



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

February 8, 2016

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

SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1 – REQUEST FOR  
ADDITIONAL INFORMATION REGARDING LICENSE AMENDMENT  
REQUEST FOR A TEMPORARY CHANGE TO TECHNICAL SPECIFICATIONS  
FOR THE 'A' EMERGENCY SERVICE WATER PUMP REPLACEMENT"  
(CAC NO. MF7017)

Dear Mr. Waldrep:

By letter dated October 29, 2015 (Agencywide Documents Access and Management System Accession No. ML15302A542), Duke Energy Progress, Inc., the licensee, submitted a license amendment request, in accordance with Title 10, *Code of Federal Regulations* (10 CFR), Part 50, Section 90, for Shearon Harris Nuclear Power Plant, Unit 1, for a temporary change to associated Technical Specifications to allow the 'A' Train Emergency Service Water (ESW) Pump to be inoperable for 14 days to implement 'A' Train ESW pump design changes.

The staff has reviewed the licensee's submittal and determined that additional information is needed in order to complete its review. The enclosed Request for Additional Information (RAI) was e-mailed to the licensee in draft form on January 11, 2016, and January 15, 2016, and a clarification call was held on January 20, 2016, where it was agreed a response to the enclosed RAI is to be provided by February 16, 2016. Please note that if you do not respond to this letter by the agreed-upon date or provide an acceptable alternate date in writing, we may deny your application for amendment under the provisions of 10 CFR 2.108.

B. Waldrep

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If you have any questions, please call me at 301-415-2760 or [Martha.Barillas@nrc.gov](mailto:Martha.Barillas@nrc.gov).

Sincerely,



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

Docket No. 50-400

Enclosure:  
Request for Additional Information

cc w/enclosure: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION  
LICENSE AMENDMENT REQUEST FOR A TEMPORARY CHANGE TO  
TECHNICAL SPECIFICATIONS ASSOCIATED WITH THE  
'A' EMERGENCY SERVICE WATER PUMP REPLACEMENT  
DUKE ENERGY PROGRESS, INC.  
SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1  
DOCKET NO. 50-400

By letter dated October 29, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15302A542), Duke Energy Progress, Inc. (Duke Energy), the licensee, submitted a license amendment request (LAR), in accordance with Title 10, *Code of Federal Regulations* (10 CFR), Part 50, Section 90, for Shearon Harris Nuclear Power Plant, Unit 1, for a temporary change to associated Technical Specifications (TSs) to allow the 'A' Train Emergency Service Water (ESW) Pump to be inoperable for 14 days to implement 'A' Train ESW pump design changes. The staff has reviewed the licensee's submittal and determined the following request for additional information (RAI) is needed in order to complete its review.

**RAI-STSB-1**

The amendment proposes to add a Note to the Completion Time (CT) in the 12 different TSs listed in Section 2.0 of the LAR that are affected by an inoperable 'A' ESW pump. The language in the Note states that the proposed 14-day CT is contingent on compensatory measures and commitments. When a compensatory measure is a condition of a TS, it should not be referred to as a commitment in the TS wording.

1) Please revise the Note so it will use a term other than commitments.

The proposed Note in the 12 different TSs listed in Section 2.0 of the LAR does not appear to limit the proposed 14-day CT to inoperability specifically caused by the 'A' ESW pump being rendered inoperable to implement design changes to the 'A' ESW pump".

2) Please revise the Note to limit the proposed 14-day CT to inoperability caused only by the 'A' ESW pump being rendered inoperable to implement design changes to the 'A' ESW pump.

**RAI-EEEEB-1**

On page 5 of 22 of Attachment 1 of the LAR, the licensee states that both the ESW system and the Normal Service Water (NSW) system will remain available for the duration of the allowed outage time (AOT) to support operation of the 'A' Emergency Diesel Generator (EDG) if required. Please explain how the ESW system will remain available since the 'A' Train will be

Enclosure

inoperable. Also provide the latest electrical single line diagram showing how the ESW and NSW motors, the EDG, and the Dedicated Shutdown Diesel Generator (DSDG) are connected to the onsite power system.

#### **RAI-EEEE-2**

To maintain the defense-in-depth philosophy of the electrical system to meet its intended safety function, it is expected that a licensee requesting an LAR for extension of an existing AOT, should follow the staff positions established in Branch Technical Position (BTP) 8-8, Onsite (EDGs) and Offsite Power Sources Allowed Outage Time Extensions. Please explain how the licensee meets the staff position.

#### **RAI-EEEE-3**

If the EDG on the affected train continues to be available but inoperable, please describe the loading capabilities of the functional EDG. Also describe how the functional EDG would respond if called upon during a loss of offsite power event concurrent with a failure of the operable EDG.

#### **RAI-EEEE-4**

On page 8 of 22 of Attachment 1 of the LAR, under Safe Shutdown Strategies, the licensee states that the DSDG system does not meet all the requirements to be considered an emergency alternating current (AC) source since it does not supply all the loads needed for safe shutdown of the plant. In addition, the DSDG system provides an independent 480 Volt electrical power source for the Alternate Seal Injection System and other important loads to augment the Harris Nuclear Plant's ability to achieve safe shutdown of the plant in the event of a fire or Station Blackout. Please discuss the following:

- i) Clarify whether the DSDG will have the capability to achieve cold shutdown as recommended in Standard Review Plan NUREG-0800, BTP 8-8;
- ii) Discuss the location and connection details of the DSDG, including the timeline to align and connect the DSDG to the power system for safe shutdown;
- iii) The operator training established for the above scenario; and
- iv) Discuss the major/important loads that will be powered from the DSDG for safe shutdown and provide the list of loads.

#### **RAI APLA-1**

The licensee's submittal concludes that the Incremental Conditional Core Damage Probability (ICCDP) and Incremental Condition Large Early Release Probability (ICLERP) for the 14-day one-time TS change are  $7.7E-7$  and  $1.2E-7$ , respectively. The licensee calculated this assuming "the risk accumulated for this one-time license amendment request may be distributed over a five year period." The Delta ( $\Delta$ ) Core Damage Frequency (CDF) is  $9.98E-5$  per year and  $\Delta$  Large Early Release Frequency (LERF) is  $1.52E-5$  per year. The licensee's statement

indicates that the ICCDP and ICLERP are calculated by distributing the downtime of the ESW system over a five year time period. Consistent with Regulatory Guide (RG) 1.177, Revision 1, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications" (ADAMS Accession No. ML100910008), the ICCDP and ICLERP, for a one-time change, should be calculated using the change to the CDF and LERF resulting from the one-time activity, and the amount of time the activity will last (i.e., 14 days maximum). Please provide the ICCDP and ICLERP for the 14-day period, using the risk values based on the actual CT that the licensee is proposing to use in the application.

#### **RAI-APLA-2**

In Section 3.0 of Attachment 6 of the LAR, the licensee stated the root cause evaluation completed for the 'A' ESW pump failure concluded that the existing 'B' ESW pump vibration levels for this motor pump have lower amplitudes and are more stable than what was observed on the 'A' ESW pump prior to failure. Provide justification demonstrating that the independent failure probability of a failure occurring on pump B is correctly accounted for until it is refurbished during the fall outage.

#### **RAI-APLA-3**

In Fact and Observation (F&O) DA-C1-01 (related to Supporting Requirement DA-C1), 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 failures when there were no failures in preparing 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 [Probabilistic Risk Assessment] working model for PRA application." Furthermore, the licensee states that the "updated data will be used for analyses to be performed under the [Surveillance Frequency Control Program] when implemented." It is not clear on whether the licensee considered the impact of the 0.33 factor on the calculation of the risk for the specified CT. Confirm that the ICCDP and ICLERP results reported in the application are based on the 0.5 vs. the 0.33 assumption; and if not, provide the results using 0.5 instead of 0.33.

#### **RAI-APLA-4**

In F&O DA-D6-01 (related to DA-D6), the peer review team found that the licensee's definition in the component database was not consistent with the component boundary for EDG, as defined in generic source document NUREG/CR-5497, "Common Cause Failure 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, but the licensee stated that the data and documentation were updated with no impact to the LAR. Please describe, in further detail, whether the licensee identified any outliers in the review of boundary consistency and, if so, how the licensee determined that those outliers do not impact the Common Cause Failure probabilities for the LAR.

### **RAI-APLA-5**

The licensee identified a number of compensatory actions/risk management actions in Section 7.0 of Attachment 6. It is not clear if this information was derived from the Tier 2 evaluation. The Tier 2 analysis provides the staff confidence that risk-significant plant equipment outage configurations will not occur when specific plant equipment is out of service consistent with the proposed TS change. One way to accomplish this is to evaluate equipment according to its contribution to plant risk while the equipment covered by the proposed CT change is out of service. RG 1.177, Revision 1, describes an appropriate method to fully analyze the risk-significant configurations. Please describe the licensee's method of analyzing the proposed change to avoid risk-significant configurations and determining the compensatory measures identified in Section 7.0.

### **RAI-SBPB-1**

The LAR Section 3.4, Assumptions and Compensatory Measures, states during AOT, the licensee plans to provide NSW to the 'A' ESW train making that train inoperable but available. The licensee plans to defeat the safety injection (SI) isolation signals to 1SW-39 and 1SW-276. In this lineup, NSW will flow from the NSW basin to the Auxiliary Reservoir because 1SW-270 will open and 1SW-275 will close on the SI signal. With 1SW-275 shut, discuss why the licensee plans to defeat the isolation signal to 1SW-276. If this is the intended lineup, discuss the NSW mission time makeup requirements and how makeup is accomplished to the NSW basin during recovery from the design-basis accident (DBA).

### **RAI-SBPB-2**

The LAR Section 3.3, Defense in Depth Considerations, discusses some measures related to the defense-in-depth attributes in RG 1. 177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," arising from the Work Control Program that implement the Maintenance Rule Program. The lifting of heavy loads can potentially affect defense-in-depth attributes from RG 1. 177. The LAR does not address the effects of the pump replacement activities on the risk of common cause failures and system redundancy. The pump replacement activity likely involves movement of heavy loads in and around the intake structure. Describe how risks from this activity were assessed and would be controlled. 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, that could require actuation of the ESW system.

### **RAI-SBPB-3**

The LAR Section 3.3, Defense in Depth Considerations, addresses defense in depth considerations including system redundancy, independence, and diversity that are preserved commensurate with the expected frequency, consequences of challenges to the system, and uncertainties (e.g., no risk outliers). In Commitment Nos. 1 and 5 of Attachment 7 of the LAR, the licensee listed compensatory actions to preclude simultaneous equipment outages. Commitment No. 5 listed opposite train equipment to be protected. Commitment Nos. 1 and 5 do not include all of ESW Train 'B' loads whose redundant components in ESW Train 'A' have

their redundancy quality reduced by being supplied by NSW. The LAR requests extended AOT to 14 days for the following systems and associated technical specifications:

- 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"

With the 'A' Train of all the associated systems listed above inoperable but available, explain why all associated 'B' Train equipment for the TSs listed above, which are the only operable trains, are not also to be protected during the extended AOT.

#### **RAI SBPB-4**

In its application, the licensee stated during the period in which the 'A' Train ESW pump is not available, NSW will be in service and aligned to support the 'A' ESW Train equipment loads for the duration of the AOT. The licensee plans to use NSW for the 'A' ESW Train to support defense in depth. Confirm that design basis calculations in accordance with the 10 CFR Part 50, Appendix B, Quality Assurance, are in place that show that NSW as proposed in the submittal is capable of supplying the 'A' Train ESW supported systems, structures, and components (SSCs) making them fully functional as long as offsite power is maintained.

#### **RAI SBPB-5**

In its application, the licensee addressed defenses against common cause failures by stating, "The compensatory measures described in Section 3.4 assure the availability of independent, redundant, and diverse means of accomplishing critical safety functions during the proposed AOT duration. Post-maintenance testing will confirm readiness to return the 'A' ESW pump to service." 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 common cause failures. However, the information provided in the application is not sufficient discussion regarding defense against the risk of common cause failures for the 'B' ESW pump.

In License Event Report (LER) 2015-004-01, the licensee addressed the failure of the 'A' ESW pump and found the contributing cause of this event was determined to be that performance monitoring was not rigorous enough to identify a potential pump issue prior to failure. The licensee identified several modifications to be performed on the 'A' ESW pump including changes to the coupling design, mounting plate changes to achieve proper alignment with discharge flange, and bearing and snap ring mods in the pump bowl.

The licensee stated the existing 'B' ESW pump vibration levels have lower amplitudes and are more stable than what was observed on 'A' ESW pump prior to failure. However, the 'B' ESW pump could be vulnerable to all the causal factors that caused failure of 'A' ESW and also is not subject to a rigorous performance monitoring program, whose lack thereof contributed to the failure of the 'A' ESW pump. The assembly and hardware changes described in the LER are yet to be performed on the redundant 'B' ESW pump.

- a) Provide clear evidence and explanation of defense against common cause failure of the 'B' ESW pump, if such evidence exists.
- b) Considering the 'A' ESW pump coupling and bearings have been recently replaced after failure during the May 2015 outage, explain why the improvements to the 'A' ESW pump as described in the LAR takes precedence over the same repairs and improvements to the 'B' ESW pump.
- c) Discuss what upgrades in the performance monitoring program have been achieved since pump failure.

#### **RAI-SCVB-1**

The request for temporary changes to TSs to extend the 'A' ESW pump outage time relies on the reliability of 'B' Train ESW system. In its application, the licensee stated that the 'B' ESW pump has been evaluated as reliable as relative to the 'A' ESW pump. However, it is not known if and how the health and reliability of the whole train of the 'B' ESW system will be maintained during the planned 'A' ESW pump outage. The Nuclear Regulatory Commission (NRC) Generic Letter 80-30, "Clarification of the Term 'Operable' as it Applies to Single Failure Criterion for Safety Systems Required by TS," requires at least one normal and one emergency service water system be available and operable. The train of SSCs powered by the emergency power source shall be consistently maintained as operable as required for the available emergency power source. Provide the following B Train Containment Spray System Surveillance Requirements (SRs) performance records for the last two consecutive tests:

- (1) SR 4.6.2.1 a, b, c, d
- (2) SR 4.6.2.2 a, b, c, d
- (3) SR 4.6.2.3 a, b

Provide reasonable assurance on the health and reliability of the 'B' train SSCs involved in the above SRs during the planned 'A' ESW pump outage.

#### **RAI-SCVB-2**

The NRC Generic Letter 80-30, "Clarification of the Term 'Operable' as it Applies to Single Failure Criterion for Safety Systems Required by TS," requires at least one normal and one ESW system be available and operable. The train of SSCs powered by the emergency power source shall be consistently maintained as operable as required for the available emergency



power source. Provide reasonable assurance in terms of performance test record, or in terms of compensatory measures, of the health and reliability of the 'B' train containment safety-related critical SSCs, such as the booster pump, Residual Heat Removal heat exchanger, and other applicable components used to mitigate a DBA, during the planned 'A' ESW pump outage.

B. Waldrep

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If you have any questions, please call me at 301-415-2760 or [Martha.Barillas@nrc.gov](mailto:Martha.Barillas@nrc.gov).

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

Enclosure:  
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