June 6, 2013

Mr. Ron Wessel, Principal Engineer
AP1000 COL Licensing Support
Westinghouse Electric Company
1000 Westinghouse Drive
Cranberry Township, PA 16066

SUBJECT: NUCLEAR REGULATORY COMMISSION INSPECTION REPORT
NO. 99900404/2013-202

Dear Mr. Wessel:

From April 22–25, 2013, the U.S. Nuclear Regulatory Commission (NRC) staff conducted a limited-scope inspection at the Westinghouse facility (hereafter referred to as WEC) in Cranberry Township, PA. The inspection assessed WEC's compliance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21, "Reporting of Defects and Noncompliance," and selected portions of Appendix B, "Quality Assurance Program Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." The technically focused inspection specifically evaluated quality-assurance (QA) activities associated with the design, software, and evaluation of changes related to topical reports approved by the NRC for safety-related analysis code and safety-related software for new reactors and operating nuclear power plants. In addition, the NRC inspection team evaluated and observed dedication activities related to the WEC AP1000 reactor design. The enclosed report presents the results of this inspection. This inspection report does not constitute the NRC's endorsement of your overall QA or 10 CFR Part 21 programs.

Based on the inspection of safety-related analysis code and safety-related software samples, the NRC inspection team concluded that WEC met all program requirements, and the team did not identify any violations or nonconformances within the scope of this inspection.

In accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding," which is part of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), which is accessible through the NRC's Web site at http://www.nrc.gov/reading-rm/adams.html.

Sincerely,

/RA/

Richard A. Rasmussen, Chief
Electrical Vendor Branch
Division of Construction Inspection
and Operational Programs
Office of New Reactors

Docket No.: 99900404

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Office of New Reactors

Docket No.: 99900404
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U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NEW REACTORS
DIVISION OF CONSTRUCTION INSPECTION AND OPERATIONAL PROGRAMS
VENDOR INSPECTION REPORT

Docket No.:	99900404
Report No.:	99900404/2013-202
Vendor:	Westinghouse Electric Company 1000 Westinghouse Drive Cranberry Township, PA 16066
Vendor Contact:	Mr. Ron Wessel Principle Engineer AP1000 COL Licensing Support WesselRP@westinghouse.com
Background:	The Westinghouse Electric Company provides fuel, services, technology, plant design, and equipment for the commercial nuclear electric power industry.
Inspection Dates:	April 22–25, 2013
Inspectors:	Stacy Smith NRO/DCIP/CEVB, Team Leader Garrett Newman NRO/DCIP/CEVB Christopher Van Wert NRO/DSRA/SRSB Dr. Mathew Panicker NRR/DSS/SNPB
Approved by:	Richard A. Rasmussen, Chief Electrical Vendor Branch Division of Construction Inspection and Operational Programs Office of New Reactors

Enclosure

EXECUTIVE SUMMARY

Westinghouse Electric Company
99900404/2013-202

The U.S. Nuclear Regulatory Commission (NRC) conducted this inspection to verify that the Westinghouse Electric Company's facility (hereafter referred to as WEC) implemented an adequate quality assurance (QA) program for dedication of components for the AP1000 reactor and safety-related analysis code and safety-related software for new reactors and operating nuclear power plants that complied with the requirements of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities." In addition, the NRC performed this inspection to verify that WEC implemented a program under 10 CFR Part 21, "Reporting of Defects and Noncompliance," that met the NRC's regulatory requirements.

The following regulations served as the bases for this NRC inspection:

- Appendix B to 10 CFR Part 50
- 10 CFR Part 21

During the conduct of this inspection, the NRC inspection team implemented Inspection Procedure (IP) 43002, "Routine Inspections of Nuclear Vendors," dated April 25, 2011; IP 43004, "Inspection of Commercial-Grade Dedication Programs," dated April 25, 2011; and IP 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance," dated February 13, 2012.

This inspection specifically evaluated WEC's design process, software verification and validation, and evaluation of changes related to topical reports approved by the NRC for safety-related analysis code and safety-related software to ensure they were being effectively implemented to meet the applicable requirements of Appendix B to 10 CFR Part 50. The inspection focused on control of changes associated with the following topical reports:

- WCAP-16260-P-A, Revision 1, "The Spatially Corrected Inverse Count Rate (SCICR) Method for Subcritical Reactivity Measurement"

- WCAP-13360-NP-A, Revision 0, "Clarification on Use of Dynamic Rod Worth Measurement (DRWM) in Initial Plant Start-Up Applications"

- WCAP-16097-P, Revision 3, "Common Qualified Platform Record of Changes"

The NRC inspection team concluded that WEC's QA policies and procedures comply with the applicable requirements in 10 CFR Part 21 and Appendix B to 10 CFR Part 50, and that WEC's personnel are implementing these policies and procedures effectively. The results of this inspection are summarized below.

Software Control

The NRC inspection team concluded that WEC is implementing its policies and procedures that govern design control, software development, and software verification and validation processes

for safety-related analysis code and safety-related software in a way consistent with the regulatory requirements of Criterion III, “Design Control,” in Appendix B to 10 CFR 50.

Nonconforming Materials, Parts, or Components and Corrective Action

The NRC inspection team concluded that WEC is implementing its policies and procedures that govern the control of nonconforming material, parts, or components, and corrective actions in a way consistent with the regulatory requirements of Criterion XV, “Nonconforming Materials, Parts, or Components,” and Criterion XVI, “Corrective Action,” in Appendix B to 10 CFR Part 50.

Commercial-Grade Dedication

The NRC inspection team concluded that WEC is implementing its policies and procedures that govern commercial-grade dedication activities in a way consistent with the regulatory requirements of Criterion III, “Design Control,” in Appendix B to 10 CFR Part 50.

REPORT DETAILS

1. Software Control

a. Inspection Scope

The NRC inspection team reviewed the WEC processes for design control, software development, and software verification and validation for safety-related analysis code and safety-related software related to topical reports approved by the NRC to verify regulatory compliance in accordance with Criterion III, "Design Control," in Appendix B to 10 CFR 50.

b. Observations and Findings

b.1 Implementation of Common Q Software

WEC uses 2C48361, "Standard AC160 Hardware Procurement," Revision 34, dated October 31, 2013, as a living document to track changes to the Common Qualified (Common Q) platform beyond those reviewed and approved in WCAP-16097-P-A, "Common Qualified Platform Record of Changes," Appendix 5, Revision 1, dated February 2013. The NRC approved WCAP-16097 in February 2013, which reflected Common Q platform changes through March 31, 2012. The Common Q platform is a computer system that consists of a set of commercial-grade hardware and previously developed software components dedicated and qualified for use in nuclear power plants. The Common Q platform was developed from the standard Advant Control (AC) 160 computer systems currently used for control systems.

The NRC inspection team verified that there have been no significant changes to the platform. 2C4836 includes tables for allowable product revision to be used for the AC160, including description, part number, product revision, reference information, and material size code. Whenever WEC needs to make a change to the hardware-procurement document, it must first be authorized by a configuration-control board. The configuration-pcontrol board uses NA 4.44, "Engineering Drawing Creation and Change Process," Revision 3, dated December 14, 2012. The NRC inspection team verified that this procedure contained sufficient guidance to adequately manage standard drawing changes associated with the AC160.

b.2 Implementation of Advanced Digital Reactivity Computer (ADRC) Software

ARDC is used for core-design verification in pressurized-water reactors. WEC currently uses ADRC version 4.0.3, released in 2007, for operating nuclear power plant reload core verifications. The 2007 release corrected errors in printing and picoammeter readings that the previous version of the software had contained. The NRC inspection team verified that the

completed validation, verification, and installation tests were done in accordance with quality procedures.

WEC is currently in the process of updating ADRC to support changes in plant requirements, available hardware, and plant interfaces, including requirements imposed by the Westinghouse Electric Company's AP1000 reactor design. The NRC inspection team reviewed completed portions of a version update to the ADRC from version 4.03, written in the programming language C, to version 5.0, written in the programming language C++. Currently, WEC has completed all requirement specifications for the ADRC and the design specification for the hardware. WEC has completed the software development (actual coding of the software) in accordance with WEC 3.6.1, "Computer Software Development Process," Revision 0.0, dated July 24, 2012. However, at the time of the inspection, WEC was still in the process of completing the development process and ADRC Version 5.0 was not approved for use.

The software requirement specification, CN-NO-12-9, notes that upgrading Version 4.03 to Version 5.0 will be a new development effort. The NRC inspection team verified that the completed portions of the development plan, as documented in FDR 12-21, were done in accordance with quality procedures.

b.3 Implementation of Subcritical Rod-Worth Measurement (SRWM) Methodology

The SRWM methodology is described in WCAP-16260-P-A, Revision 1, "The Spatially Corrected Inverse Count Rate (SCICR) Method for Subcritical Reactivity Measurement" (Reference 4). WEC issued Technical Bulletin TB-12-3, "Subcritical Rod Worth Measurement Methodology," on February 17, 2012, to inform its customers that use of the SRWM methodology is suspended until issues identified in the technical bulletin are resolved. The technical bulletin stipulates that the SRWM methodology should no longer be used to perform post-core-reload startup physics testing until the issue with the total bank worth (TBW) measurement can be resolved. The suspension of the methodology was because of two issues: (1) the mean deviation to root squared ratio did not exceed the criterion in the biased cases as expected, and (2) measured-to-predicted TBW difference was significantly less than expected in the biased cases.

The SRWM methodology uses count-rate data from the source-range (SR) neutron detectors that are obtained during bank withdrawal in Mode 3 before rod drop-time measurements are taken. The core-design parameters that are verified by the SRWM methodology are the TBW, all rods out (ARO) critical boron concentration (CBC) at hot zero power (HZP) condition (boron end point), and the isothermal temperature coefficient (ITC). The TBW measurement is affected by this issue. TBW is one of the core-design characteristics identified in ANSI/ANS-19.6.1-2011, "American National Standard Reload Startup Physics Tests for Pressurized Water Reactors," dated January 13, 2011,

that is measured during post-refueling startup physics testing to confirm that the "as loaded core" is consistent with the "as designed" core.

The technical bulletin indicates that these issues do not result in substantial safety hazard for the reasons specified in the bulletin. Westinghouse has concluded that no core anomalies existed that the SRWM methodology measured failed to detect. The NRC inspection team verified WEC's assessment.

c. Conclusions

The NRC inspection team concluded that WEC is implementing its policies and procedures that govern design control, software development, and software verification and validation processes for safety-related analysis code and software in a way consistent with the regulatory requirements of Criterion III, "Design Control," in Appendix B to 10 CFR 50.

2. Nonconforming Materials, Parts, or Components and Corrective Action

a. Inspection Scope

The NRC inspection team reviewed a sample of nonconformance and corrective action documents with an emphasis on previous issues identified by WEC related to its sub vendor, Pennatronics, to verify compliance with Criterion XV, "Nonconforming Materials, Parts, or Components," and Criterion XVI, "Corrective Action," in Appendix B to 10 CFR Part 50. In addition, the NRC inspection team reviewed a sample of corrective action documents associated with SRWM and DRWM.

b. Observations and Findings

b.1 Implementation of the Corrective Action Program

In issue report (IR) 13-039-M007, WEC identified twenty supplier audit reports that were not completed in accordance with WEC 7.1, "Supplier Qualification and Assessment," Revision 4.1, dated February 18, 2013. WEC 7.1 establishes the requirements for conducting, reporting, and verifying corrective action and maintaining records of a quality program assessment to evaluate a supplier's quality assurance program (as well as the supplier's performance in implementing their program).

IR 13-039-M007 was initially screened and reviewed by the issue review committee as not potentially representing a condition adverse to nuclear safety pursuant to the requirements of WEC's Part 21 procedure WEC 21.0, "Identification and Reporting of Conditions Adverse to Nuclear Safety," Revision 7.1, dated June 27, 2012; however, during an NRC audit at the WEC Scottsdale, AZ, location in February 2013, the NRC raised the question of whether any safety-related components had been shipped to nuclear power plants from unqualified suppliers.

During this inspection, the NRC inspection team reviewed completed commitments associated with these corrective actions, including the initiation of two additional IRs to address this concern. WEC initiated IR 13-056-M002 to document the failure of IR 13-039-M007 to correctly document and identify this as a potential Part 21 issue that required screening through WEC 21.0. In addition, WEC initiated IR 13-049-M001 to document that the failure to issue audit reports in accordance with WEC 7.1 resulted in potential supplier programmatic deficiencies going unreported, which could potentially impact components received from the affected suppliers. This IR included four active commitments, two of which are closed.

The NRC inspection team verified that the closed commitments, IR 13-049-M001.01 and IR 13-049-M001.02, were adequate. Specifically, the NRC inspection team verified that deviations identified in the Pennatronics quality program audit report, WES-2012-318-R, were appropriately evaluated and that WEC had adequate technical justification to demonstrate that a defect did not exist. WEC issued a stop-work order to Pennatronics that was still in place at the time of the NRC inspection due to significant QA programmatic deficiencies. In addition, the NRC inspection team reviewed the evaluation of Keystone Compliance, LLC, Judd Wire Inc., and Global Circuits to verify that the audit reports WEC performed did not include any findings or observations and, therefore, had no impact on components received from these suppliers.

In addition, the NRC inspection team reviewed the root-cause analysis report for IR # 12-012-M011, which determined that a flaw in SRWM methodology itself, as well as breakdowns in the original software-development process, resulted in the software being unreliable to detect TBW deviations. In the root cause, WEC identified that the flaw was not detected until 2012 because WEC determined that it did not have an integrated process to develop an integrated product for which the methodology and software were well documented, understood, and questioned. Additionally, WEC identified missed opportunities to identify the issues approximately a year earlier. The NRC inspection team reviewed the corrective actions performed to correct the condition and the apparent cause, which included the issuance of Technical Bulletin TB-12-3, suspension of use of the SRWM software, a review of the current procedures controlling software development, and an extent-of-condition review. The NRC inspection team verified that the completed corrective actions were adequate to identify and correct the conditions adverse to quality.

c. Conclusions

The NRC inspection team concluded that WEC is implementing its policies and implementing procedures that govern its corrective action program in a way consistent with the regulatory requirements of Criterion XVI, “Corrective Action.”

3. Commercial-Grade Dedication

a. Inspection Scope

The NRC inspection team reviewed WEC's policies and implementation procedures that govern the implementation of WEC's commercial-grade dedication program to ensure that they are consistent with the regulatory requirements of Criterion III," Design Control," and Criterion VII, "Control of Purchased Material, Parts, and Services," in Appendix B to 10 CFR Part 50. The NRC inspection team observed commercial-grade dedication activities and reviewed supporting documentation.

b. Observations and Findings

The NRC inspection team witnessed portions of commercial-grade dedication activities in progress for the AP1000 reactor design, and specifically, the machining services for a 1E-to-non-1E isolation raceway bracket. The NRC reviewed the design specification for the part and the associated commercial-grade dedication plan and determined that the plan adequately captured the critical characteristics for the part. The NRC inspection team witnessed the inspector implement the plan by verifying that the dimensions of the bracket were within the tolerances of the drawing. The WEC inspector also properly verified that the part number was accurate and that the required documents, such as certified material test reports, were provided by the commercial supplier.

c. Conclusions

The NRC inspection team concluded that WEC is implementing its policies and implementing procedures that govern its commercial-grade dedication program in ways consistent with the regulatory requirements of Criterion III," Design Control," and Criterion VII, "Control of Purchased Material, Parts, and Services," in Appendix B to 10 CFR Part 50.

4. Entrance and Exit Meetings

On April 22, 2013, the NRC inspection team presented the inspection scope during an entrance meeting with WEC management and additional personnel. On April 25, 2013, the NRC inspection team presented the inspection results during an exit meeting with WEC management and other WEC personnel.

ATTACHMENT

1. PERSONS CONTACTED AND NRC STAFF INVOLVED:

Name	Title	Affiliation	Entrance	Exit	Interviewed
Ron Wessel	AP1000 Licensing	WEC	X	X	X
March Grider	Manager, Nuclear Operations	WEC		X	X
Patrick Sebastiani	Principal Engineer	WEC		X	X
David Chapman	Fellow Engineer	WEC	X	X	X
Linda Phelps	Senior Quality Engineer	WEC		X	X
Abdul Dulloo	Product Manager	WEC		X	X
Dan Kistler		WEC			X
Bill Smoody	Principal Engineer	WEC		X	X
Lou Grobmyer	Consulting Enginer	WEC			X
Thomas Rodack	Director, Nuclear Fuels	WEC			X
Stacy Smith	Inspector	NRC	X	X	
Garrett Newman	Inspector	NRC	X	X	
Christopher Van Wert	Technical Expert	NRC	X		
Dr. Mathew Panicker	Technical Expert	NRC	X		
Dan Kistler	Principal Engineer	WEC		X	
Kristopher Cummings	Manager, Fuel Engineering Licensing	WEC		X	
Mark Stofko	Manager, I&C Licensing	WEC		X	
John Deblasio		WEC	X	X	X
Ben Holspple	Quality Engineer	WEC		X	
April Lloyd	Acting Director PSDR	WEC		X	
Stephanie Grier	Quality Engineer	WEC		X	
Stephen Packard		WEC		X	
Marty Ryan	Principal Engineer	WEC		X	X
Matthew Shakon	Senior Engineer	WEC		X	

Name	Title	Affiliation	Entrance	Exit	Interviewed
Dale Harmon	Quality	WEC	X	X	X
Larry Erin	Director, Regulatory Oversight	WEC	X	X	X
Maria Assard	Manager, Safety System Support			X	

2. INSPECTION PROCEDURES USED:

Inspection Procedure 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance," dated February 13, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML113190538)

Inspection Procedure 43002, "Routine Inspections of Nuclear Vendors," dated April 25, 2011 (ADAMS Accession No. ML110871933)

Inspection Procedure 43004, "Inspection of Commercial Grade Dedication Programs," dated April 25, 2011 (ADAMS Accession No. ML110871957)

3. ITEMS OPENED, CLOSED, AND DISCUSSED:

Item Number	Status	Type	Description

NONE

4. DOCUMENTS REVIEWED:

- "Subcritical Rod Worth Measurement (SRWM) Methodology Issues Lessons Learned ," PowerPoint Presentation for High CAPs Issue – 12-012-M011
- ANSI/ANS-19.6.1-2011, "American National Standard Reload Startup Physics Tests for Pressurized Water Reactors," dated January 13, 2011
- Blanket PO B02642 from STPNOC, Revision 16, dated October 14, 2010
- CN-NO-11-11, "Subcritical Rod Worth Measurement Data Analysis System (SRWM DAS) Version 4.0.3 Software Change Specification," Revision 0
- CN-SST-07-7, "Advanced Digital Reactivity Computer (ADRC) Version 4.03, Software change Specification," Revision 0
- Commercial Grade Dedication Instruction (CDI)-4056, "Services associated with Build to Print Fabricated Parts & Assemblies," Revision 6, dated December 17, 2012
- Drawing 10074D42, "Standard 1E to Non-1E Isolation Raceway Details," Revision 2
- IR # 10-160-M013, "Local Coincidence Logic Processor Not Receiving Partial Trip Data over High Speed Link," dated June 9, 2010
- IR # 11-055-M015, "Withdrawal of DRWM Clarification letter from the NRC," dated May 29, 2011
- IR # 11-132-M029, "Basis for SRM Predicted Total Bank Worth," dated May 12, 2011

- IR # 11-193-M025, “SPT/SRWM Design Constants File Predicted Eigenvalues Inconsistent with ANC Sequence,” dated July 12, 2011
- IR # 11-200-M011, “Total Bank Worth Review Criteria Failed during DRWM Testing at Ginna Cycle 36 Startup,” dated July 19, 2011
- IR # 11-285-M001, “Subcritical Rod Worth Measurement (SRWM) Version 4.0.2 Software Error,” dated October 12, 2011
- IR # 11-290-M024, “Error Precursor in SRWM Software,” dated October 17, 2011
- IR # 12-012-M011, “Potential Discrepancy in Measured Eigenvalue Determination Using SCICR Methodology,” dated January 12, 2012
- LTR-NO-09-104, “Executed Procedure ADRC-SW-001 Rev. 9 for Windows XP,” dated March 26, 2010
- LTR-NO-11-113, “Software Release of SWRM Version 4.03 on Windows XP Platform,” dated October 17, 2011
- LTR-NO-112, “Installation and Pre-Configuration Validation Testing of SRWM Version 4.0.3 and SRWM Single Application Computer Program References for Internal Use,” dated October 17, 2011
- LTR-NO-12-15, “Subcritical Physics Testing (SPT) With Subcritical Rod Worth Measurement Methodology (SRWM); Plant Specific Impact Assessment for South Texas Unit 1 Cycle 17 and Unit 2 Cycle 16,” dated February 17, 2012
- LTR-NO-12-22, “Subcritical Physics Testing (SPT) With Subcritical Rod Worth Measurement Methodology (SRWM); Plant Specific Impact Assessment for Wolf Creek Cycle 19,” dated February 17, 2012
- LTR-NRC-12-41, “Subcritical Rod Worth Measurement (SRWM) Methodology Service Withdrawal,” dated April 25, 2012
- LTR-PO_07-67, “ADCR.EXE Version 4.03 Installation and Validation Results for Windows 2000 Operating System,” dated June 13, 2007
- LTR-SRC-10-52, “Opening Request for PD-10-12, ‘Local Coincidence Logic (LCL) Processor Not Receiving Partial Trip Data Over High Speed Link (HSL),’” dated July 23, 2010
- LTR-SRC-10-74, “Closeout Request for PD-10-12, ‘Local Coincidence Logic (LCL) Processor Not Receiving Partial Trip Data Over High Speed Link (HSL),’” dated September 20, 2010
- LTR-SRC-12-9, “PD-876 Closeout, “SRWM Methodology Software,” dated February 21, 2012
- NSNP 3.6.2, “Validation of Computer Software,” Revision 2, dated February 8, 2010
- PO 481008 from Ameren, Revision 2, dated May 17, 2012
- PO 745758, Revision 0, dated May 28, 2009
- PO SNG28577-0003 from Georgia Power (Vogtle 2), Revision 0, dated August 13, 2012
- QSP-219, “Quality Specification for Procurement Services Associated with Build to Print Fabricated Parts & Assemblies,” Revision 9, dated December 2012
- Technical Bulletin (TB)-12-3, “Subcritical Rod Worth Methodology,” dated February 17, 2012
- WCAP-13360-NP-A, “Clarification on Use of Dynamic Rod Worth Measurement (DRWM) in Initial Plant Start-up Applications,” Supplement 1, Revision 0, dated March 2012
- WCAP-16260-P-A, “The Spatially Corrected Inverse Count Rate (SCICR) Method for Subcritical Reactivity Measurement,” Revision 1, dated July 2007

- WEC 16.2, “Westinghouse Corrective Actions Process,” Revision 4.1, dated April 17, 2012
- WEC 21.0, “Identification and Reporting of Conditions Adverse to Nuclear Safety,” Revision 7.1, dated June 27, 2012
- WEC 21.0, “Identification and Reporting of Conditions Adverse to Safety,” Revision 7.1, dated June 27, 2012
- WNA-DS-02182-GEN, “Class 1E to Non-Class 1E Isolation Barrier Design Requirements,” Revision 1, dated November 2012
- WEC 3.6.1, “Computer Software Development Process,” Revision 0.0
- NSNP 3.6.3, “Configuration Control of Computer Programs and Systems,” Revision 2
- WEC 3.6.5, “External Computer Software,” Revision 0.0, dated July 24, 2012.
- HTS-AC160-001, “Inspection Procedure: Visual Inspection of AC160 Hardware,” Revision 18, dated March 2012
- WNA-PT-00156-GEN, “Test Plan for the AC160 Automated Vision Inspection System,” Revision 0, dated February 2012
- WNA-TR-02698-GEN, “Test Report for the AC160 Automated Vision Inspection System,” Revision 0, dated March 2012
- CN-NO-12-9, “Advanced Digital Reactivity Computer (ADRC) Version 5.0 Software Requirements Specification,” Revision 0
- WEC 3.3.1, “Design Reviews,” Revision 5.0, dated April 24, 2013
- WEC 3.6.1, “Computer Software Development Process,” Revision 0.0, dated July 24, 2012
- Final Design Review (FDR) 12-21, “Advanced Digital Reactivity Computer (ADRC),” dated February 7, 2013
- WEC 21.0, “Identification and Reporting of Conditions Adverse to Nuclear Safety,” Revision 7.1, dated June 27, 2012, establishes the requirements for identifying, evaluating and processing potential conditions adverse to nuclear safety.
- WEC 7.1, “Supplier Qualification and Assessment,” Revision 4.1, dated February 18, 2013, establishes the requirements for conducting, reporting, verifying corrective action, and maintaining records of a quality program assessment to evaluate a suppliers’ quality assurance program as well as the supplier performance in implementing their program.
- WEC 16.2, “Westinghouse Corrective Action Process,” Revision 4.1, dated April 17, 2012, establishes requirements for identifying, documenting and resolving issues that require corrective or preventive action.
- WEC 22.5, “Westinghouse Human Performance Program,” Revision 1, dated February 8, 2010, establishes the framework for the human performance program.
- Issue Report (IR) 13-039-M007, dated February 8, 2013
- IR 13-049-M001, dated February 18, 2013
- Commitment 13-049-M001.02
- IR 13-056-M002, dated February 25, 2013
- WES-2012-318-R, “Supplier Quality Program Audit Report of Pennatronics,” dated February 13, 2013
- SSHE-SHC-13-004, “Evaluation of Product Related Audit Findings – Pennatronics,” dated March 22, 2012

- Human Performance Event Investigation Report for IR 13-056-M002, dated February 14, 2013
- SWO-13-092-M042, “Stop Work Order,” issued to Pennatronics, dated April 8, 2013

5. ACRONYMS USED:

AC	advant control
ADRC	Advanced Digital Reactivity Computer
AP1000	Advanced Passive 1000-MW reactor
ARO	all rods out
CBC	critical boron concentration
CEVB	Construction Electrical Vendor Branch
CDI	commercial dedication instruction
CFR	*Code of Federal Regulations*
Common Q	common qualified
DCIP	Division of Construction Inspection and Operational Programs
DCP	design-change proposal
DRWM	dynamic rod-worth measurement
E&DCR	engineering and design coordination report
HZP	hot zero power
IP	inspection procedure
IR	issue report
ITC	isothermal temperature coefficient
NRC	(U.S.) Nuclear Regulatory Commission
NRO	Office of New Reactors
PO	purchase order
QA	quality assurance
SR	source range
SRWM	subcritical rod-worth measurement
TBW	total bank worth
WEC	Westinghouse Electric Company