



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
245 PEACHTREE CENTER AVENUE NE, SUITE 1200  
ATLANTA, GEORGIA 30303-1257

October 30, 2015

Mr. Benjamin C. Waldrep  
Vice President  
Duke Energy Progress, Inc.  
Shearon Harris Nuclear Power Plant  
P. O. Box 165, Mail Code: Zone 1  
New Hill, North Carolina 27562-0165

**SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT - NRC INTEGRATED  
INSPECTION REPORT 05000400/2015003**

Dear Mr. Waldrep:

On September 30, 2015, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Shearon Harris nuclear power plant Unit 1. The enclosed inspection report documents the inspection results which were discussed on October 23, 2015, with you and other members of your staff.

Two NRC-identified findings and three self-revealing findings of very low safety significance (Green) were identified during this inspection. Four of these findings were determined to involve violations of NRC requirements. The NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Shearon Harris Power Plant, Unit 1.

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region II; and the NRC Resident Inspector at Shearon Harris facility.

B. Waldrep

2

In accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Agency Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

George T. Hopper, Chief  
Reactor Projects Branch 4  
Division of Reactor Projects

Docket No.: 50-400  
License No.: NPF-63

Enclosure:  
NRC IR 05000400/2015003  
w/Attachment: Supplementary Information

cc Distribution via ListServ

B. Waldrep

2

In accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Agency Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

George T. Hopper, Chief  
Reactor Projects Branch 4  
Division of Reactor Projects

Docket No.: 50-400  
License No.: NPF-63

Enclosure:  
NRC IR 05000400/2015003  
w/Attachment: Supplementary Information

cc Distribution via ListServ

PUBLICLY AVAILABLE       NON-PUBLICLY AVAILABLE       SENSITIVE       NON-SENSITIVE  
ADAMS:  Yes      ACCESSION NUMBER: ML15303A082       SUNSI REVIEW COMPLETE       FORM 665 ATTACHED

OFFICE	RII:DRP	RII:DRP	RII:DRS	RII:DRS	RII:DRP	RII:DRP	
SIGNATURE	MJR4 via email	JDA via email	MAB7 via email	BLC2 via email	JSD	GTH	
NAME	M. Riches	J. Austin	M. Bates	B. Caballero	J. Dodson	G. Hopper	
DATE	10/23/2015	10/28/2015	10/27/2015	10/27/2015	10/30/2015	10/29/2015	
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

OFFICIAL RECORD COPY DOCUMENT NAME: G:\DRP\IRPB4\HARRIS\REPORTS\2015 REPORTS\15-03\IR 15-003.DOCX

Letter to Benjamin C. Waldrep from George T. Hopper dated October 30, 2015.

SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT - NRC INTEGRATED  
INSPECTION REPORT 05000400/2015002

**DISTRIBUTION:**

D. Gamberoni, RII

S. Price, RII

L. Gibson, RII

OE MAIL

RIDSNNRRDIRS

PUBLIC

RidsNrrPMShearonHarris Resource

**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket Nos.: 50-400

License Nos.: NPF-63

Report No.: 05000400/2015003

Licensee: Duke Energy Progress, Inc.

Facility: Shearon Harris Nuclear Power Plant, Unit 1

Location: 5413 Shearon Harris Road  
New Hill, NC 27562

Dates: July 1, 2015 through September 30, 2015

Inspectors: J. Austin, Senior Resident Inspector  
M. Riches, Resident Inspector  
M. Bates, Senior Operations Engineer (Section 1R11.2)  
B. Caballero, Senior Operations Engineer (Section 1R11.2)  
J. Dodson, Senior Project Engineer (Section 4OA2)

Approved by: George T. Hopper, Chief  
Reactor Projects Branch 4  
Division of Reactor Projects

Enclosure

## SUMMARY OF FINDINGS

IR 05000400/2015003; July 1, 2015, through September 30, 2015; Duke Energy Progress, Inc., Shearon Harris Nuclear Power Plant, Unit 1, Flood Protection Measures, Maintenance Effectiveness, Plant Modifications, Problem Identification and Resolution.

The report covered a three-month period of inspection by resident inspectors and regional inspectors. There were two NRC-identified and two self-revealing violations, and one self-revealing finding documented in this report. The significance of inspection findings are indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," (SDP) dated April 29, 2015. The cross-cutting aspects are determined using IMC 0310, "Aspects within the Cross-Cutting Areas" dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy dated February 4, 2015. The NRC's program for overseeing the safe operations of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5.

### Cornerstone: Initiating Events

Green. A self-revealing green finding was identified for failure to implement adequate corrective actions for the repeated failure of PS-4175, low pressure steam inlet crossover pressure switch in accordance with licensee procedure AD-PI-ALL-0100, Corrective Action Program.

Specifically, on multiple occasions the licensee failed to install a pressure switch rated for design conditions on the Main Turbine which led to an unplanned reactivity addition, when PS-4175 failed open. The licensee entered this into their corrective action program (CAP) as action request (AR) 755621 and took immediate actions to reduce power to less than 100 percent. Reactor power reached a maximum value of 100.5 percent.

Failure to implement adequate corrective action for the repeated failure of pressure switch PS-4175 in accordance with licensee procedure AD-PI-ALL-0100 was a performance deficiency. The performance deficiency was determined to be more than minor because if left uncorrected the performance deficiency had the potential to lead to a more significant safety concern. Specifically, if not for the manual actions taken by the operators to insert control rods, the reactivity addition would have continued and would have ultimately resulted in a reactor trip on high neutron flux. Using IMC 0609, "Significance Determination Process" Attachment 4, Initial Characterization of Findings, and Appendix A, The SDP for Findings At-Power, (June 19, 2012), the inspectors determined the finding was a contributor as a Transient Initiator to the Initiating Events cornerstone. The inspectors determined the finding was of very low safety significance (Green) because it did not result in a reactor trip and it did not cause the loss of any mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition. The inspectors concluded the finding was associated with the design margins aspect (H.6) of the human performance cross-cutting area since the licensee repeatedly failed to install a pressure switch adequate for the operating conditions. (Section 1R12)

Green. A self-revealing green NCV of 10 CFR 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants, Criterion III, Design Control, was identified for failure to implement design control measures that verify adequacy of design. Specifically, EC 83681 involved the installation of a new pump bearing with different wear characteristics but

the EC failed to evaluate the impact of the bearing replacement on alignment sensitivity of the pump shaft. The licensee took immediate action to align the Normal Service Water system to provide cooling to the heat loads affected by the loss of the "A" ESW pump.

Failure to incorporate alignment requirements for the pump shaft in the work instructions associated with EC 83681 was a performance deficiency. The performance deficiency was related to the equipment performance attribute of the initiating events cornerstone. The performance deficiency was determined to be more than minor because the performance deficiency adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the failure of the ESW pump shaft resulted in a loss of service water which ultimately led to the loss of the 'A' train of shutdown cooling for a period of twelve minutes. Inspectors evaluated the finding using IMC 0609, "Significance Determination Process," Attachment 4 and Appendix G (June 19, 2012), "Shutdown Operations Significance Determination Process." The inspectors determined the finding was associated with the Initiating Event cornerstone and required a detailed risk evaluation because the finding involved a loss of safety function. A detailed risk evaluation was completed by a regional Senior Reactor Analyst (SRA). The regional SRA performed a detailed risk review of the finding. The SRA performed the analysis by increasing the maintenance unavailability for the pump, and evaluating it versus the base case. This method was chosen because the pump was in standby service, and the dominant method of determining there was a failure would have been during testing, or operation under non accident conditions. The additional time for the unnecessary repair was used to adjust the base case maintenance unavailability. Online and shutdown risk were evaluated. The total impact was determined to be low enough for the finding to be GREEN for SDP purposes. The finding had a cross-cutting aspect in the Human Performance area of Design Margin (H.6). (1R18).

Green. The inspectors identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion XVI, for the licensee's failure to identify and correct a condition adverse to quality affecting the Environmental Qualification (EQ) Program. Specifically, the licensee failed to enter into the CAP the results of the vendor audit of the EQ program which resulted in the licensee blocking open D10 and D11 on June 16, 2015 while the unit was at 100 percent power. The resident inspectors questioned the main control room (MCR) about the doors being open and the licensee immediately closed D10 and D11. The licensee has entered the violation into their CAP as AR 754721, implemented interim guidance as an operation's standing instruction (2015-024) not to open D10 or D11 while in mode 1-4.

The opening of the tornado door between the main steam tunnel (MST) and the reactor auxiliary building (RAB) was a performance deficiency. The finding was screened in accordance with NRC IMC 0609.04, Initial Characterization of Findings, dated July 7, 2012. The finding was determined to affect the Initiating Events Cornerstone as the MST to RAB tornado door represented a barrier which left RAB systems and components vulnerable to harsh environment conditions should a high energy line break (HELB) occur during the time the doors were open. SDP screening determined that the finding could have affected equipment used to mitigate a LOCA, could have caused a reactor trip, could have resulted in internal flooding conditions, and could have affected equipment relied upon to transition the plant to a stable shutdown condition and required a detailed risk evaluation. A detailed risk evaluation was performed by a regional SRA in accordance with NRC IMC 0609 Appendix A. The major analysis assumptions included: a twenty hour exposure interval, HELBs postulated in all steam and feedwater piping in the

MST, pipe break frequency from EPRI Report 1021086, no recovery credit for door closure, and a bounding CCDP value utilized. The CCDP was estimated using the NRC Shearon Harris SPAR model assuming a reactor trip initiator and bounding assumptions that the postulated RAB harsh environmental and flooding conditions would cause failure of the following equipment: auxiliary feedwater system, alternate seal injection system, RAB essential services chillers, component cooling water pumps, charging and safety injection pumps, and the residual heat removal pumps. The dominant sequence was a reactor trip, success of the reactor protection system, and failure of the reactor coolant pump (RCP) seals leading to an unmitigated RCP seal LOCA. The risk was mitigated by the short exposure period and the probability of steam and feedwater HELBs. The analysis determined that the finding represented an increase in core damage frequency of  $< 1.0 \text{ E-6/year}$ , a GREEN finding of very low safety significance. This finding has a cross-cutting aspect in the area of Problem Identification and Resolution in the Corrective Action component because the licensee did not take appropriate corrective actions to address safety issues in a timely manner. [P.3] (Section 4OA2)

### **Cornerstone: Mitigating Systems**

Green. A self-revealing Green NCV of Technical Specification (TS) 6.8.1, Procedures and Programs, for the licensee's inadequate implementation of procedure AD-OP-ALL-0200, Clearance and Tagging, when the licensee failed to establish an appropriate clearance boundary to support filling the cooling tower basin. This resulted in excess of 45,000 gallons of water being spilled in the RAB. The licensee initiated corrective actions to address potential equipment degradation and personnel hazards as a result of the spill.

The licensee's failure to adequately implement procedure, AD-OP-ALL-0200, Clearance and Tagging, Section 5.5, Step 1 was a performance deficiency. Specifically, CO 310942 did not establish isolation between the cooling tower basin and ISW-276, which was not completely assembled. The performance deficiency was more than minor because if left uncorrected, it would have the potential to lead to a more significant safety concern. Specifically, if operator action had not stopped the leakage, it potentially would have challenged the operability of safety related equipment on multiple levels of the RAB. Using MC 0609, SDP, Appendix G, Exhibit 3 – Mitigating Systems Screening Questions, the finding is a deficiency affecting the qualification of a mitigating SSC, however, the SSC function was restored with operator action, resulting in a GREEN finding of very low safety significance. The finding had a crosscutting aspect of procedure adherence, as described in the area of human performance because the licensee allowed the CO to be lifted in the plant without properly establishing an isolation boundary and isolating the cooling tower basin from ISW-276 while not fully assembled. (H.8). (Section 1R06)

### **Other Findings**

SL IV. The inspectors identified a severity level (SL) IV NCV of 10 CFR 50.72(b)(3)(xiii) for the failure to report to the NRC within 8 hours the major loss of emergency assessment capability of the Technical Support Center (TSC). Specifically, on multiple occasions between January 2015 and July 2015, there were unplanned losses of emergency response facility (ERF) function, which resulted in the loss of emergency assessment capability, which the licensee failed to report the condition within the 8-hour time requirement. Subsequently, the licensee notified the NRC once it was realized a report was required and entered the issue in the CAP as AR 757885.



The failure to report the loss of emergency assessment capability in the TSC as required by 10 CFR Part 50.72(b)(3)(xiii) was a performance deficiency. The licensee's failure to notify the NRC was determined to impact the regulatory process, which requires evaluation through the traditional enforcement process. Based on the examples provided in Section 6.9 of the Enforcement Policy, dated February 4, 2015, Inaccurate and Incomplete Information or Failure to Make a Required Report, the performance deficiency was determined to be a SL IV violation. Specifically, example d.9 states that a SL IV violation involves a failure to make a report required by 10 CFR 50.72 or 10 CFR 50.73. Because the violation was processed as a traditional enforcement violation, no cross-cutting aspect is assigned. (Section 4OA2)

## REPORT DETAILS

### Summary of Plant Status

Unit 1: The unit began the period at 100 percent power and remained at or near this power level throughout the inspection period.

#### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

#### 1R01 Adverse Weather Protection (71111.01 – 1 sample)

##### a. Inspection Scope

##### .1 Seasonal Extreme Weather Conditions

The inspectors conducted a detailed review of the station's adverse weather procedures written for extreme high temperatures. The inspectors verified that weather-related equipment deficiencies identified during the previous year had been placed into the work control process and/or corrected before the onset of seasonal extremes. The inspectors evaluated the licensee's implementation of adverse weather preparation procedures and compensatory measures before the onset of and during seasonal extreme weather conditions. Documents reviewed are listed in the Attachment.

The inspectors evaluated the following risk-significant systems:

- Containment Cooling
- Technical Support Center HVAC

##### b. Findings

No findings were identified.

#### 1R04 Equipment Alignment (71111.04 – 4 samples)

##### a. Inspection Scope

##### .1 Partial Walkdown

The inspectors verified that critical portions of the selected systems were correctly aligned by performing partial walkdowns. The inspectors selected systems for assessment because they were a redundant or backup system or train, were important for mitigating risk for the current plant conditions, had been recently realigned, or were a single-train system. The inspectors determined the correct system lineup by reviewing plant procedures and drawings. Documents reviewed are listed in the Attachment.

The inspectors selected the following systems or trains to inspect:

- 'A' and 'B' Emergency Diesel Generator (EDG) Ventilation Rooms
- Temporary Diesel Driven Fire Pump (DDFP) while permanent DDFP is OOS for repairs
- 'B' train of Essential Services Chilled Water (ESCW) system with 'A' train ESCW out-of-service for planned maintenance

b. Findings

No findings were identified.

.2 Complete Walkdown

The inspectors verified the alignment of the diesel fuel oil storage. The inspectors selected this system for assessment because it is a risk-significant mitigating system. The inspectors determined the correct system lineup by reviewing plant procedures, drawings, the updated final safety analysis report (UFSAR), and other documents. The inspectors reviewed records related to the system's outstanding design issues, maintenance work requests, and deficiencies. The inspectors verified that the selected system was correctly aligned by performing a complete walkdown of accessible components.

To verify the licensee was identifying and resolving equipment alignment discrepancies, the inspectors reviewed corrective action documents, including condition reports and outstanding work orders. The inspectors also reviewed periodic reports containing information on the status of risk-significant systems, including maintenance rule reports and system health reports. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05A/Q – 6 samples)

a. Inspection Scope

Quarterly Inspection

The inspectors evaluated the adequacy of selected fire plans by comparing the fire plans to the defined hazards and defense-in-depth features specified in the fire protection program. In evaluating the fire plans, the inspectors assessed the following items:

- control of transient combustibles and ignition sources
- fire detection systems
- water-based fire suppression systems
- gaseous fire suppression systems

- manual firefighting equipment and capability
- passive fire protection features
- compensatory measures and fire watches
- issues related to fire protection contained in the licensee's CAP

The inspectors toured the following fire areas to assess material condition and operational status of fire protection equipment. Documents reviewed are listed in the Attachment.

- Turbine Building 286 elevation, fire zone 1-G-286
- RAB 286 elevation, fire zone 1-A-BAL-D
- RAB 305 elevation, fire zone 12-A-BAL
- RAB 305 elevation – PIC Rooms, fire zone 12-A-CRC1
- 'A' EDG Building, fire zone 1-DGA-D
- 'B' EDG Building, fire zone 1-DGB-D

The inspectors reviewed the follow ARs associated with this area to verify that the licensee identified and implemented appropriate corrective actions:

- AR 1940704, NFPA 805 monitoring exceeded performance criteria
- AR 758592, Diesel Driven Fire Pump Jacket Water Flow

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06 – 1 sample)

a. Inspection Scope

.1 Internal Flooding

The inspectors reviewed related flood analysis documents and walked down the area(s) listed below containing risk-significant structures, systems, and components susceptible to flooding. The inspectors verified that plant design features and plant procedures for flood mitigation were consistent with design requirements and internal flooding analysis assumptions. The inspectors also assessed the condition of flood protection barriers and drain systems. In addition, the inspectors verified the licensee was identifying and properly addressing issues using the CAP. Documents reviewed are listed in the Attachment.

- RAB Flood Calculation, PRA-F-E0004

b. Findings

Introduction: A self-revealing Green NCV of Technical Specification (TS) 6.8.1, Procedures and Programs, for the licensee's inadequate implementation of procedure AD-OP-ALL-0200, Clearance and Tagging, when the licensee failed to establish an appropriate clearance boundary to support filling the cooling tower basin. This resulted in excess of 45,000 gallons of water being spilled in the RAB.

Description: On April 22, 2015, to support filling of the cooling tower basin, CO 310942 lift was being implemented in the plant. This CO lift was completed at 1451, operations began to fill the cooling tower basin at 1611, at a fill rate of 22,000 gallons per minute (GPM) and was expecting the fill to be completed at approximately 2045. At approximately 2033 the main control room (MCR) received a report of a significant amount of water coming out of the flange connection of 1SW-276, the common ESW return to normal service water (NSW), which was being reassembled. The operation's crew entered abnormal operating procedures, AOP-022, Loss of Service Water, at 2033 and performed the isolation sequence prescribed in the procedure. Once the service water valves were closed and NSW pumps were secured as described in the procedure, the leakage slowed significantly and the leakage was within the capacity of the RAB drain system capability. The leakage from 1SW-276 was a result of the cooling tower basin level reaching a point where water flowed from the cooling tower basin into the RAB through the NSW return line. The water made it to 1SW-276 because the clearance writer and verifier assumed that the elevation of the NSW water return line to the cooling tower basin would remain above the elevation of the cooling tower basin and thereby creating the boundary to preclude backfill. AD-OP-ALL-0200, Section 5.5, Step 1 requires clearances to provide a safe boundary for all physical work to be performed under the clearance or for required equipment protection. This is accomplished by identifying, isolating, and tagging all required isolation points. The licensee initiated corrective actions to address potential equipment degradation and personnel hazards as a result of the spill.

Analysis: The licensee's failure to adequately implement procedure, AD-OP-ALL-0200, Clearance and Tagging, Section 5.5, Step 1 was a performance deficiency. Specifically, CO 310942 did not establish isolation between the cooling tower basin and ISW-276, which was not completely assembled. The performance deficiency was more than minor because if left uncorrected, it would have the potential to lead to a more significant safety concern. Specifically, if operator action had not stopped the leakage, it potentially would have challenged the operability of safety related equipment on multiple levels of the RAB. Using MC 0609, SDP, Appendix G, Exhibit 3 – Mitigating Systems Screening Questions, the finding is a deficiency affecting the qualification of a mitigating SSC, however, the SSC function was restored with operator action, resulting in a GREEN finding of very low safety significance. The finding had a crosscutting aspect of procedure adherence, as described in the area of human performance because the licensee allowed the CO to be lifted in the plant without properly establishing an isolation boundary and isolating the cooling tower basin from ISW-276, while not fully assembled. (H.8).

Enforcement: TS 6.8.1, Procedures and Programs, requires, in part, that written procedures be implemented covering activities referenced in Regulatory Guide 1.33, Revision 2, dated February 1978, including safety-related activities carried out during operation of the reactor plant. Procedure, AD-OP-ALL-0200, Clearance and Tagging, Section 5.5, step 1, Clearance and Development Standards, states “Clearances will provide a safe boundary for all physical work to be performed under the clearance or for required equipment protection. This is accomplished by identifying, isolating, and tagging all required isolation points.”

Contrary to this requirement, on April 22, 2015, the licensee did not establish adequate isolation from the cooling tower basin, resulting in excess of 45,000 gallons of water from the cooling tower basin being spilled into the RAB. Because the licensee entered the issue into the CAP and the finding was of very low safety significance (Green), this violation is being treated as an NCV, consistent with Section 2.3.2.a of the Enforcement Policy. This violation was entered into the licensee’s CAP as AR 745185 and is designated as NCV 05000400/2015003-01, Failure to Adequately Implement the Clearance and Tagging Procedure.

1R11 Licensed Operator Regualification Program and Licensed Operator Performance (71111.11 – 3 samples)

a. Inspection Scope

.1 Resident Inspector Quarterly Review of Licensed Operator Regualification

On August 19, 2015, the inspectors observed an evaluated simulator scenario administered to an operating crew as part of the annual requalification operating test required by 10 CFR 55.59, “Requalification”. The scenario evaluated the crew’s ability to respond to abnormal and emergency events including loss of cooling to the 1A Unit Auxiliary Transformer, failure of the 1B steam generator (SG) pressure transmitter, and a main steam line break outside containment with a subsequent tube rupture on 1B SG.

The inspectors assessed the following:

- licensed operator performance
- the ability of the licensee to administer the scenario and evaluate the operators
- the quality of the post-scenario critique
- simulator performance

Documents reviewed are listed in the Attachment.

.2 Biennial Review of Licensed Operator Regualification

The inspectors reviewed the facility operating history and associated documents in preparation for this inspection. During the week of August 3 - 7, 2015, the inspectors reviewed documentation, interviewed licensee personnel, and observed the administration of operating tests associated with the licensee’s operator requalification

program. Each of the activities performed by the inspectors was done to assess the effectiveness of the facility licensee in implementing requalification requirements identified in 10 CFR Part 55, "Operators' Licenses." The evaluations were also performed to determine if the licensee effectively implemented operator requalification guidelines established in NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," and Inspection Procedure (IP) 71111.11, "Licensed Operator Requalification Program." The inspectors also evaluated the licensee's simulation facility for adequacy for use in operator licensing examinations using ANSI/ANS-3.5-2009, "American National Standard for Nuclear Power Plant Simulators for use in Operator Training and Examination." The inspectors observed two crews during the performance of the operating tests. Documentation reviewed included written examinations, job performance measures (JPMs), simulator scenarios, licensee procedures, on-shift records, simulator modification request records, simulator performance test records, operator feedback records, licensed operator qualification records, remediation plans, watch standing records, and medical records. The records were inspected using the criteria listed in IP 71111.11. Documents reviewed during the inspection are documented in the list of documents reviewed.

b. Findings

(Opened) Unresolved Item (URI): Written NRC Biennial Examinations Did Not Meet Qualitative Standards

Introduction: The inspectors identified an URI associated with 10 CFR 55.59, "Requalification," based on a preliminary determination that between 20 and 40 percent of the written examination questions administered to licensed operators during the biennial requalification examination were potentially flawed. This item is unresolved pending further inspection to determine whether a performance deficiency exists.

Description: The NRC-required biennial written examinations are designed to ensure that licensed operators maintain safe standards of knowledge and ability in order to take appropriate safety-related actions in response to actual abnormal or emergency conditions. As part of the biennial licensed operator training inspection, the inspectors evaluated the content of two NRC-required biennial written examinations (Set 1 Exam 1 SRO and Set 2 Exam 4 SRO) that the licensee developed and administered to licensed operators in 2014. Between 20 percent and 40 percent of items reviewed were determined to potentially contain flaws such as more than one implausible distracter, direct lookup, or low level of difficulty. The standard for determining a question flaw was located within site-specific procedures and further defined within NUREG-1021, "Operator Licensing Examination Standards for Power Reactors."

Several questions were determined to potentially not contain an appropriate level of difficulty. In many instances there may not have been an acceptable amount of knowledge tested for where to find the answer in an open book exam. Compounding the impact on level of difficulty, answer choices could be eliminated without using nuclear power plant operating knowledge. The licensee entered the issue into their CAP as AR 01940942.

Pending further guidance from the Office of Nuclear Reactor Regulation (NRR) on the evaluation of the level of difficulty in establishing whether a performance deficiency exists, this issue is identified as URI 05000400/2015003-02, NRC Biennial Written Examinations May Not Have Met Qualitative Standards.

.3 Resident Inspector Quarterly Review of Licensed Operator Performance in the Actual Plant/Main Control Room

The inspectors observed licensed operator performance in the MCR following the receipt of a fire alarm inside containment. The crew determined that an actual fire did not exist inside containment. The cause of the alarm was due to the loss of normal purge and inadequate containment cooling resulting in a rapid rise in temperatures in the pressurizer cubicle, which allowed temperatures in the area to reach the heat detector trip setpoint. The crew maximized containment cooling, reset the tripped alarm and subsequently took actions to drain the fire header inside containment.

The inspectors assessed the following:

- use of plant procedures
- control board manipulations
- communications between crew members
- use and interpretation of instruments, indications, and alarms
- use of human error prevention techniques
- documentation of activities
- management and supervision

Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12 – 4 samples)

a. Inspection Scope

The inspectors assessed the licensee's treatment of the issues listed below to verify the licensee appropriately addressed equipment problems within the scope of the maintenance rule (10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants"). The inspectors reviewed procedures and records to evaluate the licensee's identification, assessment, and characterization of the problems as well as their corrective actions for returning the equipment to a satisfactory condition. The inspectors also interviewed system engineers and the maintenance rule coordinator to assess the accuracy of performance deficiencies and extent of condition. Documents reviewed are listed in the Attachment.



- PS-4175, Low Pressure Steam Inlet Crossover Pressure Switch failure
- Maintenance Rule evaluation on 1-SW-3500A Out of Tolerance and Will Not Reset
- Maintenance Rule evaluation on Spring Setting for RC-H-0455 Out of Tolerance
- Maintenance Rule evaluation on EST-223 As-found Test of 1MS Outside of Technical Specifications

b. Findings

Introduction: A self-revealing green finding was identified for failure to implement adequate corrective actions for the repeated failure of PS-4175, low pressure steam inlet crossover pressure switch in accordance with licensee procedure AD-PI-ALL-0100, CAP. Specifically, on multiple occasions the licensee failed to install a pressure switch rated for design conditions on the Main Turbine which led to an unplanned reactivity addition, when PS-4175 failed open.

Description: At 0827 on June 22, 2015, with the unit at 100 percent RTP, the control room operators observed a decreasing trend on  $T_{avg}$  and  $T_{ref}$  with a concurrent increasing trend on reactor power. Operators took manual control of the control rods to reduce reactor power. Reactor power reached a maximum of 100.5 percent power at 0835. At 0850, all control room indications for reactor power were observed to be below 100 percent. At 0855, it was noted that all main turbine drain valves were open. The operators took manual action and reclosed the drain valves. Subsequent troubleshooting revealed that pressure switch PS-4175 had failed open, which provided an input signal to the drain valves. The drain valves are designed to close during power ascension when pressure inside the low pressure crossover inlet reaches 36 psi (approximately 200 megawatts). The pressure switch also provides an open and close signal to the exhaust hood spray valves over a range of 21.75 psi to 18 psi, respectively.

The inspectors reviewed previous work orders and ARs associated with pressure switch, PS-4175, and determined that as early as 2005, it was identified that the design characteristics of the pressure switch were not compatible with the known conditions in which the pressure switch was required to operate. AR 157760 initiated on May 2, 2005, identified that the pressure switch had a design pressure band of 0-100 psi and was operating in an environment that typically experienced pressures in the 250 psi range during full power operations. An Adverse Condition Investigation associated with the AR acknowledged that based on the equipment history (i.e., repeated as-found observations of being out of tolerance and requiring calibration) that the cause of the failures associated with the pressure switch was due to an inadequate design issue. However, the final recommendation was to not upgrade the pressure switch to one designed for the expected conditions because the consequences of failure were minimal, since plant operating procedures provided adequate guidance for manually operating the exhaust hood spray valves during plant startup and shutdown. The investigation did not consider the impact of failure of the pressure switch at full power operation nor make any mention of the impact of a failure on the main turbine drain valves. The decision was made to not replace the pressure switch based on the minimal consequences and the cost involved to implement a setpoint change on the new instrument. The inspectors noted that in December 2011, issues with pressure switch PS-4175, were again identified. On

December 29, 2011, AR 506379 was initiated documenting that pressure switch PS-4175 had failed multiple times and recommending that the pressure switch be replaced with an item designed to handle the expected pressures at full-power operation. In February 2012, the issue was entered into the Long-Term Asset Management (LTAM) process and was submitted to Plant Health Committee (PHC) for prioritization. While the PHC evaluation recognized the high probability for repeat failure of the component it rated the consequences from failure as very low. The PHC recommended replacing the pressure switch, but gave it a low priority, which at the time of the event the funding for the LTAM ticket had not been obligated. In the information provided for the evaluation, the PHC was not made aware of the potential for the failure to effect electrical generation. During the spring 2015 Refueling Outage, the licensee again installed a new pressure switch with an operating pressure band of 0-100 psi. The work was completed on April 10, 2015, and the plant started up on May 15, 2015. PS-4175 failed again on June 22, 2015, resulting in an unplanned reactivity addition.

Analysis: Failure to implement adequate corrective action for the repeated failure of pressure switch PS-4175 in accordance with licensee procedure AD-PI-ALL-0100, CAP, was a performance deficiency. The performance deficiency was determined to be more than minor because if left uncorrected the performance deficiency had the potential to lead to a more significant safety concern. Specifically, if not for the manual actions taken by the operators to insert control rods, the reactivity addition would have continued and would have ultimately resulted in a reactor trip on high neutron flux. Using IMC 0609, "Significance Determination Process" Attachment 4, Initial Characterization of Findings, and Appendix A, The SDP for Findings At-Power, (June 19, 2012), the inspectors determined the finding was a contributor as a Transient Initiator to the Initiating Events cornerstone. The inspectors determined the finding was of very low safety significance (Green) because it did not result in a reactor trip and it did not cause the loss of any mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition. The inspectors concluded the finding was associated with the design margins aspect (H.6) of the human performance cross-cutting area since the licensee repeatedly failed to install a pressure switch adequate for the operating conditions.

Enforcement: The licensee's procedure, AD-PI-ALL-0100, "Corrective Action Program" defines corrective action as an action that resolves an undesired condition, causal factor, or potential extent of condition for the resolution of conditions adverse to quality.

Contrary to the above, the licensee failed on multiple occasions to resolve the undesired condition or extent of condition related to the installation of a pressure switch that was not designed for the operating conditions and ultimately resulted in a reactivity addition event. This finding does not involve enforcement action because no violation of a regulatory requirement was identified. Because this finding does not involve a violation and is of very low safety significance, it is identified as a FIN: 05000400/2015003-03, Failure to Implement Adequate Corrective Actions.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 3 samples)

a. Inspection Scope

The inspectors reviewed the maintenance activities listed below to verify that the licensee assessed and managed plant risk as required by 10 CFR 50.65(a)(4) and licensee procedures. The inspectors assessed the adequacy of the licensee's risk assessments and implementation of risk management actions. The inspectors also verified that the licensee was identifying and resolving problems with assessing and managing maintenance-related risk using the CAP. Additionally, for maintenance resulting from unforeseen situations, the inspectors assessed the effectiveness of the licensee's planning and control of emergent work activities. Documents reviewed are listed in the Attachment.

- July 29, 2015, Leak testing the Auxiliary Boiler Fuel Oil sumps using the fire water system with the fire detectors in Zone 1-72 on the Turbine Building 286' elevation disabled.
- September 2, 2015, Qualitative risk assessment to the aggregate online risk with the DDFP out-of-service.
- September 30, 2015, Qualitative yellow risk while performing schedule maintenance and "A" Feed Regulating Valve in Manual.

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15 – 4 samples)

a. Inspection Scope

.1 Operability and Functionality Review

The inspectors selected the operability determinations or functionality evaluations listed below for review based on the risk-significance of the associated components and systems. The inspectors reviewed the technical adequacy of the determinations to ensure that TS operability was properly justified and the components or systems remained capable of performing their design functions. To verify whether components or systems were operable, the inspectors compared the operability and design criteria in the appropriate sections of the TS and UFSAR to the licensee's evaluations. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. Additionally, the inspectors reviewed a sample of corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with operability evaluations. Documents reviewed are listed in the Attachment.

- 1A-SA Battery Room Exceeded 79 Degrees Fahrenheit, AR 1951099
- Pressurizer Level L-460 Exceeded TS.4.3.1.1, AR 01948957
- "A" Component Cooling Water Pump Outboard Mechanical Seal Leak, AR 1940953

.2 Operator Work-Around Review

The inspectors performed a detailed review of the licensee's operator work-around, operator burden, and control room deficiency lists for the station in effect on September 30, 2015, to verify that the licensee identified operator workarounds at an appropriate threshold and entered them in the CAP. The inspectors verified that the licensee identified the full extent of issues, performed appropriate evaluations, and planned appropriate corrective actions. The inspectors also reviewed compensatory actions and their cumulative effects on plant operation. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18 – 2 samples)

a. Inspection Scope

The inspectors verified that the plant modification(s) listed below did not affect the safety functions of important safety systems. The inspectors confirmed the modifications did not degrade the design bases, licensing bases, and performance capability of risk significant structures, systems and components. The inspectors also verified modifications performed during plant configurations involving increased risk did not place the plant in an unsafe condition. Additionally, the inspectors evaluated whether system operability and availability, configuration control, post-installation test activities, and changes to documents, such as drawings, procedures, and operator training materials, complied with licensee standards and NRC requirements. In addition, the inspectors reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with modifications. Documents reviewed are listed in the Attachment.

- Engineering Change (EC) 100701, Leak Repair of Drain Line at Bottom of 'C' MS Line Drip Leg
- EC 83681, ESW Pump Bowl Bearing Material Change

b. Findings

Introduction: A self-revealing green NCV of 10 CFR 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants, Criterion III, Design Control, was identified for failure to implement design control measures that verify adequacy of design. Specifically, EC 83681 involved the installation of a new pump

bearing with different wear characteristics but the EC failed to evaluate the impact of the bearing replacement on alignment sensitivity of the pump shaft.

Description: On May 4, 2015, with the unit shutdown in Mode 5, the site experienced a loss of ESW flow due to a failure of the 'A' ESW pump shaft, which resulted in a loss of the 'A' train of shutdown cooling for a period of approximately twelve minutes. An investigation revealed the pump failure was due to a separation of the shaft coupling halves at one of the line shaft joints. All twelve capscrew fasteners used to hold the coupling halves together on coupling #2 had failed. During the R17 (Spring 2012) refueling outage, the discharge column on 'A' ESW pump was replaced, and included the installation of new pump bearings with improved wear characteristics under EC 83681. The failure of coupling #2 caused the "A" ESW pump to be inoperable and non-functional, which resulted in entry into the action statements for TS 3.8.12 (AC sources - Shutdown).

Following the failure of the shaft coupling, the licensee performed a root cause evaluation (RCE), which determined that the pump shaft was out of alignment vertically and caused bowing at the #2 coupling. The coupling failed due to the cyclic stresses exerted by the bowing of the shaft. The RCE also determined that verification of the vertical alignment of the pump shaft was not included in EC 83681. The EC only verified alignment via vibration readings at the point where the motor and pump shaft were coupled. No vibration readings were taken at any other points along the pump shaft. In addition, monitoring of motor/pump performance only looked at vibration readings at the coupling where the motor and pump shaft are joined. The RCE also determined that the design margin between the loads on the coupling and the actual yield strength of the coupling was low and that expected levels of environmental degradation could cause failure of the capscrews holding the coupling together.

Analysis: Failure to incorporate alignment requirements for the pump shaft in the work instructions associated with EC 83681 was a performance deficiency. The performance deficiency was related to the equipment performance attribute of the initiating events cornerstone. The performance deficiency was determined to be more than minor because the performance deficiency adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the failure of the ESW pump shaft resulted in a loss of service water which ultimately led to the loss of the 'A' train of shutdown cooling for a period of twelve minutes. Inspectors evaluated the finding using IMC 0609, "Significance Determination Process," Attachment 4 and Appendix G (June 19, 2012), "Shutdown Operations Significance Determination Process." The inspectors determined the finding was associated with the Initiating Event cornerstone and required a detailed risk evaluation because the finding involved a loss of safety function. A detailed risk evaluation was completed by a regional SRA. The regional SRA performed a detailed risk review of the finding. The SRA performed the analysis by increasing the maintenance unavailability for the pump, and evaluating it versus the base case. This method was chosen because the pump was operating when it is normally in standby, and the dominant method of determining there was a failure would have been during testing, or operation under non accident conditions. The additional time for the

unnecessary repair was used to adjust the base case maintenance unavailability. Online and shutdown risk were evaluated. The total impact was determined to be low enough for the finding to be GREEN for SDP purposes. The finding had a cross-cutting aspect in the Human Performance area of Design Margin (H.6).

Enforcement: In part, 10 CFR Appendix B, Quality Assurance, Subpart III, Design Control states that measures shall be established for the identification and control of design interfaces and for coordination among participating design organizations. These measures shall include the establishment of procedures among participating design organizations for the review, approval, release, distribution, and revision of documents involving design interfaces. The design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculation methods, or by the performance of a suitable testing program.

Contrary to the above, the licensee failed to verify or check the adequacy of the design as it related to the installation of a new pump bearing with different wear characteristics on the alignment sensitivity of the pump shaft on the "A" ESW pump. The licensee took immediate action to align the Normal Service Water system to provide cooling to the heat loads affected by the loss of the "A" ESW pump. The licensee entered this issue into their CAP as NCR 747036. Because the licensee entered the issue into the CAP and the finding was of very low safety significance (Green), this violation is being treated as an NCV, consistent with Section 2.3.2.a of the NRC's Enforcement Policy: NCV 05000400/2015003-04: Loss of "A" ESW Train.

1R19 Post-Maintenance Testing (71111.19 – 3 samples)

a. Inspection Scope

The inspectors either observed post-maintenance testing or reviewed the test results for the maintenance activities listed below to verify the work performed was completed correctly and the test activities were adequate to verify system operability and functional capability.

- WO 20019359, Control Circuit Fuse blown for Motor Operated Valve 1C2-19, September 20, 2015
- WO 13370214, Electrical PM-E0025, for 6.9kV Motors, September 22, 2015
- WO 13304560, Install ESCW 'A' Alarm Annunciations on the MCR per EC 80693, September 24, 2015

The inspectors evaluated these activities for the following:

- Acceptance criteria were clear and demonstrated operational readiness
- Effects of testing on the plant were adequately addressed
- Test instrumentation was appropriate
- Tests were performed in accordance with approved procedures

- Equipment was returned to its operational status following testing
- Test documentation was properly evaluated

Additionally, the inspectors reviewed a sample of corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with post-maintenance testing. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 5 samples)

a. Inspection Scope

The inspectors reviewed the surveillance tests listed below and either observed the test or reviewed test results to verify testing adequately demonstrated equipment operability and met TS and licensee procedural requirements. The inspectors evaluated the test activities to assess for preconditioning of equipment, procedure adherence, and equipment alignment following completion of the surveillance. Additionally, the inspectors reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with surveillance testing. Documents reviewed are listed in the Attachment.

Routine Surveillance Tests

- OST-1231, Control Room Emergency Filtration System Train “A” Operability Monthly Interval
- OST-1021, Daily Surveillance Daily Interval, Modes 1, 2
- OST-1847, Safety Injection Actuation; Control Room Ventilation Isolation Train “A”
- FPT-3010, Engine Driven Main Fire Pump Functionality Test Monthly Interval; Modes: All

In-Service Tests (IST)

- OST-1094, Sequencer Block Circuit and Containment Fan Cooler Testing Train ‘A’ Quarterly Interval – All Modes

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation (71114.06 – 2 sample)

a. Inspection Scope

The inspectors observed the emergency preparedness drills conducted on July 9, 2015 and September 1, 2015. The inspectors observed licensee activities in the simulator and the technical support center to evaluate implementation of the emergency plan, including event classification, notification, and protective action recommendations. The inspectors evaluated the licensee's performance against criteria established in the licensee's procedures. Additionally, the inspectors attended the post-exercise critique to assess the licensee's effectiveness in identifying emergency preparedness weaknesses and verified the identified weaknesses were entered in the CAP.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151 – 3 samples)

a. Inspection Scope

The inspectors reviewed a sample of the performance indicator (PI) data, submitted by the licensee, for the Unit 1 PIs listed below. The inspectors reviewed plant records compiled from July 2014 through June 2015 to verify the accuracy and completeness of the data reported for the station. The inspectors verified that the PI data complied with guidance contained in Nuclear Energy Institute 99-02, "Regulatory Assessment Performance Indicator Guideline," and licensee procedures. The inspectors verified the accuracy of reported data that were used to calculate the value of each PI. In addition, the inspectors reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with PI data. Documents reviewed are listed in the Attachment.

Cornerstone: Mitigating Systems

- residual heat removal system
- high pressure injection system
- emergency AC power system

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152 – 4 samples)

.1 Routine Review

The inspectors screened items entered into the licensee's CAP to identify repetitive equipment failures or specific human performance issues for follow-up. The inspectors



reviewed CRs, attended screening meetings, or accessed the licensee's computerized corrective action database.

## .2 Annual Follow-up of Selected Issues

### a. Inspection Scope

The inspectors conducted a detailed review of the following nuclear condition reports: (NCRs):

- AR 759881, apparent cause evaluation potential discrepancy. This AR was to evaluate the ACE data/evidence to that empirical data which was identified during leakage from the cooling tower basin into the RAB.
- AR 754721, RAB's High Energy Line Break (HELB) doors propped open
- AR 758330, TSC non-functionality 10 CFR 50.72 Report Delay

The inspectors evaluated the following attributes of the licensee's actions:

- complete and accurate identification of the problem in a timely manner
- evaluation and disposition of operability and reportability issues
- consideration of extent of condition, generic implications, common cause, and previous occurrences
- classification and prioritization of the problem
- identification of root and contributing causes of the problem
- identification of any additional condition reports
- completion of corrective actions in a timely manner

Documents reviewed are listed in the Attachment.

### b. Findings

- .1 Introduction: The inspectors identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion XVI, for the licensee's failure to identify and correct a condition adverse to quality affecting the Environmental Qualification (EQ) Program. Specifically, the licensee failed to enter into the CAP the results of the vendor audit of the EQ program which resulted in the licensee blocking open doors D10 and D11 on June 16, 2015 while the unit was at 100 percent power. The resident inspectors questioned the MCR about the doors being open and the licensee immediately closed D10 and D11. The licensee has entered the violation into their CAP as AR 75472, implemented interim guidance as an operation's standing instruction (2015-024) not to open D10 or D11 while in mode 1-4.

Description: On January 16, 2014, the licensee generated AR 663071 to address an NRC identified issue that Harris had not fully implemented the requirements of 10 CFR 50.49 related to the EQ program. Inspectors identified discrepancies in program documentation and field implementation. The licensee created a corrective action in this AR to have an independent review of the EQ program and field implementation. This was performed as EC 297238-Owner's review of third party assessment of HNP EQ program, which

was completed on February 15, 2015. Within this EC (Section 8.1.e) there is documentation that, HNP does not have formal HELB barrier controls to evaluate planned impairments to physical barriers that are credited or relied upon as part of the HELB analysis. This issue was not entered in to the licensee's CAP.

On June 16, 2015, with the unit at 100 percent power, a fire alarm in the Volume Control Tank (VCT) Valve Galley room was received. The fire brigade responded and determined that the alarm was not caused by an actual fire, but was due to a steam leak inside the Main Steam Tunnel (MST). Maintenance was attempting to repair a steam leak inside the MST with the tornado doors on each side of the MST (Doors D10 and D11) open to allow emergency egress for the workers in the event the steam leak worsened during the repair. With the unattended doors open the heat and steam from the MST entered the RAB and caused the heat detector in the VCT Valve Gallery room to actuate. Previously, the licensee had determined that safety-related equipment and instrumentation within the RAB did not need to be environmentally qualified (EQ) to the harsh environment of a steam or feedwater line break because they would not be exposed to the harsh environment that occurs during a steam or feedwater line break. However, with doors D10 and D11 open, the licensee's design assumption of no HELB potential in the RAB concerning EQ requirements was no longer valid. The licensee identified safety-related components are located on the 261-ft elevation and that equipment would have been adversely affected in the event of a HELB occurred in the steam tunnel as a result of leaving doors D10 and D11 open and unattended.

Analysis: The opening of the tornado door between the MST and the RAB was a performance deficiency. Using Appendix B of MC-612, the PD was determined to be associated with the Initiating Events cornerstone and was related to the configuration control attribute. The performance deficiency was determined to be more than minor because it adversely affected the cornerstone objective which is to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. The finding was screened in accordance with NRC IMC 0609.04. The finding was determined to affect the Initiating Events Cornerstone as the MST to RAB tornado door represented a barrier which left RAB systems and components vulnerable to harsh environment conditions should a HELB occur during the time the doors were open. SDP screening determined that the finding could have affected equipment used to mitigate a LOCA, could have caused a reactor trip, could have resulted in internal flooding conditions, and could have affected equipment relied upon to transition the plant to a stable shutdown condition and required a detailed risk evaluation.

A detailed risk evaluation was performed by a regional SRA in accordance with NRC IMC 0609 Appendix A. The major analysis assumptions included: a twenty hour exposure interval, HELBs postulated in all steam and feedwater piping in the MST, pipe break frequency from EPRI Report 1021086, no recovery credit for door closure, and a bounding CCDP value utilized. The CCDP was estimated using the NRC Shearon Harris SPAR model assuming a reactor trip initiator and bounding assumptions that the postulated RAB harsh environmental and flooding conditions would cause failure of the following equipment: auxiliary feedwater system, alternate seal injection system, RAB

essential services chillers, component cooling water pumps, charging and safety injection pumps, and the residual heat removal pumps. The dominant sequence was a reactor trip, success of the reactor protection system, and failure of the reactor coolant pump (RCP) seals leading to an unmitigated RCP seal LOCA. The risk was mitigated by the short exposure period and the probability of steam and feedwater HELBs. The analysis determined that the finding represented an increase in core damage frequency of  $< 1.0 \text{ E-6/year}$ , a GREEN finding of very low safety significance. This finding has a cross-cutting aspect in the area of Problem Identification and Resolution in the Corrective Action component because the licensee did not take appropriate corrective actions to address safety issues in a timely manner. [P.3]

Enforcement: 10 CFR Part 50, Appendix B, Criterion XVI, Corrective Actions, states in part, measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformance's are promptly identified and corrected.

Contrary to the above, the licensee failed to identify and correct a condition adverse to quality affecting the EQ program requirements. The licensee entered the issue into their CAP as AR 754721. The finding is of very low safety significance (Green) and is being treated as an NCV, consistent with Section 2.3.2.a of the NRC's Enforcement Policy: NCV 05000400/2015003-05: Failure to implement EQ program requirements.

- .2 Introduction: The inspectors identified a severity level (SL) IV NCV of 10 CFR 50.72(b)(3)(xiii) for the failure to report to the NRC within 8 hours the major loss of emergency assessment capability of the Technical Support Center (TSC). Specifically, on multiple occasions between January 2015 and July 2015, there were unplanned losses of emergency response facility (ERF) function, which resulted in the loss of emergency assessment capability, which the licensee failed to report the condition within the 8-hour time requirement.

Description: At 11:05 PM on July 7, 2015, the licensee observed temperatures in the TSC at 77° F and on an increasing trend. The licensee identified a failure of TSC ventilation system. Using the guidance provided in PLP-717, Equipment Important to Emergency Preparedness and ERO Response, the TSC was subsequently declared non-functional and the alternate TSC (area immediately outside the control room) was credited as the alternate location where ERO members should report in the event of an onsite emergency. At approximately 8:00 AM on July 8, 2015, the resident inspectors questioned the licensee whether a report had made to the NRC based on the loss of emergency assessment capability. Initially, the licensee stated that a report was not required since an alternate TSC was available. The resident inspectors informed the licensee that in accordance with NUREG 1022, "Event Report Guidelines 10 CFR 50.72 and 50.73", Supplement 1, that an unplanned loss of a primary ERF is reportable if not restored within the facility activation time specified in the emergency plan, which, in this instance, was one hour. At 3:30 PM on July 8, 2015 the licensee submitted a non-emergency eight hour notification. Subsequently, the licensee performed a review covering the previous three years for instances when the primary TSC was declared non-functional which resulted in unplanned loss of emergency assessment capability.

The review identified that on January 7, 2015, June 20, 2015, and June 30, 2015 TSC experienced an unplanned loss of assessment capability and failed to notify the NRC as required by 10 CFR 50.72(b)(3)(xiii).

Analysis: The failure to report the loss of emergency assessment capability in the TSC as required by 10 CFR Part 50.72(b)(3)(xiii) was a performance deficiency. The licensee's failure to notify the NRC was determined to impact the regulatory process, which requires evaluation through the traditional enforcement process. Based on the examples provided in Section 6.9 of the Enforcement Policy, dated February 4, 2015, Inaccurate and Incomplete Information or Failure to Make a Required Report, the performance deficiency was determined to be a SL IV violation. Specifically, example d.9 states that a SL IV violation involves a failure to make a report required by 10 CFR 50.72 or 10 CFR 50.73. Because the violation was processed as a traditional enforcement violation, no cross-cutting aspect is assigned.

Enforcement: 10 CFR Part 50.72(b)(3)(xiii), states in part, that the licensee shall notify the NRC as soon as practical and in all cases within 8 hours of the occurrence of any event that results in a major loss of emergency assessment capability.

Contrary to the above, on January 7, June 20, June 30, and July 7, 2015, the licensee failed to notify the NRC within eight hours that the TSC had experienced a major loss of emergency assessment capability. This violation is being treated as an NCV, consistent with Section 2.3.2.a of the Enforcement Policy. The licensee entered this issue into the corrective action program as AR 757885 and revised the implementing procedure for NRC notification relating to loss of emergency assessment capability. NCV 05000400/2015003-06, Failure to Report the Loss of Emergency Assessment Capability.

### .3 Safety Conscious Work Environment

#### a. Inspection Scope

NRC inspectors conducted a follow up assessment of the Safety Conscious Work Environment (SCWE) in the radiation protection department using both a written survey and interviews with staff, contractors, supervisors, and managers. The inspectors reviewed the PI&R SCWE observations from inspection report 05000400/2015001, allegations from the last 18 months, employee concerns from the last 18 months and a sampling of ECP related corrective actions. Additionally, inspectors reviewed the corrective actions from condition report (CR) 740804, and conducted interviews with selected radiation protection, operations, and security personnel. During the inspection, inspectors were sensitive to areas and issues that would represent challenges to the free flow of information, such as areas where employees may be reluctant to raise concerns or report issues in the CAP.

b. Assessment

Inspectors determined that the corrective actions associated with CR 740804 were adequately addressed and implemented. Inspectors reviewed the Radiation Protection Nuclear Safety Culture Action Plan, the Mechanical Maintenance Respectful Work Environment and SCWE Action Plan, and the HNP Nuclear Security 2015 Organizational Improvement Plan.

Based on survey questionnaires and interviews conducted with plant employees from various departments, and the documented corrective actions, the inspectors determined that licensee management emphasized the need for all employees to identify and report problems using the appropriate methods established within the administrative programs, including the CAP, ECP, supervisors, and managers. Personnel interviewed knew that these methods were readily accessible to all employees, and that used these methods on a routine basis.

The inspectors determined that employees felt free to raise issues, and that management encouraged employees to place issues into the CAP for resolution. The inspectors did not identify any reluctance on the part of the licensee staff, supervisors or managers to report safety concerns. The inspectors concluded that the corrective actions taken to date were effective, and currently the station has a safety-conscious work environment adequate to support nuclear safety.

4OA6 Meetings, Including Exit

On October 23, 2015, the resident inspectors presented the inspection results to Mr. Ben Waldrep and other members of the licensee's staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

ATTACHMENT: SUPPLEMENTARY INFORMATION

## **SUPPLEMENTARY INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee personnel**

E. Bertram, Continuing Training Supervisor  
R. Bright, Simulator Support  
J. Caves, (Acting) Manager, Nuclear Regulatory Affairs  
T. Hamilton, Plant General Manager  
L. Faulk, Director, Nuclear Plant Security  
A. Forsha, Fleet NRC Examination Specialist  
M. Fulks, LOCT Program Lead  
D. Griffith, Manager, Nuclear Training  
R. J. Horton, Operations Training  
J. Keltner, Manager, Nuclear Chemistry  
S. O'Connor, General Manager, Nuclear Engineering  
B. McCabe, Manager, Nuclear Oversight  
M. Parker, Manager, Nuclear Radiation Protection  
S. Rua, NLO/Regulatory Examination Supervisor  
A. Rucker, (Acting) Training Manager  
S. Scott, (Acting) Operations Manager  
R. Vandenberg, Assistant Operations Manager - Shift  
B. Waldrep, Site Vice President

#### **NRC personnel**

G. Hopper, Chief, Reactor Projects Branch 4, Division of Reactor Projects, Region II

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened and Closed

05000400/2015003-01	NCV	Failure to Adequately Implement the Clearance and Tagging Procedure (Section 1R06)
05000400/2015003-03	FIN	Failure to Implement Adequate Corrective Actions (Section 1R12)
05000400/2015003-04	NCV	Loss of "A" ESW Train (Section 1R18)
05000400/2015003-05	NCV	Failure to implement EQ Program Requirements (Section 4OA2.1)
05000400/2015003-06	NCV	Failure to Report the Loss of Emergency Assessment Capability (Section 4OA2.2)

### Opened

05000400/2015003-02	URI	Written NRC Biennial Examinations Did Not Meet Qualitative Standards (Section 1R11.2)
---------------------	-----	---

## LIST OF DOCUMENTS REVIEWED

### **Section 1R01: Adverse Weather Protection**

#### Procedures

ORT-1415, Electric Unit Heater Check Monthly Interval  
OP-161.01, Operations Freeze Protection and Temperature Maintenance Systems  
AP-300, Severe Weather  
AP-301, Seasonal Weather Preparations and Monitoring

#### Work Orders

WO #13326233, M-TR, Pressure Test on New Coils, 1CV-E002:005  
WO #13540665, EI, AHU-17 Condenser is Not Making Cold Refrigerant

### **Section 1R04: Equipment Alignment**

#### Partial System Walkdown

Emergency Diesel Generator Ventilation system:  
Procedure OP-155, Diesel Generator Emergency Power System,  
Drawing CAR-2168-G-548, HVAC – Air Flow Diagrams Miscellaneous Buildings

#### Fire Protection System:

Procedure OP-149, Fire Protection  
Drawing 2165-S-0900, Simplified Flow Diagram Fire Protection Sprinkler Systems

#### Essential Services Chilled Water System:

Procedure OP-148, Essential Services Chilled Water System,  
Drawing 2165-S-0998-S02, Simplified Flow Diagram Essential Services Chilled Water Systems

### **Section 1R05: Fire Protection**

FPP-001 Fire Protection Program Manual  
FPP-013, Fire Protection – Minimum Requirements, Mitigating Actions and Surveillance Requirements  
FPP-012-04-DBG, Diesel Generator Building Fire Pre-Plan  
FPP-012-07-TB, Turbine Building Fire Pre-Plan  
FPP-012-02-RAB286, Reactor Auxiliary Building Elevation 286 Fire Pre-Plan  
FPP-012-02-RAB305-324, Reactor Auxiliary Building Elevations 305 and 324 Fire Pre-Plan

### **Section 1R06: Flood Protection Measures**

#### UFSAR Sections

2.4.10, Flooding Protection Requirements  
3.6A.6, Flooding Analysis



Calculations

Appendix I to the HNP Probabilistic Safety Assessment, Internal Flooding Analysis  
Calculation #PRA-F/E-0004, RAB Unit 1 Elevation 190' & 216' Flood Analysis, Rev. 7

Procedures

AOP-022, Loss of Service Water  
OP-139, Service Water System  
AD-OP-All-0200, Clearance and Tagging

Other Documents

Apparent Cause Evaluation (AR 745185), 1/sw-276, AOP-022 (Loss of SW) Entry, 04/22/2015  
Apparent Cause Evaluation (AR 712308), Pipe Rupture Flooding Design Criteria, 10/18/2015  
Operability Determination for NCR 749419  
CAR-2167 G-1150, Reactor Auxiliary Building EI 190.00 Plan – Unit 1, Rev. 8

**Section 1R11: Licensed Operator Regualification Program**Action Requests

AR 758453, MCR Received Fire Alarm in Containment

Benchmark Tests

SST-001, "Steady State Accuracy and Stability Test", Performed 11/16/09, 12/15/10  
SST-002, "Steady State Accuracy and Stability Test", Performed 11/16/09, 12/15/10  
SST-003, "Steady State Accuracy Test", Performed 11/16/09, 12/15/10  
TT-001, "Reactor Trip", Performed 10/10

Job Performance Measure (JPM) Packages

Transfer Control to the ACP  
Reset Turbine Driven Aux Feedwater Pump  
Isolate Ruptured SG – MSIV Will Not Close  
Place Containment Cooling in the Maximum Cooling Mode  
Classify an Event – ALERT

General Documentation Reviewed

DSS-012, LOCT Simulator Evaluation Guide, Rev. 11  
Biennial written examination for 2010 – weeks 1 through 5  
EOP-User's Guide, Part 4, Rev 29  
LERs 2009 to 2010

Procedures

OSP-NGGC-1000, Fleet Conduct of Operations, Revision 3  
Operations Management Manual, OMM-001, Operations Administrative Requirements, Rev 92  
Training Administrative Procedure (TAP) -403, Examination and Testing, Rev 19  
TAP 410, NRC License Examination Security Program, Rev 15  
TAP-412, Simulator Operations, Maintenance and Testing, Rev 8  
Training Program Procedure (TPP)-206 Training Program Procedure-Simulator Rev 10  
TPP- 306, Licensed Operator Continuing Training Program, Revision 20  
TRN-NGGC-0002, Performance Review and Remedial Training, Rev 0

TRN-NGGC-0420, Conduct of Simulator Training and Evaluation, Rev 0,  
 TRN-NGGC-0440, Rev 0  
 TRN-NGGC-1000, Conduct of Training, Rev 3  
 AOP- 004, Remote Shutdown  
 HNP-E/ELEC-0001 Appendix 1 Compliance Assessment by Scenario  
 TRN-NGGC-1000, Conduct of Training, Rev 3  
 APP-ALB-030, 8-1, Fire Detection System Fire  
 APP-FP-001, 3-5, Containment Building Zone 1-7A  
 OP-149, Fire Protection

### Records

License Reactivation Packages (6)  
 LORP Training Attendance records (6)  
 Medical Files (6)  
 Remedial Training Records (5)  
 Remedial Training Examinations (5)  
 Simulator Service Requests (two years of records reviewed)  
 Condition Reports Resulting in Clock Resets (42 records reviewed)  
 Open Simulator Service Request Report (10 Open Requests)  
 Simulator Service Request (SSR) 13-0354, Completion 06/10/2014  
 Closed Simulator Service Request Report from 06/03/2013 to 08/05/2015 (210 Closed Requests)

### Condition Reports Generated During/As a Result of the Inspection

AR 01940942, IP 71111.11B NRC Biennial LOCT Inspection Feedback, August 6, 2015

### Written Examinations

Set 1 Exam 1 SRO, Biennial Written Exam  
 Set 2 Exam 4 SRO, Biennial Written Exam

### Procedures

Nuclear Operating Fleet, Administrative Procedure, AD-TQ-ALL-0425, Simulator Scenario Based Testing, Rev. 1, 04/30/2013  
 Progress Energy, Harris Nuclear Plant, Harris Training Section, Training Administration Procedure, TAP-412, Simulator Operation, Maintenance and Testing, Rev. 9  
 Harris Nuclear Plant, Plant Operating Manual, VOLUME 8, PART 1, Training Program Procedure, TPP-266, Simulator Program, Rev 12  
 Nuclear Operating Fleet, Administrative Procedure, Non-Safety Related, AD-TQ-ALL-0230, Licensed Operator Requalification Annual and Biennial Exam Development, Rev. 1, 03/11/2015  
 Nuclear Operating Fleet, Administrative Procedure, AD-TQ-ALL-0410, Remediation and Reevaluation, Rev. 0, 06/01/2015  
 Nuclear Operating Fleet, Administrative Procedure, AD-TQ-ALL-0470, Trainee Evaluation and Examination and Security, Rev. 0, 06/01/2015  
 Nuclear Operating Fleet, Administrative Procedure, AD-TQ-ALL-1000, Conduct of Training, Rev 6, 06/10/2015  
 Duke Energy Progress, Harris Nuclear Plant, Harris Training Section, Training Administration Procedure, TAP-403, Examination and Testing, Rev 28, 08/28/2014

Progress Energy, Harris Nuclear Plant, Harris Training Section, Training Administrative Procedure, TAP-410, NRC License Examination Security Program, Rev. 21, Effective Date 03/17/2014

Harris Nuclear Plant, Plant Operating Manual, Volume 8, Part 1, Training Program Procedure, TPP-306, Licensed Operator Continuing Training Program, Rev. 24

Nuclear Generation Group BNP/HNP/RNP, Standard Procedure, Volume 99, Book/Part 99, TRN-NGGC-0420, Conduct of Simulator Training and Evaluation, Rev. 4

Nuclear Generation Group BNP/HNP/RNP, Standard Procedure, Volume 99, Book/Part 99, TRN-NGGC-0440, Regulated Exam Security, Rev. 4

### Simulator Tests

Simulator Test Guide, Integrated Systems Test, Test No. NOT-005, Plant Start-up – GP-5, Rev. 5, 04/10/03, Test Performed 04/03/2015

Simulator Test Guide, Integrated Systems Test, Test No. SST-001, Steady-State Accuracy and Stability Test, Rev. 10, 01/31/2005, Test Performed 06/14/2015

Simulator Benchmark to Plant Transient caused by Loss of 1E2 on 08/08/2013

Simulator Test Guide, Transient Test, TT-003, Simultaneous Closure of All Main Steam Isolation Valves, Rev. 10, 07/17/2015, Test Performed 07/07/2015

HNP Simulator Core Cycle 20, Core Physics Verification Test Results

Harris Nuclear Plant, Licensed Operator Continuing Training, Simulator Evaluation Guide, DSS-054, Rev. 2

Harris Nuclear Plant, Licensed Operator Continuing Training, Simulator Evaluation Guide, DSS-059, Rev. 2

### Scenario Packages

Simulator Scenario DSS-059, Rev 0

Simulator Scenario DSS-054, Rev 2

Simulator Scenario DSS-012, Rev 11

Simulator Scenario DSS-002, Rev 21

### JPM Packages

JPM-CR-282(a)-L, Rev 0, Pressurizer PORV Failure

JPM-CR-003, Rev 12, Shift Steam Dump Control to Tavg Mode

JPM-IP-288, Rev 0, Locally Isolate Seal Water Return Header

JPM-IP-213, Rev 4, Align Equipment for Extended Power Loss

JPM-CR-290, Rev 0, Classify Event – Unusual Event

JPM-CR-044, Rev. 16, Lowering CCW Surge Tank Level

JPM-IP-109, Rev 15, Shut MSIVs by Isolating Air

JPM-CR-225, Rev 2, Take Corrective Action for Failure of 'A' CSIP Miniflow valve to Reposition

JPM-IP-231, Rev 5, Resetting Safeguards Signal at SSPS

JPM-CR-292(a)-L, Rev 0, Shutdown EDG B-SB from MCB for Maintenance, Field Flash Stays Energized

### **Section 1R12: Maintenance Effectiveness**

NUMARC 93-01, Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants

ADM-NGGC-0101, Maintenance Rule Program

AR 157760, PS-4175V over pressurized during Online Operations  
 AR 689457, I, PS-01TA-4175V, Leaking from Inside Housing  
 AR 755621, Secondary Efficiency Loss / Turbine Drain Valves Auto Open  
 WO 13394390, Replace PS-01TA-4175V (LP Steam Inlet Crossover Pressure)

**Section 1R13: Maintenance Risk Assessments and Emergent Work Evaluation**

OMP-003, Outage Shutdown Risk Management  
 OMM-001, Conduct of Operations  
 WCP-NGGC-1000, Conduct of On-Line Work Management  
 WCM-001, On-line Maintenance  
 ADM-NGGC-0006, Online Equipment Out-of-Service (EOOS) Models for Risk Assessment

**Section 1R15: Operability Evaluations**

OPS-NGGC-1305, Operability Determinations  
 AD-OP-ALL-0202, Aggregate Operator Impact Assessment

**Section 1R18: Plant Modifications**

EC 100701, Leak Repair of Drain Line at Bottom of 'C' MS Line Drip Leg  
 EC 83681, ESW Pump Bowl Bearing Material Change  
 AR 747048, 'A' ESW Pump Unexpectedly Stopped Pumping  
 AR 751190, Steam Leak on Drip Leg Pipe Downstream of MSIV  
 AD-EG-ALL-1155, Post Modification Testing, Rev. 0  
 Root Cause Evaluation (AR 747036), Loss of 'A' ESW Flow and Pressure, Entry into AOP-022  
 Standing Instruction 2015-027, Operation of ESW Pumps  
 WO 13527790, Steam Leak on Drip Leg 2" Pipe Downstream  
 WO 01339163, Disassemble, Inspect, and Refurbish 'A' ESW Pump

**Section 1R19: Post Maintenance Testing**

WO 20019359, Control Circuit Fuse blown for Motor Operated Valve 1C2-19, September 20, 2015  
 WO 13370214, Electrical PM-E0025, for 6.9kV Motors, September 22, 2015  
 WO 13304560, Install ESCW 'A' Alarm Annunciations on the MCR per EC 80693, September 24, 2015

**Section 1R22: Surveillance Testing**

OST-1231, Control Room Emergency Filtration System Train "A" Operability Monthly Interval  
 OST-1021, Daily Surveillance Daily Interval, Modes 1, 2  
 OST-1847, Safety Injection Actuation; Control Room Ventilation Isolation Train "A"  
 FPT-3010, Engine Driven Main Fire Pump Functionality Test Monthly Interval; Modes: All  
 OST-1094, Sequencer Block Circuit and Containment Fan Cooler Testing Train 'A' Quarterly Interval – All Modes

**Section 4OA1: Performance Indicator Verification**

NEI 99-02, Regulatory Assessment Performance Indicator Guideline  
 Calculation HNP-F/PSA-0068, NRC Mitigating System Performance Index Basis Document for Harris Nuclear Plant

Procedures

REG-NGGC-0009, NRC Performance Indicators and Monthly Operating Reports Data, Rev. 14

**Section 40A2: Identification and Resolution of Problems**

AD-PI-ALL-0100, Corrective Action Program

AD-PI-ALL-0101, Root Cause Evaluation

AD-PI-ALL-0102, Apparent Cause Evaluation

AD-PI-ALL-0103, Quick Cause Evaluation

AD-PI-ALL-0104, Prompt Investigation Response Team

AD-PI-ALL-0105, Effectiveness Reviews

AR 759881, apparent cause evaluation potential discrepancy. This AR was to evaluate the ACE data/evidence to that empirical data which was identified during leakage from the cooling tower basin into the RAB.

AR 754721, RAB's High Energy Line Break (HELB) doors propped open

AR 758330, TSC non-functionality 10 CFR 50.72 Report Delay