November 30, 2007

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10 CFR 50.90

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Monticello Nuclear Generating Plant
Docket 50-263
Renewed Facility Operating License No. DPR-22

Response to Request for Additional Information to Revise Technical Specification Surveillance Requirement 3.8.4.2 for the 250 VDC Division 2 Battery Charger Output (TAC No. MD4438)

On February 15, 2007, (Reference 1, Enclosure 1) the Nuclear Management Company, LLC (NMC) submitted a request to revise Surveillance Requirement 3.8.4.2 for the 250 VDC Division 2 Battery Charger output in the Monticello Nuclear Generating Plant Technical Specifications. Additional information was requested by the U.S. Nuclear Regulatory Commission (NRC) on the basis for this proposed change by email (Reference 2, Enclosure 1). Responses to the NRC requests is provided within Enclosure 1.

In accordance with 10 CFR 50.91, a copy of this application, with attachments, is being provided to the designated Minnesota official.

I declare under penalty of perjury that the foregoing is true and correct. Executed on November 30, 2007.

for T. O'Connor

Timothy J. O'Connor
Site Vice President, Monticello Nuclear Generating Plant
Nuclear Management Company, LLC

Enclosure

cc: Administrator, Region III, USNRC
Project Manager, Monticello, USNRC
Resident Inspector, Monticello, USNRC
Minnesota Department of Commerce

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ENCLOSURE 1

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

On February 15, 2007, (Reference 1) the Nuclear Management Company, LLC (NMC) submitted a request to revise Surveillance Requirement 3.8.4.2 for the 250 VDC Division 2 Battery Charger output in the Monticello Nuclear Generating Plant (MNGP) Technical Specifications. Additional information was requested by the U.S. Nuclear Regulatory Commission (NRC) on the basis for this proposed change by email (Reference 2). NMC's response to each NRC request (shown in bold print) immediately follows each request.

(1) The purpose of Surveillance Requirement (SR) 3.8.4.2 is to verify the design capacity of the battery chargers. As specified in the Technical Specification Bases, the ampere requirements are based on the output rating of the chargers. Describe how the proposed ampere level satisfies the intent of the SR.

The 250 VDC Division 2 battery chargers were designed to supply greater than or equal to 150 amps. The circuit rating from each charger to Distribution Cabinet D-100 imposed a design constraint requiring the current limiter for each Division 2 battery charger to be adjusted to stay within its circuit breaker rating. The Bases to SR 3.8.4.2 will be clarified to reflect this amendment in accordance with the MNGP TS Bases Control Program (Specification 5.5.9) following approval.

The 250 VDC Division 2 battery chargers are capable of maintaining the battery in a charged state with the largest combined demands of the various steady state loads applied. The actual normal operating steady state loads are between 24-27 amps as determined from a review of system operating logs over a twelve month period. The 250 VDC Division 2 Battery Service Profile calculation conservatively determined the normal steady state base load as approximately 40 amps. The average discharge rate over the 4-hour discharge profile was determined in the 250 VDC Division 2 Battery Service Profile calculation to be approximately 48 amps including the starting and stopping of DC motors.

The 250 VDC Division 2 battery chargers with the current limiters set to 110 amps are capable of maintaining the 250 VDC Division 2 battery charged since the average current draw from the largest combined demands of the various steady state loads is considerably less than the chargers' current limit.

(2) Describe how the battery chargers current limiter is field adjusted and whether it is a one-time permanent adjustment or a temporary adjustment for testing purposes.

Each 250 VDC Division 2 battery charger current limiter was field adjusted during initial system installation. This was a one-time permanent adjustment. The current limiter's setting is periodically verified during preventive maintenance. It could be adjusted, if necessary, by adjusting a potentiometer on a circuit card

internal to the charger. This potentiometer is not accessible without opening the charger door panel and is not adjusted for testing purposes.

(3) Provide a detailed description of the Division 2 250-volts(V) direct current (DC) system design voltage range and how the battery chargers, under all conditions, including during charger current limit operation, satisfy that range. Include in the description how the system voltage range provides the necessary supply voltage to the Division 2 250-VDC powered equipment under all design conditions.

The 250 VDC Division 2 Battery System is required to operate without the battery chargers supplying system loads during two design basis events, a Loss of Coolant Accident (LOCA) with a Loss of Off-site Power (LOOP) and a Station Blackout (SBO). The most limiting requirement is a SBO requiring a 4-hour battery supply. During a LOCA/LOOP event, the MNGP is not required to assume either the concurrent loss of both divisions of the emergency diesel generators or the concurrent loss of both the normal and the installed spare battery chargers for a single division of DC power. Therefore, the SBO profile envelops the LOCA/LOOP scenario.

The required minimum Division 2 battery voltage for critical devices to operate is approximately 215.6 VDC. The 250 VDC Division 2 battery is discharge tested each refueling outage and is verified to provide this minimum voltage during the 4-hour discharge profile while being discharged.

The 250 VDC Division 2 Distribution System voltage will be greater than the minimum required voltage, as the battery itself will be at or above the minimum required battery voltage of approximately 215.6 VDC without any charge being provided. The current flow provided to the Division 2 Battery will be limited by each charger's current limiter and the demand from the Division 2 DC Distribution System. Each charger will operate in a current limited mode until the battery is sufficiently recharged such that the current demand decreases below the current limiter setting. The DC Distribution System voltage level when the charger is in current limit mode will follow the battery voltage as it increases from recharging, and will be above the minimum voltage and increasing.

Therefore, the Division 2 Battery Chargers will supply the DC Distribution System with a supply voltage above the minimum required battery voltage under all design conditions, including charger current limit operations.

(4) Provide a detailed description of how the 110 ampere setting of the current limit function of the Division 2 250-VDC chargers support the maximum continuous system combined design load current while also simultaneously providing necessary battery charging current.

The proposed 110 ampere setting of the current limiter was chosen primarily to provide a rapid recharge of the 250 VDC Division 2 battery to comply with the second option for meeting SR 3.8.4.2:

> Verify each required battery charger can recharge the battery to the fully charged state within 24 hours for 250 VDC subsystems and 8 hours for 125 VDC subsystems while supplying the largest combined demands of the various continuous steady state loads, after a battery discharge to the bounding design basis event discharge state.

The bounding design basis discharge is the discharge to the 250 VDC Division 2 Battery Service (SBO) Profile. The SBO service profile removes approximately 234 amp-hours from the 250 VDC Division 2 Battery. The battery recharging rate will be limited by the maximum continuous system combined design load current.

Actual normal steady state loads are between 24-27 amps as determined from a review of system operating logs over a twelve month period and the average discharge rate over the 4-hour discharge profile as determined in the 250 VDC Division 2 Battery Service Profile calculation is approximately 48 amps.

A methodology used to size the battery chargers is from IEEE Standard 946-1985, "IEEE Recommended Practice for the Design of Safety-Related DC Auxiliary Power Systems for Nuclear Power Generating Stations." Equation 1 in Section 6.2 of the standard can be used to estimate the time required to charge a battery to 95 percent of its fully charged condition.

$$I = L + (1.1 \times Ah)/T \quad \text{or} \quad T = (1.1 \times Ah)/(I - L)$$

Where:

T	=	Time to recharge the battery to approximately 95 percent capacity (hours)
I	=	Rated Charger Output (amps)
L	=	Continuous DC Load (amps)
Ah	=	Ampere-hours discharged from the battery
1.1	=	Constant (compensates for the battery losses)

Assuming the maximum continuous system combined design load current (L) is 48 amps, the ampere-hours discharged (Ah) is approximately 234 A-h from the service profile, the rated charger output is 110 amps, and applying the above equation results in a 95 percent capacity recharge time of approximately 4.2 hours. This is approximately one-sixth of the required time of 24 hours, which indicates that the battery can be recharged in much less than 24 hours from the bounding design basis event discharge state.

If the 250 VDC Division 2 Battery was completely discharged to the manufacturer's rating of 490 A-h (to 1.75 volts per cell at a 4-hour rate), which is beyond the design basis discharge and below the minimum required Division 2 DC system voltage, the battery can still be recharged in less than 24 hours. Applying the same calculation above, results in a 95 percent recharge time (T) of 8.7 hours or approximately one-third of the required 24 hour period.

These results substantiate that the 110 ampere setting of the current limit function of the 250 VDC Division 2 Battery chargers support the maximum continuous system combined design load current while also simultaneously providing the necessary battery charging current.

REFERENCES

1. NMC letter to NRC, "License Amendment Request to Revise Technical Specification Surveillance Requirement 3.8.4.2 for the 250 VDC Division 2 Battery Charger Output," (L-MT-07-018), dated February 15, 2007.

2. NRC email dated August 6, 2007, "Draft RAI re. 250-VDC Battery Charger Amendment (TAC MD4438)."