

**From:** Wall, Scott  
**Sent:** Friday, August 14, 2020 12:59 PM  
**To:** Lashley, Phil H (EH)  
**Cc:** Morgan, Jeffrey D.  
**Subject:** Final RAI - Perry - Adoption of TSTF-500 DC Electrical Systems (EPID No. L-2020-LLA-0089)

Dear Mr. Lashley,

By Letter dated April 24, 2020 (Agencywide Documents Access management System (ADAMS) Accession No. ML20115E517), Energy Harbor Nuclear Corp (EHNC, the licensee) submitted a license amendment request (LAR) to Operating License NPF-58 for Perry Nuclear Power Plant, Unit No. 1 (PNPP). The proposed amendment would modify technical specification requirements related to direct current electrical systems in accordance with Technical Specification Task Force (TSTF) Traveler TSTF-500, Revision 2, "DC Electrical Rewrite - Update to TSTF-360."

The NRC staff has reviewed the submittals and determined that additional information is needed to complete its review. The specific questions are found in the enclosed request for additional information (RAI). During a telephone calls on August 14, 2020, the EHNC staff indicated that a response to the RAIs would be provided by October 2, 2020.

If you have questions, please contact me at 301-415-2855 or via e-mail at [Scott.Wall@nrc.gov](mailto:Scott.Wall@nrc.gov).

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Docket No. 50-440

Enclosure:  
Request for Additional Information

cc: Listserv

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**RAI-EEOB (TSTF-500)**

REQUEST FOR ADDITIONAL INFORMATION

TECHNICAL SPECIFICATIONS TASK FORCE - 500, REVISION2

ENERGY HARBOR NUCLEAR CORP

PERRY NUCLEAR POWER PLANT, UNIT NO. 1

## NRC DOCKET No. 50-440

### INTRODUCTION

By Letter dated April 24, 2020 (Agencywide Documents Access management System (ADAMS) Accession No. ML20115E517), Energy Harbor Nuclear Corp (the licensee) submitted a license amendment request (LAR) to Operating License NPF-58 for Perry Nuclear Power Plant, Unit No. 1 (PNPP). The proposed amendment would modify technical specification requirements related to direct current electrical systems in accordance with Technical Specification Task Force (TSTF) Traveler TSTF-500, Revision 2, "DC Electrical Rewrite - Update to TSTF-360."

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing the application and has determined that the following additional information is required in order to complete the review.

### APPLICABLE REGULATION AND GUIDANCE

The requirements in the Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, General Design Criterion (GDC) 17, "Electric power systems," state, in part, that:

An onsite electric power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety....

The onsite electric power supplies, including the batteries, and the onsite electric distribution system, shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure.

The requirements in 10 CFR Part 50, Appendix A, GDC 18, "Inspection and testing of electric power systems," state, in part, that "[e]lectric power systems important to safety shall be designed to permit appropriate periodic inspection and testing of important areas and features."

### RAI-EEOB-01

Section 2.2, "Verifications and Required Updated Safety Analyses Report [UFSAR] Changes," of the LAR, the licensee stated that the PNPP Updated Safety Analysis Report will be revised to include, "How a 15 percent design margin for the batteries corresponds to a 2 amp float current value indicating that the battery is 92 percent charged for Division 1, 96 percent charged for Division 2, and 95 percent charged for Division 3."

Regarding the selection of float current limit (or return to service limit), TSTF-500 states:

*One method of selecting the return to service limit that has been accepted by the NRC is reserving [5%] of the available design margin above that required to perform the intended design function.*

The selected float current limit provides an indication that the battery is less than 100 percent charged, therefore the [5%] design margin is maintained to provide assurance that the battery is fully charged to perform its design safety function when the float current limit is reached.

The NRC staff notes that the licensee does not discuss how the 15 percent design margin would ensure that the PNPP batteries would be fully charged at a 2-amp float current.

- Explain how maintaining a 15 percent design for the batteries will ensure that the batteries are fully charged (i.e., capable of performing their design function) when the 2-amp float current limit is reached.

**RAI-EEOB-02**

In Attachment 2 of the LAR, the licensee proposed the following new TS 3.8.4 Condition B:

Condition B	Required battery on one subsystem inoperable.
Required Action B.1	Restore battery to operable status.
Completion Time	2 hours

The licensee proposed to revise existing Condition A and renumber it Condition C, as follows:

Condition C	Division 1 or 2 DC electrical power subsystem inoperable for reasons other than Condition A or B.
Required Action C.1	Restore Division 1 and 2 DC electrical power subsystems to operable status.
Completion Time	2 hours

The Reviewer Note for TSTF-500 Section 3.8.4 Required Action B.1 stated that Condition B (One [or two] batter[y][ies on one subsystem] inoperable) is included if Required Action B.1 and Required Action C.1 for Condition C (One DC electrical power subsystem inoperable for reasons other than Condition A [or B]) would have different completion times. If the plant design supports different completion times when a battery is inoperable, but the charger is operable, then Condition B is used. If not, Condition B is deleted, and only Condition C is used.

The NRC staff notes that the proposed completion time for an inoperable required battery on one subsystem (new Condition B in LAR) is the same as the completion time for an inoperable required battery with operable battery charger (revised Condition C in LAR). Thus, based on the above Reviewer Note in TSTF-500, the proposed new Condition B with associated Required Action B.1 and completion time should not be adopted.

- Justify the deviation from the TSTF-500 for adoption of new Condition B and Required Action B.1 with the same 2-hour completion time as for Required Action C.1.

**RAI-EEOB-03**

TS 3.8.4, “DC Sources – Operating,” limiting condition for operation (LCO) requires the Division 1, Division 2, and Division 3 DC electrical power subsystems shall be OPERABLE, with each subsystem consisting of either the Unit 1 or Unit 2 battery, either the normal or reserve battery charger, and the corresponding control equipment and interconnecting cabling supplying power to the associated bus within the division.

The licensee proposed a new alternate testing for a battery charger in revised SR 3.8.4.2

Verify each battery charger can recharge the battery to the fully charged state within 24 hours while supplying the largest combined demands of the various continuous steady state loads, after a battery discharge to the bounding design basis event discharge state.

UFSAR Section 8.3.2.1.2.2, "Capacity," states: "The battery chargers are sized to supply the continuous load of both units while simultaneously recharging the battery to a fully charged condition from the design minimum charge of 1.875 volts/cell for Division 1 and 1.863 volts/cell for Division 2 within 12 hours."

UFSAR Section 8.3.2.1.3.5, "Battery Capacity," states: "The Division 3 battery charger is capable of recharging the Division 3 battery from a fully discharged condition in eight hours while also supplying the steady-state dc bus loads."

The NRC staff notes that the above UFSAR sections do not discuss 24-hour charging capability for the Division 1, 2, or 3 battery charger, as proposed in revised SR 3.8.4.2.

- Explain the basis for the proposed 24 hours in SR 3.8.4.2 for the PNPP battery charger.

#### **RAI-EEOB-04**

The proposed new TS 3.8.6 Condition A would apply when one or two batteries on one subsystem is found with one or more battery cell(s) with a float voltage of less than 2.07 volts (V).

The NRC staff notes that the 2.07-V for the battery cell float voltage is bracketed in TSTF-500. The battery cell float voltage limit should be greater than or equal to the battery open circuit cell voltage to ensure that the battery is not discharging. A battery cell voltage below the open circuit cell voltage indicates that the cell is discharging. It appears that the basis for the proposed 2.07-V limit for the PNPP battery cell float voltage was not provided.

- Discuss the basis for the 2.07-V limit for the PNPP battery cell float voltage. In the discussion, provide the batteries' open circuit cell voltages.

#### **RAI-EEOB-05**

The licensee proposed to relocate current SR 3.8.4.8 from TS 3.8.4 to TS 3.8.6 and renumber it as SR 3.8.6.6. The modified performance discharge test in TSTF-500 is adopted for the proposed SR 3.8.6.6 and the note stating "credit may be taken for unplanned event that satisfy this SR" in the current SR 3.8.4.8 is not added to SR 3.8.6.6.

The TSTF-500 states: "The licensee must confirm that the modified performance discharge test completely encompasses the load profile of the battery service test and that it adequately confirms the intent of the service test to verify the battery capacity to supply the design basis load profile."

The NRC staff notes that the LAR does not discuss the adequacy of the modified performance discharged for the PNPP batteries and the exclusion of the current SR 3.8.4.8 note from SR 3.8.6.6.

- a. Confirm that the modified performance discharge test completely encompasses the load profile of the battery service test and that it adequately confirms the intent of the service test to verify the battery capacity to supply the design basis load profile.
- b. Explain why the note in SR 3.8.4.8 was not added to SR 3.8.6.6.

#### **RAI-EEOB-06**

The licensee proposed adding a new TS 3.8.6 Condition D which would apply to one or two battery (ies) on one subsystem with a pilot cell electrolyte temperature less than the minimum established design limits. The Required Action D.1 would restore the battery pilot cell temperature to greater than or equal to minimum established design limits within 12 hours.

In Enclosure A of the LAR, the licensee states:

Energy Harbor Nuclear Corp. verifies that battery room temperature is routinely monitored such that a room temperature excursion could reasonably expect to be detected and corrected prior to the average battery electrolyte temperature dropping below the minimum electrolyte temperature.

Regarding the selection of pilot cells, the TSTF-500 states:

Previously, average battery temperature was monitored instead of pilot cell temperature. As a result, temperature was not a criterion with selecting a pilot cell. In order to use pilot cell temperature instead of the average battery temperature, temperature must be used as a criterion when selecting the pilot cell. [...] For batteries where it could be shown that the maximum temperature deviation across the battery did not exceed the IEEE 450 recommended maximum of 5°F [degrees Fahrenheit], the NRC has accepted that the cell temperature was not a critical parameter. Therefore, for these batteries, cell temperature did not have to be taken into account when selecting pilot cells.

The NRC staff notes that the LAR does not discuss 1) the frequency of monitoring the battery room and how the battery room temperature would be restored if it was outside the temperature design limits, and 2) the selection of the battery pilot cell based on temperature.

- a. Provide a discussion about how the battery rooms temperatures are monitored and provide the minimum frequencies at which the temperatures are monitored. Also explain how the licensee would restore the vital and DG battery rooms' temperatures if they were outside the temperature design limits.
- b. Provide a discussion about the selection of the battery pilot cell based on temperature. If the temperature will not be used as a criterion for selecting battery pilot cells, provide an analysis of temperature deviations for the batteries based on operation experience to show that the maximum temperature deviation across the batteries does not exceed the IEEE 450 recommended maximum of 5°F.

#### **RAI-EEOB-07**

In Enclosure A of the LAR, the licensee proposed relocating the TS Table 3.8.6-1, "Battery Surveillance Requirements," to a licensee-controlled program. The Table 3.8.6-1 includes

Category A, B, and C limits for the battery cell parameters (i.e., electrolyte level, float voltage, specific gravity).

- Confirm that the battery cell parameters (electrolyte level, float voltage, specific gravity) will continue to be controlled at their current Categories A, B, and C levels in the licensee-controlled program, and that actions to restore deficient values will be implemented in accordance with the licensee's corrective action program.

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