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50.90

NLS2009010
March 11, 2009

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Subject: License Amendment Request to Revise Nonconservative Battery Resistance Technical Specification Surveillance Requirements
Cooper Nuclear Station, Docket No. 50-298, DPR-46

Dear Sir or Madam:

The purpose of this letter is for the Nebraska Public Power District (NPPD) to request an amendment to Facility Operating License DPR-46 in accordance with the provisions of 10 CFR 50.4 and 10 CFR 50.90 to revise the Cooper Nuclear Station (CNS) Technical Specifications (TS). The license amendment request proposes to revise two TS Surveillance Requirements (SRs) that have been determined to be nonconservative. The nonconservative SRs are SR 3.8.4.2 and SR 3.8.4.5 in TS Section 3.8.4, "DC Sources – Operating". The SRs verify that battery connection resistance is less than specified limits for the individual parts of the battery. However, the total resistance of the battery, as determined by summing the values of resistance for these individual parts, could exceed the value of total battery resistance reflected in the load and voltage study calculations.

Site procedures have administrative limits of 50 micro-ohms ($\mu\Omega$) that have been sufficient to preclude battery resistance values exceeding design calculation limits. As an enhancement to the surveillance procedure, total battery resistance was added to address the TS non-conservatism. This continues to ensure the batteries are able to perform their safety function and that continued operation of CNS is conservative.

Attachment 1 provides a description of the TS changes, the basis for the amendment, the no significant hazards consideration evaluation pursuant to 10 CFR 50.91(a)(1), and the environmental impact evaluation pursuant to 10 CFR 51.22. Attachment 2 provides the proposed changes to the current CNS TS in marked up format. Attachment 3 provides the final typed TS pages to be issued with the amendment. Attachment 4 provides conforming changes to the TS Bases for Nuclear Regulatory Commission (NRC) information.

COOPER NUCLEAR STATION
P.O. Box 98 / Brownville, NE 68321-0098
***Telephone:** (402) 825-3811 / **Fax:** (402) 825-5211*
www.nppd.com

A001
NRR

NPPD requests NRC approval of the proposed TS changes and issuance of the requested license amendment by March 9, 2010. The amendment will be implemented within 30 days following issuance.

These proposed TS changes have been reviewed by the necessary safety review committees (Station Operations Review Committee and Safety Review and Audit Board). Amendments to the CNS Facility Operating License through Amendment 231, issued June 30, 2008, have been incorporated into this request. This request is submitted under oath or affirmation pursuant to 10 CFR 50.30(b).

By copy of this letter and its attachments, the appropriate State of Nebraska official is notified in accordance with 10 CFR 50.91(b)(1). Copies are also being provided to the NRC Region IV office and the CNS Senior Resident Inspector in accordance with 10 CFR 50.4(b)(1).

Should you have any questions concerning this matter, please contact David Van Der Kamp, Licensing Manager, at (402) 825-2904.

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

Executed on MARCH 11 2009
(Date)

Sincerely,

Stewart B. Minahan
Vice President - Nuclear and
Chief Nuclear Officer

/em

Attachments

cc: Regional Administrator w/attachments
USNRC - Region IV

Cooper Project Manager w/attachments
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector w/attachments
USNRC - CNS

Nebraska Health and Human Services,
Department of Regulation and Licensure w/
attachments

NPG Distribution w/o attachments

CNS Records w/attachments

Attachment 1

NPPD Evaluation

License Amendment Request to Revise Nonconservative Battery Resistance Technical Specification Surveillance Requirements (Section 3.8.4, "DC Sources – Operating)

Cooper Nuclear Station, Docket 50-298, DPR-46

Revised Technical Specification Pages

3.8-17
3.8-18
3.8-19

1.0 Summary Description

This license amendment request (LAR) is a request to amend Operating License DPR-46 for Cooper Nuclear Station (CNS). The proposed change would revise the operating license by adding a parameter of total battery resistance to the values of battery connection resistance in Surveillance Requirements (SR) 3.8.4.2 and SR 3.8.4.5 in Technical Specification (TS) Section 3.8.4, "DC Sources – Operating". The format of the SRs is revised by specifying the battery parameters and the values of resistance in a table.

This change is being proposed because the parameters currently specified in the SRs do not, by themselves, ensure that the batteries will be maintained in a condition such that they are able to perform their safety function. This proposed change will correct the nonconservative condition in the TS.

There is no specific schedule or timing constraints for approval of this LAR. However, Nuclear Regulatory Commission (NRC) approval of the LAR and issuance of an amendment with these revised TS is needed as soon as reasonable to return the TS to a conservative condition. The procedures used to perform these SRs have been revised to ensure that the batteries are able to perform their safety function. These revisions ensure that the batteries are maintained operable. Upon receipt of the approved amendment, CNS will implement the change within 30 days.

2.0 Detailed Description

The following revisions are proposed to TS Section 3.8.4, "DC Sources – Operating".

2.1 SR 3.8.4.2 and SR 3.8.4.5 are revised by adding a new parameter called "Total Battery Resistance" to the battery connection resistance parameters that are required to be verified by these SRs.

2.2 A new table, Table 3.8.4-1, is created to specify the parameters to be verified by these SRs and the limit for each parameter. The values of resistance in micro-ohms ($\mu\Omega$) to be verified by these SRs are removed from the SRs and are specified in this new table. The SRs are revised by referring to Table 3.8.4-1 and the limits specified in the table. The following are the values of Total Battery Resistance specified in the SRs:

- 125 volt Batteries (Divisions 1 and 2) $\leq$ 3300 $\mu\Omega$
- 250 volt Batteries (Divisions 1 and 2) $\leq$ 6500 $\mu\Omega$

Revised TS Bases are provided in Attachment 4 for NRC information. These Bases revisions will be made as an implementing action pursuant to TS 5.5.10, "TS Bases Control Program", following issuance of the amendment.

Circumstances Resulting in the Need for the Requested Amendment

Specific load profiles that address the design basis loss-of-coolant accident (LOCA) and Station Blackout (SBO) are determined by calculations at CNS. There are four separate calculations, one each for Division 1 and Division 2 of the 125 volt Direct Current (DC) system, and one each for Division 1 and Division 2 of the 250 volt DC System. These calculations contain the Service Test Profile Development, in which the total resistance of each battery is determined. This total resistance is used in determining the voltage acceptance criteria which ensures that the battery is in its design condition and that the design basis load profiles are enveloped.

The calculations derive the total resistance by assuming a resistance value of 50 μΩ for each inter-cell connection. TS SR 3.8.4.2 and SR 3.8.4.5 specify an acceptance value of 150 μΩ for each inter-cell connection. This value of 150 μΩ was previously specified in Custom Technical Specifications which met surveillance requirements of NRC Regulatory Guide 1.129 and Institute of Electrical and Electronics Engineers (IEEE) Standard 450-1987 prior to CNS conversion to Improved Technical Specifications. It is appropriate to retain 150 μΩ as the value for the acceptance limit for localized inter-cell connection resistance. The nonconservative nature of the TS is based on a postulated condition in which the value of inter-cell resistance for many cells exceeds 50 μΩ, but are still less than the TS SR limit of 150 μΩ. In this condition, it is possible that the total battery resistance could exceed the values reflected in the calculations, even though the performance of the SR was successful.

It should be understood that this condition is extremely unlikely, based on it being unlikely that numerous cells would experience values of inter-cell resistance that exceed the 150 μΩ limits. Furthermore, administrative limits are specified in procedures to ensure that the subject non-conservative condition does not exist at CNS.

Addition of the parameter of total battery resistance to the SRs, with the values derived from the applicable voltage and load study calculations, specified as the surveillance acceptance criteria will restore conservatism to the CNS TS.

Conforming revisions to the TS Bases are proposed in support of the requested revisions to the TS. The TS Bases for SR 3.8.4.2 and SR 3.8.4.5 are revised by the addition of a paragraph stating that the total resistance of the batteries is also monitored, this total resistance being the sum of the inter-cell connectors, the inter-tier cables and connectors, the inter-rack cables and connectors, and the terminal connections. The Bases revisions include specifying the limit for total resistance to 2 significant digits for each DC system and division as appropriate, with a reference to the associated calculation. The four calculations are added as references to Bases Section B 3.8.4.

3.0 Technical Evaluation

CNS is a boiling water reactor (BWR) of General Electric design BWR4, with Mark 1 containment. The electrical power system at CNS consists of various Alternating Current and DC systems. Two of the DC power systems are the 125 volt system and the 250 volt system. These two systems provide both motive and control power to selected safety related and non-safety related equipment.

The systems are designed to have sufficient independence, redundancy, and testability to perform their safety functions, assuming a single failure.

Each of these systems provides two independent on-site sources of DC power for startup operation, shutdown, and the loads required for station safety. The loss of any one source will not prevent safe shutdown of the station. The safety objective of these two systems is to provide an uninterruptible source of power to supply normal and emergency 125 volt DC and 250 volt DC control and power loads under all conditions.

The 125 volt DC and 250 volt DC systems each have two subsystems. The Division 1 and Division 2 125 volt DC subsystems each consist of a 125 volt battery, battery charger, and distribution system. The Division 1 and Division 2 250 volt DC subsystems each consist of a 250 volt battery, battery charger, and distribution system.

Each 125 volt battery has 58 individual cells. Each 250 volt battery has 120 individual cells. Each 125 volt and 250 volt battery is capable of supplying adequate power to operate its loads during emergency conditions.

The batteries and battery chargers are designed and installed to Class 1E requirements. The batteries and battery chargers are seismically qualified and are located in the Control Building which is a Class I seismic structure. These batteries meet the requirements of IEEE Standards 450-1995, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Stationary Type Power Plant and Substation Lead Storage Batteries," and 535-1979, "IEEE Standard for Qualification of Class 1E Lead Storage Batteries for Nuclear Power Generating Stations," and 485-1983, "IEEE Standard for the Sizing of Large Stationary Type Power Plant and Substation Lead Storage Batteries."

Calculations evaluating event specific load profiles for the DC systems at CNS have been performed to address the concurrent Loss-of-Offsite Power/Loss-of-Coolant Accident (LOOP/LOCA) event and the SBO event. These calculations determine the terminal voltages at the devices and verify adequate voltage and current exists for these devices to perform their safety function for the LOOP/LOCA and SBO events. This evaluation includes assuming values of resistance for all parts of the battery, as well as the total battery resistance. These values of resistance are used to calculate the acceptable voltages at the devices. If the test voltages measured during the battery service test profile meet or exceed the acceptance voltages, the battery in its as-found condition performs at least as well as the

battery modeled in the analyses for a load profile that is similar to, but envelopes, the design basis load profiles.

Revising the TS by specifying the parameter of total battery resistance and the value in the TS 3.8.4 SRs, based on the value specified in the applicable calculations, restores the required conservatism to the TS and ensures assumptions in Updated Safety Analysis Report (USAR) accident analyses remain valid.

4.0 Regulatory Safety Analysis

4.1 Applicable Regulatory Requirements/Criteria

Construction of CNS predated the 1971 issuance of 10 CFR 50, Appendix A, "General Design Criteria for Nuclear Power Plants". Appendix F, "Conformance to AEC Proposed General Design Criteria", of the CNS USAR discusses that CNS is designed to conform to the proposed general design criteria (GDC) published in the July 11, 1967, Federal Register, except where commitments were made to specific 1971 GDC. It notes that the Atomic Energy Commission accepted CNS conformance with these proposed GDC.

The following is a discussion of the applicable regulations and the Draft GDC from USAR Appendix F, along with a discussion of continued conformance.

4.1.1 10 CFR 50.36, Technical Specifications

10 CFR 50.36(b) requires each license authorizing operation of a utilization facility to include technical specifications (TS). 10 CFR 50.36(c) specifies the categories that are to be included in TS. 10 CFR 50.36(c)(3) identifies Surveillance Requirements (SRs) as one of the categories to be included in TS. 10 CFR 50.36(c)(3) states:

> "*Surveillance Requirements are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met.*"

The addition of total battery resistance as an additional parameter to be included in surveillance of the batteries, and the reformatting to reflect the battery resistance limits in a table, SR 3.8.4.2 and SR 3.8.4.5 will continue to ensure that the station 125 volt DC and 250 volt DC Systems are able to perform their safety related functions. Thus, the Limiting Condition for Operation will continue to be met. Therefore, CNS continues to meet this regulation with the proposed changes to TS SR 3.8.4.2 and SR 3.8.4.5.

4.1.2 10 CFR 50, Appendix A, GDC 17, Electric Power Systems

NOTE: The discussion of Criterion 24, "Emergency Power for Protection Systems" and Criterion 39, "Emergency Power for Engineered Safety Features" in CNS USAR Appendix F, states that Nebraska Public Power District (NPPD) is committed to 1971 GDC 17 which supersedes these draft GDC in their entirety. GDC 17 states the following:

> *"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 safety function for each system (assuming the other system is not functioning) shall be to provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents.*
>
> *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."*

Adding total battery resistance as a parameter to be monitored as part of battery surveillance, and reformatting of the limits into a table, does not affect CNS compliance with this GDC. Therefore, CNS continues to comply with GDC 17.

4.2 Precedent

Exelon Nuclear Corporation's Quad Cities Nuclear Power Station submitted a similar license amendment request on December 21, 2007 via letter RS-07-120 from Jeffrey L. Hanson, Licensing Manager. Reference TAC NOs MD7539 and MD7540.

4.3 No Significant Hazards Consideration

10 CFR 50.91(a)(1) requires that licensee requests for operating license amendments be accompanied by an evaluation of no significant hazard posed by issuance of the amendment. Nebraska Public Power District (NPPD) has evaluated this proposed amendment with respect to the criteria given in 10 CFR 50.92(c). The following is the evaluation required by 10 CFR 50.91(a)(1).

NPPD is requesting an amendment of the operating license for the Cooper Nuclear Station (CNS) to add total battery resistance as a parameter that must be monitored in tests of the station batteries. CNS has two systems of direct current (DC) batteries,

these two systems having different voltages. One system provides DC voltage of 125 volts, and the other provides DC voltage of 250 volts. These two systems provide both motive and control power to selected safety related and non-safety related equipment.

This parameter of total battery resistance is added to the Technical Specification Surveillance Requirements (SR) that test the batteries. The value of the resistance limit specified in the SR is the value of total resistance specified in the load and voltage study calculations for each of the applicable DC systems with adjustments required for instrument inaccuracies.

1. **Do the proposed changes involve a significant increase in the probability or consequences of an accident previously evaluated?**

   Response: No.

   Performing surveillances that test the resistance and capacity of batteries is not a precursor of any accident previously evaluated. Adding a new parameter as an acceptance criterion for successful test of the batteries does not significantly affect the method of performing the surveillances, such that the probability of an accident would be affected. Therefore, the proposed changes do not result in a significant increase in the probability of an accident previously evaluated.

   Revision of the surveillances by adding total battery resistance as a parameter to be monitored will help to ensure that the voltage and capacity of the batteries is such that they will provide the power assumed in calculations of design basis accident mitigation. Therefore, the change does not involve a significant increase in the consequences of an accident previously evaluated.

   NPPD concludes that the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **Do the proposed changes create the possibility of a new or different kind of accident from any accident previously evaluated?**

   Response: No.

   The proposed change does not involve any modification of the plant or how the plant is operated. Therefore, NPPD concludes that these proposed changes do not create the possibility of a new or different kind of accident from any previously evaluated.

3. Do the proposed changes involve a significant reduction in a margin of safety?

Response: No.

The proposed change will continue to ensure that the station batteries are able to perform their design function as assumed in calculations that evaluate their function during design basis accidents. The proposed change will not affect the design or functioning of the Reactor Protection System, the Emergency Core Cooling Systems, or containment. Based on this, the ability of CNS to mitigate the design basis accidents that rely on operation of the station batteries is not adversely impacted. Therefore, NPPD concludes that these proposed changes do not involve a significant reduction in a margin of safety.

4.4 Conclusions

Based on the responses to the above questions, NPPD concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c) and, accordingly, a finding of "no significant hazards consideration" is justified.

5.0 Environmental Consideration

10 CFR 51.22 provides criteria for, and identification of, licensing and regulatory actions eligible for categorical exclusion from performing an environmental assessment or environmental impact statement. 10 CFR 51.22(c)(9) identifies an amendment to an operating license for a reactor which changes an inspection or a surveillance requirement as a categorical exclusion provided that operation of the facility in accordance with the proposed amendment would not: (1) involve a significant hazards consideration, (2) result in a significant change in the types or significant increase in the amount of any effluents that may be released off-site, or (3) result in a significant increase in individual or cumulative occupational radiation exposure.

CNS review has determined that the proposed amendment, which would change a surveillance requirement, does not involve (1) a significant hazards consideration, (2) a significant change in the types or significant increase in the amounts of any effluent that might be released offsite, or (3) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion 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 need be prepared in connection with the proposed amendment.

6.0 References

6.1 USAR Chapter VIII, Electrical Power Systems Section; Section VIII-6, 125/250 Volt DC Power Systems.

Attachment 2

**Proposed Technical Specification Revisions
(Markup)**

Cooper Nuclear Station, Docket No. 50-298, DPR-46

Revised Technical Specification Pages

3.8-17
3.8-18
3.8-19

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage on float charge is: a. ≥ 125 V for the 125 V batteries; and b. ≥ 250 V for the 250 V batteries.	7 days
SR 3.8.4.2	Verify no visible corrosion at battery terminals and connectors. OR Verify battery connection resistance is ≤ 1.5E-4 ohm for inter-cell connections, ≤ 2.8E-4 ohm for inter-rack connections, ≤ 1.5E-4 ohm for inter-tier connections, and ≤ 1.5E-4 ohm for terminal connections.	92 days
SR 3.8.4.3	Verify battery cells, cell plates, and racks show no visual indication of physical damage or abnormal deterioration that degrades battery performance.	18 months
SR 3.8.4.4	Remove visible corrosion and verify battery cell to cell and terminal connections are coated with anti-corrosion material.	18 months
SR 3.8.4.5	Verify battery connection resistance is ≤ 1.5E-4 ohm for inter-cell connections, ≤ 2.8E-4 ohm for inter-rack connections, ≤ 1.5E-4 ohm for inter-tier connections, and ≤ 1.5E-4 ohm for terminal connections.	18 months

meets the limits specified in Table 3.8.4-1.

meets the limits specified in Table 3.8.4-1.

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.6	Verify: a. Each required 125 V battery charger supplies ≥ 200 amps at ≥ 125 V for ≥ 4 hours; and b. Each required 250 V battery charger supplies ≥ 200 amps at ≥ 250 V for ≥ 4 hours.	18 months
SR 3.8.4.7	----------NOTES---------- 1. The modified performance discharge test in SR 3.8.4.8 may be performed in lieu of the service test in SR 3.8.4.7 once per 60 months. 2. This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR. ---------- Verify battery capacity is adequate to supply, and maintain in OPERABLE status, the required emergency loads for the design duty cycle when subjected to a battery service test.	18 months

Move to Page 3.8-17

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.4.8 ----------NOTE---------- This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR. ---------- Verify battery capacity is ≥ 90% of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test.	60 months AND 18 months when battery shows degradation or has reached 85% of expected life with capacity < 100% of manufacturer's rating AND 24 months when battery has reached 85% of the expected life with capacity ≥ 100% of manufacturer's rating

Move to page 3.8-18

Insert Table 3.8.4-1 here

Table 3.8.4-1 (page 1 of 1)
Battery Connection Resistance Limits

PARAMETER	LIMIT (MICRO-OHMS)	SYSTEM	DIVISION
Inter-cell connections	≤ 150	not applicable	not applicable
Inter-rack connections	≤ 280	not applicable	not applicable
Inter-tier connections	≤ 150	not applicable	not applicable
Terminal connections	≤ 150	not applicable	not applicable
Total battery resistance	≤ 3300	125 volt	1
	≤ 3300	125 volt	2
	≤ 6500	250 volt	1
	≤ 6500	250 volt	2

Added

Attachment 3

Proposed Technical Specification Revisions
(Final Typed)

Cooper Nuclear Station, Docket No. 50-298, DPR-46

Revised Technical Specification Pages

3.8-17
3.8-18
3.8-19

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage on float charge is: a. ≥ 125 V for the 125 V batteries; and b. ≥ 250 V for the 250 V batteries.	7 days
SR 3.8.4.2	Verify no visible corrosion at battery terminals and connectors. OR Verify battery connection resistance meets the limits specified in Table 3.8.4-1.	92 days
SR 3.8.4.3	Verify battery cells, cell plates, and racks show no visual indication of physical damage or abnormal deterioration that degrades battery performance.	18 months
SR 3.8.4.4	Remove visible corrosion and verify battery cell to cell and terminal connections are coated with anti-corrosion material.	18 months
SR 3.8.4.5	Verify battery connection resistance meets the limits specified in Table 3.8.4-1.	18 months
SR 3.8.4.6	Verify: a. Each required 125 V battery charger supplies ≥ 200 amps at ≥ 125 V for ≥ 4 hours; and b. Each required 250 V battery charger supplies ≥ 200 amps at ≥ 250 V for ≥ 4 hours.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.7	----------NOTES---------- 1. The modified performance discharge test in SR 3.8.4.8 may be performed in lieu of the service test in SR 3.8.4.7 once per 60 months. 2. This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR. ----------	
	Verify battery capacity is adequate to supply, and maintain in OPERABLE status, the required emergency loads for the design duty cycle when subjected to a battery service test.	18 months
SR 3.8.4.8	----------NOTE---------- This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR. ----------	
	Verify battery capacity is $\geq$ 90% of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test.	60 months AND 18 months when battery shows degradation or has reached 85% of expected life with capacity < 100% of manufacturer's rating AND 24 months when battery has reached 85% of the expected life with capacity $\geq$ 100% of manufacturer's rating

Table 3.8.4-1 (page 1 of 1)
Battery Connection Resistance Limits

PARAMETER	LIMIT (MICRO-OHMS)	SYSTEM	DIVISION
Inter-cell connections	≤ 150	not applicable	not applicable
Inter-rack connections	≤ 280	not applicable	not applicable
Inter-tier connections	≤ 150	not applicable	not applicable
Terminal connections	≤ 150	not applicable	not applicable
Total battery resistance	≤ 3300	125 volt	1
	≤ 3300	125 volt	2
	≤ 6500	250 volt	1
	≤ 6500	250 volt	2

Attachment 4

Proposed Technical Specification Bases Revisions
(Information Only)

Cooper Nuclear Station, Docket No. 50-298, DPR-46

Revised Technical Specification Bases Pages

B 3.8-46
B 3.8-47
B 3.8-48
B 3.8-49
B 3.8-50
B 3.8-51

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1

Verifying battery terminal voltage while on float charge for the batteries helps to ensure the effectiveness of the charging system and the ability of the batteries to perform their intended function. Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery (or battery cell) and maintain the battery (or battery cell) in a fully charged state. The voltage requirements are based on the nominal design voltage of the battery and are consistent with the initial voltages assumed in the battery sizing calculations. The 7 day Frequency is conservative when compared with the manufacturer's recommendations and IEEE-450 (Ref. 7).

SR 3.8.4.2

Visual inspection to detect corrosion of the battery cells and connections, or measurement of the resistance of each inter-cell, inter-rack, inter-tier, and terminal connection, provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance.

The limits for battery connection resistance are specified in Table 3.8.4-1.

For inter-cell, inter-tier, and terminal connections, the limits are 150 micro-ohm. For inter-rack connections, the limit is 280 micro-ohm.

The total resistance of the batteries is also monitored. This total resistance is the sum of the inter-cell connectors, the inter-tier cables and connectors, the inter-rack cables and connectors, and the terminal connections. The limits for total resistance in the load and voltage studies are 3355 micro-ohm for the 125 volt batteries (Ref. 11 and 12), 6595 micro-ohm for Division 1 of the 250 volt battery (Ref. 13), and 6775 micro-ohm for Division 2 of the 250 volt battery (Ref. 14). The total resistance limits in Table 3.8.4-1 are conservative two significant digit expressions of the calculated limits.

The Frequency for these inspections, which can detect conditions that can cause power losses due to resistance heating, is 92 days. This Frequency is considered acceptable based on operating experience related to detecting corrosion trends.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.3

Visual inspection of the battery cells, cell plates, and battery racks provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance. The presence of physical damage or deterioration does not necessarily represent a failure of this SR, provided an evaluation determines that the physical damage or deterioration does not affect the Operability of the battery (its ability to perform its design function). The 18 month Frequency for the Surveillance is based on engineering judgement. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency has been concluded to be acceptable from a reliability standpoint.

SR 3.8.4.4 and SR 3.8.4.5

Visual inspection and resistance measurements of inter-cell, inter-rack, inter-tier, and terminal connections provides an indication of physical damage or abnormal deterioration that could indicate degraded battery condition. The anti-corrosion material is used to help ensure good electrical connections and to reduce terminal deterioration. The visual inspection for corrosion is not intended to require removal of and inspection under each terminal connection.

The removal of visible corrosion is a preventive maintenance SR. The presence of visible corrosion does not necessarily represent a failure of this SR, provided visible corrosion is removed during performance of this Surveillance.

The limits for battery connection resistance are specified in Table 3.8.4-1.

For inter-cell, inter-tier, and terminal connections, the limits are 150 micro-ohm. For inter-rack connections, the limit is 280 micro-ohm.

The total resistance of the batteries is also monitored. This total resistance is the sum of the inter-cell connectors, the inter-tier cables and connectors, the inter-rack cables and connectors, and the terminal connections. The limits for total resistance in the load and voltage studies are 3355 micro-ohm for the 125 volt batteries (Ref. 11 and 12), 6595 micro-ohm for Division 1 of the 250 volt battery (Ref. 13), and 6775 micro-ohm for Division 2 of the 250 volt battery (Ref. 14). The total resistance limits in Table 3.8.4-1 are conservative two significant digit expressions of the calculated limits.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The 18 month Frequency for the Surveillances is based on engineering judgment. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency has been concluded to be acceptable from a reliability standpoint.

SR 3.8.4.6

Battery charger capability requirements are based on the design capacity of the chargers (Ref. 3). According to Regulatory Guide 1.32 (Ref. 8), the battery charger supply is required to be based on the largest combined demands of the various steady state loads and the charging capacity to restore the battery from the design minimum charge state to the fully charged state, irrespective of the status of the unit during these demand occurrences. The minimum required amperes and duration ensures that these requirements can be satisfied.

The Frequency is acceptable, given the unit conditions required to perform the test and the other administrative controls existing to ensure adequate charger performance during these 18 month intervals. In addition, this Frequency is intended to be consistent with expected fuel cycle lengths.

SR 3.8.4.7

A battery service test is a special test of the battery's capability, as found, to satisfy the design requirements (battery duty cycle) of the DC electrical power system. The discharge rate and test length corresponds to the design duty cycle requirements as specified in design calculations.

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.32 (Ref. 8) and Regulatory Guide 1.129 (Ref. 9), which state that the battery service test should be performed during refueling operations or at some other outage, with intervals between tests not to exceed 18 months.

This SR is modified by two Notes. Note 1 allows the performance of a modified performance discharge test in lieu of a service test once per 60 months. The substitution is acceptable because a modified performance discharge test represents a more severe test of battery capacity than SR 3.8.4.7.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The reason for Note 2 is that performing the Surveillance would remove a required DC electrical power subsystem from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy the Surveillance.

SR 3.8.4.8

A battery performance discharge test is a test of constant current capacity of a battery, normally done in the as found condition, after having been in service, to detect any change in the capacity determined by the acceptance test. The test is intended to determine overall battery degradation due to age and usage.

A battery modified performance discharge test is a simulated duty cycle consisting of just two rates; the one minute rate published for the battery or the largest current load of the duty cycle, followed by the test rate employed for the performance discharge test, both of which envelope the duty cycle of the service test. Since the ampere-hours removed by a rated one minute discharge represents a very small portion of the battery capacity, the test rate can be changed to that for the performance test without compromising the results of the performance discharge test. The battery terminal voltage for the modified performance discharge test should remain above the minimum battery terminal voltage specified in the battery service test for the duration of time equal to that of the service test.

A modified discharge test is a test of the battery capacity and its ability to provide a high rate, short duration load (usually the highest rate of the duty cycle). This will often confirm the battery's ability to meet the critical period of the load duty cycle, in addition to determining its percentage of rated capacity. Initial conditions for the modified performance discharge test should be identical to those specified for a service test. Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.4.8; however, only the modified performance discharge test may be used to satisfy SR 3.8.4.8 while satisfying the requirements of SR 3.8.4.7 at the same time.

The acceptance criteria of $\geq$ 90% capacity for this Surveillance is conservative with respect to IEEE-450 (Ref. 7) and IEEE-485 (Ref. 10). These references recommend that the battery be replaced if its capacity is below 80% of the manufacturer's rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The Frequency for this test is normally 60 months. If the battery shows degradation, or if the battery has reached 85% of its expected life and capacity is < 100% of the manufacturer's rating, the Surveillance Frequency is reduced to 18 months. However, if the battery shows no degradation but has reached 85% of its expected life, the Surveillance Frequency is only reduced to 24 months for batteries that retain capacity ≥ 100% of the manufacturer's rating. Degradation is indicated, according to IEEE-450 (Ref. 7), when the battery capacity drops by more than 10% relative to its capacity on the previous performance tests or when it is below 90% of the manufacturer's rating. The 60 month frequency is consistent with the recommendations in IEEE-450 (Ref. 7). The 18 month and 24 month Frequencies are derived from the recommendations in IEEE-450 (Ref. 7)

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required DC electrical power subsystem from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy the Surveillance.

REFERENCES

1. USAR, Section VIII-6.2.
2. Regulatory Guide 1.6.
3. IEEE Standard 308, 1970.
4. USAR, Chapter XIV.
5. 10 CFR 50.36(c)(2)(ii).
6. Regulatory Guide 1.93.
7. IEEE Standard 450, 1995.
8. Regulatory Guide 1.32, February 1977.
9. Regulatory Guide 1.129, December 1974.
10. IEEE Standard 485, 1983.

BASES

REFERENCES (continued)

11. NEDC 87-131C, VDC Division I Load and Voltage Study.

12. NEDC 87-131D, VDC Division II Load and Voltage Study.

13. NEDC 87-131A, VDC Division I Load and Voltage Study.

14. NEDC 87-131B, VDC Division II Load and Voltage Study.

ATTACHMENT 3 LIST OF REGULATORY COMMITMENTS©[4]

Correspondence Number: NLS2009010

The following table identifies those actions committed to by Nebraska Public Power District (NPPD) in this document. Any other actions discussed in the submittal represent intended or planned actions by NPPD. They are described for information only and are not regulatory commitments. Please notify the Licensing Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITMENT NUMBER	COMMITTED DATE OR OUTAGE
None		