Nuclear Operating Company

South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
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South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Amended Changes to Technical Specification 3/4.8.2 for
Batteries and DC Systems (TAC Nos. MC5720 and MC5721)

Reference: Letter, David W. Rencurrel to Document Control Desk, "Resolution of Issues Regarding Proposed Amendment to Technical Specification 3/4.8.2 to Modify Requirements Related to Batteries and DC Systems (TAC Nos. MC5720 and MC5721)," dated April 6, 2007

Pursuant to 10 CFR 50.90, the STP Nuclear Operating Company (STPNOC) requested Nuclear Regulatory Commission approval of an amendment to Unit 1 Operating License NPF-76 and Unit 2 Operating License NPF-80. The request proposed changes to Technical Specification 3/4.8.2.1, "DC Sources – Operating," and 3/4.8.2.2, "DC Sources – Shutdown," with addition of a new Technical Specification 3/4.8.2.3,"Battery Parameters." In telephone discussions with the NRC staff reviewer, specific areas were identified that need clarification. The subject subsections from the most recent submittal (referenced above) are to be replaced with the attached pages.

With one exception, there are no changes to the content of the Technical Specifications as a result of this submittal. The exception is a reduction in the amount of time (from 7 days to 72 hours) from that originally proposed for restoring a battery charger to operability when no chargers in a power train are operable. This affects Technical Specifications 3.8.2.1.b.3 and 3.8.2.2.b.3.

There are no new commitments in this letter.

If there are any questions, please contact either Mr. P. L. Walker at 361-972-8392 or me at 361-972-7861.

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

Executed on 5/31/07.

David W. Rencurrel
Vice President,
Engineering & Strategic Projects

PLW
Attachments: Clarification of Proposed Changes to Technical Specification 3/4.8.2 (Batteries and DC Systems)

STI: 32164209

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**SOUTH TEXAS PROJECT**

**CLARIFICATION OF PROPOSED CHANGES TO**
**TECHNICAL SPECIFICATION 3/4.8.2 (BATTERIES AND DC SYSTEMS)**

**1. Provide justification for the time to restore a battery charger in a DC electrical power subsystem to operable status (TS Action 3.8.2.1.b.3).**

**Section 4.1.1**

LCO Action 3.8.2.1.b.3 provides 72 hours for a required battery charger in one DC electrical power subsystem to be restored to operable status compared to two hours as currently required. This is revised from the originally proposed seven days for restoration. (This change also applies to LCO Action 3.8.2.2.b.3.)

During normal operation, the 125-VDC loads are powered from the battery chargers with the batteries floating on the system. Each battery is supported by two 100% capacity chargers. In the event all off-site AC sources are lost, AC power is supplied to the battery chargers by the standby diesel generators. In case of a loss of normal power to the battery charger, the DC load is automatically powered from the station batteries. Batteries supply emergency power required for plant protection and control without interruption when the power from AC sources is interrupted. The batteries are sized to carry their connected ESF loads in the event of loss of AC power for two hours without power flow from the chargers.

Each of the three safety-related power trains is backed up with its own onsite diesel generator, and any one of the three can provide sufficient power to safely shutdown its associated reactor and remove the reactor's decay heat for risk-significant core damage frequency sequences identified in the plant-specific probability safety assessment. Furthermore, any one of the three standby diesel generators per unit can be designated as the alternate AC power source. As currently stated in STP Technical Specification 3.8.1.1, Action b, an inoperable standby diesel generator is to be restored to operability within 14 days or the unit is to be in hot shutdown within the next 12 hours and in cold shutdown within the following 24 hours. This timing is the result of a Technical Specification change approved by the NRC in license amendments 85 and 72 (Units 1 and 2, respectively).

Proposed Actions 3.8.2.1.b.1 and 3.8.2.2.b.1 would provide assurance that a battery discharge is terminated by requiring that the battery terminal voltage be restored to greater than or equal to the minimum established float voltage in two hours. This allows time to return an inoperable charger to operable status or to reestablish an alternate means of restoring battery terminal voltage to greater than or equal to the minimum established float voltage. The proposed actions will provide assurance that the battery is restored to the fully charged condition within two hours following any discharge that might have occurred due to an inoperable battery charger.

Proposed Actions 3.8.2.1.b.2 and 3.8.2.2.b.1 would require verification once per 12 hours that the battery float current does not exceed 2 amps to confirm that the battery has been fully charged. If the battery float current exceeds two amps, there may be additional problems and the battery must be declared inoperable. Verification provides assurance that the battery has sufficient capacity to perform its safety function.

Presuming that (1) the DC bus remains energized, (2) the battery terminal voltage is maintained, (3) the battery is fully charged, and (4) fully capable auxiliary battery chargers (two chargers per battery) with diesel generator support are available, there is reasonable basis for extending the allowed restoration time for a required inoperable battery charger beyond the 2-hour limit to the proposed 72 hours (LCO Actions 3.8.2.1.b.3 and 3.8.2.2.b.3).

## NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

Pursuant to 10CFR50.91, this analysis provides a determination that the proposed changes to the Technical Specifications do not involve any significant hazards consideration as defined in 10CFR50.92, as described below:

- **The proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.**

  The proposed change rearranges the Technical Specifications for the direct current electrical power system, and adds new Conditions and required actions with revised completion times to allow for battery charger inoperability. Neither the direct current electrical power subsystem nor associated battery chargers are initiators of an accident sequence previously evaluated. Performance of plant operational activities in accordance with the proposed Technical Specification changes ensures that the direct current electrical power subsystem is capable of performing its function as previously described, even with a restoration time of 72 hours. Therefore, the mitigating functions supported by the subject subsystem will continue to provide the protection assumed by the safety analysis.

  Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

- **The proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.**

  The proposed change does not involve any physical alteration of the units. No new equipment is introduced, and installed equipment is not operated in a new or different manner. The proposed changes do not affect setpoints for initiation of protective or mitigating actions.

  Operability of the DC electrical power subsystems in accordance with the proposed technical specifications is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the plant.

  The proposed changes will not alter the manner in which equipment operation is initiated, nor will the functional demands on credited equipment be changed. No alteration in the operating procedures is proposed, and no change is being made to procedures relied upon in response to an off-normal event. No new failure modes are being introduced, and the proposed change does not alter assumptions made in the safety analyses.

  Therefore, the proposed change does not create the possibility of a new or different accident from any accident previously evaluated.

- **The proposed change does not involve a significant reduction in the margin of safety.**

  The proposed change will not adversely affect operation of plant equipment and will not result in a change to the setpoints at which protective actions are initiated. Sufficient DC capacity to support operation of mitigation equipment is ensured, even with a restoration time of 72 hours. The provisions of the Battery Monitoring and Maintenance Program will ensure that the station batteries are maintained in a highly reliable manner.

  The equipment fed by the DC electrical system will continue to provide adequate power to safety-related loads in accordance with analysis assumptions.

  Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the evaluation provided above, STPNOC concludes that the proposed change does not involve a significant hazards consideration and will not have a significant effect on safe operation of the plant. Therefore, there is reasonable assurance that operation of the South Texas Project in accordance with the proposed revision to the Technical Specifications will not endanger the public health and safety.

**ANALYSIS**

The design of the South Texas Project Class 1E 125-vdc electrical power systems is in accordance with the requirements of GDC 17, NRC Regulatory Guide 1.6, and IEEE-308. Redundant power supplies and equipment satisfy GDC 17 for a single failure.

The overall system design, including functional requirements, redundancy, capacity, and availability is in conformance with IEEE-308 criteria for Class 1E systems with the exception of intervals for battery performance discharge tests, which are in accordance with IEEE 450. The battery charger supply capacity is in accordance with Regulatory Guide 1.32.

Periodic inspection and testing of the DC systems are performed to monitor the condition of the equipment to ensure reliable operation. Visual inspections, electrolyte level, specific gravity, and cell voltage checks, and performance discharge tests are performed at regular intervals on each battery. Maintenance and testing procedures and criteria for replacement are in accordance with IEEE 450. Visual checks and performance tests are also scheduled for the battery chargers.

The proposed changes to the DC electrical power system specifications are consistent with the applicable regulatory requirements. Full charger operability based on the margin afforded in the design capacity of the battery charger continues to be required. Verification that the batteries are maintained within the established limitations ensures that the batteries have sufficient capacity to perform the required duty cycle.

Based upon the considerations discussed above:

- There is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner;
- Such activities will be conducted in compliance with the Commission's regulations; and
- Issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

**ENVIRONMENTAL CONSIDERATION**

10 CFR 51.22(b) specifies the criteria for categorical exclusion from the requirements for a specific environmental assessment per 10 CFR 51.21. STPNOC has evaluated the proposed amendment and determined that:

- The proposed amendment does not involve a significant hazards consideration.

  As demonstrated in the No Significant Hazards Consideration Determination, the requested license amendment does not involve any significant hazards consideration.

- There is no significant change in the types or significant increase in the amounts of any effluent that may be released offsite.

  The proposed amendment involves no change to the facility and does not involve any change in the manner of operation of any plant systems involving the generation, collection or processing of radioactive materials or other types of effluents. Therefore, no increase in the amounts of effluents or new types of effluents would be created.

- There is no significant increase in individual or cumulative occupational radiation exposure.

  The requested license amendment involves no change to the facility and will not increase the radiation dose resulting from the operation of any plant system. Furthermore, implementation of this proposed change will not involve work activities that could contribute to occupational radiation exposure. Therefore, there will be no increase in individual or cumulative occupational radiation exposure associated with this proposed change.

Accordingly, the proposed amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment is required to be prepared in connection with these proposed changes.

ELECTRICAL POWER SYSTEMS

3/4.8.2 DC SOURCES

OPERATING

LIMITING CONDITION FOR OPERATION

3.8.2.1 As a minimum, the following DC electrical sources shall be OPERABLE:

a. Channel I 125-volt Battery Bank E1A11 (Unit 1), E2A11 (Unit 2) and one of its two associated chargers,

b. Channel II 125-volt Battery Bank E1D11 (Unit 1), E2D11 (Unit 2) and one of its two associated full capacity chargers,

c. Channel III 125-volt Battery Bank E1B11 (Unit 1), E2B11 (Unit 2) and one of its two associated full capacity chargers, and

d. Channel IV 125-volt Battery Bank E1C11 (Unit 1), E2C11 (Unit 2) and one of its two associated chargers.

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

ACTION:

a. With one of the required battery banks inoperable, restore the inoperable battery bank to OPERABLE status within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With no battery chargers for a channel OPERABLE,

1. Restore battery terminal voltage to greater than or equal to the minimum established float voltage within 2 hours, AND

2. Verify float current for the affected battery does not exceed 2 amps once per 12 hours, AND

3. Restore one battery charger to OPERABLE status within 72 hours.

If the battery terminal voltage cannot be restored in the allowed time, float current is excessive, or a battery charger is not restored to operability in the time allowed, the affected reactor unit is to be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With one of the required channels inoperable for reasons other than (a) or (b) above, restore the channel to OPERABLE status within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

ELECTRICAL POWER SYSTEMS

DC SOURCES

SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.8.2.2 DC electrical power subsystem shall be OPERABLE to support the DC electrical power distribution subsystem(s) required by LCO 3.8.3.2, "Onsite Power Distribution – Shutdown."

APPLICABILITY: MODES 5 and 6

ACTION:

a. With one or more required DC electrical power subsystems inoperable:

1. Immediately declare affected required feature(s) inoperable OR

2. Immediately:

- Initiate action to suspend operation with a potential for draining the reactor vessel, AND

- Suspend all operations involving CORE ALTERATIONS, operations involving positive reactivity additions that could result in loss of required SHUTDOWN MARGIN or required boron concentration, or movement of irradiated fuel, AND

- Initiate corrective action to restore the required DC electrical power subsystems to OPERABLE status as soon as possible.

b. With no battery chargers for a required channel OPERABLE:

1. Restore battery terminal voltage to greater than or equal to the minimum established float voltage within 2 hours, AND

2. Verify float current for the affected battery does not exceed 2 amps once per 12 hours, AND

3. Restore one battery charger to OPERABLE status within 72 hours.

If the battery terminal voltage cannot be restored within the allowed time, float current is excessive, or a battery charger is not restored to operability in the time allowed:

- Initiate action to suspend operation with a potential for draining the reactor vessel, AND

**2. Provide basis for actions in response to reduced pilot cell electrolyte temperature (Technical Specification 3.8.2.3.d).**

**Section 4.1.1**

STPNOC proposes to add new Technical Specification 3.8.2.3.d which applies to a battery found with a pilot cell electrolyte temperature less than the minimum established design limit. A low electrolyte temperature limits the current and power available from the battery. However, design margin will enable a battery whose capacity has been downgraded to have sufficient capacity to perform the intended functions. Therefore, low pilot cell electrolyte temperature does not require that a battery be considered inoperable.

The minimum design temperature for the STP Class 1E batteries is 65°F. The appropriate margin for this temperature was used during battery sizing in accordance with IEEE 485. The STP battery rooms are maintained at a temperature above 70°F. Battery room temperatures are verified once per day as being above this level. Since batteries have very large thermal inertia, a low room temperature is expected to be corrected prior to the battery reaching its minimum operating temperature.

In addition to the temperature margin, an aging margin of 25% is used in sizing. The minimum available remaining design margin for any battery is 29.6% for Train A. 5% of this margin is reserved for the use of the 2 amp return-to-service limit. The remaining margin is more than sufficient to allow for temperature variation below the 65°F minimum used in sizing. Quarterly historical data show that the STP minimum/maximum temperature deviation is well within a 5 degree Fahrenheit variance. Therefore, use of pilot cell electrolyte temperature in lieu of average battery electrolyte temperature is bounded by the STP design and is acceptable.

**Provide basis for battery design margin (surveillance requirement 4.8.2.1).**

**Section 4.1.4**

This change replaces the current requirements for battery specific gravity monitoring in Table 4.8-2, "Battery Surveillance Requirements," with surveillance requirements utilizing a suitable operability limit based on float current to ensure the battery state-of-charge is sufficient for its design duty cycle. TSTF-360 provides technical justification for using the replacement criteria. The requirements are relocated to Technical Specification Action 3.8.2.3.b and Surveillance Requirement 4.8.2.3.a.

Float current monitoring will be used in place of specific gravity monitoring for tests performed weekly and quarterly. The battery manufacturer concurs with the use of float current monitoring for the purpose of determining the state-of-charge of the STP station batteries. More specifically, the battery manufacturer states that float current (Surveillance Requirement 4.8.2.3.a) is a reasonable parameter to use to confirm a state of full charge for the 125 V DC STP station batteries. The accuracy and capability of the float current monitoring equipment provides adequate assurance that deletion of the requirement for specific gravity measurement will not have a significant impact on safety or the ability to accurately determine the operability of the station batteries.

The rated battery charger output is 300 amps, with a load limit of 330 amps. Allowing the inverter loads to be carried by the battery (20-kva at 0.8 pf and 90% efficiency) reduces the current available to recharge the battery by 142 amps. The normal bus load of 30 amps (as determined by on-line surveillance testing) further reduces the available current of 300 amps with a net reduction of 172 amps (142 plus 30), leaving 128 amps. 5% of this value is 6.4 amps. Applying a maximum charging current of 2 amps ensures the 5% design margin is not exceeded.

**Include details provided in the Bases justifying float current monitoring in place of specific gravity monitoring (surveillance requirement 4.8.2.3).**

**Section 4.1.4**

Application of specific gravity monitoring to determine the battery state-of-charge is replaced by float current monitoring for weekly and quarterly testing. Float charge is the condition in which the charger supplies the continuous charge required to overcome the internal losses of a battery and maintain the battery in a charged state. Float current requirements are based on the float current indicative of a charged battery. Use of float current to determine the state of charge of the battery is consistent with IEEE 450-2002.

Measuring current at a specific voltage (typically the float voltage in normal operation) can be used to assess the level of charge. At low voltage, a current of 2 amps is appropriate for cells with 8-hour capacities of 1000 amp-hours or larger. Float current greater than 2 amps in one or more batteries indicates that a partial discharge of the battery capacity has occurred. This may be due to a temporary loss of a battery charger or possibly due to one or more battery cells in a low voltage condition reflecting some loss of capacity. However, although float current may be greater than 2 amps, the battery capacity remains sufficient for the battery to perform its intended safety function during the time allowed.

Due to the technical nature of the rationale for the change, additional details are provided in attachments to TSTF-360, Revision 1.

**Provide justification for use of float current to determine the state of battery charge (surveillance requirement 4.8.2.3.a).**

**Section 4.1.6**

New Surveillance Requirement 4.8.2.3.a will require verification every 7 days that float current for each battery is less than or equal to 2 amps, and is used to determine the state of charge of the battery. The float current requirements are based on the float current indicative of a charged battery. If battery float current is greater than 2 amps, the battery may not be fully charged.

Use of float current to determine the state of charge of the battery and the 7-day cycle for verification exceeds the requirements of IEEE 450-2002 and is in accordance with vendor authorization.