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SECURITY-RELATED INFORMATION - WITHHOLD UNDER 10 CFR 2.390
UPON REMOVAL OF ATTACHMENT 1 THIS LETTER IS UNCONTROLLED

10 CFR 50.90

April 28, 2016
Serial: HNP-16-034

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Shearon Harris Nuclear Power Plant, Unit 1
Docket No. 50-400
Renewed License No. NPF-63

Subject: Response to Second Request for Additional Information Regarding the Harris Nuclear Plant License Amendment Request to Revise Technical Specifications by Relocating Specific Surveillance Frequency Requirements to a Licensee Controlled Program (TAC MF6583)

Ladies and Gentlemen:

By letter dated August 18, 2015 (Agencywide Document Access and Management System (ADAMS) Accession No. ML15236A265), as supplemented by letter dated September 29, 2015 (ADAMS Accession No. ML15272A443), Duke Energy Progress, Inc. (Duke Energy), submitted a License Amendment Request (LAR) proposing changes to the Technical Specifications (TS) for Shearon Harris Nuclear Power Plant, Unit 1 (HNP). The proposed amendment would modify HNP TS by relocating specific surveillance frequencies to a licensee-controlled program with the implementation of Nuclear Energy Institute (NEI) 04-10, "Risk-Informed Technical Specification Initiative 5B, Risk-Informed Method for Control of Surveillance Frequencies" (ML071360456).

The NRC staff reviewed the request and determined that additional information was needed to complete their review. Duke Energy provided a response to the NRC requests for additional information (RAI) in a letter dated February 5, 2016. The NRC staff reviewed this response and determined that additional information is needed with regards to Duke Energy's response to RAI-4, RAI-5, and RAI-8.

Enclosure 1 to this letter provides the HNP response to the second request for additional information. Security-related information, as identified under 10 CFR 2.390(d)(1), can be found in Attachment 1 of Enclosure 1.

This document contains no new Regulatory Commitments.

In accordance with 10 CFR 50.91(b), HNP is providing the state of North Carolina with a copy of this response.

Should you have any questions regarding this submittal, please contact John Caves, Regulatory Affairs Manager, at 919-362-2406.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on April 28, 2016.

Sincerely,

Benjamin C. Waldrep

Enclosures:

1. Response to Request for Additional Information

cc: Mr. J. D. Austin, NRC Sr. Resident Inspector, HNP
Mr. W. L. Cox, III, Section Chief, N.C. DHSR
Ms. M. Barillas, NRC Project Manager, HNP
NRC Regional Administrator, Region II

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SERIAL HNP-16-034

ENCLOSURE 1

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1

DOCKET NO. 50-400

RENEWED LICENSE NUMBER NPF-63

(8 PAGES)

1.0 INTRODUCTION

By letter dated August 18, 2015 (Agencywide Document Access and Management System (ADAMS) Accession No. ML15236A265), as supplemented by letter dated September 29, 2015 (ADAMS Accession No. ML15272A443), Duke Energy Progress, Inc. (Duke Energy), submitted a License Amendment Request (LAR) proposing changes to the Technical Specifications (TS) for Shearon Harris Nuclear Power Plant, Unit 1 (HNP). The proposed amendment would modify HNP TS by relocating specific surveillance frequencies to a licensee-controlled program with the implementation of Nuclear Energy Institute (NEI) 04-10, "Risk-Informed Technical Specification Initiative 5B, Risk-Informed Method for Control of Surveillance Frequencies" (ML071360456).

The NRC staff reviewed the request and determined that additional information was needed to complete their review. On January 6, 2016, Duke Energy received a request from the NRC for additional information regarding nine questions related to the technical adequacy of the internal events probabilistic risk assessment (PRA). Further, on January 22, 2016, the NRC requested additional information regarding four questions related to the Technical Specification markups in the original LAR. The responses for both sets of requests for additional information (RAIs) were addressed by letter (ADAMS Accession No. ML16036A091) dated February 5, 2016 (Reference 1).

The NRC staff has reviewed the response to the RAIs and has determined that additional information is needed to complete their review. On March 25, 2016, Duke Energy received a request from the NRC for additional information regarding Duke Energy’s response to RAI-4, RAI-5, and RAI-8. Response to the request as presented in References 2 and 3 is requested by April 29, 2016.

Response to the March 25, 2016, RAI is presented below for those items listed in Reference 2 and in Attachment 1 for the security-related information item in Reference 3 .

References

1. Duke Energy Letter, *Response to Request for Additional Information Regarding Harris Nuclear Plant License Amendment Request to Revise Technical Specifications by Relocating Specific Surveillance Frequency Requirements to a Licensee Controlled Program (TAC MF6583)*, dated February 5, 2016 (ML16036A091)
2. NRC Email, Martha Barillas (NRC) to John Caves (Duke Energy), *CONTAINS SUNSI: Harris TSTF 425 DRAFT RAI (revised) MF6583*, dated April 15, 2016
3. NRC Email, Martha Barillas (NRC) to John Caves (Duke Energy), *SUNSI: Harris TSTF 425 draft RAI supplemental info request MF6583.docx,* dated April 20, 2016

2.0 REQUEST FOR ADDITIONAL INFORMATION

NRC Request

1. To demonstrate that the HNP's PRA model reflects the as-built, as-operated plant, as required by Regulatory Guide 1.200, Revision 2, provide the requested information below with regard to success criteria and credited operator actions:

    a. F&O HR-F2-01 includes a discussion on the timing of initiation of feed and bleed (F&B). The RAI 4 response states the PRA model credits time beyond steam generator dry-out to initiate F&B. Demonstrate that the initiation of feed and bleed credited in the PRA model is consistent with the plant operating procedures when crediting time beyond the loss of secondary heat or otherwise update the PRA to be consistent with the operating procedures.

Duke Energy Response to NRC RAI-1.a

The operator action (OPER-3) associated with feed and bleed (F&B) is procedurally driven based on the HNP Emergency Operating Procedures (EOPs) and the Functional Restoration Procedure (FRP-H.1). The success criteria and timing for this operator action are determined by Modular Accident Analysis Program (MAAP) runs which calculated the steam generator (SG) dry-out times as described in the Duke Energy response to RAI-4. The MAAP calculation inputs were based on the procedurally-driven actions, and the success criteria beyond SG dry-out are based on MAAP results. Operator interviews, including a tabletop walkthrough of the procedures, were conducted with a licensed senior reactor operator (SRO) in order to validate the timing and validity of the analyses.

The SRO reviews demonstrated that the analyses on the timing of initiation of F&B included in the PRA model are consistent with the plant operating procedures. Documentation of the analyses is included in the HNP system notebooks.

NRC Request

b. With relation to RAI 5 response, F&O 57-HR-H2 operator action OPER-70, "Failure to align Spare Charging Safety Injection Pump (CSIP)", address the following:

    i. Discuss when PRA credit is taken or not taken for the spare CSIP. Since some failure modes of the charging pumps (such as common cause failure, independent failure, failure to start, failure to run) may preclude this operator action or impact its timing, also include a discussion on how these failure modes were taken into consideration when crediting the spare CSIP.

Duke Energy Response to NRC RAI-1.b.i

PRA credit is taken for the spare charging safety injection pump (CSIP) when the pump is aligned to either train while the primary train CSIP is out of service (OOS) for testing or maintenance, or is otherwise unavailable. All CSIP modes of failure are accounted for and modeled for all 3 CSIPs in the HNP PRA model. When the C CSIP (spare) is aligned to a particular train, the associated *fails to start* and *fails to run* events are modeled just as if the normal train CSIP is aligned.

Model Gate	Description	Function
HCCFPACFTR	CCF - 2 OF 3 CSIPs (A AND C) FAIL TO RUN	Common Cause failures to run of A train
HCCFPBCIER	CCF - 2 OF 3 CSIPs FAIL TO RUN B AND C	Common Cause failures to run of B train
HCCFPABCIER	CCF - 3 OF 3 CSIPs FAIL TO RUN	Common Cause failures to run of A train, B train
HCCFPBCFTS	CCF - 2 OF 3 CSIPs (B AND C) FAIL TO START OR CVs FAIL TO OPEN	Common Cause failures to start
HCCFPACFTS	CCF - 2 OF 3 CSIPs (A AND C) FAIL TO START OR CVs FAIL TO OPEN	Common Cause failures to start
HCCFPABCFTS	CCF - 3 OF 3 CSIPs FAIL TO START OR CVs FAIL TO OPEN	Common Cause failures to start
HTMSWPUMP	SWING CSIP C UNAVAILABLE - MAINTENANCE	When aligned to support A train CSI
HTMSWPUMP	SWING CSIP C UNAVAILABLE - MAINTENANCE	When aligned to support B train CSI
OPER-70	FAILURE TO ALIGN SWING PUMP FOR CSIP	CSIP C DEMAND FAILURES
OPER-70	FAILURE TO ALIGN SWING PUMP FOR CSIP	SWING PUMP FAILS for TRAIN A
OPER-70	FAILURE TO ALIGN SWING PUMP FOR CSIP	SWING PUMP FAILS for TRAIN B

NRC Request

ii. The F&O resolution states that the plant has been modified and OPER-70 has been updated. Please explain the update and how the peer review's comment related to being without high head safety injection for 12 hours (the assumed time available to place the spare CSIP into service) was addressed.

Duke Energy Response to NRC RAI-1.b.ii

The high-head safety injection (HHSI) system consists of three, 100% capacity, motor-driven, horizontal centrifugal pumps (the CSIPs) and their associated piping, valves, equipment, and instrumentation. In 2005, the CSIP swing (or spare) pump was modified with the installation of a local, manual transfer switch for AC power to reduce the time required to align and start the

spare pump. The operation of the transfer switch and breaker racking evolutions are procedurally-driven actions that are detailed in OP-107. This procedurally-driven task is much simpler and requires much less time to complete than the original configuration (it now takes approximately 25 minutes).

If the running CSIP fails, the operators will receive an annunciator alarm (ALB-006) and will be directed to the reactor coolant pump (RCP) abnormal condition procedures (AOP-004 and OP-107) that provide instructions to align the spare CSIP. The available time window to complete the action is 75 minutes. Based on an operator walkthrough of the procedures, the manual action can be completed within 25 minutes, and the median response time to complete the action is estimated to be 10 minutes. OPER-70 was updated based on this timing. This procedural guidance and timing were re-confirmed with two HNP SROs on April 21, 2016.

NRC Request

iii. Confirm that sequence-specific time windows for successful completion of the spare CSIP installation were evaluated, and describe how the time estimated to complete this action was verified (walkthroughs, talkthroughs, training, etc.).

Duke Energy Response to NRC RAI-1.b.iii

The response time of 25 minutes for OPER-70 is based on operator walkthrough of the procedural guidance (OP-107) and is documented in the HNP Human Reliability Calculation. Electrical alignment of the spare CSIP to either train is accomplished by manual operation of a transfer switch from the spare CSIP room and alignment of the swing pump breaker to the pump train being replaced.

This operator action is conducted in the switchgear room, which is 2 minutes transit time from the control room on the 286-foot level of the reactor auxiliary building (RAB), and in the CSIP room on the 236-foot level of the RAB. Two breaker racking operations are required on the bus to which the spare charging pump is being aligned. This procedural guidance and the timing of the operator actions were re-confirmed with two HNP SROs on April 21, 2016.

NRC Request

c. The response to RAI 5 clarifies that operator action OPER-Q14 is a post-initiator combination of operator actions that assumes complete loss of both the Emergency Service Water (ESW) and the Normal Service Water (NSW) systems. Explain the technical basis for crediting the CSIP as well as the Residual Heat Removal (RHR) system in the PRA model without service water cooling, and discuss how this success criteria are credited in the PRA model. Explain whether this system operation, (i.e., running the charging pumps or using the RHR system without service water cooling) is consistent with the plant operating procedures.

<u>Duke Energy Response to NRC RAI-1.c</u>

Loss of both the emergency service water (ESW) and normal service water (NSW) supplies to the CSIPs will result in failure of the CSIPs. Each CSIP failure is an input into the loss of reactor coolant pump (RCP) seal injection gate of the model. In the event of a loss of all 3 CSIPs, the RCP seals will remain intact by virtue of a plant modification which added the Alternate Seal Injection (ASI) positive displacement pump. The ASI package is a completely independent and automatically initiated system. The ASI pump is powered by its own diesel generator which will automatically start on demand to prevent seal loss of coolant accidents (LOCAs). Potential failures of the ASI pump are included. These models are consistent with plant operating procedures and reflect the as-built, as-operated plant.

There are no ESW dependencies for the residual heat removal (RHR) system, so there are none modeled in the PRA. The RHR pumps provide their own seal cooling water from the pump discharge, cooled by a small heat exchanger served by the component cooling water (CCW) system. The RHR pumps will continue to operate until the CCW is too hot to perform its function or until either ESW or NSW is restored. This is also consistent with plant operating procedures and reflects the as-built, as-operated plant.

<u>NRC Request</u>

d. F&O 57-HR-H2 indicates that operator action OPER-42 is a non-proceduralized action associated with operators being able to detect Refueling Water Storage Tank (RWST) isolation valves in the closed position following a safety injection signal, which could cause failure of the CSIPs. The response to RAI 5 indicates that OPER-42 is related to operator diagnosis and does not explicitly address recovery or realignment. Clarify whether OPER-42 is credited in the PRA model. If it is, then address the following:

    i. Clarify what recovery and/or realignment actions are credited in OPER -42. Describe the relied-upon non-proceduralized operator action(s) after diagnosis of the CSIP suction.

<u>Duke Energy Response to NRC RAI-1.d.i</u>

OPER-42, failure to align CSIP suction for SI, is included in the HNP PRA model in two locations; both are related to failure of the CSIP suction from the refueling water storage tank (RWST) following a safety injection (SI) signal. The procedural guidance for OPER-42 is provided in EOP-E-0 and the first four steps are first performed from memory then repeated with the SRO and procedure:

1. verify the reactor is tripped,
2. verify that the turbine is tripped,
3. verify emergency power is available, and
4. verify that safety injection has actuated correctly.

Detailed instructions to verify the CSIP suction valves from the RWST are OPEN are included in the procedure for verification of SI. Operator actions to open the RWST valves are performed as part of the “response not met” step in the procedure. If the CSIPs have no suction source, then the pumps are assumed to be failed.

NRC Request

ii. Provide further PRA justification for crediting this non-proceduralized operator action if it involves more than diagnosis.

Duke Energy Response to NRC RAI-1.d.ii

The actions for OPER-42 are guided by EOP-E-0 and the annunciator panel procedure (APP-ALB-006). This procedurally-driven action is verification of the alignment flow-path. Following an SI signal, two valves from the volume control tank (VCT) close, and one of two valves from the RWST open. If this does not occur, the VCT will quickly empty due to the high SI flow. Operators will correct the valve alignment and verify valve position from the control room. The valve alignment is displayed with valve position indicating lights on a well-defined mimic board.

NRC Request

iii. F&O 57-HR-H2 states that CSIP can run without damage for ~5 minutes. Discuss how the assumption of 5 minutes is supported by engineering analyses. Summarize the HRA timing analysis of time available vs. time required for diagnosis and action(s), including a description of the action(s) and justification for the times.

Duke Energy Response to NRC RAI-1.d.iii

If the suction valves from the RWST fail to open, "the time for the VCT depletion is approximately 5 minutes" and is documented in the PRA System Notebook. The statement of running without damage for ~5 minutes is based on the volume of the VCT and the capacity of the CSIPs. The operator action to recover CSIP suction (OPER-42) is driven by procedures based on the expected annunciators for the scenario and operator training. The operator action is given a high failure probability of 0.3 in the model based on the available time. If the CSIP pumps do not have a suction source, then they will fail in approximately 30 seconds (plant operating experience (OE)) and, therefore, are assumed to be failed in the PRA.

NRC Request

e. Confirm that PRA system success criteria are consistent with the operating procedures; otherwise explain how it will be addressed in the PRA model to be consistent with the operating procedures.

<u>Duke Energy Response to NRC RAI-1.e</u>

The success criteria used in the HNP PRA are based on proceduralized actions and plant-specific analyses that define the system or combination of systems required for the plant to successfully respond to an event. Thermal hydraulic calculations using MAAP are provided to support individual success criterion and to provide important insights into the use of the success criterion. These models and insights are consistent with the operating procedures, are documented in the Success Criteria notebook, and are reviewed with Operations staff to confirm their validity.

<u>NRC Request</u>

f. Confirm that there are no non-proceduralized operator actions credited in the PRA; otherwise, for each of these actions provide adequate justification for its PRA credit.

<u>Duke Energy Response to NRC RAI-1.f</u>

A review of the HNP PRA model confirms that there are no non-proceduralized operator actions credited in the current PRA model. The subject F&O was written more than 10 years ago against a previous model of record prior to the HNP Internal Events Peer Review. Operator actions are procedurally driven and have been developed to meet the capability category II requirements of the PRA Standard.