May 28, 2008

L-MT-08-039
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 Facility Operating License
License No. DPR-22

Monticello Extended Power Uprate (USNRC TAC MD8398):
Acceptance Review Supplemental Information

References:

1) NMC Letter to USNRC, "License Amendment Request: Extended Power Uprate," dated March 31, 2008

2) NMC Letter to USNRC, "Monticello Extended Power Uprate (USNRC TAC MD8398): Acceptance Review Supplement Regarding Radiological Analysis," dated May 20, 2008

Pursuant to 10 CFR 50.90, Nuclear Management Company, LLC (NMC), requested in Reference 1 approval of amendments to the Monticello Nuclear Generating Plant (MNGP) Renewed Operating License (OL) and Technical Specifications (TS) to increase the maximum power level authorized from 1775 megawatts thermal (MWt) to 1870 MWt, an approximate five percent increase in the current licensed thermal power (CLTP). The proposed request for Extended Power Uprate (EPU) represents an increase of approximately 12 percent above the Original Licensed Thermal Power (OLTP). The Monticello EPU application was supplemented on May 20, 2008 by Reference 2.

In teleconferences held May 2, May 6, and May 12, 2008, the NRC staff indicated that additional information would be necessary for the NRC to complete the acceptance review of the Monticello EPU license amendment request (LAR). Additional requests for information required for acceptance of the EPU LAR were brought up in the May 14, 2008 public meeting between the NRC and NMC. The questions were formalized and emailed to NMC on May 15, 2008. Further clarifying conferences calls were held with the NRC staff on May 16, May 20, and May 21, 2008. These calls resulted in clarification of the requests as well as deletion of certain requests for acceptance review information. Deletion of requests is noted within the specific responses.

The enclosures listed below separate the questions by NRC review branch and provide responses to the requested information. Not all information requested in the May 15, 2008 email is enclosed in this letter. The Accident Dose Branch request was provided in a letter dated May 20, 2008 (reference 2). Responses to the Electrical Engineering Branch Question 1 and all of the Mechanical and Civil Engineering Branch questions will be provided at a later date as discussed with the NRC Staff in a conference call on May 23, 2008.

List of Enclosures:

Enclosure 1 contains questions and responses for the Environmental Review Branch.

Enclosure 2 contains the questions and responses for the Component Performance and Testing Branch.

Enclosure 3 contains questions and responses for the Steam Generator Tube Integrity and Chemical Engineering Branch.

Enclosure 4 contains questions and responses for the Electrical Engineering Branch. As stated above, Question 1 will be submitted at a later date as discussed during the May 23, 2008 teleconference.

Enclosure 5 contains the question and response for the Reactor Systems Branch.

NMC has reviewed the No Significant Hazards Consideration and the Environmental Consideration submitted with Reference 1 relative to the enclosed supplemental information. NMC has determined that there are no changes required to either of these sections of Reference 1.

Commitment Summary

This letter makes no new commitments and does not change any existing commitments.

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

Executed on May 28, 2008.

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

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

Enclosures (5)

1. Enclosure 1, Environmental Review Branch Questions and Responses
2. Enclosure 2, Component Performance and Testing Branch Questions and Responses
3. Enclosure 3, Steam Generator Tube Integrity and Chemical Engineering Branch Questions and Responses
4. Enclosure 4, Electrical Engineering Branch Questions and Responses
5. Enclosure 5, Reactor Systems Branch Questions and Responses

Enclosure 1 to L-MT-08-039

Environmental Review Branch Questions and Responses

ENCLOSURE 1

1) RERB – ENVIRONMENTAL REVIEW BRANCH

NRC Question:

Per yesterday meeting with applicant I would like to request document "2006 MNGP ALARA Report " that was cited in Enclosure 4 to L-MT-08-018 "MNGP extended power uprate Environmental Assessment" under table 7.2.1-1 "Exposure history (in REM) from 2006 MNGP ALARA Report", p. 50 of 69.

NMC Response:

A conference call was held with the requestor on May 20, 2008 to clarify the specifc data requested. The reviewer requested verification of the exposures in the Monticello Extended Power Uprate (EPU) License Amendment Request (LAR) Enclosure 4, Table 7.2.1-1. The reviewer stated five years of exposure data would be sufficient. Rather than submit the "2006 MNGP ALARA Report," NMC agreed to submit confirmation of the exposure data by downloading the history from the Institute of Nuclear Power (INPO) Consolidated Data Entry (CDE) database. The confirming exposures from January 2002 to December 2006 are located in Table 1-1 of this Enclosure.

NRC Question:

1. In sections 6.1.6.1 and 6.2.2 of Enclosure 4, the Environmental Assessment provides a description of the Higgins' eye pearlymussel, a freshwater mollusk, which is a federally endangered species that is located in the Mississippi River in the vicinity of the Monticello Nuclear Generating Plant (MNGP). Its range has been reduced to 50% of historic levels, and is limited to the Mississippi River and three of its tributaries. The pearlymussel is susceptible to entrainment and impingement in its early life stages, including the male gamete and larval (glochidia) stages, both of which are found in river currents. In paragraph 6 of section 6.2.8 (Impingement and Entrainment) sentence one states "Extended power uprate does not effect the impingement and entrainment of organisms...." However, with an increase of the *average annual* water intake from the *current* water withdrawal rate of 509 cubic feet/second (cfs) to the *maximum annual average* surface water appropriation limit of 645 cfs (Section 6.2.2- Surface Water Appropriation), which is greater than a 25% increase in water withdrawal, a strong inference can be made that this increase in water withdrawal will correspondingly lead to a greater than 25% increase in pearlymussel early life stage mortality within the vicinity of MNGP. This would contradict the statement in section 6.2.8 quoted above that no organisms will be affected by impingement and entrainment. While current permits allow for an increase in average water withdrawal, this will still result in an increase in the average annual water withdrawal from the Mississippi River, and a corresponding increase in the mortality of the federally protected juvenile Higgins' eye pearlymussel. Do you have data to evaluate what impact this increased water withdrawal will have on the population of the Higgins' eye pearlymussel?

NMC Response:

After a telephone conference on May 21, 2008, this question was removed.

ENCLOSURE 1

NRC Question:

2. Section 6.2.4 (Increase in Circulating Water Discharge Temperature) describes the thermal impacts associated with an increased discharge temperature of 4.5 degrees F, stating that "The slight discharge canal temperature increase will not result in one half of the surface width of the river temperature exceeding the 90 degree F maximum...", and "... water temperatures downstream are not high enough to harm aquatic species or impede fish migration even in summer months." In section 6.2.6 (Mississippi River Thermal Plume) it is stated "... roughly 30 to 70 percent of the river is unaffected by the heated discharge. This also means that up to 70% of the river width is affected by current heat discharges. And section 6.2.7 (Cold Shock) notes that compliance with State water quality standards was not possible under extreme summer flows. The thermal plume has been noted to extend six kilometers downstream of the plant. With an increase of 4.5 degrees F for thermal discharges, it appears that there can be increases in the length of the thermal plume, increases to the percent of the river affected by the heated discharge beyond the current 70%, and an increase in non-compliance with State water quality standards, which contradicts several of your findings in section 10.0 (Conclusions). Please address these concerns.

NMC Response:

The range of the thermal plume coverage (generally 30 percent to 70 percent) varies based in large part on ambient air, river water temperatures, river flow volumes and distance downstream from the discharge canal. The temperature surveys conducted to map the thermal plume in the1980s used the difference in river temperature from ambient to define the thermal plume. That means a difference of one degree F was considered to be included in the thermal plume.

The Monticello EPU Environmental Assessment indicates that the maximum 4.5 degrees F temperature increase across the plant occurs when the cooling towers are not in operation, which is during the cooler seasons of the year (generally late September through early May). During the warmer months (generally late May through early September), the projected temperature increase across the plant is less than 4.5 degrees F due to tempering by the cooling towers. From the Monticello EPU LAR Enclosure 4, Section 6.2.4 "during combinations of high river temperature and high atmospheric temperatures, discharge canal temperatures have approached the NPDES permit limits with cooling tower operation. During such periods NSP *(Northern States Power)* has reduced power at MNGP to maintain compliance with the NPDES permit. This practice will continue under extended power uprate conditions." Maximum discharge canal temperature limits will not change with EPU.

The Monticello EPU LAR Enclosure 4, Section 6.2.2, states in the first paragraph that, "Extended power uprate does not introduce any significant changes to the screen wash, service water, or circulating water flow requirements. Extended power uprate does not involve any changes to the water appropriation requirements of this permit." Maximum circulating water flow rates will not change with EPU.

ENCLOSURE 1

The plant has operated up to the NPDES permit thermal limit of 95 degrees F in the past as indicated above. From Monticello EPU LAR Enclosure 4, Section 6.2.4, "Based on studies that evaluate the MNGP impact on the river ecosystem, cooling tower operation during the summer months has adequately prevented detrimental environmental effects and water temperatures downstream are not high enough to harm aquatic species or impede fish migration even in summer months. Temperature monitoring of outfall SD001 (discharge canal) is continuous, and NSP has consistently operated MNGP in conformance with the permit's thermal discharge requirements." Summer discharge canal NPDES permit temperature limits will be complied with and maximum circulating water flow rates will not change. Therefore, EPU operation within the NPDES permit thermal limits will not be detrimental to the environment as operation will remain within historical values that have been evaluated by past studies.

Enclosure 1

Table 1-1, Monticello Nuclear Generating Plant External Whole Body Exposure from INPO Consolidated Data Entry:

Radiation Protection												
	2002-Jan	**2002-Feb**	**2002-Mar**	**2002-Apr**	**2002-May**	**2002-Jun**	**2002-Jul**	**2002-Aug**	**2002-Sep**	**2002-Oct**	**2002-Nov**	**2002-Dec**
External Whole Body Exposure (man-rem)	4.799	3.830	3.684	3.307	3.421	2.226	3.501	3.940	3.335	2.683	2.408	2.896
	2003-Jan	**2003-Feb**	**2003-Mar**	**2003-Apr**	**2003-May**	**2003-Jun**	**2003-Jul**	**2003-Aug**	**2003-Sep**	**2003-Oct**	**2003-Nov**	**2003-Dec**
External Whole Body Exposure (man-rem)	3.688	2.939	5.481	30.270	99.592	7.412	2.087	2.328	2.768	4.139	4.413	3.742
	2004-Jan	**2004-Feb**	**2004-Mar**	**2004-Apr**	**2004-May**	**2004-Jun**	**2004-Jul**	**2004-Aug**	**2004-Sep**	**2004-Oct**	**2004-Nov**	**2004-Dec**
External Whole Body Exposure (man-rem)	2.870	2.233	2.283	2.595	2.716	7.039	2.395	1.979	2.688	4.023	2.304	2.069
	2005-Jan	**2005-Feb**	**2005-Mar**	**2005-Apr**	**2005-May**	**2005-Jun**	**2005-Jul**	**2005-Aug**	**2005-Sep**	**2005-Oct**	**2005-Nov**	**2005-Dec**
External Whole Body Exposure (man-rem)	3.228	6.510	124.766	27.939	1.511	1.261	1.521	1.694	1.401	1.599	2.699	1.072
	2006-Jan	**2006-Feb**	**2006-Mar**	**2006-Apr**	**2006-May**	**2006-Jun**	**2006-Jul**	**2006-Aug**	**2006-Sep**	**2006-Oct**	**2006-Nov**	**2006-Dec**
External Whole Body Exposure (man-rem)	2.053	1.828	3.211	3.942	3.650	3.545	1.298	1.534	1.748	3.079	3.738	3.788

Annual Exposure	**2002**	**2003**	**2004**	**2005**	**2006**
External Whole Body Exposure (man-rem)	**40.030**	**168.859**	**35.194**	**175.201**	**33.414**

Enclosure 2 to L-MT-08-039

Component Performance and Testing Branch Questions and Responses

2) CPTB – COMPONENT PERFORMANCE AND TESTING BRANCH

NRC Question:

1. In response to Generic Letter (GL) 89-10,"Safety-Related Motor-Operated Valve Testing and Surveillance," and 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves," the licensee should have in place approved programs for design-basis review, testing and surveillance for safety-related MOVs. Provide an evaluation of the EPU impact on these programs.

NMC Response:

All Extended Power Uprate (EPU) Task Reports for the various systems were reviewed to determine increases in system pressure caused by EPU:

- The Reactor Water Cleanup (RWCU) tie to Feedwater results in a 12.1 psig increase. This increase is applied as an increase to the RWCU Isolation valves.
- An increase of slightly less than 5 psig occurs for Residual Heat Removal Service Water (RHRSW) due to EPU. There are no RHRSW valves in the GL 89-10 Motor-Operated Valve (MOV) Program.
- An increase in the Containment Response pressures for both wetwell (+1.5 psig) and drywell (+4.1 psig) peak pressures. This increase is applied to applicable MOV system calculations.

All of the functional calculations and each of the valve scenarios have been reviewed for changes due to these increases.

A review of GL 89-10 MOVs for effects due to EPU conditions was performed based on changes to environmental temperatures associated with High Energy Line Break (HELB) and post-LOCA Reactor Building Heatup.

Changes identified from the above review were used as inputs to the Monticello MOV (MMOV) database, which computes required and available thrusts and compares the field test results to compute various operating margins.

MOVs that are powered by DC were evaluated using the Boiling Water Reactor Owner's Group (BWROG) DC MOV Methodology. The results from the DC BWROG methodology were input into the MMOV database and margins were obtained, as before.

Following the review of MOV Functional calculations, the following adjustments were made to line pressure and differential pressure for the affected valves and scenarios:

- MO-1426 and MO-4229, MO-4230 (Reactor Building Closed Cooling Water (RBCCW) Drywell Isolation) isolate against maximum drywell pressure (+4.6 psig from previous analysis). The MMOV database pressure for RBCCW valves was increased by 10 psig for both differential pressure and line pressure.
- MO-1986 and MO-1987 (RHR Suction Isolation) isolate against maximum wetwell pressure (+1.5 psig from previous analysis). The MMOV database

pressure for these RHR valves was increased by 10 psig for both differential pressure and line pressure.

- MO-2100, MO-2101, and MO-2102 (Reactor core isolation cooling (RCIC) Pump Suction Isolation) open (MO-2100, MO-2101) or isolate (MO-2102) against maximum wetwell pressure (+1.5 psig from previous analysis). The MMOV database pressure for these RCIC valves was increased by 10 psig for both differential pressure and line pressure.
- MO-2096 (RCIC Barometric Condenser Isolation) isolates against maximum wetwell pressure (+1.5 psig from previous analysis). The MMOV database pressure for this RCIC valve was increased by 10 psig for both differential pressure and line pressure.
- MO-2061 and MO-2062, MO-2063 (high pressure coolant injection (HPCI) Suction Isolation) open (MO-2061, MO-2062) or isolate (MO-2063) against maximum wetwell pressure (+1.5 psig from previous analysis). The MMOV database pressure for these HPCI valves was increased by 10 psig for both differential pressure and line pressure.
- MO-2397 and MO-2398 (RWCU Containment Isolation) isolate against maximum drywell pressure (+4.1 psig from previous analysis). The MMOV database pressure for RWCU valves was increased by 10 psig for both differential pressure and line pressure.

MOVs have been evaluated using peak temperature values that in many cases are higher than the equivalent current functional value. The values used are bounding and are used for analytical convenience. As noted above, the values used for pressure changes (both differential pressure and line pressure) are chosen to be significantly above the changes due to EPU.

After making the temperature changes and applying the BWROG DC Motor Performance Methodology (as applicable), a margin report was obtained to determine the margin differences reported for each valve.

The results of the MOV Margin Report were reviewed to determine which valves in the GL 89-10 MOV population had margins which were reduced to, or below zero percent due to changes determined above.

Conclusion

All MOVs with the following exception will perform their safety-related functions under EPU conditions:

MO-2021 requires field adjustment to the torque switch to reduce the output thrust below the maximum actuator capability at degraded voltage conditions.

This is the valve identified in PUSAR Section 2.2.4, MO-2021 (RHR Containment Spray Isolation).

NRC Question

2. Provide review results of each safety-related systems and safety-related valves (including safety/relief valve setpoints) that are affected by EPU, and maximum changes in flow rate, pressure, and fluid/ambient temperature. The licensee states that a field adjustment to a torque switch setting was identified for one MOV. The licensee should identify this valve and associated system, and provide the evaluation that resulted in the required adjustment.

NMC Response:

As clarified by conference call with the staff on May 20, 2008, the following PUSAR sections (Monticello EPU License Amendment Request (LAR) Enclosure 5) contain evaluations for specific systems regarding changes, if any, due to new EPU conditions for flow rate, pressure, and temperature:

- ADS (Automatic Depressurization System) PUSAR, Section 2.8.4.2 notes that:

  NMC has evaluated the effects of the proposed EPU on the overpressure protection capability of the plant during power operation. The evaluation indicates that the plant will continue to have sufficient pressure relief capacity to ensure that pressure limits are not exceeded.

- RHR (Residual Heat Removal System) PUSAR, Section 2.8.4.4 notes that:

  NMC has evaluated the effects of the proposed EPU on the RHR system. The evaluation indicates that the RHR system will maintain its ability to cool the Reactor Coolant System (RCS) following shutdown and provide decay heat removal.

  In addition, the Low Pressure Coolant Injection (LPCI) mode of RHR is discussed in PUSAR Section 2.8.5.6.2.

- SLCS (Standby Liquid Control System) PUSAR, Section 2.8.4.5 notes that:

  NMC has evaluated the effects of the proposed EPU on the SLCS. The evaluation indicates that the system will continue to provide the function of reactivity control independent of the control rod system following implementation of the proposed EPU.

- HPCI (High Pressure Coolant Injection System) PUSAR, Section 2.8.5.6.2 notes that:

  Because the maximum normal operating pressure and the safety relief valve (SRV) setpoints do not change for EPU, the HPCI system performance requirements do not change.

- Core Spray (CS) System, PUSAR, Section 2.8.5.6.2 notes that:

  The slight change in the system operating condition due to EPU for a postulated LOCA does not affect the hardware capabilities of the CS system. The generic core spray distribution assessment provided in General Electric (GE) ELTR2, Section 3.3, continues to be valid for the EPU as described in GE CLTR, Section 4.2.3.

As described in PUSAR Section 2.2.4, MO-2021 (RHR Containment Spray Isolation) requires a field adjustment to the torque switch. Under EPU conditions, the ambient accident temperature increases to the point that the actuator available output is decreased slightly (-0.65 percent) below the current torque switch setting. This valve is also identified in response to Question 1 of this enclosure.

NRC Question

3. Describe activities and lessons learned programs that are dedicated to the enhancement of MOVs and AOVs performance/design basis review, and testing programs.

NMC Response:

MOV Program

The purpose of the MMOV Program is to ensure that all safety-related MOVs are selected, set and maintained so that the MOVs will operate under design basis conditions.

AOV Program

The purpose of the Monticello Air Operated Valve Program is to ensure that air operated valves determined to be active safety related, safety significant, or critical are selected, set, tested, and maintained so that the Air Operated Valves (AOVs) will operate under normal, abnormal, or emergency operating design basis conditions. Furthermore, the AOV Program will ensure continued AOV reliability for the life of the plant.

Additionally, NMC fleet procedures require operating experience to be evaluated and incorporated for the corresponding programs.

The MOV and AOV programs are governed by site and fleet procedures which address:

- MOV and AOV Program Requirements
- MOV and AOV Program Engineering Standards
- Grouping Of MOVs For Selection Of Test Frequency
- MOV Margin Improvement
- MOV Program Design Methodology
- MOV Margin Analysis and Periodic Verification
- MOV Diagnostic Test Preparations and Evaluation

NRC Question

4. Provide an evaluation of EPU impact on the functional design of safety-related pumps, and EPU impact on the IST program for pumps and valves.

NMC Response:

The Monticello EPU LAR, Enclosure 5 (PUSAR), Section 2.3.3 and 2.8 evaluate the EPU impact on safety related pumps.

Impact on the Monticello IST Program:

The ASME Inservice Test (IST) Program at Monticello is on a concurrent Ten-Year Interval (the Fourth IST Ten-Year Interval) which began on March 9, 2003. The Code of Record is the 1995 Edition through 1996 Addenda of the ASME Code for Operation and Maintenance of Nuclear Power Plants (OM Code).

Evaluation of the effect of changes in plant conditions on the performance of components in the ASME IST Program is performed as part of the design change process. Design changes that are required to implement the EPU will perform this evaluation. The scope of the Monticello ASME IST Program will not be affected by the EPU. There are no new components added or existing components deleted within the boundaries of the existing ASME IST Program (as listed in the Monticello EPU LAR, Enclosure 8). Also, no changes to any test periodicities are needed. In conclusion, no changes are anticipated in the ASME IST Program as a result of the Monticello EPU.

NRC Question

5. Precedents approved
-SPU Amendment Request for Millstone 3. (Section 2.2.4) (ADAMS #ML072000386)
-SPU Amendment Request for Comanche Peak, (Section 2.2.4) (ADAMS #ML072490131)

NMC Response:

Reference to precedent discussed during May 20, 2008 conference call. No response required.

Enclosure 3 to L-MT-08-039

Steam Generator Tube Integrity and Chemical Engineering Branch Questions and Responses

3) CSGB – SG TUBE INTEGRITY AND CHEMICAL ENGINEERING BRANCH

NRC Question:

2.1.5 Protective Coating Systems (Paints) - Organic Materials

The applicant should identify the conditions (temperature, pressure, radiological dose) used to qualify Service Level I protective coatings in containment for current operating conditions and assess whether they remain bounding for DBA conditions following the extended power uprate.

NMC Response:

a. The coating systems for the Monticello drywell are Carbozinc 11/Phenoline 305, with repairs made using Carboline 890/Carboline 890. The following table shows the qualification test report values and comparisons to extended power uprate (EPU) conditions.

System	Peak Temp. ° F	Peak Press (psig)	Irradiation (Rads)
CZ11/305	320	50	2E8
890/890	320	50	2E8
EPU Conditions	278	44.1	5.44E7

b. The coating systems for the Monticello torus are Carbozinc 11/Phenoline 368 WG, with repairs made using Phenoline 368 Primer/Phenoline 368 WG and with Phenoline 368WG/Phenoline 368WG. The following table shows the qualification test report values and comparisons to EPU conditions.

System	Peak Temp. ° F	Peak Press (psig)	Irradiation (rads)
CZ11/368WG 368/368WG	340	70	1E9
368WG/368WG	281	42	3E8
EPU Conditions	207	33.8	5.44E7

NRC Question:

2.1.6 Flow-Accelerated Corrosion

The applicant should provide a sample list of components for which wall thinning is predicted and measured by ultrasonic testing or other methods in order to assess the accuracy of the FAC predictions from CHECWORKS. This list should also include the initial wall thickness (nominal), current (measured) wall thickness, and a comparison of the measured wall thickness to the thickness predicted by the CHECWORKS FAC model.

The applicant should identify those systems that are expected to experience the greatest increase in wear as a result of power uprate and the effect of individual process variables (i.e., moisture content, temperature, oxygen, and flow velocity) on each system identified. For the most susceptible systems and components, the applicant should provide the total predicted increase in wear rate due to FAC as a result of power uprate conditions.

NMC Response:

a. To address the request from the first paragraph, NMC has attached Table 3-1. Table 3-1 contains a sampling of components that demonstrates the accuracy of the CHECWORKS model. The list is populated by the susceptible modeled components that were examined during the last refueling outage. It shows the predicted thickness prior to the outage and the actual measured thickness during the outage and a comparison of the two.

The results show that the model predicts the measured thickness with an average accuracy of approximately five percent. This is conservative because the actual thickness is greater than the predicted thickness, thus allowing margin.

Table 3-1, FAC Sample List

System	Component	Tnom	Checworks Predicted Thickness @ RFO 23	RFO 23 Actual Measured Thickness	Ratio of Measured to Predicted (measured/predicted)
Condensate	NX-13142-1D E3	0.38	0.36	0.364	1.017
Condensate	NX-13142-1D E4	0.38	0.37	0.374	1.017
Extraction Steam	NX-13142-96A P13	0.38	0.44	0.453	1.026
Extraction Steam	NX-13142-96B P8	0.38	0.33	0.337	1.035
Feedwater	NX-13142-53F E3	0.59	0.64	0.667	1.038
Feedwater	NX-13142-53F P4	0.59	0.49	0.497	1.023
Heater Drain	NX-13142-10C E1	0.44	0.34	0.358	1.057
Heater Drain	NX-13142-10C E2	0.37	0.31	0.338	1.086
Heater Drain	NX-13142-10C E3	0.37	0.33	0.353	1.082
Main Steam	NH-108168 E1	0.28	0.26	0.275	1.061
Main Steam	NH-108168 E2	0.28	0.25	0.27	1.062
Main Steam	NH-108168 E3	0.28	0.23	0.247	1.068
Main Steam	NH-108169 E1	0.28	0.23	0.25	1.068
Main Steam	NX-13142-138B E6	0.28	0.25	0.263	1.054

b. To address the request from the second paragraph, the following summarizes the activities performed to evaluate the effect of EPU conditions:

The Checworks model was revised for EPU heat balance information conditions (flows, pressures, enthalpies, etc.). Analyses for three cycles (cycle 24 through cycle 26) were performed for both current power level (1775 MWt) and EPU power level (2004 MWt).

Data for wear rate, remaining life, and other variables was gathered for 825 components (modeled components that would be affected by the change in power) at both power levels. The two datasets were then compared to each other to determine the effects on the parameters.

The results in Table 3-2 below show the systems that are expected to experience the greatest increase in wear as a result of EPU and the effects of the individual process variables. The total predicted increase in wear rate of the systems is also shown in the table.

Table 3-2, Predicted Increase In Wear Rate due to EPU

System	Wear Rate	Press	Temp	Quality	Enthalpy	Flow Velocity	Oxygen	Comments
Extraction Steam	**29.00**	15.70	3.30	-0.10	0.20	27.20	21.30	This wear rate only applies to two small sections of straight pipe, one on each train, off of the 14 heater extraction steam inlet nozzles. Note that the affected components will be replaced with the new feedwater heaters in 2011.
Condensate	**22.18**	27.65	6.20	0.00	0.00	18.95	0.00	This covers most of the condensate piping; from the 11 drain coolers to the 13 heaters.
Feedwater	**20.62**	23.60	4.80	0.00	0.00	19.60	0.00	This affects the piping between the 14 and 15 heaters.
Heater Drain	**20.21**	25.27	5.27	0.00	0.00	16.53	5.00	The two areas affected are between the 12 heaters and the 12 drain coolers and between the 14 and 13 heaters.

Enclosure 4 to L-MT-08-039

Electrical Engineering Branch Questions and Responses

4) EEEB – ELECTRICAL ENGINEERING BRANCH

NRC Question

1) In Section 2.3 of the LAR under the section titled 'Outside Containment', the licensee stated the following:

"The total integrated doses (normal plus accident) for EPU conditions were evaluated and determined not to adversely affect qualification of most of the EQ equipment located outside of containment. Equipment not qualified to the new environmental conditions at EPU will be reanalyzed, re-qualified, or replaced prior to implementation of EPU."

In order for the Electrical Engineering Branch (EEEB) to start its review, the full EQ analysis must be completed. This includes any reanalysis, re-qualification, or replacement of equipment. The licensee must also describe how the equipment was evaluated (e.g., calculations, assessments, etc.) and show how the equipment remains bounded (i.e., provide the original design parameters and the updated values including the supporting calculations).

NMC Response:

The response to this question will be submitted later as discussed in the May 23, 2008 teleconference.

NRC Question

2) For each topic in Section 2.3 of the LAR, the licensee consistently concludes that systems, structures, and components continue to remain bounded by existing analyses.

In order for EEEB to start its review, the licensee must demonstrate how the analyses for the SSCs remain bounding (i.e., provide the original design parameters and the updated values including the supporting calculations). Additionally, the licensee also must provide more detailed information as to how the SSCs were evaluated.

NMC Response:

Environmental Qualification of Electrical Equipment (PUSAR Section 2.3.1)

This section will be addressed in the response to Question 1 to be submitted later as discussed in the May 23, 2008 teleconference.

Offsite Power System (PUSAR Section 2.3.2) and Onsite AC Power Systems (PUSAR Section 2.3.3)

The safety related loads do not change at extended power uprate (EPU) conditions. The existing analysis shows that sufficient voltage and capacity is available to start and operate safety related loads based on the power requirements of the loads.

The onsite buses are designed to provide acceptable voltage to the safety related loads under worst case grid voltage conditions. The AC power requirements for the operation of safety related loads will not change under EPU.

Monticello's AC Load Study program controls and maintains the databases and computer models used to evaluate and record electrical load study cases and calculations that are performed. This program is used to assure that the distribution system voltage ranges meet the underlying electrical system design bases for plant conditions. The following loading conditions are analyzed to ensure that the electrical system design bases are maintained:

A. Full plant load
B. Emergency Core Cooling System (ECCS)/Loss of Coolant Accident (LOCA) plant load
C. Minimum plant load

The AC Load Study program has established the following electrical system design bases for determining acceptable distribution system voltages:

1. 120 VAC Instrument AC System Voltages:
   Maximum - 132 VAC, Minimum - 108 VAC (+/− 10% of rated 120 VAC)

2. 480 VAC System Voltages:
   Maximum - 506 VAC, Minimum - 426 VAC (+/− 10% voltage at the terminals of 460 VAC)

3. 4160 VAC System Voltage:
   Maximum - 4400 VAC at the 4 kV motor terminals (110% of rated 4000 VAC), Minimum - 3975 VAC

A separate analysis verifies that the bases for degraded voltage relay setpoint remains valid under the EPU configuration and loading conditions. This analysis will include the transformer and balance of plant (BOP) modifications planned for EPU. Plant procedures incorporate these limits.

Non-safety Related AC System Loads

At EPU conditions there will be an increase in the non-safety related electrical loads primarily due to increased condensate/feedwater pump flow requirements. The impact of this increase results in several challenges. The capacity of the 1R transformer is marginal. The start of a larger feedwater pump increases the voltage drop to the 4.16 kV switchgear resulting in reduced margins to protective relaying setpoints. Also, the fault contribution from larger motors reduces the margin to the fault ratings of the switchgear and any increase in the capacity of the 1R transformer will exacerbate the situation. Consequently, the configuration of the 1R and 2R sources and non-safety onsite distribution system will be modified to increase capacity and improve margins to equipment ratings and protective relaying setpoints. The modifications to the 1R and

2R offsite power sources are in the conceptual stage at this time and are scheduled for installation in the 2011 outage.

Offsite Power System Grid Voltages

The offsite power system is designed to provide adequate power to site loads given that the steady state source 345 kV and 115 kV grid voltages are within the ranges specified by plant procedures. The ranges are derived from the plant AC load studies. Operation within these ranges provides adequate voltage for operability of safety related equipment, provides for proper operation of various automatic voltage regulating equipment such as load tap changers, and will result in the avoidance of inadvertent bus transfers of the safety related buses due to degraded voltage when starting plant equipment. This performance will be demonstrated by the AC load studies completed as part of the off-site source (1R and 2R) modifications.

Modification Control for EPU

The configuration changes noted above will be controlled by the Monticello Modification Process. This process requires compliance with site work instructions for the Fuse/Breaker Coordination Study and AC Electrical Load Study. Conformance to the Monticello licensing bases is controlled by required load studies for changes to the site AC electrical system. The AC load study is described in the Updated Safety Analysis Report USAR) and references the associated NRC review and approval correspondence. AC load studies become formal plant calculations. The AC load study assumptions and the EPU impact are noted below.

- Loads shed by ECCS load shedding are not included in the Offsite AC System loading determination for the Design Basis Accident (DBA) LOCA loads.

  EPU Impact: EPU does not involve any changes to load shedding circuits.

- The AC load studies include minimum and maximum equipment voltages for steady state operation and motor starting. It also includes, by reference, the degraded voltage setpoints.

  EPU Impact: The load study established voltage limits based on equipment design. These limits were established with NRC approval. EPU does not change these limits. All of the new EPU AC motors will be designed to start and operate within the existing voltage limits or, if operated at a different voltage base, new limits will be established based on equipment design. EPU does not require any changes to the setpoints for the degraded bus voltage and loss of voltage logic.

- The Offsite AC System load application is based on ECCS load sequencing.

  EPU Impact: EPU does not affect any of the timing associated with ECCS load sequencing.

- The Demand and Diversity Factors for AC Load Studies are included in the AC load study.

  EPU Impact: EPU does not require any changes to this load application methodology.

- Steady state voltage profile studies are completed using the maximum (Weak System) switchyard impedance with the minimum specified distribution system voltage. Short circuit studies use the minimum (Strong System) switchyard impedance with the maximum distribution system voltage.

  EPU Impact: EPU does not change these conservative assumptions.

DC Onsite Power System (PUSAR Section 2.3.4)

DC Onsite Power System changes remain bounded by battery capacity. Revision of station DC battery calculation verified acceptable margin remains after EPU.

- Monticello 125 VDC Division I Battery has spare capacity of 15.83 percent under EPU conditions. The CLTP analysis had a battery margin of 10.50 percent.

- Monticello 250 VDC Division I Battery has spare capacity of 20.64 percent under EPU conditions. The CLTP analysis had a battery margin of 23.63 percent.

- Monticello 125 VDC Division II Battery has spare capacity of 26.58 percent under EPU conditions. The CLTP analysis had a battery margin of 20.24 percent.

- Monticello 250 VDC Division II Battery has spare capacity of 8.19 percent under EPU conditions. The CLTP analysis had a battery margin of 2.04 percent prior to EPU.

Improvements in margin were based on changes in the Station Blackout (SBO) scenario assumptions as provided in Monticello EPU LAR Enclosure 5 (PUSAR Section 2.3.5) and use of more realistic assumptions on battery loading in the calculation. The revised calculations included all pending minor changes to the calculations. No changes are expected for 250 VDC battery loads. Potential loading changes to the 125 VDC systems are not expected to be significant based on 10 CFR 50.59 screening or evaluation of the proposed changes.

Station Blackout and DC Loading (PUSAR Section 2.3.5)

The design basis loading for the safety related DC systems is the loading profile that occurs during an SBO event. The DC System electrical design parameters at the end of the four hour design basis SBO load discharge remain within design.

The DC battery calculations for EPU demonstrate that, given conservative assumptions for the timing and application of DC loads during this event, sufficient DC power is

available to start and operate all mitigation equipment in accordance with the applicable IEEE acceptance criteria, and that additional design margin is available.

Divisional 250 VDC Systems

An important Division II battery loading assumption is the timing and number of automatic High Pressure Coolant Injection (HPCI) cycles in the four hour SBO period. The SBO analysis has been revised for EPU conditions. The current licensed thermal power (CLTP) 250 VDC battery load profile assumes five automatic HPCI cycles in the SBO event. The EPU SBO analysis demonstrated that the number of required HPCI cycles over the design coping duration is four cycles or less. This result, of itself, is necessary but not sufficient to conclude that the SBO DC load profile at EPU is bounded by the existing DC load profile at CLTP. The timing of the loads affects the battery load flow profile, and therefore the battery sizing and the node voltages. The EPU equipment run times and the timing changes were developed into a load profile and the DC system calculation was revised. Based on the results of this revision, the Division II 250 VDC system has sufficient capacity to start and operate all connected DC loads for the worst case loading scenario.

The Division I 250 VDC System primarily provides power to Reactor Core Isolation Cooling (RCIC) loads. The associated battery sizing calculation shows that the RCIC System can be started and automatically stopped once followed by two additional manual restarts. This can be accomplished with significant spare capacity. The calculation supports the SBO mitigation strategy by demonstrating sufficient battery capacity for operation of RCIC loads to support the starts above. If available, RCIC System operation during an SBO is preferred since it lowers risk by preserving the Division II battery for HPCI operation. There is no event analysis that provides specific load flow timing information to this DC calculation beyond the initial automatic RCIC System start assumption, which is not changing for EPU. Since RCIC is not credited in the SBO analysis, EPU has no material effect on this calculation.

Divisional 125 VDC Systems

The assumptions for battery sizing and voltage drop for the Division I 125 VDC battery are based, in part, on the same HPCI run times assumptions used in the 250 VDC case. The results, however, are not particularly sensitive to HPCI run times since the 125 VDC loads are primarily a function of the automatic Loss of Offsite Power (LOOP) responses of equipment not credited in the SBO mitigation such as 4 kV breaker logic. EPU does not significantly affect the response of this equipment during an SBO or the associated load timing assumptions and methodology. The updated calculation incorporated the results from the EPU analyses and demonstrated that the load profile is not significantly affected, and that sufficient battery capacity exists to start and operate all connected DC loads for the worst case loading scenario.

The assumptions for battery sizing and voltage drop for the Division II 125 VDC battery are similar to the Division I calculation except for the divisional load changes. As above, the results are not particularly sensitive to changes due to EPU. The updated calculation demonstrated that the load profile is not significantly affected, and that

sufficient battery capacity exists to start and operate all connected DC loads for the worst case loading scenario.

NRC Question

3) In Section 2.3 of the LAR (Specifically Sections 2.3.3 and 2.3.4), the licensee stated that some equipment may change.

In order for EEEB to start its review, the licensee must provide assurance that all required plant modifications are accounted for in its EPU application.

NMC Response:

The Monticello EPU LAR, Enclosure 8, "Planned Modifications for Monticello Extended Power Uprate," contains a comprehensive list of all modifications that are planned for EPU. As noted in Enclosure 8, some of the listed modifications have been completed, some are planned for installation in 2009, and some are planned for installation in 2011. These tables also include modifications that are not required for EPU, but are being planned as part of the life cycle management (LCM) program.

Modifications that have already been completed were those required to obtain data for steam dryer analysis. The remaining modifications are required to support full power operation at 2004 MWt. Completion of turbine modifications planned for 2009 will enable operation at power levels above CLTP. None of the planned modifications listed below are safety related except for the modification providing upgrades to EQ equipment. Modifications associated with the Monticello EPU LAR Enclosure 5 (PUSAR), Section 2.3 are described below:

PUSAR Section 2.3.1, Environmental Qualification of Electrical Equipment, Modifications:

- HELB Update/EQ Update – The response to EEEB Question 1 will provide more detailed information. Question 1 will be submitted at a later date as discussed with the NRC staff on May 23, 2008.

PUSAR Section 2.3.2, Offsite Power Systems, Planned Modifications:

- 1AR Transformer Replacement – replacement due to aging not EPU
- Main Transformer and Isophase Duct – increased capacity
- Reactor Feed Pump Replacement – new higher horsepower 13.8kV motor
- Condensate Pump Upgrades – new higher horsepower 13.8kV motor
- New 13.8kV Bus Installation – replace existing 11 and 12 4kV buses with 13.8kV bus including replacement of the 1R and 2R transformers
- Replace the Recirculation M-G Set Motors – new 13.8kV motor

Increases in required condensate and feedwater pump capacity for EPU result in electrical loads for onsite non-safety related AC power systems that exceed the capacity of the existing system. The modifications listed above provide upgrades to

plant non-safety related AC electrical distribution systems to correct this deficiency. There are no changes required to safety related buses.

The existing non-safety related #11 and #12 4kV buses will be replaced with a new bus rated at 13.8kV. This will require replacing all motors associated with the new bus to provide motors rated at 13.8kV. These modifications will insure compliance with design requirements as defined in the Technical Evaluation of PUSAR Section 2.3.2.

The electrical modifications planned for upgrade of the Offsite Power Systems are required due to the upgrades to the onsite AC systems. Potential grid modifications will be identified, if required, as part of the Midwest Independent System Operator (MISO) grid stability study associated with approval of the interconnection application for generation needed to support 2004 MWt reactor power. These modifications will be provided to the NRC for review by a later submittal as described in Sections 1.0 and 2.0 of the Monticello EPU LAR Enclosure 1, "NMC Evaluation of Proposed Changes to Operating License and Technical Specifications for Extended Power Uprate." A separate license amendment request will be submitted to increase the power level to 2004 MWt.

The MISO grid stability study for approval of the interconnection application for generation needed to support 1870 MWt did not identify any grid modifications as being required. This study will be submitted to the NRC by June 30, 2008.

PUSAR Section 2.3.3, Onsite AC Power System, Planned Modifications:

There are no modifications required for the alternating current (AC) onsite power system for those standby power sources, distribution systems, and auxiliary supporting systems provided to supply power to safety-related equipment.

EPU does not affect the timing associated with ECCS load sequencing and has no effect on Emergency Diesel Generators (EDG) transient performance. There are no changes to the sequencing and timing of AC ECCS loads during a DBA LOCA. EPU has no effect on the functional requirements for the instrumentation and control subsystems of the safety-related EDG power systems and there are no changes to the instrumentation and control systems of the essential AC systems.

The EDG design basis loading is not affected by EPU. The EDG continuous load rating of 2500 kW envelopes the initial and steady state loading for the EDG. In addition, EDG transient voltage and frequency performance is not affected since the EDG loading does not change. See PUSAR Section 2.8.5.6.2, Emergency Core Cooling System and Loss-of-Coolant Accidents, for the evaluation of ECCS loads.

PUSAR Section 2.3.4, DC Onsite Power System, Planned Modifications:

There are no currently identified modifications to the DC Onsite Power Systems. The DC System may be modified to include changes for certain EPU modifications.

These modifications are not directly due to power dependent effects on equipment used in design basis event mitigation (safety related equipment). For instance, modifications to the 4kV switchgear to improve short circuit margin may require changes to the 125 VDC System. In some cases, additional loads may be included, which will be evaluated by the DC load study engineer in accordance with the Monticello modification process. These modifications will be accomplished without significantly reducing existing design margins. See the response to Question 4 for PUSAR Section 2.3.4 below for a discussion of existing analysis results and impact on margins.

PUSAR Section 2.3.5, Station Blackout, Planned Modifications:

There are no modifications required for SBO.

NRC Question

4) In Section 2.3 of the LAR, the licensee consistently notes that conditions do not change significantly as a result of EPU.

In order for EEEB to start its review, the licensee must quantify the changes in conditions as a result of the proposed EPU.

NMC Response:

PUSAR Section 2.3.1, Environmental Qualification of Electrical Equipment

This PUSAR Section notes that the "normal temperature, pressure, and humidity conditions do not change significantly as a result of EPU." The response to Question 1 will provide more detailed information. Question 1 will be submitted at a later date as discussed with the staff on May 23, 2008.

PUSAR Section 2.3.2, Offsite Power System

This PUSAR section describes the offsite power system evaluation. The basis for no significant change is provided in LAR Enclosure 14, "Grid Stability Evaluation Summary." In addition, PUSAR Section 2.3.2 notes:

> "Monticello USAR Section 8.2 describes the separation and independence of the offsite power supplies. The detailed description of the network interconnections will change with the electrical modifications planned for EPU, however, the adequacy of the independence and separation of the offsite power supplies will be maintained.
>
> EPU can affect the grid and AC loads served by the offsite power supply system. Several modifications to existing onsite and offsite electrical equipment are necessary to assure the system is adequate for operation with increased non-safety related in-plant loads and uprated plant electrical output as shown in PUSAR Table 2.3-3. The review concluded the following:

- The continuous current rating of the isolated phase bus will be upgraded from 18.7 kA to support the higher Generator output of 19.834 kA at EPU condition. This will be accomplished by modification of the forced air-cooling system.

- The main transformer will be replaced for EPU operation and the associated switchyard components (rated for maximum transformer output) are adequate for the uprated transformer output.

- The protective relaying for the main generator is adequate for the uprated generator output with some changes in protective relay setpoints.

- With modification of the 1R and 2R supplies and onsite non-safety distribution, the offsite AC power sources will be adequate to accomplish required ECCS functions under postulated design basis accident conditions with the 115kV and 345kV grid voltages within the operating limits described in USAR Section 8.10.

- An independent engineering firm was contracted to perform a grid stability study for the increased EPU generator output. The results indicate that, with the completion of some grid modifications, the electrical output can be increased without compromising the capability of the off-site power sources supplying the in-plant loads, with the completion of some modifications, as defined in the current licensing basis. A summary of this study was provided in Enclosure 14 of the License Amendment Request.

The current licensing basis addresses onsite and offsite electrical supply and distribution systems for safety-related components. There is no significant effect on grid stability or reliability. There is no increase in safety-related loads at EPU conditions.

At EPU conditions, the modified Offsite Power System will have sufficient capacity to start and operate the required safety-related AC loads that are postulated to operate during design basis events. The capacity of the offsite sources will be such that a degraded bus voltage transfer will not occur for the limiting design basis load cases.

At EPU conditions, the modified Offsite Power System will supply power within the existing design voltage ranges for starting and steady state operation of AC electrical equipment, selective coordination will be maintained, and steady state currents and fault currents will be within the design ratings of the AC electrical equipment."

PUSAR Section 2.3.3, Onsite AC Power System

The evaluation states that the safety related AC onsite power system will continue to meet the requirements of Monticello's current licensing basis following implementation

of the proposed EPU. As noted in the response to Question 2 above, some modifications are required for non-safety related onsite AC power systems.

PUSAR Section 2.3.4, DC Onsite Power System

DC Onsite Power System changes remain bounded by battery capacity. Revision of station DC battery calculations verified acceptable margin remains after EPU.

- Monticello 125 VDC Division I Battery has spare capacity of 15.83 percent under EPU conditions. The CLTP analysis had a battery margin of 10.50 percent.

- Monticello 250 VDC Division I Battery has spare capacity of 20.64 percent under EPU conditions. The CLTP analysis had a battery margin of 23.63 percent.

- Monticello 125 VDC Division II Battery has spare capacity of 26.58 percent under EPU conditions. The CLTP analysis had a battery margin of 20.24 percent.

- Monticello 250 VDC Division II Battery has spare capacity of 8.19 percent under EPU conditions. The CLTP analysis had a battery margin of 2.04 percent prior to EPU.

Improvements in margin were based on changes in the SBO scenario assumptions as provided in PUSAR Section 2.3.5 and use of more realistic assumptions on battery loading in the calculation. The revised calculations included all pending minor changes to the calculations. No changes are expected for 250 VDC battery loads. Potential loading changes to the 125 VDC systems are not expected to be significant based on 10 CFR 50.59 screening or evaluation of the proposed changes.

PUSAR Section 2.3.5, Station Blackout

The evaluation states that the plant will continue to meet the requirements of 10 CFR 50.63 following implementation of the proposed EPU.

Enclosure 5 to L-MT-08-039

Reactor Systems Branch Questions and Responses

Enclosure 5

5) SRXB – REACTOR SYSTEMS BRANCH

NRC Question

The SRXB issue with Rod Drop Accident is as follows:

Appendix B to SRP Section 4.2, Revision 3, provides new acceptance criteria for the "reactivity initiated accident," i.e., the Control Rod Drop Accident.

The acceptance criteria are given in terms of peak radial average fuel enthalpy and fuel rod internal pressure for low-power events with respect to high cladding temperature. At greater than 5% thermal power, the criterion is based on CPR. For pellet clad metal interaction, fuel failure criteria are expressed in terms of radial average fuel enthalpy and fuel hydrogen content.

The acceptance criteria are below the previously accepted 170 cal/g for fuel failure, and significantly below the design limit of 280 cal/g.

NMC Response

This NRC question was discussed with the NRC staff, General Electric (GE), and Nuclear Management Company, LLC (NMC) during a teleconference held on May 16, 2008. During this discussion it was determined by the NRC staff that this question could be removed from the acceptance review. No response from NMC or GE is necessary for acceptance review.