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NLS2010043
October 29, 2010

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

Subject: Non-Conservative Battery Terminal Voltage and Specific Gravity in Technical Specification Surveillance Requirements
Cooper Nuclear Station, Docket No. 50-298, License No. 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 proposed amendment corrects the currently non-conservative values of minimum voltages in Surveillance Requirement 3.8.4.1 for the 125 volt and 250 volt batteries. Similarly, the proposed amendment corrects the currently non-conservative battery specific gravity values listed in Table 3.8.6-1. NPPD has determined from the No Significant Hazards Consideration evaluation that this change does not involve a significant hazard.

Nebraska Public Power District requests approval of the proposed amendment by October 30, 2011, allowing a one year period for NRC review. Once approved, the amendment will be implemented within 60 days.

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. No regulatory commitments are being made by this request.

This proposed TS change has 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 236 issued March 18, 2010, have been incorporated into this request. This request is submitted under affirmation pursuant to 10 CFR 50.30(b).

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NRR

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: 10/29/2010
(Date)

Sincerely,

Brian J. O'Grady
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 w/attachments
Department of Regulation and Licensure

NPG Distribution w/o attachments

CNS Records w/attachments

Non-Conservative Battery Terminal Voltage and Specific Gravity in Technical Specification Surveillance Requirements
Cooper Nuclear Station, NRC Docket 50-298, DPR-46

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1.0 SUMMARY DESCRIPTION

This letter is a request to amend Operating License DPR-46 for Cooper Nuclear Station (CNS). The proposed changes would revise the Technical Specifications (TS) to replace non-conservative minimum voltages in Surveillance Requirement (SR) 3.8.4.1 for the 125 volt (V) direct current (DC) and 250 V DC essential batteries, and the non-conservative battery specific gravity (SG) values listed Table 3.8.6-1.

CNS requests approval of this License Amendment Request by October 30, 2011, allowing a one year period for NRC review. Pending issuance of the amendment, the following interim actions have been taken. CNS has revised battery surveillance procedures to administratively control the SG and terminal voltage within the values of the load flow, voltage analysis, and battery capacity calculations. Upon receipt of the approved amendment, CNS will implement the changes within 60 days.

2.0 DETAILED DESCRIPTION

The following revisions are proposed to TS Section 3.8.4, DC Sources – Operating, and to Section 3.8.6, Battery Cell Parameters.

2.1 Proposed Change.

SR 3.8.4.1 will be revised to replace 125 V with 125.9 V, and 250 V with 260.4 V.

Table 3.8.6-1 will be revised to replace SG values for the Category A pilot cell, and the average of all connected cells for Categories B and C cells with the value of 1.205. Also, the Category B allowable limit for a connected cell will be revised to a SG value of 1.200 while continuing to observe the 1.205 limit on average SG.

2.2 Need for Change

This change is being proposed to correct non-conservative TS limits in accordance with Administrative Letter (AL) 98-10 (Reference 6.1).

The first non-conservative specification is TS SR 3.8.4.1 which specifies minimum terminal voltages. The required float charge per cell for the manufacturer's nominal SG of 1.215 corresponds to a minimum float charge of 2.17 volts per cell (Vpc). This minimum float voltage of 2.17 Vpc provides charging at a value greater than the minimum cell voltage.

The second non-conservative specification is in Table 3.8.6-1 which identifies SG limits less than values used in the minimum load flow, voltage analysis, and battery capacity calculations. The revised SG limits and corresponding reduced battery capacities are accounted for in the battery calculations.

Either of these two non-conservatisms could have allowed a battery to be incorrectly considered OPERABLE when it was not capable of performing its intended safety function. A review of battery health over the last three years showed that actual battery conditions did not approach either the non-conservative limits or the new corrected limits being proposed here.

2.3 Conforming Bases Changes

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. The TS Bases for pages B 3.8-60 and B 3.8-61 are revised to conform to the changes proposed for Table 3.8.6-1. The Bases for SR 3.8.4.1 was revised to explain how terminal voltage is determined.

3.0 TECHNICAL EVALUATION

3.1 System Description

CNS is a boiling water reactor (BWR) of General Electric design BWR4, with a Mark 1 containment. The 125 V and 250 V DC power systems provide both motive and control power to selected safety related and non-safety related equipment. The Division 1 and Division 2 125 V DC subsystems each consist of a 125 V DC battery, a 125 V battery charger and associated 125 V DC distribution system. The Division 1 and Division 2 250 V DC subsystems each consist of a 250 V DC battery, a 250 V battery charger and associated 250 V DC distribution system. There is an additional 125 V battery charger and an additional 250 V battery charger which can be used as backups to supply either division if the normal battery charger is lost. The backup chargers can be supplied from either division to maintain proper divisional separation.

During normal operation, DC loads are powered from the battery chargers with the batteries "floating" on the system. In case of loss of normal power to the battery charger, the DC loads are automatically powered from the batteries. Each battery has adequate storage capacity to carry the required design load.

3.2 Updated Safety Analysis Report (USAR) Safety Design Basis

Each 125 volt and 250 volt battery must have adequate capacity to safeguard the station until AC power sources are restored.

The 125/250 volt batteries and battery racks must be Class I Seismic equipment to assure continuous operation of the equipment under maximum seismic shock conditions applicable to the area and locations of the equipment.

The 125/250 volt batteries must provide power for maintaining the plant in a safe hot shutdown condition in the event Control Room operation is prevented by fire and the Alternate Shutdown System is used. Once an emergency diesel-generator is on-line,

it will power battery chargers in order to maintain station batteries in a fully charged state.

The 125/250 volt Division I and II batteries must provide power for a 4 hour duration during a Station Blackout in accordance with 10CFR50.63, NUMARC 87-00 (Reference 6.2), and Reg. Guide 1.155 (Reference 6.3). However, the 125 and 250 volt Division II batteries are required to provide power for a 4½ hour duration in accordance with 10CFR50 Appendix R Post-Fire Safe and Alternate Safe Shutdown Analysis Report.

3.3 Current TS Bases

SR 3.8.4.1 requires verifying battery terminal voltage while on float charge 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.

TS Table 3.8.6-1 delineates the limits on electrolyte level, float voltage, and SG for three different categories. Category A defines the normal parameter limit for a designated pilot cell in each battery. The cells selected as pilot cells are those whose temperature, voltage, and electrolyte SG approximate the state of charge of the entire battery. Category B defines the normal parameter limits for connected cells. The term "connected cell" excludes any battery cell that may be jumpered out. Category C defines the limits for connected cells. These values, although reduced, provide assurance that sufficient capacity exists to perform the intended function and maintain a margin of safety.

3.4 Analytical Methods, Standards, Data & Results

For SR 3.8.4.1, the new terminal voltage while on float charge was determined by multiplying the number of cells in the battery by the minimum float voltage for the battery's nominal SG. At CNS, the battery cells are designed for a nominal SG of 1.215 +/- 0.005. The minimum cell float voltage for a SG of 1.215 is 2.17 Vpc. The 125 VDC systems have 58 cells connected in series and the 250 VDC systems have 120 cells connected in series. Multiplying 2.17 Vpc by 58 cells yields the minimum voltage for the 125 V batteries of 125.9. Multiplying 2.17 Vpc by 120 cells yields the minimum voltage for the 250 V batteries of 260.4.

For Table 3.8.6-1, the determination of SG limits started from the consideration that an average SG less than 1.210 (the low end of the nominal range) requires derating the battery's capacity. The manufacturer quantified an average SG of 1.205 (0.005 less than nominal) as having a battery capacity of 96% of rated, a 4% reduction in capacity. Using SG of 1.205, CNS analyzed both divisions of 125 V and 250 V DC

Systems using electrical power systems design, simulation, and analytic software (EDSA©) to obtain a DC Load Flow Analysis. These analyses found the DC systems acceptable to meet electrical requirements for safe shutdown and for maintaining the plant in safe shutdown mode. In addition, Station Blackout scenarios (loss of AC power) and Appendix R fire scenarios (Division II only for Appendix R) were evaluated with results bounded by the load flow analyses.

3.5 Technical Justification of Proposed Changes

The proposed changes to SR 3.8.4.1 and Table 3.8.6-1 ensure conservative limits are applied for terminal voltage and SG so that station batteries are operated in a manner consistent with manufacturer recommendations, plant design basis, and initial conditions assumed in station accident and transient analyses.

3.6 USAR Accident Analysis Impact

The initial conditions of Design Basis Accident and transient analyses in the USAR, Chapter XIV assume that Engineered Safety Feature systems are operable. Operability of DC subsystems required by TS is consistent with initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining DC sources operable during accident conditions in the event of an assumed loss of all offsite AC power or all onsite AC power and a worst case single failure. Since these changes to SR 3.8.4.1 and Table 3.8.6-1 restore conservatism to operating limits, they support maintaining the 125 V and 250 V batteries capable of satisfying the initial conditions assumed in the accident and transient analyses.

3.7 Conclusion

In summary, the proposed change is technically sound and continues to maintain the same level of safety as the current licensing basis.

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 that a license authorizing operation of a utilization facility 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 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 changes to SR 3.8.4.1 and Table 3.8.6-1 restore conservatism to battery limits to ensure that 125 V and 250 V DC Systems are able to perform their safety related functions. Thus, the associated Limiting Conditions for Operation will continue to be met. Therefore, CNS continues to meet this regulation with the proposed changes.

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 NPPD is committed to 1971 GDC 17 which supersedes the draft GDC. 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."

Restoring battery limits to conservative values to ensure the 125 V and 250 V DC Systems are able to perform their safety related functions does not affect CNS compliance with this GDC. CNS continues to comply with GDC 17.

4.2 Precedent

No applicable precedents have been identified for this proposed license amendment. NPPD requests that this amendment request be reviewed on its own merits.

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 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. The proposed amendment corrects the currently non-conservative values of minimum voltages in Surveillance Requirement 3.8.4.1 for the 125 volt and 250 volt batteries. Similarly, the proposed amendment corrects the currently non-conservative battery specific gravity values listed Table 3.8.6-1.

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

   Response: No.

   Performing surveillances that verify terminal voltage and specific gravity of batteries is not a precursor of any accident previously evaluated. Restoring battery limits to conservative values 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.

   Restoring battery limits to conservative values so that batteries are maintained in accordance with plant design basis ensures they provide the power assumed in design basis accident mitigation calculations. 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 to the plant or equipment or how they are 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 station batteries are able to perform their design function as assumed in calculations that evaluate their function during design basis accidents. The proposed change actually increases the margin of safety by restoring conservatisms inherent in battery design and manufacturer's recommendations. 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.

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.

4.4 Conclusion

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

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 AL 98-10, Dispositioning of Technical Specifications that are Insufficient to Assure Plant Safety, dated December 29, 1998

6.2 NUMARC 87-00, Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors

6.3 Reg. Guide 1.155, Station Blackout

Attachment 2

Proposed Technical Specification Revisions
(Markup)

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

Revised Technical Specification Pages

3.8-17
3.8-25

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage on float charge is: a. ≥ ~~125~~ 125.9 V for the 125 V batteries; and b. ≥ ~~250~~ 260.4 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)

Table 3.8.6-1 (page 1 of 1)
Battery Cell Parameter Requirements

PARAMETER	CATEGORY A: LIMITS FOR EACH DESIGNATED PILOT CELL	CATEGORY B: LIMITS FOR EACH CONNECTED CELL	CATEGORY C: LIMITS FOR EACH CONNECTED CELL
Electrolyte Level	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark(a)	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark(a)	Above top of plates, and not overflowing
Float Voltage	≥ 2.13 V	≥ 2.13 V	> 2.10 V
Specific Gravity(b)(c)	≥ ~~1.195~~ 1.205	≥ ~~1.190~~ 1.200 AND Average of all connected cells > ~~1.200~~ 1.205	Not more than 0.020 below average of all connected cells AND Average of all connected cells ≥ ~~1.190~~ 1.205

(a) It is acceptable for the electrolyte level to temporarily increase above the specified maximum level during and following equalizing charges provided it is not overflowing.

(b) Corrected for electrolyte temperature and level. Level correction is not required, however, when on float charge and battery charging current is < 2 amps.

(c) A battery charging current of < 2 amps when on float charge is acceptable for meeting specific gravity limits following a battery recharge, for a maximum of 7 days. When charging current is used to satisfy specific gravity requirements, specific gravity of each connected cell shall be measured prior to expiration of the 7 day allowance.

Attachment 3

Proposed Technical Specification Revisions
(Re-Typed)

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

Revised Technical Specification Pages

3.8-17
3.8-25

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage on float charge is: a. ≥ 125.9 V for the 125 V batteries; and b. ≥ 260.4 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)

Table 3.8.6-1 (page 1 of 1)
Battery Cell Parameter Requirements

PARAMETER	CATEGORY A: LIMITS FOR EACH DESIGNATED PILOT CELL	CATEGORY B: LIMITS FOR EACH CONNECTED CELL	CATEGORY C: LIMITS FOR EACH CONNECTED CELL
Electrolyte Level	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark(a)	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark(a)	Above top of plates, and not overflowing
Float Voltage	≥ 2.13 V	≥ 2.13 V	> 2.10 V
Specific Gravity(b)(c)	≥ 1.205	≥ 1.200 AND Average of all connected cells > 1.205	Not more than 0.020 below average of all connected cells AND Average of all connected cells ≥ 1.205

(a) It is acceptable for the electrolyte level to temporarily increase above the specified maximum level during and following equalizing charges provided it is not overflowing.

(b) Corrected for electrolyte temperature and level. Level correction is not required, however, when on float charge and battery charging current is < 2 amps.

(c) A battery charging current of < 2 amps when on float charge is acceptable for meeting specific gravity limits following a battery recharge, for a maximum of 7 days. When charging current is used to satisfy specific gravity requirements, specific gravity of each connected cell shall be measured prior to expiration of the 7 day allowance.

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 3.8-60
B 3.8-61

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).

Terminal voltage while on float charge is determined by multiplying the number of cells in the battery by minimum float voltage for the battery's nominal SG. At CNS, battery cells are designed for a nominal SG of 1.215 +/- 0.005. Minimum cell float voltage for SG of 1.215 is 2.17 volts per cell (Vpc). The 125 VDC systems have 58 cells connected in series and the 250 VDC systems have 120 cells connected in series. Multiplying 2.17 Vpc by 58 cells yields minimum voltage for 125 V batteries of 125.9. Multiplying 2.17 Vpc by 120 cells yields minimum voltage for 250 V batteries of 260.4.

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.

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SURVEILLANCE REQUIREMENTS

Table 3.8.6-1 (continued)

is not overflowing. These limits ensure that the plates suffer no physical damage, and that adequate electron transfer capability is maintained in the event of transient conditions. IEEE-450 (Ref. 3) recommends that electrolyte level readings should be made only after the battery has been at float charge for at least 72 hours.

The Category A limit specified for float voltage is ≥ 2.13 V per cell. This value is based on manufacturer's recommendations, and on the recommendation of IEEE-450 (Ref. 3), which states that prolonged operation of cells below 2.13 V can reduce the life expectancy of cells.

1.205

The Category A limit specified for specific gravity for each pilot cell is ≥ ~~1.195 (0.015 below the manufacturer's fully charged nominal specific gravity or a battery charging current that had stabilized at a low value)~~. This value is characteristic of a charged cell with adequate capacity. According to IEEE-450 (Ref. 3), the specific gravity readings are based on a temperature of 77°F (25°C).

The specific gravity readings are corrected for actual electrolyte temperature and level. For each 3°F (1.67°C) above 77°F (25°C), 1 point (0.001) is added to the reading; 1 point is subtracted for each 3°F below 77°F. The specific gravity of the electrolyte in a cell increases with a loss of water due to electrolysis or evaporation. Level correction will be in accordance with manufacturer's recommendations.

Category B defines the normal parameter limits for each connected cell. The term "connected cell" excludes any battery cell that may be jumpered out.

The Category B limits specified for electrolyte level and float voltage are the same as those specified for Category A and have been discussed above. The Category B limit specified for specific gravity for each

1.200

connected cell is ≥ ~~1.190 (0.020 below the manufacturer's fully charged, nominal specific gravity)~~ with the average of all connected cells ~~1.200 (0.010 below the manufacturer's fully charged, nominal specific gravity)~~.

>1.205

These values are based on manufacturer's recommendations. The minimum specific gravity value required for each cell ensures that a cell with a marginal or unacceptable specific gravity is not

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SURVEILLANCE REQUIREMENTS

Table 3.8.6-1 (continued)

masked by averaging with cells having higher specific gravities.

Category C defines the limits for each connected cell. These values, although reduced, provide assurance that sufficient capacity exists to perform the intended function and maintain a margin of safety. When any battery parameter is outside the Category C limits, the assurance of sufficient capacity described above no longer exists, and the battery must be declared inoperable.

The Category C limit specified for electrolyte level (above the top of the plates and not overflowing) ensures that the plates suffer no physical damage and maintain adequate electron transfer capability. The Category C limit for voltage of 2.10 V is conservative, and is based on IEEE-450, Appendix C (Ref. 3), which states that a cell voltage of 2.07 V or below, under float conditions and not caused by elevated temperature of the cell, indicates internal cell problems and may require cell replacement.

1.205

The Category C limit on average specific gravity $\geq$ ~~1.190~~, is based on manufacturer's recommendations ~~(0.020 below the manufacturer's recommended fully charged, nominal specific gravity)~~. In addition to that limit, it is required that the specific gravity for each connected cell must be no less than 0.020 below the average of all connected cells. This limit ensures that a cell with a marginal or unacceptable specific gravity is not masked by averaging with cells having higher specific gravities.

The footnotes to Table 3.8.6-1 that apply to specific gravity are applicable to Category A, B, and C specific gravity. Footnote (b) of Table 3.8.6-1 requires the above mentioned correction for electrolyte level and temperature, with the exception that level correction is not required when battery charging current, while on float charge, is < 2 amps. This current provides, in general, an indication of acceptable overall battery condition.

Because of specific gravity gradients that are produced during the recharging process, delays of several days may occur while waiting for the specific gravity to stabilize. A stabilized charging current is an acceptable alternative to specific gravity measurement for determining the state of

ATTACHMENT 3 LIST OF REGULATORY COMMITMENTS©[4]

Correspondence Number: NLS2010043

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		