



Monticello Nuclear Generating Plant
2807 W County Rd 75
Monticello, MN 55362

September 30, 2013

L-MT-13-092
10 CFR 50.90

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

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

Subject: Monticello Extended Power Uprate (EPU): Completion of EPU Commitments, Proposed License Conditions and Revised Power Ascension Test Plan (TAC MD9990)

- References:
- 1) Letter from Northern States Power Company, a Minnesota corporation (NSPM), d/b/a Xcel Energy to Document Control Desk, "License Amendment Request: Extended Power Uprate (TAC MD9990)," L-MT-08-052, dated November 5, 2008. (ADAMS Accession No. ML083230111)
 - 2) Letter from T. J. O'Connor (NSPM), to Document Control Desk (NRC), "Monticello Extended Power Uprate: Updates to Docketed Information (TAC MD9990)," L-MT-10-072, dated December 21, 2010. (ADAMS Accession No. ML103570026)
 - 3) Letter from T. J. O'Connor (NSPM), to Document Control Desk (NRC), "Monticello Extended Power Uprate: Update on EPU Commitments (TAC MD9990)," L-MT-11-044, dated August 30, 2011. (ADAMS Accession No. ML11249A045)
 - 4) Letter from M A Schimmel (NSPM) to Document Control Desk (NRC), "Monticello Extended Power Uprate: Supplement to Revise Technical Specification Setpoint for the Automatic Depressurization System Bypass Timer (TAC MD9990)," L-MT-12-091, dated October 30, 2012. (ADAMS Accession No. ML12307A036)

Pursuant to 10 CFR 50.90, the Northern States Power Company, a Minnesota corporation (NSPM), doing business as Xcel Energy, 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.

In Reference 2, NSPM modified the No Significant Hazards Consideration (NSHC) and updated certain topics associated with the MNGP Extended Power Uprate (EPU) project (Reference 1). In Reference 3, NSPM modified or completed certain commitments associated with the MNGP EPU project.

The purpose of this letter is to provide the NRC with the closure of commitments previously provided to the NRC for the MNGP EPU project, provide license conditions for power ascension to EPU conditions, and update the power ascension test plan to reflect the proposed license conditions.

Enclosure 1 provides the following commitment information:

- Section 1 – Closure of Feedwater/Condensate Events Commitment
- Section 2 – Closure of Feedwater/Condensate Pump Area Heat Load Commitment
- Section 3 – Closure of Updated Safety Analysis Report Emergency Heat Load Modification Commitment
- Section 4 – Summary of Commitments

Enclosure 2 of this letter provides proposed license conditions for implementation of the EPU License Amendment Request. The proposed license conditions cover the power ascension activities associated with replacement steam dryer monitoring.

Enclosure 3 of this letter provides a revised power ascension test plan for the steam dryer to implement the proposed license conditions described in Enclosure 2. The power ascension test plan augments and provides greater detail concerning the power ascension activities associated with replacement steam dryer monitoring.

The documentation provided herein does not change the conclusions of the No Significant Hazards Consideration and the Environmental Consideration evaluations provided in Reference 1 as revised by References 2 and 4.

In accordance with 10 CFR 50.91(b), a copy of this application supplement, without enclosures, is being provided to the designated Minnesota Official.

Summary of Commitments

This letter makes no new commitments. This letter closes selected commitments and revises one commitment associated with the MNGP EPU project. See Enclosure 1 for details.

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

Executed on: September 30, 2013

A handwritten signature in cursive script, reading "Karen D. Fili", is written over a horizontal line.

Karen D. Fili
Site Vice-President
Monticello Nuclear Generating Plant
Northern States Power Company-Minnesota

Enclosures (3)

cc: Administrator, Region III, USNRC (w/o enclosures)
Resident Inspector, Monticello Nuclear Generating Plant, USNRC (w/o enclosures)
Project Manager, Monticello Nuclear Generating Plant, USNRC
Minnesota Department of Commerce (w/o enclosures)

ENCLOSURE 1

COMPLETION OF EXTENDED POWER UPRATE REGULATORY COMMITMENTS

The purpose of this enclosure is to provide an update on the closure of regulatory commitments associated with the Extended Power Uprate (EPU) project. Details regarding the following commitments are provided below:

- Section 1 – Closure of Feedwater/Condensate Events Commitment
- Section 2 – Closure of Feedwater/Condensate Pump Area Heat Load Commitment
- Section 3 – Closure of Updated Safety Analysis Report Emergency Heat Load Modification Commitment
- Section 4 – Summary of Final Commitments

SECTION 1

CLOSURE OF FEEDWATER/CONDENSATE EVENTS COMMITMENT

Background

In Reference S1-1, Northern States Power Company, a Minnesota corporation (NSPM), d/b/a Xcel Energy provided a license amendment request (LAR) for the Monticello Nuclear Generating Plant (MNGP). The Reference S1-1 LAR requested approval to increase the maximum authorized power level from 1775 megawatts thermal (MWt) to 2004 MWt.

In Reference S1-2, NSPM provided a response to NRC requests for additional information (RAIs). As part of the response to RAI 2.12.2, NSPM made the following commitment:

NSPM will perform an analysis prior to RFO25 [Refueling Outage] 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.

In Reference S1-3, NSPM modified the commitment, based on project schedule considerations, to read as follows:

NSPM will perform an analysis prior to EPU implementation 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.

In Reference S1-4 NSPM modified the commitment, based on further engineering review, to read as follows:

Prior to EPU implementation NSPM will revise operating procedures for Condensate/Feedwater (CFW) transient events, to take prudent actions to recover CFW flow, and place the reactor in a safe and stable condition.

Discussion

NSPM completed an evaluation that provided the basis for procedure changes to assist the operator in performing the necessary steps to keep MNGP in a safe stable condition

following a single condensate pump trip that could result in the loss of both feedwater pumps. The evaluation concluded that at higher reactor powers, the operators should manually insert a reactor SCRAM if vessel level cannot be restored. Based upon these findings, fifteen procedures were identified for revision. These procedures have been revised.

Conclusion

Analyses have been completed to verify the correct response to tripping of a condensate pump and two feedwater pumps. The analyses determined that procedure changes were necessary to direct the operator to SCRAM the plant if vessel level cannot be restored. These procedure changes have been implemented. Therefore, the commitment has been completed and can be closed.

References:

- S1-1 Letter from Northern States Power Company, a Minnesota corporation (NSPM), d/b/a Xcel Energy to Document Control Desk, "License Amendment Request: Extended Power Uprate (TAC MD9990)," L-MT-08-052, dated November 5, 2008. (ADAMS Accession No. ML083230111)
- S1-2 Letter from T. J. O'Connor (NSPM), to Document Control Desk (NRC), "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)," L-MT-09-046, dated June 12, 2009. (ADAMS Accession No. ML091670410)
- S1-3 Letter from T. J. O'Connor (NSPM), to Document Control Desk (NRC), "Monticello Extended Power Uprate: Update on EPU Commitments (TAC MD9990)," L-MT-11-044, dated August 30, 2011. (ADAMS Accession No. ML11249A045)
- S1-4 Letter from M. A. Schimmel (NSPM), to Document Control Desk (NRC) "Monticello Extended Power Uprate (EPU): Second Supplement for Gap Analysis Updates (TAC MD9990)," L-MT-13-020, Dated February 27, 2013. (ADAMS Accession No. ML130640494)

SECTION 2

CLOSURE OF FEEDWATER/CONDENSATE PUMP AREA HEAT LOAD COMMITMENT

Background

In Reference S2-1 NSPM provided a license amendment request (LAR) to the license for the Monticello Nuclear Generating Plant. The Reference S2-1 LAR requested to increase the maximum authorized power level from 1775 megawatts thermal (MWt) to 2004 MWt.

In Reference S2-2 NSPM provided a response to a NRC request for additional information (RAI). As part of the response to RAI 35, NSPM made the following commitment:

NSPM commits to evaluating the changes in condensate and feed pump area heat load to confirm temperatures remain within design limits prior to RFO25. If necessary, modifications to the HVAC [heating ventilating and air conditioning] system for this area will be implemented to maintain these areas within the design limits.

The commitment was changed to extend the due date as described in Enclosure 1 of Reference S2-3 as shown below.

NSPM commits to evaluating the changes in condensate and feed pump area heat load to confirm temperatures remain within design limits prior to EPU implementation. If necessary, modifications to the HVAC system for this area will be implemented to maintain these areas within the design limits.

Discussion

Reference S2-2, RAI 35 asked NSPM to provide the results and conclusions of a detailed evaluation of the feedwater and condensate pump area heat load. The bases for the request came from NSPM stating in Reference S2-1, Enclosure 5, section 2.7.5 that the proposed EPU may affect the Turbine Building HVAC system since higher process temperatures and higher motor temperatures may result from modification made to the plant for EPU. NSPM further indicated that these changes had not yet been evaluated.

In support of the modification to install replacement condensate and feedwater pumps, NSPM performed an analysis of the heat load in each pump area. For the condensate pumps area the evaluation determined that additional cooling is required. The

modification for the condensate pumps included additional area cooling features. This modification was completed in the 2013 refueling outage. For the feedwater pump area, the evaluation determined that additional cooling is not required. The calculation demonstrated that the heat load decreased in the feedwater pump area due to other configuration changes. Therefore, additional cooling was not required.

Conclusion

Analyses have been completed to verify the change in heat load in the condensate/feedwater pump area. In the condensate pump area the increased heat load was determined to require additional cooling. NSPM completed a modification to support the increased condensate pump area heat load. For the feedwater pump area the heat load with the replaced feedwater pumps is acceptable and no modification is required. Therefore, the commitment has been completed and can be closed.

References:

- S2-1 Letter from Northern States Power Company, a Minnesota corporation, a Minnesota corporation (NSPM), d/b/a Xcel Energy to Document Control Desk, "License Amendment Request: Extended Power Uprate (TAC MD9990)," L-MT-08-052, dated November 5, 2008. (ADAMS Accession No. ML083230111)
- S2-2 Letter from T J O'Connor (NSPM), to Document Control Desk (NRC), "Monticello Extended Power Uprate: Response to NRC Containment and Ventilation Review Branch (SCVB) Request for Additional Information (RAI) dated March 19, 2009, and March 26, 2009 (TAC No. MD9990)," L-MT-09-048, dated July 13, 2009. (ADAMS Accession No. ML092170404)
- S2-3 Letter from T. J. O'Connor (NSPM), to Document Control Desk (NRC), "Monticello Extended Power Uprate: Update on EPU Commitments (TAC MD9990)," L-MT-11-044, dated August 30, 2011. (ADAMS Accession No. ML11249A045)

SECTION 3

CLOSURE OF UPDATED SAFETY ANALYSIS REPORT EMERGENCY HEAT LOAD MODIFICATION COMMITMENT

Background

In Reference S3-1 Northern States Power Company, a Minnesota corporation (NSPM), d/b/a Xcel Energy provided a license amendment request (LAR) for the Monticello Nuclear Generating Plant (MNGP). The Reference S3-1 LAR requested to increase the maximum authorized power level from 1775 megawatts thermal (MWt) to 2004 MWt.

In Reference S3-2 NSPM provided a response to a NRC request for additional information (RAI). As part of the response to RAI 2.5-2, NSPM made the following commitment:

Prior to RFO25, the USAR [Updated Safety Analysis Report] will be revised to indicate that the emergency heat load of 24.7 MBTU/hr occurs approximately 168 hours after shutdown.

This commitment was subsequently revised in Reference S3-3 to read:

Prior to implementation of EPU, the USAR will be revised to indicate that the emergency heat load of 24.7 MBTU/hr occurs approximately 192 hours after shutdown.

Discussion

The MNGP USAR has been updated in accordance with the commitment.

Conclusion

Based on the above this commitment can be closed based on the completed USAR update.

References:

- S3-1 Letter from Northern States Power Company, a Minnesota corporation (NSPM), d/b/a Xcel Energy to Document Control Desk, "License Amendment Request: Extended Power Uprate (TAC MD9990)," L-MT-08-052, dated November 5, 2008. (ADAMS Accession No. ML083230111)
- S3-2 Letter from T J O'Connor (NSPM) to Document Control Desk, " Monticello Extended Power Uprate: Response to NRC Balance of Plant Review Branch

L-MT-13-092

(SBPB) Request for Additional Information (RAIs) dated March 23, 2009 (TAC MD9990)," L-MT-09-046, dated June 12, 2009. (ADAMS Accession No. ML091670410)

S3-3 Letter from T J O'Connor (NSPM) to Document Control Desk, " Monticello Extended Power Uprate: Updates to Docketed Information (TAC MD9990)," L-MT-10-072, dated December 21, 2010. (ADAMS Accession No. ML103570026)

SECTION 4

SUMMARY OF EXTENDED POWER UPRATE COMMITMENTS

Below is the complete list of NRC commitments for the Extended Power Uprate (EPU) project prior to issuance of this letter.

Extended Power Uprate Commitments			
No.	Letter No. Date	Commitment text	Status
1	L-MT-08-052 11/5/2008	NSPM will inspect the steam dryer during the next refueling outage to confirm no unexpected changes in crack length on the steam dryer.	Complete (L-MT-10-046)
2	L-MT-09-017 3/19/2009	The steady state bypass void fraction for the EPU core will be calculated using the method described by the NSPM response to NRC RAI SNPB-7 of L-MT-09-017.	Complete (L-MT-10-046)
3	L-MT-09-043 8/12/2009	NSPM will provide the evaluation of steam dryer structural integrity to the NRC staff prior to further increases in reactor power when increasing to power levels above CLTP [Current Licensed Thermal Power].	Deleted (L-MT-10-046)
4	L-MT-09-043 8/12/2009	NSPM will perform outage steam dryer inspections based on the guidance of BWRVIP [Boiling Water Reactor Vessel Internals Program].	Active
5	L-MT-09-044 8/21/2009	Confirmation that Feedwater and Condensate pump and heater replacement modifications are complete and meet the code allowables will be provided to the NRC prior to implementation of the EPU license amendment request.	Active
6	L-MT-09-044 8/21/2009	Confirmation that modification of support TWH-143 is complete will be provided to the NRC prior to implementation of the EPU license amendment request.	Complete (L-MT-11-044)

7	L-MT-13-020, revised from L-MT-11-044, Enclosure 1 and revised from original in L-MT- 09-046 6/12/2009	Prior to EPU implementation NSPM will revise operating procedures for Condensate/Feedwater (CFW) transient events, to take prudent actions to recover CFW flow, and place the reactor in a safe and stable condition.	Active
8	L-MT-10-072 12/21/2010 Revised from original in L-MT- 09-046 6/12/2009	Prior to implementation of EPU, the USAR will be revised to indicate that the emergency heat load of 24.7 MBTU [Thousand British thermal units]/hr occurs approximately 192 hours after shutdown.	Active
9	L-MT-11-044 Enclosure 1 Revised from original in L-MT- 09-048 7/13/2009	NSPM commits to evaluating the changes in condensate and feed pump area heat load to confirm temperatures remain within design limits prior to EPU implementation. If necessary, modifications to the HVAC system for this area will be implemented to maintain these areas within the design limits.	Active
10	L-MT-09-100 10/28/2009	If NRR agrees to review the MELLLA+ [Maximum Extended Load Line Limit Analysis Plus] LAR concurrent with the EPU LAR, NSPM will commit in the MELLLA+ LAR to resolve the CAP section in the same manner as the issue is resolved for the delayed EPU amendment.	Complete (L-MT-10-046)
11	L-MT-10-046 6/30/2010	As part of MNGP restart following installation of the replacement steam dryer, NSPM will implement the Power Ascension Test Plan found in Enclosure 1, Appendix 5 of L-MT- 10-046.	Active

Revised or Completed Commitments

Commitment 7 is completed as described in Section 1.

Commitment 8 is completed as described in Section 3.

Commitment 9 is completed as described in Section 2.

Commitment 11 is revised based on Enclosure 3 to this letter.

Final List of EPU Commitments

Based on these changes and the revised commitments associated with this letter the revised EPU commitments table is as follows:

Extended Power Uprate Commitments			
No.	Letter No. Date	Commitment text	Status
1	L-MT-08-052 11/5/2008	NSPM will inspect the steam dryer during the next refueling outage to confirm no unexpected changes in crack length on the steam dryer.	Complete (L-MT-10-046)
2	L-MT-09-017 3/19/2009	The steady state bypass void fraction for the EPU core will be calculated using the method described by the NSPM response to NRC RAI SNPB-7 of L-MT-09-017.	Complete (L-MT-10-046)
3	L-MT-09-043 8/12/2009	NSPM will provide the evaluation of steam dryer structural integrity to the NRC staff prior to further increases in reactor power when increasing to power levels above CLTP.	Deleted (L-MT-10-046)
4	L-MT-09-043 8/12/2009	NSPM will perform outage steam dryer inspections based on the guidance of BWRVIP.	Active
5	L-MT-09-044 8/21/2009	Confirmation that Feedwater and Condensate pump and heater replacement modifications are complete and meet the code allowables will be provided to the NRC prior to implementation of the EPU license amendment request.	Active
6	L-MT-09-044 8/21/2009	Confirmation that modification of support TWH-143 is complete will be provided to the NRC prior to implementation of the EPU license amendment request.	Complete (L-MT-11-044)
7	L-MT-13-020, revised from L-MT-11-044, Enclosure 1 and revised from original in L-MT- 09-046 6/12/2009	Prior to EPU implementation NSPM will revise operating procedures for Condensate/Feedwater (CFW) transient events, to take prudent actions to recover CFW flow, and place the reactor in a safe and stable condition.	Complete (L-MT-13-092)

8	L-MT-10-072 12/21/2010 Revised from original in L-MT- 09-046 6/12/2009	Prior to implementation of EPU, the USAR will be revised to indicate that the emergency heat load of 24.7 MBTU/hr occurs approximately 192 hours after shutdown.	Complete (L-MT-13-092)
9	L-MT-11-044 Enclosure 1 Revised from original in L-MT- 09-048 7/13/2009	NSPM commits to evaluating the changes in condensate and feed pump area heat load to confirm temperatures remain within design limits prior to EPU implementation. If necessary, modifications to the HVAC system for this area will be implemented to maintain these areas within the design limits.	Complete (L-MT-13-092)
10	L-MT-09-100 10/28/2009	If NRR agrees to review the MELLLA+ LAR concurrent with the EPU LAR, NSPM will commit in the MELLLA+ LAR to resolve the CAP section in the same manner as the issue is resolved for the delayed EPU amendment.	Complete (L-MT-10-046)
11	L-MT-13-092 Enclosure 3, revised from L- MT-10-046 6/30/2010	As part of MNGP restart following installation of the replacement steam dryer, NSPM will implement the Power Ascension Test Plan found in Enclosure 1, Appendix 5 of L-MT-10-046, as revised by L-MT-13-092.	Active

ENCLOSURE 2

PROPOSED LICENSE CONDITIONS FOR REPLACEMENT STEAM DRYER POWER ASCENSION ACTIVITIES

The following are proposed license conditions applicable for replacement steam dryer power ascension activities from 1775 MWt to 2004 MWt. These license conditions are developed to provide for monitoring, evaluating, and taking prompt action in response to potential adverse flow effects as a result of power uprate operation on the replacement steam dryer (including verifying the continued structural integrity of the steam dryer).

Proposed License Conditions

15. In conjunction with the license amendment to revise paragraph 2.C.1 of Renewed Facility Operating License No. DPR-22 to reflect the new maximum licensed reactor core power level of 2004 megawatts thermal (MWt), the license is also amended to add the following license conditions. These license conditions provide for monitoring, evaluating, and taking prompt action in response to potential adverse flow effects as a result of power uprate operation on plant structures, systems, and components (including verifying the continued structural integrity of the steam dryer). These license conditions are applicable to the initial power ascension from 1775 MWt to 2004 MWt (EPU) conditions:
 - (a) The following requirements are placed on the initial operation of the facility above the thermal power level of 1775 MWt for the power ascension to 2004 MWt. These conditions are applicable until the first time full EPU conditions (2004 MWt) are achieved. If the number of active strain gages is less than two strain gages (180 degrees apart) at any of the eight MSL locations, NSPM will stop power ascension and repair/replace the damaged strain gages and only then resume power ascension.
 1. NSPM shall monitor the MNGP main steam line (MSL) strain gauges during power ascension above 1775 MWt for increasing pressure fluctuations in the steam lines. Upon the initial increase of power above 1775 MWt until reaching 2004 MWt, NSPM shall collect data from the MSL strain gauges at nominal 2.5 percent thermal power increments and evaluate steam dryer performance based on this data.
 2. During power ascension at each nominal 2.5 percent power level above 1775 MWt, the licensee shall compare the MSL data to the approved limit curves and determine the minimum alternating stress ratio. A summary of the results shall be

provided for NRC review at approximately 105 percent and 110 percent of 1775 MWt.

3. NSPM shall hold the facility at approximately 105 percent and 110 percent of 1775 MWt to perform the following:
 - a. Collect strain data from the MSL strain gauges;
 - b. Collect vibration data from the accelerometers in the following locations: MSLs (including those in the drywell, turbine building and in the steam tunnel), Feedwater Lines (FWLs) (including those in the drywell and turbine building), Safety Relief Valves (SRVs), Main Steam Isolation Valves (MSIVs) in the drywell, and Turbine Stop Valves (TSVs);
 - c. Evaluate steam dryer performance based on MSL strain gauge data;
 - d. Evaluate the measured vibration data collected from the vibration monitoring instruments at that power level, data projected to EPU conditions, trends, and to the acceptance limits;
 - e. Provide the steam dryer evaluation and the vibration evaluation, including the data collected, to the NRC staff by facsimile or electronic transmission to the NRC project manager upon completion of the evaluation;
 - f. NSPM shall not increase power above each hold point until 96 hours after the NRC project manager confirms receipt of the evaluations transmission or until verbal approval by NRC to increase power is provided, whichever comes first.
4. If any frequency peak from the MSL strain gauge data exceeds the Level 1 limit curves, NSPM shall return the facility to a power level at which the limit curve is not exceeded. NSPM shall resolve the discrepancy, evaluate and document the continued structural integrity of the steam dryer, and provide that documentation by facsimile or electronic transmission to the NRC project manager prior to further increases in reactor power. If a revised stress analysis is required to be performed and new limit curves are developed, then NSPM shall not further increase power above each hold point until 96 hours after the NRC project manager confirms receipt of the transmission or until verbal approval by NRC to increase power is provided, whichever comes first.
5. In addition to evaluating the MSL strain gauge data, NSPM shall monitor reactor pressure vessel water level instrumentation, and MSL piping accelerometers when power levels are increasing. If resonance frequencies are identified as increasing above nominal levels in proportion to strain gauge instrumentation data, NSPM shall stop power ascension, evaluate and document the continued structural integrity of the steam dryer, and provide that documentation to NRC staff by facsimile or electronic transmission to the NRC project manager prior to further increases in reactor power.

(b) NSPM shall implement the following actions for the initial power ascension from 1775 MWt to 2004 MWt condition.

1. In the event that acoustic signals (in MSL strain gauge signals) are identified that exceed the Level 1 limit curves during power ascension above 1775 MWt, NSPM shall evaluate dryer loads, and stresses, and re-establish the limit curves. In the event that stress analyses are re-performed based on new strain gauge data to address paragraph 15(a)4. above, the revised load definition, stress analysis, and limit curves shall include:
 - a. Application of the ACE 2.0 and ACE 2.0-SPM values for percent bias error and for percent uncertainty to all the SRV acoustic resonances.
 - b. Use of bump-up factors associated with all the SRV acoustic resonances as determined from the scale model test results.
 - c. Evaluation of the effects of ± 10 percent frequency shifts in increments of 2.5 percent.
2. After reaching 2004 MWt, NSPM shall obtain measurements from the MSL strain gauges and establish the steam dryer flow-induced vibration load fatigue margin for the facility, update the dryer stress report, and re-establish the limit curves with the updated load definition. This data will be provided to the NRC staff as described in license condition 15(e).

(c) NSPM shall prepare the EPU power ascension test procedure to include:

1. The stress limit curves to be applied for evaluating steam dryer performance;
2. Specific hold points and their durations during EPU power ascension;
3. Activities to be accomplished during the hold points;
4. Plant parameters to be monitored;
5. Inspections and walkdowns to be conducted for steam, feedwater, and condensate systems and components during the hold points;
6. Methods to be used to trend plant parameters;
7. Acceptance criteria for monitoring and trending plant parameters, and conducting the walkdowns and inspections;
8. Actions to be taken if acceptance criteria are not satisfied; and

9. Verification of the completion of commitments and planned actions specified in its application and all supplements to the application in support of the EPU license amendment request pertaining to the steam dryer prior to power increase above 1775 MWt. NSPM shall provide the related EPU startup test procedure sections to the NRC by facsimile or electronic transmission to the NRC project manager prior to increasing power above 1775 MWt.
- (d) The following key attributes of the program for verifying the continued structural integrity of the steam dryer shall not be made less restrictive without prior NRC approval:
1. During initial power ascension testing above 1775 MWt, each test plateau increment shall be approximately 5 percent of 1775 MWt.
 2. Level 1 performance criteria; and
 3. The methodology for establishing the limit curves used for the Level 1 and Level 2 performance
- (e) The results of the power ascension testing to verify the continued structural integrity of the steam dryer shall be submitted to the NRC staff in a report that includes a final load definition and stress report of the steam dryer, including the results of a complete re-analysis using the ACE 2.0 and ACE2.0-SPM specific bias and uncertainties. The report will be provided within 90 days of the completion of EPU power ascension testing.
- (f) During the first two scheduled refueling outages after reaching EPU conditions, a visual inspection shall be conducted of all accessible, susceptible locations of the steam dryer in accordance with the inspection guidelines provided to the NRC.
- (g) The results of the visual inspections of the steam dryer shall be reported to the NRC staff within 90 days following startup from the respective refueling outage.
- (h) At the end of the second refueling outage, following the implementation of the EPU, the licensee shall submit a long-term steam dryer inspection plan based on industry operating experience along with the baseline inspection results for NRC review and approval.

The license conditions described above shall expire (1) upon satisfaction of the requirements in Paragraphs 15(f) and 15(g), provided that a visual inspection of the steam dryer does not reveal any new unacceptable flaw(s) or unacceptable flaw growth that is due to fatigue, and (2) upon satisfaction of the requirements specified in Paragraph 15(h).

ENCLOSURE 3

**REVISED POWER ASCENSION TEST PLAN FOR MONITORING THE
REPLACEMENT STEAM DRYER DURING POWER ASCENSION ACTIVITIES**

The initial power ascension test plan (PATP) was provided in NSPM letter L-MT-10-046 (dated June 30, 2010, ADAMS Accession No. ML102010462) and was revised in NSPM letter L-MT-11-004 (dated January 13, 2012, ADAMS Accession No. ML12019A246).

The PATP was revised to align with the license conditions provided in Enclosure 2. This revision supersedes previous revisions of the PATP.

REPLACEMENT STEAM DRYER POWER ASCENSION TEST PLAN

1 INTRODUCTION AND PURPOSE

The Monticello Nuclear Generating Plant (MNGP) Constant Pressure Power Uprate (CPPU also called Extended Power Uprate (EPU)) Flow Induced Vibration (FIV) Replacement Steam Dryer Power Ascension Test Plan (RSD - PATP) describes the planned course of action for monitoring and evaluating the performance of the RSD as well as the Main Steam and Feedwater piping systems during power ascension testing and operation.

The RSD - PATP is divided into three testing plans to ensure that sufficient monitoring of the RSD is accomplished as required by Regulatory Guide 1.20.

- Section A – Performs testing from 0% – 80% of the current licensed thermal power level (CLTP is 1775 MWt). This equates to 0 MWt to approximately 1420 MWt. This section may be completed prior to NRC approval for CPPU (2004 MWt). This section has been completed.
- Section B – Performs testing from 80% to 100% of the CLTP. This equates to 1420 MWt to approximately 1775 MWt. This section may be completed prior to NRC approval for CPPU (2004 MWt). This section has been completed.
- Section C – Performs testing above 100% of CLTP to the full CPPU conditions. This equates to 1775 MWt to 2004 MWt. This section will only be completed after NRC approval to proceed to CPPU.

The purpose of each section is to verify acceptable performance of the RSD and piping system integrity. The RSD - PATP is a portion of the overall CPPU start-up testing described in Enclosures 9 and 10 of MNGP's CPPU License Amendment Request (Reference 1). The RSD - PATP supersedes previous portions of Enclosures 9 and 10 of Reference 1 that addressed the previously installed steam dryer. Completion of the RSD - PATP will ensure that the integrity of the steam dryer and piping systems will be maintained in an acceptable state.

The RSD - PATP assesses steam dryer and selected piping system performance for the MNGP CPPU start-up power ascension process. Each section establishes operating limits, data collection and analysis requirements, and any subsequent actions if necessary. The RSD - PATP will also perform confirmatory steam dryer inspections for a period of time following initial and continued operation at uprated power levels.

There are three main elements of the RSD - PATP:

- 1) Slow and deliberate power ascension with defined hold points and durations, allowing time for monitoring and analysis.
- 2) A detailed power ascension monitoring and analysis program to trend steam dryer performance through the monitoring of Main Steam Line (MSL) strain gauges, RSD strain gauges (this instrumentation was removed in 2013), RSD accelerometers (this instrumentation was removed in 2013) and RSD pressure transducers (this instrumentation was removed in 2013), and moisture carryover.
- 3) An inspection and analysis program to verify steam dryer and piping system performance.

This plan includes specific hold points and durations during power ascension; activities to be accomplished during hold points; data to be collected; required inspections and walk downs; data evaluation methods; and acceptance criteria for monitoring and trending plant parameters. This plan incorporates requirements from Regulatory Guide (RG) 1.20 (Reference 2). Detailed procedures will be developed to implement this plan.

As of August 2011, Sections A and B of this test plan have been implemented and steam dryer data has been gathered to support operation under CLTP conditions. Only Section C of the test plan remains to be implemented.

2 POWER ASCENSION TEST PLAN (PATP) SCOPE

2.1 Parameter Monitoring

In each test plan the following items will be assessed, except as specifically noted.

2.1.1 Steam Dryer Indirect Monitoring

RSD stress for all power ascension steps will be monitored using MSL strain readings. Evaluation of the strain gauge data will be by comparison against the limit curves. The action levels and the required actions are:

Level 1: Allowable Stress Exceeded

- Action - Reduce power to previous acceptable level and re-evaluate

Level 2: Low Margin to Allowable Stresses

- Action - Hold at current power level and re-evaluate

If during the RSD - PATP above CLTP conditions (section C testing) the number of active MSL strain gauges is less than one strain gauge at each location, then NSPM will stop start up activities. In this condition repair activities will commence and start up activities above CLTP will resume when strain gauges function has been returned.

2.1.2 Steam Dryer Direct Monitoring

RSD stress was monitored prior to 2013 using RSD strain gauges, RSD accelerometers and RSD pressure transducers. Evaluation of the data was performed by comparison against expected calculated values. The action levels and the required actions are:

Level 1: Allowable Stress Exceeded

- Action - Reduce power to previous acceptable level and re-evaluate

Level 2: Low Margin to Allowable Stresses

- Action - Hold at current power level and re-evaluate

RSD data was collected. The instrumentation performing direct monitoring of the RSD was removed in 2013 and therefore, is not available through the full RSD - PATP.

2.1.3 Moisture Carryover Evaluation

Data evaluation/analysis will be performed near 100% (at approximately 99.5% - 100% which corresponds to 1765 – 1775 MWt) of CLTP and above up to EPU power level by comparing moisture carryover data obtained at each power ascension step against the predetermined acceptance criteria. The subject acceptance criteria and the required action upon failure are:

Level 1: N/A

- Action - None

Level 2: Moisture carryover >0.1% by weight

- Action - Hold at current power level and re-evaluate

2.1.4 Data Collection Methods and Locations for the Steam Dryer

1. Main Steam Line Strain Gauges

Strain Gauge locations as discussed in Section 2.3 of Enclosure 1 will be monitored. Data obtained from the strain gauges will be recorded on a DAS located outside of the drywell.

2. RSD Instrumentation.

RSD Instrumentation (e.g. RSD strain gauges, RSD accelerometers and RSD pressure transducers) was monitored prior to its removal in 2013. Data obtained from the instrumentation was recorded on a Data Acquisition System located

outside of the drywell. This instrumentation has been removed and is no longer available.

3. Moisture Carryover

Moisture Carryover data collection will be completed via the implementation of existing station operating procedures.

2.1.5 Inspections and Walk Downs

Piping, valves and other related components outside the drywell will be monitored visually, either by walk down or cameras at each test power level. If visual observation indicates significant vibration, the noted condition will be evaluated in more detail.

2.1.6 Other Monitoring

Plant data that may be indicative of off-normal steam dryer and or piping system performance will be monitored during power ascension (e.g. reactor water level, steam flow, feed flow, steam flow distribution between the individual steam lines). Plant data can provide an early indication of unacceptable steam dryer/system performance. The monitoring of selected plant parameters will be controlled by test procedure.

2.2 Power Ascension Test Plans

Detailed test procedures will be developed for the implementation of the actual power ascension testing evolutions. The MNGP power ascension will occur over a period of time with gradual increases in power, hold periods, and engineering analysis of monitored data prior to subsequent power increases.

2.2.1 RSD - PATP Section A – *This section was completed during power ascension from the 2011 refueling outage*

The RSD – PATP section A includes (but is not limited to):

- 1) Collection of data from 0 MWt to approximately 1420 MWt;
- 2) Power ascension rate will be equivalent to normal operational practices;
- 3) Data will be evaluated against acceptance criteria at every approximately 20% power step increase (355 MWt).

2.2.1.1 Monitoring and Analysis – RSD - PATP Section A

The assessment of the system/component performance and integrity will be completed through the analysis of main steam line data.

Power ascension above 0 MWt – 1420 MWt will be achieved via the following methodology:

- 1) Ensure limits and operational parameters are defined and available;
- 2) Maximum hourly power increase in accordance with normal operational procedures.
- 3) At each approximately 20% power ascension step (355 MWt)
 - Compare vibration data to acceptance criteria
 - Perform plant walk downs
 - Review data evaluation and walk down results

The duration of the individual 20% power ascension steps will be determined by the time required to obtain the specified data, complete the data evaluation, and determine the acceptability of proceeding to the next power ascension step.

As noted, system performance and integrity will be evaluated based on the review and analysis of MSL strain gauge values. For the strain gauge element, acceptance criteria are established for use in the subject analysis. Data evaluation and analyses will be performed by comparing actual obtained data against the acceptance criteria. The strain gauge criteria will provide two action levels, which are used in determining the acceptability of the continuance of power ascension increases. The action levels for the steam dryer reanalysis are defined in section 2.1.

2.2.2 RSD - PATP Section B – *This section was completed during power ascension from the 2011 refueling outage*

The RSD – PATP section B includes (but is not limited to):

- 1) Collection of data from 1420 MWt to approximately 1775 MWt;
- 2) Power ascension rate equivalent to normal operational practices;
- 3) Data will be evaluated against acceptance criteria at every approximately 6.6% power step increase. Data will be collected with any core flow that lies within the safe operating region of the Power/Flow Map.

2.2.2.1 Monitoring and Analysis – RSD - PATP Section B

The assessment of the system/component performance and integrity will be completed through the analysis of main steam line data.

Power ascension above 1420 MWt to 1775 MWt will be achieved via the following methodology:

- 1) Obtain baseline observations at 1420 MWt;

- 2) Maximum hourly power increase in accordance with normal operational procedures.
- 3) At each approximately 6.6% power ascension step (118 MWt)
 - Compare vibration data to acceptance criteria
 - Perform plant walk downs
 - Review data evaluation and walk down results

The duration of the individual 6.6% power ascension steps will be determined by the time required to obtain the specified data, complete the data evaluation, and determine the acceptability of proceeding to the next power ascension step.

As noted, system performance and integrity will be evaluated based on the review and analysis of MSL strain gauge values. For the strain element, acceptance criteria are established for use in the subject analysis. Data evaluation and analyses will be performed by comparing actual obtained data against the acceptance criteria. The strain criteria will provide two action levels, which are used in determining the acceptability of the continuance of power ascension increases. The action levels for the MSL strain analysis is defined in section 2.1.

At approximately 99.5% - 100% (1765 – 1775 MWt) the test plan will obtain and evaluate moisture carryover data. System performance and integrity will be evaluated based on the review and analysis of moisture carryover values. For the moisture carryover element acceptance criteria is established for use in the subject analysis. Data evaluation and analyses will be performed by comparing actual obtained data against the acceptance criteria. The moisture carryover criteria will provide an action level, which are used in determining the acceptability of the continuance of power ascension increases. The action level for the moisture carryover analysis is defined in section 2.1.

2.2.3 RSD - PATP Section C

The RSD – PATP section C includes (but is not limited to):

- 1) Collection of data from 1775 MWt to 2004 MWt;
- 2) Power ascension rate of 2%/hr above 1775 MWt;
- 3) Data will be evaluated against acceptance criteria at every approximately 2.5% power step increase (44 MWt).

2.2.3.1 Monitoring and Analysis – RSD - PATP Section C

The assessment of the system/component performance and integrity will be completed through the analysis of both main steam line and dryer moisture carryover data.

Power ascension above 1775 MWt will be achieved via the following methodology:

- 1) Obtain baseline observations at 1775 MWt;
- 2) Maximum hourly power increase approximately 2% per hour (35 MWt)
- 3) At each approximately 2.5% power ascension step (44 MWt)
 - Compare vibration data to acceptance criteria
 - Obtain and evaluate moisture carryover data
 - Perform plant walk downs
 - Review data evaluation and walk down results
- 4) Compliance with the License Conditions for EPU power ascension
- 5) At approximately 1775 MWt, 1863 MWt and 2004 MWt, NSPM will obtain MSL data at -7 psi from nominal and +7 psi from nominal reactor pressure (not to exceed 1010 psig). This data will be reviewed against the limit curves.

The duration of the individual 2.5% power ascension steps will be determined by the time required to obtain the specified data, complete the data evaluation, and determine the acceptability of proceeding to the next power ascension step.

As noted, system performance and integrity will be evaluated based on the review and analysis of both MSL strain gauges and moisture carryover values. For both the strain and moisture carryover elements, acceptance criteria are established for use in the subject analysis. Data evaluation and analyses will be performed by comparing actual obtained data against the acceptance criteria. The strain gauge data will be compared to the two actions levels on the stress limit curves, which are used in determining the acceptability of the continuance of power ascension. The action levels for the dryer, the MSL strains and moisture carryover analyses are defined in section 2.1.

If a level 1 limit curve stress is exceeded NSPM shall perform activities as described in license condition 15(a)4. If a level 1 limit curve stress is not exceeded, NSPM may, at its own discretion, continue with power ascension in accordance with this plan.

2.2.4 NRC Communication

2.2.4.1 Interface during RSD - PATP

NSPM will provide to the NRC data reductions and comparisons to design data only after appropriate MNGP plant management review. At each 5% increment in power above 1775 MWt (e.g., 105% and 110% of 1775 MWt) a summary of results will be provided to the NRC in accordance with License Conditions 15(a)2 and 15(a)3.

2.2.4.2 Written Reports

NSPM will provide written reports following completion of the MNGP power ascension testing in accordance with License Condition 15(e)

3 POST-CPPU MONITORING & INSPECTION PROGRAM

Monitoring of various plant parameters, potentially indicative of steam dryer / system failure will be continued after completion of the test program. Monitoring results will be made available to the NRC Staff. The following inspections will be performed:

3.1 Moisture Carryover

Station operating procedures will be used to monitor operating moisture carryover conditions. Results will be reviewed and evaluated on a defined basis to monitor moisture carryover conditions.

3.2 MSL Strain Gauge Monitoring

As long as the previously installed MSL strain gauges remain operational, future data collection will be performed as deemed appropriate during the remainder of the operating cycle following CPPU implementation.

3.3 Steam Dryer Monitoring and Inspection

The steam dryer inspection and the monitoring of plant parameters, potentially indicative of steam dryer failure, will be conducted. Future steam dryer non-destructive examinations during refueling outages will be conducted using the inspection plan provided in Reference 3. A long-term inspection plan will be provided to the NRC in accordance with License Condition 15(h).

3.4 Inspections and Walk Downs

During the subsequent refueling outage or other outage that provides access for inspection, piping, valves and other related components inside and outside the drywell will be monitored visually by walk down. If visual observation indicates significant vibration, the noted condition will be documented in the corrective action program and evaluated in more detail.

4 REFERENCES

- 1) Letter from Northern States Power Company, a Minnesota corporation (NSPM), d/b/a Xcel Energy to Document Control Desk (NRC), "License Amendment Request: Extended Power Uprate," L-MT-08-052, dated November 5, 2008. (ADAMS Accession No. ML083230111)
- 2) Regulatory Guide 1.20, Revision 3, "Comprehensive Vibration Assessment Program for Reactor Internals During Preoperational and Initial Startup Testing," dated March 2007. (ADAMS Accession No. ML070260376)
- 3) Letter from M A Schimmel (NSPM) to Document Control Desk (NRC), "Monticello Extended Power Uprate: Replacement Steam Dryer – Inspection Criteria and Plan (TAC MD9990)," L-MT-12-090, dated October 22, 2012. (ADAMS Accession No. ML12298A032)