NMC
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Monticello Nuclear Generating Plant
Operated by Nuclear Management Company, LLC

WITHHOLD ENCLOSURE 5 FROM PUBLIC DISCLOSURE UNDER 10 CFR 2.390

September 25, 2007

L-MT-07-055
10 CFR 50.90
10 CFR 50.46

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

License Amendment Request: Revision to the Allowable Value and Channel Calibration Surveillance Interval for the Recirculation Riser Differential Pressure - High Function

Pursuant to 10 CFR 50.90, the Nuclear Management Company, LLC (NMC) proposes to revise the allowable value for Technical Specification (TS) Function 2.j, "Recirculation Riser Differential Pressure - High (Break Detection)," in Table 3.3.5.1-1, "Emergency Core Cooling System (ECCS) Instrumentation," of Specification 3.3.5.1. This change is based on a reanalysis of the small break Loss of Coolant Accident (LOCA) which determined a new minimum detectable break area for the Low Pressure Coolant Injection (LPCI) loop select logic. Also, the NMC proposes to revise the associated channel calibration frequency for this instrumentation from a 12-month to a 24-month nominal interval for the Monticello Nuclear Generating Plant (MNGP).

The reanalysis was performed for General Electric (GE)14 fuel and reflects a methodology change which considered the potential for axial power shape to influence the overall design basis accident results. This methodology change resulted in a change in the licensing basis accident with the highest Peak Cladding Temperature (PCT). As a result, a small break rather than the large recirculation line break LOCA has become the limiting accident with respect to PCT. The NMC proposes to re-zero the licensing basis PCT for GE14 fuel at the new value of 1990°F determined by the reanalysis.

Enclosure 1 provides a description of the proposed change and includes the technical evaluation and associated no significant hazards and environmental considerations. Enclosure 2 provides marked-up TS pages indicating the proposed changes. Enclosure 3 provides a copy of the associated draft TS Bases pages for information.

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Enclosure 4 provides a non-proprietary copy of a GE report for the MNGP, "SAFER/GESTR ECCS-LOCA Analysis – LPCI Loop Selection Detectable Break Area," dated September 2006, for NRC review and approval in conjunction with the proposed amendment. This GE report provides the technical basis for the proposed change to the minimum detectable break area for the LPCI loop select logic system.

Enclosure 5 provides a proprietary version of the GE report and accompanying affidavit. Pursuant to 10 CFR 2.390, it is requested that Enclosure 5 be withheld from public disclosure.

NMC requests approval of the proposed license amendment by one year from the date of submittal, with an implementation period of 90 days.

Summary of Commitments

This letter makes the following new commitment:

> The LPCI loop select Recirculation Riser Differential Pressure - High function differential pressure indicating switches will be added to the Instrument Trending Program in conjunction with the implementation of this amendment.

The MNGP Plant Operations Review Committee has reviewed this application. In accordance with 10 CFR 50.91, a copy of this application, with enclosures, is being provided to the designated Minnesota Official.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on September 25, 2007.

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

Enclosures (5)

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

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ENCLOSURE 1

DESCRIPTION OF CHANGE

LICENSE AMENDMENT REQUEST REVISION TO THE ALLOWABLE VALUE AND CHANNEL CALIBRATION SURVEILLANCE INTERVAL FOR THE RECIRCULATION RISER DIFFERENTIAL PRESSURE - HIGH FUNCTION

1.0 INTRODUCTION

Pursuant to 10 CFR 50.90, the Nuclear Management Company, LLC (NMC) proposes to revise the Monticello Nuclear Generating Plant (MNGP) licensing basis to incorporate the results of a revised small break Loss of Coolant Accident (LOCA) analysis for determining the Low Pressure Coolant Injection (LPCI) loop select logic minimum detectable break area. A General Electric (GE) Report, "SAFER/GESTR ECCS-LOCA Analysis – LPCI Loop Selection Detectable Break Area," (Reference 1) provided in Enclosures 4 and 5 (non-proprietary and proprietary version, respectively) provides the technical basis for the proposed changes.

The reanalysis was performed for GE14 fuel[1] and reflects a methodology change (Reference 2) which considered the potential for axial power shape to influence the overall design basis accident (DBA) results. This methodology change resulted in a change in the licensing basis accident with the highest Peak Cladding Temperature (PCT). As a result, a small break rather than the large recirculation line break LOCA has become the limiting accident with respect to PCT. The NMC proposes to re-zero the licensing basis PCT for GE14 fuel at the new value of 1990°F determined by the reanalysis.

In conjunction with this revised analytical basis, NMC proposes via this license amendment request (LAR) to revise the allowable value for Technical Specification (TS) Function 2.j, "Recirculation Riser Differential Pressure – High (Break Detection)" differential pressure indicating switches[2] in Table 3.3.5.1-1, "Emergency Core Cooling System (ECCS) Instrumentation." Also, it is proposed to revise the associated channel calibration frequency Surveillance Requirement (SR) from a nominal 12-month to a 24-month interval. This longer surveillance interval is consistent with the once per cycle durations approved by the NRC for Improved Standard Technical Specification (ITS) conversions for the Boiling Water Reactor (BWR/4) plant design (NUREG-1433) (Reference 3), for those plants that retained the LPCI loop select logic.

2.0 BACKGROUND

The Recirculation Riser Differential Pressure – High (Break Detection) differential pressure indicating switches (TS Table 3.3.5.1-1, Function 2.j) historically have been

1. During the 2007 refueling outage the last of the GE11 fuel assemblies were discharged. The applicable ECCS-LOCA analyses are now those solely for GE14 fuel.
2. The differential pressure indicating switches (DPIS-2-129A, B, C, and D) are Barton Model 580A-0.

calibrated on a once per year frequency. As part of the two-year fuel cycle extension project it was proposed to revise the calibration interval from 12-months to once per cycle (24-months) and a drift analysis was performed to determine the acceptability in accordance with the MNGP implementation of the GE Instrument Setpoint Methodology (Reference 4). It was determined that due to instrument drift and small available analytical margin that the calibration interval could not be extended at that time and a 12-month calibration interval was retained when these instruments were added to the TS as part of the ITS conversion.

The GE SAFER/GESTR set of computer codes (Reference 5) are the evaluation model currently used for ECCS LOCA licensing basis analysis for the MNGP. The previous ECCS-LOCA analysis (References 6 and 7) assumed the LPCI loop select logic was capable of selecting the intact recirculation loop for break sizes down to 0.1 square-feet (ft^2). The calculated pressure differential between the recirculation loops corresponding to this 0.1 ft^2 minimum detectable break area provides the current analytical basis for the recirculation riser differential pressure measuring instrumentation within the plant TS.

3.0 PROPOSED CHANGES

The NMC performed a reanalysis of the small break LOCA. This ECCS-LOCA reanalysis (Reference 1) conservatively postulated the failure of the LPCI loop selection logic[3] to select the unbroken (correct) recirculation loop for all break sizes lower than a minimum detectable break area of 0.4 ft^2. Calculation of the pressure differential between the recirculation loops corresponding to this increased minimum detectable break area of 0.4 ft^2 provides a new analytical basis for the recirculation riser differential pressure measuring instrumentation within the plant TS.

<u>Proposed Technical Specification Changes</u>

Based upon the small break LOCA reanalysis results, it is proposed to increase the allowable value for Function 2.j, "Recirculation Riser Differential Pressure - High (Break Detection)," in TS Table 3.3.5.1-1, "Emergency Core Cooling System Instrumentation," from less than or equal to 24.0 inches-water column (wc) to less than or equal to 100 inches-wc.

Also, it is proposed to extend the CHANNEL CALIBRATION surveillance interval for Function 2.j to reflect a once per cycle, 24-month, nominal, surveillance interval. A mark-up of the proposed changes to Function 2.j in Table 3.3.5.1-1 is provided on the following page (deletions are marked as strikethroughs, additions are double-underlined).

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3. The LPCI loop select logic was included in the GE BWR/3 and 4 plant original design to determine the broken recirculation loop in the event of a design basis LOCA and direct LPCI flow to the discharge of the unbroken recirculation loop. GE subsequently offered a modification resulting in the logic being removed from most of the applicable BWRs.

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
2.	LPCI System					
j.	Recirculation Riser Differential Pressure - High (Break Detection)	1, 2, 3	4	C	SR 3.3.5.1.2 ~~SR 3.3.5.1.6~~ SR 3.3.5.1.7 SR 3.3.5.1.8	≤ ~~24.0~~ 100 inches wc

TS Table 3.3.5.1-1 currently lists SR 3.3.5.1.6[4] as the applicable CHANNEL CALIBRATION surveillance requirement for Function 2.j, requiring performance at a 12-month frequency. The NMC proposes the following changes to the surveillance requirements listed in Table 3.3.5.1-1:

- Revise the allowable value from specifying less than or equal to 24.0 inches-wc to less than or equal to 100 inches-wc.

- Replace SR 3.3.5.1.6 which specifies performance of a CHANNEL CALIBRATION at a 12-month frequency with SR 3.3.5.1.7 which specifies performance at a 24-month frequency.

Enclosure 3 provides a mark-up of the changes to TS Table 3.3.5.1-1. Enclosure 4 provides a copy of the draft TS Bases pages. The Bases changes will be issued in accordance with Specification 5.5.9, "Technical Specification TS Bases Control Program," following approval of this LAR.

Proposed LOCA Licensing Basis Changes

The reanalysis was performed reflecting a methodology change (Reference 2) which considered the potential for axial power shape to influence the overall DBA results. This methodology change resulted in a change in the licensing basis accident with the highest PCT. The DBA with the highest PCT changed from a large recirculation line break LOCA to a small recirculation line break LOCA with this methodology change. A discussion of the LOCA reanalysis results and the technical basis for the proposed licensing basis changes is provided in Section 5 of Enclosures 4 and 5. The table below (Table 5 of Enclosure 4) summarizes the ECCS-LOCA analysis results following this reanalysis.

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4. SR 3.3.5.1.6 (performed at a 12-month frequency) is applied to other Functions in the table and hence cannot be revised to reflect a 24-month frequency.

TABLE – 1 MNGP ECCS-LOCA ANALYSIS RESULTS

	Parameter	DBA (Ref. 7)	Small Break (Ref. 1)	10 CFR 50.46 Accept. Criteria
1.	Nominal PCT	GE Proprietary	GE Proprietary	-----
2.	Appendix K PCT	GE Proprietary	GE Proprietary	-----
3.	Licensing Basis PCT	1960°F	1990°F	≤ 2200°F
4.	Upper Bound PCT	1600°F	1570°F	≤ 1600°F (Ref. 5)
5.	Maximum Local Oxidation	< 5.0%	< 5.0%	≤ 17%
6.	Core-Wide Metal-Water Rxn.	< 0.1%	< 0.2%	≤ 1.0%
7.	Coolable Geometry	Items 3 and 5	Items 3 and 5	≤ 2200°F & ≤ 17%

10 CFR 50.46(a)(3)(i) and (a)(3)(ii) require that for significant changes or errors, i.e., those resulting in a calculated PCT different by more than 50°F from the temperature calculated for the limiting transient using the last acceptable model, or where the sum of the absolute magnitudes is greater than 50°F, that the licensee propose a schedule for providing a reanalysis or taking other action to show compliance with 10 CFR 50.46 requirements.

Currently, the sum of the absolute value of changes prior to this reanalysis for the GE14 fuel type is 45°F. Since this reanalysis was performed for GE14 fuel(5) and results in the limiting licensing basis PCT of 1990°F (discussed further herein) the NMC proposes to re-zero the licensing basis PCT for GE14 fuel at this value as determined by this reanalysis. It is requested that the NRC Safety Evaluation approving this LAR also reflect this change to the MNGP SAFER/GESTR ECCS-LOCA licensing basis.

4.0 LPCI LOOP SELECT LOGIC SYSTEM OPERATION

The ECCS is designed, in conjunction with the primary and secondary containment, to limit the release of radioactive materials to the environment following a LOCA. The ECCS uses two independent methods (flooding and spraying) to cool the core during a LOCA. The ECCS network consists of the High Pressure Coolant Injection (HPCI) System, the Core Spray (CS) System, the low pressure coolant injection (LPCI) mode of the Residual Heat Removal (RHR) System, and the Automatic Depressurization System (ADS). The suppression pool provides the required source of water for the ECCS.

On receipt of an initiation signal, the ECCS pumps automatically start and the system aligns to inject water from either the Condensate Storage Tanks or suppression pool (SP) into the Reactor Coolant System (RCS). The ADS is initiated, but action is

5. During the 2007 refueling outage the last of the GE11 fuel assemblies were discharged. The applicable ECCS-LOCA analyses are now those solely for GE14 fuel.

delayed, allowing the operator to interrupt the timed sequence to depressurization if it is not required. Following initiation, the HPCI System pump discharge pressure almost immediately exceeds RCS pressure and coolant is injected into the reactor vessel to cool the core. If the break is small, the HPCI System maintains coolant inventory as well as level with the RCS still pressurized. If HPCI fails, or is unable to maintain inventory, it is backed up by the ADS in combination with the LPCI and CS Systems. In this case, the ADS timed sequence is allowed to time-out and open selected safety / relief valves (S/RVs) depressurizing the RCS, allowing the LPCI and CS to overcome RCS pressure and inject. If the break is large, RCS pressure initially drops rapidly and the LPCI and CS inject to cool the core. Water from the RCS break returns to the SP where it is recycled and circulated through a heat exchanger cooled by the RHR Service Water System. Depending on the location and size of the break, portions of the ECCS may be ineffective; however, the overall design is effective in cooling the core regardless of the size or location of the piping break.

The combined operation of all ECCS subsystems is designed to ensure that no single active component failure will prevent automatic initiation and successful operation of the minimum required ECCS equipment.

Low Pressure Coolant Injection Mode of Operation

The LPCI mode is an independent operating mode of the RHR System. There are two LPCI subsystems (described in Updated Safety Analysis Report (USAR) Section 6.2.3), each consisting of two motor driven RHR pumps (in the same RHR division) and piping and valves to transfer water from the SP to the RCS via the selected recirculation loop. The LPCI system initiation logic contains the LPCI loop select logic whose purpose is to determine which, if any, of the recirculation loops are broken and select the non-broken loop for injection (the B loop is selected if neither loop is broken).

The LPCI subsystems are designed to provide core cooling at low RCS pressure. Upon receipt of an initiation signal, all four LPCI pumps are automatically started (A and B at approximately 5 seconds and C and D at approximately 10 seconds after AC power is available). The RHR System valves in the LPCI flow path automatically position to provide the proper flow path to inject into the selected recirculation loop. When the RCS pressure drops sufficiently, LPCI injection via the selected recirculation loop begins and water enters the reactor via the jet pumps.

Low Pressure Coolant Injection Loop Select Logic Operation

There are two redundant trip systems in the LPCI loop select logic. The logic is initiated upon the receipt of either a Reactor Vessel Water Level - Low Low signal or a Drywell Pressure - High signal. When initiated, the logic first determines recirculation pump operation by sensing the differential pressure (Δp) between the suction and discharge of each recirculation pump.

If the logic senses that either recirculation pump is not running, i.e., the unit is in single loop operation, then a trip signal is sent to both recirculation pumps to eliminate the possibility of pipe breaks being masked by the operating recirculation pump pressure. The recirculation pump trip signal is delayed by approximately 0.5 second to ensure that at least one pump is off since the break detection sensitivity is greater with both pumps running. If a recirculation pump trip signal is generated, reactor steam dome pressure must decrease to a specified value before the logic will continue. This adjusts the selection time to optimize sensitivity and still ensure that LPCI injection is not unnecessarily delayed. After the satisfaction of this pressure requirement or if both recirculation pumps indicate they are running, a 2 second time delay is provided to allow momentum effects to establish the maximum Δp for loop selection. Selection of the unbroken recirculation loop is then done by comparing the absolute pressure of the two recirculation riser loops. The broken recirculation loop is indicated by a lower pressure than the unbroken loop. The recirculation loop with the higher pressure is used for LPCI injection. If, after a small time delay (approximately 0.5 seconds), the pressure in recirculation loop A is not indicating higher than loop B, the logic will actuate to inject to the B recirculation loop, the 'default' choice for the logic. A signal will be provided to close the B recirculation loop discharge valve, open the LPCI injection valve to the B recirculation loop and close the LPCI injection valve to the A recirculation loop. If recirculation loop A pressure indicates higher than loop B pressure, the converse occurs.

<u>Description of the Recirculation Riser Differential Pressure - High (Break Detection) Function in Support of LPCI Loop Select Logic Operation</u>

Recirculation riser Δp signals (Function 2.j) are used by the LPCI loop select logic to determine which, if any, recirculation loop is broken by comparing the pressure of the two recirculation loops. A broken loop will be indicated by a lower pressure than an unbroken loop. The loop with the higher pressure is then selected, after a short delay, for LPCI injection. If neither loop is broken, the logic defaults to injecting into the "B" recirculation loop. This Function is only required to be OPERABLE for the DBA LOCA analysis, i.e., if the break location is in the recirculation system suction piping. For a DBA LOCA, the analysis assumes that the LPCI loop select logic successfully identifies and directs LPCI flow to the unbroken recirculation loop, so that core reflooding is accomplished in time to ensure that the fuel peak cladding temperature remains below the limits of 10 CFR 50.46. For other LOCA events, (i.e., non-DBA recirculation system pipe breaks), or other RPV pipe breaks, the success of the loop select logic is less critical than for the DBA.

Recirculation Riser Differential Pressure - High (Break Detection) signals are initiated from four differential pressure switches that sense the pressure differential between the A and B recirculation loop risers. If, after a small time delay, the pressure in loop A is not indicating higher than loop B pressure, the logic will select the B loop for injection. If recirculation loop A pressure is indicating higher than loop B pressure, the logic will select the A loop for LPCI injection. The Recirculation Riser Differential Pressure - High

(Break Detection) Allowable Value was chosen to be as low as possible, while still maintaining the ability to differentiate between a broken and unbroken recirculation loop.

The four channels of the Recirculation Riser Differential Pressure - High (Break Detection) Function are only required to be OPERABLE in MODES 1, 2, and 3 to ensure that no single failure can prevent the LPCI loop select logic from successfully selecting the unbroken recirculation loop for LPCI injection. This function is not required OPERABLE in MODES 4 and 5 because the event of concern in these modes is an inadvertent vessel draindown rather than a LOCA. Multiple means of low pressure injection (controlled by plant procedures) are available in MODES 4 and 5 and the LPCI loop select logic is not required to be OPERABLE.

5.0 TECHNICAL ANALYSIS

The ECCS-LOCA performance evaluation and the previous ECCS-LOCA analysis supporting introduction of GE14 fuel[6] (References 6 and 7) considered breaks ranging from the maximum recirculation suction line break down to a 0.05 ft^2 recirculation suction line break. The GE SAFER/GESTR set of computer codes is the MNGP evaluation model for the ECCS-LOCA licensing basis.

To provide additional analytical margin, a small break LOCA reanalysis, described in the GE report entitled, "SAFER/GESTR ECCS-LOCA Analysis – LPCI Loop Selection Detectable Break Area," (Reference 1) was performed to demonstrate the acceptability of increasing the minimum detectable break area of the LPCI loop select logic. This analysis was performed applying the same bases, ECCS performance characteristics, and plant and fuel design, as the SAFER/GESTR ECCS-LOCA analyses of record (References 6 and 7). Also, the updates and corrections to the evaluation model identified to date were incorporated. Specifically, a methodology was applied to assess the affect of axial power shape on the small break ECCS-LOCA analysis results.

A series of small break cases were re-calculated, to investigate the ECCS response under the assumption that the minimum detectable break size of the LPCI loop select logic was increased from the current 0.1 ft^2 requirement to 0.4 ft^2. The new analysis conservatively postulated failure of LPCI loop select logic such that LPCI would now inject into the broken (incorrect) recirculation loop for all small breaks up to 0.4 ft^2. The PCT was calculated for LOCA transients initiated by hypothetical small breaks, ranging in size from 0.05 to 0.5 ft^2, applying assumptions consistent with 10 CFR 50 Appendix K, "ECCS Evaluation Models." The PCT for the span of limiting break sizes was calculated with Nominal assumptions, as well.

Operation of the LPCI loop select logic depends upon the capability of the plant instrumentation to reliably measure the Δp between the recirculation loops. Establishment of a minimum detectable break size in turn determines a corresponding loop Δp that must be reliably measured to support proper LPCI loop selection. Based

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6. During the 2007 refueling outage the last of the GE11 fuel assemblies were discharged. The applicable ECCS-LOCA analyses are now those solely for GE14 fuel.

on a 0.4 ft^2 minimum detectable break area the Δp was calculated assuming equal flow in both recirculation loops, as well as the maximum allowed flow mismatch between the recirculation loops. This recirculation loop Δp defined a new analytical basis for implementing the revised minimum detectable break limit.

Applying this new analytical basis a new analytical limit (AL) was determined and utilized in a new setpoint calculation for the LPCI loop select logic Recirculation Riser Differential Pressure - High (Break Detection), Function 2.j to increase the allowable value (AV) for this function from 24.0 to 100 inches-wc. Also, the drift and revised instrument setpoint analysis determined that by applying this additional margin the CHANNEL CALIBRATION frequency could be changed from a 12-month to a 24-month frequency.

Additionally, the results of this reanalysis determined that a large break LOCA was no longer the limiting DBA for the MNGP with respect to PCT for GE14 fuel. The analysis determined that a small break LOCA with a [GE PROPRIETARY – See Section 5 of Enclosure 5] peaked power shape was now the limiting case. 10 CFR 50.46(a)(3)(i) and (a)(3)(ii) require that when the sum of the absolute magnitudes of any differences in PCT is greater than 50°F, that a licensee propose a schedule for reanalysis. Currently, there is a 5°F margin to this limit. The NMC proposes to re-zero the PCT for the GE14 fuel type as 1990°F in accordance with the results of this new reanalysis.

The following sections provide discussions on the LPCI loop select logic design basis, LOCA evaluation model and methodology; and the reanalysis results and the licensing basis PCT. Discussions are also provided on the MNGP instrument setpoint program implementation of the GE Instrument Setpoint Methodology and its conformance to NRC Generic Letter (GL) 91-04 guidance; applicability of TSTF-493; descriptions of the drift uncertainty and allowable value calculations; a review against the guidelines in Enclosure 2 to GL 91-04; and a discussion of logic system reliability. Also, while this submittal is not intended to be considered risk-informed, the impact of the extension to a 24-month (nominal) surveillance interval was also evaluated from a Probabilistic Risk Analysis (PRA) perspective.

5.1 Summary Description of the Design Basis for LPCI Loop Select Logic

USAR Section 14.7.2.3 discusses ECCS equipment performance. USAR Figure 14.7-12 depicts schematically the LPCI initiation logic.

The LPCI loop select logic functions specified in TS Table 3.3.5.1-1 are only necessary in the event of a recirculation line break LOCA, i.e., proper functioning of this logic is assumed for mitigation. The GE ECCS performance evaluation and subsequent analyses of record (AOR) considered breaks ranging from the maximum recirculation suction line break down to a 0.05 ft^2 recirculation suction line break.

For the DBA LOCA analysis the bounding break location was assumed to be in the recirculation system suction piping. For a recirculation line break, including the DBA LOCA, the analysis assumes that the LPCI loop select logic successfully identifies and directs LPCI flow to the unbroken recirculation loop, so that core reflooding is accomplished in time to ensure that the peak cladding temperature of the fuel remains within the limits of 10 CFR 50.46.

ECCS performance for the four other non-recirculation line breaks; i.e., those breaks in the feedwater, core spray, and main steam lines (both in and outside containment) were also evaluated. For these other LOCA events, (the non-recirculation system pipe breaks) success of the loop select logic to properly pick the unbroken recirculation loop is not required.

5.2 LOCA Evaluation Model and Methodology

The LOCA is analyzed in conjunction with the ECCS performance evaluation in accordance with the criteria of 10 CFR 50.46 and Appendix K to 10 CFR 50. A complete spectrum of postulated break sizes and locations was considered in the evaluation of ECCS performance. The objective was to demonstrate conformance with the ECCS acceptance criteria of 10 CFR 50.46 for the most limiting break size, break location, and single failure combination for the plant.

The SAFER/ GESTR-LOCA application methodology applied at the MNGP is approved by the NRC. This methodology takes advantage of the NRC guidelines in SECY 83-472 regarding the acceptable level of conservatism for realistic evaluation models. LOCA analysis results are determined through application of GE computer models. Four models calculate features of the LOCA response – LAMB, TASC, GESTR-LOCA and SAFER. Though these models form the basis for the general ECCS-LOCA calculation, for the new analysis, only SAFER calculations were necessary to model the ECCS operation for small breaks to implement the new minimum detectable break area limit. SAFER calculates the reactor long-term response over a complete spectrum of hypothetical break sizes and locations. It realistically models all regimes of core heat transfer; calculates core and vessel water levels, system pressure response, ECCS performance (PCT and heat transfer coefficients); and other primary thermal-hydraulic phenomena occurring in the reactor as function of time.

Compliance to the acceptance criteria of 10 CFR 50.46 was demonstrated by calculation of both an Upper Bound (UB) PCT and Licensing Basis (LB) PCT, following the methodology of References 8 and 5. Calculations to define the plant-specific break spectrum were performed using nominal input values. Calculation of the limiting PCT to demonstrate conformance with the requirements of 10 CFR 50.46 was then performed using the specific inputs and models of Appendix K to 10 CFR 50.

Conformance evaluation of the nominal PCT is also required through the use of a statistical UB PCT which was required to be less than the LB PCT as defined in Reference 8. This ensures that the LB PCT was greater in all cases than the 95th percentile of the PCT distribution for the limiting case LOCA, and for all LOCAs within the design basis.

The NRC Safety Evaluation Report, approving the original SAFER/ GESTR-LOCA evaluation model (Reference 4), imposed a restriction of 1600°F on the acceptable UB PCT calculation result for analyses using this methodology, which is the licensing basis analysis for the MNGP. A 15 percent Peak Linear Heat Generation Rate (PLHGR) reduction was applied in the GE14 ECCS-LOCA analysis for MNGP (Reference 5) to comply with this restriction and has been retained in the new analysis. An UB PCT based on the limiting small break case was calculated to demonstrate compliance to the 1600°F limit.

In conformance with the methodology, a LB PCT complying with the provisions of Appendix K was also calculated to demonstrate conformance to the 10 CFR 50.46 acceptance criteria, specifically the maximum allowable PCT of 2200°F, and confirmed the bounding nature of the LB PCT with respect to the UB PCT.

10 CFR 50.46 Notification Letter 2006-01 (Reference **Error! Bookmark not defined.**) identified an issue which resulted in a change in the GE methodology assumed for the small break ECCS-LOCA analyses regarding the assumed axial power shape (See Sections 3.3 and 5 of Enclosures 4 and 5). This, and the other evaluation model changes and errors discovered subsequent to the MNGP GE14 ECCS-LOCA analysis (Reference 7), have been resolved with the analysis of these small break cases.

To resolve the Notification Letter 2006-01 issue, base calculations for the break spectrum assuming a power shape consistent with the prevailing methodology were first performed. Then since a [GE PROPRIETARY – See Section 5 of Enclosure 5] peaked power shape was identified as potentially more limiting in Reference **Error! Bookmark not defined.**, the proprietary change in methodology described in Sections 3.3 and 5 of Enclosures 4 and 5 was applied to determine the limiting power shape and PCT.

5.3 Reanalysis Results

For the DBA LOCA analysis the bounding break location was assumed to be in the recirculation system suction piping. Previously, the LOCA analysis results indicated that the limiting large break and single failure combination for the MNGP was the maximum recirculation suction line break with battery failure for nominal assumptions and with LPCI injection valve failure for 10 CFR 50 Appendix K assumptions. Also, previously the most limiting small recirculation line break was the 0.07 ft^2 recirculation line suction break with battery failure for nominal assumptions and the 0.08 ft^2 recirculation line suction break with battery failure for Appendix K assumptions. The small recirculation line break has become limiting, based on this reanalysis as indicated below.

Large Recirculation Line Breaks

As discussed in Section 5.1 of Enclosures 4 and 5, the large recirculation line, or DBA, break at rated conditions results in enough pressure difference between the recirculation loops that correct identification of the broken recirculation loop and alignment of valves by the LPCI loop select logic is not challenged and hence would be unaffected by this change in LPCI loop select logic and was determined to be outside the scope of this reanalysis. The large break LOCA analyzed in Reference 7 remains valid.

Non-Recirculation Line Breaks

The analyses of References 6 and 9 demonstrate that the non-recirculation line break cases were non-limiting. These breaks were not considered for the current reanalysis, as the analysis results are not affected by the LPCI loop select logic. For the non-recirculation line break cases, delivery of LPCI through either recirculation loop is acceptable. The analyses of References 5 and 9 remain valid.

Small Recirculation Line Breaks

The most limiting single failure for small recirculation line breaks is the battery failure, which eliminates the most ECCS capacity along with the High Pressure Coolant Injection (HPCI) System. The small recirculation line break cases were reanalyzed for GE14 fuel with Nominal and Appendix K assumptions at rated conditions to determine the small break with the highest PCT assuming failure of the LPCI loop select logic for break sizes less then 0.4 ft^2. The results of these analyses are given in Table 4 and Figures 1 and 2 in Enclosures 4 and 5.

It was determined that there was a slight shift in the limiting break size and an increase in PCT after applying the new methodology. See Section 5.2 of Enclosure 5 as the entire basis for the results is considered proprietary by GE.

Alternate Operating Modes

Previous analyses for DBA breaks and allowed alternate operation modes (Maximum Extended Load Line Limit Analysis, Single Loop Operation, and Increased Core Flow) continue to be valid and are not affected by these analysis results.

Analysis results are summarized in Table 5 of Enclosures 4 and 5 (see Table 1 of this enclosure for a non-proprietary version of the results.)

The large recirculation line break LOCA is currently the DBA LOCA. The large recirculation line break LOCA results in a licensing basis PCT of 1960°F (Reference 7). The small break LOCA analyzed herein for GE14 fuel resulted in a licensing basis PCT of 1990°F. The small break LOCA resulted in a higher PCT than the large recirculation line break LOCA and becomes the limiting DBA break case and the basis for regulatory compliance according to the revised methodology discussed in Reference **Error! Bookmark not defined.**.

Since the small break LOCA has been reanalyzed and becomes the limiting case, there is no reason to continue adding the PCT changes as a result of notification of errors and changes in ECCS evaluation models to the previous GE14 fuel result, as a new limiting DBA has been established. The NMC proposes to re-zero the PCT for the GE14 fuel type as 1990°F as discussed in the next section.

5.4 Update to the GE14 Peak Cladding Temperature Licensing Basis

10 CFR 50.46(a)(3)(i) and (a)(3)(ii) require that each change to or error discovered in an acceptable evaluation model or in the application of a model that affects the PCT calculation be reported at least annually to the NRC. In the 2006 NMC letter for changes and errors in ECCS evaluation models for the MNGP (Reference 10), it was reported that two GE notification letters modified the analysis of record (AOR) for the GE14 fuel type (Reference 7). These notifications have resulted in a total increase in PCT of 45°F for GE14 fuel above the limiting licensing basis PCT reported in the AOR. The current adjusted licensing basis PCT for the GE14 fuel type is listed in Table 2. As indicated, the adjusted PCT includes all changes dating back to the AOR.

GE performs ECCS evaluations using the plant-specific ECCS evaluation model and as new fuel types are introduced and applied at a unit, provides plant-specific ECCS evaluations for the new fuel design. Revision 1 to NEDC-32514P, "Monticello SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis," provides the base AOR (Reference 6). When GE14 fuel was added, an ECCS evaluation (Reference 7, below) was performed and together the two analyses were the AOR. The ECCS small break reanalysis for this LAR, to revise the LPCI loop select logic minimum detectable break size, was performed with the GE14 fuel type[7] and further supplements (and supersedes) portions of the prior analyses of record.

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7. The applicable ECCS-LOCA analyses are those for GE14 fuel since the remaining GE11 fuel was removed from the core during the 2007 RFO.

TABLE 2 – SUMMARY OF MONTICELLO LOCA ANALYSES OF RECORD CHANGES AND ERRORS INVOLVING CHANGES IN PCT

APPLICABLE ANALYSIS OR ERROR DESCRIPTION	REF.	LICENSING BASIS PCT (°F)	
		GE14 (Ref. 7)	NEW GE14 (Ref. 1)
NEDC-32514P, Rev. 1, Monticello SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis	6.	----	----
GE-NE-J1103878-09-02P, Monticello ECCS-LOCA Evaluation for GE14	7.	<1960	----
GE-NE-0000-0052-3113-R0, SAFER/GESTR ECCS-LOCA Analysis – LPCI Loop Selection Detectable Break Area	1.	----	1990
Impact of SAFER Level/Volume Table Error on PCT (Notification Letter 2003-01)	11.	- 15	----
Impact of Top Peaked Power Shape for Small Break LOCA Analysis (Notification Letter 2006-01)	**Error! Bookmark not defined.**	+ 30	----
Sum of absolute value of changes since last AOR.		45	----
Algebraic sum of changes since last AOR.		+ 15	----
CURRENT AOR ADJUSTED PEAK CLADDING TEMPERATURE		<1975	1990

The sum of the absolute values of the PCT (References 7, **Error! Bookmark not defined.** and 11) for the GE14 fuel type prior to this reanalysis is 45°F.
10 CFR 50.46(a)(3)(ii) requires that for significant changes or errors, i.e., those where the sum of the absolute magnitudes is greater than 50°F, that a licensee propose a schedule for providing a reanalysis. Recognizing that only a 5°F absolute value of margin remained for the GE14 fuel type before analysis would be required, provided an additional reason for the NMC to perform this reanalysis in addition to the requested LPCI loop select logic break size change in support of proposed TS changes.

Since this reanalysis was performed for GE14 fuel, and is limiting as just discussed, the NMC proposes to re-zero the PCT for the GE14 fuel type as 1990°F. It is requested that the NRC Safety Evaluation approving this LAR reflect the proposed changes to the MNGP ECCS-LOCA licensing basis in addition to the TS changes proposed herein.

5.5 Applicability of MNGP Instrument Setpoint Program and NRC Generic Letter 91-04 Guidance

On June 30, 2004, (Reference 12) NMC applied for and on September 30, 2005, received License Amendment 143 (Reference 13), which approved the necessary changes to the MNGP custom TS necessary to operate on a 24-month fuel cycle. The LPCI loop select logic functions were not included in the custom TS, and hence were not included in the 24-month fuel cycle license amendment. The functions were added as part of the ITS conversion amendments.

The guidance of NRC Generic Letter (GL) 91-04, "Changes in Technical Specification Surveillance Intervals to Accommodate a 24-Month Fuel Cycle," (Reference 14) was applied in the development of the setpoint changes for the 24-month fuel cycle amendment and was incorporated into the MNGP instrument setpoint program. The enclosures listed below were provided for NRC review as part of the June 30, 2004, 24-month cycle LAR and are included on the MNGP docket. While not included within this submittal, the methodology, positions and interpretations taken, and standards therein, are incorporated and reflect the current program. The ADAMS Accession Numbers for the pertinent parts of the LAR submittal and the license amendment approving the 24-month cycle license amendment are provided below for reference.

Enclosure	Enclosure Title	ADAMS Accession Number
1.	Methodology Summary and Compliance With Generic Letter 91-04	ML042040169
2.	NMC's Interpretation of the NRC Comments on the Staff Review of EPRI Technical Report 103335, "Guidelines for Instrument Calibration Extension / Reduction Programs"	ML042040174
4.	"Drift Analysis (Instrumentation and Controls)," Appendix III to the Engineering Standards Manual Procedure (ESM 03.02-APP-III)	ML042040177
Monticello Nuclear Generating Plant – Issuance of Amendment Re: Implementation of 24-Month Fuel Cycles (TAC No. MC3692)," dated September 30, 2005.		ML052700252

While GL 91-04 was written using examples associated with changing from an 18-month to a 24-month fuel cycle, neither the text itself nor the principles expressed, prohibit the GL guidance from being used in other applications involving different time frames. The GL 91-04 methodology has been utilized by other licensees (References 15, 16 and 17), and approved by the NRC, in prior LARs which extended the instrument calibration intervals to nominally 24-months from the existing intervals which were significantly shorter than 18 months (and for the accompanying allowable value changes, where necessary).

The guidance of GL 91-04, as reflected in the NRC reviewed methodology for the 24-month fuel cycle amendment for the MNGP, was applied to evaluate the affects of extending the surveillance interval to reflect a nominal 24-month cycle and associated changes to the allowable value for the LPCI loop select logic Recirculation Riser Differential Pressure - High (Break Detection) function.

5.6 Description of the MNGP Implementation of the GE Instrument Setpoint Methodology

The NMC applied the GE Instrument Setpoint Methodology (Reference 4), to determine the AV for the LPCI loop select logic Recirculation Riser Differential Pressure - High function (Function 2.j). While the method used to calculate the AV is similar to ISA-S67.04 (Reference 18), Method 2, in that the AV is derived from the AL, it is not equivalent since the GE Instrument Setpoint Methodology includes additional error terms not included in ISA Method 2. With the inclusion of these additional error terms, the resulting AV is more conservative from the perspective of protecting the AL. A summary description of the methodology was provided in response to a previous NRC request for additional information (RAI) (Question 1, within Enclosure 2) for the 24-month fuel cycle LAR (Reference 19). The NRC has previously reviewed and approved the GE Instrument Setpoint Methodology as documented in Reference 20.

In the GE Instrument Setpoint Methodology, the AV is established so that there is at least a 95 percent probability of providing the trip action before the process variable reaches the AL when the maximum allowable drift has occurred. The methodology used to determine the AV includes all known error terms (excluding drift) for a particular instrument application under trip conditions. The Nominal Trip Setpoint (NTSP) is established as the limiting value of the sensed process variable at which a trip action may be set to operate at time of calibration so there is at least a 95 percent probability of providing the trip action before the process variable reaches the AL.

The GE Instrument Setpoint Methodology includes an additional evaluation methodology that is performed called the Licensee Event Report (LER) Avoidance Test. The LER Avoidance Test can be performed to assure that there is sufficient margin between the AV and the NTSP to reasonably avoid violations of the AV. It determines the error that may be present during surveillance testing and adjusts the NTSP to provide added margin to the AV if necessary. Essentially, the LER Avoidance Test determines a standard deviation of the statistical combination of the uncertainties of an instrument channel, consisting of the following: the channel instrument accuracy, channel calibration accuracy, and instrument drift (combined by square-root-sum-of-the-squares), and compares that value to the absolute value of the difference of the NTSP and Allowable Value. The LER Avoidance Test therefore determines the margin required between the Allowable Value and the NTSP to allow for instrument drift that might occur during the established surveillance period.

5.7 Applicability of TSTF-493 – Clarify Application of Setpoint Methodology for LSSS Functions

The guidance of draft TSTF-493 (Reference 21) and the associated NRC and Nuclear Energy Institute (NEI) correspondence was reviewed. LPCI loop select logic Function 2.j, "Recirculation Riser Differential Pressure - High (Break Detection)," in TS Table 3.3.5.1-1, does not meet the identified criteria for Limiting Safety System Settings (LSSS) that protect a Safety Limit under development by the BWR Owners Group in support of TSTF-493. Hence, TSTF-493 is not applicable. NMC in response to an RAI dated July 1, 2005, (Reference 22) made the following commitments in conjunction with the 24-month fuel cycle license amendment. The disposition of these commitments with respect to LPCI loop select logic Function 2.j is:

- *Continue resetting Limiting Safety System Settings (LSSS) setpoints within the specified tolerances (as-left criteria) until the Technical Specification Task Force's TS change pertinent to instrument setpoints [i.e., TSTF-493] has been approved by the NRC and assessed for applicability to Monticello.*

  The LPCI loop select logic Recirculation Riser Differential Pressure - High (Break Detection) (Function 2.j) is not an LSSS that protects a Safety Limit and consequently this commitment does not apply.

- *Assess applicability of the Technical Specification Task Force's TS change pertinent to instrument setpoints [i.e., TSTF-493], when approved by the NRC, to determine whether changes to Monticello's licensing basis are necessary.*

  The LPCI loop select logic Recirculation Riser Differential Pressure - High (Break Detection) (Function 2.j) is not an LSSS that protects a Safety Limit.

  The NMC will assess TSTF-493, after final approval by the NRC, to determine whether changes to MNGP licensing basis are necessary. That review will include the potentially applicable population of instrumentation functions, including the Recirculation Riser Differential Pressure - High (Break Detection) (Function 2.j) function since it is included within the scope of the existing commitment.

5.8 Description of the Drift Uncertainty Calculation

The As-Found/As-Left (AFAL) analysis methodology[8] was used to statistically determine instrument drift based on the calibration data available for the Barton Model 580A-0 differential pressure indicating switches. The AFAL data includes several potential sources of uncertainty over and above true instrument drift such as instrument accuracy, measurement and test equipment error, personnel-induced variations, and temperature and environmental effects. Since it is not possible to separate the other potential sources of uncertainty from the true instrument drift, the AFAL analysis methodology produces a conservative estimate of the drift that will be seen under in-plant conditions.

No outliers were identified by the T-test. The Chi-Squared test was performed to test the assumption that the drift data was normally distributed and this assumption of normality was not rejected. A histogram of the drift data demonstrated that the drift data could be bounded by a normal distribution, offset by a bias.

The past performance of the Barton Model 580A-0 differential pressure indicating switches has shown that they do not exhibit a time dependency. A scatter plot of the drift interval data was developed. Based upon a visual examination of the data, in accordance with the MNGP drift analysis guidance, the uncertainty was required to be treated as moderately time dependent. The analyzed drift bias and random uncertainty terms were extrapolated to 30 months by multiplying the approximately 12-month drift values by the square root of the ratio of the time periods. This resulted in a calculated 30-month analyzed drift uncertainty of approximately +3.5 ± 13.6 inches-wc. Use of this drift uncertainty in determining the AV provides a high probability that the AV determined and applied to the Barton Model 580A-0 differential pressure indicating switches will not be exceeded during routine calibrations.

The AFAL method for extrapolating the approximately 12-month drift data for use as 30-month drift values is in accordance with the GE Instrument Setpoint Methodology.

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8. The AFAL analysis methodology described in EPRI Report TR-103335-R1 (Reference 24) was provided to the NRC as Enclosure 4 to the 24-month fuel cycle LAR (ADAMS Accession Number ML0402040177) and is proceduralized as Appendix III to the Engineering Standards Manual, "Drift Analysis (Instrumentation and Controls)."

5.9 Description of the Method Used for Calculating the Allowable Value

The NMC applied the MNGP specific implementation of the GE methodology, "Engineering Standards Manual, Appendix I (GE Methodology Instrumentation and Controls)," (Reference 23) to determine the AV for the LPCI loop select logic Recirculation Riser Differential Pressure - High function (Function 2.j). Based on the 0.4 ft^2 minimum detectable break area determined acceptable by the ECCS reanalysis; the pressure differential was calculated assuming equal flow in both recirculation loops, as well as the maximum allowed flow mismatch between the recirculation loops. This recirculation loop pressure differential(9) defined a new analytical basis for the Recirculation Riser Differential Pressure - High function based upon the revised minimum detectable break limit.

To ensure that the Barton Model 580A-0 differential pressure indicating switches will trip prior to going off scale, the setpoint calculation conservatively established an AL for this function at ≤ 138.6 inches-wc (≤ 5.0 psid). This AL is very conservative with respect to the actual calculated value determined by the GE ECCS reanalysis for the minimum detectable break limit. Therefore, the AL used in the setpoint calculation ensures the instrumentation will detect a break smaller than the minimum break size of 0.4 ft^2 used in the revised ECCS reanalysis.

Applying the new AL for the LPCI loop select logic Recirculation Riser Differential Pressure - High function (Function 2.j) the AV was increased from ≤ 24.0 to ≤ 100 inches-wc. There is sufficient margin to the AL as demonstrated by the setpoint calculation to accommodate the revised AV of ≤ 100 inches-wc when all applicable instrument uncertainties are considered. Also, the drift and revised instrument setpoint analysis determined that by applying this additional margin the CHANNEL CALIBRATION frequency could be reduced from a 12-month to a 24-month frequency. The table below summarizes the proposed changes:

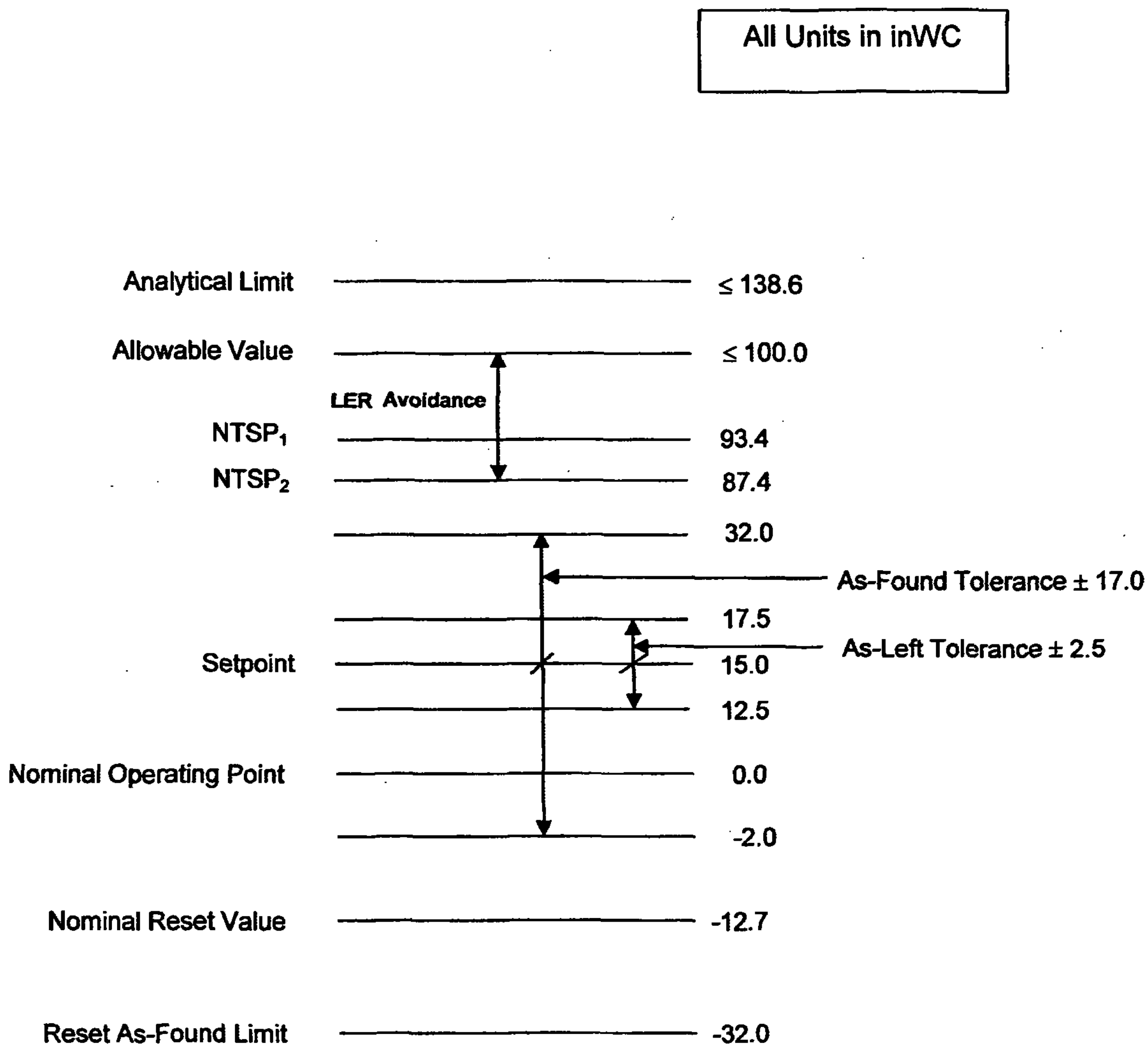
	Function and Title	NTSP	Current AV	Proposed AV	New Anal. Limit
			(in inches-wc)		
2.j.	Recirculation Riser Differential Pressure - High (Break Detection)	15.0	≤ 24.0	≤ 100.0	≤ 138.6

In accordance with Appendix I to the MNGP Engineering Standards Manual, which procedurally implements the GE Instrument Setpoint Methodology at the MNGP, the AL, the AV, nominal trip setpoint (NTSP), and the as-found and as-left tolerances were determined. The LER Avoidance Test evaluation was applied to assure sufficient margin between the setpoint and the AV. Figure 1

9. The calculated pressure differential is considered proprietary information by GE, but is provided in Section 5.5 of proprietary Enclosure 5 (Reference 1).

graphically depicts the relationship between the various setpoint parameters for the Recirculation Riser Differential Pressure - High (Break Detection) function.

FIGURE 1 – RECIRCULATION RISER DIFFERENTIAL PRESSURE – HIGH, LPCI LOOP SELECT SETPOINT RELATIONSHIPS



5.10 Reviews against the Seven Guidelines in Enclosure 2 to Generic Letter 91-04

GL 91-04, Enclosure 2, "Guidance for Addressing the Effect of Increased Surveillance Intervals on Instrument Drift and Safety Analysis Assumptions," states that licensees should address several issues to provide an acceptable basis for increasing the calibration interval for instruments that are used to perform safety functions. The NRC staff identified specific actions that should be addressed in order to justify a proposed increase in the calibration interval.

An analysis for extending the calibration frequency for LPCI loop select logic Function 2.j, "Recirculation Riser Differential Pressure - High (Break Detection)" in TS Table 3.3.5.1-1, from 12 to 24-months has been performed in accordance with Enclosure 2 of GL 91-04. It was concluded that the nominal surveillance frequency could be extended to 24-months (30-months including the SR 3.0.2 "grace period") without any adverse effects on plant safety. Also, the analysis concluded that changing to a 24-month surveillance interval for LPCI loop select logic Function 2.j has minimal impact on safety system reliability.

Provided below are the seven guidelines stated in Enclosure 2 to GL 91-04, a summary of the recommended NRC actions contained in the GL, the applicable NRC issues from the GL, and the actions NMC has taken to implement each NRC recommended action to address the issues.

1. **Confirm that instrument drift as determined by as-found and as-left calibration data from surveillance and maintenance records has not, except on rare occasions, exceeded acceptable limits for a calibration interval.**

   NRC ISSUE: The surveillance and maintenance history for instrument channels should demonstrate that most problems affecting instrument operability are found as a result of surveillance tests other than the instrument calibration. If the calibration data show that instrument drift is beyond acceptable limits on other than rare occasions, the calibration interval should not be increased because instrument drift would pose a greater safety problem in the future.

   NMC RESPONSE: Differential pressure measurement for Function 2.j, Recirculation Riser Differential Pressure - High (Break Detection), is performed by Barton Model 580A-0 differential pressure indicating switches. A review of the AFAL calibration data for the current nominal 12-month calibration frequency for the Barton Model 580A-0 differential pressure indicating switches indicated that there were no occasions in which the as-found surveillance value was outside of the as-found tolerance.

2. **Confirm that the values of drift for each instrument type (make, model, and range) and application have been determined with a high probability and a high degree of confidence. Provide a summary of the methodology and assumptions used to determine the rate of instrument drift with time based upon historical plant calibration data.**

   NRC ISSUE: The licensee should have a body of as-found and as-left calibration data that permits the determination of the rate of instrument drift with time over the calibration interval. This data should allow the determination of instrument drift for those instruments that perform safety functions.

NMC RESPONSE: The methodology used to perform drift evaluations of plant instrument surveillance data was provided in an enclosure entitled "Drift Analysis (Instrumentation and Controls)," within the 24-month fuel cycle LAR. The NMC uses, at the MNGP, the AFAL analysis methodology developed by the Electric Power Research Institute (EPRI), documented in topical report TR-103335-R1, "Guidelines for Instrument Calibration Extension/Reduction Programs," (Reference 24) to statistically determine the drift for a calibration interval. A detailed explanation of the MNGP drift evaluation methods, including the applicability of TR-103335-R1, was included in the 24-month fuel cycle LAR.

The guidance described in the EPRI topical report provides more detail than GL 91-04 on application of statistical methods to support 24-month fuel cycles. As discussed in the NRC Safety Evaluation (SE) for the 24-month fuel cycle amendment, the staff has not formally endorsed TR-103335, but in a letter dated December 1, 1997, (Reference 25), indicated the report offered acceptable guidance for GL 91-04 calibration interval extension programs except in some areas where they had comments requiring further clarification. As stated in the SE, "In Enclosure 2 of the June 30, 2004, application, the licensee [has] addressed all the concerns that the NRC staff identified in its December 1, 1997, letter."

The differential pressure measurements required by Function 2.j are made by Barton Model 580A-0 differential pressure indicating switches. To provide an adequate basis for the drift study, the data for the four Barton differential pressure indicating switches were combined, since they measured the same function and had the same characteristics. A statistical evaluation was made of the instrument surveillance data for these Barton differential pressure switches to predict, within a 95%/95% confidence level, the expected performance of the instruments based on their past performance. The drift evaluation was done by applying the MNGP specific drift analysis methodology using Microsoft® Excel spreadsheets based upon the guidance in the EPRI TR-103335-R1. The MathCad® application was used to verify the evaluation. The surveillance data was analyzed to determine if the data was normally distributed.

Based on the recommendations from the EPRI TR-103335-R1 and the NRC review comments to the original EPRI TR-103335 report, the time dependence of the current drift was evaluated and conservative assumptions were made in extrapolating the current drift value to new drift value to be applied for 24-month (nominal) fuel cycles. This is discussed in more detail in Section 5.8.

3. **Confirm that the magnitude of instrument drift has been determined with a high probability and a high degree of confidence for a bounding calibration interval of 30 months for each instrument type (make, model number, and range) and application that performs a safety function. Provide a list of the channels by TS section that identifies these instrument applications.**

NRC ISSUE: The magnitude of the instrument drift error that occurs over a longer interval is an important consideration to justify an extension of the calibration interval for instruments that perform safety functions. Licensees need to identify the applications where the calibration interval for these instruments depends upon the length of the fuel cycle and could be as long as 30 months (the extension limit for this calibration interval). Licensees should determine the projected value of the instrument drift error that could occur over a 30-month interval for each of these applications.

NMC RESPONSE: The drift performance was predicted with a 95%/95% confidence level. The methodology described in previous sections was used to determine the magnitude of instrument drift with a high degree of confidence and a high degree of probability for a bounding calibration interval of 30 months. The pertinent information for Function 2.j is:

TS Table Function and Title	Make / Model	Description
Table 3.3.5.1-1, Function 2.j, Recirculation Riser Differential Pressure – High (Break Detection)	Barton Model 580A-0	Differential Pressure Switches DPIS-2-129A, B, C, and D.

A drift evaluation was performed using the MNGP specific drift analysis procedure for a 30-month interval. In order to provide a bounding AV, the drift uncertainty was treated as moderately time dependent and extrapolated to 30-months by multiplying the 12-month drift values (bias and random) by the square root of the ratio of the time periods. This resulted in a calculated 30-month drift of +3.5 ± 13.6 inches-wc for the Barton Model 580A-0 differential pressure indicating switches.

The proposed AV considering this calculated drift uncertainty was shown to provide adequate assurance that the Barton Model differential pressure indicating switches are consistent with the assumptions used in the ECCS performance reanalysis.

4. **Confirm that a comparison of the projected instrument drift errors has been made with the values of drift used in the setpoint analysis. If this results in revised setpoints to accommodate larger drift errors, provide proposed TS changes to update trip setpoints. If the drift errors result in a revised safety analysis to support existing setpoints, provide a summary of the updated analysis conclusions to confirm that safety limits and safety analysis assumptions are not exceeded.**

   NRC ISSUE: Licensees should ensure that the projected value of instrument drift for an increased calibration interval is consistent with the values of drift errors used in determining safety system setpoints. These setpoints ensure that the consequences of accidents and anticipated transients are bounded within the assumptions of the safety analysis. If the allowance for instrument drift that was used to establish trip setpoints for safety systems would be exceeded, licensees should establish new trip setpoints for safety systems.

   Instrument Society of America (ISA) Standard, ISA-A67.04-1982, "Setpoints for Nuclear Safety-Related Instrumentation Used in Nuclear Power Plants," provides a methodology for evaluating instrument drift. The NRC endorsed this standard in Regulatory Guide 1.105, "Instrument Setpoints for Safety-Related Systems." If a new setpoint must be used to ensure that safety actions will be initiated consistent with the assumptions of the safety analysis, this will require a Technical Specifications revision to reflect a new trip setpoint value. If the combination of instrument drift errors and current trip setpoints is not consistent with existing safety analysis assumptions, licensees should perform a new safety analysis to confirm that safety limits will not be exceeded with the increased drift associated with longer calibration intervals.

   NMC RESPONSE: A statistical evaluation was made of the AFAL surveillance data for the Barton 580A-0 differential pressure indicating switches. The differential pressure indicating switches measuring the Recirculation Riser Differential Pressure - High function have historically been calibrated on a once per year frequency. The calibration frequency was proposed to be increased to once per cycle as part of a preventive maintenance optimization effort, and a drift analysis was performed as part of the 24-month fuel cycle extension project. Due to the relatively large instrument drift and small available margins determined by the drift analysis, the calibration interval for these instruments could not then be extended to 24 months. Subsequently, the NMC commissioned GE to perform a small break LOCA reanalysis to determine the LPCI loop select logic minimum detectable break area, the results of which are provided in Enclosures 4 and 5. Due to the increase in available margin due to this reanalysis, which could be applied to increase the AL, a 24-month (nominal) calibration interval was determined to be acceptable. A summary of this reanalysis is provided in Sections 5.2 and 5.3. As previously discussed, a new AV was determined for the LPCI loop select logic Recirculation Riser Differential Pressure - High function and a discussion of the proposed TS changes is provided in Section 3.

5. **Confirm that the projected instrument errors caused by drift are acceptable for control of plant parameters to effect a safe shutdown with the associated instrumentation.**

   NRC ISSUE: Licensees should determine the effect of instrument errors on control systems used to effect a safe shutdown. Licensees must confirm that the instrument errors caused by drift will not affect the capability to achieve a safe plant shutdown.

   NMC RESPONSE: The impact of the drift has been reviewed for Barton 580A-0 differential pressure indicating switches. The calculated drift value was compared to drift allowances in the setpoint calculation, and the GE design basis. The setpoint calculation for the Recirculation Riser Differential Pressure - High function was revised to include the calculated 30-month drift value and a new AV was determined. The calculations performed ensured that the proposed operating setpoint provides adequate margin to the AV and the AL. Therefore, the projected instrument errors caused by drift are acceptable for control of plant parameters to achieve a safe shutdown.

6. **Confirm that all conditions and assumptions of the setpoint and safety analyses have been checked and are appropriately reflected in the acceptance criteria of plant surveillance procedures for channel checks, channel functional tests, and channel calibrations.**

   NRC ISSUE: Licensees should take care to avoid errors or oversights when establishing acceptance criteria for plant surveillance procedures that are derived from the assumptions of the safety analysis and the results of the methodology for determining setpoints. The NRC staff experience is that licensees have encountered problems when asked to confirm that instrument drift and other errors and assumptions of the safety and setpoint analyses are consistent with the acceptance criteria included in plant surveillance procedures. This review should include channel checks, channel functional tests, and the calibration of channels for which surveillance intervals are being increased.

   NMC RESPONSE: The drift analysis of the plant surveillance data for the Barton Model 580A-0 differential pressure indicating switches and the setpoint analysis for determining the allowable value for the corresponding TS function, Function 2.j, "Recirculation Riser Differential Pressure - High (Break Detection)," has been fully verified.

The associated plant surveillance procedure will be revised as part of the implementation of this amendment following approval of this LAR to reflect the new allowable value and surveillance interval. As part of the procedural review process plant surveillance procedures are verified to appropriately reflect the assumptions and conditions of the setpoint calculations.

7. **Provide a summary description of the program for monitoring and assessing the effects of increased calibration surveillance intervals on instrument drift and its effect on safety.**

NRC ISSUE: Finally, licensees should have a program to monitor calibration results and the effect on instrument drift that will accompany the increase in calibration intervals. The program should ensure that existing procedures provide data for evaluating the effects of increased calibration intervals. The data should confirm that the estimated errors for instrument drift with increased calibration intervals are within the limits projected.

NMC RESPONSE: To determine the effect of increasing the calibration interval to 24-months, a drift study for the Barton Model 580A-0 differential pressure indicating switches AFAL surveillance data was performed. Statistical evaluation was made of both instrument component and loop surveillance data to predict, within a 95%/95% confidence level, the expected performance of an instrument component or loop based on the past performance. To compensate for variability in plant shutdowns, the study was performed for 24 months + 25% (30 months total).

As part of the 24-month fuel cycle license amendment (Amendment 143), MNGP implemented a trending program to monitor calibration results and the potential effect on instrument drift accompanying an increase in calibration intervals. The program provides data for evaluating the effects of the increased calibration intervals. In the 24-month fuel cycle LAR, NMC made the following commitment:

> Monticello will implement a trending program to address setpoints for TS calibration intervals extended to 24 months. Setpoints found to exceed the expected drift for the instruments would require an additional evaluation to ensure the instrument's performance is still enveloped by the assumptions in the drift or setpoint analysis. The trending program will also plot setpoint or transmitter As-Found/As-Left (AFAL) values to verify that the performance of the instruments is within expected boundaries and that adverse trends (repeated directional changes in AFAL even of smaller magnitudes) are detected and evaluated.

The LPCI loop select Recirculation Riser Differential Pressure - High (Break Detection) (Table 3.3.5.1-1 - Function 2.j) differential pressure indicating switches will be added to the trending program developed to address the above commitment. Therefore, NMC is making the following commitment:

> The LPCI loop select Recirculation Riser Differential Pressure - High function differential pressure indicating switches will be added to the Instrument Trending Program in conjunction with the implementation of this amendment.

As described in the program, setpoints found to exceed the expected drift require an additional evaluation to ensure the instrument's performance is still enveloped by the assumptions in the drift or setpoint analysis. Components found outside of the As Found Tolerance are entered in the MNGP Corrective Action Program (CAP) to ensure that any negative trend will be identified, documented, and appropriate actions taken.

5.11 Consideration of Logic System Reliability

In the 24-month fuel cycle LAR, NMC referenced the NRC safety evaluation (SE) dated August 2, 1993, relating to the extension of the Peach Bottom, Units 2 and 3, surveillance intervals from 18 months to 24 months. In this SE, as reiterated in the SE to the 24-month fuel cycle licensing amendment, the NRC staff stated the following:

> Industry reliability studies for boiling water reactors (BWRs), prepared by the BWR Owners Group (NEDC-30936P), show that the overall safety systems' reliability is not dominated by the reliability of the logic system, but by the mechanical components (e.g., pumps and valves), which are consequently tested on a more frequent basis. Since the probability of a relay or contact failure is small relative to the probability of mechanical component failure, increasing the logic system functional test interval represents no significant change in the overall safety system unavailability.

The original design of GE BWR/3 and 4 reactors included the LPCI loop select logic. It was subsequently removed from most BWRs as part of a LPCI modification offered by GE. This resulted in it not being included directly in the above referenced study, nonetheless, the study's conclusions are applicable since the LPCI loop select logic was included in the original design of the ECCS, and hence was designed to the same design constraints as the logic evaluated. Therefore, increasing the surveillance test interval for the LPCI loop select Recirculation Riser Differential Pressure – High function should represent no significant change in the overall safety system unavailability.

The above evaluations demonstrate that extending the LPCI loop select Recirculation Riser Differential Pressure - High function channel calibration interval to 24-months (nominal) does not have any adverse effects on plant safety. A new TS Allowable Value has been determined for this function. The probability of exceeding the new TS Allowable value is small and the probability itself remains well within the setpoint methodology guideline. The methodology used was in accordance with "General Electric Instrument Setpoint Methodology," NEDC-31336P-A, accepted by NRC Safety Evaluation Report dated November 6, 1995. Therefore, NMC has concluded that the proposed revision to the MNGP TS are acceptable.

5.12 Probabilistic Risk Assessment (PRA)

The MNGP 2005 average maintenance Probabilistic Risk Assessment (PRA) model was applied to reasonably quantify the significance of increasing the surveillance interval for the LPCI loop select Recirculation Riser Differential Pressure – High function. While this submittal is not intended to be considered risk-informed, the impact of the extension of the surveillance interval to 24-months (nominal) was evaluated from a PRA perspective as far as the model would allow. To do this, the change in the probability of failure (failure rate) associated with extending a surveillance interval from 12 to 24 months was determined, and then the PRA model was run assuming this failure rate and failure of the LPCI loop select logic (i.e., the logic always selects the wrong recirculation loop for injection).

The effect of increasing a surveillance interval can be determined by applying the equation for determining the average unavailability between tests.

Average Unavailability between Tests = $1 + 1/\lambda\tau\ (e^{-\lambda\tau} - 1)$

Applying this equation and assuming a failure rate (λ) of 1.0 E-06/hour (a conservative failure rate), the following failure probabilities were determined when the surveillance test interval (τ) was changed from 12 to 24 months. This represents approximately a factor of two increase in failure probability.

- Probability of failure at 12 months 4.37 E-03
- Probability of failure at 24 months 8.71 E-03

The failure rate for the LPCI loop select logic event presently included in the PRA model was increased by a factor of two to account for the increase in surveillance interval from 12 to 24 months.

Note that the importance of the LPCI loop select logic in the PRA model is limited since it is not required for any accident other than for the recirculation line break LOCA. The PRA model conservatively assumes that failure of the LPCI loop select logic will always result in LPCI injection to the broken (wrong) recirculation loop as apposed to a random chance that the logic selects the broken loop. This in turn, will result in complete LPCI failure for recirculation loop LOCA initiated events with break sizes greater than a 3 inch equivalent diameter. For breaks with less than a 3 inch equivalent diameter hole the current PRA average maintenance model indicates that adequate core cooling is maintained even with LPCI injection into the broken recirculation loop.

Quantifying the model with this two fold increase in loop select failure probability results in a Core Damage Frequency (CDF) of 7.316 E-06/year as opposed to the baseline CDF value of 7.315 E-06/year, a change (ΔCDF) of 1.0 E-09/year.

As discussed in Regulatory Guide (RG) 1.174 (Reference 26), a change in CDF at Monticello is considered "Very Small" if it is less than 1.0 E-06/year. Additionally, RG 1.174 considers a change in Large Early Release Frequency (LERF) to be "Very Small" if it is less than 1.0 E-07/year. For this evaluation, if all core damage events were assumed to lead to a large early release, the resulting ΔLERF would still remain below the "Very Small" threshold.

The NMC has conservatively evaluated the change in risk, consisting of CDF and LERF, associated with increasing the channel calibration surveillance interval for SR 3.3.5.1.7 for the LPCI loop select Recirculation Riser Differential Pressure - High function. The results of the analysis are:

1. The change in CDF is 1.0 E-09/year (much less than 1.0 E-06/year).

2. The change in LERF is less than 1.0 E-07/year.

As can be seen the increase in CDF assuming an increase in surveillance interval to nominally 24-months represents much less than a "Very Small" change as described in RG 1.174. Accordingly, the increase in risk from lengthening the surveillance interval from a 12-month to a nominal 24-month frequency results in an extremely small increase in risk, resulting in a negligible risk impact.

5.13 Conclusion

Performance of channel calibration testing for the Recirculation Riser Differential Pressure - High function when the plant is shutdown and this instrument function is not required to be OPERABLE reduces the potential consequences of an error.

The proposed TS changes involve changing the Recirculation Riser Differential Pressure - High function Allowable Value to allow a 24 month nominal operating cycle length. The proposed TS changes do not physically impact the normal operation of the plant, nor do they impact any design or functional requirements of the associated systems. The proposed TS changes do not introduce any accident initiators. NMC has concluded that extending the nominal surveillance interval to 24 months has minimal impact on the LPCI System reliability and the overall impact on plant safety is negligible.

In Enclosure 1 to the June 30, 2004, application for the 24-month fuel cycle amendment the methodology used to evaluate the acceptability of changes to a 24-month fuel cycle and compliance with GL 91-04 was discussed. The proposed 24-month (nominal) calibration frequency is supported by plant-specific analyses consistent with those performed for the 24-month cycle amendment.

The historical maintenance and surveillance test data at the proposed (24-month) bounding surveillance test interval limit was reviewed, and an evaluation performed. For the LPCI loop select Recirculation Riser Differential Pressure - High function it was determined that the function could not be increased to a 24-month (nominal) surveillance test interval. With the ECCS reanalysis results applied to increase the AL, it was determined that the AV could be increased, and accounting for drift that a 24-month surveillance interval would then be acceptable. Following NRC approval of this revised small break analysis (in conjunction with the TS changes proposed herein) for the minimum break size that the LPCI loop select logic must correctly respond to, this new 24-month surveillance interval will be consistent with the assumptions in the plant licensing bases.

The proposed extension in the nominal surveillance interval to 24-months for the LPCI loop select Recirculation Riser Differential Pressure - High function is supported by the calibration interval drift evaluation and the PRA evaluation associated with extending the surveillance interval.

6.0 REGULATORY ANALYSIS

6.1 No Significant Hazards Determination

In accordance with the requirements of 10 CFR 50.90, the Nuclear Management Company, LLC (NMC) requests an amendment to facility Operating License DPR-22, for the Monticello Nuclear Generating Plant (MNGP). The proposed amendment requests to revise the allowable value and channel calibration surveillance interval for the low pressure coolant injection (LPCI) loop select Recirculation Riser Differential Pressure - High differential pressure indicating switches, Function 2.j in Technical Specification Table 3.3.5.1-1. The proposed changes are based upon the results of a revised minimum detectable break area for the LPCI loop select logic based on a new small break loss of coolant accident (LOCA) analysis.

The proposed changes in allowable value and surveillance frequency for the LPCI loop select logic Recirculation Riser Differential Pressure - High differential pressure indicating switches have been established applying the GE Instrument setpoint methodology guidance, as specified in the MNGP instrument setpoint methodology. The difference between the analytical limit and the allowable value allows for channel instrument accuracy, calibration accuracy, process measurement accuracy, and primary element accuracy. The margin between the allowable value and the nominal trip setpoint (NTSP) allows for instrument drift that might occur during the established surveillance period. Two separate verifications were performed for the calculated NTSP. The first, a Spurious Trip Avoidance Test, evaluates the impact of the NTSP on plant availability. The second verification, an LER Avoidance Test, calculates the probability of avoiding a Licensee Event Report (or exceeding the allowable value) due to instrument drift. These two verifications are statistical evaluations to provide additional assurance of the acceptability of the NTSP. Use of these methods and verifications provides the assurance that if the setpoint is found conservative too the allowable value during surveillance testing, the instrumentation would have provided the required trip function by the time the process reached the analytic limit for the applicable events.

The NMC has evaluated the proposed amendment in accordance with 10 CFR 50.91 against the standards in 10 CFR 50.92 and has determined that the operation of the MNGP in accordance with the proposed amendment presents no significant hazards. NMC's evaluation against each of the criteria in 10 CFR 50.92 follows.

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

The proposed change revises the analysis for the small break LOCA by increasing the size of the required minimum detectable break area for the LPCI loop select logic. The increase in size of the minimum required detectable break area does not adversely affect accident initiators or precursors nor alter the design assumptions, conditions, or the manner in which the plant is operated and maintained. The proposed change does not alter or prevent the ability of structures, systems, and components from performing their intended function to mitigate the consequences of an initiating event within the assumed acceptance limits.

The ECCS will continue to function as designed to inject sufficient water to provide core cooling. An ECCS evaluation performed in accordance with the provisions of 10 CFR 50, Appendix K, "*ECCS Evaluation Models*", demonstrates continued conformance to the acceptance criteria of 10 CFR 50.46, "*Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power* Reactors".

In accordance with the results of this reanalysis, it is proposed to revise the allowable value and associated surveillance frequency for the LPCI loop select logic Recirculation Riser Differential Pressure - High differential pressure indicating switches function within the Technical Specifications. This instrumentation is not an initiator for any analyzed event. As a result, the proposed change in allowable value will not result in unnecessary plant transients. The role of the instrumentation is in mitigating and thereby limiting the consequences of accidents. The allowable value has been developed to ensure that the design and safety analyses limits will be satisfied. The methodology used for the development of the allowable value and associated surveillance frequency ensures that the instrumentation remains capable of mitigating design basis events as described in the safety analyses, and that the results and consequences described in the safety analyses remain bounding. No new failure modes have been introduced because of this action and the consequences remain consistent with previously evaluated accidents. Therefore, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?**

Response: No.

The change revises the minimum required detectable break area for the LPCI loop select logic. The change does not impose any new or different requirements or eliminate any existing requirements. The proposed change is consistent with the safety analysis assumptions and current plant operating practice.

No new accident scenarios, transient precursors, failure mechanisms, or limiting single failures are introduced as a result of the proposed change. Equipment important to safety will continue to operate as designed. The changes do not result in any event previously deemed incredible being made credible. The changes do not result in adverse conditions or result in any increase in the challenges to safety systems.

The proposed changes have been established using the GE Instrument Setpoint Methodology guidance, as specified and applied in the Monticello setpoint methodology program, and does not create the possibility of a new or different kind of accident from any accident previously evaluated. This is based on the fact that the method and manner of plant operation is unchanged. The use of the proposed allowable value does not impact safe operation of the plant, in that the safety analyses limits are maintained.

The allowable value was developed using a methodology to ensure the affected instrumentation and associated systems and components remain capable of mitigating accidents and transients. The proposed amendment does not involve operation of any system, structure, or component (SSC) in a manner or configuration different from those previously recognized or evaluated. No new failure mechanisms are introduced. Plant equipment will not be operated in a manner different from previous operation, except that the allowable value has been changed. Since the existing operating parameters have been evaluated to maintain the unit within existing design basis criteria, the proposed changes do not create the possibility of a new or different kind of accident from any previously evaluated.

3. **Does the proposed amendment involve a significant reduction in a margin of safety?**

Response: No.

There are no new or significant changes to the initial conditions contributing to accident severity or consequences. The proposed amendment will not affect the plant protective boundaries, will not cause a release of fission products to the public, nor will it degrade the performance of any other SSCs important to safety.

Extending the surveillance interval and increasing the allowable value does not involve a change to any limit on accident consequences specified in the license or regulations and does not involve a change to how accidents are mitigated or a significant increase in the consequences of an accident. The instrumentation and components involved in this request have exhibited reliable operation based on the results of their performance during past periodic ECCS functional testing. The proposed changes have been developed using a methodology to ensure safety analyses limits are not exceeded. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, the NMC has determined that operation of the facility in accordance with the proposed change does not involve a significant hazards consideration as defined in 10 CFR 50.92(c), in that it does not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety.

6.2 Applicable Regulatory Requirements

The MNGP was designed largely before the publishing of the 70 General Design Criteria (GDC) for Nuclear Power Plant Construction Permits proposed by the Atomic Energy Commission (AEC) for public comment in July 1967, and constructed prior to the 1971 publication of Appendix A, "General Design Criteria for Nuclear Power Plants", to 10 CFR Part 50. As such, the MNGP was not licensed to the Appendix A, General Design Criteria (GDC).

The MNGP USAR, Section 1.2, lists the principal design criteria (PDCs) for the design, construction and operation of the plant. MNGP USAR Appendix E provides a plant comparative evaluation with the proposed AEC 70 design criteria. Applicable July 1967 AEC draft criteria are:

> Criterion 38 – Reliability and Testability of Engineered Safely Features
>
> All engineered safety features shall be designed to provide high functional reliability and ready testability. In determining the suitability of a facility for a proposed site, the degree of reliance upon and acceptance of the inherent and engineered safety afforded by the systems, including engineered safety features, will be influenced by the known and the demonstrated performance capability and reliability of the systems, and by the extent to which the operability of such systems can be tested and inspected where appropriate during the life of the plant.
>
> Criterion 46 – Testing of Emergency Core Cooling System Components
>
> Design provisions shall be made so that active components of the emergency core cooling systems, such as pumps and valves, can be tested periodically for operability and required functional performance.

The NMC believes that the MNGP design is in conformance with the intent of the proposed AEC 70 design criteria.

While there is not a direct one-to-one alignment between the July 1967 draft GDCs and the GDCs issued in 1971 as Appendix A to 10 CFR Part 50, the GDC are comparable. Corresponding GDCs in part are:

> Criterion 21 – Protection system reliability and testability
>
> The protection system shall be designed for high functional reliability and inservice testability commensurate with the safety functions to be performed. Redundancy and independence designed into the protection system shall be sufficient to assure that (1) no single failure results in loss of the protection function and (2) removal from service of any component or channel does not result in loss of the required minimum redundancy unless the acceptable

reliability of operation of the protection system can be otherwise demonstrated. The protection system shall be designed to permit periodic testing of its functioning when the reactor is in operation, including a capability to test channels independently to determine failures and losses of redundancy that may have occurred.

Criterion 35 – Emergency core cooling

A system to provide abundant emergency core cooling shall be provided. The system safety function shall be to transfer heat from the reactor core following any loss of reactor coolant at a rate such that (1) fuel and clad damage that could interfere with continued effective core cooling is prevented and (2) clad metal-water reaction is limited to negligible amounts.

Suitable redundancy in components and features, and suitable interconnections, leak detection, isolation, and containment capabilities shall be provided to assure that for onsite electric power system operation (assuming offsite power is not available) and for offsite electric power system operation (assuming onsite power is not available) the system safety function can be accomplished, assuming a single failure.

Criterion 37 – Testing of emergency core cooling system

The emergency core cooling system shall be designed to permit appropriate periodic pressure and functional testing to assure (1) the structural and leaktight integrity of its components, (2) the operability and performance of the active components of the system, and (3) the operability of the system as a whole and, under conditions as close to design as practical, the performance of the full operational sequence that brings the system into operation, including operation of applicable portions of the protection system, the transfer between normal and emergency power sources, and the operation of the associated cooling water system.

The MNGP criteria addressing the emergency core cooling system (ECCS) are listed in Updated Safety Analysis Report (USAR) Section 1.2.3, “Reactor Core Cooling”. The applicable criteria for this system are discussed in USAR Section 6.2, “Emergency Core Cooling System (ECCS)”. The applicable analysis is contained in USAR Section 14.7.2.

10 CFR 50.46, “Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors,” specifies the following acceptance criteria for ECCS-LOCA analyses.

Criterion 1 – Peak Cladding Temperature: The calculated maximum fuel element cladding temperature shall not exceed 2200°F.

Criterion 2 – Maximum Cladding Oxidation: The calculated total local oxidation shall not exceed 0.17 times the total cladding thickness before oxidation.

Criterion 3 – Maximum Hydrogen Generation: The calculated total amount of hydrogen generated from the chemical reaction of the cladding with water or steam shall not exceed 0.01 times the hypothetical amount that would be generated if all the metal in the cladding cylinder surrounding the fuel, excluding the cladding surrounding the plenum volume, were to react.

Criterion 4 – Coolable Geometry: Calculated changes in core geometry shall be such that the core remains amenable to cooling.

Criterion 5 – Long-Term Cooling: After any calculated successful initial operation of the ECCS, the calculated core temperature shall be maintained at an acceptably low value and decay heat shall be removed for the extended period of time required by the long-lived radioactivity remaining in the core.

Conformance of the ECCS-LOCA analyses with Criteria 1 through 3 for the MNGP is presented in the enclosed report. As discussed within the enclosures, conformance with Criterion 4 is demonstrated by conformance to Criteria 1 and 2. The bases and demonstration of compliance with Criterion 5 are documented within the enclosure and remain unchanged by application of SAFER/GESTR-LOCA.

The proposed Surveillance Requirement changes were evaluated in accordance with the guidance provided in NRC Generic Letter 91-04, "Changes in Technical Specification Surveillance Intervals to Accommodate a 24-Month Fuel Cycle," dated April 2, 1991. Justification for these changes has also been provided in accordance with the guidance contained in GL 91-04. Based on the evaluation presented herein, NMC has concluded that the proposed TS changes in instrumentation surveillance frequency to reflect a 24-month interval (and associated allowable values) are consistent with the guidance of GL 91-04. The MNGP monitoring program is adequate for assessing the effects of the extended instrument calibration surveillance intervals on future instrument drift.

NMC has evaluated the proposed changes against the applicable regulatory requirements and acceptance criteria as described herein. The technical analysis in Section 5.0 above concludes that the proposed change to the small break LOCA analysis will continue to assure that the design requirements and acceptance criteria of the emergency core cooling system are met. Based on this there is reasonable assurance that the health and safety of the public, following approval of this change to revise the allowable value and extend the LPCI loop select logic Recirculation Riser Differential Pressure - High differential pressure indicating switches surveillance interval to nominally 24-months, is unaffected.

7.0 ENVIRONMENTAL EVALUATION

NMC has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. The proposed amendment does not involve (i) a significant hazards consideration, or (ii) authorize a significant change in the types or a significant increase in the amounts of any effluent that may be released offsite, or (iii) result in a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for a categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, NMC concludes pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

8.0 REFERENCES

1. GE Nuclear Energy, GE-NE-0000-0052-3113-P-R0, "Nuclear Management Company, LLC, Monticello Nuclear Generating Plant SAFER/GESTR ECCS-LOCA Analysis – LPCI Loop Selection Detectable Break Area," dated September 2006.

2. 10 CFR 50.46 Notification Letter 2006-01, "Impact of Top Peaked Power Shape for Small Break LOCA Analysis," July 28, 2006.

3. NRC NUREG-1433, "Standard Technical Specifications, General Electric Plants, BWR/4," Revision 3.0, dated June 2004.

4. GE Nuclear Energy, NEDC-31336-P-A, "General Electric Instrument Setpoint Methodology," dated September 1996.

5. NRC letter (C. O. Thomas) to GE (J. F. Quirk), Acceptance for Referencing of Licensing Topical Report NEDE-23785P, Revision 1, Volume III (P), "The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Flow Accident," June 1, 1984.

6. GE Nuclear Energy, NEDC-32514P, Revision 1, "Monticello Nuclear Generating Plant SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis," dated October 1997.

7. GE Nuclear Energy, GE-NE-J1103878-09-02P, "Monticello ECCS-LOCA Evaluation for GE14," August 2001.

8. NEDE-23785-P-A, "The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident, Volume III, SAFER/GESTR Application Methodology" Revision 1, General Electric Company, October 1984.

9. GE Nuclear Energy, NEDC-31786P, "Monticello SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis," dated December 1990.

10. NMC letter to NRC, "2006 Report of Changes and Errors in ECCS Evaluation Models," (L-MT-06-084) dated December 30, 2006.

11. 10 CFR 50.46 Notification Letter 2003-01, "Impact of SAFER Level/Volume Table Error on the Peak Cladding Temperature (PCT)," GE Proprietary Information, dated May 6, 2003.

12. NMC letter to NRC, "License Amendment Request to Support 24-Month Fuel Cycles," (L-MT-04-036) dated June 30, 2004, (ADAMS Ascension No. ML052700252).

13. NRC letter to NMC, "Monticello Nuclear Generating Plant – Issuance of Amendment Re: Implementation of 24-Month Fuel Cycles (TAC No. MC3692)," dated September 30, 2005, (ADAMS Ascension No. ML052700252).

14. NRC Generic Letter 91-04, "Changes in Technical Specification Surveillance Intervals to Accommodate a 24-Month Fuel Cycle," dated April 2, 1991.

15. NRC letter to TVA, "Browns Ferry Nuclear Plant, Units 2 and 3 – Issuance of Amendments Regarding Extension of Surveillance Calibration Interval for Area Temperature Monitoring Instrumentation of the Main Steam Valve Vault," dated November 26, 2002, (ADAMS Ascension No. ML023310327).

16. NRC letter to Entergy Nuclear Operations, "Pilgrim Nuclear Station – Issuance of Amendment Re: Instrumentation Trip Level Settings and Calibration Intervals Changes," dated April 17, 2003, (ADAMS Ascension No. ML030690008).

17. NRC letter to TVA, "Browns Ferry Nuclear Plant, Units 1, 2 and 3 – Issuance of Amendments Regarding Extension of Channel Calibration Surveillance Requirement Performance Frequency and Allowable Value Revision," dated September 21, 2006, (ADAMS Ascension No. ML062160077).

18. Instrumentation, Systems, and Automation (ISA) Society, ANSI/ISA-S67.04-2000, "Setpoints for Nuclear Safety-Related Instrumentation."

19. NMC letter to NRC, "Response to NRC Requests for Additional Information Regarding License Amendment Request Supporting 24-Month Fuel Cycles (TAC No. MC3692)," (L-MT-05-005) dated March 3, 2005.

20. NRC letter to the Boiling Water Reactor Owners Group, "Revision to Safety Evaluation Report on NEDC-31366, Instrument Setpoint Methodology (NEDC-31336P)," dated November 6, 1995.

21. Technical Specification Task Force (TSTF), Improved Standard Technical Specifications Change Traveler, TSTF-493, Revision 2, "Clarify Application of Setpoint Methodology for LSSS Functions."

22. NMC letter to NRC, "Response to NRC Requests for Additional Information Reqarding License Amendment Request Supportinq 24-Month Fuel Cycles (TAC No. MC3692)," (L-MT-05-075) dated July 1, 2005.

23. MNGP Engineering Standards Manual ESM-03.02-APP-I, Appendix I (GE Methodology Instrumentation and Controls), Revision 4.

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24. Electric Power Research Institute (EPRI) Report TR-103335, "Guidelines for Instrument Calibration Extension/Reduction Programs," Revision 1.

25. NRC to EPRI, "Status Report on the Staff Review of EPRI Technical Report TR-103335, Guidelines for instrument Calibration Extension/Reduction Programs, March 1994," dated December 1997.

26. NRC Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," Revision 1, dated November 2002.

ENCLOSURE 2

MONTICELLO NUCLEAR GENERATING PLANT

LICENSE AMENDMENT REQUEST

REVISE THE ALLOWABLE VALUE AND CHANNEL CALIBRATION SURVEILLANCE INTERVAL FOR THE RECIRCULATION RISER DIFFERENTIAL PRESSURE - HIGH FUNCTION

MARKED-UP TECHNICAL SPECIFICATION PAGES

(2 pages follow)

SURVEILLANCE REQUIREMENTS

--NOTES--

1. Refer to Table 3.3.5.1-1 to determine which SRs apply for each ECCS Function.

2. When a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed as follows: (a) for up to 6 hours for Functions 3.c and 3.f; and (b) for up to 6 hours for Functions other than 3.c and 3.f provided the associated Function or the redundant Function maintains ECCS initiation capability.

SURVEILLANCE		FREQUENCY
SR 3.3.5.1.1	Perform CHANNEL CHECK.	12 hours
SR 3.3.5.1.2	Perform CHANNEL FUNCTIONAL TEST.	92 days
SR 3.3.5.1.3	Calibrate the trip unit.	92 days
SR 3.3.5.1.4	Perform CHANNEL CALIBRATION.	92 days
SR 3.3.5.1.5	Perform CHANNEL FUNCTIONAL TEST.	12 months
SR 3.3.5.1.6	Perform CHANNEL CALIBRATION.	12 months
SR 3.3.5.1.7	Perform CHANNEL CALIBRATION.	24 months
SR 3.3.5.1.8	Perform LOGIC SYSTEM FUNCTIONAL TEST.	24 months
SR 3.3.5.1.9	Perform CHANNEL FUNCTIONAL TEST.	24 months

FOR INFORMATION - NO CHANGES

Table 3.3.5.1-1 (page 3 of 6)
Emergency Core Cooling System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
2. LPCI System					
e. Reactor Steam Dome Pressure Permissive - Bypass Timer (Pump Permissive)	1, 2, 3	2	C	SR 3.3.5.1.7 SR 3.3.5.1.8	≥ 18 minutes and ≤ 22 minutes
	$4^{(a)}$, $5^{(a)}$	2	B	SR 3.3.5.1.7 SR 3.3.5.1.8	≥ 18 minutes and ≤ 22 minutes
f. Low Pressure Coolant Injection Pump Start - Time Delay Relay	1, 2, 3, $4^{(a)}$, $5^{(a)}$	4 per pump	B	SR 3.3.5.1.7 SR 3.3.5.1.8	
Pumps A, B					≤ 5.33 seconds
Pumps C, D					≤ 10.59 seconds
g. Low Pressure Coolant Injection Pump Discharge Flow - Low (Bypass)	1, 2, 3, $4^{(a)}$, $5^{(a)}$	1 per pump	E	SR 3.3.5.1.2 SR 3.3.5.1.7 SR 3.3.5.1.8	≥ 360 gpm and ≤ 745 gpm
h. Reactor Steam Dome Pressure - Low (Break Detection)	1, 2, 3,	4	B	SR 3.3.5.1.2 SR 3.3.5.1.7 SR 3.3.5.1.8	≥ 873.6 psig and ≤ 923.4 psig
i. Recirculation Pump Differential Pressure - High (Break Detection)	1, 2, 3	4 per pump	C	SR 3.3.5.1.2 SR 3.3.5.1.7 SR 3.3.5.1.8	≥ 63.5 inches wc
j. Recirculation Riser Differential Pressure - High (Break Detection)	1, 2, 3	4	C	SR 3.3.5.1.2 ~~SR 3.3.5.1.6~~ SR 3.3.5.1.7 SR 3.3.5.1.8	≤ ~~24.0~~ 100.0 inches wc
k. Reactor Steam Dome Pressure - Time Delay Relay (Break Detection)	1, 2, 3	2	B	SR 3.3.5.1.7 SR 3.3.5.1.8 SR 3.3.5.1.9	≤ 2.97 seconds

(a) When associated ECCS subsystem(s) are required to be OPERABLE per LCO 3.5.2.

ENCLOSURE 3

MONTICELLO NUCLEAR GENERATING PLANT

LICENSE AMENDMENT REQUEST

REVISE THE ALLOWABLE VALUE AND CHANNEL CALIBRATION SURVEILLANCE INTERVAL FOR THE RECIRCULATION RISER DIFFERENTIAL PRESSURE - HIGH FUNCTION

DRAFT TECHNICAL SPECIFICATION BASES PAGES

(FOR INFORMATION)

(2 pages follow)

BASES

SURVEILLANCE REQUIREMENTS (continued)

The Frequency of SR 3.3.5.1.4 is based upon the assumption of a 92 day calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis. The Frequency of SR 3.3.5.1.6 is based upon the assumption of a 12 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis. The Frequency of SR 3.3.5.1.7 is based upon the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis, and for Function 2.j, a revised minimum detectable break area for the LPCI loop select logic (Ref. 5).

The SR 3.3.5.1.4 annotation in Table 3.3.5.1-1 for Functions 1.c, 1.d, 2.c, 2.d, 4.c, 4.d, 5.c, and 5.d has been modified by two Notes. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of instrument performance will verify that the instrument will continue to behave in accordance with design basis assumptions. The purpose of the assessment is to ensure confidence in the instrument performance prior to returning the instrument to service. These channels will also be identified in the Corrective Action Program. In accordance with procedures, entry into the Corrective Action Program will require review and documentation of the condition of OPERABILITY. The second Note requires the setting for the instrument be returned to within the as-left tolerance of the nominal trip setpoint. This will ensure that sufficient margin to the Safety Limit and /or Analytical Limit is maintained. If the setting for the instrument cannot be returned to within the as-left tolerance of the nominal trip setpoint, then the instrument channel shall be declared inoperable. The second Note also requires that the nominal trip setpoint and the methodology for calculating the as-left and the as-found tolerances be in a document controlled under 10 CFR 50.59 (i.e., Technical Requirements Manual (Ref. 4)).

<u>SR 3.3.5.1.8</u>

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required initiation logic for a specific channel. The system functional testing performed in LCO 3.5.1, LCO 3.5.2, LCO 3.8.1, and LCO 3.8.2 overlaps this Surveillance to provide complete testing of the assumed safety function.

The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed

BASES

SURVEILLANCE REQUIREMENTS (continued)

with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency.

REFERENCES

1. USAR, Section 14.7.2.

2. USAR, Chapter 14.

3. NEDC-30936-P-A, "BWR Owners' Group Technical Specification Improvement Analyses for ECCS Actuation Instrumentation, Parts 1 and 2," December 1988.

4. Technical Requirements Manual.

5. GE-NE-0000-0052-3113-P-R0, "SAFER/GESTR ECCS-LOCA Analysis – LPCI Loop Selection Detectable Break Area," September 2006. (Approved Am. XXX)