



Westinghouse Electric Company
Nuclear Power Plants
1000 Westinghouse Drive
Cranberry Township, Pennsylvania 16066
USA

Document Control Desk
U S Nuclear Regulatory Commission
Two White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Direct tel: 412-374-2035
Direct fax: 724-940-8505
e-mail: ziesinrf@westinghouse.com

Your ref: Docket No. 52-006
Our ref: DCP_NRC_003132

February 17, 2011

Subject: Submittal of AP1000 DCD Page Revisions and Associated Confirmatory Item Responses

Westinghouse is submitting responses to the below listed Confirmatory Items related to the Advanced Final Safety Evaluation for Chapter 7, "Instrumentation and Controls," of NUREG-1793, Supplement 2 - AP1000 Design Certification Amendment. In addition, attached are the related DCD page changes impacted by these CIs.

This information is submitted in support of the AP1000 Design Certification Amendment Application (Docket No. 52-006). The information included in these responses is generic and is expected to apply to all COL applications referencing the API000 Design Certification and the API000 Design Certification Amendment Application.

Confirmatory Item Responses

CI-SRP-7.1-ICE-02: WCAP-16361-P and WCAP 17179-P was not added to the Tier 2* list in AP1000 DCD Intro.

Westinghouse Response: Per agreement with the USNRC, WCAP-16361-P will not be categorized as a Tier 2* document. WCAP-17179-P will be characterized as Tier 2* in DCD Rev 19.

CI-SRP-7.2-ICE-01: Although the reference to APP-GW-GLR-137 has been added to the DCD, Westinghouse must also add the reference for WCAP-16674 (TR-88). In addition, a new revision to APP-GW-GLR-137 has not been submitted to verify modifications.

Westinghouse Response: WCAP-16674 (TR-88) will be added as a Reference in DCD Rev 19 and the report itself is being submitted under separate cover. Document APP-GW-GLR-137, "Bases of Digital Overpower and Overtemperature Delta-T (OPΔT/ OTΔT) Reactor Trips" is also being submitted under separate cover.

CI-SRP7.2-ICE-02: Westinghouse will update Revision 3 of the FMEA to more clearly state that the system is not continually sending "new" updated setpoints to the AC160, but simply performing its communication function.

Westinghouse Response: The revised WCAP-16438, "FMEA of AP1000 Protection and Safety Monitoring System" contains the requested information and is being submitted under separate cover.

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CI-SRP-7.2-ICE-06: All language that states that the CIM is not susceptible to SWCCF has been removed from documentation with the exception of WCAP-16674.

Westinghouse Response: WCAP-16674 has been revised to address the Staff's concerns. In addition, Westinghouse confirmed that CIM SWCCF language either has been removed or does not exist in other documents including those evaluated by the USNRC in evaluation of Chapter 7 of the AP1000 DCD.

CI-SRP-7.2-ICE-07: WEC has not removed words "complete" from the systems definition phase in Tier 1 of the DCD. In addition, the systems definition phase has not been re-inserted into ITAAC Table 2.5.2-8, Item 11.

Westinghouse Response: The word "complete" has been removed from the systems definition phase in Tier 1 of DCD Rev 19. In addition, for ITAAC Table 2.5.2-8, the Systems Definition Phase has been reinstated as Item b). Finally, for ITACC consistency, Item a) was reinserted but with the description "Not used".

CI-SRP-7.2-ICE-08: A revision to WCAP-16361-P has not been submitted.

Westinghouse Response: WCAP-16361-P, "Westinghouse Setpoint Methodology for Protection Systems" has been revised and is being submitted under separate cover.

CI-SRP-7.3-ICE-01: A description of the ADS spurious actuation blocks was added to the Rev. 18, but the corresponding information needs to be provided in the FMEA. A new revision to the FMEA has not been received.

Westinghouse Response: The ADS Spurious Actuation material was added to WCAP-16438, "FMEA of AP1000 Protection and Safety Monitoring System". The document is being submitted under separate cover.

CI-SRP-7.9-ICE-03: The revision number for APP-GW-J0R-012 was not included in Revision 18 of the AP1000 DCD.

Westinghouse Response: Revision 19 of the DCD will identify APP-GW-J0R-012, "AP1000 Protection and Safety Monitoring System Computer Security Plan" as Revision 1.

CI-SRP-7A-SRSB-01: A new revision to APP-GW-GLR-137 has not been submitted.

Westinghouse Response: The revised APP-GW-GLR-137, "Bases of Digital Overpower and Overtemperature Delta-T (OPΔT/ OTΔT) Reactor Trips" is being submitted under separate cover.

CI-SRP-7A-SRSB-02: A new revision to APP-GW-GLR-137 has not been submitted.

Westinghouse Response: The revised APP-GW-GLR-137, "Bases of Digital Overpower and Overtemperature Delta-T (OPΔT/ OTΔT) Reactor Trips" is being submitted under separate cover.

CI-SRP-7A-SRSB-03: Figures in Chapter 15 were not updated and the discussion was not incorporated into Chapter 15.

Westinghouse Response: This issue is being addressed under a separate USNRC submittal.

CI-SRP-7A-SRSB-04: A new revision to APP-GW-GLR-137 has not been submitted.

Westinghouse Response: The revised APP-GW-GLR-137, "Bases of Digital Overpower and Overtemperature Delta-T (OPΔT/ OTΔT) Reactor Trips" is being submitted under separate cover.

This letter is being submitted in response to an NRC request to document minor editorial corrections in support of the AP1000 Design Certification Amendment Application (Docket No. 52-006). The information included in these responses is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification and the AP1000 Design Certification Amendment Application.

Questions or requests for additional information related to the content and preparation of this response should be directed to Westinghouse. Please send copies of such questions or requests to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

Very truly yours,



R. F. Ziesing
Director, U.S. Licensing

/Enclosure

1. Submittal of AP1000 DCD Page Revisions and Associated Confirmatory Item Responses

cc:	D. Jaffe	- U.S. NRC	1E
	E. McKenna	- U.S. NRC	1E
	S. K. Mitra	- U.S. NRC	1E
	T. Spink	- TVA	1E
	P. Hastings	- Duke Energy	1E
	R. Kitchen	- Progress Energy	1E
	A. Monroe	- SCANA	1E
	P. Jacobs	- Florida Power & Light	1E
	C. Pierce	- Southern Company	1E
	E. Schmiech	- Westinghouse	1E
	G. Zinke	- NuStart/Entergy	1E
	R. Grumbir	- NuStart	1E
	B. Seelman	- Westinghouse	1E

ENCLOSURE 1

Submittal of AP1000 DCD Page Revisions and Associated Confirmatory Item Responses

Introduction

AP1000 Design Control Document

Table 1-1 (Cont.)
 Index of AP1000 Tier 2 Information Requiring NRC Approval for Change

Item	Expiration at First Full Power	Tier 2 Reference
Maximum Fuel Rod Average Burnup	No	4.3.1.1.1
Reactor Core Description (First Cycle)	Yes	Table 4.3-1
Nuclear Design Parameters (First Cycle)	Yes	Table 4.3-2
Reactivity Requirements for Rod Cluster Control Assemblies	Yes	Table 4.3-3
ASME Code Piping Design Restrictions	Yes	5.2.1.1
Reactor Coolant Pump Design	No	5.4.1.2.1
MOV Design and Qualification	Yes	5.4.8.1.2
Other Power-Operated Valves Design and Qualification	Yes	5.4.8.1.3
Motor Operated Valves	Yes	5.4.8.5.2
Power Operated Valves	Yes	5.4.8.5.3
ASME Code Cases	Yes	Table 5.2-3 Table 3.9-9 Table 3.9-10 5.2.1.2
WCAP-17201-P, "AC160 High Speed Link Communication Compliance to DI&C-ISG-04 Staff Position 9, 12, 13, and 15," Rev 0, February 2010	Yes	Table 1.6-1 7.1.7
WCAP-15927 (Non-Proprietary), "Design Process for AP1000 Common Q Safety Systems," Rev 2	Yes	Table 1.6-1 7.1.2.14.1 7.1.7
WCAP-17179, "AP1000 Component Interface Module Technical Report"	Yes	Table 1.6-1 7.1
WCAP-16097-P-A, "Common Qualified Platform," Rev 0	Yes	Table 1.6-1 7.1
WCAP-16096-NP-A, "Software Program Manual for Common Q Systems," Rev 01A	Yes	Table 1.6-1 7.1
Verification and Validation	Yes	7.1.2.14
Hard-wired DAS manual actuation	No	7.7.1.11
Nuclear Island Fire Areas	No	Figure 9A-1
Turbine Building Fire Areas	No	Figure 9A-2
Annex I & II Building Fire Areas	No	Figure 9A-3
Radwaste Building Fire Areas	No	Figure 9A-4
Diesel Generator Building Fire Areas	No	Figure 9A-5

Deleted: WCAP-14605, "Westinghouse Setpoint Methodology for Protection Systems, AP600," Rev 0
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2. System Based Design Descriptions and ITAAC AP1000 Design Control Document

- b) The PMS provides process signals to the data display and processing system (DDS) through isolation devices.
 - c) Data communication between safety and nonsafety systems does not inhibit the performance of the safety function.
 - d) The PMS ensures that the automatic safety function and the Class 1E manual controls both have priority over the non-Class 1E soft controls.
 - e) The PMS receives signals from non-safety equipment that provides interlocks for PMS test functions through isolation devices.
8. The PMS, in conjunction with the operator workstations, provides the following functions:
- a) The PMS provides for the minimum inventory of displays, visual alerts, and fixed position controls, as identified in Table 2.5.2-5. The plant parameters listed with a "Yes" in the "Display" column and visual alerts listed with a "Yes" in the "Alert" column can be retrieved in the main control room (MCR). The fixed position controls listed with a "Yes" in the "Control" column are provided in the MCR.
 - b) The PMS provides for the transfer of control capability from the MCR to the remote shutdown workstation (RSW) using multiple transfer switches. Each individual transfer switch is associated with only a single safety-related group or with nonsafety-related control capability.
 - c) Displays of the open/closed status of the reactor trip breakers can be retrieved in the MCR.
9. a) The PMS automatically removes blocks of reactor trip and engineered safety features actuation when the plant approaches conditions for which the associated function is designed to provide protection. These blocks are identified in Table 2.5.2-6.
- b) The PMS two-out-of-four initiation logic reverts to a two-out-of-three coincidence logic if one of the four channels is bypassed. All bypassed channels are alarmed in the MCR.
 - c) The PMS does not allow simultaneous bypass of two redundant channels.
 - d) The PMS provides the interlock functions identified in Table 2.5.2-7.
10. Setpoints are determined using a methodology which accounts for loop inaccuracies, response testing, and maintenance or replacement of instrumentation.
11. The PMS hardware and software is developed using a planned design process which provides for specific design documentation and reviews during the following life cycle stages:
- a) Design requirements phase, may be referred to as conceptual or project definition phase (Complete)
 - b) System definition phase,

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2. System Based Design Descriptions and ITAAC AP1000 Design Control Document

Table 2.5.2-8 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria		
Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
11. The PMS hardware and software is developed using a planned design process which provides for specific design documentation and reviews during the following life cycle stages:	Inspection will be performed of the process used to design the hardware and software.	A report exists and concludes that the process defines the organizational responsibilities, activities, and configuration management controls for the following:
a) Not used		a) Not used
b) <u>System definition phase</u>		b) <u>Specification of functional requirements.</u>
c) <u>Hardware and software development phase, consisting of hardware and software design and implementation</u>		c) <u>Documentation and review of hardware and software.</u>
d) <u>System integration and test phase</u>		d) <u>Performance of system tests and the documentation of system test results, including a response time test performed under maximum CPU-loading to demonstrate that the PMS can fulfill its response time criteria.</u>
e) <u>Installation phase</u>		e) <u>Performance of installation tests and inspections.</u>

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1. Introduction and General Description of Plant AP1000 Design Control Document

Table 1.6-1 (Sheet 12 of 21)

MATERIAL REFERENCED

DCD Section Number	Westinghouse Topical Report Number	Title
6.2	WCAP-15644-P (P) WCAP-15644-NP	AP1000 Code Applicability Report, Revision 2, March 2004
6.3	WCAP-8966 (P)	Evaluation of Mispositioned ECCS Valves, September 1977
	WCAP-13594 (P) WCAP-13662 (NP)	FMEA of Advanced Passive Plant Protection System, Revision 1, June 1998
6A	WCAP-15846 (P) WCAP-15862	WGOTHIC Application to AP600 and AP1000, Revision 1, March 2004
	WCAP-14135 (P) WCAP-14138	Final Data Report for Passive Containment Cooling System Large Scale Test, Phase 2 and Phase 3, Revision 3, November 1998
	WCAP-15613 (P) WCAP-15706	AP1000 PIRT and Scaling Assessment Report, March 2001
7.1	WCAP-14605 (P) WCAP-14606 (NP)	Westinghouse Setpoint Methodology for Protection Systems – AP600, April 1994
	WCAP-16361-P WCAP-16361-NP	Westinghouse Setpoint Methodology for Protection Systems - AP1000, February 2011
	WCAP-15775	AP1000 Instrumentation and Control Defense-in-Depth and Diversity Report
	[WCAP-16096-NP-A	Software Program Manual for Common Q Systems, Revision 01A, January 2004)*
	[WCAP-16097-P-A WCAP-16097-NP-A	Common Qualified Platform, Revision 01, May 2003)*
	WCAP-15776	Safety Criteria for the AP1000 Instrumentation and Control Systems, April 2002
	WCAP-16674-P WCAP-16674-NP	AP1000 I&C Data Communication and Manual Control of Safety Systems and Components, Revision 4
	WCAP-16675-P WCAP-16675-NP	AP1000 Protection and Safety Monitoring System Architecture Technical Report, Revision 5
	APP-GW-GLR-017	AP1000 Standard Combined License Technical Report, Resolution of Common Q NRC Items

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(P) Denotes Document is Proprietary

*NRC Staff approval is required prior to implementing a change in this information; see DCD Introduction Section 3.5.

1. Introduction and General Description of Plant AP1000 Design Control Document

Table 1.6-1 (Sheet 13 of 21)

MATERIAL REFERENCED

DCD Section Number	Westinghouse Topical Report Number	Title
7.1	[WCAP-17179-P WCAP-17179-NP]	AP1000 Component Interface Module Technical Report*
	[WCAP-15927 (NP)]	Design Process for AP1000 Common Q Safety Systems, Revision 2, November 2008)*
		Westinghouse Electric Company Quality Management System (QMS), (Non-Proprietary), Revision 5, October 2002
	APP-GW-J0R-012	AP1000 Protection and Safety Monitoring System Computer Security Plan, Revision 1
	[WCAP-17201-P]	AC160 High Speed Link Communication Compliance to DI&C-ISG-04 Staff Positions 9, 12, 13 and 15, Revision 0, February 2010)*
	WCAP-17184-P (P)	AP1000™ Diverse Actuation System Planning and Functional Design Summary Technical Report
7.2	WCAP-16438-P WCAP-16438-NP	FMEA of AP1000 Protection and Safety Monitoring System, Revision 3
	WCAP-16592-P WCAP-16592-NP	Software Hazards Analysis of AP1000 Protection and Safety Monitoring System, Revision 2
	WCAP-15776	Safety Criteria for the AP1000 Instrumentation and Control Systems, April 2002
	WCAP-16097-P-A WCAP-16097-NP-A	Common Qualified Platform, Digital Plant Protection System, Appendix 3, May 2003
7.3	WCAP-15776	Safety Criteria for the AP1000 Instrumentation and Control Systems, April 2002
7.7	WCAP-17184-P	AP1000™ Diverse Actuation System Planning and Functional Design Summary Technical Report
9.5	WCAP-15871	AP1000 Assessment Against NFPA 804, Revision 1, December 2002
10.2	WCAP-16650-P (P) WCAP-16650-NP	Analysis of the Probability of the Generation of Missiles for AP1000 Fully Integral Low Pressure Turbines, Revision 0, February 2007
	WCAP-16651-P (P) WCAP-16651-NP	Probabilistic Evaluation of Turbine Valve Test Frequency, Revision 1, May 2009

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*NRC Staff approval is required prior to implementing a change in this information; see DCD Introduction Section 3.5.

1. Introduction and General Description of Plant AP1000 Design Control Document

Table 1.6-1 (Sheet 18 of 21)

MATERIAL REFERENCED

DCD Section Number	Westinghouse Topical Report Number	Title
16.1	WCAP-12472-P-A (P) WCAP-12473-A	BEACON Core Monitoring and Operations Support System, August 1994, and Addendum 1, May 1996
	WCAP-7308-L-P-A (P) WCAP-7308-L-A	Evaluation of Nuclear Hot Channel Factor Uncertainties, June 1988
	WCAP-9273-NP-A	Westinghouse Reload Safety Evaluation Methodology, July 1985
	WCAP-14606	Westinghouse Setpoint Methodology for Protection Systems, April 1996
	WCAP-10271-P-A (P) WCAP-10272-A	Evaluation of Surveillance Frequencies and Out of Service Times for the Reactor Protection Instrumentation System, June 1996
	WCAP-7924-A	Basis for Heatup and Cooldown Limit Curves, April 1975
	WCAP-16361-P (P)	Westinghouse Setpoint Methodology for Protection Systems – AP1000, February 2011
	WCAP-13632-P-A (P) WCAP-13787-A	Elimination of Pressure Sensor Response Time Testing Requirements, Revision 2, January 1996
	WCAP-7769	Topical Report on Overpressure Protection, October 1971
	WCAP-15985	AP1000 Implementation of the Regulatory Treatment of Nonsafety-Related Systems Process, Revision 2, August 2003
	WCAP-16779	AP1000 Overpressure Protection Report, April 2007
17.6	WCAP-8370	Energy Systems Business Unit – Power Generation Business Unit Quality Assurance Plan, Revision 12a
	WCAP-8370/7800	Energy Systems Business Unit – Nuclear Fuel Business Unit Quality Assurance Plan, Revision 11A/7A
	WCAP-12600	AP600 Advanced Light Water Reactor Design Quality Assurance Program Plan, Revision 4, January 1998
18.1	WCAP-14645	Human Factors Engineering Operating Experience Review Report for the AP1000 Nuclear Power Plant, Revision 3
	WCAP-14644	AP600/AP1000 Functional Requirements Analysis and Function Allocation, Revision 1

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7. Instrumentation and Controls

AP1000 Design Control Document

7.1.2.7.2 Nuclear Instrumentation Detectors

Three types of neutron detectors are used to monitor the leakage neutron flux from a completely shutdown condition to 120 percent of full power. The intermediate range channels are capable of measuring overpower excursions up to 200 percent of full power.

The lowest range (source range) covers six decades of leakage neutron flux. The lowest observed count rate depends on the strength of the neutron sources in the core and the core multiplication associated with the shutdown reactivity. This generally is greater than two counts per second. The next range (intermediate range) covers eight decades. Detectors and instrumentation are chosen to provide overlap between the higher portion of the source range and the lower portion of the intermediate range. The highest range of instrumentation (power range) covers approximately two decades of the total instrumentation range. This is a linear range that overlaps the higher portion of the intermediate range. The neutron detectors are installed in tubes located around the reactor vessel in the primary shield. Detector types for these three ranges are:

- Source range – proportional counter or pulse fission chamber
- Intermediate range – pulse fission chamber
- Power range – uncompensated ionization chamber

7.1.2.7.3 Equipment Status Inputs

Some inputs to the protection system are not measurements of process or nuclear variables, but are discrete indications of the status of certain equipment. Examples include manual switch positions, contact status inputs, and indications provided by valve limit switches.

7.1.2.8 Communication Functions

Reference 19, Section 3, and Reference 25 describe the communication functions.

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7.1.2.9 Fault Tolerance, Maintenance, Test, and Bypass

Reference 19, Section 7 describes the fault tolerance features, and Section 6 describes the maintenance, test, and bypass features of the protection and safety monitoring system.

7.1.2.10 Isolation Devices

Isolation devices are used to maintain the electrical independence of divisions, and to prevent interaction between nonsafety-related systems and the safety-related system.

Isolation devices are incorporated into selected interconnections to maintain division independence. Isolation devices serve to prevent credible faults (such as open circuits, short circuits, or applied credible voltages) in one circuit from propagating to another circuit.

7. Instrumentation and Controls

AP1000 Design Control Document

7.1.6 Combined License Information

7.1.6.1 The Combined License information requested in this subsection is addressed in WCAP-16361-P (Reference 17), and the applicable changes are incorporated into the DCD. The Westinghouse Setpoint Control Program (SCP) will be incorporated into the AP1000 DCD Technical Specifications in accordance with COL/DC-ISG-8. This will facilitate combined license (COL) applicants' adoption of the AP1000 DCD Technical Specifications. Prior to initial fuel load, a reconciliation of the setpoints against the final design for each plant will be performed.

The following words represent the original Combined License Information Item commitment, which has been addressed as discussed above:

Combined License applicants referencing the AP1000 certified design will provide a calculation of setpoints for protective functions consistent with the methodology presented in Reference 5. Reference 5 is an AP600 document that describes a methodology that is applicable to AP1000. AP1000 has some slight differences in instrument spans.

7.1.6.2 The Combined License information requested in this subsection has been completely addressed in APP-GW-GLR-017 (Reference 18), and the applicable changes are incorporated into the DCD. No additional work is required by the Combined License applicant.

The following words represent the original Combined License Information Item commitment, which has been addressed as discussed above:

Combined License applicants referencing the AP1000 certified design will provide resolution for generic open items and plant-specific action items resulting from NRC review of the I&C platform. This will include definition of a methodology for overall response time testing.

7.1.7 References

1. IEEE 603-1991, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations."
2. [WCAP-17201-P, Revision 0, "AC160 High Speed Link Communication Compliance to DI&C-ISG-04 Staff Positions 9, 12, 13 and 15," February 2010.]*
3. Not used.
4. Not used.
5. WCAP-14605 (Proprietary) and WCAP-14606 (Non-Proprietary), "Westinghouse Setpoint Methodology for Protection Systems, AP600," April 1996.
6. 10 CFR 21, "Reporting of Defects and Noncompliance."
7. WCAP-15775, "AP1000 Instrumentation and Control Defense-in-Depth and Diversity Report."

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*NRC Staff approval is required prior to implementing a change in this information; see DCD Introduction Section 3.5.

7. Instrumentation and Controls

AP1000 Design Control Document

- 8. [WCAP-16097-P-A (Proprietary) and WCAP-16097-NP-A (Non-Proprietary), Revision 0, "Common Qualified Platform," May 2003.]*
- 9. [WCAP-16096-NP-A, Revision 01A, "Software Program Manual for Common Q Systems," January 2004.]*
- 10. Not used.
- 11. Not used.
- 12. WCAP-15776, "Safety Criteria for the AP1000 Instrument and Control Systems," April 2002.
- 13. Not used.
- 14. Not used.
- 15. IEEE 7-4.3.2-1993, "IEEE Standard Criteria for Digital Computers in Safety Systems of Nuclear Power Generating Stations."
- 16. Not used.
- 17. WCAP-16361-P (Proprietary) and WCAP-16361-NP (Non-Proprietary), "Westinghouse Setpoint Methodology for Protection Systems – AP1000," February 2011.
- 18. APP-GW-GLR-017, AP1000 Standard Combined License Technical Report, "Resolution of Common Q NRC Items," Westinghouse Electric Company LLC.
- 19. WCAP-16675-P (Proprietary) and WCAP-16675-NP (Non-Proprietary), "AP1000 Protection and Safety Monitoring System Architecture Technical Report," Revision 5.
- 20. [WCAP-15927, Revision 2 (Non-proprietary), "Design Process for AP1000 Common Q Safety Systems," November 2008.]*
- 21. Westinghouse Electric Company Quality Management System (QMS), Revision 5 (Non-Proprietary), October 1, 2002.
- 22. APP-GW-J0R-012, "AP1000 Protection and Safety Monitoring System Computer Security Plan," Revision 1, Westinghouse Electric Company LLC.
- 23. WCAP-17184-P, "AP1000™ Diverse Actuation System Planning and Functional Design Summary Technical Report."
- 24. [WCAP-17179-P (Proprietary) and WCAP-17179-NP (Non-Proprietary), "AP1000 Component Interface Module Technical Report," Revision 1]*
- 25. WCAP-16674-P (Proprietary) and WCAP-16674-NP (Non-Proprietary), "AP1000 I&C Data Communication and Manual Control of Safety Systems and Components," Revision 4.

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*NRC Staff approval is required prior to implementing a change in this information; see DCD Introduction Section 3.5.

7. Instrumentation and Controls

AP1000 Design Control Document

The following words represent the original Combined License Information Item commitment, which has been addressed as discussed above:

Combined License applicants referencing the AP1000 certified design will provide an FMEA for the protection and safety monitoring system. The FMEA will include a Software Hazards Analysis. This FMEA will provide the basis for those Technical Specification Completion Times that rely on an FMEA for their basis.

7.2.4 References

1. WCAP-16438-P (Proprietary), WCAP-16438-NP (Non-Proprietary), "FMEA of AP1000 Protection and Safety Monitoring System," Revision 3.
2. WCAP-15776, "Safety Criteria for the AP1000 Instrument and Control Systems," April 2002.
3. WCAP-16097-P-A (Proprietary) and WCAP-16097-NP-A (Non-Proprietary), Appendix 3, Rev. 0, "Common Qualified Platform, Digital Plant Protection System," May 2003.
4. WCAP-16592-P (Proprietary), WCAP-16592-NP (Non-Proprietary), "Software Hazards Analysis of AP1000 Protection and Safety Monitoring System," Revision 2.
5. APP-GW-GLR-137, "Bases of Digital Overpower and Overtemperature Reactor Trips," Revision 1.

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Programs and Manuals
5.5

5.5 Programs and Manuals

5.5.14 Setpoint Program (SP) (continued)

- b. The Nominal Trip Setpoint (NTS), As-Found Tolerance (AFT), and As-Left Tolerance (ALT) for each Technical Specification required automatic protection instrumentation function shall be calculated in conformance with WCAP-16361-P, "Westinghouse Setpoint Methodology for Protection Systems – AP1000," February 2011.
- c. For each Technical Specification required automatic protection instrumentation function, performance of a CHANNEL CALIBRATION, CHANNEL OPERATIONAL TEST (COT), or REACTOR TRIP CHANNEL OPERATIONAL TEST (RTCOT) surveillance "in accordance with the Setpoint Program" shall include the following:
 - 1. The as-found value of the instrument channel trip setting shall be compared with the previously recorded as-left value.
 - i. If the as-found value of the instrument channel trip setting differs from the previously recorded as-left value by more than the pre-defined test acceptance criteria band (i.e., the specified AFT), then the instrument channel shall be evaluated to verify that it is functioning in accordance with its design basis before declaring the requirement met and returning the instrument channel to service. An Instrument Channel is determined to be functioning in accordance with its design basis if it can be set to within the ALT. This as-found condition shall be entered into the plant's corrective action program.
 - ii. If the as-found value of the instrument channel trip setting is less conservative than the specified AFT, the surveillance requirement is not met and the instrument channel shall be immediately declared inoperable.
 - 2. The instrument channel trip setting shall be set to a value within the specified ALT around the specified NTS at the completion of the surveillance; otherwise, the surveillance requirement is not met and the instrument channel shall be immediately declared inoperable.

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Reporting Requirements
5.6

5.6 Reporting Requirements

5.6.5 CORE OPERATING LIMITS REPORT (continued)

3. WCAP-10216-P-A, Revision 1A, "Relaxation of Constant Axial Offset Control FQ Surveillance Technical Specification," February 1994 (Westinghouse Proprietary) and WCAP-10217-A (Non-Proprietary).

(Methodology for Specifications 3.2.3 - AXIAL FLUX DIFFERENCE (Relaxed Axial Offset Control) and 3.2.1 - Heat Flux Hot Channel Factor (W(Z) surveillance requirements for FQ Methodology).)
 4. WCAP-12945-P-A, Volumes 1-5, "Westinghouse Code Qualification Document for Best Estimate Loss of Coolant Accident Analysis," Revision 2, March 1998 (Westinghouse Proprietary) and WCAP-14747 (Non-Proprietary).

(Methodology for Specification 3.2.1 - Heat Flux Hot Channel Factor.)
 5. WCAP-12472-P-A, "BEACON Core Monitoring and Operations Support System," August 1994, Addendum 1, May 1996 (Westinghouse Proprietary), and Addendum 2, March 2001 (Westinghouse Proprietary) and WCAP-12473-A (Non-Proprietary).

(Methodology for Specification 3.2.5 - OPDMS - Monitored Power Distribution Parameters.)
 6. APP-GW-GLR-137, Revision 1, "Bases of Digital Overpower and Overtemperature Delta-T (OPΔT/OTΔT) Reactor Trips," Westinghouse Electric Company LLC.

(Methodology for Specification 2.1.1 – Reactor Core Safety Limits, and 3.3.1 – Reactor Trip System (RTD) Instrumentation.)
- c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Passive Core Cooling Systems limits, nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met.
 - d. The COLR, including any midcycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

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RTS Instrumentation
B 3.3.1

BASES

SURVEILLANCE REQUIREMENTS (continued)

The SR 3.3.1.13 is modified by a note exempting neutron detectors from response time testing. A Note to the Surveillance indicates that neutron detectors may be excluded from RTS RESPONSE TIME testing. This Note is necessary because of the difficulty in generating an appropriate detector input signal. Excluding the detectors is acceptable because the principles of detector operation ensure a virtually instantaneous response.

REFERENCES

1. Chapter 6.0, "Engineered Safety Features."
2. Chapter 7.0, "Instrumentation and Controls."
3. Chapter 15.0, "Accident Analysis."
4. WCAP-16361-P, "Westinghouse Setpoint Methodology for Protection Systems – AP1000," February 2011 (proprietary).
5. Institute of Electrical and Electronic Engineers, IEEE-603-1991, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations," June 27, 1991.
6. 10 CFR 50.49, "Environmental Qualifications of Electric Equipment Important to Safety for Nuclear Power Plants."
7. APP-GW-GSC-020, "Technical Specification Completion Time and Surveillance Frequency Justification."
8. APP-GW-GLR-137, Revision 11, "Bases of Digital Overpower and Overtemperature Delta-T (OPΔT/OPΔT) Reactor Trips," Westinghouse Electric Company LLC.
9. WCAP-13632-P-A (Proprietary) and WCAP-13787-A (Non-Proprietary), Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," January 1996.

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ESFAS Instrumentation
B 3.3.2

BASES

REFERENCES (continued)

9. WCAP-16361-P, "Westinghouse Setpoint Methodology for Protection Systems – AP1000," February 2011 (proprietary).
 10. APP-GW-GLR-004, Rev. 0, "AP1000 Shutdown Evaluation Report," July 2002.
 11. Chapter 19.0, "Probabilistic Risk Assessment," Appendix 19E, "Shutdown Evaluation."
 12. WCAP-13632-P-A (Proprietary) and WCAP-13787-A (Non-Proprietary), Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," January 1996.
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