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June 12, 2009

L-MT-09-046
10 CFR 50.90

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

Monticello Extended Power Uprate: Response to NRC Balance of Plant Review Branch (SBPB) Request for Additional Information (RAI) dated March 23, 2009 (TAC No. MD9990)

References: 1. NSPM letter to NRC, License Amendment Request: Extended Power Uprate (L-MT-08-052) dated November 5, 2008 (Accession Number ML083230111)

2. Email P. Tam (NRC) to K. Pointer, G. Salamon (NSPM) dated March 23, 2009, Monticello - Draft RAI from Balance of Plant Branch re. Proposed EPU Amendment (TAC MD9990)

Pursuant to 10 CFR 50.90, the Northern States Power Company, a Minnesota corporation (NSPM), requested in Reference 1 an amendment to the Monticello Nuclear Generating Plant (MNGP) Renewed Operating License (OL) and Technical Specifications (TS) to increase the maximum authorized power level from 1775 megawatts thermal (MWt) to 2004 MWt.

On March 23, 2009, the U.S. Nuclear Regulatory Commission (NRC) Balance of Plant Review Branch (SBPB) provided five RAIs to NSPM described in Reference 2. Enclosure 1 provides the NSPM response to the SBPB RAIs.

In accordance with 10 CFR 50.91, a copy of this letter is being provided to the designated Minnesota Official.

Summary of Commitments

1. NSPM will perform an analysis prior to RFO25 to predict combined Condensate and Feedwater system performance for normal operation and for transients including Single Feedwater pump trip, Feedwater Control System Failure and Single Condensate Pump Trip. Acceptance criteria will include adequate margin to preclude loss of both reactor feedwater pumps from low suction pressure or flow.

2. Prior to RFO25, the USAR will be revised to indicate that the emergency heat load of 24.7 MBTU/hr occurs approximately 168 hours after shutdown.

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

Executed on June 12, 2009.

John Gundl For TJO

Timothy J. O'Connor
Site Vice President, Monticello Nuclear Generating Plant
Northern States Power Company - Minnesota

Enclosure

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

ENCLOSURE 1

MONTICELLO NUCLEAR GENERATING PLANT

RESPONSE TO SBPB RAIs
DATED MARCH 23, 2009

SBPB RAI 2.5-1

Table 2.2-1, "Liquid Line Breaks," indicates the flooding elevation within the reactor building and turbine building will increase. Section 2.2.1.2 of the PUSAR states that the reactor building and turbine building pressure, temperature, flooding and relative humidity profiles at EPU conditions were evaluated for the effect on equipment qualification as discussed in Sections 2.2.5 and 2.3.1. Explain the criteria used to evaluate the effect of increased flooding elevations on safe shutdown equipment and the basis for the acceptance criterion for flooding elevation.

NSPM RESPONSE

MNGP chose not to perform its flooding analysis using an equipment list detailing those components required for safe shutdown and core cooling. Instead, MNGP assumed that if at least one division of an engineered safety system was demonstrated to be operable during an internal flooding event, then the requirement for safe shutdown and core cooling was met. This evaluation is provided in USAR Appendix I Section I.5. Additional detail is provided in Enclosure 17 (Task Report T1004) to the EPU License Amendment Request L-MT-08-052 (Accession No. ML083230111).

An increase in submergence level for four valves in the reactor building steam chase is discussed in our response to EEEB Draft RAI 3 submitted in NSPM letter L-MT-09-045. The conclusion is that there is no adverse impact on the safety functions of the associated components and systems.

The EPU HELB analysis identified a deficiency in the existing HELB analysis in the turbine building. The existing analyses failed to consider the actuation of the fire sprinklers in the condenser bay and the resultant flooding on the lower 4kV equipment room. A flood barrier had previously been installed which assured current operability and past operability was evaluated and submitted to the NRC as LER 2008-01 in L-MT-08-019 (Accession No. ML080910155). The current design does not require change for operation under EPU conditions. No other turbine building components required for safe shutdown under HELB are adversely impacted by flooding.

SBPB RAI 2.5-2

Section 2.5.3.1 of the PUSAR describes that the limiting condition for the spent fuel pool (SFP) heat load (the emergency heat load) is a heat load value of 24.7 MBtu/hr and that this design basis limiting heat load does not change at EPU conditions. However, Section 10.2.2 of the MNGP USAR states that the emergency heat load condition assumes that a full core discharge that fills the last 484 spaces in the pool is required 30 days following the last refueling discharge and the full core discharge is complete 150 hours after shutdown. Since the USAR information specifies a fuel quantity and a decay time, it is not clear how the design basis maximum heat load would remain unchanged for operation at the EPU power level. Clarify the PUSAR statement considering the increased decay heat load of each fuel assembly following operation at EPU power levels and describe any operational restrictions related to the maximum SFP heat load.

NSPM RESPONSE

It is recognized that the emergency/full core offload heat load is increased for EPU. However, this increase will be managed by performing the required cycle-specific heat load calculation prior to moving fuel to the pool. The current USAR emergency heat load value of 24.7 MBtu/hr will continue to be used as the limiting heat load for transfer to the spent fuel pool. The USAR will be revised to indicate that the emergency heat load of 24.7 MBTU/hr occurs approximately 168 hours after shutdown. Cycle specific calculations are procedurally controlled. The MNGP methods and assumptions used for decay heat calculations were previously described to the NRC staff by letter L-MT-06-070 dated December 15, 2006 (Accession No. ML063610073). MNGP commits to maintain fuel pool heat load within the heat removal capabilities of the fuel pool cooling and RHR systems using cycle specific calculations and procedural controls described here in the future.

SBPB RAI 2.5-3

Section 2.5.3.1 of the PUSAR describes that the SFP would reach the boiling temperature in 6.5 hours in the worst case conditions after the limiting full core offload and the boil-off rate at these design conditions would be 53 gpm. However, Section 10.2.2 of the MNGP USAR states that the minimum possible time to achieve bulk pool boiling is 10.3 hours (assuming a maximum initial fuel pool temperature of 120°F) and the maximum evaporation rate after bulk boiling commences is 43 gpm. List the initial conditions and assumptions/methods used for each analysis, and explain any differences. Also, specify which initial conditions of the EPU analysis that would be included among the administrative controls used to establish the fuel offload schedule for refueling.

NSPM RESPONSE

Revision 24 of the MNGP USAR contains a time to boil value of 10.3 hours and required makeup rate of 43 gpm if fuel pool cooling capability were lost. These values assume an initial fuel pool temperature of 120 deg F and an emergency heat load of 20 MBtu/hr. A fuel temperature of 350 deg F during bulk boiling is also provided.

Revision 25 of the MNGP USAR revised the emergency heat load value for the emergency heat load evaluation to 24.7 MBtu/hr due to a license amendment request for contingent installation of a temporary fuel storage rack in the spent fuel pool. This heat load is not changing for EPU conditions. Consistent with the above USAR section and the present design basis, the time to boil from initial pool temperatures of 125°F and 140°F, the fuel temperature, and the corresponding makeup rate were calculated for EPU conditions. The initial pool temperatures, which are different from the Rev. 24 USAR temperature assumption of 120°F above, are in accordance with USAR Section 10.2.2.1 and with a related NMC docketed correspondence L-MT-06-070 dated 12-15-06 (Accession No. ML063610073). These updated assumptions for initial temperature did not specifically arise from EPU, but were used for consistency with the current design basis. The resulting limiting time to boil is 6.5 hours assuming an initial temperature of 140°F for an assumed heat transfer rate of 24.7 MBTU/hr. The corresponding makeup rate is 53 gpm.

Administrative controls used to establish fuel offload schedule are covered by the commitment provided in response to SBPB 2.5-2.

SBPB RAI 2.12.1

Section 11.8.2.3 of the Monticello USAR states that the feedwater pumps will automatically trip on high water level following transients and that this automatic feature decreases the possibility of main steam line flooding following transients. Main steam line flooding creates an adverse system interaction in that flooding would affect the operation of the high pressure coolant injection and reactor core isolation cooling systems. The 2002 Monticello plant response to a load rejection suggests that the feedwater system could routinely challenge the high level feedwater pump trip following main turbine trips. Considering the proposed EPU modifications to support increased main feedwater flow, describe how the high reactor water level setpoint has been verified to protect against main steam line flooding. In the discussion, address potential single operator and equipment failures, and discuss the uncertainty in the analysis results relative to the need for testing.

NSPM RESPONSE

The plant response to scram #113 in 2002 is described in Enclosure 9 of NSPM letter L-MT-08-052 (Accession No. ML083230111). This scram resulted in the operators manually tripping one reactor feedwater (FW) pump followed by an automatic trip of the second reactor FW pump on high reactor water level <2 seconds later. A turbine trip on high water level occurred simultaneously with the automatic trip of the second reactor FW pump. The operators had not closed the FW block valves to isolate FW regulating valve leakage when the high level trips occurred. This was an expected response with the current plant design.

The EPU modifications to the Condensate and Feedwater (FW) systems include new Feedwater regulating valves. These new valves will reduce feedwater leakage when closed with the reactor feedwater pumps running. This improved isolation capability will reduce the potential to challenge the high level FW pump and Turbine trip setpoint following plant scrams. Current post scram level control operator actions include placing the FW low flow valve in auto, closing the FW regulating valves and closing the FW block valves. The new FW regulating valves will improve vessel level control and reduce operator actions required to restart a reactor FW pump after a high level trip.

The existing reactor high water level trip logic for the FW pumps will be retained. This is a single failure proof one-out-of-two-twice logic scheme that provides a trip signal to the FW pump motor breakers. It is calibrated to trip within the Tech. Spec. allowable value of < 49"; instrument uncertainties are within 1" indicated. The bottom of the steam lines are at 108.5". Upon sensing high reactor water level, the FW pump motors are tripped terminating injection providing almost 60" of margin before the steam line will start to flood which is considered acceptable for EPU conditions.

SBPB RAI 2.12.2

Section 7.7.4.2 of the Monticello USAR states that the feedwater pumps will automatically trip on low suction pressure and, after a time delay, low suction flow. Consistent with the guidance of SRP Section 14.2.1, explain any analyses or testing that will be conducted to ensure the modified feedwater and condensate systems perform in a manner that avoids unexpected system interactions that increase the frequency of loss of feedwater events.

NSPM RESPONSE

EPU is not changing any instrumentation logic described in USAR Section 7.7.4. The Main Steam and FW flow transmitters will be replaced or respanned to accommodate the increased EPU flowrates. The FW pumps will still have the pump protection trips described in USAR Section 7.7.4.2. Actual setpoints may be revised based on pump testing. The new pumps will be performance tested in the manufacturer's facility in accordance with Hydraulic Institute Standards and ASME PCT 8.2. These tests will include NPSHr at various flows and suction transient testing at design flow and speed. Certified performance curves and test data will be provided for each pump. The pumps will be tested after installation to verify performance under operating conditions. These tests will be part of the overall post modification testing to assure that the modified Feedwater and Condensate systems will perform as predicted under EPU operating conditions.

During the EPU power ascension, pressure, flow and controller data will be gathered on the feedwater system performance. This measured data will be compared against expected values for flow and pressure at the reactor feedwater pump suction and discharge. These values are based on information such as feedwater flow control valve (FCV) performance curves, feedwater and condensate pump performance curves, feedwater system flows and pressures determined from a hydraulic model of the system, and vessel dome pressure. In addition the pump performance curves will be verified during power ascension at various operating points.

MNGP commits to perform analysis to predict combined Condensate and Feedwater system performance for normal operation and for transients including Single Feedwater pump trip, Feedwater Control System Failure and Single Condensate Pump Trip. Acceptance criteria will include adequate margin to preclude loss of both reactor feedwater pumps from low suction pressure or flow.