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

September 16, 2016

Mr. Benjamin C. Waldrep
Site Vice President
Shearon Harris Nuclear Power Plant
Duke Energy
5413 Shearon Harris Road
New Hill, NC 27562-0165

SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1 - ISSUANCE OF AMENDMENT ON TEMPORARY CHANGES TO TECHNICAL SPECIFICATIONS FOR THE 'A' EMERGENCY SERVICE WATER PUMP REPLACEMENT (CAC NO. MF7017)

Dear Mr. Waldrep:

The Nuclear Regulatory Commission has issued Amendment No. 153 to Renewed Facility Operating License No. NPF-63 for the Shearon Harris Nuclear Power Plant, Unit 1. This amendment changes the Technical Specifications in response to your application dated October 29, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15302A542) as supplemented by letters dated February 16, 2016 (ADAMS Accession No. ML16047A389), August 8, 2016 (ADAMS Accession No. ML16221A711), August 26, 2016 (ADAMS Accession No. ML16239A306), September 8, 2016 (ADAMS Accession No. ML16252A358) and September 16, 2016 (ADAMS No. ML16260A140).

The amendment changes several Shearon Harris Nuclear Power Plant, Unit 1, Technical Specifications to allow the 'A' Emergency Service Water (ESW) pump to be inoperable for 14 days to allow for the replacement of the 'A' train ESW pump. The license amendment request is applicable on a one-time basis to be implemented during the replacement of the 'A' ESW pump and will expire on October 29, 2016.

A copy of the related Safety Evaluation is enclosed. Notice of Issuance will be included in the Commission's regular biweekly *Federal Register* notice.

Sincerely,

Martha Barillas, Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-400

Enclosures:
1. Amendment No. 153 to NPF-63
2. Safety Evaluation

cc w/enclosures: Distribution via Listserv

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

DUKE ENERGY PROGRESS, LLC.

DOCKET NO. 50-400

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No.153
Renewed License No. NPF-63

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Duke Energy Progress, LLC. (the licensee), dated October 29, 2015, as supplemented by letters dated February 16, 2016, August 8, 2016, August 26, 2016, September 8, 2016, and September 16, 2016, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications, as indicated in the attachment to this license amendment; and paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-63 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, as revised through Amendment No. 153, are hereby incorporated into this license. Duke Energy Progress, LLC, shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance and shall be implemented by October 29, 2016.

FOR THE NUCLEAR REGULATORY COMMISSION

Tracy Orf, Acting Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Renewed License
and the Technical Specifications

Date of Issuance: September 16, 2016

ATTACHMENT TO LICENSE AMENDMENT NO. 153

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1

RENEWED FACILITY OPERATING LICENSE NO. NPF-63

DOCKET NO. 50-400

Replace the following page of the renewed facility operating license with the revised page. The revised page is identified by amendment number and contains a line in the margin indicating the area of change.

Remove	Insert
Page 4	Page 4

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove	Insert
3/4 1-10	3/4 1-10
3/4 5-3	3/4 5-3
3/4 6-11	3/4 6-11
3/4 6-12	3/4 6-12
3/4 6-13	3/4 6-13
3/4 7-4	3/4 7-4
3/4 7-11	3/4 7-11
3/4 7-12	3/4 7-12
3/4 7-14	3/4 7-14
3/4 7-14a	3/4 7-14a
3/4 7-17	3/4 7-17
3/4 7-30	3/4 7-30
3/4 8-1	3/4 8-1
3/4 8-2	3/4 8-2

C. This license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect, and is subject to the additional conditions specified or incorporated below.

(1) Maximum Power Level

Duke Energy Progress, LLC, is authorized to operate the facility at reactor Core power levels not in excess of 2948 megawatts thermal (100 percent rated core power) in accordance with the conditions specified herein.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, as revised through Amendment No. 153, are hereby incorporated into this license. Duke Energy Progress, LLC. shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

(3) Antitrust Conditions

Duke Energy Progress, LLC. shall comply with the antitrust conditions delineated in Appendix C to this license.

(4) Initial Startup Test Program (Section 14)[1]

Any changes to the Initial Test Program described in Section 14 of the FSAR made in accordance with the provisions of 10 CFR 50.59 shall be reported in accordance with 50.59(b) within one month of such change.

(5) Steam Generator Tube Rupture (Section 15.6.3)

Prior to startup following the first refueling outage, Carolina Power & Light Company* shall submit for NRC review and receive approval if a steam generator tube rupture analysis, including the assumed operator actions, which demonstrates that the consequences of the design basis steam generator tube rupture event for the Shearon Harris Nuclear Power Plant are less than the acceptance criteria specified in the Standard Review Plan, NUREG-0800, at 15.6.3 Subparts II (1) and (2) for calculated doses from radiological releases. In preparing their analysis Carolina Power & Light Company* will not assume that operators will complete corrective actions within the first thirty minutes after a steam generator tube rupture.

[1] The parenthetical notation following the title of many license conditions denotes the section of the Safety Evaluation Report and/or its supplements wherein the license condition is discussed.

* On April 29, 2013, the name "Carolina Power & Light Company" (CP&L) was changed to "Duke Energy Progress, Inc." On August 1, 2015, the name "Duke Energy Progress, Inc." was changed to "Duke Energy Progress, LLC."

REACTIVITY CONTROL SYSTEMS
CHARGING PUMPS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.4 At least two charging/safety injection pumps shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

With only one charging/safety injection pump OPERABLE, restore at least two charging/safety injection pumps to OPERABLE status within 72 hours* or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN as specified in the CORE OPERATING LIMITS REPORT (COLR), plant procedure PLP-106 at 200°F within the next 6 hours; restore at least two charging/safety injection pumps to OPERABLE status within the next 7 days or be in HOT SHUTDOWN within the next 6 hours.

---------- NOTE ----------

*The 'A' Train charging/safety pump is allowed to be inoperable for a total of 14 days only to allow for the implementation of design improvements on the 'A' Train ESW pump. The 14 days will be taken one time no later than October 29, 2016. During the period in which the 'A' Train ESW pump supply from the Auxiliary Reservoir or Main Reservoir is not available, Normal Service Water will remain available and in service to supply the 'A' Train ESW equipment loads until the system is ready for post maintenance testing. Allowance of the extended Completion Time is contingent on meeting the Compensatory Measures and Conditions described in the HNP LAR submittal correspondence letter HNP-16-056.

SURVEILLANCE REQUIREMENTS

4.1.2.4 At least two charging/safety injection pumps shall be demonstrated OPERABLE by verifying, on recirculation flow or in service supplying flow to the Reactor Coolant System and reactor coolant pump seals, that a differential pressure across each pump of greater than or equal to 2446 psid is developed when tested pursuant to the Inservice Testing Program.

EMERGENCY CORE COOLING SYSTEMS

3/4.5.2 ECCS SUBSYSTEMS - T_{avg} GREATER THAN OR EQUAL TO 350°F

LIMITING CONDITION FOR OPERATION

3.5.2 Two independent Emergency Core Cooling System (ECCS) subsystems shall be OPERABLE with each subsystem comprised of:

a. One OPERABLE Charging/safety injection pump,

b. One OPERABLE RHR heat exchanger,

c. One OPERABLE RHR pump, and

d. An OPERABLE flow path capable of taking suction from the refueling water storage tank on a Safety Injection signal and, upon being manually aligned, transferring suction to the containment sump during the recirculation phase of operation.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

a. With one ECCS subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 72 hours* or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

b. In the event the ECCS is actuated and injects water into the Reactor Coolant System, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 90 days describing the circumstances of the actuation and the total accumulated actuation cycles to date. The current value of the usage factor for each affected Safety Injection nozzle shall be provided in this Special Report whenever its value exceeds 0.70.

---------- NOTE ----------

*The 'A' Train ECCS subsystem is allowed to be inoperable for a total of 14 days only to allow for the implementation of design improvements on the 'A' Train ESW pump. The 14 days will be taken one time no later than October 29, 2016. During the period in which the 'A' Train ESW pump supply from the Auxiliary Reservoir or Main Reservoir is not available, Normal Service Water will remain available and in service to supply the 'A' Train ESW equipment loads until the system is ready for post maintenance testing. Allowance of the extended Completion Time is contingent on meeting the Compensatory Measures and Conditions described in HNP LAR submittal correspondence letter HNP-16-056.

SURVEILLANCE REQUIREMENTS

4.5.2 Each ECCS subsystem shall be demonstrated OPERABLE:

a. At least once per 12 hours by:

1. Verifying that the following valves are in the indicated positions with the control power disconnect switch in the "OFF" position, and the valve control switch in the "PULL TO LOCK" position:

CONTAINMENT SYSTEMS

3/4.6.2 DEPRESSURIZATION AND COOLING SYSTEMS

CONTAINMENT SPRAY SYSTEM

LIMITING CONDITION FOR OPERATION

3.6.2.1 Two independent Containment Spray Systems shall be OPERABLE with each Spray System capable of taking suction from the RWST and transferring suction to the containment sump.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With one Containment Spray System inoperable, restore the inoperable Spray System to OPERABLE status within 72 hours** or be in at least HOT STANDBY within the next 6 hours; restore the inoperable Spray System to OPERABLE status within the next 48 hours or be in COLD SHUTDOWN within the following 30 hours. Refer also to Specification 3.6.2.3 Action.

---------- NOTE ----------

**The 'A' Train Containment Spray System is allowed to be inoperable for a total of 14 days only to allow for the implementation of design improvements on the 'A' Train ESW pump. The 14 days will be taken one time no later than October 29, 2016. During the period in which the 'A' Train ESW pump supply from the Auxiliary Reservoir or Main Reservoir is not available, Normal Service Water will remain available and in service to supply the 'A' Train ESW equipment loads until the system is ready for post maintenance testing. Allowance of the extended Completion Time is contingent on meeting the Compensatory Measures and Conditions described in HNP LAR submittal correspondence letter HNP-16-056.

SURVEILLANCE REQUIREMENTS

4.6.2.1 Each Containment Spray System shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power-operated, or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position*;

b. By verifying that, on an indicated recirculation flow of at least 1832 gpm, each pump develops a differential pressure of greater than or equal to 186 psi when tested pursuant to the Inservice Testing Program;

c. At least once per 18 months by:

1. Verifying that each automatic valve in the flow path actuates to its correct position on a containment spray actuation test signal and

2. Verifying that each spray pump starts automatically on a containment spray actuation test signal.

3. Verifying that, coincident with an indication of containment spray pump running, each automatic valve from the sump and RWST actuates to its appropriate position following an RWST Lo-Lo test signal.

d. At least once per 10 years by performing an air or smoke flow test through each spray header and verifying each spray nozzle is unobstructed.

e. At least once per 92 days by verifying that containment spray locations susceptible to gas accumulation are sufficiently filled with water.

* Not required to be met for system vent flow paths opened under administrative control.

CONTAINMENT SYSTEMS
SPRAY ADDITIVE SYSTEM

LIMITING CONDITION FOR OPERATION

3.6.2.2 The Spray Additive System shall be OPERABLE with:

a. A Spray Additive Tank containing a volume of between 3268 and 3768 gallons of between 27 and 29 weight % of NaOH solution, and

b. Two spray additive eductors each capable of adding NaOH solution from the chemical additive tank to a Containment Spray System pump flow.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With the Spray Additive System inoperable, restore the system to OPERABLE status within 72 hours* or be in at least HOT STANDBY within the next 6 hours; restore the Spray Additive System to OPERABLE status within the next 48 hours or be in COLD SHUTDOWN within the following 30 hours.

---------- NOTE ----------

*The Spray Additive System is allowed to be inoperable for a total of 14 days only to allow for the implementation of design improvements on the 'A' Train ESW pump. The 14 days will be taken one time no later than October 29, 2016. During the period in which the 'A' Train ESW pump supply from the Auxiliary Reservoir or Main Reservoir is not available, Normal Service Water will remain available and in service to supply the 'A' Train ESW equipment loads until the system is ready for post maintenance testing. Allowance of the extended Completion Time is contingent on meeting the Compensatory Measures and Conditions described in HNP LAR submittal correspondence letter HNP-16-056.

SURVEILLANCE REQUIREMENTS

4.6.2.2 The Spray Additive System shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power-operated, or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position;

b. At least once per 6 months by:

1. Verifying the contained solution volume in the tank, and

2. Verifying the concentration of the NaOH solution by chemical analysis.

c. At least once per 18 months by verifying that each automatic valve in the flow path actuates to its correct position on a containment spray or containment isolation phase A test signal as applicable; and

d. At least once per 5 years by verifying each eductor flow rate is between 17.2 and 22.2 gpm, using the RWST as the test source containing at least 436,000 gallons of water.

LIMITING CONDITION FOR OPERATION

3.6.2.3 Four containment fan coolers (AH-1, AH-2, AH-3, and AH-4) shall be OPERABLE with one of two fans in each cooler capable of operation at low speed. Train SA consists of AH-2 and AH-3. Train SB consists of AH-1 and AH-4.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

a. With one train of the above required containment fan coolers inoperable and both Containment Spray Systems OPERABLE, restore the inoperable train of fan coolers to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With both trains of the above required containment fan coolers inoperable and both Containment Spray Systems OPERABLE, restore at least one train of fan coolers to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Restore both above required trains of fan coolers to OPERABLE status within 7 days of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With one train of the above required containment fan coolers inoperable and one Containment Spray System inoperable, restore the inoperable Spray System to OPERABLE status within 72 hours* or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Restore the inoperable train of containment fan coolers to OPERABLE status within 7 days of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

---------- NOTE ----------

*The 'A' Train containment fan coolers and the 'A' Train Containment Spray System are allowed to be inoperable for a total of 14 days only to allow for the implementation of design improvements on the 'A' Train ESW pump. The 14 days will be taken one time no later than October 29, 2016. During the period in which the 'A' Train ESW pump supply from the Auxiliary Reservoir or Main Reservoir is not available, Normal Service Water will remain available and in service to supply the 'A' Train ESW equipment loads until the system is ready for post maintenance testing. Allowance of the extended Completion Time is contingent on meeting the Compensatory Measures and Conditions described in HNP LAR submittal correspondence letter HNP-16-056.

SURVEILLANCE REQUIREMENTS

4.6.2.3 Each train of containment fan coolers shall be demonstrated OPERABLE:

a. At least once per 31 days by:

1. Starting each fan train from the control room, and verifying that each fan train operates for at least 15 minutes, and

2. Verifying a cooling water flow rate, after correction to design basis service water conditions, of greater than or equal to 1300 gpm to each cooler.

b. At least once per 18 months by verifying that each fan train starts automatically on a safety injection test signal.

LIMITING CONDITION FOR OPERATION

3.7.1.2 At least three independent steam generator auxiliary feedwater pumps and associated flow paths shall be OPERABLE with:

a. Two motor-driven auxiliary feedwater pumps, each capable of being powered from separate emergency buses, and

b. One steam turbine-driven auxiliary feedwater pump capable of being powered from an OPERABLE steam supply system.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

a. With one auxiliary feedwater pump inoperable, restore the required auxiliary feedwater pumps to OPERABLE status within 72 hours* or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

b. With two auxiliary feedwater pumps inoperable, be in at least HOT STANDBY within 6 hours and in HOT SHUTDOWN within the following 6 hours.

c. With three auxiliary feedwater pumps inoperable, immediately initiate corrective action to restore at least one auxiliary feedwater pump to OPERABLE status as soon as possible. (NOTE: LCO 3.0.3 and all other LCO Required Actions requiring MODE changes are suspended until one AFW train is restored to OPERABLE status. Following restoration of one AFW train, all applicable LCOs apply based on the time the LCOs initially occurred.)

---------- NOTE ----------

*The 'A' Train auxiliary feedwater pump is allowed to be inoperable for a total of 14 days only to allow for the implementation of design improvements on the 'A' Train ESW pump. The 14 days will be taken one time no later than October 29, 2016. During the period in which the 'A' Train ESW pump supply from the Auxiliary Reservoir or the Main Reservoir is not available, Normal Service Water will remain available and in service to supply the 'A' Train ESW equipment loads until the system is ready for post maintenance testing. Allowance of the extended Completion Time is contingent on meeting the Compensatory Measures and Conditions described in HNP LAR submittal correspondence letter HNP-16-056.

SURVEILLANCE REQUIREMENTS

4.7.1.2.1 Each auxiliary feedwater pump shall be demonstrated OPERABLE:

a. At least once per 92 days on a STAGGERED TEST BASIS by:

1. Demonstrating that each motor-driven pump satisfies performance requirements by either:

a) Verifying each pump develops a differential pressure that (when temperature - compensated to 70°F) is greater than or equal to 1514 psid at a recirculation flow of greater than or equal to 50 gpm (25 KPPH), or

b) Verifying each pump develops a differential pressure that (when temperature - compensated to 70°F) is greater than or equal to 1259 psid at a flow rate of greater than or equal to 430 gpm (215 KPPH).

PLANT SYSTEMS

3/4.7.3 COMPONENT COOLING WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.3 At least two component cooling water (CCW) pumps*, heat exchangers and essential flow paths shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With only one component cooling water flow path OPERABLE, restore at least two flow paths to OPERABLE status within 72 hours** or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.7.3 At least two component cooling water flow paths shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power-operated, or automatic) servicing safety-related equipment that is not locked, sealed, or otherwise secured in position is in its correct position; and

b. At least once per 18 months by verifying that:

1. Each automatic valve servicing safety-related equipment or isolating non-safety-related components actuates to its correct position on a Safety Injection test signal, and

2. Each Component Cooling Water System pump required to be OPERABLE starts automatically on a Safety Injection test signal.

3. Each automatic valve serving the gross failed fuel detector and sample system heat exchangers actuates to its correct position on a Low Surge Tank Level test signal.

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* The breaker for CCW pump 1C-SAB shall not be racked into either power source (SA or SB) unless the breaker from the applicable CCW pump (1A-SA or 1B-SB) is racked out.

**The 'A' Train component cooling water flow path is allowed to be inoperable for a total of 14 days only to allow for the implementation of design improvements on the 'A' Train ESW pump. The 14 days will be taken one time no later than October 29, 2016. During the period in which the 'A' Train ESW pump supply from the Auxiliary Reservoir or Main Reservoir is not available, Normal Service Water will remain available and in service to supply the 'A' Train ESW equipment loads until the system is ready for post maintenance testing. Allowance of the extended Completion Time is contingent on meeting the Compensatory Measures and Conditions described in HNP LAR submittal correspondence letter HNP-16-056.

3/4.7.4 EMERGENCY SERVICE WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.4 At least two independent emergency service water loops shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With only one emergency service water loop OPERABLE, restore at least two loops to OPERABLE status within 72 hours* or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

---------- NOTE ----------

*The 'A' Train emergency service water loop is allowed to be inoperable for a total of 14 days only to allow for the implementation of design improvements on the 'A' Train ESW pump. The 14 days will be taken one time no later than October 29, 2016. During the period in which the 'A' Train ESW pump supply from the Auxiliary Reservoir or Main Reservoir is not available, Normal Service Water will remain available and in service to supply the 'A' Train ESW equipment loads until the system is ready for post maintenance testing. Allowance of the extended Completion Time is contingent on meeting the Compensatory Measures and Conditions described in HNP LAR submittal correspondence letter HNP-16-056.

SURVEILLANCE REQUIREMENTS

4.7.4 At least two emergency service water loops shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power-operated, or automatic) servicing safety-related equipment that is not locked, sealed, or otherwise secured in position is in its correct position; and

b. At least once per 18 months by verifying that:

1. Each automatic valve servicing safety-related equipment or isolating non-safety portions of the system actuates to its correct position on a Safety Injection test signal, and

2. Each emergency service water pump and each emergency service water booster pump starts automatically on a Safety Injection test signal.

PLANT SYSTEMS

3/4.7.6 CONTROL ROOM EMERGENCY FILTRATION SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.6 Two independent Control Room Emergency Filtration System (CREFS) trains shall be OPERABLE.*

APPLICABILITY: a. MODES 1, 2, 3, and 4

b. MODES 5 and 6

c. During movement of irradiated fuel assemblies and movement of loads over spent fuel pools

ACTION:

a. MODES 1, 2, 3 and 4:

----------NOTE----------
In addition to the Actions below, perform Action c. if applicable.
---

1. With one CREFS train inoperable for reasons other than an inoperable Control Room Envelope (CRE) boundary, restore the inoperable CREFS train to OPERABLE status within 7 days** or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
2. With one or more CREFS trains inoperable due to inoperable CRE boundary:
   a. Initiate action to implement mitigating actions immediately or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours;
   b. Within 24 hours, verify mitigating actions ensure CRE occupant radiological exposures will not exceed limits and that CRE occupants are protected from hazardous chemicals and smoke or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours;
   c. Restore CRE boundary to OPERABLE within 90 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

* The control room envelope (CRE) boundary may be opened intermittently under administrative controls.

**The 'A' CREFS train is allowed to be inoperable for a total of 14 days only to allow for the implementation of design improvements on the 'A' Train ESW pump. The 14 days will be taken one time no later than October 29, 2016. During the period in which the 'A' Train ESW pump supply from the Auxiliary Reservoir or Main Reservoir is not available, Normal Service Water will remain available and in service to supply the 'A' Train ESW equipment loads until the system is ready for post maintenance testing. Allowance of the extended Completion Time is contingent on meeting the Compensatory Measures and Conditions described in HNP LAR submittal correspondence letter HNP-16-056.

LIMITING CONDITION FOR OPERATION (Continued)

b. MODES 5 and 6

---NOTE---
In addition to the Actions below, perform Action c. if applicable.
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1. With one CREFS train inoperable for reasons other than an inoperable CRE boundary, restore the inoperable CREFS train to OPERABLE status within 7 days or immediately initiate and maintain operation of the remaining OPERABLE CREFS train in the recirculation mode.
2. With both CREFS trains inoperable for reasons other than an inoperable CRE boundary or with the OPERABLE CREFS train required to be in the recirculation mode by ACTION b.1., not capable of being powered by an OPERABLE emergency power source, immediately suspend all operations involving CORE ALTERATIONS or movement of irradiated fuel.
3. With one or more CREFS trains inoperable due to inoperable CRE boundary, immediately suspend all operations involving CORE ALTERATIONS or movement of irradiated fuel assemblies.

PLANT SYSTEMS

3/4.7.7 REACTOR AUXILIARY BUILDING (RAB) EMERGENCY EXHAUST SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.7 Two independent RAB Emergency Exhaust Systems shall be OPERABLE.*

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

a. With one RAB Emergency Exhaust System inoperable, restore the inoperable system to OPERABLE status within 7 days** or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With two RAB Emergency Exhaust Systems inoperable due to an inoperable RAB Emergency Exhaust System boundary, restore the RAB Emergency Exhaust System boundary to OPERABLE status within 24 hours. Otherwise, be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.7.7 Each RAB Emergency Exhaust System shall be demonstrated OPERABLE:

a. At least once per 31 days on a STAGGERED TEST BASIS by initiating, from the control room, flow through the HEPA filters and charcoal adsorbers and verifying that the system operates for at least 10 continuous hours with the heaters operating:

b. At least once per 18 months or (1) after any structural maintenance on the HEPA filter or charcoal adsorber housings, or (2) following significant painting, fire, or chemical release in any ventilation zone communicating with the system by:

1. Verifying that the cleanup system satisfies the in-place penetration and bypass leakage testing acceptance criteria of less than 0.05% and uses the test procedure guidance in Regulatory Positions C.5.a, C.5.c, and C.5.d of Regulatory Guide 1.52, Revision 2, March 1978, and the unit flow rate is 6800 cfm ± 10% during system operation when tested in accordance with ANSI N510-1980;

2. Verifying, within 31 days after removal, that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, has a methyl iodine penetration of ≤ 2.5% when tested at a temperature of 30°C and at a relative humidity of 70% in accordance with ASTM D3803-1989.

* The RAB Emergency Exhaust Systems boundary may be opened intermittently under administrative controls.

** The 'A' Train RAB Emergency Exhaust System is allowed to be inoperable for a total of 14 days only to allow for the implementation of design improvements on the 'A' Train ESW pump. The 14 days will be taken one time no later than October 29, 2016. During the period in which the 'A' Train ESW pump supply from the Auxiliary Reservoir or Main Reservoir is not available, Normal Service Water will remain available and in service to supply the 'A' Train ESW equipment loads until the system is ready for post maintenance testing. Allowance of the extended Completion Time is contingent on meeting the Compensatory Measures and Conditions described in HNP LAR submittal correspondence letter HNP-16-056.

PLANT SYSTEMS

3/4.7.13 ESSENTIAL SERVICES CHILLED WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.13 At least two independent Essential Services Chilled Water System loops shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With only one Essential Services Chilled Water System loop OPERABLE, restore at least two loops to OPERABLE status within 72 hours* or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

---------- NOTE ----------

*The 'A' Train Essential Services Chilled Water System loop is allowed to be inoperable for a total of 14 days only to allow for the implementation of design improvements on the 'A' Train ESW pump. The 14 days will be taken one time no later than October 29, 2016. During the period in which the 'A' Train ESW pump supply from the Auxiliary Reservoir or Main Reservoir is not available, Normal Service Water will remain available and in service to supply the 'A' Train ESW equipment loads until the system is ready for post maintenance testing. Allowance of the extended Completion Time is contingent on meeting the Compensatory Measures and Conditions described in HNP LAR submittal correspondence letter HNP-16-056.

SURVEILLANCE REQUIREMENTS

4.7.13 The Essential Services Chilled Water System shall be demonstrated OPERABLE by:

a. Performance of surveillances as required by the Inservice Testing Program, and

b. At least once per 18 months by demonstrating that:

1. Non-essential portions of the system are automatically isolated upon receipt of a Safety Injection actuation signal, and

2. The system starts automatically on a Safety Injection actuation signal.

3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1 A.C. SOURCES

OPERATING

LIMITING CONDITION FOR OPERATION

3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and

b. Two separate and independent diesel generators, each with:

1. A separate day tank containing a minimum of 1457 gallons of fuel,

2. A separate main fuel oil storage tank containing a minimum of 100,000 gallons of fuel, and

3. A separate fuel oil transfer pump.

c. Automatic Load Sequencers for Train A and Train B.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With one offsite circuit of 3.8.1.1.a inoperable:

1. Perform Surveillance Requirement 4.8.1.1.1.a within 1 hour and once per 8 hours thereafter; and

2. Restore the offsite circuit to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours; and

3. Verify required feature(s) powered from the OPERABLE offsite A.C. source are OPERABLE. If required feature(s) powered from the OPERABLE offsite circuit are discovered to be inoperable at any time while in this condition, restore the required feature(s) to OPERABLE status within 24 hours from discovery of inoperable required feature(s) or declare the redundant required feature(s) powered from the inoperable A.C. source as inoperable.

b. With one diesel generator of 3.8.1.1.b inoperable:

1. Perform Surveillance Requirement 4.8.1.1.1.a within 1 hour and once per 8 hours thereafter; and

*2. Within 24 hours, determine the OPERABLE diesel generator is not inoperable due to a common cause failure or perform Surveillance Requirement 4.8.1.1.2.a.4#; and

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* This ACTION is required to be completed regardless of when the inoperable EDG is restored to OPERABILITY.

Activities that normally support testing pursuant to 4.8.1.1.2.a.4, which would render the diesel inoperable (e.g., air roll), shall not be performed for testing required by this ACTION statement.

LIMITING CONDITION FOR OPERATION

ACTION (Continued):

3. Restore the diesel generator to OPERABLE status within 72 hours** or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours; and
4. Verify required feature(s) powered from the OPERABLE diesel generator are OPERABLE. If required feature(s) powered from the OPERABLE diesel generator are discovered to be inoperable at any time while in this condition, restore the required feature(s) to OPERABLE status within 4 hours from discovery of inoperable required feature(s) or declare the redundant required feature(s) powered from the inoperable A.C. source as inoperable.

c. With one offsite circuit and one diesel generator of 3.8.1.1 inoperable:

NOTE: Enter applicable Condition(s) and Required Action(s) of LCO 3/4.8.3, ONSITE POWER DISTRIBUTION - OPERATING, when this condition is entered with no A.C. power to one train.

1. Restore one of the inoperable A.C. sources to OPERABLE status within 12 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
2. Following restoration of one A.C. source (offsite circuit or diesel generator), restore the remaining inoperable A.C. source to OPERABLE status pursuant to requirements of either ACTION a or b, based on the time of initial loss of the remaining A.C. source.

**The 'A' diesel generator is allowed to be inoperable for a total of 14 days only to allow for the implementation of design improvements on the 'A' Train ESW pump. The 14 days will be taken one time no later than October 29, 2016. During the period in which the 'A' Train ESW pump from the Auxiliary Reservoir or Main Reservoir is not available, Normal Service Water will remain available and in service to supply the 'A' Train ESW equipment until the system is ready for post maintenance testing. Allowance of the extended Completion Time is contingent on meeting the Compensatory Measures and Conditions described in HNP LAR submittal correspondence HNP-16-056.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 153 TO RENEWED FACILITY

OPERATING LICENSE NO. NPF-63

DUKE ENERGY PROGRESS, LLC.

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1

DOCKET NO. 50-400

1.0 INTRODUCTION

By letter dated October 29, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15302A542), as supplemented by letters dated February 16, 2016 (ADAMS Accession No. ML16047A389), August 8, 2016 (ADAMS Accession No. ML16221A711), August 26, 2016 (ADAMS Accession No. ML16239A306), September 8, 2016 (ADAMS Accession No. ML16252A358), and September 16, 2016 (ADAMS Accession No. ML16260A140), Duke Energy Progress, LLC. (the licensee) submitted a license amendment request (LAR) for the Shearon Harris Nuclear Power Plant, Unit 1 (HNP or Harris) Technical Specifications (TSs) to allow temporary changes to TS 3.1.2.4, "Charging Pumps – Operating"; TS 3.5.2, "ECCS [Emergency Core Cooling Systems] Subsystems – Tavg Greater Than or Equal To 350 °F"; TS 3.6.2.1, "Containment Spray System"; TS 3.6.2.2, "Spray Additive System"; TS 3.6.2.3, "Containment Cooling System"; TS 3.7.1.2, "Auxiliary Feedwater System"; TS 3.7.3, "Component Cooling Water System"; TS 3.7.4, "Emergency Service Water System"; TS 3.7.6, "Control Room Emergency Filtration System"; TS 3.7.7, "Reactor Auxiliary Building (RAB) Emergency Exhaust System"; TS 3.7.13, "Essential Services Chilled Water System"; and TS 3.8.1.1, "AC [Alternating Current] Sources – Operating." The proposed LAR will permit the 'A' Emergency Service Water (ESW) pump to be inoperable for 14 days to allow for the replacement of the 'A' Train ESW pump with design upgrades. When the 'A' ESW pump is being replaced, the 'A' ESW train will be inoperable, but available by being supplied by the non-safety normal service water (NSW). The LAR is applicable on a one-time basis to be implemented during the replacement of the 'A' ESW pump and will expire on October 29, 2016.

The supplements dated February 16, 2016, August 8, 2016, August 26, 2016, September 8, 2016, and September 16, 2016, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's initial proposed no significant hazards consideration determination as published in the *Federal Register* on January 5, 2016 (81 FR 260).

2.0 REGULATORY EVALUATION

2.1 Systems Description

The service water system (SWS) is described in the Final Safety Analysis Report (FSAR) Chapter 9. The SWS is designed to (a) provide cooling water at a maximum temperature of 95 degrees Fahrenheit (°F) to remove plant heat loads by using the cooling tower and associated components during normal and shutdown operation; (b) provide cooling water at a maximum temperature of 95 °F to remove essential plant heat loads using the Auxiliary Reservoir or its backup during emergency operation; (c) isolate non-essential cooling loads from essential cooling loads during conditions which could compromise the system safety function; (d) provide a heat sink for essential loads assuming a single active or passive component failure; (e) withstand or be protected from the effects of a safe shutdown earthquake, a design basis tornado, maximum flood levels, and a high energy line break without loss of safety function; (f) provide essential cooling services assuming a loss of offsite power (LOOP) in conjunction with any event in (d) or (e); (g) allow periodic testing and inspection of equipment to assure system integrity and capability; (h) provide for detecting, controlling, and isolating radioactive leakage into and out of the system. The SWS consists of two NSW pumps, two ESW pumps, two service water booster pumps, and associated piping, valves, and instrumentation. During unit start-up, shutdown, and normal operation, service water requirements are met by one of the NSW pumps. Under emergency conditions, the service water supply is switched from the cooling tower to the ESW pumps with preferred suction from the Auxiliary Reservoir through the ESW Intake Channel.

The ESW system is a support system for several Safety Class systems that are needed for safe shutdown and accident mitigation including the systems associated with this TS LAR. The Safety Class systems have an A and B train for redundancy in order to meet the requirements of the General Design Criteria (GDC). Under accident conditions, ESW will supply only essential equipment for safe plant shutdown to include both trains of component cooling water (CCW) heat exchangers, RAB chillers, standby diesel generator coolers, charging pump coolers, containment fan coolers, post-accident sampling chiller, and ESW pump strainer back and screen wash.

The FSAR Section 9.2.2 states the CCW system (CCWS) consists of two component cooling water heat exchangers, three CCW pumps, surge tank, cooling lines to various components, and associated piping, valves, and instrumentation. The CCWS supplies cooling water to various plant components during all phases of plant operation and shutdown. It serves as an intermediate cooling system between the Reactor Coolant System (RCS) and the SWS. The CCWS supplies the following safety related components: residual heat removal pumps, residual heat exchangers, and spent fuel pool heat exchangers.

FSAR Section 9.2.8 states the Essential Service Chilled Water System (ESCWS) provides chilled water to the air handling units for the Control Room Air Conditioning System, RAB engineered safety feature (ESF) Equipment Cooling System, RAB Switchgear Rooms Ventilation System, RAB Electrical Equipment Protection Rooms Ventilation System and Fuel-Handling Building Spent Fuel Pool Pump Room Ventilation System. The ESCWS meets Safety Class 3 and Seismic Category I requirements and consists of two 100 percent capacity

subsystems A and B. The condenser section of the chiller section of each subsystem is supplied with cooling water from the SWS and ESW.

The FSAR Section 10.4.9 describes the function of the Auxiliary Feedwater System (AFW) is to supply feedwater to the secondary side of the steam generators at times when the normal feedwater system is not available, thereby maintaining the heat sink capabilities of the steam generator. The system provides an alternate to the Feedwater System during startup, hot standby and cooldown and also functions as an Engineered Safeguards System. The Auxiliary Feedwater System is directly relied upon to prevent core damage during plant transients resulting from a loss of normal feedwater flow, steam line rupture, main feedwater line rupture, steam generator tube rupture, loss-of-coolant accident (LOCA) and/or LOOP by providing feedwater to the unaffected steam generators to maintain their inherent heat sink capability. To accomplish these requirements, the system consists of two 100 percent motor driven pumps (one powered for 'A' Train and one 'B' Train) and a 200 percent turbine driven pump powered by either of two steam generators. The ESW system provides a backup source of water to the AFW system when the condensate storage tank is unavailable.

The FSAR Section 6.4 states the RAB Emergency Exhaust System is designed to draw down the potentially contaminated ESF equipment areas to a slight negative pressure below atmospheric and provide particulate filtration and radioiodine adsorption to reduce the quantities of radioactive materials in the gaseous effluent released to the atmosphere during a design basis accident. Upon receipt of a safety injection actuation signal (SIAS) or a control room isolation signal, the normal supply and exhaust system for the RAB shall stop, and both emergency exhaust units shall start, which can be initiated on an SIAS, a Control Room Outside Air Intake (OAI) High Radiation Signal, or a Control Room OAI Smoke Signal. During the proposed allowed outage time (AOT) window, the 'B' Train of RAB Emergency Exhaust System will remain operable and the 'A' Train of the RAB Emergency Exhaust System will remain available.

The FSAR Section 6.5.2 states the purpose of the Containment Spray System (CSS) is to remove heat and fission products from a post-accident containment atmosphere by spraying borated sodium hydroxide (NaOH) solution into the containment. The CSS consists of two separate trains of equal capacity, each capable of meeting the system design basis spray coverage. Each train includes one containment spray pump, spray headers, nozzles, valves, piping, a containment recirculation sump, a cavitating venturi, and an eductor. The refueling water storage tank and the containment spray additive tank are common to both Containment Spray loops. Each train is powered from a separate ESF bus. The TS Bases Section 3.6.2.2 states the Spray Additive System ensures that sufficient NaOH is added to the containment spray in event of a LOCA. The TS Bases Section 3.6.2.3 states the Containment Fan Coolers ensure that adequate heat removal capacity is available when operated in conjunction with the Containment Spray System during post-LOCA conditions. The CSS and the Containment Fan Coolers are redundant to each other in providing post-accident cooling of the containment atmosphere. However, the CSS also provides a mechanism for removing iodine from the containment atmosphere.

The TS Bases Section 3.7.6 for the Control Room Emergency Filtration System (CREFS) states the CREFS consists of two independent, redundant trains that recirculate and filter the air in the control room envelope (CRE) and a CRE boundary that limits the inleakage of unfiltered air.

The FSAR Section 9.3.4.1.2.5 states three charging pumps of the single speed, horizontal, centrifugal type are supplied to inject coolant into the RCS. Parts in contact with the reactor coolant are fabricated of austenitic stainless steel or other corrosion resistant material. There is a minimum flow recirculation line to protect the centrifugal charging pumps from a closed discharge valve condition. Charging flowrate is determined from a pressurizer level signal that regulates a modulating valve on the discharge side of the centrifugal pumps. The centrifugal charging pumps also serve as high-head safety injection pumps in the ECCS. The first footnote in FSAR Table 6.3.2-8 states, three charging/safety injection (CH-SI) pumps are installed and a maximum of two may be operable at one time. Per the second system diagram in Attachment 5 of the LAR, all three CH-SI pumps can have cooling water provided by either the 'A' or 'B' train of the ESW system.

FSAR Section 6.3.1 states the ECCS provides shutdown capability by means of boron injection for the following accident conditions: a LOCA including a pipe break or a spurious relief or safety valve opening in the RCS that would result in a discharge larger than that which could be made up by the normal makeup system; a rupture of a control rod drive mechanism causing a rod cluster control assembly ejection accident; a steam or feedwater system break accident including a pipe break or a spurious power operated relief or safety valve opening in the secondary steam system, which would result in an uncontrolled steam release or a loss of feedwater and a steam generator tube failure. The system is designed to tolerate a single active failure (injection phase) or a single active or passive failure (recirculation phase). The capabilities are accomplished by a combination of suitable redundancy, instrumentation for indication and/or alarm of abnormal conditions, and relief valves to protect piping and components against malfunctions. The ECCS can meet its minimum required performance level with onsite or offsite electrical power. The ECCS consists of the centrifugal charging pumps, residual heat removal pumps, accumulators, a boron injection tank, residual heat removal heat exchangers, a refueling water storage tank, along with associated piping, valves, instrumentation, and other related equipment. Each train is powered from a separate ESF bus.

The LAR states that during the proposed AOT window, the 'B' ECCS Train will be operable. The 'A' ECCS Train will remain available with cooling water provided by the NSW system.

The 'A' ESW train provides cooling for the 'A' charging/safety injection (CH-SI) pump and, indirectly via CCW, to the 'A' residual heat removal (RHR) heat exchanger, and 'A' RHR pump during emergency conditions. Thus, the 'A' ESW train outage will render the 'A' CH-SP, 'A' RHR heat exchanger, and 'A' RHR pump inoperable, as well as the A train structures, systems and components in TSs affected by this LAR.

As described in FSAR Section 8.3, the onsite AC power distribution system receives power under normal operating conditions through the Unit auxiliary transformers. Under start-up and shutdown conditions, power is supplied through the start-up transformers. Two non-safety-related 6.9 kiloVolt (kV) switchgear buses (1D and 1E) provide the path of power from these transformers to the onsite power distribution system. Should the preferred (offsite) power from these buses be unavailable, onsite power is supplied directly to the onsite power distribution system from two emergency diesel generators (1A-SA and 1B-SB). The onsite power system consists of two 6.9 kV diesel generators (1A-SA and 1B-SB), two 6.9 kV ESF buses (1A-SA and 1B-SB), various ESF and non-ESF 480 Volt (V) buses, motor control centers, 208/120V power

panels and a Direct Current Power System. The two 6.9 kV ESF buses 1A-SA and 1B-SB supply equipment essential for safe shutdown of the plant. These two buses receive power either from the non-safety-related buses 1D and 1E or from the diesel generators (1A-SA and 1B-SB). Either bus 1A-SA or 1B-SB can supply sufficient power to shut down the plant and to maintain the plant in a safe condition, under normal and design accident conditions. Each emergency diesel generator (EDG) must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on detection of bus under voltage. Each EDG must also be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the ESF buses. The FSAR Section 9.5.2 states the Jacket Water System includes an engine-driven centrifugal pump, standpipe, three-way thermostatic control valve, and heat exchanger with the required interconnecting piping. The tube side of the heat exchanger is normally supplied with cooling water from the ESW System. The NSW system may also be aligned to supply cooling water to the Jacket Water System heat exchanger.

2.2 Description of Proposed Change

The licensee proposed adding a NOTE to the following TS to modify the allowed outage time (AOT) to allow 14 days of plant operation while the 'A' ESW train is inoperable during the pump maintenance.

TS 3.1.2.4, "Charging Pumps – Operating"
TS 3.5.2, "ECCS Subsystems – Tavg Greater Than or Equal To 350 °F"
TS 3.6.2.1, "Containment Spray System [CSS]"
TS 3.6.2.2, "Spray Additive System"
TS 3.6.2.3, "Containment Cooling System [CCS]"
TS 3.7.1.2, "Auxiliary Feedwater [AFW] System"
TS 3.7.3, "Component Cooling Water [CCW] System"
TS 3.7.4, "Emergency Service Water System [ESWS]"
TS 3.7.6, "Control Room Emergency Filtration System [CREFS]"
TS 3.7.7, "Reactor Auxiliary Building [RAB] Emergency Exhaust System"
TS 3.7.13, "Essential Services Chilled Water System [ESCWS]"
TS 3.8.1.1, "AC Sources – Operating"

The following note for a one-time AOT extension will be added to the ACTION statement of each TS listed above.

The 'A' Train [**system per bracket below*] is allowed to be inoperable for a total of 14 days only to allow for the implementation of design improvements on the 'A' Train ESW pump. The 14 days will be taken one time no later than October 29, 2016. During the period in which the 'A' Train ESW pump supply from the Auxiliary Reservoir or Main Reservoir is not available, Normal Service Water will remain available and in service to supply the 'A' Train ESW equipment loads until the system is ready for post-maintenance testing. Allowance of the extended Completion Time (CT) is contingent on meeting the Compensatory Measures and Conditions described in HNP LAR submittal correspondence letter HNP-16-056.

** [*"Charging Pumps – Operating," or "ECCS Subsystems – Tavg Greater Than or Equal to 350 °F" or "Containment Spray System," or "Spray Additive System," or "Containment Cooling*

System," or "Auxiliary Feed water System," or "Component Cooling Water System," or "Emergency Service Water System," or "Control Room Emergency Filtration System," or "Reactor Auxiliary Building Emergency Exhaust System," or "Essential Services Chilled Water System," or "AC Sources – Operating"]

Duke Energy proposed a one-time AOT extension from 72 hours to 14 days to the HNP TS to replace the 'A' ESW pump with a different design as a result of a root cause evaluation completed after the May 2015 'A' ESW pump failure. On May 4, 2015, while HNP was shut down for a scheduled refueling outage in Mode 5, the Operations Surveillance Test for Safety Injection, "Engineered Safety Feature Response Time on Train B," was being performed. During this test the 'A' ESW pump failed, resulting in a loss of flow and pressure to the 'A' ESW header. This event was reported in License Event Report 2015-004-001. The 'A' ESW pump was rebuilt with new couplings, coupling fasteners, and bearings prior to plant startup that commenced on May 13, 2015, and declared operable.

Duke Energy proposed the one-time extension to 14 days since replacement of the 'A' ESW pump is not a typical maintenance activity that can be performed within the existing 72 hours completion time window. Given the duration of the maintenance activity, the unit would be required to be shut down by the current TS. If the work exceeds 14 days under the proposed temporary extension, the unit would be required to shut down in accordance with TSs.

2.3 Regulatory Requirements

Section 182a of the Atomic Energy Act (the Act) requires applicants for nuclear power plant operating licenses to include the TSs as part of the license. The TSs ensure the operational capability of structures, systems and components (SSCs) that are required to protect the health and safety of the public. The regulatory requirements related to the content of the TSs are contained in Section 50.36 to Title 10 of the *Code of Federal Regulations* (10 CFR). That regulation requires that the TSs include items in the following specific categories: (1) Safety limits, limiting safety systems settings, and limiting control settings (10 CFR 50.36(c)(1)); (2) Limiting conditions for operation [LCO] (10 CFR 50.36(c)(2)); (3) Surveillance requirements (10 CFR 50.36(c)(3)); (4) design features (10 CFR 50.36(c)(4)); and (5) administrative controls (10 CFR 50.36(c)(5)).

10 CFR 50.36(c)(2)(i) states, in part:

> Limiting conditions for operation are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met.

The Nuclear Regulatory Commission (NRC) staff may grant a licensee's request to revise the TSs, provided that the NRC staff plant-specific review supports a finding of continued adequate safety because: (1) the change is editorial, administrative, or provides clarification (i.e., no requirements are materially altered); (2) the change is more restrictive than the licensee's current requirement; or (3) the change is less restrictive than the licensee's current requirement,

but nonetheless still affords adequate assurance of safety when judged against current regulatory standards.

The licensee's current TS LCO for ESW requires the licensee to have two independent ESW loops OPERABLE in MODES 1 through 4. When only one emergency service water loop is OPERABLE, the licensee's TS contain an action to restore at least two loops to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. That is, the current TSs contain an AOT of 72 hours for the condition when one ESW train is inoperable. It should be noted that the terms CT and AOT are used interchangeably throughout the licensee's documents discussing the request. While CT is the more appropriate term for a plant with TS format and content similar to that found in NUREG-1431, "Standard Technical Specifications, Westinghouse Plants," the HNP TSs follow an earlier format. The NRC staff finds both CT and AOT terms to be equivalent in use and meaning. For clarity, the NRC staff will refer to AOT throughout the SE.

Section 50.65 of 10 CFR, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," requires that before performing maintenance activities (including but not limited to surveillance, post-maintenance testing, and corrective and preventive maintenance), the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities.

Appendix A to 10 CFR Part 50, GDC 2 - "Design basis for protection against natural phenomena" requires in part, structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without loss of capability to perform their safety function.

GDC 4 -"Environmental and dynamic effects design bases,' requires in part structures, systems, and components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents.

GDC 17 - "Electric power systems," requires, in part, that nuclear power plants have onsite and offsite electric power systems to permit the functioning of structures, systems, and components that are important to safety. The onsite system shall have sufficient independence, redundancy, and testability to perform its safety function, assuming a single failure. The offsite power system is required to be supplied by two physically independent circuits that are designed and located so as to minimize, to the extent practical, the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. In addition, this criterion requires provisions to minimize the probability of losing electric power from the remaining electric power supplies as a result of loss of power from the unit, the offsite transmission network, or the onsite power supplies.

GDC18 - "Inspection and testing of electric power systems," requires in part that electric power systems that are important to safety must be designed to permit appropriate periodic inspection and testing.

GDC 34 -"Residual heat removal," requires a system to remove residual heat shall be provided. The system safety function shall be to transfer fission product decay heat and other residual heat from the reactor core at a rate such that specified acceptable fuel design limits and the design conditions of the reactor coolant pressure boundary are not exceeded. Suitable redundancy in components and features, and suitable interconnections, leak detection, and isolation capabilities shall be provided to assure that for onsite electric power system operation (assuming offsite power is not available) and for offsite electric power system operation (assuming onsite power is not available) the system safety function can be accomplished, assuming a single failure.

GDC 38 – "Containment heat removal," requires in part a system to remove heat from the reactor containment shall be provided. The system safety function shall be to reduce rapidly, consistent with the functioning of other associated systems, the containment pressure and temperature following any loss-of-coolant accident and maintain them at acceptably low levels.

GDC 44 - "Cooling Water," requires a system to transfer heat from structures, systems, and components important to safety, to an ultimate heat sink shall be provided. The system safety function shall be to transfer the combined heat load of these structures, systems and components under normal operating and accident conditions. Suitable redundancy in components and features, and suitable interconnections, leak detection, and isolation capabilities shall be provided to assure that for onsite electric power system operation (assuming offsite power is not available) and for offsite electric power system operation (assuming onsite power is not available) the system safety function can be accomplished, assuming a single failure.

Regulatory Guide (RG) 1.93, "Availability of Electric Power Sources," provides guidance with respect to operating restrictions or AOT if the number of available AC sources is less than that required by the TS LCO. In particular, this guide prescribes a maximum AOT of 72 hours for an inoperable onsite or offsite AC source.

RG 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," describes a risk-informed approach, acceptable to the NRC, for assessing the nature and impact of proposed permanent licensing-basis changes by considering engineering issues and applying risk insights. This RG also provides risk-acceptance guidelines for evaluating the results of such evaluations. While not directly applicable to temporary changes, the NRC staff used RG 1.174 for guidance in evaluating the licensee's proposed changes.

RG 1.177, "An Approach for Plant Specific, Risk Informed Decisionmaking: Technical Specifications," describes an acceptable risk informed approach specifically for assessing proposed TS changes in AOTs.

RG 1.177 Tier 1 assesses the risk impact of the proposed change in accordance with acceptance guidelines consistent with the Commission's Safety Goal Policy Statement, as documented in RG 1.177. Tier 1 assesses the impact on operational plant risk based on the change in core damage frequency (ΔCDF) and change in large early release frequency (ΔLERF). It also evaluates plant risk while equipment covered by the proposed AOT is out-of-service, as represented by incremental conditional core damage probability (ICCDP) and

incremental conditional large early release probability (ICLERP). Tier 1 also addresses the quality of the licensee's plant-specific probabilistic risk assessment (PRA) model used to support the subject application.

RG 1.177 Tier 2 identifies and evaluates any potential risk-significant plant configurations that could result if equipment, in addition to that associated with the proposed license amendment, is taken out-of-service simultaneously, or if other risk significant operational factors, such as concurrent system or equipment testing, are also involved. The purpose of this evaluation is to ensure that appropriate restrictions on dominant risk-significant configurations associated with the change are in place.

RG 1.177 Tier 3 addresses the licensee's overall configuration risk management program (CRMP) to ensure that adequate programs and procedures are in place for identifying risk significant plant configurations resulting from maintenance or other operational activities and appropriate compensatory measures are taken to avoid risk significant configurations that may not have been considered when the Tier 2 evaluation was performed. Compared with Tier 2, Tier 3 provides additional coverage to ensure risk significant plant equipment outage configurations are identified in a timely manner and that the risk impact of out of service equipment is appropriately evaluated prior to performing any maintenance activity over extended periods of plant operation. Tier 3 guidance can be satisfied by the Maintenance Rule (10 CFR 50.65(a)(4)), which requires a licensee to assess and manage the increase in risk that may result from activities such as surveillance testing and corrective and preventive maintenance, subject to the guidance provided in RG 1.177, Section 2.3.7.1, and the adequacy of the licensee's program and PRA model for this application. The CRMP is to ensure that equipment removed from service prior to or during the proposed extended AOT will be appropriately assessed from a risk perspective.

RG 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," describes an acceptable approach for determining whether the quality of the PRA models, in total or the parts that are used to support an application, is sufficient to provide confidence in the results, such that the PRA models can be used in regulatory decision making for light-water reactors

NUREG-0800, BTP 8-8, "Onsite (Emergency Diesel Generators) and Offsite Power Sources Allowed Outage Time Extensions," dated February 2012, provides guidance to the NRC staff in reviewing LARs for licensees proposing a one-time or permanent TS change to extend an EDG AOT beyond 72 hours.

NUREG-0800, Standard Review Plan, Chapter 18, "Human Factors Engineering," for evaluating (1) designs, (2) design processes, (3) design reviews, and (4) operator actions submitted by applicants and licensees for the broad range of NRC review responsibilities

NUREG-1764, "Guidance for the Review of Changes to Human Actions," Revision 1, is used by NRC staff to review changes in human actions, such as those that are credited in nuclear power plant safety analyses.

General guidance for evaluating the technical basis for proposed risk-informed changes is provided in Section 19.2, "Review of Risk Information Used to Support Permanent Plant-Specific

Changes to the Licensing Basis: General Guidance," of the NRC Standard Review Plan (SRP), NUREG-0800. Guidance on evaluating PRA technical adequacy is provided in Section 19.1, "Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities." More specific guidance related to risk-informed TS changes is provided in SRP Section 16.1, "Risk-Informed Decision-making: Technical Specifications," which includes AOT changes as part of risk-informed decision making. Section 19.2 of the SRP states that a risk-informed application should be evaluated to ensure that the proposed changes meet the following key principles:

The staff's review and evaluation of the specific proposed change is discussed in Section 3.0 below.

3.0 TECHNICAL EVALUATION

3.1 Method of Staff Review

One acceptable approach for making risk-informed decisions about proposed TS changes is to show that the proposed changes meet the following five key principles stated in RG 1.177:

1. The proposed change meets the current regulations unless it is explicitly related to a requested exemption or rule change.
2. The proposed change is consistent with the defense-in-depth philosophy.
3. The proposed change maintains sufficient safety margins.
4. When the proposed changes result in an increase in core damage frequency or risk, the increases should be small and consistent with the intent of the Commission's Safety Goal Policy Statement.
5. The impact of the proposed changes should be monitored using performance measurement strategies.

3.2 Key Principle 1: Compliance with Current Regulations

The licensee's proposed one-time AOT for the 'A' ESW pump maintenance is 14 days. This request represents an extension of the current TS AOT for ESW train from 72 hours and therefore, is a relaxation of TS requirements. The AOT requirement for all the TS supported systems listed in Section 2.2 of this safety evaluation (SE), except CREFS and RAB Emergency Exhaust System, would be relaxed as well. For the CREFS and RAB Emergency Exhaust System, the relaxation would be from 7 days to 14 days. The licensee provided a risk-informed justification for the proposed relaxation that included a set of compensatory measures and requirements incorporated through a NOTE into the HNP TSs, which includes the statement "Allowance of the extended Completion Time is contingent on meeting the Compensatory Measures and Conditions described in the HNP LAR submittal correspondence letter HNP-16-056." The list of compensatory measures and requirements that must be met as part of the TSs 14-day AOT is contained in a table titled "CONDITIONS ASSOCIATED WITH ONE TIME TS CHANGE" in Attachment 4 of RAI response letter dated August 8, 2016 (HNP-16-056) as listed below.

1. Normal Service Water (NSW) will remain available and in service for the duration of the allowed outage time (AOT) to support operation of the

'A' Emergency Diesel Generator (EDG) if required. OP-155, "Diesel Generator Emergency Power System," Section 5.1.2, "EDG Control Room Manual Start," step 2 says "VERIFY service water flow has been established to the EDG per OP-139." OP-139, Section 5.3, "Supplying Both ESW [Emergency Service Water] Headers with NSW/Securing ESW Pump," requires the NSW header in service and the ESW header filled and vented per Section 8.24, which would align Service Water to the EDG.

2. The 'B' Train ESW will remain operable. OWP-SW, "Service Water," includes component lineups necessary when an ESW pump is inoperable that provides defense-in-depth for prevention of core damage and containment failure. The lineup steps for time periods when the 'A' ESW pump is inoperable include the lifting of leads to disable the Safety Injection (SI) close signal to service water valve 1SW-39 and service water valve 1SW-276. This allows the breakers to be maintained on and allows expeditious isolation capability in the event of a SW leak in the Reactor Auxiliary Building (RAB). This lineup also defeats the SI signal to service water valve 1SW-276 to maintain it open. As long as service water valves 1SW-274 and 1SW-40 are operable, the 'B' Train ESW header is isolable and operable.

3. In accordance with OMM-001, "Operations Administrative Requirements," the following equipment is posted protected by Operations when 'A' ESW pump is unavailable: Switchyard (Breakers 52-1, 52-2, 52-3 and Line Panels 5, 6, and 7), 'B' ESW pump and breaker, B-Train Process Instrumentation Control (PIC) cabinets (PIC 2, 4, 10, 14, and 18), and the 'A' Start-up Transformer.

4. Prior to the AOT entry, the weather forecast will be reviewed for any forecasted weather that could affect the availability of offsite power. The outage will not commence if weather conditions are predicted that could adversely affect the availability of offsite power. WCM-001, "On-line Maintenance Risk Management," requires review of the weather forecast prior to the beginning of this maintenance outage.

5. The opposite train or critical equipment listed below and supporting components will be posted protected:
   - EDGs (both 'A' and 'B' EDGs)
   - NSW Pumps and power supplies (both 'A' and 'B' NSW Pumps)
   - Dedicated Shutdown Diesel Generator
   - Alternate Seal Injection Pump
   - Turbine Driven Auxiliary Feedwater (AFW) Pump
   - B' ESW Pump

6. Continuous fire watches in risk critical areas will be instituted on the protected train, which will include the following rooms:
   - 'B' Electrical Switchgear Room
   - 'B' Cable Spread Room
   - 'B' Battery Room

7. Restrictions will remain in place on hot work and transient combustibles in the following rooms:
   - 'B' Electrical Switchgear Room
   - 'B' Cable Spread Room
   - 'B' Battery Room

8. Operators will be briefed on the procedures and guidance for the equipment lineup necessary for the proposed AOT activity.

9. Operators will be briefed to improve operator response for ASI [Alternate Seal Injection] System actions.

10. The 'B' ESW pump discharge pressure transmitter will be calibrated within three months prior to the proposed AOT.

11. The 'B' ESW pump discharge strainer differential pressure will be checked when the 'B' ESW pump is in service and a backwash will be completed to verify it is clean within one month prior to the proposed AOT. This will ensure that the strainer is clean and capable of performing its duty during the AOT.

12. Switchgear Room in Turbine Building 286' will be posted protected, in order to minimize the risk to NSW power supplies.

13. Restrictions will be in place on switchyard work or other maintenance and testing that could cause a plant trip for the duration of the AOT. Additionally, the system load dispatcher will be contacted once per day to ensure no significant grid perturbations are expected during the extended AOT.

14. The FLEX ESW pump will be pre-staged in advance of the AOT entry to allow for connection to the 'A' Train ESW header, to provide alternate cooling to the 'A' EDG in the event of a loss of offsite power (LOOP). Dedicated personnel will be available to make the necessary equipment manipulations such that the 'A' EDG will be started within approximately one hour of the LOOP. The 'A' EDG will be manually started and operations will energize the necessary loads to perform the safety function of decay heat removal in the event of a LOOP.

15. All associated 'B' Train equipment for the Technical Specifications (TS) listed below, which are the only operable trains, are to be protected during the extended AOT.

    TS 3.1.2.4, "Charging Pumps – Operating"
    TS 3.5.2, "ECCS Subsystems – Tavg Greater Than or Equal To 350°F"
    TS 3.6.2.1, "CSS"
    TS 3.6.2.2, "Spray Additive System"
    TS 3.6.2.3, "CCS"
    TS 3.7.1.2, "AFW System"
    TS 3.7.3, "CCW System"

TS 3.7.4, "ESWS"
TS 3.7.6, "CREFS"
TS 3.7.7, "RAB Emergency Exhaust System"
TS 3.7.13, "ESCWS"
TS 3.8.1.1, "AC Sources – Operating"

16. The Demineralized Water Storage Tank will be maintained between 29 and 34 feet for the duration of the AOT.

17. The following actions will be taken prior to and during the proposed AOT as described:
    - EDG cooling flow will be verified prior to the AOT entry.
    - 'B' EDG loading and operational check will be completed prior to the AOT entry.
    - 'B' ESW pump operational check will be completed prior to the AOT entry.
    - Proceduralized EDG inspections and checks will be performed daily for reliability during the AOT, which are normally completed weekly.
    - Freeze protection equipment as required and ventilation in the intake buildings will be verified as functional prior to the AOT.
    - Position of low head safety injection recirculation to Refueling Water Storage Tank isolation valves, 1SI-448 and 1SI-331, will be verified prior to the AOT, in addition to other SW valves that will support the clearance for the pump replacement.

The RG 1.177 contains guidance on the use of compensatory measures in risk-informed license amendment requests. In accordance with RG 1.177 Section 2.3.6, the risk impact of some of the listed compensatory measures were considered quantitatively. RG 1.177 Section 2.2 contains a discussion on traditional engineering considerations the licensee and staff should use to evaluate a risk-informed license amendment request. The staff determined that the proposed compensatory measures are acceptable per RG 1.177 Section 2.2, in that regulations continue to be met with the compensatory measure proposed. The licensee does not propose to deviate from existing regulatory design criteria and requirements and compliance with existing design regulations is maintained by the proposed TS changes.

The staff issued an RAI on how the licensee would respond in the event protected systems/components in the LAR were rendered INOPERABLE or non-functional. In the licensee's RAI response dated August 8, 2016, the licensee provided a discussion of actions the licensee would take to ensure sufficient defense-in-depth if any of the protected systems/components became INOPERABLE or nonfunctional, respectively, either before or during maintenance on the 'A' ESW pump. The NRC staff reviewed the licensee's response and determined that the licensee's use of the NOTE in the affected TS maintains requirements to enter applicable TS ACTIONS for supported systems rendered inoperable by an inoperable ESW train. The staff also determined that limits on use of the AOT ensure the AOT will only be entered for one time and the total duration of time in the AOT will be limited to a maximum of 14 days while the plant is at power.

The NRC staff determined that while the proposed extended AOT is a relaxation to existing TS requirements, it is acceptable because the justifications and conditions provided by the licensee still affords adequate assurance of safety when judged against current regulatory standards. The NRC staff determined that the TSs as amended by the proposed changes, will continue to meet the requirements of 10 CFR 50.36(c)(2).

3.3 Key Principle 2: Defense-In-Depth Evaluation

Consistency with defense-in-depth philosophy is maintained if:

- A reasonable balance among prevention of core damage, prevention of containment failure and consequence mitigation is preserved.

Prevention of core damage depends on the ability to continuously remove decay heat after an initiating event. During the extended AOT of 14 days, if a LOOP occurred, the 'B' ESW train remains available to mitigate the event. The plant would initially maintain the ability to remove decay heat with the turbine driven (TD) AFW pump and the steam generator pressure operated relief valves (PORV), while the 'B' ESW train provides defense in depth by providing the capability to achieve cold shutdown. If the 'B' ESW train failed, with compensatory measures in place, the plant would restore the 'A' EDG within 1 hour to provide power to a motor driven (MD) AFW pump and CH-SI pumps.

In its supplement dated February 16, 2016, the licensee did not adequately explain how decay heat would be removed in case of a LOOP and loss of 'B' ESW and maintain the ability to safely be in hot shutdown for an extended period with the ability to achieve cold shutdown for defense in depth. Therefore, the NRC staff asked an RAI for the licensee to evaluate how long the plant could be maintained in hot shutdown and how and when the capability to achieve cold shutdown would be achieved. The licensee responded in a letter dated August 8, 2016, stating for hot shutdown/decay heat removal, the condensate storage tank (CST), assuming a non-seismic event, can supply AFW for 36 hours. Before the start of maintenance on the 'A' ESW pump, the licensee will fill the demineralized water storage tank (DWST) to a level between 29 to 34 feet, which will extend the supply of fresh water to AFW to 5 days. The hotwell with approximately 92,000 gallon will provide additional inventory if needed. The licensee has diesel driven FLEX DWST and FLEX hotwell transfer pumps, to transport water to the CST as necessary to meet AFW demand. The total available fresh water supply to the steam generators would last at least 5 days for decay heat removal purposes for operation in either Mode 3 or 4. The licensee stated the 'A' ESW pump would be tested and ready for installation prior to commencing work and at any point during the 'A' ESW pump replacement, that they could restore functionality to the 'A' ESW pump within 4.7 days to achieve cold shutdown capability as defense in depth for decay heat removal. This would not include installation of vibration monitoring equipment nor post-maintenance testing, but would establish ESW flow to the 'A' ESW train and achieve cold shutdown capability. The staff notes that within the 5-day capability of removing decay heat in Mode 3 or 4 with clean water sources, that offsite power may become available that would restore NSW capability and/or the failure in the 'B' ESW train could be repaired, restoring cold shutdown capability.

The AOT extension would be allowed only one time. Based on the normal availability of the NSW system and the 'B' ESW train, the compensatory measures to be in place prior to start of

the planned maintenance, and mitigation proposed by the licensee the NRC staff finds the licensee has addressed prevention of core damage for this one-time evolution. The availability and reliability of redundant systems to remove decay heat is explained in more detail below.

The NRC staff asked the licensee to demonstrate sufficient safety related containment cooling during a LOOP and failure of the 'B' ESW train. In its response dated August 8, 2016, the licensee stated an analysis considering hot shutdown conditions for 10 days based on worst-case summertime conditions indicate that peak containment pressure and temperature are within values established for containment qualification and it is reasonable to conclude that containment temperature over the potential 4.7 day period of hot shutdown will be maintained in an acceptable range. Therefore, the NRC staff concluded prevention of containment failure is maintained and the LAR does not adversely affect consequence mitigation features.

- Over reliance on programmatic activities as compensatory measures associated with the change in the licensing basis is avoided.

Programmatic activities to be used in accomplishing 'A' ESW pump replacement include a special valve lineup and 17 compensatory actions and corresponding additional training specified in the licensee's letter dated August 8, 2016. A protected equipment list will be in effect and additional dedicated operators will be stationed. The NRC staff does not consider this an over reliance on programmatic activities for a one-time AOT extension.

- System redundancy, independence, and diversity are maintained commensurate with the expected frequency, consequences of challenges to the system, and uncertainties (e.g., o risk outliers).

During normal operation with the ESW system fully operable, the non-safety NSW supplies both 'A' and 'B' ESW trains. To achieve independence, the trains are isolated from one another by motor operated valves which activate upon a safety injection actuation signal (SIAS). The associated ESW pumps start and are powered by separate safeguard busses. During the replacement of 'A' ESW pump and the extended AOT, the NSW system will function as the supply to the 'A' ESW train. Prior to start of 'A' ESW pump replacement, the SIAS will be defeated on certain motor operated valves while others will be de-energized to achieve isolation between trains 'A' and 'B' during accident mitigation. The NSW system will function as the supply to the 'A' ESW train, unless there is a loss of offsite power. The NSW is not a Safety Class system and is non-seismic and not powered by a safeguards bus. If the NSW is lost due to a LOOP or seismic event, the 'B' ESW train is available to meet all ESW requirements to mitigate the event. If the 'B' ESW system also failed, compensatory measures are in place and will be functional within 1 hour to mitigate the event, including a temporary FLEX ESW pump to supply limited flow to the 'A' CH-SI pump bearings, the 'A' EDG for power to the 'A' CH-SI Pump and 'A' MD AFW pump. The 'A' EDG will then be available within 1 hour after the LOOP and be able to power a MD AFW pump and the CH-SI pump. During the 1 hour before the FLEX pump supplies the 'A' ESW train, the TD AFW pump will be supplying makeup water to the steam generators and the steam generator PORVs will be used to relieve steam and remove decay heat. After 'A' EDG restoration, a MD AFW pump will become available to back up the TD AFW pump. Seventeen compensatory measures and requirements, as described in HNP LAR submittal correspondence letter HNP-16-056 will be in place prior to start of the planned replacement of the 'A' ESW pump. These conditions serve as compensatory measures to

achieve reasonable assurance that if a LOOP and failure of the 'B' ESW train occurred, there would be adequate measures in place for system redundancy independence, and diversity commensurate with the expected frequency, consequences of challenges to the system, and uncertainties to provide reasonable assurance of the ability to remove decay heat. Therefore, the staff finds the intent of GDC 44 is met.

The NRC staff evaluated the licensee's request to extend the AOT for the 'A' CH-SI pump to determine whether the overall availability of the 'A' CH-SI pump would be reduced significantly as a result of increased on-line maintenance activities.

The licensee proposed compensatory actions to reduce the risk of loss of redundant CH-SI pump capability. Notably, per the licensee's RAI response, dated August 8, 2016, the licensee will maintain the 'A' CH-SI available with the NSW system with both NSW pumps functional. Further, per the same RAI response the licensee maintain the 'A' EDG and a FLEX ESW pump available to support the function of the 'A' CH-SI in the case of a loss of NSW. Based on this being a one-time change of limited duration, the NRC staff concludes that the programmatic activities are appropriate and necessary for maintaining defense-in-depth.

The NRC staff evaluated the licensee's request to extend the AOT for ECCS subsystems to determine whether the overall availability of the ECCS subsystems would be reduced significantly as a result of increased on-line maintenance activities.

The licensee proposed compensatory actions to reduce the risk of loss of redundant ECCS subsystems required for safe shutdown during the 'A' ESW pump modifications. In the RAI response letter dated August 8, 2016, the licensee stated it will maintain the 'A' CH-SI pump, 'A' RHR heat exchanger and 'A' RHR pump available with the NSW system with both NSW pumps functional. Further, per the same RAI response the licensee will maintain the 'A' EDG and a FLEX ESW pump available to support the function of the 'A' CH-SI pump in the case of a loss of NSW.

The NRC staff requested additional information related to how sufficient defense-in-depth would be maintained if any of the systems/components described in Section 7.0 of the LAR became INOPERABLE or non-functional. In RAI response letter dated August 8, 2016, the licensee stated that the AOT will not be entered if any of the protracted systems/components listed in Section 7.0 become INOPERABLE or non-functional. Further, the licensee stated that if any of the systems/components listed in Section 7.0 become INOPERABLE or non-functional during the AOT, that action will be taken in accordance with TS 3.0.3. Based on this being a one-time change of limited duration, the NRC staff concludes that the programmatic activities are appropriate and necessary for maintaining defense-in-depth and a residual heat removal function as described in GDC 34.

The NRC staff requested the licensee address the effects of the pump replacement activities with respect to the movement of heavy loads in and around the intake structure. In its RAI, the NRC staff asked the licensee to provide a description of any protections against direct impact on ESW components, protection against hazards such as internal flooding that could result from a load drop on piping within the intake structure, and protection against initiating events, such as loss of NSW or internal power distribution. The licensee responded by RAI letter dated February 16, 2016, stating the movement of the 'A' ESW pump, pump motor, and roof plugs has

been planned to ensure that the loads will not travel over the 'B' ESW equipment. In addition, the protected NSW equipment supporting the 'A' Train ESW supported systems, structures, and components (SSCs) are located in a remote location relative to this structure and equipment. The licensee also stated the load paths for the heavy loads associated with this activity will be evaluated to ensure that they do not pass over protected equipment and if dropped could not cause damage (including flooding) to the protected equipment.

- Defenses against potential common cause failures (CCF) are maintained and the potential for introduction of new CCF mechanisms is assessed

Traditional engineering considerations specified in RG 1.177 state that in assessing TS changes, licensees should consider defense in depth features including maintaining defense against potential CCFs. The information provided in the LAR was not sufficient regarding CCF for the 'B' ESW pump. In an RAI, the NRC staff asked the licensee to explain why the LAR addresses replacement of the 'A' ESW pump, and not the 'B' ESW pump in order to address CCF. The licensee responded in a letter dated February 16, 2016 stating the existing 'B' ESW pump vibration levels for this motor-pump have lower amplitudes and are more stable than what was observed on 'A' ESW pump prior to failure, especially on the 2X range, which is most indicative of a misalignment issue. These differences from the 'A' ESW pump give reasonable assurance that the 'B' ESW pump can be considered reliable. The licensee performed an engineering change evaluation and concluded the existing 'B' ESW pump will run reliably with no time restrictions. Vibration monitoring of the ESW pumps was increased to a monthly frequency (from quarterly) and motor running current monitoring on the ESW pumps was increased to a quarterly frequency (from every 3 years). Additionally, the licensee plans to replace the 'B' ESW pump in the upcoming outage. The NRC staff found the licensee appropriately addressed CCF.

- Independence of Physical Barriers is not degraded

With the ability to continuously remove decay heat, the proposed change does not affect the fuel cladding. The reactor coolant pressure boundary is not challenged by this LAR. In an RAI, the staff asked the licensee to demonstrate that sufficient safety related containment cooling will be maintained during a design-basis event. In RAI response letter dated August 8, 2016, the licensee stated the loss of cooling to the Reactor Containment Building following an extended loss of AC power was considered in the evaluation of a loss of containment cooling for the proposed extended LOOP. It considers hot shutdown (350 °F) conditions from 12 hours to 10 days into the event and both cases are based on worst-case summertime conditions. The results indicate that peak containment pressure and peak temperature are well within values established for Reactor Containment Building equipment qualification. With consideration of the peak pressures and temperatures calculated for summertime conditions over a 10-day period, it is reasonable to assume that containment temperatures over the potential 4.7-day period in hot shutdown will be maintained within an acceptable range. With containment temperature and pressure in acceptable ranges, the containment boundary is not adversely affected. Therefore, the staff finds GDC 34 and GDC 38 continue to be met.

In an RAI, the NRC staff asked the licensee to provide the results of analyses or testing performed to demonstrate that FLEX cooling inventory loss expected due to leakage past the repositioned valves and back leakage via the ESW/Nuclear Service Water pump discharge

check valves would not impair the ability of the FLEX pump to perform its intended compensatory defense-in-depth safety function of providing sufficient cooling flow to the loads assumed in this LAR. In their response dated August 26, 2016, the licensee provided the special lineup and the maintenance history. Any maintenance on valves related to ESW have a Generic Letter 89-13 visual inspection performed and HNP valve history demonstrates the valves being found in like-new condition after 6-plus years of service. Therefore, any potential leak-by of large bore stainless steel valves at HNP is expected to be minimal. Based upon the FLEX ESW Pump capacity and the minimal isolation valve leak-by described above, there is significant margin between the expected worst-case valve leakage and the pump flow rate available, beyond the combined system demand flow rate. Flow monitoring will be used after placing the FLEX ESW pump in service, to verify acceptable flow rates to the loads identified above.

- Defense against human errors is maintained

According to the RAI response letter dated August 8, 2016, the licensee will staff the Outage Command Center for the duration of the AOT to provide oversight and support for emergent issues. The licensee will be ready to implement a contingency plan for connecting the FLEX ESW pump to the 'A' Train ESW header, to provide alternate cooling to the 'A' EDG in the event of a LOOP. Personnel will be trained to support necessary actions for this contingency plan. Additionally, operators will be briefed on procedures and guidance for equipment lineups and ASI system actions to improve response. The 'B' Train of all associated TSs will be protected during the AOT. Fire watches will be implemented and restrictions on hot work and transient combustibles will be in place in risk critical areas. Duke Energy fleet staff will be available to support plant staff with resolution of issues during the proposed AOT. Spare parts will be onsite to support emergent repairs, which include spare ESW pump parts, a spare FLEX ESW pump, and diesel generator parts. Based on the information provided by the licensee, the NRC staff finds that defense against human errors will be reasonably achieved.

In its RAI response letter dated February 16, 2016, the licensee provided information on the strategy to recover flow to the 'A' ESW train, thereby restoring flow to the "A" EDG. Further, in a supplement to the LAR dated August 26, 2016, the licensee provided additional detail on the actions the dedicated operators would take to recover flow for the 'A' ESW train.

It was determined through this human factors evaluation that the new tasks introduced in this LAR use skills and abilities similar to those required for existing tasks performed frequently by operators (i.e., valve manipulations). As described by the licensee and shown in Attachment 1of the supplement dated August 26, 2016, the FLEX ESW pump will be pre-staged with developed instructions that have been trained on and validated, with dedicated operators standing by to take actions if necessary.

The staff finds the operator actions described in this LAR are of low-risk significance and are, therefore, found to be appropriate for a Level III review, the lowest of the graded reviews possible under the guidance in NUREG-1764. Although the operator actions have been analyzed as appropriate for a Level III review, several criteria for a Level II review have been used as described below.

Human Factors Analysis Criterion 1

Criterion 1 indicates that licensees should perform a functional and task analysis, identify how the personnel will know when the human action (HA) is necessary, that it is performed correctly, and when it can be terminated. Task analyses should provide a description of what the personnel must do. The licensee should identify how human tasks or performance requirements are being changed. The task analysis should identify reasonable or credible, potential errors and their consequences.

The licensee has provided a description and timeline of the associated new operator actions. The licensee has also described how the personnel will know the actions are necessary and whether or not the actions are successful. The effect of potential errors and the consequences were also discussed by the licensee in the submittal. This criterion has been satisfied by the licensee with the submitted LAR as supplemented.

Human Factors Analysis Criterion 2

Criterion 2 ensures that the licensee has evaluated staffing concerns. Specifically, the effects of the changes in HAs upon the number and qualifications of current staffing levels of operations personnel for normal and minimal staffing conditions.

The licensee has identified that two dedicated operators will be used to carry out the new human actions described in the LAR as supplemented. The licensee also indicated that a walk-through would be performed during the planning process of the maintenance window. If it is found that time to recover has been challenged, more operations personnel will be added to shorten the duration of the required actions. The actions specified are skill of the craft type actions taken by operators on a daily basis (e.g., valve manipulations, reading equipment gages) and no special qualifications or change to the qualifications are required. This criterion has been satisfied by the licensee with the submitted LAR and its supplements.

Human Action Verification Criterion 1

Criterion 1 states that an evaluation should be conducted at the actual human system interface (HSI) to determine that all required HSI components, as identified by the task analysis, are available and accessible.

The licensee has provided a timeline of operator actions necessary and stated plans to perform a walk through during the maintenance planning process. The NRC staff finds this criterion has been satisfied by the licensee with the submitted LAR and its supplements.

Human Action Verification Criterion 2

Criterion 2 states that a walk-through of the HAs under realistic conditions should be performed to determine that the procedures are complete, technically accurate, and usable. The training program appropriately addressed the changes in plant systems and HAs. Also included in Criterion 2 is that the HAs can be completed within the time criterion for each scenario that is applicable to the HAs and that the scenario used should include any complicating factors that are expected to affect the crews' ability to perform the HAs.

The licensee has provided a timeline of operator actions necessary and stated that procedures are in development for the new operator actions proposed. The licensee also plans to perform a walk through during the maintenance planning process. This criterion has been satisfied by the licensee with the submitted LAR and its supplements.

Human Action Verification Criterion 3

Criterion 3 states that the walkthroughs should include at least one crew of actual operators.

The actions specified are skill of the craft type actions taken by operators on a daily basis (e.g., valve manipulations, reading equipment gages) and no special qualifications or change to the qualifications are required. For this reason, the significance of using actual operators is minimal and the criterion can be considered satisfied by the licensee with the submitted LAR and its supplements.

The licensee stated that the evolution will be implemented through the existing Engineering Change process and should actions fail, the existing FLEX support guidelines would be implemented. In the RAI response letter dated August 8, 2016, the licensee provided additional information concerning the timing of actions associated with recovery of the 'A' EDG and possible transition to ELAP [extended loss of AC power] procedures in the event those actions fail.

Additional defense-in-depth measures are provided by the existing FLEX Support Guidelines associated with extended loss of AC power. The licensee is using existing processes and associated regulatory conditions in the LAR for development of procedures, training of personnel, and validation of the strategy to ensure that the actions are feasible within the required time. Additionally, the licensee is taking measures to limit the possibility of human errors from impacting the plant during the proposed maintenance including pre-job briefings and the protection equipment that has been evaluated as risk-significant or critical.

The NRC Staff completed a review of the operator manual actions proposed by this LAR. The operator manual actions reviewed will be directed by procedures that are in development by the licensee using existing processes that meet the guidance provided in NUREG-1764. The risk significance of the proposed changes and the new actions indicated by the licensee do not warrant a detailed review of the procedures. The applicable plant procedures developed should provide adequate guidance for the successful completion of the HAs and adequately reflect the new HAs proposed. During the procedure development process, Human Factors Engineering principles and criteria should be applied along with all other design requirements to develop procedures that are technically accurate, comprehensive, explicit, easy to use, and validated, per NUREG-1764. Therefore, based on the information provided in the LAR and its supplements, the NRC staff finds the licensee meets NUREG-1764 and SRP Chapter 18 guidance proposed in the compensatory measures related to human factors.

- The Intent of Plant design is maintained

In order to maintain the defense-in-depth approach during the ESW pump 'A' replacement, the licensee has a compensatory measure to align the normal non-safety related water system to

support the ESW loads and valve positions are controlled, either administratively or by design, to ensure that both safety-related ESW trains are not connected following ESW actuation. This will maintain the functional capability of the inoperable ESW 'A' train during the time that the NSW system is functional, as long as offsite power is available. The licensee will implement compensatory measures that will prohibit discretionary maintenance or testing on equipment as detailed in its application. This is intended to manage risk during the use of this one-time AOT extension.

The ESW system was designed to meet the requirements of GDC 44. Two trains of ESW meet the requirements. With the 'A' ESW system inoperable, the NSW is used to supply the 'A' ESW train. But the NSW system does not meet GDC 2 in that NSW is not Seismic Category and would be lost during a LOOP. Compensatory measures have been enacted to provide backup to the 'B' ESW train if it was lost. The 17 compensatory measures and requirements described in HNP LAR submittal correspondence letter HNP-16-056 are sufficient for a one-time 14-day outage to replace the 'A' ESW pump. Therefore, the NRC staff considers intent of plant design to be maintained in accordance with GDC 2 and GDC 44 for this one-time 14-day extended outage.

It is the NRC staff's position that the availability of an additional power source is a condition for approval of an extended EDG AOT. The NRC staff followed the guidance provided in NUREG-0800, BTP 8-8 for evaluating the LAR. The NRC staff considers that a replacement (i.e., supplemental) AC power source is needed to back up an inoperable EDG during an extended AOT to maintain the defense-in-depth of the electrical power sources. In response to an RAI regarding the supplemental source, the licensee stated that the FLEX ESW pump will be available for use during the proposed AOT to support the operability of the EDG. The FLEX ESW pump will be pre-staged in advance of the AOT entry to allow for connection to the 'A' Train ESW header, to provide alternate cooling to the 'A' EDG in the event of a LOOP. Dedicated personnel will be available to make the necessary equipment manipulations such that the 'A' EDG will be started within approximately 1 hour of the LOOP. In RAI response letter dated February 16, 2016, the licensee stated that the cooling capability of the FLEX ESW pump would only support the unit's transition to a safe, stable condition in hot shutdown for an extended period of time. The cooling flow from the FLEX ESW pump would not fully support all of the other safety-related functions and specifically lacks sufficient flow to support RHR operation. The staff noted that although the FLEX pump can support the operability of the EDG to provide the required electric power to support the design-basis functions of the EDG, it does not have the capacity to provide adequate cooling water for other safety systems required for safe shutdown. In response to the second RAI, in letter dated August 8, 2016, the licensee stated that sufficient feedwater-quality water volume is immediately available to maintain the plant in hot shutdown conditions for 5 days. In the event of either a LOOP or failure of a required 'B' Train system during the installation of the replacement pump, the installation time would not exceed 4 days and 16 hours. The pump will be ready to begin cooling the 'A' ESW Train within 4 hours from the time maintenance is completed on the 'A' ESW pump. At that time, the full ESW capabilities would be available to restore 'A' Train safety function including RHR, which would support a transition to cold shutdown. The NRC staff determined that EDG 'A' operability can be maintained in case of a LOOP concurrent with a loss of 'B' ESW pump or 'B' EDG. The licensee also stated that compensatory measures would be in place during the AOT Extension as identified by BTP 8-8. The licensee further stated that the 'A' EDG will have sufficient capacity to power 'A' emergency loads with the FLEX pump in place to provide the

required cooling water to meet the EDG safety functions. The NRC staff determined that the compensatory measures and requirements described in HNP LAR submittal letter HNP-16-056 proposed in the application meet the defense-in-depth measures discussed in BTP 8-8.

The NRC staff finds that the proposed changes to the HNP TSs provide reasonable assurance of the continued availability of the required electrical power to shut down the reactor and to maintain the reactor in a safe condition after an anticipated operational occurrence or a postulated design-basis accident. The NRC staff concludes that the proposed TS changes are in accordance with 10 CFR 50.36, 10 CFR 50.65, and meet GDC 17 and GDC 18, and finds the changes acceptable.

3.4 Key Principle 3: Evaluation of Safety Margins

The extended AOT does not modify or impact Codes and Standards approved for use by the NRC relevant to the ESW system and associated supported systems. Safety analysis acceptance criteria as specified in the Updated FSAR, particularly for large break LOCA, are met during the extended AOT, assuming the 'B' ESW train does not fail. The probability of a LOCA and failure of the 'B' ESW train during the 14-day outage is highly unlikely and within the CDF criteria approved by the NRC. Therefore, the NRC staff finds that an adequate margin of safety will be maintained.

3.5 Key Principle 4: Change in Risk Consistent with the Commission's Safety Goal Policy Statement

The evaluation presented below addresses the NRC staff's philosophy of risk-informed decision making, that when the proposed changes result in a change in CDF or risk, the increase should be small and consistent with the intent of the Commission's Safety Goal Policy Statement.

Tier 1: PRA Capability and Insights

The first tier evaluates the impact of the proposed AOT extension on plant operational risk based on the HNP PRA model. The Tier 1 staff review involves two aspects: (1) evaluation of technical adequacy of the HNP PRA and its application to the proposed AOT extension, and (2) evaluation of the PRA results and insights stemming from its application.

PRA Quality

To determine whether the PRA used in support of the proposed AOT extension is of sufficient quality, scope, and detail, the staff evaluated the relevant PRA information provided by the licensee in their submittal, as supplemented, and considered the findings of recent PRA peer reviews and evaluations. The staff's review of the licensee's submittal focused on the capability of the licensee's PRA model to analyze the risks resulting from the proposed ESW AOT extension. The PRA scope for this application includes internal events, seismic events, and fires during full power operation.

As stated in the submittal, the licensee is proposing to extend the ESW TS AOT from 72 hours to 14 days for the 'A' ESW pump replacement. The HNP PRA model was used to evaluate the quantitative impacts of the TS change. This model is an internal events, including internal

flooding, and internal fire risk models. The HNP PRA model initially received an internal events full scope peer review by the Westinghouse Owners Group in 2002. The licensee then performed a self-assessment to identify the gaps between their PRA model and the American Society of Mechanical Engineers (ASME) Standard RA-Sb-2005 "Standard for Probabilistic Risk Assessment for Nuclear Power Plant Applications," in 2006. A year later, in 2007, the licensee performed a focused scope peer review due to changes including plant-specific data, Human Reliability Analysis update, and addition of new or more detailed heating, ventilation and air conditioning models for the Charging Safety Injection Pump rooms, Switchgear rooms, and ESW pump rooms. In 2014, the internal flooding PRA underwent an upgrade and subsequent focused-scope peer reviewed by the licensee. In 2015, the licensee performed a self-assessment of its internal events PRA against the requirements in the ASME/ANS [American Nuclear Society] Standard RA-Sa-2009, as endorsed and clarified by RG 1.200, Revision 2. The licensee provided the list of Facts and Observations (F&Os) in Appendices 6-C and 6-D of Attachment 6 of its submittal. The licensee's F&O table discussed the findings by peer review and self-assessment, their associated Supporting Requirements (SRs), and the licensee's proposed resolution or impact assessment. The NRC staff requested additional information on two of the F&Os as discussed below:

F&O DA-C1-01 associated with SR DA-C1 (open): The licensee used a value of 0.33, instead of Jeffrey's non-informative prior, which is equivalent to 0.5 in this case, for number of ESW pump failures when there were no failures in available generic failure data. The licensee stated that it has adjusted the values of the 0.33 to 0.5 as part of a plant-specific data update and incorporated this into the "PRA working model for PRA application." The licensee stated that the updated data will be used for analyses to be performed under the Surveillance Frequency Control Program when implemented. It was not clear on whether the licensee considered the impact of the 0.33 factor on the calculation of the risk for the specified AOT. In its RAI, the NRC staff requested that the licensee confirm that the ICCDP and ICLERP results reported in the application are based on the 0.5 versus the 0.33 assumption; and if not, provide the results using 0.5 instead of 0.33. In Response to the RAI, the licensee confirmed that the Model of Record that was utilized to quantify the risk for this submittal has been reviewed and verified that Jeffrey's non-informative prior value of 0.5 was used for failure data. Based on the licensee changing the Jeffrey's non-informative prior value to 0.5, the NRC staff finds the licensee's disposition acceptable for this application.

In F&O DA-D6-01 (related to SR DA-D6), the peer review team found that the licensee's definition in the component database was not consistent with the component boundary for Emergency Diesel Generator, as defined in generic source document NUREG/CR-5497, "Common Cause Failure [CCF] Parameter Estimation." The peer review team concluded that there was no evidence that a systematic evaluation was performed for other component boundaries. The licensee stated that NUREG/CR-5497 was reviewed and outliers for component boundary were identified and corrected. The licensee further stated that the data and documentation were updated with no impact to the submittal. In response to the NRC staff's RAI-APLA-4, on whether the licensee identified any outliers in the review of boundary consistency and how those outliers do not affect CCF, the licensee identified three instances where the boundaries were modified and performed a review of the surveillance tests to ensure the appropriate components are captured within the designated component boundary. Based on the licensee's description of its review of the component boundary and the surveillance tests

with the modified boundaries, the NRC staff finds the licensee's disposition acceptable for this application.

The NRC staff finds that HNP internal events PRA has been peer-reviewed in accordance with ASME/ANS Standard RA-Sa-2005 an RG 1.200, Rev. 1 and that the licensee has performed a gap assessment against the current PRA standard and RG 1.200, Rev. 2. The NRC staff's evaluation of the provided F&Os associated with SRs that did not meet Capability Category II of the ASME/ANS Standard for certain SRs, indicated that the findings either did not have an impact on this application or were sufficiently dispositioned for use in the application.

External Events

In its LAR, the licensee stated that HNP Fire PRA model was developed in support of National Fire Protection Administration (NFPA) 805 and reviewed in 2008 by NRC. Section 3.4.8 of the NRC SE (ADAMS Accession No. ML101750602) discussed the quality of HNP fire PRA model and concluded that the licensee's PRA used to perform the risk assessments in accordance with NFPA 805, Section 2.4.4 (plant change evaluations), and Section 4.2.4.2 (fire risk evaluations), is of sufficient quality to support the application (i.e., transition of the HNP fire protection program to NFPA 805). Following approval of NFPA 805, HNP updated the fire PRA in 2013 to implement resolutions of previously identified conservatisms, including human failure events, dependency analysis, and recovery rule files. The fire risk, along with the internal events and internal flooding risks were quantified to calculate the ICCDP and the ICLERP.

The seismic PRA analysis results screened out the contribution of ESW structures and components, except for the pump column and sole plate. The ESW pumps were selected for assessment of the high confidence of low probability of failure (HCLPF) capacity in the HNP Individual Plant Examination of External Events (IPEEE) analysis. The HCLPF capacity was estimated by scaling existing analyses, considering the pump column and sole plate as potential failure modes. The seismic contribution to pump column stresses was low due to the numerous bearing supports. The governing failure mode was determined to be the sole plate with a sufficiently high HCLPF of 0.67g. The conclusion of the seismic margin assessment was that the Harris HCLPF capacity, including the ESWS, meets the 0.3g review level earthquake. Furthermore, the licensee's response to NRC 10 CFR 50.54(f) letter regarding recommendations of the Near Term Task Force of the Fukushima Daiichi accident indicated that the updated seismic hazard is lower than evaluated in the IPEEE and is not a significant hazard requiring quantitative risk evaluation.

The high winds hazards were screened out as not significant. The licensee evaluated design wind loading, tornado missile analysis, and tornado wind loading. HNP also performed a sensitivity study to compare the metrics with an inflated weather related LOOP initiator in accordance with plant operating procedure. The sensitivity results in the LOOP-Weather Related initiator reporting an increase in CDF on the order of 8E-8/yr. The licensee's evaluation concluded that the estimated risk increase is negligible and that SSCs, whose failure would impact the safe shutdown of the reactor, were protected from this occurrence due to either being designed to withstand such loading or being housed within a structure which is designed to withstand the loading.

The external flood evaluation did not find any vulnerability due to floods. The NRC staff's assessment of the licensee's 50.54(f) flooding hazard reevaluation report resulted in some flooding levels exceeding the Current Licensing Basis flood levels, however, they do not impact safety related equipment.

The transportation accidents evaluation did not find any vulnerability due to transportation accidents. The IPEEE results also showed that the licensee's evaluation of nearby air traffic, runways, roads, railways and fixed facilities are not considered a significant hazard and do not require a quantitative risk evaluation.

Because the risk of internal fire is assessed by a fire PRA model of sufficient quality and the impact of other external events is evaluated using results of IPEEE and other studies, the NRC staff concludes that the impact of external events is appropriately considered for the application

PRA Insights

Based on the Harris PRA model, the addition of compensatory measures, and the availability of the 'B' ESW Pump, the licensee calculated the ICCDP and ICLERP for the proposed 14-day 'A' ESW pump AOT. The results of the risk evaluations are presented in table below and compared to the acceptance guidelines of RG 1.177.

14-day unavailability of ESW 'A' Train[1]		
Risk Metric	Acceptance Guideline[2]	PRA Results
ICCDP	< 1.0E-6 or < 1.0E-5[3]	3.8E-06
ICLERP	< 1.0E-7 or < 1.0E-6[3]	5.9E-07

[1] It is anticipated that Harris will enter this TS Condition for the full 14 days. Therefore, assuming a maximum of one full entry per year, the ICCDP and ICLERP are as stated above

[2] Acceptance guidelines for one-time only TS CT change.

[3] These threshold values are applicable when effective compensatory measures implemented to reduce the sources of increased risk

The risk values in the above table are within the RG 1.177 acceptance guidelines for an acceptable incremental increase in risk (i.e., ICCDP and ICLERP), provided there are compensatory measures in place to reduce the source of the increase in risk.

Tier 2: Avoidance of Risk-Significant Plant Configurations

A licensee must provide reasonable assurance that risk significant plant equipment outage configurations will not occur when specific plant equipment is out-of-service in accordance with the proposed TS change. The avoidance of risk-significant plant configurations limits potentially high risk configurations that could exist if equipment, in addition to that associated with the proposed TS change, is simultaneously removed from service or other risk-significant operational factors such as concurrent system or equipment testing are involved. Therefore, Tier 2 helps ensure that appropriate restrictions are placed on dominant risk-significant configurations relevant to the proposed TS change.

The licensee's Tier 2 evaluation identified the following Tier 2 conditions as a result of the proposed extended ESW AOT extension.

1. The opposite train or critical equipment listed below and supporting components will be protected. Quantitative credit was taken in the risk assessment for protecting all these SSCs.

    - Emergency Diesel Generators (both 'A' and 'B')
    - Normal Service Water Pumps and power supplies (both 'A' and 'B')
    - Dedicated Shutdown Diesel Generator
    - Alternate Seal Injection (ASI) Pump
    - Turbine Driven Auxiliary Feedwater Pump
    - 'B' Emergency Service Water Pump

2. Continuous fire watches in risk critical areas will be instituted on the protected train.
3. Restrictions on hot work and transient combustibles will be in place in critical areas:
4. Operators will be briefed on the procedures and guidance for the equipment lineup necessary for the proposed Allowed Outage Time (AOT) activity.
5. Operators will be briefed in order to improve operator response for ASI System actions.
6. The 'B' ESW pump discharge pressure transmitter will be calibrated within three months prior the proposed AOT.
7. The 'B' ESW pump discharge strainer differential pressure will be checked when the 'B' ESW pump is in service and a backwash will be completed to verify it is clean within one month prior to the proposed AOT. This will ensure that the strainer is clean and capable of performing its duty during the AOT.
8. The Switchgear Room in Turbine Building 286' will be protected, in order to minimize the risk to Normal Service Water (NSW) power supplies.
9. Restrictions will be in place on switchyard work or any other maintenance and testing that could cause a plant trip (minimize evolutions that could result in Loss of Off-Site Power).
10. FLEX equipment (ESW pump) will remain available with procedures for operation.

The staff finds that the licensee provided adequate analyses of risk-significant configurations while the 'A' ESW pump is out-of-service and identified appropriate compensatory actions that can mitigate corresponding increases in risk. Therefore, the staff concludes that the licensee's analysis of risk significant combinations and identification of compensatory actions are consistent with RG 1.177 and provide reasonable assurance that risk-significant plant equipment outage configurations will not occur during the extended AOT.

Tier 3: Risk-Informed Configuration Risk Management

A Tier 3 program ensures that while an ESW is in a Limiting Condition of Operation (LCO), additional activities will not be performed that could further degrade the capability of the plant to respond to a condition the inoperable ESW was designed to mitigate, and as a result, increase plant risk beyond that assumed by the risk-informed licensing action. Tier 3 programs: (1) ensure that additional maintenance does not increase the likelihood of an initiating event intended to be mitigated by the out-of-service equipment such as redundant or associated systems or components, (2) evaluates the effects of additional equipment out-of-service during ESW maintenance activities that would adversely impact risk, and (3) evaluates the impact of maintenance on equipment or systems assumed to remain operable by the ESW AOT analysis.

Accordingly, a licensee should develop a Configuration Risk Management Program (CRMP) to ensure that it appropriately evaluates the risk impact of out-of-service equipment before performing a maintenance activity. Licensees can utilize the overall CRMP (as referenced in RG 1.177) through the Maintenance Rule (10 CFR 50.65(a)(4)). Specifically, the rule requires that, before performing any maintenance activity, the licensee must assess and manage the potential risk increase that may result from a proposed maintenance activity. A licensee's submittal must include a discussion on the licensee's CRMP for assessing the risk associated with the removal of "A" ESW pump from service and their conformance to the requirements of 10 CFR 50.65(a)(4), and the additions and clarifications outlined in Section 2.3.7.2 of RG 1.177, as they relate to the proposed extended ESW AOT.

The licensee has a developed a CRMP based on 10 CFR 50.65(a)(4). This program is a procedure-based, risk-informed assessment process to manage the quantitative and qualitative risk associated with planned and unplanned (emergent) plant maintenance activities. HNP's key procedures are WCM-001, "On-line Maintenance Risk Management," and ADEG-ALL-1210, "Maintenance Rule Program." HNP's Equipment Out of Service software performs a configuration-dependent assessment of the overall impact on risk of proposed plant configurations during the performance of maintenance activities that remove equipment from service. The CRMP uses an integrated approach of both quantitative and qualitative methods to identify risk-significant plant maintenance equipment outage configurations. In addition, the licensee's Tier 2 conditions specify additional compensatory measures to assess and manage the risk for an extended ESW AOT.

Based on the above, the staff finds the licensee's Tier 3 program for complying with paragraph (a)(4) of 10 CFR 50.65 is consistent with the guidance of Chapter 16.1 of the SRP and RG 1.177 and thus is acceptable.

3.6 Key Principle 5: Performance Measurement Strategies - Implementation and Monitoring Program

RG 1.177 establishes the need for an implementation and monitoring program to ensure that extensions to TS AOTs do not degrade operational safety over time and that no adverse degradation occurs due to unanticipated degradation or common cause mechanisms.

An implementation and monitoring program is intended to ensure that the impact of the proposed TS change continues to reflect the reliability and availability of systems, subsystems,

and components (SSCs) impacted by the change. RG 1.174 states that monitoring performed in conformance with the Maintenance Rule, 10 CFR 50.65, can be used when the monitoring performed is sufficient for the SSCs affected by the risk-informed application.

The licensee provided a brief evaluation of the proposed TS change against the three tiered approach in the LAR. In addition, in Attachment 1 of the LAR, the licensee confirmed that the key safety significant systems are monitored under the HNP Maintenance Rule Program. The availability and reliability are monitored such that the SSCs will continue to perform adequately.

The staff concludes that the implementation and monitoring program for the proposed TS change described by the licensee satisfies the fifth key safety principle of RG 1.177.

The risk impact of the proposed extended ESW 14-day AOT, as estimated by ICCDP and ICLERP, is consistent with the acceptance guidelines in RG 1.177 and staff guidance outlined in Sections 16.1 and 19.2 of NUREG-0800. The staff finds that the risk analysis approach used by the licensee to estimate the risk impacts was performed using a PRA model of sufficient quality for the proposed amendment request. The Tier 2 evaluation identified risk-significant plant configurations requiring compensatory measures, which were included in the submittal as a licensing commitment. Based on the licensee's risk-informed assessment discussed in this SE, the staff finds that the proposed extension of the ESW AOT to 14 days at HNP is acceptable because the increase in plant risk is small and consistent with the acceptance guidelines of RG 1.177.

The NRC staff evaluated the licensee's proposed AOT extension to 14 days for the associated TSs listed in Section 2.0 of this SE. The NRC staff performed an evaluation in accordance with the traditional engineering considerations of RG 1.177. With the 'A' ESW pump inoperable for replacement and NSW supplying the 'A' train ESW loads, and in a special valve lineup that maintains redundancy and independence of the 'A' and 'B' ESW trains, the plant can mitigate a LOCA, assuming no single failure in the 'B' ESW train. The probability of a LOCA and single failure in the B ESW train in the 14-day AOT is significantly smaller and less than NRC CDF criteria. The probability of a seismic induced LOOP event in the 14-day AOT that disables the NSW and CST with a single failure of the seismic Category 1 'B' ESW train is also negligible. In the event of a non-seismic caused LOOP and failure of the 'B' ESW train, the NRC staff evaluated the proposed AOT extension, using the traditional engineering considerations of RG 1.177. Based on the NRC staff's findings provided in Section 3.0 of this SE, the NRC staff concludes that the traditional engineering considerations of RG 1.177 to include, i) balance of prevention of core damage and containment failure, ii) not over relying on programmatic activities, iii) having system redundancy, independence and diversity commensurate with the risk, iv) not having the potential of common cause failure, v) maintaining physical barriers, vi) maintaining defense against human errors, vii) maintaining the intent of plant design, viii) not reducing safety margin, and ix) being in compliance with current regulations, have been satisfied. Therefore, the NRC staff concludes the regulatory requirements and guidelines specified in Section 2.0 of this SE are met and is, thus, acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the State of North Carolina official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (81 FR 260). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

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Date: September 16, 2016

A copy of the related Safety Evaluation is enclosed. Notice of Issuance will be included in the Commission's regular biweekly *Federal Register* notice.

Sincerely,

/RA/

Martha Barillas, Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-400

Enclosures:
1. Amendment No. 153 to NPF-63
2. Safety Evaluation

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