



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 16, 2021

Site Vice President
Entergy Operations, Inc.
Waterford Steam Electric Station, Unit 3
17265 River Road
Killona, LA 70057-3093

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 – SUMMARY OF REGULATORY AUDIT AND COMPLETED OPEN ITEMS LIST IN SUPPORT OF DIGITAL UPGRADE LICENSE AMENDMENT REQUEST (EPID L-2020-LLA-0164)

Dear Sir or Madam:

By letter W3F1-2020-0038 dated July 23, 2020, as supplemented by letters W3F1-2021-0002, W3F1-2021-0015, W3F1-2021-0025, W3F1-2021-0026, W3F1-2021-0032, W3F1-2021-0041, W3F1-2021-0047, W3F1-2021-0051, and W3F1-2021-0054 dated January 22, January 29, March 5, March 19, May 21, June 2, June 21, July 19, and July 29, 2021, respectively,¹ Entergy Operations, Inc. (the licensee) applied for a license amendment to Renewed Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3. The proposed changes would revise various technical specifications in order for the licensee to implement a planned modification that will replace the digital minicomputers of the core protection calculator system (CPCS) and the control element assembly calculator system with a more reliable digital system. The amendment supports the replacement of the existing CPCS, also called the legacy system, with a functionally equivalent digital Common Qualified CPCS provided by Westinghouse Electric Company, LLC.

The U.S. Nuclear Regulatory Commission (NRC), Office of Nuclear Reactor Regulation staff conducted a virtual audit to support its review of the amendment request. The NRC staff audited various licensee documents and interviewed licensee (and its contract support) staff. The NRC staff issued its audit plan² on October 1, 2020, and supplemented the plan by e-mail³ dated March 22, 2021.

Enclosure 3 of this letter contains proprietary information. When separated from Enclosure 3, this document is DECONTROLLED.

¹ Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML20205L588, ML21024A005, ML21029A156, ML21064A535, ML21082A393, ML21141A000, ML21153A390, ML21172A299, ML21200A254, and ML21210A283, respectively

² ADAMS Accession No. ML20268B324

³ ADAMS Accession No. ML21084A255

The NRC staff used an “open item process”⁴ to support the licensing review and identify potential requests for additional information and audit items. The NRC and licensee discussed these open items during partially closed meetings. The NRC staff maintained the open items in a spreadsheet, which the NRC staff attached to the meetings’ summaries.⁵

The NRC staff conducted the audit using internet-based portals provided by the licensee and its contractors. The NRC staff held multiple teleconferences with the licensee and its contractors. The purpose of the audit was to review the licensee’s (and its contractors’) documentation related to the subject of its application (e.g., calculations, reports, and vendor oversight plan), which were not available in ADAMS, to acquire additional understanding about the amendment request and to determine whether additional information was needed to be docketed to complete the staff’s safety evaluation.

On November 19, and December 10, 2020, and January 21, February 17, March 3, March 28-April 1, April 6–8, April 14, April 28, and June 9, 2021, the NRC staff held teleconferences with the licensee to discuss the documents on the portal and the topics contained in Enclosures 2 and 3 of this audit summary.

In accordance with the audit plan, the NRC sent the licensee a request for additional information by letter dated April 29, 2021 (ADAMS Accession No. ML21112A254). The licensee responded to the NRC’s request and supplemented its amendment request.

In lieu of an exit meeting, the licensing project manager informed licensee staff by telephone on June 30, 2021, that the NRC staff completed its audit and no longer needed access to the portals after completion of the licensing review. The NRC also closed all open items associated with its review of the license amendment request. Enclosure 1 of this audit summary lists the NRC and licensee (and its contractor) staff that participated in the audit. Enclosures 2 and 3 list the documents that the NRC audited and have a summary of topics discussed during the audit. Enclosures 4 and 5 have the completed open items list.

The NRC staff has determined that Enclosure 3 contains proprietary information pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 2.390, “Public inspections, exemptions, requests for withholding.” The proprietary information is indicated by bold text enclosed within **[[double brackets]]**. The proprietary version of the Open Items List is provided as Enclosure 3. Accordingly, the NRC staff has also prepared a nonproprietary version of the Open Items List, which is provided as Enclosure 4.

⁴ Enclosure 3 to ADAMS Accession No. ML20289A267

⁵ The meeting dates and corresponding meeting summaries’ ADAMS Accession Nos. are: September 22 (ML20288A742), October 21 (ML20315A267), November 4 (ML20325A321), and November 18, 2020 (ML20325A241); and January 6 (ML21032A013), January 21 (ML21032A013), February 3 (ML21039A268), February 17 (ML21071A286), March 3 (ML21075A032), March 17 (ML21085A865), and April 14, 2021 (ML21112A249).

If you have any questions, please contact Ms. Audrey Klett, at 301-415-0489 or by e-mail to Audrey.Klett@nrc.gov.

Sincerely,

/RA Audrey Klett for/

Jason J. Drake, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosures:

1. List of Audit Participants
2. Summary of Audited Documents
and Audit Discussions
3. Completed Open Items List –
Proprietary
4. Completed Open Items List –
Nonproprietary

cc: Listserv w/o Enclosure 3

LIST OF AUDIT PARTICIPANTS

U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation Staff

Odunayo Ayegbusi, Probabilistic Risk Assessment (PRA) Licensing Branch B
Samir Darbali, Long Term Operations and Modernization Branch
Greg Galletti (observer), Quality Assurance and Vendor Inspection Branch
DaBin Ki, Operator Licensing and Human Factors Branch
Audrey Klett, Plant Licensing Branch 1
Richard Stattel, Instrumentation and Controls Branch
Summer Sun, Nuclear Systems Performance Branch
Tarico Sweat, Technical Specifications Branch
Shilp Vasavada, PRA Licensing Branch C
Justin Vazquez, Operator Licensing and Human Factors Branch
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Steven Merkiel
Warren Odess-Gillett
Erin Orga
Steven Slowik
Matt Shakun
John Wiesemann

The U.S. Nuclear Regulatory Commission (NRC) staff audited, in a sampling manner, the following documents during its review of the license amendment request for the Waterford Steam Electric Station, Unit 3 (Waterford 3 or Waterford Unit 3). This enclosure does not include documents that are in NRC's Agencywide Documents Access and Management System (ADAMS). This enclosure also summarizes audit discussions among the licensee, the licensee's contractors, and the NRC staff.

Entergy Operations, Inc. (Licensee) Documents

1. AUD-WF3-2019-00236-CA058, "Entergy VOP [Vendor Oversight Plan] Audit Report: Software Regression Analysis," No Date Provided

This report documents the licensee's audit conducted at Westinghouse Electric Company, LLC (Westinghouse or the vendor) in Cranberry, Pennsylvania. This report documents the licensee's review of the regression analysis performed for the core protection calculator (CPC) reference design (i.e., the baseline software release) to the original software installed at the Palo Verde Nuclear Generating Station (Palo Verde). This report also documents the licensee's oversight activities to verify that Westinghouse followed independent verification and validation (IV&V) requirements in the NRC-approved Common Qualified (Common Q) software program manual (SPM). This audit report states that a majority of the algorithm tests from Palo Verde are not planned to be retested and that the licensee would need to audit or review these tests in detail at a future audit. This audit report also identifies areas where Westinghouse's corrective action program identified measures to prevent issues related to a lack of formal communication of design changes with the software design team. Westinghouse identified these issues during regression analysis between various release versions for the Palo Verde core protection calculator system (CPCS).

2. AUD-WF3-2019-00236-CA071 "Entergy VOP Audit Report: Requirements Traceability Audit," October 13, 2020

This report documents the licensee's audit of Westinghouse, which the licensee conducted remotely during June 8-12, 2020. The licensee reviewed the draft requirements traceability matrix (RTM) tables for the CPCS system requirement specification, including WNA-RTM-00076-CWTR3, Revision C, "Requirements Traceability Matrix for the Core Protection Calculator System Upgrade Project." The audit reviewed requirements traceability analysis for the "delta" approach in which the requirements traceability analysis performed by IV&V is based on the delta between the Waterford Unit 3 CPCS project and the reference plant.

3. AUD-WF3-2019-00236-CA127, Revision 0, "Entergy VOP Audit Report: Requirements Phase IV&V Audit," April 7, 2021

This audit report documents the licensee's audit of Westinghouse's CPCS requirements phase activities. This audit focused on ensuring the requirements identified in the RTM match those in Waterford Unit 3 documents. This audit report covers two audits: (1) the CPCS requirements phase activities, and (2) the small-scale audit conducted in early March 2021 as part of condition report (CR) No. CR-HN-2021-00060, corrective action (CA) No. CA-00002 for the CI631 card issues identified during the January 2021 single channel factory acceptance test. This report concludes that the audit was successful and that either

Enclosure 2

all questions were answered satisfactorily or those requiring further actions were added to the Global Instrumentation and Control Issue Tracking System.

This report notes that the licensee generated CR-HQN-2021-0557, -0558, and -0561 during the NRC audit to address potential discrepancies the NRC staff identified during its review of Westinghouse documents and requirements tracing issues. The licensee stated that it will include the extent of the CR and its IV&V document reviews in Revision 1 of this audit report.

4. CPP-WF3-2019-002 (WTF3-2019-00236), Revision 0, "CPCS Replacement Project Critical Procurement Plan (CPP)," June 21, 2019

This document identifies the proposed CPCS replacement project, evaluates the risk associated with this project, and identifies risk mitigators. This document also identifies the major milestones and the estimated schedule for each milestone. This document includes an evaluation of various design and plan development and procurement considerations, in-process verification activities, site acceptance and preinstallation activities, budget, inventory, documentation considerations, and any associated work tracking items related to the evaluation results.

5. EN-AD-101, "NMM [Nuclear Management Manual] Procedure Process," January 2021

This procedure establishes, in part, a process to standardize fleet programs and processes to achieve excellence, as defined in another licensee document, EN-PL-100, "Nuclear Excellence Model."

6. EN-DC-115, Revision 30, "Engineering Change Process," July 28, 2020

This procedure provides the licensee's standard process for engineering changes, from the development of the change to its closure. This procedure has specific criteria for digital equipment software and cyber security requirements and requires adherence to EN-IT-104, "Software Quality Assurance," for software related procurements.

7. EN-DC-149, Revision 15, "Acceptance of Vendor Documents," March 18, 2020

This procedure establishes the process for controlling the receipt, distribution, review, and revision of technical vendor documents not originating from the licensee. This procedure applies to the acceptance of vendor prepared engineering changes, with the exception of those engineering changes prepared, reviewed, approved, and accepted using the standard design process referenced in EN-DC-115.

8. EN-DC-163, "Human Factors Evaluation," January 2021

This procedure provides guidelines for ensuring that modifications to instrumentation and control panels, boards, and workstations at licensee facilities conform to human factors engineering standards and consider the needs of the operator. The procedure provides for ensuring that applicable human factors criteria established during the detailed control room design reviews of each licensee facility are addressed for future modifications. Additionally, the procedure states to whom and to what this procedure applies.

9. EN-IT-104, Revision 16, "Software Quality Assurance Program," August 20, 2019

This procedure establishes a unified software quality assurance program for the licensee's nuclear fleet. This procedure provides the method for authorizing, controlling, approving, and implementing software changes.

10. EN-MP-100, Revision 14, "Critical Procurements," September 4, 2020

This procedure provides for establishing oversight activities of the planning and execution of services related to critical materials, including the criteria for critical procurement and a template for developing a critical procurement plan.

11. EN-PL-101, "Entergy Nuclear Organization and Functional Structure," January 2021

This manual describes the licensee's organization and the key personnel responsible for the safe and reliable operation of its nuclear sites.

12. EN-TQ-201, "Systematic Approach to Training Process," January 2021

This procedure establishes the process for the systematic approach to training for the development, administration, and maintenance of training programs at the licensee's facilities.

13. EN-TQ-212, "Conduct of Training and Qualification," January 2021

This procedure summarizes: (1) the roles and responsibilities of workers, line management, and training personnel for the conduct of training and qualification activities, and (2) accredited and non-accredited training programs.

14. ENT-WF3-CPC-022, "Audit Plan for the Westinghouse Audit on September 3–5, 2019," August 19, 2019

This audit plan describes the licensee's planned audit of Westinghouse's processes and procedures for the CPCS project. The plan provides for auditing requirements traceability, configuration management, testing, secure development environment, quality assurance program compliance, software verification and validation (V&V), the Westinghouse Input/Output (I/O) Simulator, the corrective action program, the delta approach, Palo Verde CPCS code issues, the Common Q window watchdog timer, VOP critical characteristics, and Common Q I/O card technical information.

15. ENT-WF3-CPC-043, "Audit Plan for the Westinghouse Audit on October 17, 2019," October 10, 2019

This document describes the licensee's planned audit of Westinghouse's process for deriving system requirements based on the Waterford Unit 3 CPCS functional requirements.

16. ENT-WF3-CPC-101, "Audit Plan for the Westinghouse Audit on March 9th – 13th 2020," February 13, 2020

This document describes the licensee's planned audit to review the V&V report and documentation associated with the Palo Verde CPCS software Revision 6.7, which is the

baseline starting point for the Waterford Unit 3 CPCS software. The licensee's audit activities included review of the regression analysis and the testing procedure and reports that support the software release and demonstrate the applicable SPM process for such testing.

17. ENT-WF3-CPC-017, "Cabinet Door Lock Replacement Not Necessary for the CPC Project," August 13, 2019, and ENT-WF3-CPC-115, "Control Panel 7 & 2 Cyber Security Door Lock Plan," March 17, 2020

These documents describe the licensee's intended cyber security requirements for the control panel cabinet doors. The NRC staff did not identify discrepancies during its review of these documents.

18. ENT-WF3-CPC-127, "Audit Plan for the Westinghouse Requirements Traceability Audit June 8 – 12, 2020," April 20, 2020

This document describes the licensee's planned remote audit of Westinghouse documents and processes as part of the CPCS replacement project VOP, that took place June 8-12, 2020. The audit plan covers the licensee's review of the RTM and the Waterford Unit 3 delta documents.

19. ENT-WF3-CPC-279, Update for VOP Audit Plan for the Requirements Phase IV&V Audit, February 4, 2021

This document describes the licensee's final planned remote audit for the Requirements Phase IV&V performed during February 10–24, 2021. The licensee's audit activities included requirements traceability, regression analysis, and review of the test procedures and test reports that support the software release and demonstrate the applicable SPM process for such testing.

20. Entergy Quality Assurance Program Manual (QAPM), Revision 39, July 16, 2020

The licensee's QAPM describes the quality assurance program and associated implementing documents that provide control of activities that affect the quality of safety-related structures, systems, and components. The QAPM identifies regulatory commitments, including commitments to NRC regulatory guides.

21. LO-HQNLO-2018-00081, "CPCS Benchmarking Report," January 2021

This report summarizes the initial benchmarking trip by the Waterford CPCS Team to Palo Verde.

22. LO-HQNLO-2019-00086, "CPCS Benchmarking Report," January 2021

This report summarizes a follow-up benchmarking trip conducted by the Waterford CPCS Team to Palo Verde.

23. Purchase Order (PO) 10587546, Revision 2, "CPC, CEAC [Control Element Assembly Calculator], CEAPDS [Control Element Assembly Position Display System] Single Channel and Four Channel Components," August 15, 2019

This document is the licensee's PO for the procurement of CPCS components from Westinghouse. This PO imposes additional procurement specifications (e.g., SPEC-18-00005-W, Revision 0) on Westinghouse. This PO also requires that Westinghouse certify CPCS design documents reviewed and accepted by the licensee. This PO requires Westinghouse to seismically and environmentally qualify items in the PO in accordance with Institute of Electric and Electronics Engineers (IEEE) Standard (Std) 344-1975, "IEEE Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations," and IEEE Std 323-1971, "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations," respectively. The PO also requires Westinghouse to certify that all cables meet the flame test requirements of IEEE Std 383-1974.

24. PO 10591996, "Input/Output (I/O) Simulator Components," October 3, 2019

This document is the licensee's PO for the procurement of I/O simulator equipment, including the I/O chassis, processor cards, and rack to simulate CPCS I/O signals.

25. SPEC-18-00005-W, Revision 0, "Core Protection Calculator System Procurement Specification," April 2, 2019

This document establishes the technical requirements for the replacement CPCS. The licensee imposed this specification on Westinghouse (the supplier) in PO 10587546. Section 3.0 of this document provides a list of regulatory documents, codes, standards, commitments, and procedures that are directly applicable to the design, procurement, manufacture, installation, testing, operation, modification, and maintenance of the system and its components and constituent parts, and requires Westinghouse to comply with them.

26. "VOP Audit Report #1, Entergy – Audit Report for Audit Conducted September 3rd – 5th 2019," October 24, 2019

This report documents the audit that the licensee conducted at Westinghouse offices in Windsor, Connecticut. The report identifies what the licensee audited, including Westinghouse's procedures and processes related to engineering change, configuration management, and commercial grade dedication program. The audit report also documents discussions the licensee held with Westinghouse regarding the terminology for various tests performed on Common Q-based safety-related systems and Westinghouse's IV&V process for Common Q application software development activities and design outputs.

27. VOP-WF3-2019-00236, Revision 4, "Waterford Steam Electric Station Unit 3 Core Protection Calculator System Replacement Project Vendor Oversight Plan," January 20, 2021

The CPCS VOP provides a description of the oversight activities that the licensee will perform of Westinghouse for the development of the CPCS. This plan identifies key stakeholders that will participate in vendor oversight activities, project and technical risk factors, and performance measures and acceptance criteria. This plan also identifies the various processes and procedures that govern the vendor oversight activities described in

the VOP and the relationship between the licensee's QAPM and the referenced procedures. The VOP identifies critical characteristics important to design, material, and system performance that the licensee will verify as a part of the vendor oversight activities described in the plan. The VOP also describes the design artifacts that the licensee will review and the software lifecycle activities that the licensee will audit. The VOP states that the licensee will make changes to the VOP per the engineering change process described in EN-DC-115.

Westinghouse Electric Company, LLC Documents

28. 00000-ICE-36369, Revision 2, "CPC Timing Analysis for the Common Q Core Protection Calculator System," September 14, 2006

This timing analysis evaluates the response times of the generic Common Q CPCS with respect to updated final safety analysis report (UFSAR) acceptance criteria for the different CPC process inputs and documents. The analysis concludes that the generic Common Q CPCS will meet the required response times and perform the rate change and reactor power cutback functions correctly with the described changes. The NRC staff did not identify discrepancies during its review.

29. 00000-ICE-37764, Revision 4, "Summary Qualification Report of Hardware Testing for Common Q Applications," 2014

This report presents an overview of the results of the Common Q supplemental hardware qualification program, which qualifies a group of equipment for use in safety-related applications in nuclear power plants. The qualified equipment consists of digital processors, I/O modules, power supplies, display systems, and miscellaneous support equipment.

30. 00000-ICE-37773, Revision 0, "Supplemental Qualification Test Report for Common Q Applications," April 2003

This report provides a summary of the hardware qualification testing performed to certify various equipment as Class 1E for use in Common Q systems. The testing performed includes seismic, environmental, and electromagnetic compatibility tests.

31. 00000-ICE-37778, Revision 0, "Qualification Summary Report for the PVNGS [Palo Verde] Common Q Based CPCS," April 2003

This report provides a summary of the qualification status of the equipment in the Palo Verde replacement CPCS. This report also provides an overview of the equipment qualification testing performed for the Common Q program.

32. AN03007Sp, "AC160 [Advant Controller 160] CPU [Central Processing Unit] Loading Restrictions," March 26, 2003

This document is Reference 1.4.2.12 of Westinghouse specification 00000-ICE-30158, Revision 14, "System Requirements Specification for the Common Q Core Protection Calculator System." This document identifies restrictions to the AC160 system related to the CPU load limit and avoiding overload conditions. This document also specifies the tests confirming that the system will not be overloaded with the maximum CPU load limit specified in Section 3.2.7.2.7 of the licensing technical report (LTR). During the audit, the NRC staff

reviewed the design restrictions and compared them with those identified in Section 3.2.7.2.7 of the LTR for the CPCS upgrade. The NRC staff noted to the licensee that Section 3.2.7.2.7 of the LTR did not address two of the design restrictions. The licensee later updated Section 3.2.7.2.7 of the LTR to include them.

33. Calculation Note CN-EQT-19-6, Revision 0, "Determination of In-Equipment Response Spectra for Waterford Unit 3 Core Protection Calculator System," August 12, 2019

This document includes the calculation results to develop in-equipment response spectra for the CPCS project. It also includes calculation methods, inputs, analysis, and evaluation details.

34. CN-EQT-20-5, Revision 1, "Qualification Evaluation of Core Protection Calculator System Equipment for Waterford Unit 3 Main Control Room," August 27, 2020

This document provides an assessment of the existing qualification of the CPCS upgrade equipment to be installed in the main control room and identifies required additional efforts to complete qualification of the main control room CPCS upgrade equipment.

35. CN-EQT-20-7, Revision 0, "Seismic Evaluation of Waterford Unit 3 Auxiliary Protection Cabinet," May 11, 2020

This document provides calculations for determining the impacts to the existing seismic qualification of the auxiliary protection cabinet from the modifications supporting the CPCS upgrade project. The document's calculation and evaluation show that there is no significant impact to the seismic qualification of the existing auxiliary protection cabinet structure from the modifications supporting the CPCS upgrade project.

36. CWTR3-19-21, Revision 2, "Transmittal of Westinghouse Final Compliance Matrix for SPEC-18-00005-W," June 28, 2019

This letter includes the final compliance matrix for SPEC-18-00005-W, "Core Protection Calculator Purchase Specification." The matrix includes the licensee specifications for the CPCS replacement project, Westinghouse's disposition of the specifications, and the licensee's review of the dispositions. This matrix supports requirements management.

37. EQ-TP-496-CWTR3, Revision 0, "Environmental Test Procedure for the Core Protection Calculator System Equipment," June 2020

This document includes the procedures for conducting the environmental qualification testing for the CPCS upgrade equipment.

38. EQ-TP-499-CWTR3, Revision 0, "Seismic Test Procedure for the Core Protection Calculator System Equipment," July 2020

This document provides the procedures for conducting the seismic qualification testing for the CPCS upgrade equipment.

39. EQ-TP-508-CWTR3, Revision 0, "Environmental Test Procedure for the Core Protection Calculator MUX [Multiplexer] Assembly," September 2020

This document includes the procedures for conducting the environmental qualification testing for the CPCS upgrade project auxiliary protective cabinet MUX assembly.

40. EQLR-463, Revision 0, "Electromagnetic Compatibility Report for the Waterford 3 Core Protection Calculator Upgrade Equipment," August 2020

This report provides results and other details of the electromagnetic compatibility qualification testing conducted for the CPCS upgrade equipment.

41. EQLR-470, Revision 0, "Mild Environment Test Report for the Core Protection Calculator System Equipment," September 2020

This report provides results and other details of the environmental qualification testing conducted for the CPCS upgrade equipment.

42. EQLR-475, Revision 0, "Seismic Qualification Test Report for the Core Protection Calculator System Equipment," September 2020

This report provides results and other details of the seismic qualification testing conducted for the CPCS upgrade equipment.

43. EQLR-483, Revision 0, "Mild Environment Test Report for the Auxiliary Protective Cabinet MUX Assembly," November 2020

This report provides results and other details of the environmental qualification testing conducted for the CPCS upgrade project auxiliary protective cabinet MUX assembly to demonstrate acceptable performance for its use in a mild environment.

44. GPEP-PMP-2019-000020, Revision 2, "Project Management Plan for the Waterford 3 Core Protection Calculator Upgrade," May 19, 2020

This document is Reference 28 of the LTR and describes the project management processes for the CPCS replacement. During the audit, the NRC staff reviewed the project management plan, which addresses the CPCS replacement project scope, schedule, deliverables, risk management, and project requirements and refers to other project plans for quality, requirements management, configuration management, and software development. The NRC staff did not identify discrepancies during its review.

45. LTR-TA-19-154, Revision 0, "Waterford 3 Core Protection Calculator System Safety Function Table," November 13, 2019

This document is Reference 32 of the LTR and includes a CPCS safety functions table. During the audit, the NRC staff reviewed the table, which identifies the UFSAR Chapter 15 events, credited CPCS trip signals, monitored variables and their ranges, analytical limits, number of channels, and actuation logic. The NRC staff did not identify discrepancies during its review.

46. LTR-TA-20-4, Revision 0, "Waterford Unit 3 Common Q Implementation – Non-LOCA [Loss-of-Coolant Accident] Evaluation of Updated CPCS Response Times," February 12, 2020

This document is Reference 24 of the LTR and provides the evaluation of the CPCS response times on the non-LOCA analyses caused by the implementation of the Common Q CPCS. During the audit, the NRC staff reviewed the non-LOCA evaluated events table and the response time estimated impact tables. The LTR includes Table 15 of this document as Table 3.2.6-1. The NRC staff did not identify discrepancies during its review.

47. SPEC-10-00001-MULTI, "73.55 Fleet Strategy Implementation – Fiber Optic Cable Common-Procurement Specification," February 16, 2010

This document identifies specifications for fiber optic cabling that will be used during the CPCS installation. During the NRC's audit, the NRC staff reviewed this specification to understand how it meets criteria of plant-specific Action Item No. 20 of the Common Q platform topical report safety evaluation. The NRC staff did not identify discrepancies during its review.

48. WCAP-16097-P/NP, Appendix 5, Revision 5, "Common Qualified Platform Record of Changes," October 2020

This document is Reference 13 of the LTR and the updated version of Reference 19 to the Common Q platform safety evaluation (ADAMS Accession No. ML20020A003). This document provides a summary of changes made to Common Q platform components, a detailed analysis, qualification documents, and conclusion statements on the status of all changes relative to NRC's conclusions in its safety evaluation. During the audit, the NRC staff reviewed the assessments done for all platform component changes that are applicable to the CPCS upgrade. The NRC staff did not identify discrepancies during its review.

49. WCAP-16166-P Supplement 1-E05, Revision 5, "Equipment Qualification Report for AC160 Platform – PC [Personal Computer] Node Box [PCNB] / Flat Panel Display [FPD] System Components," September 2019

This report summarizes the seismic, environmental, and electromagnetic compatibility qualification of the PCNB/FPD system components. This report also confirms that the PCNB/FPD system components are qualified for Class 1E applications and identifies the component qualified levels.

50. WCAP-16166-P, Supplement 1-E09, Revision 1, "Equipment Qualification Report for AC160 Platform – AI687 and AI688 Modules and Supporting Components for Use in Common Qualified (Common Q) Post Accident Monitoring System," September 2010

This report summarizes the electromagnetic compatibility, environmental, and seismic qualification of the analog input (AI)687 and AI688 modules for use in the Westinghouse Common Q Platform. This report confirms that the AI687 and AI688 modules are qualified for Class 1E applications and identifies the component qualified levels.

51. Westinghouse Organization Chart, as Referenced in LTR Section 5.2.12, "Software V&V Processes"

This chart identifies the Westinghouse divisions, groups, and staff involved in the CPCS upgrade project. During the audit, the NRC staff reviewed the independence between the engineering design group and IV&V group. The NRC staff did not identify discrepancies during its review.

52. WNA-AR-00861-CWTR3, Revision 2, "Software Hazard Analysis for the Core Protection Calculator System Upgrade Project," November 2020

This document is Reference 54 of the LTR and identifies the CPCS replacement software hazards and their mitigation or elimination. The NRC staff reviewed the software hazards analysis during its audit. The NRC staff did not identify discrepancies during its review.

53. WNA-CN-00566-CWTR3, "CPCS Uncertainty Calculation for Waterford Unit 3," October 22, 2019

This document is Reference 59 of the LTR and identifies instrument processing uncertainties associated with the CPCS system. During the audit, the NRC staff reviewed this calculation to understand the methods for determining instrument processing uncertainties and how the licensee will use these uncertainties to account for the revised uncertainties associated with the replacement CPCS. The NRC staff did not identify discrepancies during its review.

54. WNA-IG-00871-GEN, "Human Factors Engineering Guideline for the Common Q Display System, Westinghouse Electric Company LLC," January 2021

This procedure summarizes, in part, a design guide for the software changes made from the reference design screens. This procedure references NUREG-0700, "Human-System Interface Design Review Guidelines" (ADAMS Accession No. ML20162A214).

55. WNA-PC-00069-CWTR3, Revision 1, "Configuration Management Plan for the Core Protection Calculator System Upgrade Project," July 2019

This document is Reference 31 of the LTR and is the configuration management plan for the CPCS replacement project. During the audit, the NRC staff reviewed the configuration management plan, which identifies the configuration management responsibilities and activities, including identification of configuration items, configuration control, configuration status accounting, configuration audits and reviews, hardware and software interface control, and delivery of the product for the CPCS replacement project. The NRC staff did not identify discrepancies during its review.

56. WNA-PD-00594-CWTR3, Revision 2, "Software Development Plan for the Core Protection Calculator System Upgrade," September 2020

This document is Reference 25 of the LTR and is the software development plan derived from the SPM. The software development plan describes the CPCS replacement project organization, development tools and techniques, system development plans, training requirements, and documents to be generated. The NRC staff did not identify discrepancies during its review.

57. WNA-PQ-00496-CWTR3, Revision 1, "WF3 Project Quality Plan," July 2019

This document is the project quality plan for the CPCS replacement project. During the audit, the NRC staff reviewed the project quality plan, which describes the process for developing the CPCS replacement software, standards to be followed, and any exceptions and clarifications. The NRC staff did not identify discrepancies during its review.

58. WNA-PT-00303-CWTR3, Revision 1, "Test Plan for the Common Q Core Protection Calculator System," October 2020

This document is the CPCS replacement test plan and describes the CPCS replacement tests and testing requirements. During the audit, the NRC staff reviewed the test plan and noted that it was not clear how it would be used with Section 7, "Software Test Plan," of the SPM. The NRC staff created Open Item No. 41 (ADAMS Accession Nos. ML21223A143 (Enclosure 4; not publicly available, proprietary information) and ML21160A057 (Enclosure 5, nonproprietary)) to understand how the licensee derived WNA-PT-00303-CWTR3 from Section 7 of the SPM, and how the licensee will use WNA-PT-00303-CWTR3 in conjunction with Section 7 of the SPM.

59. WNA-PV-00110-CWTR3, "Software Verification & Validation Plan for the Core Protection Calculator System Upgrade Project," January 2020

This document is the software V&V plan, which identifies software IV&V activities for the CPCS project (e.g., IV&V organizational requirements, IV&V activities for each of the life cycle phases, IV&V methods and tools, and reporting requirements) to ensure that the CPCS software performs its intended functions. The NRC staff did not identify discrepancies during its review.

60. WNA-RM-00015-CWTR3, Revision 2, "Requirements Management Plan for the Core Protection Calculator System Upgrade Project," April 2020

This document specifies the management process implementation for the Waterford Unit 3 CPCS system requirements that have changed from the reference design. During the audit, the NRC staff reviewed the requirements management plan, which addresses the requirements definition and traceability for the CPCS replacement software requirements specification. The NRC staff did not identify discrepancies during its review.

Summary and Results of Audit Discussions with Licensee Regarding VOP Implementation for the Requirements Phase

The NRC and licensee had audit discussions regarding vendor oversight activities conducted on the CPCS development activities and design artifacts, including those completed for the reference plant (i.e., Palo Verde). The NRC staff discussed the letters sent from the licensee to Westinghouse regarding documents reviewed in accordance with EN-DC-149, as shown in the EN-DC-149 forms, and Westinghouse's response to the licensee's comments on these documents. The NRC staff requested the licensee to describe how the comments were dispositioned relevant to the final acceptance of the document and explain why certain letters did not follow the documented process in EN-DC-149 for comment disposition. As a result, the licensee created CR-HQN-2021-00558 to resolve the observed potential discrepancies on the EN-DC-149 forms for reviewing Westinghouse documents.

The NRC staff requested the licensee to clarify whether the licensee reviewed Westinghouse's procedure, NABU-DP-00014-GEN, Revision 12, "Design Process for Common Q Safety Systems," and whether the oversight activities performed to date verified that Westinghouse is adhering to this procedure for the CPCS project. Licensee staff stated that the oversight activities performed to date (of the audit discussion) did not include verification that Westinghouse had followed the processes in NABU-DP-00014-GEN. The licensee created WT-WTWF3-2019-00236 CA-0164 to track the corrective action to perform a review of NABU-DP-00014-GEN during the licensee's June 2021 design requirements IV&V audit. The NRC and licensee staff also discussed the licensee's audits of the requirements phase documents for the CPCS project, including the review of the RTM for the CPCS system requirements specification. The NRC staff noted that the licensee did not identify that there were several linkage errors in this RTM during the licensee's audit. The licensee created condition report CR-HQN-2021-00561 to document the potential gap of not documenting these linkage errors as part of its audits.

The NRC staff requested the licensee staff to clarify whether it reviewed and approved WNA-PT-00303-CWTR3, Revision 1, "Entergy Operations Inc Waterford Steam Electric Station Unit 3 Test Plan for the Common Q Core Protection Calculator System," in accordance with EN-DC-149. The licensee stated it did not perform a formal review of the test plan. The NRC staff noted that this test plan did not clearly identify which reference plant factory acceptance test would be repeated for the CPCS project. The licensee created condition report CR-HQN-2021-00648 to evaluate whether it should review and approve this test plan in accordance with EN-DC-149.

The NRC staff requested the licensee to clarify the terminology in the VOP with respect to the licensee's audit activities and Westinghouse's IV&V activities. The NRC staff noted that the VOP did not clearly distinguish the terms that describe the licensee's VOP audit activities to verify requirements traceability and Westinghouse's terms for Westinghouse's IV&V team's requirements traceability activities, as documented in WCAP-16096, Revision 5, "Common Q Software Program Manual." In addition, the VOP's organization and numbering scheme did not provide clear identification for various activities. The licensee created condition reports CR-HQN-2021-00561 and CR-HQN-2021-00622 to address the issues identified in the NRC staff's observations. The NRC staff verified the licensee implemented these changes and adequately addressed the issues in the CRs associated with VOP changes. The NRC staff will inspect the licensee's resolutions to the issues in the other CRs related to this audit during site acceptance testing.

ENCLOSURE 4

(NONPROPRIETARY)

COMPLETED OPEN ITEMS LIST

Proprietary information pursuant to Section 2.390 of Title 10 of the *Code of Federal Regulations* has been redacted from this document.

Redacted information is identified by blank space enclosed within [[double brackets]].

					<p>operating procedures will require the operators to perform system checks and verify operability of the CPCS deviation / function. The procedure will direct the operator to dispatch a maintenance technician to determine the source of the alarm as needed." (W3F1-2020-0038 Page 18 of 27)</p> <p>The NRC staff agrees with the licensee's proposed actions in the LAR. So, for this LAR the licensee should cite both the credited self-diagnostic functions in Appendix B and proposed monitoring activities to justify the SR elimination in Section 2.2 of the LAR, not just the Appendix B. However, since Section 2.2 of the LAR cites Appendix B to WCAP-18464 as the sole justification for SR elimination (see Enclosure W3F1-2020-0038, Page 5 of 27) and Appendix B does not include any plant monitoring activity, it could lead to the misunderstanding that if the NRC accepts this LAR, it would also be accepting Appendix B as the only basis for the SR elimination. In addition, the LAR says on Page 18 of 27, in part, that "while LTR Appendix B states that monitoring is not required in order to credit self-diagnostic features". The NRC staff does not agree with this statement to address the above criterion in BTP 7-17. Furthermore, Appendix B says to leverage the Vogtle LAR for the SR elimination. But, the Vogtle LAR included plant monitoring activities as one of bases for the SR elimination. Therefore, the SR Elimination basis in both Section 2.2 of this LAR and Appendix B will need to include the licensee's commitment to perform self-diagnostic monitoring activities and the Appendix B interpretations should be revised to establish consistency with the LAR.</p>	<p>"LTR Appendix B along with the Waterford System Engineer and Operations Actions Supporting TS SR Reduction (LAR Enclosure Section 3.4), provides the detailed justification that demonstrates that the self-diagnostics meet the requirements of 10 CFR 50.36 for the CPCS..."</p>		
2	ST-02	Self-Tests (Jack Zhao, Richard Stattel, Samir Darbali)	B.2.5	B-6	<p>The bullet item on this page states the following: [[</p>	<p>(Entergy 11/3/20 Update) PROPRIETARY RESPONSE A. [[]] B. [[</p>	Closed	

]]			
3	ST-03	Self-Tests (Jack Zhao, Richard Stattel, Samir Darbali)	TS BASES mark-up	52/377 81/377	<p>Insert C includes the following statement:</p> <p>“The performance of channel checks validates that the self-diagnostics are continuing to perform their self-checking functions.”</p> <p>It is not clear how a channel check can validate performance of self-diagnostics. Please provide clarification to allow the NRC staff to understand how channel checks can validate performance of self-diagnostics.</p>	<p>]]</p> <p>(Entergy 11/3/20 Update) PROPRIETARY RESPONSE</p> <p>The LTR Appendix B will be revised as follows:</p> <p>[[</p>	Closed	
4	ST-04	Self-Tests (Jack Zhao, Richard Stattel,	B.7.1	B-39	<p>Appendix B of WCAP 18464 contains the following statement:</p> <p>[[</p>	<p>]]</p> <p>A Channel Check to review that these screens contain no alarms verifies that the system is functioning correctly.</p> <p>(Entergy 11/3/20 Update) PROPRIETARY RESPONSE</p> <p>This is correct. The sentence in the LTR will be revised as follows:</p> <p>[[</p>	Closed	

		Samir Darbali)						
5	ST-05	Self-Tests (Jack Zhao, Richard Stattel, Samir Darbali)	B.3.2.1	B-10	<p>The WCAP 18464 states: "IEC 60880 is comparable to IEEE 7-4.3.2, and the staff has found IEC 880 to be an acceptable equivalent".</p> <p>This was a statement in the NRC original safety evaluation of Common Q which has been superseded. The statement has been removed from the current Common Q platform TR safety evaluation report.</p> <p>The NRC does not consider IEC 880 to be an equivalent to IEEE 7-4.3.2. As such, the NRC evaluates all digital systems to the criteria of IEEE 7-4.3.2.</p>	<p>Consistent with Westinghouse WCAP-18461, the following text will be deleted from the LTR (WCAP-18464):</p> <p>"B.3.2.1 Common Q Topical Report – NRC Safety Evaluation</p> <p>"The Common Q Platform diagnostics were developed under a robust process that was reviewed by the NRC. In 2000, the NRC issued a safety evaluation report (ML003740165, Bibliography 8) on the Common Q Topical Report (CENP-396-P, Rev. 01 which is the predecessor to WCAP-16097-P-A, Reference 4). In that report the NRC acknowledged receipt of Westinghouse document GKWF700777, "Design and Life Cycle Evaluation Report on Previously-Developed Software in ABB AC160, I/O Modules and Tool Software" (Bibliography 9) in support of the commercial dedication of the AC160.</p> <p>The safety evaluation report states that the, "AC160 PDS [Previously Developed Software] is composed of the AC160 software, S600 I/O Module(s) software, and ABB Tool software. The evaluation is based on the requirements specified in International Electrotechnical Commission (IEC) standard IEC-60880, "Software for Computers in the Safety Systems of Nuclear Power Stations." IEC 60880 is referenced in IEEE 7-4.3.2-2003, "IEEE Standard Criteria for Digital Computers in Safety Systems of Nuclear Power Generating Stations". IEC 60880 is comparable to IEEE 7-4.3.2-2003, and the staff has found standard IEC 880 to be an acceptable equivalent."</p> <p>The Design and Lifecycle Evaluation (DLCE) applies to all aspects of the PDS including the system software that executes the nuclear</p>	Closed	

						application program and the diagnostics integrated with the system software. In other words, the same software quality approach applied to both aspects of the system software. The results of this report were discussed with the NRC staff during the licensing of the Common Q platform. The NRC also reviewed this document as part of their review of LAR 19-001 for Vogtle 3&4 (Reference 42)."		
6	SA-01	Sys. Req. Spec. (Samir Darbali, Deanna Zhang)	LAR 3.1 LTR 3 LTR 5	5-1	<p>The licensee provided two CPCS System Requirements Specification (SyRS) documents: the reference CPCS design (Palo Verde) SyRS (00000-ICE-30158 (LAR Attachment 7 and LTR Reference 2)) and the WF3-specific "delta" SyRS (WNA-DS-04517-CWTR3 (LAR Attachment 8 and LTR Reference 21)).</p> <p>The staff noticed that the SyRS for the reference CPCS design (00000-ICE-30158) revision is Revision 14. The SyRS that was reviewed as part of the Palo Verde CPCS upgrade is Revision 7.</p> <p>The LAR and LTR make several inaccurate statements regarding which revision of 00000-ICE-30158 was previously reviewed by the NRC. For example:</p> <p>LAR Section 3.1 states: "The SyRS project document has a reference design document (Attachment 7), which has been previously reviewed by the NRC, and a "delta" document (Attachment 8) which describes differences for the Waterford project."</p> <p>LTR Section 5, item b. states: "The base system requirements for the WF3 CPCS is the CPCS System Requirements Specification (Reference 2), which have already been reviewed by the NRC as part of the Palo Verde CPCS replacement."</p> <p>LTR Section 5.2.4 states "As stated earlier, the reference design for the WF3 CPCS replacement is documented in Reference 2. These requirements and their traceability have already been reviewed and approved by the NRC as part of the Palo Verde CPCS replacement."</p> <p>Again, these statements are inaccurate because the SyRS that was reviewed for the Palo Verde CPCS upgrade review is Revision 7 of 00000-ICE-30158. The staff has not reviewed nor performed traceability of requirements for 00000-ICE-30158 after Revision 7. Additionally, the licensee has not demonstrated in the LAR or LTR that they have performed these activities.</p> <p>Clarification questions:</p> <ul style="list-style-type: none"> (a) Are the statements that the NRC staff had previously reviewed the SyRS (00000-ICE-30158) meant as background information, or for crediting the previous evaluation? 	<p>(a) As previously described to the NRC during the Acceptance Review discussions:</p> <ul style="list-style-type: none"> The intent of the statements in the Enclosure and LTR, as well as the entire paragraph in the Enclosure, was to communicate that the NRC has reviewed the overall design of the replacement CPC system in a previous license amendment (i.e., PVNGS 1, 2, and 3, Amendment No. 150; ML033030363). It was not Entergy's intent to state, or even suggest, that the specific revision of the reference design document that was used for the Waterford CPC replacement (i.e., Revision 14) has been reviewed by the NRC, or that the NRC's review of the previous revision (i.e., Revision 7, submitted in ML032830027) could be used for the NRC's review of the Waterford project. However, Entergy understands how the wording of the statement is ambiguous in this respect. <p>(b) 00000-ICE-30158, Rev 14, System Requirements Specification for the Common Q Core Protection Calculator System, is the basis document for WNA-DS-04517-CWTR3, System Requirements Specification for the Core Protection Calculator System. WNA-DS-04517-CWTR3 is the WF3 delta document for WF3. Requirements traceability is to WNA-DS-04517-CWTR3. When WNA-DS-04517-CWTR3, Rev 0, was reviewed and approved for owners acceptance per procedure EN-DC-149, the applicable sections of 00000-ICE-30158, Rev 14, were reviewed. Based on the regression analysis for n-th of kind systems described in WCAP-16096-P, "Software Program Manual for Common Q Systems," the only requirements traceability will be for the modified sections provided in WNA-DS-04517-CWTR3. There is a VOP audit action to compare the non-modified sections of 00000-ICE-30158, Rev 14, to the Requirements Traceability as part of the Requirements Traceability Matrix (RTM) VOP Audit.</p> <p>A regression analysis of the software is at a lower level of review than doing a regression analysis of the System Requirements Specification, and WF3 considered this review to be of greater value that a document review since this include the complete implementation of any changes. WF3 performed a regression analysis VOP audit of the current Palo Verde code (release 6.7), which was the base line for the WF3 project, to the Palo Verde initial code (release 5.0) to confirm the SPM was followed for design quality, requirements traceability, and IV&V including testing.</p> <p>00000-ICE-30158, Rev 7 to Rev 13 were not specifically reviewed or audited, since these were not credited for any vendor oversight</p>	Closed	RAI-13 (OI 6(b))

				<ul style="list-style-type: none"> • (b) Is the licensee performing independent design quality, traceability and other oversight activities for: <ul style="list-style-type: none"> ○ 00000-ICE-30158 Revision 7? ○ 00000-ICE-30158 Revisions 8 through 14? ○ or only for the WF3-specific "delta" SyRS (WNA-DS-04517-CWTR3)? • (c) Slide 37 of the March 19, 2020 preapplication meeting identified the SyRS as a living document, as defined in ISG-06 (i.e., a document that will be revised as system development activities progress). Please clarify if this statement refers to 00000-ICE-30158, WNA-DS-04517-CWTR3, or both documents. <p>10/28/2020 Update:</p> <p>(a.1) The last sentence of the response states that "However, Entergy understands how the wording of the statement is ambiguous in this respect." Please explain if the LAR and LTR will be revised to address the ambiguous wording.</p>	<p>activity or project activity. The VOP audit of the regression analysis of the software was considered by WF3 to be the best method to access the difference from the Palo Verde software to be used as the baseline for the WF3 software.</p> <p>(c) Slide 37 of the March 19, 2020 pre-application meeting identified the SyRS as a living document, as defined in ISG-06 (i.e., a document that will be revised as system development activities progress). This statement refers to only WNA-DS-04517-CWTR3</p> <p>(a.1) Yes, the LAR Enclosure will be revised per the response to SA-01a.</p> <p>Yes, the LTR Section 3.3.4, System Requirements Documentation (D.2.3.3 and D.2.3.3.1), will be revised as follows:</p> <p>From: "Reference 2 is the CPCS System Requirements Document. It is the system requirements specification for the reference design for the Common Q CPCS. The reference design system requirements is based on two requirements documents that define the legacy CPCS functionality:</p> <ul style="list-style-type: none"> - Functional Design Requirements for a Core Protection Calculator (Reference 36) and - Functional Design Requirements for a Control Element Assembly Calculator (Reference 37) <p>The Common Q CPCS reference design system requirements specification (Reference 2) was developed to migrate the functional requirements of References 36 and 37) to a Common Q CPCS architecture. The result was the Palo Verde CPCS implementation.</p> <p>The existing Waterford CPCS is based on the same two functional design requirements documents (References 36 and 37). Therefore, the CPCS reference design is also applicable to the Waterford CPCS replacement plus additional changes to accommodate plant interface differences, requested licensee improvements, and changes in technology in the Common Q platform."</p> <p>To: "Reference 2 is the CPCS System Requirements Document for the reference design for the Common Q CPCS. The reference design system requirements is based on two requirements documents that define the legacy CPCS functionality:</p> <ul style="list-style-type: none"> - Functional Design Requirements for a Core Protection Calculator (Reference 36) and - Functional Design Requirements for a Control Element Assembly Calculator (Reference 37) <p>The Common Q CPCS reference design system requirements specification (Reference 2) was developed to migrate the functional</p>		
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						<p>requirements of References 36 and 37 to a Common Q CPCS architecture. The result was the Palo Verde CPCS implementation. <i>Note that Revision 7 of Reference 2 (ML032830027) was reviewed by the NRC.</i></p> <p>The existing Waterford CPCS is based on the same two functional design requirements documents (References 36 and 37). Therefore, the CPCS reference design is also applicable to the Waterford CPCS replacement plus additional changes to accommodate plant interface differences, requested licensee improvements, and changes in technology in the Common Q platform. <i>Reference 2 is the current revision of the CPCS System Requirements Document for the reference design.</i>"</p>		
7	SDP-01	SW Dev Plan (Deanna Zhang Samir Darbali)	LTR	Section 5.1.1	<p>This section of the LTR states, "Any exceptions to the SPM would be documented in the WF3 CPCS Software Development Plan (Reference 25). The Software Development Plan also includes clarifications to particular items to make clear how certain aspects of the SPM are being fulfilled."</p> <p>For the ARP, ISG-06, Rev 2 provides guidance on what should be submitted. This includes a summary of the application software planning and processes. The LTR does not provide sufficient information to summarize the differences between the SPM and the WF3 CPCS Software Development Plan in accordance with the guidance of ISG-06, Rev. 2.</p> <p>Please summarize the differences between the SPM and the WF3 CPCS Software Development Plan.</p>	<p>Entergy Update 11/3/20</p> <p>The LTR will be revised to include the following: The WF3 CPCS Software Development Plan (WNA-PD-00594-CWTR3) documents the following alternatives to the Common Q SPM (WCAP-16096-P-A): Section 5.6.1 of the SPM states: " 1. IV&V phase summary reports: These reports are issued after each life cycle phase of the IV&V task to summarize the IV&V review. Phase summary reports may be consolidated into a single report if desired. These reports shall contain the following: a. Description of IV&V tasks performed b. Summary of task results c. Summary of discrepancies and their resolution d. Assessment of software quality e. Recommendations"</p> <p>Alternative: The IV&V activities will be performed at their respective phases per the Software V&V Plan (SVVP); however, the IV&V team will not issue phase summary reports after each life cycle phase. The results of individual tasks are documented, and anomalies are reported in the RITS system for their resolution. A final IV&V report will be issued encompassing all software development phases.</p> <p>Justification: Due to the limited scope of the project, which is based on a previously completed reference design, the Concept, Requirements, Design, and Implementation phases are impacted concurrently and iterated frequently. Therefore, having intermediate summary reports does not produce additional value to the stakeholders than what is already being provided through underlying task reports and RITS. The Phase Summary Report (PSR) is not the only method of gatekeeper for design progression to the next phase. The design can proceed based on the result of the individual tasks. Therefore, the PSR will be produced only once for this project, which will report on all activities,</p>	Closed	No RAIs

						<p>and will serve as the Final IV&V Report. This is an acceptable alternative to SPM Section 5.6.1, since the feedback to design team is provided timely based on formally issued anomalies and other underlying reports.</p> <p>Section 6.3.2 of the SPM states: "Project-specific software goes to the Lead SW engineer for approval/rejection. ...the Lead SW engineer determines the feasibility and appropriateness of project-specific software changes. They sign the form for approval / rejection."</p> <p>Alternative: All software modifications shall be documented with a Software Change Request (SCR) via Global Instrumentation and Control Issue Tracking System [RITS]. All functional deviations shall be documented with RITS. Modifications can be initiated because of a change in functional requirements or because of a functional deviation from the intended functional requirements. The RITS system does not include a method for the Lead SW engineer to approve a software change request; therefore, an alternative approach for approval by the Lead SW engineer or subsystem lead will be taken. Justification: RITS that are identified as functional RITS require approval by a software lead and/or subsystem lead for inclusion in a baseline. The initiator of the functional RITS shall: • Require a detailed evaluation of the RITS. • Route the RITS to the software lead or designated subsystem lead for formal approval of the RITS in a baseline through the detailed evaluation.</p>		
8	SDP-02	Common Q Changes (Deanna Zhang Samir Darbali)	LTR	Section 5.1.6	<p>LTR Section 5.1.6 states in part, "Appendix 5 of the Common Q Topical Report (Reference 13) is the output document for the change process described in Reference 12. The document provides a summary of changes and then detailed recording of analysis and/or qualification documents, and a conclusion statement on the status of the change relative to the NRC safety conclusions. Reference 13 can be audited by the NRC staff..."</p> <p>The response to SPM PSAI 6 refers to the Common Q PSAI regarding the record of changes, but it does not address the validity of the previously derived safety conclusions <i>if changes have been made to the Common Q SPM</i>. The response to SPM PSAI 1 refers to the WF3 CPCS Software Development Plan and does not identify if there are any exceptions to the SPM (see the previous open item).</p> <p>LTR Section 6.2.2.16 provides a list of the current product revisions used for the WF3 CPCS project. However, it does not describe whether the new revisions invalidate any of the safety conclusions in the safety evaluation of the Common Q platform. This section also states that WF3</p>	<p>The LTR Section 5.1.6 will be revised as follows:</p> <p>"There have been no changes to the SPM since its approval by the NRC. As a result, the Common Q Record of Changes document will not include any assessments of changes to the SPM."</p>	Closed	No RAIs

					<p>will review the topical report record of changes document in Reference 13 for adequate qualification documentation that the changes do not invalidate safety conclusions in the safety evaluation of the Common Q platform.</p> <p>It is not clear whether the WF3 review will verify that safety conclusions for the differences will only be on qualification or whether it would include other topics (e.g., software quality, etc.).</p>			
9	SDP-04	SW Requirements (Deanna Zhang Samir Darbali)	LTR	Section 5.2.5	<p>This section states in part, "The allocation of CPCS reference design system requirements (Reference 2) to software have already been accomplished as part of the NRC-approved Palo Verde CPCS replacement. The WF3 delta requirement from the reference design are documented in Reference 21. These are allocated to software as described in Section 5, item c and documented in the SRS....Similar to the WF3 system requirements specification, the SRS is independently reviewed, approved and baselined as input to the ongoing life cycle activities. In addition, the RTM is updated showing the tracing of software requirements to the WF3 system requirements specification (Reference 21)."</p> <p>(a) Based on this description, it is not clear whether the RTM only include requirements on the differences between the WF3 CPCS replacement system/corresponding software requirements and the system requirements/corresponding software requirements in Westinghouse Rev 14 baseline of the CPC system requirements specification or whether it includes all CPCS system requirements.</p> <p>(b) Given that (1) the WF3 system requirements specification only includes deltas between the WF3 CPCS project and the referenced System Requirements Specification of the Common Q Core Protection Calculator System (0000-ICE-30158), Revision 14, and (2) the System Requirements Specification of the Common Q Core Protection Calculator System (0000-ICE-30158) version that was reviewed and approved during the referenced Palo Verde CPCS Digital Upgrade LAR is Revision 7, it is unclear what types of regression analysis have been performed between the Revision 7 and Revision 14 of the System Requirements Specification of the Common Q Core Protection Calculator System to use Revision 14 as the new baseline for the WF3 CPCS project?</p> <p>(c) It is also not clear whether Entergy performed appropriate oversight on the activities related to addressing the differences between Revision 7 and Revision 14 of the System Requirements Specification of the Common Q Core Protection Calculator System.</p>	<p>(a) The RTM only includes requirements on the differences between the WF3 CPCS replacement system/corresponding software requirements and the system requirements/corresponding software requirements in the Westinghouse Rev 14 baseline of the CPCS requirements specification.</p> <p>(b) (Entergy 11/3/20 Update)</p> <p>The following summarizes the revisions to 00000-ICE-30158 since Revision 7.</p> <p>Revision 08 This revision was to change the state of the Operating Bypass Contact annunciator outputs as a result of field installation. Some additional typographical errors and inconsistencies were also corrected. Change Summary: Text Main Body Changes 1. Corrected Figure 2.1-1. 2. Section 2.2.1.5.2.2.1: Deleted "or CPP" from the third bullet. 3. Section 2.3.9.6.3: Revised discussion of Operating Bypass relays so that form A contacts are used on all outputs. 4. Table 3.1.1.1.7-1: Deleted CPC Trouble for CEAC processor global memory failure. 5. Section 3.5.3: Revised to define that an availability analysis shall be performed not a reliability analysis. 6. Added requirement for ANSIN45.2.2 Level B storage in new section 3.6.</p> <p>Appendix Changes: None</p> <p>Revision 09 This revision only changed page A121 in the Appendix. The change was to clarify the calculation of the row index.</p> <p>Revision 10 This revision incorporates changes to various display pages based on customer comments. Change Summary: Text Main Body Changes</p>	Closed	RAI-13 (OI 9(c))

					<ol style="list-style-type: none">1. Moved table of Contents prior to the Revision Abstract and increase number of entries.2. Revision 09 was issued with various bookmarks printed as "Error! Reference source not found". Corrected these or removed the reference (pgs 23, 30, 103, 210).3. Section 1.4.2: Removed revision level on CEAPD SysRS (Ref. 1.4.2.9) and added footnote.4. Section 2.1: Reworded last bullet and removed Reference to CEAPD SysRS.5. Section 2.1.1.4.3.4: Clarified and added reference to CEAPD data link section6. Section 2.1.2.2.4.1: added CEA positions to items transmitted to CEAPD.7. Section 2.1.2.2.4.3: Removed reference to CEAPD SysRS.8. Section 2.2.1.4.4: Added requirement for CEA trip snapshot page with live CEA position data.9. Section 2.2.1.4.6: added CRC value to Addressable Constants page.10. Section 2.2.1.4.7: added CRC value to Change Addressable constants page.11. Section 2.2.1.4.12: added missing colon for "Page 3".12. Section 2.2.1.4.19: defined CEA inputs to be displayed as SUBGRP_x on this page.13. Section 2.2.1.4.20: Corrected spelling of capability.14. Section 2.2.1.5.2.1.2: clarified trouble alarm occurs for loss of other display.15. Section 2.2.1.5.2.2: Added alarm icon label to sentence.16. Section 2.2.1.5.2.2.1 and 2, added OM and MTP CRCs do not agree to trouble list.17. Section 2.2.2.4: changed heading text and changed requirements for AI calibration testing for CPC, CPP1, and CPP2 functional tests.18. Section 2.2.2.4: Removed requirement to enable the Exit Functional test icons only if the associated AI calibration is complete. This section was modified to reflect the as implemented software.19. Section 2.2.2.4.6: added section to describe functional test interlock requirements.20. Section 2.3: corrected CEAPD description and removed reference.21. Section 2.3.4.1.3: added missing period to end of sentence.22. Section 2.3.4.4.3.2: corrected description since CEAPD does not use trip buffer data.23. Section 3.1.1.1.6.3.1: added "minimum" to description.24. Section 3.1.1.1.9.13: removed reference to CEAPD and added reference to applicable sections.25. Section 3.1.1.1.9.13.1: Clarified data being sent to CEAPD.26. Section 3.1.1.1.10.3: defined the CEA position data being sent to CEAPD and usage.27. Section 3.1.1.1.10.8: added CEA positions to CEAPD cross channel comparison information. <p>Appendix Changes:</p>		
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					<p>1. Corrected Table of contents to remove "symbol" link after Sec. 3.2.5.6. 2. Pg 116: Added IRPC decision statement to reflect text description. 3. Pg 217: Added definition of CEAIW. 4. Pg 217, 219: Moved all variable definitions to end of section 3.2.6.1.1 5. Pg 220: Clarified that CPOS(i,1) is the CEA position of the current execution cycle.</p> <p>Revision 11 Change Summary: Text Main Body Changes 1. Pg 59 clarified the conditions for taking the CEAC snapshot. 2. This revision incorporated changes to the Reactor Power Cutback detection algorithm in Appendix A.</p> <p>Revision 12 Change Summary: Appendix Changes 1. Pg A224, added footnote for starting the RPC timer.</p> <p>Revision 13 Change Summary: Text Main Body Changes 1. Page 150, incorporated CAPs Commitment 07-285-W006.02 for both CEACs inoperable.</p> <p>Revision 14 Change Summary: Text Main Body Changes 1. Re-numbered Sections to match Table of Contents per CAPAL 100074239.</p> <p>Appendix Changes: 1. Correct QHOT definition in Sections 3.2.4.5 & 3.2.4.16 of Appendix A per CAPS #08-315-W001.</p> <p>11/16/20 Update: Entergy did not perform a regression analysis between the 00000-ICE 30158 Revision 7 and 00000-ICE 30158 Revision 14 documents. Entergy performed a lower level regression analysis audit of the Palo Verde CPCS software changes between the initial release of the software that was approved by the NRC and the current baseline of the Palo Verde CPCS software. This VOP audit included all software change requests for the Palo Verde CPCS software. These software changes in some cases required a revision to the 00000-ICE 30158. This regression analysis audit is documented in an Entergy regression analysis audit report (AUD-WF3-2019-236-CA058).</p> <p>There were no hardware design changes to the CPCS since NRC approval.</p>		
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						<p>(c) Reference SA-01a and SA-01b</p> <p>00000-ICE-30158, Rev 14, System Requirements Specification for the Common Q Core Protection Calculator System, is the basis document for WNA-DS-04517-CWTR3, System Requirements Specification for the Core Protection Calculator System. WNA-DS-04517-CWTR3 is the WF3 delta document for WF3. Requirements traceability is to WNA-DS-04517-CWTR3. When WNA-DS-04517-CWTR3, Rev 0, was reviewed and approved for owners acceptance per procedure EN-DC-149, the applicable sections of 00000-ICE-30158, Rev 14, were reviewed. Based on the regression analysis for n-th of kind systems described in WCAP-16096-P, "Software Program Manual for Common Q Systems," the only requirements traceability will be for the modified sections provided in WNA-DS-04517-CWTR3. There is a VOP audit action to compare the non-modified sections of 00000-ICE-30158, Rev 14, to the Requirements Traceability as part of the Requirements Traceability Matrix (RTM) VOP Audit.</p> <p>A regression analysis of the software is at a lower level of review than doing a regression analysis of the System Requirements Specification, and WF3 considered this review to be of greater value than a document review since this includes the complete implementation of any changes. WF3 performed a regression analysis VOP audit of the current Palo Verde code (release 6.7), which was the base line for the WF3 project, to the Palo Verde initial code (release 5.0) to confirm the SPM was followed for design quality, requirements traceability, and IV&V including testing.</p> <p>00000-ICE-30158, Rev 7 to Rev 13 were not specifically reviewed or audited, since these were not credited for any vendor oversight activity or project activity. The VOP audit of the regression analysis of the software was considered by WF3 to be the best method to assess the difference from the Palo Verde software to be used as the baseline for the WF3 software</p>		
10	SDP-03	SW Design (Deanna Zhang Samir Darbali)	LTR	Section 5.2.8	<p>This section states in part, "System Validation Test – this is formal integration testing of the software and hardware performed by the independent test team. The System Validation Test traces the test cases to the WF3 CPCS replacement system requirements specification (Reference 21)."</p> <p>Please explain whether the system validation test only includes test cases for the WF3 CPCS replacement system requirements specification or if it also includes the CPCS reference system requirements specification (Rev. 14).</p>	<p>The intention is to re-run the complete set of PVNGS system tests with the design changes made for the WF3 implementation. Therefore, no credit is being taken for past system tests.</p>	Closed	RAI-13
11	VOP-01	Critical Characteristics	VOP Summary	Table of Contents	<p>It appears that the VOP does not have complete identification of activities for providing oversight of the project and will only be a plan to develop or determine them while the expectation is to have the activities and associated acceptance criteria completed. Examples include:</p>	<p>(a) Per VOP Section 7, "The scope of vendor oversight is expected to evolve during the project. Project-specific performance measures that warrant vendor oversight are updated as this list changes."</p>	Closed	Audited

		(Deanna Zhang Samir Darbali)		<p>a. Section 6: Development and Assessment of Potential Project and Technical Risk Factors b. Section 7: Determine Performance Measures and Acceptance Criteria (Critical Characteristics/Design Artifacts)</p> <p>(a) It is also not clear what oversight activities are associated with Section 7 of the VOP to verify the vendor has satisfied the critical characteristics.</p> <p>(b) Section 2 of the VOP Summary states in part "The level of vendor oversight follows a graded approach, based on project and technical risk factors, which are described in VOP Section 6. All levels of the graded approach will include specifically defined performance measures and acceptance criteria which are described in VOP Section 7." Based on this description, the project and technical risk factors and the performance measures and acceptance criteria for the critical characteristics and programmatic elements should already have been identified in the VOP. This does not appear to be consistent with the titles of Sections 6 and 7.</p> <p>(c) It is also not clear based on the title of Section 8 in the Table of Contents for the VOP, what "Implement Appropriate Oversight Methods" will entail.</p>	<p>The performance measures are divided into three categories:</p> <ul style="list-style-type: none"> • Critical Characteristics, • Design Artifacts, and • Programmatic Elements. <p>As listed in VOP Section 7, the following activities are used to provide oversight of each category:</p> <p>Critical Characteristics:</p> <p>"Oversight of critical characteristics utilizes the following vendor oversight activities:</p> <ul style="list-style-type: none"> • Conducting vendor audits and quality surveillances • Reviewing WEC design output documents • Participating in Factory Acceptance Testing • Conducting Site Acceptance Testing • Conducting Post-Modification Testing • Observing or witnessing specific vendor activities • Capturing issues in WF3/WEC corrective action programs" <p>Design Artifacts:</p> <p>"Oversight of the design artifacts utilizes the following vendor oversight activities:</p> <ul style="list-style-type: none"> • Conducting vendor audits • Reviewing WEC design output documents (e.g., specifications, drawings, analyses) • Providing input to and review/confirmation of specific vendor activities and related information items • Coordinating multi-disciplined interactions between various stakeholders • Capturing issues in WF3/WEC corrective action programs" <p>Programmatic Elements:</p> <p>"Conducting vendor audits</p> <ul style="list-style-type: none"> • Reviewing WEC design output documents • Providing input to and review/confirmation of specific vendor activities and related information items • Observing or witnessing specific vendor activities • Participating directly in specific vendor activities • Coordinating multi-disciplined interactions between various stakeholders • Capturing issues in WF3/WEC corrective action programs" <p>(b) The acceptance criteria and oversight activities have been identified in VOP Sections 6 and 7. The VOP is a plan and can be revised pending the design/project evolution. As the design/project</p>		
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						<p>progresses, it may be necessary to add more acceptance criteria or design artifacts to conduct adequate vendor oversight.</p> <p>(c) Section 8 is intended to show escalation of oversight methods based on the risk factors. If the risk factors which are periodically evaluated indicate that risks are increasing, then supplemental oversight methods may need to be used.</p>		
12	VOP-02	<p>CPP (Deanna Zhang Samir Darbali)</p>	VOP Summary	Section 2	<p>This section of the VOP Summary, states in part, "Monitoring, verification and acceptance phase activities are defined in the Critical Procurement Plan (CPP) during the Planning Phase. Verification can be either through the normal Receipt Inspection process or other activities outlined in the CPP. The Critical Procurement Plan provides a summary of the requirements and necessary actions including on-site services (when required), to ensure that a critical procurement will meet Entergy's expectations...The CPP credits the management of procurement risks based on the Westinghouse software verification and validation process, factory acceptance testing, performance of site acceptance testing, and rigorous software testing. QA (quality assurance) surveillances will be performed to ensure the approved Westinghouse processes were followed."</p> <p>Given that the VOP summary states that the CPP will be an input to the VOP, what is the relationship between the CPP and the VOP (e.g., the CPP will be referenced in the VOP or parts of the CPP will be incorporated into the VOP)?</p>	<p>As indicated in VOP Section 2, Vendor Oversight Plan (VOP) Scope, "The CPCS Replacement Project Critical Procurement Plan (CPP) (Reference 6), prepared under Entergy procedure EN-MP-100, Critical Procurements (Reference 13), is incorporated by reference into the VOP."</p>	Closed	Audited
13	VOP-03	<p>Oversight of SPM project-specific instances (Deanna Zhang Samir Darbali)</p>	VOP Summary	Section 3	<p>This section of the VOP Summary, states in part, "Some of the SPM plans will have project-specific instances (i.e., SVVP, SCMP, and Software Test Plan). These project-specific plans will be evaluated to ensure they are developed in accordance with the SPM."</p> <p>Please explain what specific activities will be performed by Entergy to review these plans and what the acceptance criteria are.</p>	<p>Vendor Oversight Plan Revision 2 was uploaded to Item A-01c for reference. VOP section 7 provides some details on how Entergy will review plans and what acceptance criteria will be used. Specifically, subsection Software Verification and Validation describes acceptance criteria for software V&V detail.</p> <p>The VOP Plan includes the use of other Entergy processes and procedures.</p>	Closed	Audited
14	VOP-04	<p>V&V (Deanna Zhang Samir Darbali)</p>	VOP Summary	Section 3	<p>This section of the VOP Summary states that reviews will be performed of V&V for each applicable lifecycle phase for each plan through test.</p> <p>a. Please explain what these reviews will entail. For example, will all lifecycle phase design outputs be reviewed and will the review only cover the WF3 project-specific application without including the baseline (e.g., Rev. 14 of the System Requirements Specification of the Common Q Core Protection Calculator System (0000-ICE-30158))?</p> <p>b. Will Entergy audit the design change packages performed between the previous versions of the System Requirements Specification of the Common Q Core Protection Calculator System (up to Revision 7) and corresponding design and implementation documentation between those versions?</p>	<p>a. VOP Revision 2 was uploaded to item A-01c for reference. Section 2 discusses the overall review process, including the relationship to risk ranking and how items are reviewed. Section 7 (specifically Design Artifacts and Programmatic Elements subsections) discusses the reviews throughout the life cycle development.</p> <p>In summary, the VOP, when executed by WF3, does ensure that Westinghouse executes the CPCS system and software lifecycle development consistent with the LAR. The execution of the VOP includes other processes, and procedure EN-DC-149 is used for owner acceptance of design artifacts.</p> <p>EN-DC-149 Rev 15 "Acceptance of Vendor Documents" attached in IMS</p>	Closed	Audited

						<p>b. This question is similar to the question asked in item SA-01b and SDP-04c. These responses to those items describe how the SyRS was reviewed and how previous revisions were handled.</p> <p>Additionally, there was discussion on this topic during the VOP audit meeting on 11/19/2020</p>		
15	VOP-05	Vendor oversight activities (Deanna Zhang Samir Darbali)	VOP Summary	Section 3	<p>This section lists a number of vendor oversight activities that will be applied to the programmatic elements.</p> <p>Please explain how the vendor oversight activities correspond to specific programmatic elements.</p>	<p>VOP Revision 2 has been attached to item A-01c for reference. Section 7 (specifically, Programmatic Elements and Quality Assurance subsections) discuss in detail how vendor oversight activities correspond to specific programmatic elements.</p>	Closed	Audited
16	VOP-06	Criterion VII of Appendix B to 10 CFR Part 50 (Deanna Zhang Samir Darbali)	VOP Summary	All, Section 8	<p>The VOP Summary does not address Appendix B, Criterion VII, "Control of Purchased Items and Services" and the VOP Summary language is inconsistent with Criterion VII. Please explain:</p> <ul style="list-style-type: none"> a. whether the surveillances planned are consistent with source verification. Source verification needs to be performed at intervals consistent with the importance and complexity of the item or service, and shall include monitoring, witnessing, or observing selected activities. b. how the VOP addresses "Control of Suppliers Nonconformances" including evaluation of nonconforming items, review of nonconformances to procurement requirements or purchaser-approved documents (e.g., technical or material requirement violated, requirement in supplier documents, which has been approved by the Purchaser, is violated, purchaser disposition of supplier recommendation, verification of the implementation of the disposition). c. how "supplier evaluation and selection, acceptance of items or services, supplier non conformances, including their evaluation and disposition" will be documented. Section 8 of the VOP Summary, "Documentation," is not clear on this. 	<p>a. VOP Audits and WF3 Quality Assurance (QA) surveillances (EN-QV-108, QA Surveillance Process) are used in conjunction with the CPCS Replacement Project Critical Procurement Plan (CPP), CPP-WF3-2019-002, to provide adequate vendor oversight as defined in the Vendor Oversight Plan.</p> <p>Per EN-QV-108, a surveillance is "a process of reviewing or observing an activity, process, or end product to verify that certain actions have been or are being accomplished to obtain desired results. This includes the terms "Monitoring", "Observations", "Walk-downs", "Site Vendor Audit", and "Source Verification." A surveillance activity is normally documented as a surveillance report." In addition, "Surveillances may not be used in lieu of a required audit."</p> <p>b. The VOP incorporates the Critical Procurement Plan (CPP-WF3-2019-002) and specific existing Entergy QA procedures by reference, including EN-QV-108 (QA Surveillance Process). The CPP ensures adequate and timely Supplier QA involvement. Additionally, Work Tracking items (within Entergy's PCRS program) track development of QA surveillances. Procedure EN-LI-102 controls the Entergy Corrective Action Program.</p> <p>c. As discussed in VOP-06b, the Critical Procurement Plan (CPP) is incorporated by reference in the Vendor Oversight Plan (VOP). The CPP provides details Entergy's Supplier QA involvement. Additionally, within the CPP, an evaluation template is used to evaluate the different categories in the project to discrete criteria. If that criteria is not currently available, a tracking action is created to ensure the criteria is evaluated and accepted. The CPP is controlled by Entergy procedure EN-MP-100.</p>	Closed	Audited

17	RT-01	Response Time (Summer Sun, Samir Darbali)	LTR 3.2.6	<p><u>Effect of the CPC Response Time on Thermal Margin Degradation</u></p> <p>Section 3.2.6 of Attachment 4 in the LAR describes the estimated impact of the CPCS delay time on thermal margin degradation. It indicates that the basis of the estimate is the CEA rod drop time LAR submitted in 2015 that increased the CEA rod drop time in the safety analysis an additional 200 ms due to a hold coil delay that needed to be accounted for. The method used for the CPCS delay time estimate on thermal margin results is to take the thermal margin degradation of the CEA rod drop 200 ms delay and then extrapolate for the increase in CPCS response times.</p> <p>(1) Discuss acceptability of the extrapolation method used to estimate the effect of the CPCS delay time on thermal margin degradation.</p> <p>(2) Identify and justify the values of the CPCS delay times used in the thermal margin estimate for each of the applicable transients and accidents listed in Table 3.2.6-1 of Attachment 4.</p> <p>(3) Discuss what will be done to assure that the values of the CPCS delay time used in the thermal margin estimate are the limiting values applicable to Waterford 3 when the CPCS is installed for operation.</p> <p>(4) Discuss and justify what will be done to assure that the thermal margin estimate for the preinstalled CPCS condition is acceptable, if the values of the CPCS delay time used in thermal margin estimate are not limiting values.</p> <p>10/15/2020 Update:</p> <p>(1.1) Follow-up question to OI 17(1): The last paragraph of the response states that "In addition, the reload analyses will incorporate the new CPC response times ..."</p> <p>Please clarify the methods that will be used for performing the reload analysis.</p> <p>(3.1) Follow-up question to OI 17(3): The first sentence of the response states that "The response times calculated in WNA-CN-00572-CWTR3 for the CPCS are bounded by the current response time requirements specified in the reference design (00000-ICE-30158).</p> <p>Please clarify the adequacy of the response time requirements specified in the reference design in terms of the thermal limits (i.e., DNBR and LHGR) calculation.</p>	<p>(1) Waterford 3 letters W3F1-2015-0040 [Reference 1] and W3F1-2015-0061 [Reference 2] submitted a control element assembly drop time increase request to the NRC. This request was approved under Waterford 3 license amendment 246 [Reference 3]. Letter W3F1-2015-0061 provided the limiting events results with a control element assembly drop time increase of 200 milliseconds. The W3F1-2015-0040 and W3F1-2015-0061 results can be used to extrapolate the new CPC time impacts on the analysis results. The letter W3F1-2015-0061 showed small changes for the 200 milliseconds and within the acceptance limits. It is reasonable to use the same extrapolation to judge that the analysis results will remain within the acceptance limits (i.e., the largest delay is 53.5 msec). In addition, the reload analyses will incorporate the new CPC response times to ensure the accident analyses thermal margin requirements cover any analysis impacts.</p> <p>References</p> <p>1. W3F1-2015-0040, License Amendment Request to Revise Control Element Assembly Drop Times, July 2, 2015 [ADAMS Accession Number ML15197A106].</p> <p>2. W3F1-2015-0061, Supplement to Revise Control Element Assembly Drop Times Associated with Technical Specification 3.1.3.4, August 13, 2015 [ADAMS Accession Number ML15226A346].</p> <p>3. NRC License Amendment 246, Control Element Assembly Drop Times, November 13, 2015 [ADAMS Accession Number ML15289A143].</p> <p>(1.1) The actual WF3 CPCS calculated response times will be used as input for the reload analysis.</p> <p>(2) The identification and justification for the CPCS delay time values in the thermal margin estimate for each applicable transient and accident listed in Table 3.2.6-1 is documented in Westinghouse document LTR-GIC-20-003, "Waterford 3 CPCS Response Time Information for FSAR and Technical Specification." A 2nd document, WNA-CN-00572-CWTR3, "Core Protection Calculator System Response Time Calculation" provides the response time calculation for the WF3 CPCS. Both of these can be submitted to the NRC.</p> <p>WNA-CN-00572-CWTR3, "Core Protection Calculator System Response Time Calculation" was attached to the LAR. LTR-GIC-20-003, "Waterford 3 CPCS Response Time Information for FSAR and Technical Specification" is on the Westinghouse document portal.</p> <p>See OI 26 (h)</p> <p>(3) The response times calculated in WNA-CN-00572-CWTR3 for the CPCS are bounded by the current response time requirements specified in the reference design (00000-ICE-30158). The response</p>	Closed	RAI-07
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					<p>time testing conducted during FAT and post installation testing will confirm that the system meets these response time criteria.</p> <p>(3.1) It is LTR-GIC-20-003 that correlates the response time calculated in WNA-CN-00572-CWTR3 to the various CPCS trips. LTR-GIC-20-003 describes the adequacy of the new response time requirements. After further investigation, it was determined that the revised calculated response times are not bounded by the reference design, and the WF 3 SyRS, WNA-DS-04517-CWTR3, needs to specify these new response time requirements. A Westinghouse Corrective Action Issue Report (IR-2020-11971) was issued accordingly. A new revision 5 of WNA-DS-04517-CWTR3 with the new response time requirements is now issued.</p> <p>The Licensing Technical Report is not impacted by this revision because the LTR only referred to the Palo Verde response times and stating that WF3 specific response times would be calculated.</p> <p>Resolution. WNA-DS-04517-CWTR3, Revision 5 will be docketed by 12/31/2020.</p> <p>(4) LTR Section 3.2.6 states, "As part of the normal fuel reload process, Waterford runs the safety analysis of record with the WF3 CPCS calculated response times to validate that acceptable margin is maintained. It is the fuel reload process performed under 10 CFR 50.59 that evaluates the results of the rerun of the safety analysis prior to core reload." If the results become more limiting, the analyses results will be evaluated against the 10CFR50.59 criteria. If the 10CFR50.59 criteria requires NRC approval, then a new submittal will be generated. Based upon previous analysis impacts, it is expected that the response time changes will be covered in the reload under 50.59.</p> <p>In addition, Waterford 3 letter W3F1-2015-0062 [Reference 1] NRC request for additional information question #8 describes the Westinghouse reload process.</p> <p>Reference 1. W3F1-2015-0062, Control Element Assembly Drop Times Submittal Request for Additional Information, September 23, 2015 [ADAMS Accession Number ML15268A019].</p>		
18	CCF-01	CCF (Summer Sun, Samir Darbali, Richard Stattel, Jack Zhao)	LTR 3.2.18	<p><u>Common Cause Failure Analysis (updated 10/05/2020)</u></p> <p>Section 3.2.18 of Attachment 4 in the LAR discusses the common cause failure (CCF) analysis and indicates that the original licensing basis for WF3 assumes a potential CCF of the CPCS and that the replacements of the current digital CPCS with the Common Q platform does not change the WF3 licensing basis for defense in depth and diversity (D3) (see LTR page 3-60). In support of the D3 CCF analysis for WF3 CPC updates, the licensee quoted the NRC safety evaluation (SE) approving the CCF</p>	<p>(a) The intent of the new paragraphs in Enclosure to Entergy letter number W3F1-2020-0038, dated July 23, 2020, Section 3, "Technical Evaluation," sub-section 2, "Licensing Technical Report (LTR)" is to credit the WF3 ATWS instead of the ANO-2 and PVNGS SEs described in Attachment 4 of the Enclosure to Entergy letter number W3F1-2020-0038 (WCAP-18484-P, "Licensing Technical Report for the Waterford Steam Electric Station Unit 3 Common Q Core Protection Calculator System"). The W3F1-2020-0038 Enclosure Section 3, "Technical Evaluation," sub-section 2, provides the</p>	Closed	No RAIs

				<p>analysis for the Arkansas Nuclear One, Unit 2 ANO-2 original CPC design and Palo Verde Nuclear Generating Station (PVNGS) CPC replacements (see LTR pages 3-61 and 3-62).</p> <p>LAR Section 2. "Licensing Technical Report (LTR)," paragraphs 3 – 8 credit the WF3 Anticipated Transient Without Scram (ATWS) Mitigation Systems described in FSAR Chapter 7.8. These paragraphs were added after the draft LAR review preapplication meeting discussions regarding LTR Section 3.2.18.</p> <p>(a) Please explain if the intent of the new paragraphs in LAR Section 2 is to credit the WF3 ATWS instead of the ANO-2 and PVNGS SEs (LTR pages 3-61 and 3-62).</p> <p>In a public meeting held September 22, 2020, the licensee discussed open item 18, Common Cause Failure Analysis, and indicated that it would rely on the information related to the ATWS mitigation systems in FSAR Section 7.8 to address the open item 18 for the CCF analysis.</p> <p>(b) Since the licensee is crediting ATWS, please describe how the ATWS analysis is sufficient to address a CCF failure of the replacement CPCS for the events which credit the CPCS.</p> <p>(c) Please discuss the current technical and licensing basis for the current digital CPCS and whether the Common Q platform maintains this technical and licensing basis for defense in depth and diversity (D3).</p> <p>(d) Please address inconsistencies in the LAR and Section 3.2.18 of the LAR Attachment 4 to reflect the information used for supporting the D3 discussion related to CCF of the CPCS.</p> <p>10/28/2020 Update:</p> <p>(d.1) The second paragraph in LAR Section 3, subsection 2, "Licensing Technical Report (LTR)," refers to LTR Section 3.2.18 and the ANO-2 and PVNGS evaluations. Please explain if this paragraph will also be revised.</p> <p>11/10/2020 Update:</p> <p>(c.1) The response to item (c) suggests that conformance with BTP 7-19 is not required. However, LAR Section 4.1 "Applicable Regulatory Requirements/Criteria" lists BTP 7-19. LTR Section 3.2.18 also identifies BTP 7-19. Please clarify if the LAR and LTR will be revised to remove references to BTP 7-19?</p>	<p>justification of the acceptability of crediting ATWS for CPCS failure to trip due to a CCF.</p> <p>(b) Background.</p> <p>1. The of the ANO-2 CPCS to perform its normal function was considered by the NRC and documented in NUREG 0308 Supplement 1, "Safety Evaluation Report related to the operation of Arkansas Nuclear One, Unit 2," dated June 1978. Supplement No. 1 to Appendix D of the Safety Evaluation Report documents the basis for the NRC's approval. In summary, analog backup trips exist for five (5) of the six (6) credited events, as well as 5 other events. The CEA misoperation event does not have a backup analog reactor trip. Automatic reactor trips have not been provided in previous Combustion Engineering protection system designs for this event. In the unlikely event that a CEA deviation event, which required a reactor trip, occurred without a CPC trip, the operator would get alarms from COLSS on CEA position and flux tilt similar to the non-CPCS plants. Operators could then initiate a manual trip. The conclusion documented in Appendix D of Supplement 1, Section D.2 is that the backups to the CPCS failure to trip at ANO-2 are acceptable.</p> <p>2. In NUREG 787, "Safety Evaluation Report related to the operation of Waterford Steam Electric Station, Unit No. 3," dated July 1981, Section 7.2.3, the NRC wrote:</p> <p>"The CPCs were not reviewed, per se, at Waterford 3. The staff has taken the operating experience of ANO-2, the previous review, and acceptance of the ANO-2 CPCs, and the similarity of the Waterford 3 and ANO-2 CPCs, into account in reaching this decision."</p> <p>3. In NUREG 0787 Supplement 5, Section 4.4.2 dated June 1983, the NRC indicated that the CPCS/CEACs are essentially the same as the ANO-2 Cycle-2 CPCs and since the ANO-2 CPC/CEAC were approved by the NRC staff (July 21, 1981 Memorandum), the review of the Waterford 3 CPC/CEAC concentrated on the software modifications and its implementation. Because there is no additional documentation in any of the subsequent supplements, the implicit conclusion is that the acceptability of the CPCs failing to meet design function at ANO-2 also applies to Waterford 3.</p> <p>4. FSAR Section 7.2.1 describes the Reactor Protection System (RPS). FSAR Section 7.2.1.1.8 describes how the system is designed to eliminate credible multiple channel failures originating from a common cause. This section applies to all of the RPS, which includes CPCs. This section is unchanged since Revision 0 of the FSAR (circa 1985)</p> <p>Discussion The CPC digital upgrade project does not alter how the diversity within the RPS is achieved, as described in the FSAR 7.2.1.1.8.</p>		
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						<p>However, industry and regulatory developments over the past 35 years have provided further improvements to address reactor protection systems common cause failures. The most noteworthy is the Anticipated Transient Without Scram (ATWS) rule (i.e., 10 CFR 50.62). Implementation of the ATWS Mitigation System is described in FSAR section 7.8. The system is designed to mitigate the consequences of Anticipated Operational Occurrences (AOO's) coupled with a failure of the RPS to trip the reactor. The Diverse Reactor Trip System (DRTS) provides an independent means of sensing a high pressurizer pressure and then de-energizing the MG set output contactor coils that provide the power to the Control Element Drive Mechanisms, and subsequently trip the reactor.</p> <p>The NRC provided the acceptance for the Waterford 3 ATWS mitigating systems design in the Safety Evaluation dated September 8, 1989 (ML8909180108). The NRC inspection of Compliance with the 10 CFR 50.62 (ATWS Rule) is documented in Inspection Report 89-39 dated December 5, 1989 (ML8912110063). There were no violations or deviations noted in the report concerning the implementation of the ATWS system at Waterford 3. The ATWS system at Waterford 3 is a more rigorous backup to a postulated common cause failure of the CPCS relative to reliance on the NRC's evaluation of a similar system at ANO-2. The ATWS system at Waterford 3 is plant specific, incorporated in the design basis, and is continually evaluated as the overall plant design evolves. Both the extended power uprate and replacement steam generator projects resulted in evaluations of the ATWS mitigating systems to ensure the major plant changes did not negatively impact the ATWS systems (SGT-LTR-TDA-09-20, "Evaluation of Anticipated Transients Without Scram (ATWS) Rule Compliance for Waterford 3 with RSGs and a Full Core of NGF Fuel"</p> <p>Conclusion The function of the CPCS to calculate and provide LPD and DNBR trip signals to the RPS to prevent fuel damage during AOOs is unchanged. The features of the RPS which provide analog trips as a backup to failure of the CPCS to cause trips is unchanged as a result of the CPCS digital upgrade project. However, since initial startup of Waterford 3, the implementation of the ATWS rule provides complete protection of the fuel for AOOs that should result in the RPS tripping the reactor. The ATWS systems are independent from the RPS, have been inspected by the NRC and continually evaluated for impacts as the plant design evolves.</p> <p>(c) Entergy Update 11/3/20 The technical and licensing basis for the existing CPCS are the following sections of the WF3 UFSAR:</p> <ul style="list-style-type: none"> • Chapter 7.2 (Since the CPCS is an integral part of the Reactor Protective System, the CPCS basis is described throughout the section. Note Section 		
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					<p>7.2.1.1.8 establishes the licensing basis for diversity against “a predictable common failure mode”)</p> <ul style="list-style-type: none"> • Appendix 4.3A.5.2 & 4.3A.5.3 <p>To summarize what is described in UFSAR Chapter 7.2.1.1.2.5, the basic architecture for the CPCS is a four channel computer system (i.e., Core Protection Calculator [CPC]) that calculates these parameters and initiates reactor trip signals to the analog reactor protection system. This basic architecture also includes two computers (CEAC 1 and CEAC 2) that calculate a CEA position penalty factor used by all four CPC computers.</p> <p>The WF3 I&C architecture mirrors the echelons of defense described in NUREG 6303, “Method for Performing Diversity and Defense-in-Depth Analyses of Reactor Protection Systems,” to protect the health and safety of the public. The first echelon is the non-safety control systems which controls the nuclear plant process within its technical specification limits. The second echelon of defense is the plant protection system to automatically shutdown reactivity and provide heat removal in case of an accident. And the third echelon of defense is the manual indications and controls to allow operators to manually control the plant. In addition to these echelons of defense, there is an ATWS system to protect the health and safety of the public should an anticipated transient occur without a scram.</p> <p>This plant modification only impacts the second echelon of defense, the plant protection system, and in particular the reactor protection system. The WF3 operating license allows for a computerized digital system to calculate and initiate a reactor trip on low DNBR and High LPD in support of the WF3 accident analysis, as described in the WF3 UFSAR Chapter 7.2.1.1.2.5. As summarized above and described in detail in WF3 UFSAR Chapter 7.2.1.1.2.5, the basic architecture for this aspect of the reactor protection system is a four channel computer system (i.e., CPC) that calculates these parameters and initiates reactor trip signals to the analog reactor protection system. This basic architecture also includes two computers (CEAC 1 and CEAC 2) that calculate a CEA position penalty factor used by all four CPC computers. This plant modification does not invalidate the diversity claims in UFSAR Section 7.2.1.1.8.</p> <p>The Common Q CPCS upgrade preserves this basic architecture but improves upon it by multiplying the number of CEAC computers from two to eight (2 in each channel) to improve system reliability. There are still four independent CPC channels calculating DNBR and LPD as in the existing architecture. Therefore the D3 strategy for WF3 is not impacted by this plant modification.</p> <p>There are no plans at this time to replace any of the non-safety plant control systems with the Common Q platform which could potentially</p>		
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						<p>impact the WF3 D3 strategy. Should the PPS be replaced with a digital system, then compliance to BTP 7-19 would be required.</p> <p>(d) Attachment 4 of the Enclosure to Entergy letter number W3F1-2020-0038 (WCAP-18484-P, "Licensing Technical Report for the Waterford Steam Electric Station Unit 3 Common Q Core Protection Calculator System"), Section 3.2.18 will be revised to delete reference to the ANO-2 diversity analysis and refer to the LAR for the D3 assessment for the Common Q CPCS.</p> <p>(d.1) Yes, LAR Enclosure Section 3.2, Licensing Technical Report (LTR) will be revised as part of a LAR Supplement. The following paragraph will be deleted:</p> <p>"LTR Section 3.2.18 describes the NRC evaluation of the first CPCS at Arkansas Nuclear One, Unit 2 (ANO-2) in NUREG-0308, "Safety Evaluation Report Related to the Operation of Arkansas Nuclear One, Unit 2," Supplement 1 (i.e., the ANO-2 NRC SER) in regards to CPCS Common Cause Failure (CCF). This was also the evaluation the NRC staff referred to in their PVNGS safety evaluation for the Common Q CPCS upgrade license amendment (Reference 6.10, Section 3.4.6.11). The NRC cited the ANO-2 evaluation to conclude, in part, that CCF is adequately addressed for the Common Q CPCS replacement for PVNGS. The Waterford LTR included this as part of the reference design licensing precedence."</p> <p>(c.1) In LAR Section 4.1, "Applicable Regulatory Requirements/Criteria", under the bullet, "The applicable portions of the following branch technical positions within NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition" (SRP), Chapter 7, "Instrumentation and Controls," as follows:"; the sub-bullet "Branch Technical Position 7-19, "Guidance for Evaluation of Diversity and Defense-In- Depth in Digital Computer-Based Instrumentation and Control Systems", will be removed.</p> <p>In regards to the LTR, Section 3.2.18, "Common Cause Failure (CCF)", the 1st paragraph in that section will be deleted removing the citation to BTP 7-19.</p>		
19	TS-01	Clean TS pages (Tarico Sweat, Audrey Klett, Samir Darbali)	Encl, Att 2	Cover page	<p><u>Clean TS Pages</u></p> <p>Attachment 2 cover page lists 3/4 2-6a as a clean TS page; however, the mark-up and submitted clean page is numbered 3/4 2-6, not 3/4 2-6a.</p> <p>Confirm that this was a typo and that the Attachment 2 list entry should be 3/4 2-6 and not 3/4 2-6a.</p> <p><u>11/20/20 Update:</u></p>	<p>The information on the coversheet of Attachment is incorrect. The Markup page is correct. There is no intention to submit a corrected coversheet.</p>	Closed to RAI	RAI-10

					PROPOSED DRAFT RCI: The cover page for Attachment 2 lists 3/4 2-6a as a clean TS page; however, the mark-up and submitted clean page is numbered 3/4 2-6, not 3/4 2-6a. The NRC staff requests the licensee to confirm that the page number (3/4 2-6a) listed in the Attachment 2 cover page was a typographical error and that page 3/4 2-6 is the correct page number.			
20	TS-02	Marked up and Clean TS pages (Tarico Sweat, Audrey Klett, Samir Darbali)	Encl, Att 1 Encl, Att 2	Cover pages	<p><u>Marked up and Clean TS Pages</u></p> <p>The cover page of Attachment 1 lists page 3/4 10-2 as having mark-ups; however, the marked up version of this page is not provided in the LAR. The cover page of Attachment 2 lists page 3/4 10-2, however, a clean version of this page is not included in Attachment 2 (assuming that the licensee intended to provide a mark-up of page 3/4 10-2).</p> <p>NRC staff requests the licensee to confirm whether it intended to propose changes to this TS page and, if so, to provide the proposed marked up and clean TS pages.</p> <p><u>11/20/20 Update:</u> PROPOSED DRAFT RAI: The cover page of Attachment 1 lists page 3/4 10-2 as having mark-ups; however, the marked up version of this page is not provided in the LAR. The cover page of Attachment 2 lists page 3/4 10-2, however, a clean version of this page is not included in Attachment 2 (assuming that the licensee intended to provide a mark-up of page 3/4 10-2). The NRC staff requests the licensee to licensee to confirm whether it intended to propose changes to this TS page and, if so, to provide the proposed marked up and clean TS pages, as applicable.</p>	<p>The change to TS 3.10.2 is partially described in the table on page 11 of 27 in the Enclosure to W3F1-2020-0038. The table entry for TS 3.10.2 will be enhanced to indicate that the editorial change for "Functional Unit 15" to "Functional Unit 9c" occurs four times on the page, as shown on the markup. (see below).</p> <p>TS 3.10.2 is being revised in four places to replace "Functional Unit 15" with Functional Unit 9c". This is purely editorial as a result of the changes to TS 2.2.1 and 3.3.1 described above, which redesignated the CPCs as Functional Unit 9c in Tables 2.2-1 and 3.3-1.</p> <p>The Markup and Clean copies were inadvertently absent from the LAR submittal and will be provided along with the revised table entry with the next docketed CPC correspondence. Copies attached to this response.</p>	Closed to RAI	RAI-11
21	EQ-01	Oversight of EQ (Jack Zhao, Deanna Zhang, Samir Darbali)	VOP Summary		<p>In the earlier presubmittal meetings, the licensee stated that it would include the equipment qualification (EQ) for some unqualified items as a licensee commitment. But, in the final presubmittal meeting, the licensee did not include the commitment and stated that EQ would be performed as part of the VOP. The VOP Summary does not describe how the VOP will cover the equipment qualification for the unqualified items. Please clarify which VOP Summary section includes the oversight of EQ.</p>	<p>The VOP Summary (included with the LAR) Section 5.1, Critical Characteristics, includes Environmental Critical Characteristics. In addition, VOP Section 5.2, Design Artifacts, includes review of Westinghouse design documents. This section provides examples of Westinghouse design documents including the System Requirements Specification (SyRS), Software Requirements Specification (SRS), etc. Another example, not listed, includes the Equipment Qualification Summary Report (EQSR).</p> <p>Note that VOP Section 7, Determine Performance Measures and Acceptance Criteria, includes oversight of EQ. The Environmental Critical Characteristics section includes acceptance criteria which will be evaluated as part of vendor oversight. In addition, the Design Artifacts section includes a review of the Westinghouse Equipment Qualification Summary Report (EQSR) per Entergy procedure EN-DC-149, Acceptance of Vendor Documents.</p>	Closed	<p>Audited the EQ part of the VOP</p> <p>RAI-14</p>
22	EQ-02	GDC 4 (Jack Zhao, Samir Darbali)	LAR Section 4		<p>Please clarify why the applicable GDC 4 was not addressed and evaluated in Section 4 of the LAR.</p>	<p>A LAR Supplement will contain a revision to LAR Section 4, Regulatory Evaluation. This revision will include the following:</p> <p>"10 CFR 50, Appendix A, GDC 4 requires that the core protection calculator system (CPCS) be designed and qualified to operate under</p>	Closed	No RAIs

		(Jack Zhao, Samir Darbali)		<p>functions under the design-basis conditions at the location in which the equipment will be installed. This information should be found in equipment qualification test plans, methodologies, and test reports.”</p> <p>(a) Please explain the difference between Attachment 11 (“Qualification Summary Report for Waterford Unit 3”) and the “CPCS equipment qualification summary report for Waterford Unit 3” being referred to.</p> <p>(b) Please explain when the licensee’s CPCS equipment qualification summary report will be submitted for evaluation.</p> <p>(The EQ Summary report for additional items, EQ-QR-412-CWTR3, Revision 0 mentioned in the response may need to be docketed.)</p>	<p>Attachment 11 summarizes the generic qualification performed on the Common Q platform to demonstrate that the platform can meet site environmental requirements. The subsequent EQSR is to summarize the EQ for the detailed design implementation of the CPCS. (See the response to OI #23)</p> <p>(b) The EQ Summary report referenced in the LTR, EQ-QR-400-CWTR3, Rev 0, "Core Protection Calculator System Primary Digital Components Qualification Summary Report for Waterford Unit 3" was attached to the LAR.</p> <p>The EQ Summary report for additional items, EQ-QR-412-CWTR3, Revision 0, "Core Protection Calculator System Upgrade Project Equipment Qualification Summary Report for Waterford Unit 3" is now available and is in the Westinghouse ERR per request A-01 n.</p> <p>UPDATE: EQ-QR-412-CWTR3, Revision 1 will be docketed by 12/31/2020.</p>		
26	A-01	Audit Documents Everyone		<p>Audit Documents #1: Please have the following information readily available and accessible for the NRC staff’s review via an internet-based portal:</p> <ul style="list-style-type: none"> a. <input type="checkbox"/> Licensee documentation of Common Q platform changes assessment activities performed in accordance with PSAI 6.17 response. (See WCAP-18484 LTR Section 6.2.2.16) b. <input type="checkbox"/> Common Q Record of Changes document – Updated version of Reference 19 to the Common Q platform safety evaluation, (ADAMS accession No. ML20020A003) (Reference 13 of LAR). c. <input type="checkbox"/> The VOP and other documents that are referenced in the VOP that encompass the licensee’s plan for performing oversight of the vendor for the development of the CPCS. These documents should demonstrate how the licensee will perform vendor oversight in relation to the following system and lifecycle development activities: <ul style="list-style-type: none"> o Review of the current Common Q Record of Changes o Verification that Westinghouse complies with the requirements in the SPM for a secure development environment o Equipment Qualification o Verify that Westinghouse properly propagates the response time requirements through the design, implementation, and test of the replacement CPCS d. <input type="checkbox"/> Software Development Plan for the Core Protection Calculator System Upgrade, WNA-PD-00594-CWTR3 e. <input type="checkbox"/> Configuration Management Plan for the Core Protection Calculator System Upgrade Project, WNA-PC-00069-CWTR3 f. <input type="checkbox"/> Westinghouse organization chart, as referenced in LTR Section 5.2.12, “Software V&V Processes” g. <input type="checkbox"/> Control Panel 7 & 2 Cyber Security Door Lock Plan, ENT-WF3-CPC-115 	<p>Comments from the licensee or staff on each portal document.</p> <ul style="list-style-type: none"> a. Response provided b. Provided in the WEC SharePoint c. Waterford 3’s Vendor Oversight Plan (VOP-WF3-2019-00236) Revision 2 has been uploaded to this response. Of particular note, VOP section 7 discusses how WF3 will review the Common Q record of changes (Physical Critical Characteristics subsection), how WF3 will verify Westinghouse complies with requirements in the SPM (Design Artifacts and Secure Development Environment subsections), and documents that the response time will be confirmed to meet the SyRS (Performance Critical Characteristics subsection). d. Located in WEC SharePoint e. Located in WEC SharePoint f. See Attachment 1 of the VOP and WEC SharePoint Entergy Uploaded Organization chart to IMS (11/3/20 Update) g. Entergy Uploaded to IMS (11/3/20 Update) h. Provided in response to OI 17.2, WEC Uploaded to SharePoint (11/3/20 Update) i. There is not a WF3 CPC project-specific Software Safety Plan, Section 3, Software Safety Plan, of the Common Q Software Program Manual is followed. WCAP-16096-P R5 is the SPM used for the CPC project. In some cases the SPM requires project-specific plans (e.g., Test Plan, Project Plan). However, there is no requirement for a project-specific Safety Plan, so projects can choose to follow the generic plan in Section 3 of the SPM. So, there is no WF3 CPC project-specific Software Safety Plan, Section 3, Software Safety Plan, of the Common Q Software Program Manual is followed for the project. j. Located in WEC SharePoint k. Provided in the WEC SharePoint l. WEC Uploaded to SharePoint (11/3/20 Update) 	Closed	Audited

				<p>h. <input type="checkbox"/> Document that identifies and justifies the values of the CPCS delay times used in the thermal margin estimate for each of the applicable transients and accidents listed in Table 3.2.6-1 of Attachment 4.</p> <p>i. N/A Software Safety Plan for the Core Protection Calculator System Upgrade</p> <p>j. <input type="checkbox"/> SPEC-10-00001-MULTI, "73.55 Fleet Strategy Implementation – Fiber Optic Cable Common-Procurement Specification" (Reference 40 of the LTR)</p> <p>k. <input type="checkbox"/> AC160 CPU Loading Restrictions, Document Number AN03007Sp (SyRS Reference 1.4.2.12)</p> <p>l. <input type="checkbox"/> Project Management Plan for the Waterford 3 Core Protection Calculator Upgrade, GPEP-PMP-2019-000020, Revision 1</p> <p>m. <input type="checkbox"/> WF3 Project Quality Plan</p> <p>n. <input type="checkbox"/> Subsequent EQSR (see open item 23)</p> <p>o. <input type="checkbox"/> Waterford Unit 3 Common Q Implementation – Non-LOCA Evaluation of Updated CPCS Response Times, LTR-TA-20-4, Revision 0 (LTR Reference 24)</p> <p>p. <input type="checkbox"/> PO 10587546 - CPC, CEAC, CEAPDS Single Channel and Four Channel Components</p> <p>q. <input type="checkbox"/> PO 10591996 – Input / Output (I/O) Simulator Components</p> <p>r. <input type="checkbox"/> SPEC-18-00005-W, Rev 0</p> <p>s. <input type="checkbox"/> CPCS Replacement Project Critical Procurement Project (CPP), CPP-WF3-2019-002 (WTWF3-2019-00236)</p> <p>t. <input type="checkbox"/> EN-MP-100, Critical Procurements</p> <p>u. <input type="checkbox"/> EN-DC-115, Engineering Change Process</p> <p>v. <input type="checkbox"/> EN-IT-104, Software Quality Assurance Program</p> <p>w. <input type="checkbox"/> 00000-ICE-36369, Rev. 02," CPC Timing Analysis for the Common Q Core Protection Calculator System</p> <p>x. <input type="checkbox"/> EN-DC-149, Acceptance of Vendor Documents</p> <p>y. <input type="checkbox"/> Waterford 3 Core Protection Calculator System Safety Function Table, LTR-TA-19-154, Revision 0</p> <p>z. <input type="checkbox"/> Entergy Quality Assurance Program Manual</p> <p>aa. <input type="checkbox"/> Entergy Specification SPEC-18-00005-W, Revision 0, "Core Protection Calculator Purchase Specification," April 2, 2019.</p> <p>bb. <input type="checkbox"/> Westinghouse Letter CWTR3-19-21, Revision 2, "Transmittal of Westinghouse Final Compliance Matrix for SPEC-18-00005-W," June 28, 2019.</p> <p>cc. <input type="checkbox"/> Westinghouse Calculation Note CN-EQT-19-6, Revision 0, "Determination of In-Equipment Response Spectra for Waterford Unit 3 Core Protection Calculator System," August 12, 2019.</p> <p>dd. <input type="checkbox"/> Westinghouse Document WCAP-16166-P Supplement 1-E09, Revision 1, "Equipment Qualification Report for AC160 Platform – AI687 and AI688 Modules and Supporting Components for Use in Common Qualified (Common Q) Post Accident Monitoring System".</p> <p>ee. <input type="checkbox"/> Westinghouse Document WCAP-16166-P Supplement 1-E05, Revision 5, "Equipment Qualification Report for AC160 Platform – PC Node Box / Flat Panel Display System Components".</p>	<p>m. Provided in the WEC SharePoint</p> <p>n. Provided in the WEC SharePoint</p> <p>o. Entergy Uploaded to IMS (11/3/20 Update)</p> <p>p. Entergy Uploaded to IMS (11/3/20 Update)</p> <p>q. Entergy Uploaded to IMS (11/3/20 Update)</p> <p>r. Entergy Uploaded to IMS (11/3/20 Update)</p> <p>s. Entergy Uploaded to IMS (11/3/20 Update)</p> <p>t. Entergy Uploaded to IMS (11/3/20 Update)</p> <p>u. Entergy Uploaded to IMS (11/3/20 Update)</p> <p>v. WEC Uploaded to SharePoint (11/3/20 Update)</p> <p>w. Located in IMS</p> <p>x. Located in WEC SharePoint</p> <p>y. Requested and received during the 11/19/20 VOP Audit</p> <p>z. Located in IMS</p> <p>aa. Located in IMS</p> <p>bb. Located in WEC SharePoint</p> <p>cc. Located in WEC SharePoint</p> <p>dd. Located in WEC SharePoint</p> <p>ee. Located in WEC SharePoint</p> <p>ff. Located in WEC SharePoint</p> <p>gg. Located in WEC SharePoint</p> <p>hh. Located in WEC SharePoint</p> <p>ii. Located in WEC SharePoint</p> <p>jj. Located in WEC SharePoint</p> <p>kk. Located in WEC SharePoint</p> <p>ll. Located in WEC SharePoint</p> <p>mm. Located in WEC SharePoint</p> <p>nn. Located in WEC SharePoint</p> <p>oo. Located in WEC SharePoint</p> <p>pp. Located in WEC SharePoint</p> <p>qq. Located in WEC SharePoint</p> <p>rr. Located in IMS</p> <p>ss. Located in IMS</p> <p>tt. Located in IMS</p> <p>uu. Located in IMS</p> <p>vv. Located in IMS</p> <p>ww. Located in IMS</p> <p>xx. Located in IMS</p> <p>yy. Located in IMS</p> <p>zz. Located in IMS</p> <p>aaa. Located in WEC SharePoint</p> <p>bbb. Located in WEC SharePoint</p> <p>ccc. Located in WEC SharePoint</p> <p>ddd. Located in WEC SharePoint</p> <p>eee. Located in WEC SharePoint</p> <p>fff. Located in WEC SharePoint</p> <p>ggg. Located in WEC SharePoint</p>		
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30	SA-03	CPU Load Limit / VOP (Samir Darbali, Deanna Zhang)			[[]] 12/10/2020 Update: 30.1 Please explain if implementation of all system requirements defined in 00000-ICE-30158 (applicable to Waterford 3 CPCS as identified in WNA-DS-04517-CWTR3) will be ensured via the RTM. [[]]]] [[30.1 00000-ICE-30158, Rev 14, System Requirements Specification for the Common Q Core Protection Calculator System, was reviewed against WNA-DS-04517-CWTR3 "System Requirements Specification for the Core Protection Calculator System", Revision 5. Any design requirements from 00000-ICE-30158, Rev 14, that were not identified in WNA-DS-04517-CWTR3, Rev 5, will be reviewed against the RTM during the Requirements Phase IV&V VOP Audit, and the Design Phase IV&V VOP Audit. This review will determine if these requirements are included as part of another document, such as WNA-DS-04618-CWTR3, Software Requirements Specification for the Core Protection Calculator System Replacement Project Upgrade, or if a requirement will need to be added to WNA-DS-04517-CWTR3. 30.2 [[Closed	Audited RAI-13 (OI 30.1) RAI-14 (OI 30.2)

31	EQ-06	Two Open Items Unresolved in the New EQ Summary Report (Jack Zhao)	EQ-QR-412-CWTR3, Rev. 0	<p>The new EQ Summary Report, EQ-QR-412-CWTR3, Rev. 0 contains two open items which have not been resolved in the report. What's the schedule to resolve these two open items and then revise this new EQ Summary Report accordingly?</p> <p>02/26/21 The two open items need to be closed successfully, and then the licensee should submit and docket the revised EQ Summary Report.</p>	<p>EQ Summary Report, EQ-QR-412-CWTR3, Rev. 0, had 2 open items. One for an issue with the EMC compliance of the AI688 card installed configuration, and another one for the mild environment testing is being performed on the 2E10726G01 APC MUX.</p> <p>EQ Summary Report, EQ-QR-412-CWTR3, Rev. 1, was owner accepted and issued on 12/2/2020. Rev 1 close the second open item, but there is still an Open Item for the EMC compliance of the AI688 card, the AO650 card, and the 2A10851G03 24VDC/10A power supply.</p> <p>The current plan is to have an owner accepted revision in April 2021.</p> <p>Update 4/20/21 The supplemental EMC testing is summarized in EQ-QR-412-CWTR3 and was performed to address 1) variations in signal cable shield grounding for the AI688 and AO650 cards, and 2) a revision to one of the power supplies.</p> <p>Previous testing performed on the AI688 and AO650 cards showed compliance with the EMC requirements of U.S. NRC Regulatory Guide 1.180, Revision 1. However, review of the installation at Waterford 3 showed the plant installation was inconsistent with the previous test program configuration that was going to be credited for qualification. Therefore, the previous EMC test data could not be credited for the Waterford 3 installation and the EMC tests that were applicable to the AI688 and AO650 cards were repeated with the signal cable shields terminated consistent with the Waterford 3 installation. Test programs are typically performed generically, starting with the most severe test levels identified in U.S. NRC Regulatory Guide 1.180 in order to facilitate the potential use of the test data for varying installation scenarios. Susceptibility observed during testing is characterized and addressed either by physical restriction (e.g., installation restriction to maintain the cabinet doors closed during operation) or threshold testing (i.e., the test level is reduced to achieve acceptable results and the reduced level becomes an installation restriction). The test results summarized in EQ-QR-412-CWTR3 confirm compliance with the requirements of U.S. NRC Regulatory Guide 1.180 subject to the installation restrictions</p>	Closed	RAI-03, RAI-05

						<p>identified to provide an effective protection match consistent with the severity of the environment.</p> <p>Additionally, one of the 24V power supplies that had been previously EMC qualified was also subjected to supplemental testing. The revision of the power supply that was identified to be used in the Waterford 3 upgrade was an updated version of the power supply that had been subjected to testing. The revision to the power supply could not be justified without additional testing of the potentially affected functions. Therefore, the revised power supply was subjected to supplemental testing as summarized in EQ-QR-412-CWTR3. Similar to the testing performed on the AI688 and AO650 cards, the tests on the power supply were performed starting with the most severe test levels identified in U.S. NRC Regulatory Guide 1.180 to support varying installation scenarios. The EMC tests performed on the updated power supply confirmed acceptable performance with the identified installation restrictions summarized in EQ-QR-412-CWTR3 to provide an effective protection match consistent with the severity of the environment.</p> <p>Note that there were no EMC issues with the Auxiliary Protective Cabinet multiplexer during the EMC test program; no supplemental testing was performed.</p>		
32	EQ-07	Reference containing the assessment of existing seismic, environmental, and EMC testing (Jack Zhao)	EQ-QR-412-CWTR3, Rev. 0	Section 3.1	In Section 3.1 it says that an assessment was performed for existing seismic, environmental, and EMC testing in Reference 11 (CN-EQT-20-2), but only conclusion statements are included in this new EQ Summary Report without adequate supporting information. (To be added to OI #26: Please place Reference 11 in the portal.)	Westinghouse Document CN-EQT-20-2, Revision 2, "Qualification Evaluation of Core Protection Calculator System Equipment for Waterford Unit 3 Auxiliary Protection Cabinet," October 22, 2020 is now in the WEC ERR.	Closed	
33	EQ-08	Different Equipment Under Test (EUT) (Jack Zhao)	EQ-QR-412-CWTR3, Rev. 0	Sections 4.1, 4.2, and 4.3	<p>The EUT contains different items for the EMC, environmental, and seismic testing. Please clarify why the EUT is different for the three types of EQ testing.</p> <p>03/17/2021 Update: In this EQ testing summary report for specific project equipment, for each project device which does not need a certain test, please include the justification for its exclusion from the test when this report gets to be revised and then submitted for docketing.</p>	<p>Most of the CPCS equipment listed in Table 2.1-1 of EQ-QR-412-CWTR3 was qualified by prior Westinghouse test programs. Discussion of prior qualification is documented in Section 3 of EQ-QR-412-CWTR3.</p> <p>For the equipment that required new testing for the WF3 application, some equipment was tested as complete assemblies, including the APC MUX and AC power distribution panel. In other cases, individual components were tested based on the change from the assemblies previously qualified, such as the surge suppressor on the DC power distribution panel. Some of these individual components only required specific testing and did not need to be included in all three phases of testing.</p> <p>For example, the surge suppressor only required EMC testing; seismic and environmental testing were justified by similarity to the previously qualified surge suppressor originally used in the DC power</p>	Closed	RAI-04, RAI-05

						distribution panel. Additionally, the line filter and other components had to be moved from the AC power distribution panel to a separate panel. The separate line filter panel was then included in the subsequent seismic test while the EMC and environmental tests only list the AC power panel with a note discussing the modifications to that panel.		
34	SA-04	CPP Processor (Samir Darbali)	3.2.2 CEAC AC160 Controller	3-17	LTR Section 3.2.2 describes the CEAC AC160 controller modules and states in page 3-17: "• Two PM646A CPP processor module" 34.1 Please confirm that the "Two" is a typo and that the correct subsection title is "One PM646A CPP processor module". 34.2 Please confirm if this typo will be corrected in a future LTR revision.	That is a typographical error in the document. The statement "Two PM646A CPP processor module" will be replaced by "One PM646A CPP processor module".	Closed	
35	CCF-02	CCF (Summer Sun, Samir Darbali)			LTR-TA-19-154, "Waterford 3 Core Protection Calculator System Safety Function Table" (item A-01y on the Certrec portal), Table A-1, identifies fifteen Chapter 15 events that credit the WF3 CPCS. (1) Please confirm that the events that credit the CPCS trips in the FSAR analysis are limited to those events listed in LTR-TA-19-154, Table A-1. (2) Please identify the backup safety-related analog trip for each of the events that credit the CPCS. If a backup analog trip does not exist for a specific event, please identify if an alarm is provided so that manual action can be taken. (3) Please reference the sources of information for items (1) and (2) above. (4) LTR-TA-20-4, "Waterford Unit 3 Common Q Implementation –Non-LOCA Evaluation of Updated CPCS Response Times" (item A-01o on the Certrec portal), Table 1, "Waterford-3 Non-LOCA CPCS Trip Signals" identifies 13 events that credit the WF3 CPCS. "CEA Misoperation – Single Rod Drop/CEA Sub-group Drop" and "Uncontrolled Boron Dilution" are included in LTR-TA-19-154 but not on LTR-TA-20-4 Table 1. (4.1) Please explain why these events are not included in LTR-TA-20-4, Table 1. (4.2) Please explain if the response times for these events are affected by the Common Q CPCS replacement. 2/2/2021 Update: (5) Please submit LTR-TA-20-4, "Waterford Unit 3 Common Q Implementation –Non-LOCA Evaluation of Updated CPCS Response Times" on the docket. 2/11/2021 Update: (6) Please submit LTR-TA-21-17, "Waterford 3 CPCS Safety Function Table – PPS Backup Trips," on the docket. (7) The third column of LTR-TA-21-17, Table A-1 refers to Table 7.2-4 of Reference 1. Reference 1 (ML19268A136) is for the WF3 FSAR Chapter 15 only, and not the entire FSAR. Chapter 7, which contains Table 7.2-4,	(1) The purpose of LTR-TA-19-154 is to identify the Chapter 15 events for which the CPCS responds. It is an independently reviewed engineering analysis, and as such the references listed in LTR-TA-19-154 are the sources of information to inform the analysis. (2) The attached document, LTR-TA-21-17 identifies the backup safety-related analog trips for each of the events that credit the CPCS. In all cases a backup safety-related analog trip exists except for the CEA Misoperation – Single Rod Drop / CEA Sub-group Drop event. The single CEA and subgroup drop events do not generate a reactor trip. (3) For CCF-02a response: The Reference section of LTR-TA-19-154 is the source of information. For CCF-02b response: LTR-TA-21-17 is the source of information (4.1) LTR-TA-20-4 states, "First, the Chapter 15 non-LOCA transients were screened to identify the impacted events. The impacted events only include those that: a) trip via a CPCS trip and b) have an increased response time. Updated CPCS response times that do not result in an increased response time have no unfavorable impact on the non-LOCA analyses and "are therefore not required to be evaluated herein." These two events were not included in LTR-TA-20-04 for the following reasons: "CEA Misoperation – Single Rod Drop/CEA Sub-group Drop" falls under FSAR Section 15.4.1.4 "CEA Misoperation". The single CEA and subgroup drop events do not generate a reactor trip, thus the increases in CPCS response times due to the Common Q system implementation would not impact these events. "Uncontrolled Boron Dilution" falls under FSAR Section 15.4.1.5 "CVCS Malfunction (inadvertent boron dilution)". The Boron dilution event is analyzed for all modes of plant operation. The operational Modes 1 and 2 inadvertent boron dilution event is bounded by the FSAR Sections 15.4.1.2 and 15.4.1.3 HFP and HZP CEAW events.	Closed	RAI-01 (OI 35.1) RAI-02 (OI-35.2)

				<p>is not included as one of the references. It might be clearer to keep Reference 1 for Chapter 15 and add a new Reference 3 for FSAR Chapter 7, and update the reference number in the third column of Table A-1, accordingly.</p> <p>(8) Please provide a summary of the process used for developing LTR-TA-21-17 to identify the PPS backup trip signals for the Chapter 15 events that credit the CPCS.</p>	<p>The increases in CPCS response times due to the Common Q system implementation would not change the event characteristics, so the inadvertent boron dilution event remains bounded by existing UFSAR events. For the inadvertent boron dilution event in operational Modes 3, 4, 5 and 6, all CEAs have already been inserted. Thus, the increases in CPCS response times due to the Common Q system implementation would have no impact on the inadvertent boron dilution event.</p> <p>(4.2) The response times for these events are not affected by the Common Q CPCS replacement as discussed in Open Item 035c (4.1), CCF-02c.</p> <p>(5) Document (LTR-TA-20-4, "Waterford Unit 3 Common Q Implementation –Non-LOCA Evaluation of Updated CPCS Response Times) submitted to NRC on 05-Mar-2021; ADAMS Accession Nos. ML21064A535 and ML21064A536.</p> <p>(6) Revision 1 of LTR-TA-21-17 was docketed.</p> <p>(7) LTR-TA-21-17 Revision 1 adds a reference to WF3 FSAR Chapter 7 and updates Column 3 to cite the new reference.</p> <p>(8) UPDATE: Revision 1 of LTR-TA-21-17 includes a summary of the process used for developing the document to identify the PPS backup trip signals for the Chapter 15 events that credit the CPCS.</p> <p>LTR-TA-21-17 will be revised to reference Chapter 7 to identify the PPS analog trips that serve as the backup trips for the CPCS. The WF3 UFSAR does not define the PPS analog trips that backup the CPCS trips in the case of a Common Cause Failure (CCF) of all four channels of the CPCS. As described in the response to OI 18, CCF-01; The CPCS was not reviewed in its entirety by the NRC as stated in the NRC Waterford Unit 3 SER, NUREG 0787, "Safety Evaluation Report related to the operation of Waterford Steam Electric Station, Unit No. 3, dated July 1981". Section 7.2.3 states: "The CPCs were not reviewed, per se, at Waterford 3. The staff has taken the operating experience of ANO-2, the previous review, and acceptance of the ANO-2 CPCs, and the similarity of the Waterford 3 and ANO-2 CPCs, into account in reaching this decision."</p> <p>The NRC concluded in the SER that the "...NRC considers the CPC design acceptable."</p> <p>In the Palo Verde Common Q CPCS SER, the NRC staff quotes from the ANO-2 NRC SER (NUREG-0308 Supplement 1, Appendix D) summarizing the CCF analysis and PPS backup trips to the CPCS and concludes the following:</p> <ul style="list-style-type: none"> - Palo Verde possesses an almost identical backup set of hardware implemented RPS trip functions as ANO-2. - Palo Verde RPS trips are identical with the exception that Palo Verde also has Low Flow RPS trip based on Steam Generator 		
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					<p>primary side differential pressure. This trip is used to provide sheared [RCP] shaft event protection, but would serve as a backup for any loss of flow event, including a seized RCP shaft. (OI Response Note: this is also true for WF3)</p> <p>- Replacement of the [existing] four CPC channel hardware with a common qualified platform presents a digital to digital upgrade of the Palo Verde CPC system. Licensing of this system addressed diversity issues by assuming a common cause failure of all four CPC channels. As noted in the Safety Evaluation Report issued to ANO-2 on the CPC channels, the NRC found the backup analog trips, inherent shutdown mechanisms, and provisions for manual operator action acceptable.</p> <p>In summary the NRC staff accepted the ANO-2 analysis of analog PPS trips that back up the CPCS trips for the Palo Verde Common Q CPCS replacement. The Palo Verde plant is a C-E System 80 plant which is significantly different than the ANO-2 C-E 3410 plant design. Whereas the WF3 plant design is a C-E 3410 plant evolutionary version of the C-E 3410 plant design at ANO-2. Since the NRC staff accepted the ANO-2 analysis for the Palo Verde plant CPC Common Q replacement, the same analysis could be applied to the WF3 plant, that is closer in design similarity than the Palo Verde plant. This would explain why the NRC staff chose not to review the original CPCS for WF3 in its entirety from the ANO-2 implementation, due to the similarities in power plant design.</p>		
36	RT-02	Response Times (Summer Sun, Samir Darbali)			<p>[[</p> <p>36.1</p> <p>[[</p> <p>]]</p> <p>A figure correlating the columns in both documents is in the Westinghouse ERR under the folder Open Item 36 (RT-02).</p> <p>36.2</p>	Closed	RAI-08 (OI-36.1)

				<p>]]</p> <p>(36.2) Please submit LTR-GIC-20-003, "Waterford 3 CPCS Response Time Information for FSAR and Technical Specification," on the docket.</p>	<p>LTR-GIC-20-003, Revision 1 submitted to NRC on 05-Mar-2021; ADAMS Accession Nos. ML21064A535 and ML21064A536.</p>		
37	RT-03	<p>Response Times</p> <p>(Summer Sun, Samir Darbali)</p>		<p>]]</p> <p>(37.2) Please submit the last revision of WNA-CN-00572-CWTR3 on the docket.</p>	<p>37.1 The manner in which the assumptions in WNA-CN-00572-CWTR3, Section 4.4 are verified and validated are as follows:</p> <p>1. Assumption: The CONTRM scheduling is assumed to be identical to the CONTRM timing described in 00000- ICE-36369, "CPC Timing Analysis for the Core Protection Calculator System" (Reference 1). The CONTRM timing of MOVE is changed from 500 milliseconds in Reference 1 to 512 milliseconds per Request for Engineering Change (REC) WT3-CPCS-00015.</p> <p>Verification/Validation Method Requirements are specified in the following documents and verified by IV&V WNA-DS-04618-CWTR3, Section 2.7.2, "Software Requirements Specification for the Common Q Core Protection Calculator System" identifies these as requirements: o Requirement number DS-04618-10415 o Requirement number DS-04618-10416 o Requirement number DS-04618-10417</p> <p>2. Assumption The maximum average loading constraint for a PM is assumed to be 75% for the standard method of determining CPCS response time.</p> <p>Verification/Validation Method This requirement is stated in 00000-ICE-30158 Section 2.5.4. As stated in OI-10 (SDP-03) the plan is to re-run the complete set of PVNGS system validation tests with design changes made for the WF3 implementation (i.e., the One Channel System Test and the 4-Channel FAT). This re-run of the PVNGS system validation tests includes validating the requirements in 00000-ICE-30158 Section 2.5.4.</p> <p>3. Assumption The WSES CPCS will use an IRP auxiliary relay with a response time less than, or equal to, 20 milliseconds. This assumption corrects the issue described in Reference 6 with respect to the delay value for the relay.</p> <p>Verification/Validation Method</p>	Closed	<p>No RAIs</p> <p>Audited</p>

						<p>The CPC IRP Panel (document number 2E10708) calls out 10167D72G01 for the relay which calls out PS12820H09 which contains Phoenix PLC-OSC- 24DC/ 24DC/ 5/ACT, P/N 2982786. The attached data sheet for the Phoenix PLC-OSC- 24DC/ 24DC/ 5/ACT specifies a response time of 20 μs. (see Attached)</p> <p>4. Assumption The RCPSSSS is assumed to produce 35.7 pulses per second, or greater, at 90% of rated speed (1190 RPM). This assumption requires verification. A more detailed description of this assumption is provided in Section 4.5, item 4.</p> <p>This assumption on the existing RCPSSSS in the WF3 plant is confirmed in Westinghouse document 00000-ICE-36119, "WSES-3 Core Protection Calculator System Input/Output Scaling" Section 4.0). It identifies the values assumed in WNA-CN-00572-CWTR3 for the existing RCPSSSS equipment at WF3. The RCPSSSS is unchanged as a result of the CPCS upgrade.</p> <p>Verification/Validation Method The assumption is based on the low RCP speed auxiliary trip setpoint being 90% of the normal operating speed, or 1071 RPM. The Common Q CPC upgrade CPC/CEAC Database Constants document, WNA-DT-00204-CWTR3, specifies the value K3 which is the setpoint for the pump speed, as a fraction of rated speed, at which this auxiliary trip occurs. The constant is currently listed at 0.965, or 96.5%. Therefore, the 90% assumption in WNA-CN-00572-CWTR3 is conservative.</p> <p>A fifth assumption in Revision 0 of WNA-CN-00572-CWTR3 was deleted because it was addressed and closed in Section 4.2 of revision 1.</p> <p>37.2 Revision 1 of WNA-CN-00572-CWTR3 submitted to NRC on 05-Mar-2021; ADAMS Accession Nos. ML21064A535 and ML21064A536.</p>		
38	VOP-07	VOP (Deanna Zhang Samir Darbali)	VOP Summary		02/26/21: Please describe the change control requirements that would pertain to the VOP (regarding any changes to the VOP version described in the LAR) after issuance of the amendment.	<p>The Vendor Oversight Plan (VOP) will be updated to provide wording to notify personnel of the need to review the approved Safety Evaluation Report (SER) prior to approval of changes to the document. The VOP will then be formally loaded into the Entergy document control system as an engineering controlled document via the Engineering Change process, which is governed by existing Entergy procedure EN-DC-115. Future changes to the VOP would require an Engineering Change, and as part of that change process, personnel would review the SER per added wording in the VOP to ensure non-conservative changes are not made (i.e., non-conservative changes refer to changes that reduce Entergy's oversight of vendor actions or ability to meet both the process and technical regulatory requirements). The VOP for the CPC project, like the Critical Procurement Plan, will no longer be controlled once the</p>	Closed	RAI-12

						modification has been fully implemented and formally turned over to Operations.		
39	VOP-08	VOP (Deanna Zhang Samir Darbali)	VOP Summary		<p>04/12/21: The NRC staff audited VOP-WF3-2019-00236, Revision 3, to identify details supporting the VOP Summary's description of vendor oversight activities and associated processes to perform these activities. During this audit, the NRC staff also verified whether the licensee's performance of the vendor oversight activities for the requirements phase of the CPCS development lifecycle were conducted in accordance with the VOP. The NRC staff had the following observations during the audit:</p> <ol style="list-style-type: none"> 1. The description of oversight activities related to independent verification and validation (IV&V) is distributed over various sections of the VOP. As a result, the VOP does not describe consistently the planned oversight activities of the vendor's IV&V tasks and reports for each phase of the CPCS development lifecycle. 2. The terminology used regarding requirements traceability analysis within the VOP does not distinguish between the traceability activities that will be performed by the licensee and the IV&V activities performed by the vendor. 3. The VOP does not clearly distinguish between design artifacts that would be audited by the licensee and those that would be reviewed and accepted in accordance with the licensee's procedures, EN-DC-149, "Acceptance of Vendor Documents." 4. The numbering scheme used in the VOP does not allow for oversight activity topics and associated descriptions within each topic to be clearly identifiable. <p>Because of the issues identified in these observations, it appears that the licensee did not perform certain oversight activities related to vendor IV&V tasks and outputs for the requirements phase of the CPCS development lifecycle. The VOP Summary is derived from the content of the VOP and, as such, these observations also apply to the VOP Summary. Therefore, the NRC staff requests the licensee to (1) confirm that it has revised the VOP to address the issues identified in the above four observations, and (2) supplement the LAR with the corresponding changes to the VOP Summary to reflect the VOP changes, to demonstrate that the VOP and VOP Summary contain clear and consistent descriptions of vendor oversight activities.</p>	<p>VOP-WF3-2019-00236, "WF3 Core Protection Calculator System Replacement Project Vendor Oversight Plan," Revision 4 updates descriptions of independent verification and validation (V&V) to consistently describe the planned oversight activities.</p> <p>VOP-WF3-2019-00236 Revision 4 adds a detailed Requirements Traceability Analysis V&V section to distinguish between the traceability activities that will be performed by the licensee and the independent V&V activities performed by the vendor. Additionally, a Software V&V section is also added to clarify V&V in different life cycle phases.</p> <p>VOP-WF3-2019-00236 Revision 4 updates the Design Artifacts section to distinguish when design artifacts are reviewed and accepted in accordance with EN-DC-149, "Acceptance of Vendor Documents."</p> <p>VOP-WF3-2019-00236 Revision 4 updates the numbering scheme throughout the document to allow for oversight activity topics and associated descriptions within each topic to be identifiable and more easily referenced.</p>	Closed	RAI-15
40	HFE-01	HFE (DaBin Ki)			In Attachment 13 (Nonproprietary), "Human Factors Engineering Analysis," Section 3, "Operating Experience Review," Subsection 1, "Predecessor/Related Plants and Systems," of the LAR, Entergy stated the following:	<p>The March 2020 Engineering Benchmark Report is LO-HQNLO-2019-00086 CA-00002.</p> <p>The August 2018 Initial Maintenance Benchmark Report is LO-WLO-2018-00081.</p>	Closed	No RAIs

					<p><i>This OE is documented in formal benchmarking reports tracked by LO-WLO-2018-00081 (initial Maintenance benchmark) and LO-HQNLO-2019-00086 (Engineering benchmark held in March 2020) (References 12 and 13).</i></p> <p>However, in Section 14, "References," of Attachment 13, the title for Reference 12 states, "LO-HQNLO-2018-0081, CPCS Benchmarking Report."</p> <p>Please confirm the correct document number and title for the benchmarking report.</p>			
41	SDP-05	Software Test Plan (Samir Darbali)			<p>4/15/21: The staff audited WNA-PD-00594-CWTR3, "Software Development Plan for the Core Protection Calculator," Revision 2. Section 5.5, "Software Test Plan," of WNA-PD-00594-CWTR3 states that the WF3 Test Plan is derived from the Common Q Software Program Manual (SPM), Section 7, and provides a reference for the WF3-specific test plan, WNA-PT-00303-CWTR3, "Test Plan for the Common Q Core Protection Calculator System."</p> <p>However, the LTR does not mention the use of a WF3-specific test plan. Section 5.2.9 of the LTR states, "Testing will be conducted in accordance with the Common Q SPM, Section 7 describing the levels of testing of the software modules and units (e.g., MTP and OM) culminating with an integrated system test. Section 7 of the SPM also describes the methodology for response time testing."</p> <p>The NRC staff requests the licensee to (1) explain how WNA-PT-00303-CWTR3 is derived from the SPM, Section 7, and (2) how WNA-PT-00303-CWTR3 will be used in conjunction with the SPM, Section 7.</p>	<p>(1) WNA-PT-00303-CWTR3, "Test Plan for the Common Q Core Protection Calculator System," identifies that it will address the Integration Test, System Validation Test, and Factory Acceptance Test (FAT) portions of the Common Q testing sequence by reperforming the same set of tests that were conducted for the reference design (PVNGS CPCS). These correspond to the Level 3 and Level 4 testing levels specified in SPM Table 7.3-1. The software component testing (i.e. Module Test and Unit Test) that correspond to Level 1 and Level 2 of Table 7.3-1 are considered satisfied through the reference plant except for those modules revised as a result of changes for the WF3 CPCS project. Note that some Unit Testing will be reperformed as part of the Level 3 and 4 testing (e.g., OM and MTP display testing). In regards to SPM Exhibit 7-1, all of the initial test program is intended to be completed in full. From a system level testing perspective, this is being treated as a first application and any applicable system testing will be performed. There will be no sampling or reduction in scope (i.e., Westinghouse is not making any use of Nth of a kind methods).</p> <p>(2) WNA-PT-00303-CWTR3 is the implementation test plan for the WF3 CPCS project that must meet the criteria in SPM Section 7.</p>	Closed	RAI-09
42	LTR-01	Licensing Basis (Samir Darbali)			<p>LTR Section 3.2.19 states that "the licensing basis for WF3 is IEEE Std. 279, and this modification will not change the WF3 licensing, basis." However, the year of IEEE Std. 279 is not identified.</p> <p>Please identify the specific version of IEEE Std. 279 which is the licensing basis for the WF3 CPCS, and where in the FSAR it is documented.</p>	<p>UFSAR Section 7.2.1.2 and 7.2.2.3.2 refer to IEEE 279-1971 specifically referencing Reactor Protection System (RPS).</p> <p>Section 7.2.1.2b states that the RPS conforms to the requirements of IEEE 279-1971. Section 7.2.2.3.2 lists IEEE 279-1971 as equipment design criteria and the subsections list how each of the requirements listed in section 4 of IEEE 279 are satisfied.</p>	Closed	No RAIs

ACRONYMS/ABBREVIATIONS

ACRONYM/ ABBREVIATION	DEFINITION	ACRONYM/ ABBREVIATION	DEFINITION
A	Audit (only used for identification of open items in IMS)	MCR	Main Control Room
ANO	Arkansas Nuclear One	NRC	U.S. Nuclear Regulatory Commission
ARP	Alternate Review Process	OI	Open Item
Att.	Attachment	OM	Operator Module

ACRONYM/ ABBREVIATION	DEFINITION	ACRONYM/ ABBREVIATION	DEFINITION
ATWS	Anticipated Transient Without a Scram	PSAI	Plant-Specific Action Items
BTP	Branch Technical Position	PVNGS	Palo Verde Nuclear Generation Station
CCF	Common Cause Failure/D3	RAI	Request for Additional Information
CEA	Control Element Assembly	RC	Regulatory Commitments
CPP	Critical Procurement Plan	RCI	Request for Confirmation of Information
CFR	Code of Federal Regulations	RT	Response Time
CPCS	Core Protection Calculator System	RTM	Requirements Traceability Matrix
CPU	Central Processing Unit	SA	System Architecture (only used for identification of open items in IMS)
D3	Defense in Depth and Diversity	SDOE	Secure Development and Operational Environment
DNBR	Departure from Nucleate Boiling Ratio	SDP	Software Development Plan; System Development Processes, including SPM PSAs (only used for identification of open items in IMS)
DWGS	Drawings	SE	Safety Evaluation
Encl.	Enclosure	SFCP	Surveillance Frequency Control Program
EQ	Environmental Qualification	SPM	Software Program Manual
EQSR	Equipment Qualification Summary Report	SR	Surveillance Requirement
FAT	Factory Acceptance Testing	SRS	Software Requirements Specification
FME	Foreign Material Exclusion	ST	Surveillance Testing/Self-Diagnostics/SR Elimination (only used for identification of open items in IMS)
FSAR	Final Safety Analysis Report	SVVP	Software Verification and Validation Plan
GDC	General Design Criterion (or Criteria)	SW. Dev. Plan	Software Development Plan
HFE	Human Factors Engineering	SyRS or Sys. Req. Spec.	System Requirements Specifications
I&C	Instrumentation and Control	TR	Topical Report
ID	Identification	TRM	Technical Requirements Manual
IEC	International Electrotechnical Commission	TS	Technical Specifications
IEEE	Institute of Electronic and Electrical Engineering	V&V	Validation and Verification
ISG	Interim Staff Guidance	VOP	Vendor Oversight Plan
[CERTREC] IMS	Inspection Management System	WF3 or W3	Waterford Steam Electric Station, Unit 3
LAR	License Amendment Request	WCAP	Westinghouse document
LHGR	Linear Heat Generation Rate	WEC	Westinghouse Electric Corporation
LTR	Licensing Technical Report	WWDT	Window Watchdog Timer

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 – SUMMARY OF REGULATORY AUDIT AND COMPLETED OPEN ITEMS LIST IN SUPPORT OF DIGITAL UPGRADE LICENSE AMENDMENT REQUEST (EPID L-2020-LLA-0164) DATED: AUGUST 16, 2021

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