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U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

U.S. EPR FSAR Tier 1 Changes Related to ANP-10309P, "U.S. EPR Digital Protection System Technical Report"

Ref. 1: Letter, Ronnie L. Gardner (AREVA NP Inc.) to Document Control Desk (NRC), "Withdrawal of ANP-10281P, 'U.S. EPR Digital Protection System Topical Report' (TAC No. MD 4977)," NRC:09:090, September 4, 2009.

Ref. 2: Letter, Sandra M. Sloan (AREVA NP Inc.) to Document Control Desk (NRC), "Conversion of ANP-10281P, 'U.S. EPR Digital Protection System Topical Report' to ANP-10309P, 'U.S. EPR Digital Protection System Technical Report'," NRC:09:119, November 24, 2009.

AREVA NP Inc. (AREVA NP) committed in Reference 1 to convert ANP-10281P, "U.S. EPR Digital Protection System Topical Report" to a technical report and submit the converted report by November 24, 2009. AREVA NP provided the converted technical report to the NRC in Reference 2. Also enclosed in Reference 2 were the corresponding changes to U.S. EPR Final Safety Analysis Report (FSAR) Tier 2.

In addition, in Reference 2, AREVA NP committed to provide the corresponding changes to U.S. EPR FSAR Tier 1 by December 4, 2009. Enclosed with this letter are the corresponding changes to U.S. EPR FSAR Tier 1 and the associated information in U.S. EPR FSAR Tier 2, Section 14.3.

If you have any questions related to this submittal, please contact me by telephone at 434-832-2369 or by e-mail at sandra.sloan@areva.com.

Sincerely,

Sandra M. Sloan

Sandra M. Sloan, Manager
New Plants Regulatory Affairs
AREVA NP Inc.

Enclosures

cc: G. Tesfaye
Docket 52-020

DO77
NRO

U.S. EPR Final Safety Analysis Report Markups

Table 14.3-8—ITAAC Screening Summary
Sheet 5 of 6

Structure, System, or Component	System KKS Code(s)	Within Scope of Tier 1	Has ITAAC in Tier 1	Tier 1 Section
Non-Class 1E Uninterruptible Power Supply	BRJ, BRU02, BTA, BTL, BUB, BUL, BUM, BRZ, BUZ	X	X	2.5.7
Normal Power Supply System	BB, BF, BH	X	X	2.5.10
Preferred (Offsite) Power Supply System	ACD	X	X	2.5.5
Power Transmission (Main Generator) System	BA, CHA, MK	X	X	2.5.6
Switchyard	ACA			
Instrumentation and Control Systems				
Boron Concentration Measurement System	CPF	X	X	2.4.11
Communication System	CY	X	X	2.4.21
Control Rod Drive Control System	BU	X	X	2.4.13
Diverse Actuation System	CR	X	X	2.4.24
Excore Instrumentation System	JKT	X	X	2.4.17
Fatigue Monitoring System	JYL	X		2.4.18
Hydrogen Monitoring System	JMU	X	X	2.4.14
Incore Instrumentation System	JKS, JKQ, CNN	X	X	2.4.19
Leakage Detection System	JYH	X	X	2.4.8
Loose Parts Monitoring System	JYF	X		2.4.20
Main Control Room (Human Factors)	CW	X	X	3.4
Plant Fire Alarm System	CYE	X	X	2.4.6
Plant Physical Protection Systems	CZ			
Priority and Actuator Control System	DS, CLE6, CLF6, CLG6, CLH6	X	X	2.4.5
Process Automation System	CR	X	~~X~~	2.4.9
Process Information and Control System	CRU	X	X	2.4.10
Protection System	JR, CLE, CLF, CLG, CLH	X	X	2.4.1
Radiation Monitoring System	JYK	X	X	2.4.22

2.4.9 Process Automation System

There are no Tier 1 entries for this system.

~~**1.0Description**~~.

~~The process automation system (PAS) is a non-safety related digital I&C system. The PAS consists of the following four subsystems:~~

- ~~Nuclear island subsystem.~~
- ~~Turbine island subsystem.~~
- ~~Balance of plant subsystem.~~
- ~~Diverse actuation subsystem (DAS).~~

~~The PAS provides the following non-safety related functions:~~

- ~~Automatic anticipated transient without scram (ATWS) mitigation functions.~~
- ~~Automatic software common cause failure mitigation functions.~~
- ~~Automatic station blackout (SBO) mitigation functions.~~
- ~~Automatic primary plant limitation functions.~~
- ~~Automatic operational functions.~~
- ~~Manual control of non-safety functions.~~
- ~~Processing of information for display.~~

~~**2.0Arrangement**~~

~~2.1The location of the PAS equipment is as listed in Table 2.4.9-1—Process Automation System Equipment.~~

~~2.2Physical separation exists between the four divisions of the DAS.~~

~~**3.0I&C Design Features, Displays and Controls**~~

~~3.1The DAS hardware and software are developed using a design process composed of five life cycle phases with each phase having design outputs which must conform to the requirements of that phase. The five life cycle phases are the following:~~

~~1.Basic design phase.~~

~~1.Detailed design phase.~~

2.Manufacturing phase.

3.Testing phase.

4.Installation and commissioning phase.

3.2The system hardware and system software in the PAS is diverse from the system hardware and system software in the protection system (PS) and the safety automation system (SAS).

3.3The DAS generates signals for automatic actuation of the functions identified in Table 2.4.9-2—Functions Automatically Actuated by the DAS.

4.0System Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.4.9-3 lists the PAS ITAAC.

~~Table 2.4.9-1—Process Automation System Equipment~~

~~Description~~	~~Location~~
~~PAS Units Division 1~~	~~Safeguard Building 1~~
~~PAS Units Division 2~~	~~Safeguard Building 2~~
~~PAS Units Division 3~~	~~Safeguard Building 3~~
~~PAS Units Division 4~~	~~Safeguard Building 4~~
~~PAS Units~~	~~Turbine Switchgear Building~~

~~Table 2.4.9-2—Functions Automatically Actuated by the DAS~~

~~Reactor trip on high steam generator (SG) pressure~~
~~Reactor trip on low SG pressure~~
~~Reactor trip on low SG level~~
~~Reactor trip on low reactor coolant system (RCS) flow (two loops)~~
~~Reactor trip on low-low RCS flow (one loop)~~
~~Reactor trip on high neutron flux (power range)~~
~~Reactor trip on low hot leg pressure~~
~~Reactor trip on high pressurizer (PZR) pressure~~
~~Reactor trip on safety injection system (SIS) actuation~~
~~Reactor trip on emergency feedwater system (EFWS) actuation~~
~~Turbine trip on reactor trip~~
~~EFWS actuation on low SG level~~
~~SIS actuation on low PZR pressure~~
~~Main steam isolation on low SG pressure~~
~~Containment isolation on SIS actuation~~

Table 2.4.9-3—Process Automation System ITAAC
(2 Sheets)

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
2.1	The PAS equipment is located as listed in Table 2.4.9-1.	Inspections will be performed of the location of the PAS equipment.	The equipment listed in Table 2.4.9-1 is located as listed in Table 2.4.9-1.
2.2	Physical separation exists between the four divisions of the DAS.	Inspections will be performed to verify that the divisions of the DAS are located in separate buildings.	The four divisions of the DAS are located in separate safeguard buildings.
3.1	The DAS hardware and software are developed using a design process composed of five life cycle phases with each phase having design outputs which must conform to the requirements of that phase. The five life cycle phases are the following: 1) Basic design phase. 2) Detailed design phase. 3) Manufacturing phase. 4) Testing phase. 5) Installation and commissioning phase.	a. Inspections will be performed to verify that the DAS basic design phase process has design outputs. b. Inspections will be performed to verify that the DAS detailed design phase process has design outputs. c. Inspections will be performed to verify that the DAS manufacturing phase process has design outputs. d. Inspections will be performed to verify that the DAS testing phase process has design outputs. e. Inspections will be performed to verify that the DAS installation and commissioning phase process has design outputs.	a. A report exists and provides the design outputs for the basic design phase of the DAS hardware and software design process. b. A report exists and provides the design outputs for the detailed design phase of the DAS hardware and software design process. c. A report exists and provides the design outputs for the manufacturing phase of the DAS hardware and software design process. d. A report exists and provides the design outputs for the testing phase of the DAS hardware and software design process. e. A report exists and provides the design outputs for the installation and commissioning phase of the DAS hardware and software design process.
3.2	The system hardware and system software in the PAS is diverse from the system hardware and system software in the protection system (PS) and safety automation system (SAS)	An analysis will be performed to demonstrate that the system hardware and system software in the PAS is diverse from the system hardware and system software in the PS and SAS.	A report exists and concludes that the system hardware and system software in the PAS is diverse from the system hardware and system software in the PS and SAS.

~~Table 2.4.9-3—Process Automation System ITAAC~~
~~(2 Sheets)~~

~~Commitment Wording~~		~~Inspections, Tests, Analyses~~	~~Acceptance Criteria~~
~~3.3~~	~~The DAS generates signals for automatic actuation of the functions identified in Table 2.4.9-2.~~	~~Tests will be performed on the as-built DAS using test signals.~~	~~The DAS generates signals for automatic actuation of the functions identified in Table 2.4.9-2.~~

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2.4.24 Diverse Actuation System

1.0 Description

The diverse actuation system (DAS) is a non-safety related digital I&C system.

The DAS provides the following non-safety related functions:

- Automatic anticipated transient without scram (ATWS) mitigation functions.
- Automatic PS software common cause failure mitigation functions.
- Automatic station blackout (SBO) mitigation functions.

2.0 Arrangement

2.1 The DAS equipment is located as listed in Table 2.4.24-1—Diverse Actuation System Equipment.

2.2 Physical separation exists between the four divisions of the DAS.

3.0 I&C Design Features, Displays and Controls

3.1 The DAS hardware and software are developed using a design process composed of five life cycle phases with each phase having design outputs which must conform to the requirements of that phase. The five life cycle phases are the following:

1. Basic design phase.
2. Detailed design phase.
3. Manufacturing phase.
4. Testing phase.
5. Installation and commissioning phase.

3.2 The system hardware and system software in the DAS are diverse from the system hardware and system software in the protection system (PS).

3.3 The DAS generates signals for automatic actuation of the functions identified in Table 2.4.24-2—Functions Automatically Actuated by the DAS.

3.4 The DAS allows manual, system-level actuation of the functions listed in Table 2.4.24-3.

4.0 System Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.4.24-4 lists the DAS ITAAC.

Table 2.4.24-1—Diverse Actuation System Equipment

Description	Location
DAS Units Division 1	Safeguard Building 1
DAS Units Division 2	Safeguard Building 2
DAS Units Division 3	Safeguard Building 3
DAS Units Division 4	Safeguard Building 4

Table 2.4.24-2—Functions Automatically Actuated by the DAS

Reactor trip on low SG pressure
Reactor trip on low SG level
Reactor trip on low reactor coolant system (RCS) flow (two loops)
Reactor trip on low-low RCS flow (one loop)
Reactor trip on high neutron flux (power range)
Reactor trip on low hot leg pressure
Reactor trip on high pressurizer (PZR) pressure
Turbine trip on reactor trip
EFWS actuation on low SG level
SIS actuation on low PZR pressure
Main steam isolation on low SG pressure
Containment isolation on high containment activity
MFWS isolation on low SG pressure
MFWS isolation on high SG level
Operating of containment H_2 mixing dampers on high containment pressure

Table 2.4.24-3—Functions Manually Actuated through the DAS

Safety Injection System Actuation
Containment Isolation (stage 1)
EFW Actuation

Table 2.4.24-4—Diverse Actuation System ITAAC
(2 Sheets)

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
2.1	The DAS equipment is located as listed in Table 2.4.24-1.	Inspections will be performed of the location of the DAS equipment.	The equipment listed in Table 2.4.24-1 is located as listed in Table 2.4.24-1.
2.2	Physical separation exists between the four divisions of the DAS.	Inspections will be performed to verify that the divisions of the DAS are located in separate buildings.	The four divisions of the DAS are located in separate safeguard buildings.
3.1	The DAS hardware and software are developed using a design process composed of five life cycle phases with each phase having design outputs which must conform to the requirements of that phase. The five life cycle phases are the following: 1) Basic design phase. 2) Detailed design phase. 3) Manufacturing phase. 4) Testing phase. 5) Installation and commissioning phase.	a. Inspections will be performed to verify that the DAS basic design phase process has design outputs. b. Inspections will be performed to verify that the DAS detailed design phase process has design outputs. c. Inspections will be performed to verify that the DAS manufacturing phase process has design outputs. d. Inspections will be performed to verify that the DAS testing phase process has design outputs. e. Inspections will be performed to verify that the DAS installation and commissioning phase process has design outputs.	a. A report exists and provides the design outputs for the basic design phase of the DAS hardware and software design process. b. A report exists and provides the design outputs for the detailed design phase of the DAS hardware and software design process. c. A report exists and provides the design outputs for the manufacturing phase of the DAS hardware and software design process. d. A report exists and provides the design outputs for the testing phase of the DAS hardware and software design process. e. A report exists and provides the design outputs for the installation and commissioning phase of the DAS hardware and software design process.
3.2	The system hardware and system software in the DAS are diverse from the system hardware and system software in the protection system (PS).	An analysis will be performed to demonstrate that the system hardware and system software in the DAS are diverse from the system hardware and system software in the PS.	A report exists and concludes that the system hardware and system software in the DAS are diverse from the system hardware and system software in the PS.

Table 2.4.24-4—Diverse Actuation System ITAAC
(2 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
3.3	The DAS generates signals for automatic actuation of the functions identified in Table 2.4.24-2.	Tests will be performed on the as-built DAS using test signals.	The DAS generates signals for automatic actuation of the functions identified in Table 2.4.24-2.
3.4	The DAS allows manual, system-level actuation of the functions listed in Table 2.4.24-3.	Tests will be performed on the as-built DAS using test signals.	The DAS generates signals allowing manual actuation of the functions identified in Table 2.4.24-3.

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