

## ArevaEPRDCPEm Resource

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**From:** Pederson Ronda M (AREVA NP INC) [Ronda.Pederson@areva.com]  
**Sent:** Wednesday, February 04, 2009 2:34 PM  
**To:** Getachew Tesfaye  
**Cc:** BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); PANNELL George L (AREVA NP INC)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 56, Supplement 2  
**Attachments:** RAI 56 Supplement 2 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. (AREVA NP) submitted Response to RAI No. 56, Supplement 1 on January 14, 2009 to address 14 of the 45 questions. The attached file, "RAI 56 Supplement 2 Response US EPR DC.pdf" provides technically correct and complete responses to 5 of the remaining 31 questions, as committed.

The following table indicates the respective pages in the response document, "RAI 56 Supplement 2 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 56 — 07.09-29	2	3
RAI 56 — 07.09-34	4	6
RAI 56 — 07.09-36	7	9
RAI 56 — 07.09-37	10	12
RAI 56 — 07.09-44	13	14

The schedule for technically correct and complete responses to the remaining 26 questions is unchanged and provided below:

Question #	Response Date
RAI 56 - 07.09-2	March 31, 2009
RAI 56 - 07.09-3	March 31, 2009
RAI 56 - 07.09-4	March 31, 2009
RAI 56 - 07.09-6	March 31, 2009
RAI 56 - 07.09-8	March 3, 2009
RAI 56 - 07.09-9	March 31, 2009
RAI 56 - 07.09-10	March 31, 2009
RAI 56 - 07.09-13	March 3, 2009
RAI 56 - 07.09-14	March 31, 2009
RAI 56 - 07.09-15	March 3, 2009
RAI 56 - 07.09-16	March 3, 2009
RAI 56 - 07.09-18	March 3, 2009
RAI 56 - 07.09-20	March 3, 2009
RAI 56 - 07.09-21	March 3, 2009
RAI 56 - 07.09-22	March 3, 2009
RAI 56 - 07.09-23	March 31, 2009
RAI 56 - 07.09-24	March 3, 2009
RAI 56 - 07.09-26	March 31, 2009
RAI 56 - 07.09-27	March 31, 2009
RAI 56 - 07.09-31	March 31, 2009
RAI 56 - 07.09-38	March 3, 2009
RAI 56 - 07.09-39	March 31, 2009
RAI 56 - 07.09-40	March 31, 2009
RAI 56 - 07.09-41	March 31, 2009
RAI 56 - 07.09-42	March 31, 2009
RAI 56 - 07.09-43	March 31, 2009

Sincerely,

*Ronda Pederson*

[ronda.pederson@areva.com](mailto:ronda.pederson@areva.com)

Licensing Manager, U.S. EPR Design Certification

**AREVA NP Inc.**

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**From:** Pederson Ronda M (AREVA NP INC)

**Sent:** Wednesday, January 14, 2009 1:26 PM

**To:** 'Getachew Tesfaye'

**Cc:** PANNELL George L (AREVA NP INC); DELANO Karen V (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 56, Supplement 1

Getachew,

The attached file, "RAI 56 Supplement 1 Response US EPR DC.pdf," provides technically correct and complete responses to 14 of the 45 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 56 Question 07.09-7.

The following table indicates the respective page(s) in the response document, "RAI 56 Supplement 1 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 56 - 07.09-1	2	3
RAI 56 - 07.09-5	4	4
RAI 56 - 07.09-7	5	7
RAI 56 - 07.09-11	7	8
RAI 56 - 07.09-12	9	9
RAI 56 - 07.09-17	10	13
RAI 56 - 07.09-19	14	14
RAI 56 - 07.09-25	15	16
RAI 56 - 07.09-28	17	18
RAI 56 - 07.09-30	19	19
RAI 56 - 07.09-32	20	20
RAI 56 - 07.09-33	21	22
RAI 56 - 07.09-35	23	23
RAI 56 - 07.09-45	24	24

The schedule for technically correct and complete responses to the remaining 31 questions is unchanged and provided below:

Question #	Response Date
RAI 56 - 07.09-2	March 31, 2009

RAI 56 - 07.09-3	March 31, 2009
RAI 56 - 07.09-4	March 31, 2009
RAI 56 - 07.09-6	March 31, 2009
RAI 56 - 07.09-8	March 3, 2009
RAI 56 - 07.09-9	March 31, 2009
RAI 56 - 07.09-10	March 31, 2009
RAI 56 - 07.09-13	March 3, 2009
RAI 56 - 07.09-14	March 31, 2009
RAI 56 - 07.09-15	March 3, 2009
RAI 56 - 07.09-16	March 3, 2009
RAI 56 - 07.09-18	March 3, 2009
RAI 56 - 07.09-20	March 3, 2009
RAI 56 - 07.09-21	March 3, 2009
RAI 56 - 07.09-22	March 3, 2009
RAI 56 - 07.09-23	March 31, 2009
RAI 56 - 07.09-24	March 3, 2009
RAI 56 - 07.09-26	March 31, 2009
RAI 56 - 07.09-27	March 31, 2009
RAI 56 - 07.09-29	March 3, 2009
RAI 56 - 07.09-31	March 31, 2009
RAI 56 - 07.09-34	March 3, 2009
RAI 56 - 07.09-36	March 3, 2009
RAI 56 - 07.09-37	March 3, 2009
RAI 56 - 07.09-38	March 3, 2009
RAI 56 - 07.09-39	March 31, 2009
RAI 56 - 07.09-40	March 31, 2009
RAI 56 - 07.09-41	March 31, 2009
RAI 56 - 07.09-42	March 31, 2009
RAI 56 - 07.09-43	March 31, 2009
RAI 56 - 07.09-44	March 3, 2009

Sincerely,

*Ronda Pederson*

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**From:** Pederson Ronda M (AREVA NP INC)

**Sent:** Wednesday, November 26, 2008 3:18 PM

**To:** 'Getachew Tesfaye'

**Cc:** PANNELL George L (AREVA NP INC); DELANO Karen V (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 56, FSAR Ch 7, Revised Schedule

Getachew,

On October 10, 2008, AREVA NP provided a schedule for responding to the 45 questions in NRC's RAI No. 56. On October 22, 2008, a public meeting was held between AREVA NP Inc. and the NRC to discuss the U.S. EPR FSAR Chapter 7 and RAI No.'s 56 through 61.

A revised schedule for a technically correct and complete response to each of the 45 questions of RAI No. 56 is provided below.

<b>Question #</b>	<b>Response Date</b>
RAI 56 - 07.09-1	January 15, 2009
RAI 56 - 07.09-2	March 31, 2009
RAI 56 - 07.09-3	March 31, 2009
RAI 56 - 07.09-4	March 31, 2009
RAI 56 - 07.09-5	January 15, 2009
RAI 56 - 07.09-6	March 31, 2009
RAI 56 - 07.09-7	January 15, 2009
RAI 56 - 07.09-8	March 3, 2009
RAI 56 - 07.09-9	March 31, 2009
RAI 56 - 07.09-10	March 31, 2009
RAI 56 - 07.09-11	January 15, 2009
RAI 56 - 07.09-12	January 15, 2009
RAI 56 - 07.09-13	March 3, 2009
RAI 56 - 07.09-14	March 31, 2009
RAI 56 - 07.09-15	March 3, 2009
RAI 56 - 07.09-16	March 3, 2009
RAI 56 - 07.09-17	January 15, 2009
RAI 56 - 07.09-18	March 3, 2009
RAI 56 - 07.09-19	January 15, 2009
RAI 56 - 07.09-20	March 3, 2009
RAI 56 - 07.09-21	March 3, 2009
RAI 56 - 07.09-22	March 3, 2009
RAI 56 - 07.09-23	March 31, 2009
RAI 56 - 07.09-24	March 3, 2009
RAI 56 - 07.09-25	January 15, 2009
RAI 56 - 07.09-26	March 31, 2009
RAI 56 - 07.09-27	March 31, 2009
RAI 56 - 07.09-28	January 15, 2009
RAI 56 - 07.09-29	March 3, 2009
RAI 56 - 07.09-30	January 15, 2009
RAI 56 - 07.09-31	March 31, 2009
RAI 56 - 07.09-32	January 15, 2009
RAI 56 - 07.09-33	January 15, 2009
RAI 56 - 07.09-34	March 3, 2009
RAI 56 - 07.09-35	January 15, 2009
RAI 56 - 07.09-36	March 3, 2009
RAI 56 - 07.09-37	March 3, 2009
RAI 56 - 07.09-38	March 3, 2009
RAI 56 - 07.09-39	March 31, 2009
RAI 56 - 07.09-40	March 31, 2009
RAI 56 - 07.09-41	March 31, 2009
RAI 56 - 07.09-42	March 31, 2009
RAI 56 - 07.09-43	March 31, 2009

RAI 56 - 07.09-44	March 3, 2009
RAI 56 - 07.09-45	January 15, 2009

Sincerely,

*Ronda Pederson*

[ronda.pederson@areva.com](mailto:ronda.pederson@areva.com)

Licensing Manager, U.S. EPR(TM) Design Certification

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**From:** Pederson Ronda M (AREVA NP INC)

**Sent:** Friday, October 10, 2008 6:50 PM

**To:** 'Getachew Tesfaye'

**Cc:** DELANO Karen V (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); PANNELL George L (AREVA NP INC); DUNCAN Leslie E (AREVA NP INC); WELLS Russell D (AREVA NP INC)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 56 (942), FSAR Ch7

Getachew,

The attached file, "RAI 56 Response US EPR DC.pdf" provides an interim response to each of the 45 questions.

A complete answer is not provided for 45 of the 45 questions.

A complete response to each of the questions will be provided by December 1, 2008.

Sincerely,

*Ronda Pederson*

[ronda.pederson@areva.com](mailto:ronda.pederson@areva.com)

Licensing Manager, U.S. EPR Design Certification

New Plants Deployment

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**From:** Getachew Tesfaye [<mailto:Getachew.Tesfaye@nrc.gov>]

**Sent:** Friday, September 12, 2008 5:44 PM

**To:** ZZ-DL-A-USEPR-DL

**Cc:** Deanna Zhang; Terry Jackson; Michael Canova; Joseph Colaccino; John Rycyna; Mario Gareri

**Subject:** U.S. EPR Design Certification Application RAI No. 56 (942), FSAR Ch7

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on August 26, 2008, and on September 5, 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:** 198

**Mail Envelope Properties** (5CEC4184E98FFE49A383961FAD402D31A65CB1)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 56, Supplement 2  
**Sent Date:** 2/4/2009 2:33:59 PM  
**Received Date:** 2/4/2009 2:34:02 PM  
**From:** Pederson Ronda M (AREVA NP INC)  
**Created By:** Ronda.Pederson@areva.com

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Tracking Status: None

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<b>Files</b>	<b>Size</b>	<b>Date &amp; Time</b>
MESSAGE	10262	2/4/2009 2:34:02 PM
RAI 56 Supplement 2 Response US EPR DC.pdf		94362

**Options**

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

**Response to**

**Request for Additional Information No. 56, Supplement 2**

**9/12/2008**

**U. S. EPR Standard Design Certification**

**AREVA NP Inc.**

**Docket No. 52-020**

**SRP Section: 07.09 - Data Communication Systems**

**Application Section: Section 7.1**

**ICE1 Branch**

**Question 07.09-29:**

Demonstrate how the Process Information and Control System (PICS) data communications system and the plant data network are designed to meet 10 CFR Part 50, Appendix A, General Design Criteria (GDC) 13. Specifically, provide information to demonstrate that the network performance, network segregations, communications protocols implemented, data rate, and bandwidth capacity support the control systems functions required by GDC 13.

GDC 13, "Instrumentation and Control" requires instrumentation to be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety, including those variables and systems that can affect the fission process, the integrity of the reactor core, the reactor coolant pressure boundary, and the containment and its associated systems. Appropriate controls shall be provided to maintain these variables and systems within prescribed operating ranges.

DC FSAR, Tier 2, Section 7.1.1.3.2, provides a description of the data communications that occur within the PICS. This section states that Processing Units (PU)s are provided for data exchange between the plant data network and the terminal data network. The PUs perform functions such as data message validation, short term data storage, and alarm management. The PUs transmit data to and receive data from the Level 1 instrumentation and control systems via the plant data network. The PUs, operator workstations, POP, and XUs exchange data via the terminal data network. These networks implement periodic communications and message validation for robust data communications. The staff finds that additional information is required regarding the data communications systems within the PICS and the plant data network to demonstrate that the control system functions required by GDC 13 can be adequately completed. Specifically, provide information to demonstrate that the network performance, network segregations, communications protocols implemented, data rate, and bandwidth capacity support the control systems functions required by GDC 13. In addition, provide information regarding what specific periodic communications occur, and how message validation is implemented.

**Response to Question 07.09-29:**

The Response to RAI 57, Question 07.07-17 describes how the functional descriptions in U.S. EPR FSAR Tier 2, Section 7.7 and the system descriptions in U.S. EPR FSAR Tier 2, Section 7.1 support GDC 13.

The Response to Question 07.09-36 addresses the review of data rates, bandwidth capacity, and data precision for non-safety-related data communications systems (DCSs).

In addition, this question requests design details regarding network performance, network segregations, communications protocol, specific periodic communications, and message validation. This detailed information is dependent on:

- Selection of a computer platform, manufacturer, and vendor.
- Detailed application software design.
- Detailed system hardware design.

These aspects of the non-safety-related control system design are not within the scope of the U.S. EPR design certification. They will be defined on a plant-by-plant basis. This approach is supported by review guidance in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants."

NUREG-0800, Section 7.0.III, "Review Scope and Content," states:

"Regardless of the type of application under consideration, the fundamental purpose of the NRC review is to determine whether the facility and equipment, the proposed use of the equipment, the operating procedures, the processes to be performed, and other technical requirements provide reasonable assurance that the applicant/licensee will comply with the regulations of 10 CFR 1-199 (Chapter I), "Nuclear Regulatory Commission," and that public health and safety will be protected.

It is not intended that the review, audit, or inspection activities by the reviewer include a complete evaluation of all aspects of the design and implementation of the I&C system. The review scope need only be sufficient to allow the reviewer to reach the conclusion of reasonable assurance described above."

NUREG-0800, Section 7.0A.3.B, "Identification of Review Topics," states:

"The level of review depends upon the importance to safety of the system under review. Control systems receive a limited review as necessary to confirm that control system failures cannot have an adverse effect on safety system functions and will not pose frequent challenges to the safety systems."

The Response to RAI 57, Question 07.07-13 describes consideration of non-safety-related system failures in the U.S. EPR FSAR Tier 2, Chapter 15 plant safety analyses.

U.S. EPR FSAR Tier 2, Section 7.1.1.6.4 describes the measures taken to establish independence between safety-related and non-safety-related I&C systems.

**FSAR Impact:**

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

**Question 07.09-34:**

Demonstrate how data communications implemented within the Process Automation System (PAS) support the functions required by 10 CFR Part 50, Appendix A, General Design Criteria (GDC) 13 and 19. Specifically, provide information to demonstrate that the network performance, network segregations, communications protocols implemented, data rate, and bandwidth capacity support the control systems functions.

GDC 13, "Instrumentation and Control," requires instrumentation to be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety, including those variables and systems that can affect the fission process, the integrity of the reactor core, the reactor coolant pressure boundary, and the containment and its associated systems. Appropriate controls shall be provided to maintain these variables and systems within prescribed operating ranges. In addition, GDC 19, "Control Room," requires a control room to be provided from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions, including loss-of-coolant accidents. Equipment at appropriate locations outside the control room shall be provided (1) with a design capability for prompt hot shutdown of the reactor, including necessary instrumentation and controls to maintain the unit in a safe condition during hot shutdown, and (2) with a potential capability for subsequent cold shutdown of the reactor through the use of suitable procedures.

DC FSAR, Tier 2, Section 7.1.1.4.6, provides a description of the data communications within the PAS. The staff finds that additional information is required to evaluate the data communications within the PAS. Demonstrate how data communications within the PAS supports the functions required by GDC 13 and GDC 19. Specifically, provide information to demonstrate that the network performance, network segregations, communications protocols implemented, data rate, and bandwidth capacity support the control systems functions required by GDC 13 and GDC 19.

**Response to Question 07.09-34:**

The Response to RAI 57, Question 07.07-17 describes how the functional descriptions in U.S. EPR FSAR Tier 2, Section 7.7 and the system descriptions in U.S. EPR FASR Tier 2, Section 7.1 support GDC 13.

NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," Section 7.9.IV identifies the GDC 19 review finding for data communication systems (DCSs) that support control system functions (SRP 7.7). This review finding states:

"DCSs have been provided to support instruments and controls within the control room to allow actions to be taken to maintain the nuclear power unit in a safe condition during shutdown, including shutdown following an accident. Therefore, the staff concludes that the DCSs employed by the reactor control system satisfy the requirements of GDC 19."

U.S. EPR FSAR Tier 2, Section 7.4 identifies multiple scenarios for safe shutdown. In each scenario, the plant systems required and the corresponding I&C controls are identified.

In addition to the safe shutdown descriptions, the U.S. EPR FSAR also provides information regarding the overall design of the PAS. U.S. EPR FSAR Tier 2, Section 7.1.1.4.6 describes the PAS subsystem architectures, including redundancy applied to control functions, the equipment used, the data communications used, and the power supplies for the system.

The description of safe shutdown systems and the PAS design in the U.S. EPR FSAR concludes that the PAS supports instruments and controls, which allow actions to be taken to maintain the nuclear power unit in a safe condition during shutdown, including shutdown following an accident. This conclusion is consistent with the GDC 19 review finding in NUREG-0800, Section 7.7.IV.

The Response to Question 07.09-36 addresses the review of data rates, bandwidth capacity, and data precision for non-safety-related DCSs.

In addition, this question requests design details regarding network performance, network segregations, and communications protocol. This detailed information is dependent on:

- Selection of a computer platform, manufacturer, and vendor.
- Detailed application software design.
- Detailed system hardware design.

These aspects of the non-safety-related control system design are not within the scope of the U.S. EPR design certification. They will be defined on a plant-by-plant basis. This approach is supported by review guidance in NUREG-0800.

NUREG-0800, Section 7.0.III, "Review Scope and Content," states:

"Regardless of the type of application under consideration, the fundamental purpose of the NRC review is to determine whether the facility and equipment, the proposed use of the equipment, the operating procedures, the processes to be performed, and other technical requirements provide reasonable assurance that the applicant/licensee will comply with the regulations of 10 CFR 1-199 (Chapter I), "Nuclear Regulatory Commission," and that public health and safety will be protected.

It is not intended that the review, audit, or inspection activities by the reviewer include a complete evaluation of all aspects of the design and implementation of the I&C system. The review scope need only be sufficient to allow the reviewer to reach the conclusion of reasonable assurance described above."

NUREG-0800, Section 7.0A.3.B, "Identification of Review Topics," states:

"The level of review depends upon the importance to safety of the system under review. Control systems receive a limited review as necessary to confirm that control system failures cannot have an adverse effect on safety system functions and will not pose frequent challenges to the safety systems."

The Response to RAI 57, Question 07.07-13 describes consideration of non-safety-related system failures in the U.S. EPR FSAR Tier 2, Chapter 15 plant safety analyses.

U.S. EPR FSAR Tier 2, Section 7.1.1.6.4 describes the measures taken to establish independence between safety-related and non-safety-related I&C systems.

**FSAR Impact:**

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

**Question 07.09-36:**

Demonstrate how the data communications system within the Severe Accident Instrumentation and Control (SA I&C) System adequately supports the monitoring and control functions following a severe accident, as required by 10 CFR Part 50, Appendix A, General Design Criteria (GDC) 13 and 19.

GDC 13, "Instrumentation and Control" requires instrumentation to be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety, including those variables and systems that can affect the fission process, the integrity of the reactor core, the reactor coolant pressure boundary, and the containment and its associated systems. Appropriate controls shall be provided to maintain these variables and systems within prescribed operating ranges. In addition, GDC 19, "Control Room" requires a control room to be provided from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions, including loss-of-coolant accidents. Equipment at appropriate locations outside the control room shall be provided (1) with a design capability for prompt hot shutdown of the reactor, including necessary instrumentation and controls to maintain the unit in a safe condition during hot shutdown, and (2) with a potential capability for subsequent cold shutdown of the reactor through the use of suitable procedures.

DC FSAR, Tier 2, Section 7.1.1.4.4, describes the data communications within the SA I&C. The staff requires additional information to evaluate the adequacy of the data communications systems within the SA I&C to complete the monitoring and control functions required by GDC 13 and GDC 19. The SA I&C performs the functions required by GDC 13 and GDC 19 for monitoring and control of I&C systems following severe accidents. Demonstrate how data communications systems within the SA I&C are designed with adequate performance and reliability to support the monitoring and control functions required for severe accident mitigation. Provide the specific bandwidth capacity, and transmission rate for the data communications modules within the SA I&C and the plant data network, and demonstrate how the specified bandwidth capacity and transmission rate are adequate to support the monitoring and control functions required for severe accident mitigation.

**Response to Question 07.09-36:**

Based on NRC review guidance, data rates, data bandwidths, and data precision requirements do not need to be specified for non-safety-related data communication systems (DCSs) in a design certification application.

NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," Section 7.9 provides review guidance for DCSs. NUREG-0800, Section 7.9.I, "Areas of Review," states:

"The scope and depth of the review and the acceptance criteria will vary according to the importance to safety of the system that the DCS is supporting."

The remainder of NUREG-0800, Section 7.9 differentiates acceptance criteria, review procedures, and evaluation findings by safety classification of the DCS under review. The

intended level of review is not the same for a non-safety-related DCS versus a safety-related DCS.

The third bullet in NUREG-0800, Section 7.9.III, "Review Procedures" identifies performance as a major design consideration that should be emphasized in the review of a DCS. The bullet states:

"The real-time performance should be reviewed with SRP BTP 7-21. This should include verification that DCS safety system timing is deterministic or bounded. Time delays within the DCS and measurement inaccuracies introduced by the DCS should be considered when reviewing the instrumentation setpoints (refer to Regulatory Guide 1.105, Revision 3, "Setpoints for Safety-Related Instrumentation," and SRP BTP 7-12). Data rates, data bandwidths, and data precision requirements for normal and off-normal operation, including the impact of environmental extremes, should be reviewed."

This passage identifies the reasons for reviewing data rates, data bandwidths, and data precision requirements. These requirements are reviewed to assess whether the system will support time delays and setpoint selections associated with the functions performed by that system. Data rates and bandwidths affect the real-time performance of a system (i.e., introduce time delays), and data precision affects measurement inaccuracies which are included in setpoint determinations.

Therefore, data rates, data bandwidths, and data precision requirements should be reviewed for I&C systems that require specification of time delays and setpoints in a U.S. EPR application.

U.S. EPR FSAR Tier 2, Chapter 15 plant safety analyses assumes specific setpoints and response times for those I&C functions credited in the analyses. Functions performed by non-safety-related I&C systems are not included in the U.S. EPR FSAR Tier 2, Chapter 15 analyses, and requirements on setpoints and time delays for non-safety-related systems are not specified in the U.S. EPR FSAR application.

SRP 7.9.IV, "Evaluation Findings," does not mention time delays, setpoints, or measurement inaccuracies under the heading "Evaluation findings applicable to any DCS". However, the heading "Additional evaluation findings applicable to all DCSs that support protection system functions," includes the following statement:

"Setpoint analyses account for measurement inaccuracies attributable to the DCS in accordance with the guidance of Regulatory Guide 1.105, Revision 3. The staff concludes that the DCS adequately supports RTS and ESFAS functions as necessary to sense accident conditions and anticipated operational occurrences in order to initiate protective actions consistent with the accident analysis presented in Chapter 15 of the SAR and evaluated in the SER."

This passage limits the need for review of the setpoints and response times to the systems performing the Reactor Trip System (RTS) and engineered safety feature actuation system (ESFAS) functions credited in the U.S. EPR FSAR Tier 2, Chapter 15 analyses.

AREVA NP will not submit detailed information about non-safety-related networks during the U.S. EPR design certification review. This approach is supported by review guidance in NUREG-0800.

NUREG 0800 Section 7.0.III, "Review Scope and Content," states:

"Regardless of the type of application under consideration, the fundamental purpose of the NRC review is to determine whether the facility and equipment, the proposed use of the equipment, the operating procedures, the processes to be performed, and other technical requirements provide reasonable assurance that the applicant/licensee will comply with the regulations of 10 CFR 1–199 (Chapter I), "Nuclear Regulatory Commission," and that public health and safety will be protected.

It is not intended that the review, audit, or inspection activities by the reviewer include a complete evaluation of all aspects of the design and implementation of the I&C system. The review scope need only be sufficient to allow the reviewer to reach the conclusion of reasonable assurance described above."

NUREG-0800 Section 7.0A.3.B, "Identification of Review Topics," states:

"The level of review depends upon the importance to safety of the system under review. Control systems receive a limited review as necessary to confirm that control system failures cannot have an adverse effect on safety system functions and will not pose frequent challenges to the safety systems."

These NUREG-0800 passages indicate that the review of non-safety-related control systems will focus on the effects of control system failure on plant safety and independence of safety-related systems from the control systems.

The Response to RAI 57, Question 07.07-13 describes consideration of non-safety-related system failures in U.S. EPR FSAR Tier 2, Chapter 15 plant safety analyses.

U.S. EPR FSAR Tier 2, Section 7.1.1.6.4 describes the measures taken to establish independence between safety-related and non-safety-related I&C systems.

Review of data rates, data bandwidths, and data precision requirements is necessary to assess setpoints and response times. However, setpoints and response times for non-safety-related systems are not needed to support the conclusions of the plant safety analyses. Therefore, data rates, data bandwidths, and data precision requirements of non-safety-related I&C systems are not provided for the U.S. EPR FSAR.

**FSAR Impact:**

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

**Question 07.09-37:**

Describe the performance and reliability of the data communications system implemented in the Reactor Control, Surveillance, and Limitation (RCSL) to complete the necessary functions required by 10 CFR Part 50, Appendix A, General Design Criteria (GDC) 13 and 19.

GDC 13 "Instrumentation and Control" requires instrumentation to be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety, including those variables and systems that can affect the fission process, the integrity of the reactor core, the reactor coolant pressure boundary, and the containment and its associated systems. GDC 19, "Control Room" requires a control room to be provided from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions, including loss-of-coolant accidents. 10 CFR 52.47(a)(9) requires, in part, that for applications for light-water cooled nuclear power plants, an evaluation of the standard plant design against the Standard Review Plan (SRP) revision in effect 6 months before the docket date of the application. The evaluation required by this section shall include an identification and description of all differences in design features, analytical techniques, and procedural measures proposed for a facility and those corresponding features, techniques, and measures given in the SRP acceptance criteria. Where such a difference exists, the evaluation shall discuss how the alternative proposed provides an acceptable method of complying with those rules or regulations of commission, or portions thereof that underlie the corresponding SRP acceptance criteria. SRP, Section 7.9, "Data Communications Systems (DCS)," provides the performance and reliability design considerations. This includes verification that the protocol selected for the DCS meets the performance requirements of all supported systems. Data rates, data bandwidths, and data precision requirements for normal and off-normal operation, including the impact of environmental extremes should be considered. There should be sufficient excess capacity margins to accommodate likely future increases in DCS demands or software or hardware changes to equipment attached to the DCS. The potential hazards to the DCS and from the DCS should be reviewed.

DC FSAR Tier 2, Section 7.1.1.4.5, provides a description of data communications within the RCSL system. This description does not include the performance and reliability of the data communications components used in the RCSL to perform the functions required by GDC 13 and GDC 19. Unneeded, but included, DCS functions should be reviewed to assure that they cannot be inadvertently activated and thereby prevent operation of the safety functions. Demonstrate that the performance and reliability guidance provided in SRP Section 7.9 has been addressed in the design of data communications components and links implemented in the RCSL to the degree necessary to support the required functions of GDC 13 and GDC 19.

**Response to Question 07.09-37:**

NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," Section 7.7.III identifies specific topics for review of control systems. The first bulleted item in this section, "Design bases," is the review topic relevant to RCSL compliance with GDC 13. This item states:

“The review should confirm that the control systems include the necessary features for manual and automatic control of process variables within prescribed normal operating limits.”

U.S. EPR FSAR Tier 2, Section 7.7.2.1 describes individual control functions performed by the RCSL that control variables as described in GDC 13. These functional descriptions address:

- The purpose of the control function.
- The plant modes of operation in which the function is utilized.
- The primary variable to be controlled by the function.
- The input variables used in the control function.
- The plant actuators controlled by the function to affect the primary control variable.
- The relationship of the control band to other setpoints for the same variable.
- Plant conditions causing the control function to be bypassed.
- Functionality of the automatic portions of the control.
- Functionality of the manual portions of the control.
- The conditions that determine the value of the setpoint for variable control setpoints.

The descriptions of these control functions conclude that the RCSL includes the functional features necessary to control process variables within their normal operating limits.

NUREG-0800, Section 7.9.IV identifies the review finding regarding GDC 19 for DCSs that support control system functions (SRP 7.7). This review finding states:

“DCSs have been provided to support instruments and controls within the control room to allow actions to be taken to maintain the nuclear power unit in a safe condition during shutdown, including shutdown following an accident. Therefore, the staff concludes that the DCSs employed by the reactor control system satisfy the requirements of GDC 19.”

U.S. EPR FSAR Tier 2, Section 7.4 identifies multiple scenarios for safe shutdown. For each scenario, the plant systems required and the corresponding I&C controls are identified.

The safe shutdown functionality information concludes that the U.S. EPR I&C architecture supports instruments and controls, which allow actions to be taken to maintain the nuclear power unit in a safe condition during shutdown, including shutdown following an accident. This conclusion is consistent with the GDC 19 review finding in NUREG-0800 Section 7.7.IV.

In addition to the functional descriptions provided in U.S. EPR FSAR Tier 2, Section 7.4 and Section 7.7, information is also provided regarding the overall design of the RCSL system.

U.S. EPR FSAR Tier 2, Section 7.1.1.4.5 describes the RCSL system architecture, including redundancy applied to control functions, the equipment used, the communications used, and the power supplies for the system.

The Response to Question 07.09-36 addresses the review of data rates, bandwidth capacity, and data precision for non-safety-related DCSs.

**FSAR Impact:**

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

**Question 07.09-44:**

Describe the performance and reliability of the data communications system implemented in the Turbine Generator Instrumentation and Control (TG I&C) system to complete the necessary functions required by 10 CFR Part 50, Appendix A, General Design Criteria (GDC) 13 and 19.

GDC 13 "Instrumentation and Control" requires instrumentation to be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety, including those variables and systems that can affect the fission process, the integrity of the reactor core, the reactor coolant pressure boundary, and the containment and its associated systems. GDC 19, "Control Room" requires a control room to be provided from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions, including loss-of-coolant accidents. 10 CFR 52.47(a)(9) requires, in part, that for applications for light-water cooled nuclear power plants, an evaluation of the standard plant design against the Standard Review Plan (SRP) revision in effect 6 months before the docket date of the application. The evaluation required by this section shall include an identification and description of all differences in design features, analytical techniques, and procedural measures proposed for a facility and those corresponding features, techniques, and measures given in the SRP acceptance criteria. Where such a difference exists, the evaluation shall discuss how the alternative proposed provides an acceptable method of complying with those rules or regulations of commission, or portions thereof that underlie the corresponding SRP acceptance criteria. SRP, Section 7.9, "Data Communications Systems (DCS)," provides the performance and reliability design considerations. This includes verification that the protocol selected for the DCS meets the performance requirements of all supported systems. Data rates, data bandwidths, and data precision requirements for normal and off-normal operation, including the impact of environmental extremes should be considered. There should be sufficient excess capacity margins to accommodate likely future increases in DCS demands or software or hardware changes to equipment attached to the DCS. The potential hazards to the DCS and from the DCS should be reviewed. Unneeded but included DCS functions should be reviewed to assure that they cannot be inadvertently activated and thereby prevent operation of the safety functions.

DC FSAR, Tier 2, Section 10.2.2.5, provides a description of data communications within the TG I&C System. This description does not include the performance and reliability of the data communications components used in the TG I&C system to perform the functions required by GDC 13 and GDC 19. Demonstrate that the performance and reliability guidance provided in SRP Section 7.9 has been addressed in the design of data communications components and links implemented in the TC I&C system to the degree necessary to support the required functions of GDC 13 and GDC 19.

**Response to Question 07.09-44:**

NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," Section 7.7.III identifies specific topics for review of control systems. The first bulleted item in this section, "Design bases," is the review topic relevant to TG I&C compliance with GDC 13. This item states:

“The review should confirm that the control systems include the necessary features for manual and automatic control of process variables within prescribed normal operating limits.”

U.S. EPR FSAR Tier 2, Section 10.2.2.5 through Section 10.2.2.10 describe individual control functions performed by the TG I&C that control variables described in GDC 13.

The descriptions of these control functions conclude that the TG I&C includes the functional features necessary to control process variables within their normal operating limits.

NUREG-0800, Section 7.9.IV identifies the review finding relative to GDC 19 for DCSs that support control system functions (SRP 7.7). This review finding states:

“DCSs have been provided to support instruments and controls within the control room to allow actions to be taken to maintain the nuclear power unit in a safe condition during shutdown, including shutdown following an accident. Therefore, the staff concludes that the DCSs employed by the reactor control system satisfy the requirements of GDC 19.”

U.S. EPR FSAR Tier 2, Section 7.4 identifies multiple scenarios for safe shutdown. For each scenario, the plant systems required and the corresponding I&C controls are identified.

The safe shutdown functionality information concludes that the U.S. EPR I&C architecture supports instruments and controls, which allow actions to be taken to maintain the nuclear power unit in a safe condition during shutdown, including shutdown following an accident. This conclusion is consistent with the GDC 19 review finding in NUREG-0800 Section 7.7.IV.

The Response to Question 07.09-36 addresses the review of data rates, bandwidth capacity, and data precision for non-safety-related DCSs.

**FSAR Impact:**

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