

INSPECTION PLAN
CPCS MODIFICATION INSTALLATION TEAM INSPECTION
REGION IV

FACILITY: Waterford Steam Electric Station, Unit 3

REPORT NUMBER: 05000382/2022012

START DATE: May 2, 2022

TEAM LEADER: Shiattin Makor (SM), Senior Reactor Inspector, Team Lead

INSPECTORS: Samir Darbali (SD), Electronics Engineer, Team Member
Kim Lawson-Jenkins (KLJ), IT Specialist, Team Member
Deanna Zhang (DZ), Sr. Reactors Operation Engineer, Team Member
Chad Stott (CS), Senior Resident Inspector, Team Member
Drew Childs (DC), Resident Inspector, Team Member

INSPECTION PROCEDURES TO BE USED IN THIS INSPECTION:

Procedure	Title	IPE Code	Current Status	Authorized Hours	Estimated Hours to Complete
52003	Supplemental Inspection	OA	N	240	240

OPEN ITEMS TO BE REVIEWED: N/A

RESIDENT INSPECTOR NOTIFIED: Yes

RESIDENT INSPECTOR INFORMATION RELATED TO INSPECTION: N/A

TEAM LEADER: _____
S. Makor Date

INSPECTOR'S BRANCH CHIEF: _____
N. Taylor Date

DRP BRANCH CHIEF: _____
J. Dixon Date

INSPECTION ANNOUNCED: Via letter dated 03/02/2022
by Ami N. Agrawal [ML22053A346]

INSPECTION PLAN
CPCS MODIFICATION INSTALLATION TEAM INSPECTION
REGION IV

I. OBJECTIVES

The NRC issued Amendment No. 260 to Renewed Facility Operating License No. NPF 38 for the Waterford Steam Electric Station, Unit 3. This amendment revises various technical specifications in order for the licensee to implement a planned modification that will replace the existing core protection calculator (CPC) system and the control element assembly calculator (CEAC) system with a Westinghouse Electric Company (WEC) Core Protection Calculator System (CPCS).

The inspection activities from the Factory Acceptance Testing (FAT) verified the licensee performed oversight of the vendor in accordance with the Vendor Oversight Plan (VOP). This included verifying that the licensee:

- a. Conducted acceptance reviews of the design outputs for the FAT phase, including but not limited to the following: test plans, test procedures, IV&V reports, test records, test result reports, anomaly reports, regression analysis performed to identify additional or modified tests, etc., in accordance with the licensee's procedures identified in the VOP.
- b. Confirmed that the vendor performed the factory acceptance tests in accordance with the processes described in the license amendment.

The objectives for the Site Acceptance Testing (SAT) and the Installation inspection are as follows:

01.01 [Alternate Review Process (ARP) only] To focus on the licensee conduct and performance of the CPCS installation and verify any open VOP inspection activities from the FAT and open inspection areas from the SAT.

01.02 To verify that the licensee has developed, implemented, tested, installed, operated, and maintained the design according to the license amendment, safety evaluation, and in accordance with the manufacturer's recommendations (as appropriate), and licensee commitments, including the commitments provided in the licensee's cyber security plan (CSP).

01.03 To confirm the licensee's upgrade to the system design conforms to the plant specific licensing basis and satisfies applicable guidance.

The inspection objective for this phase is focused on the Installation Phase and will verify the licensee's performance of FAT, SAT, and installation activities through direct observation of the licensee.

II. PREPARATION

Please review the following items in preparation of the inspection. The documents are located in IMS and on the sharepoint site:

- Updated Final Safety Analysis Report (UFSAR)
- Technical Specifications
- Completed Factory Acceptance Test (FAT), Site Acceptance Test (SAT), and installation procedures
- Factory Acceptance Test (FAT), Site Acceptance Test (SAT), and Installation Plans and Reports
- Verification and Validation (V&V) Report on Test Plans and Procedures
- Installation Plans and Procedures
- Safety Evaluation Review (SER)
- License Amendment Request (LAR) and Commitments
- Manufacturer Literature on hardware and software being installed
- Applicable drawings and schematics

Site Access: Team members will receive site-specific site access training for Waterford 3 and will be processed for unescorted access.

III. INSPECTION ACTIVITIES AND SCHEDULE

A. Prep Week: April 18 through April 29, 2022

During this period the team will review the documentation sent by the licensee in the preparation for the week of on-site inspection.

The specific duties assigned to each team member are described below.

HRMS: Time spent preparing for this inspection should be charged to OAP.

B. Inspection Weeks: May 2 through May 13, 2022

This inspection will be performed at Waterford Steam Electric Station in Killona, LA.

The entrance meeting is scheduled for May 2, 2022, at 10:00 AM.

The daily work hours will be 8:00 AM to 5:00 PM. Team members should prepare written status of observations and of issues of concern to the team leader during the afternoon team meeting.

The afternoon team meeting will be conducted each day at 3:00 PM or as needed.

The team leader and members will routinely brief NRC management and the licensee regarding observations and issues of concern as they develop.

A daily NRC management debrief will be performed on an as needed basis.

A daily licensee debrief will be at 4:00 PM or as needed.

The exit is scheduled for May 19, 2022, at 10:00 AM. Additionally, a final daily technical debrief with NRC management will be scheduled for May 18, 2022, at 9:00 AM. Microsoft Teams meeting notice will be provided.

HRMS:

- Time spent performing onsite inspection (interviews and meetings) or observations should be charged to OA.
- Time spent in the entrance meeting and performing document reviews should be charged to OAP.
- Time spent in the exit meeting should be charged to OAD.

C. Report Preparation/Documentation

The specific duties assigned to each team member are described below and assignments for each report section area will be determined before the conclusion of the onsite inspection by the team leader.

All observations and findings identified during the onsite weeks will be documented in accordance with Manual Chapter 0611. Team members will discuss all observations with the team leader.

NRC team members input is due to the team leader by **May 27, 2022**. Please make the team lead aware in advance of any challenges meeting this deadline.

HRMS: Time spent performing documentation and report preparation should be charged to OAD and OAP.

IV. SPECIFIC ACTIVITIES AND ASSIGNMENTS

Inspectors are expected to reference Attachment A which includes the installation inspection scope from Inspection Procedure (IP) 52003, "Digital Instrumentation and Control Modification Inspection" and Attachment B which includes recommended inspection items from NRR for specific activities and assignments.

Activities associated with this modification are iterative and performed in multiple phases. As a result, inspectors are expected to verify the status for their area of review since the FAT for assignments in this inspection plan. Inspection Report 05000382/2021011 summarizes what was reviewed during the FAT and notes the status at the time of that inspection and 05000382/2021014 summarizes the modification status at that time and what was reviewed during the SAT.

The anticipated deliverable for each inspector is to ensure all open items are closed/completed, summarize their inspection review, and provide input for the inspection report that addresses the specific activities they are assigned for the installation inspection portion for this digital modification.

V. ADMINISTRATIVE

The licensing contact and project manager for this inspection is Alan Harris.

Attachment A
Site Installation Inspection Scope from IP52003, "Digital Instrumentation and Control
Modification Inspection"

1. The inspectors will conduct an inspection of the Site Installation Inspection phase of the digital instrumentation and control modification as described.
- 1.1 Licensee's Vendor Oversight Plan (IP52003 ref. 2.01) **(DZ)**
 - (a) Verify that the licensee is performing vendor oversight in accordance with the VOP and procuring new equipment in accordance with the systems and services acquisition processes described in the licensee's CSP. (This would be limited to the inspection of the Entergy audit reports since the FAT.) **(KLJ)**
 - (b) Verify changes to the VOP are in accordance with the change control processes that govern the VOP as described in the license amendment and the quality assurance (QA) program. (This would be limited to the inspection of the Entergy audit reports since the FAT.)
 - (c) Verify the licensee's performance of VOP activities through review of the licensee's audit reports and other records documenting the licensee implementations of the VOP. The areas of focus include oversight of activities and design inputs of for the following phases, Requirements, Design, Implementation, and Integration. **(KLJ)**
 - (d) This activity was completed during FAT/SAT inspections.
 - (e) Verify the licensee's corrective action program appropriately addresses any deficiencies identified during VOP activities. **(ALL)**
 - (f) Verify that the licensee's procurement documents include applicable regulatory requirements and QA program attributes, in accordance with the VOP.
 - (g) Verify that the licensee's audits of vendor activities ensure establishment and implementation of each QA program attribute in accordance with the licensee's NRC-approved QA program and the VOP.
 - (h) This activity was completed during FAT inspections.
 - (i) Verify that the licensee performed the oversight activities in accordance with the procedures (e.g., engineering change process, design document review and acceptance) referenced in the VOP. **(SM)**
- 1.2 Design and Documentation Verification (IP 52003 ref. 2.02) **(SM)**
 - (a) Verify that the installed digital modification conforms to the license amendment, any licensing conditions, and/or licensing commitments, including commitments provided in the licensee's CSP. **(KLJ/SD)**
 - (b) Verify that surveillance, abnormal operating, emergency operating, and annunciator response procedures have been updated, and correctly reflect the new system attributes. **(CS/DC)**
 - (c) Verifying that plant drawings, the Update Final Safety Analysis Report (UFSAR), and other relevant documentation have been updated to reflect the replacement system. In those cases where the update to the UFSAR and other relevant documentation has not been completed, verify that the process is underway, and is properly planned and proceeding in a timely manner. **(CS/DC)**
 - (d) Verify that the shielding and grounding scheme is consistent with the license amendment, licensing basis, and applicable industry standards. **(CS/DC)**

- (e) Verify that the licensee has documented the performance of vendor oversight in accordance with the VOP. **(DZ)**
- 1.3 Review of Testing, Operations, and Training (IP 52003 ref. 2.03) **(SD/SM, CS/DC)**
- (a) Verify that test plans are sufficiently detailed to perform site acceptance tests (SAT), installation tests, and startup for the proposed digital system.
 - (b) Verify the operation manuals are sufficiently detailed, clear, and unambiguous to allow site operational and maintenance personnel to understand and operate the software and the system.
 - (c) Verify the software training plan provides adequate software, appropriate for the level of operations and maintenance being planned for licensee personnel. Verify if the software manuals are sufficiently detailed and understandable to provide training of operations and maintenance personnel, based upon the level of maintenance planned for site staff.
 - (d) Verify, by witnessing and/or reviewing the results for the site acceptance tests, installation tests, and startup tests, that the results provide objective evidence that the proposed digital system will perform as designed.
 - (e) Verify that the operators, technicians, and system engineers have been adequately trained, and have an understanding of the system commensurate with their responsibilities. If the licensee intends to use vendor support to maintain the system, verify vendor staff has training commensurate with their tasks and verify what controls the licensee exercises over the vendor with respect to design control, access, and software configuration.
 - (f) This activity was completed during the licensing activities and FAT.
 - (g) Verify that setpoints and related uncertainty terms have been accurately installed in the software.
 - (h) Verify that proper indication and/or annunciator for system bypass and failure is functional during installation or startup.
- 1.4 Review of Plans for Maintenance and Repair (IP 52003 ref. 2.04) **(SM, CS/DC)**
- (a) Verify maintenance and repair procedures have been updated, and correctly reflect the new system attributes.
 - (b) Verify if the licensee implemented any special procedures for ensuring that stored parts will be correctly handled (such as ensuring stored chips with embedded software are the correct revision).
- 1.5 Identification and Resolution of Problems **(All)**
- The team should verify that the licensee is identifying issues related to this inspection area at an appropriate threshold and entering them in the corrective action program. For a sample of selected issues documented in the corrective action program, verify that the corrective actions are appropriate. See Inspection Procedure 71152, "Identification and Resolution of Problems," for additional guidance.

Attachment B
Recommended Inspection Items for Site Installation, Startup, and Operation

The inspectors will verify the following items during the installation inspection activities.

1. Verify the licensee used the software process testing characteristics described in BTP 7-14 Section B.3.2.4 to evaluate the Waterford CPCS replacement project installation test plans. Refer to Section 3.5.1.10 (for SPM PSAI 5) of the Waterford CPCS SE for additional information regarding this evaluation item. This is an open item from SAT (RFI 23). **(SD)**
2. Verify the licensee has ensured the equipment is thoroughly inspected/tested and free of transit faults (loosing of wires, dislodged components, loosening of component mountings, etc.) that may have occurred during shipment from the vendor to the licensee location. This is an open item from SAT (RFI 9). **(SD)**
3. Verify that the SAT demonstrates that all performance requirements are met prior to placing the system into service. Refer to Section 3.6.2.2 (for PSAI 1) of the Waterford CPCS SE for additional information regarding this evaluation item. Specifically:
 - a. Review the CPCS One-Channel SAT Report. This is an open item from SAT (RFI 15). **(SD)**
 - b. Verify any SAT anomalies and corrective actions, and if any changes were made to the Waterford CPCS as a result of the SAT. **(SD/DZ)**
4. Verify that the licensee has reviewed that the Westinghouse Technical Manual includes the elements of BTP 7-14 for a Software Operations Plan. Refer to Section 3.5.1.10 (for SPM PSAI 4) of the Waterford CPCS SE for additional information regarding this evaluation item. This is an open item from SAT (RFI 25). **(DZ)**
5. Verify the licensee has developed and implemented secure operational environment measures for the SAT. Specifically, verify the security controls and procedures for control of access to the CPCS storage, staging and SAT facility. Refer to Section 3.8 of the Waterford CPCS SE for additional information regarding this evaluation item. This is an open item from SAT (RFI 28) **(KLJ)**
6. Verify the CPCS design control package includes an update of the Waterford Unit 3 Updated Final Safety Analysis Report to reflect the modified CPCS specific design bases. **(SM)**
7. Verify the CPCS installation and physical configuration implements the applicable solutions to address the Equipment Qualification Summary Report (EQSR) test anomalies. Specifically, verify that the Auxiliary Protection Cabinet (APC) MUX is installed with eight 10-32 bolts with lock washers, instead of four bolts, and other corrective actions taken for the installed APC. Refer to Section 3.4 of the Waterford CPCS SE for additional information regarding this evaluation item, and to Section 5 of CPCS EQSR EQ-QR-412-CWTR3 and Section 4 of CPCS Primary Digital Components Qualification Summary Report EQ-QR-410-CWTR3. **(SD, CS/DC)**

8. Verify the CPCS installation activities follow installation procedures, drawings, and best practices. For example,
 - a. Inspect cables interfacing the CPC and CEAC chassis
 - b. Inspect field cable installation
 - c. Inspect chassis ground cable installations
 - d. Determine if electrostatic discharge (ESD) precautions are being used during installation of CPCS equipment **(CS/DC)**

9. Verify that the modification test plan specifies the necessary testing to be performed during and after installation of the CPCS and that the test procedures are prepared, reviewed, approved, controlled, and performed under the existing operating procedures. **(SD/SM, CS/DC)**

10. Verify the modifications made to plant procedures resulting from the CPCS replacement. Refer to Section 3.6.2.2 (for PSAI 9) of the Waterford CPCS SE for additional information regarding this evaluation item. Refer to sections 1.2(b) and 1.4 of this inspection plan, and RFI 10.
 - a. Verify the CPCS operating procedures and maintenance procedures are consistent with the design capability of the CPCS and plant technical specifications. Specifically, verify the licensee has updated maintenance procedures with CPCS maintenance requirements specific for the new equipment and surveillance procedures with testing required by the technical specifications.
 - b. Verify all changes to procedures are made in accordance with the licensee's existing procedure development program. Refer to Section 3.9 of the Waterford CPCS SE for additional information regarding this evaluation item. **(SM, CS/DC)**

11. Verify the licensee procedures detailing the administrative controls for setpoint changes. Specifically, verify the procedures for declaring "inoperable" the affected division of the CPCS prior to changing setpoints. Refer to Section 3.6.2.2 (for PSAI 18) of the Waterford CPCS SE for additional information regarding this evaluation item. See RFI 11. **(SM, CS/DC)**

12. Verify the licensee procedures for performing verification that CPCS self-diagnostic faults are detected.
 - a. Verify procedures that direct the operator to dispatch a maintenance technician to determine the source of alarms
 - b. Verify procedures for walkdowns and operator rounds to perform the following tasks:
 - i. Checking the OMs for health status, alarms, and faults
 - ii. Checking the OMs CPCS channel system event log
 - iii. Checking the OMs for failed sensor stack
 - iv. Checking main control room (MCR) annunciators

- c. Verify procedures for the site engineers to perform periodic system health monitoring and generate system health reports. The CPCS checks to be performed during these engineering activities are:
 - i. Failure trending of subcomponents on CPC and CEAC circuit boards
 - ii. CPC system performance indicator trends
 - iii. Review of trend data for CEAs including RSPTs and RSPT power supplies
 - iv. Walkdowns of the CPC system

Refer to Section 3.1.16 (for CPCS self-diagnostic supervisory functions) of the Waterford CPCS SE for additional information regarding this evaluation item. See RFI 11. **(SD, CS/DC)**

- 13. Verify the licensee performs an evaluation of the user documentation (e.g., technical manuals, training material, procedural changes) associated with the CPCS prior to plant startup. **(SM, CS/DC)**
- 14. Verify the acceptability of the licensee CPCS software training plan and software operations plan specifically, verify the licensee used NMM procedure EN-TQ-201, "Systematic Approach to Training Process," to develop operations and maintenance training plans specific to the CPCS replacement. Also verify that the licensee has installed and tested the simulator to reflect the modified main control room design and those operators have completed simulator training on the new CPCS interface. Refer to Section 3.9 of the Waterford CPCS SE for additional information regarding this evaluation item. **(SD/SM, CS/DC)**
- 15. Verify the licensee has developed and implemented secure operational environment measures for the installed CPCS. Specifically, verify the security controls and procedures for control of access to the CPCS once installed and operating. Verify that the APC door locks, APC door alarms, and control of the Maintenance and Test Panel (MTP) Software Load Enable (SLE) switch and APC keys. Verify the licensee has developed and implemented measures to control the use of portable media such as USB flash drives which can be connected to the MTP node box. Refer to Section 3.8 of the Waterford CPCS SE for additional information regarding this evaluation item. **(KLJ/SD)**