NMC
Committed to Nuclear Excellence

Monticello Nuclear Generating Plant
Operated by Nuclear Management Company, LLC

WITHOLD ENCLOSURES 5 AND 6 FROM PUBLIC DISCLOSURE UNDER 10 CFR 2.390

September 8, 2008

L-MT-08-045
10 CFR 50.90

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

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

Response to Requests for Additional Information for License Amendment Request: Revision to the Allowable Value and Channel Calibration Surveillance Interval for the Recirculation Riser Differential Pressure – High Function (TAC No. MD6864)

On September 25, 2007, the Nuclear Management Company, LLC (NMC) submitted a request to revise the allowable value and channel calibration surveillance interval for the Recirculation Riser Differential Pressure – High (Break Detection) function (Function 2.j in Technical Specification (TS) Table 3.3.5.1-1) in Specification 3.3.5.1 (Enclosure 1, Reference 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.

The U.S. Nuclear Regulatory Commission (NRC) requested additional information (RAI) on the basis for this proposed change by four e-mails (References 2, 3 and 4 in Enclosure 1 and Reference 2 in Enclosure 2). Two RAIs requested information considered proprietary by General Electric – Hitachi (GEH) pursuant to 10 CFR 2.390. A non-proprietary response to each of these proprietary RAI is provided in Enclosure 1. Also a copy of a GEH proprietary 10 CFR 50.46 Notification Letter 2006-01 to NMC, dated July 28, 2006, was requested. Answers to the two RAIs that include proprietary information are provided in Enclosure 5. A copy of the proprietary 10 CFR 50.46 Notification Letter 2006-01 is provided in Enclosure 6.

GEH, as the owner of the proprietary information, has executed two affidavits provided in Enclosure 4, which identifies that the enclosed information in Enclosures 5 and 6 has been handled and classified as proprietary, is customarily held in confidence, and has been withheld from public disclosure. The proprietary information contained in Enclosures 5 and 6 was provided to the MNGP in GEH transmittals referenced by the affidavits. The proprietary information has been faithfully reproduced within the RAI responses such that the affidavits remain applicable. GEH requests that the enclosed proprietary information be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 10 CFR 9.17.

In accordance with 10 CFR 50.91, a copy of this response, 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 8, 2008.

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

Enclosures

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

ENCLOSURE 1

RESPONSE TO REQUESTS FOR ADDITIONAL INFORMATION
NEW MINIMUM DETECTABLE BREAK AREA
FOR THE LPCI LOOP SELECT LOGIC

On September 25, 2007, (Reference 1) the Nuclear Management Company, LLC (NMC) submitted a request to revise the allowable value and channel calibration surveillance interval for the Recirculation Riser Differential Pressure – High (Break Detection) function (Function 2.j in Technical Specification (TS) Table 3.3.5.1-1) in 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.

The U.S. Nuclear Regulatory Commission (NRC) requested additional information (RAI) on the basis for this proposed change by three e-mails (References 2, 3 and 4). A non-proprietary response to each RAI is provided below. NMC's response to each NRC request (shown in bold print) immediately follows each request.

Reference 3 requested a copy of the General Electric – Hitachi (GEH) proprietary 10 CFR 50.46 Notification Letter 2006-01 to NMC, dated July 28, 2006. A copy of Notification Letter 2006-01 is provided in Enclosure 6.

(1) For the LPCI system in the residual heat removal operating mode, please address the potential for a LOCA with certain postulated single failures in electrical distribution that could leave the plant vulnerable regardless of offsite power status. For loop select logic plants operating in this mode, for example, the loop select logic mechanism could allow a single active failure (i.e., an LPCI injection valve in the path to the intact recirculation loop) to disable the entire LPCI system, placing dependence on the core spray system to accomplish the low pressure core cooling function. Please explain.

Single failure considerations in conjunction with a Loss of Coolant Accident (LOCA) are described within the MNGP Updated Safety Analysis Report (USAR), Section 14.7.2.3.2. In order to determine the acceptability of the response to a LOCA, the most limiting combination of break size, location, and single failure must be determined. The single failures that are considered must reflect any failure of an Emergency Core Cooling System (ECCS) component or support system which might be postulated to occur during a LOCA. The component failures typically considered for BWR-3 plants and that were considered for the MNGP are listed below:

- An emergency diesel generator
- A DC power source (Battery)
- A LPCI injection valve
- The High Pressure Coolant Injection (HPCI) System
- An Automatic Depressurization System (ADS) valve

The single failure in the analysis is considered in conjunction with the unavailability of offsite power.

The analysis scope of the GEH report entitled, "Monticello Nuclear Generating Plant SAFER/GESTR ECCS-LOCA Analysis- LPCI Loop Selection Detectable Break Area," (Reference 5) addressed the limiting cases that the proposed change to the LPCI Loop Selection Logic minimum detectable break size would affect. The evaluation performed determined that the previous analysis for large recirculation lines breaks, non-recirculation line breaks and alternate operating modes, including single failure considerations, remained a valid basis for acceptability. The GEH report entitled, "Monticello SAFER/ GESTR-LOCA Loss-of Coolant Accident Analysis," (Reference 6) provides the details of the single failure considerations evaluated and their results.

(2) Please provide the axial power shape used in the SBLOCA [Small Break LOCA] re-analysis for the limiting break. What is the PLHGR applied to the peak power position for this shape?

The limiting size for this analysis assuming failure of the LPCI Loop Selection Logic System was a 0.9 sq. ft. break. The power shape for the limiting break is shown below, both numerically and plotted (for the 10 nodes of SAFER). The Peak Linear Heat Generation Rate (PLHGR) applied to the peak node is 11.39 kw/ft with a 1.02 multiplier for 10 CFR 50 Appendix K assumptions.

[[

PROPRIETARY INFORMATION REMOVED

]]

(3) For the limiting SBLOCA, does the PCT terminate due to top down cooling (i.e., counter-current flow) into the hot bundle and hot rod from the core spray? Please explain.

During a teleconference on March 27, 2008, with the NRC reviewing these questions, it was requested that the NMC confirm the counter-current flow model that was applied to the recent MNGP analysis. The question posed was, did GEH apply the Modified Wallis Flooding Correlation, described in NEDE-20566-P, i.e.:

$CD^{1/4} = 0.593$

It is confirmed that the Modified Wallis Flooding Correlation as described in NEDE-20566-P is the model that would be used for counter current flow, it being the standard for the SAFER Evaluation Model.

However, in the SAFER analysis, no credit for core spray is taken for cooling of the hot bundle. The only instance when top down cooling is considered would be if there were a pool formed in the upper plenum. For the MNGP the formation of a pool in the upper plenum is shown not to develop until well past the Peak Cladding Temperature (PCT) time, so no top down cooling would be considered in this instance, with no direct effect on defining PCT.

(4) The small break analysis was performed assuming an initial core flow of 100% of rated core flow. Top peaked power shape was explicitly assumed for this analysis. The large break analysis is based on previously performed analysis in GENE-J1103878-09-02P. Please justify, quantitatively, the effect of lower and higher initial core flows (i.e. MELLLA and ICF) in conjunction with the top peaked power shape on both small and large break LOCA?

Small break and large break effects are addressed separately below:

<u>Small Break</u>

Initial core flow effects are insignificant on the small break ECCS-LOCA analysis results for a BWR. For small recirculation line breaks, both recirculation pumps contribute to the flow coast down. Nucleate boiling is maintained for an extended period until core uncovery occurs due to mass loss through the break and eventual ADS actuation. Variations in the initial core flow, due to Maximum Extended Load Line Limit Analysis (MELLLA) and Increased Core Flow (ICF), are not significant enough to impact this basic response of drawn-out inventory loss and, therefore, have no impact on the calculated PCT. Core uncovery and time to recover is the prominent factor for the cladding temperature progression for the small break. Top peaked axial power shapes have been shown to generally increase the calculated PCT for small breaks, since more residual power would be deposited in the uncovered top span of the rod for a longer uncovered period for the node. Therefore the Monticello ECCS small break analysis supporting LPCI Loop Select Logic was performed with this limiting condition.

<u>Large Break</u>

For large recirculation line breaks the recirculation flow coastdown from one recirculation loop is eliminated by the break. The overall recirculation flow coast down is much more rapid. Loss of nucleate boiling in the upper part of the bundle occurs early in the blowdown, before core uncovery. This early boiling transition, or dryout, creates a condition where essentially no convective heat transfer from the rod node is possible and causes maximum early heatup for the node from residual and decay heat. PCT will be influenced significantly by the time and depth of the predicted dryout.

As a result, the initial power shape is not as predominant a factor in determining the large break LOCA PCT, so much as dryout characteristics. The following analysis cases for a BWR-3 plant point this out. At rated flow and a mid-peaked power shape, the calculations do not predict dryout penetrating to the high power node. But, with MELLLA flow, and the same mid-peaked power shape, the dryout penetrates to the hot power node (Node 6), and PCT increases notably. For a top peaked power shape, dryout penetrates the core sufficiently to uncover the hot node (Node 8) regardless of initial core flow. Therefore, the PCT for MELLLA case does not increase because of a deeper axial node penetration of early boiling transition. In general, the difference in PCTs for the two top-peaked power shape cases would be less, but differences were observed in the steam cooling as a result of the derivation of the power shape, which makes the PCT difference between these two cases appear larger in this instance.

For ICF, the PCT effect would show similarly the sensitivities to the flow and power shape but also, more significantly, would remain vulnerable to the likelihood of changes in dryout characteristics. If early boiling transition results remain similar, the expected PCT would be in line with the rated core flow case.

This non-limiting condition is not routinely analyzed. The mid-peak power shape has been the historical basis of calculations as supported by prior sensitivity studies. More recently, top-peak power shapes assumed in large break accidents have been investigated as a result of NRC inquiries. The case with the highest PCT is reported as the limiting condition.

Axial Power Shape	MELLA Flow	Rated Flow
Top-peaked	[[ ]] Dryout to Node 8.	[[ ]] Dryout to Node 8.
Mid-peaked	[[ ]] Dryout to Node 6. (mid plane)	[[ ]] Dryout to Node 7.

PROPRIETARY INFORMATION REMOVED SHOWN IN BRACKETS ABOVE

ENCLOSURE 1

RESPONSE TO REQUESTS FOR ADDITIONAL INFORMATION
NEW MINIMUM DETECTABLE BREAK AREA
FOR THE LPCI LOOP SELECT LOGIC

REFERENCES

1. NMC letter to NRC, "License Amendment Request: Revision to the Allowable Value and Channel Calibration Surveillance Interval for the Recirculation Riser Differential Pressure – High Function," (L-MT-07-055), dated September 25, 2007.

2. Email from P. Tam (NRC) to R. Loeffler (NMC) dated March 18, 2008, "Monticello – Draft RAI re. Proposed amendment on recirculation riser diff. pressure (TAC MD6864)." (ADAMS Accession No. 080790515) --- RAI Questions 1 through 3.

3. Email from P. Tam (NRC) to R. Loeffler (NMC) dated March 25, 2008, "Reference (TAC MD6864)," --- Requested copy of 10 CFR 50.46 Notification Letter 2006-01, dated July 28, 2006.

4. Email from P. Tam (NRC) to R. Loeffler (NMC) dated March 27, 2008, "Monticello – Additional Question on the Recirc. Riser Diff. Pressure Amendment (TAC MD6864)." --- Added RAI Question 4.

5. GE-NE-0000-0052-3113-R0, "Monticello Nuclear Generating Plant SAFER/GESTR ECCS-LOCA Analysis - LPCI Loop Selection Detectable Break Area," Revision 0.

6. NEDE-32514P, "Monticello SAFER/GESTR-LOCA Loss-of Coolant Accident Analysis."

ENCLOSURE 2

RESPONSE TO REQUESTS FOR ADDITIONAL INFORMATION CONCERNING SETPOINT QUESTIONS

On September 25, 2007, (Reference 1) the Nuclear Management Company, LLC (NMC) submitted a request to revise the allowable value and channel calibration surveillance interval for the Recirculation Riser Differential Pressure – High (Break Detection) function (Function 2.j in Technical Specification (TS) Table 3.3.5.1-1) in 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.

The U.S. Nuclear Regulatory Commission (NRC) requested additional information (RAI) on the basis for this proposed change by e-mail (Reference 2). NMC's response to each NRC request (shown in bold print) immediately follows each request.

(1) **Setpoint Calculation Methodology: Provide documentation (including sample calculations) of the methodology used for establishing the limiting setpoint (or NSP) and the limiting acceptable values for the As-Found and As-Left setpoints as measured in periodic surveillance testing as described below. Indicate the related Analytical Limits and other limiting design values (and the sources of these values) for each setpoint.**

Response

As discussed within Section 5.6 of Enclosure 1 to the Recirculation Riser Differential Pressure - High Function license amendment request (LAR), the MNGP has adopted and incorporated into the site Engineering Standards Manual (ESM) (Reference 3), the MNGP specific implementation of the General Electric – Hitachi (GEH Instrument Setpoint Methodology (ISM) (References 4 and 5). The ESM provides plant-specific guidance on implementation of the GEH instrument setpoint guidelines and methodology. The GEH ISM has been reviewed and approved by the NRC for use by utilities as a basis for their instrument setpoint programs as discussed within the associated NRC safety evaluation for the methodology (Reference 6).

The MNGP specific implementation of the GEH ISM was applied in the determination of the setpoints for the various TS functions discussed herein. Conceptually, the GEH method is based on ISA Standard 67.04, Method 2 but leads to more conservative setpoints. According to this approved methodology, the setpoints are calculated from the Analytic Limit (AL) using a top down approach, and margin is calculated by methodology between the AL and the Allowable Value (AV), and between AV and the Nominal Trip Setpoint (NTSP).

The AL is a process parameter value used in the safety analysis. The AL represents a limiting value for the automatic initiation of protective actions. From the AL an AV is first calculated which, has margin to the AL, based on all measurement errors except drift. This AL/AV margin includes the Process Measurement Accuracy (PMA), Primary Element Accuracy (PEA), measuring instrument loop accuracy under trip conditions (A_T), and the instrument calibration errors (C). The calibration uncertainty in the GEH ISM contains the As-Left Tolerance (ALT), so the AV is already made more conservative to account for this allowance. All random errors are combined using Square Root of the Sum of the Squares (SRSS) method, and non-conservative bias errors are added algebraically. The AV represents the limiting value to which a setpoint can drift (as determined from surveillance testing) and still assure that the AL is protected. The approved GEH ISM provides a sufficient margin between the AL and AV to assure with at least 95 percent probability that the AL will not be exceeded if the setpoint has drifted to the AV. The AV is the value specified in the TSs.

The AV/NTSP margin includes instrument loop accuracy under calibration conditions (A_C), instrument calibration errors (C) and instrument drift errors (D). The approved GEH ISM basically calculates two nominal trip setpoints. The first is the setpoint with minimum required margin to the AL based on 95 percent probability of not exceeding the AL. This setpoint is called NTSP1 and the AL/NTSP1 margin is based on all errors (PMA, PEA, A_T, C, and Drift (D)). Therefore NTSP1 is equivalent to the Limiting Trip Setpoint (LSP) referred to in RIS 2006-17 (Reference 7). However, the GEH ISM also calculates a second nominal trip setpoint, referred to as NTSP2, with additional margin to provide high confidence that the setpoint will not drift beyond the AV potentially resulting in a Licensee Event Report (LER). According to the approved GEH ISM, the final NTSP has margin to the AV which provides 90 percent assurance that the AV value specified in the TSs will not be exceeded during surveillance tests. This is known as the LER Avoidance test. The final NTSP is chosen to satisfy both goals (protecting the AL and avoiding LERs) and is equivalent to the Nominal Setpoint (NSP) term used in RIS 2006-17.

The As-Found Tolerance (AFT) for this function is calculated using the ALT and the drift error to provide an approximate 95 percent assurance that the AFT will not be exceeded during surveillance tests. MNGP procedures require the instrument to be declared inoperable if the AV is exceeded and require that corrective actions be initiated any time the AFT is exceeded. This includes evaluating instrument performance before the channel is returned to service.

By the GEH ISM all setpoints are reset to the NTSP, within ALT, after calibration. The ALT is a procedural allowance specified by the calibration procedure and its value is generally the same as the instrument accuracy. The magnitude of ALT is generally less than the target maximum value specified by RIS 2006-17. MNGP procedures consider an instrument channel inoperable if it cannot be restored or calibrated within the specified ALT. Margin allowance for ALT is already incorporated in the calculated margins for the AV and the NTSP values according to approved GEH ISM, so the ALT used in setpoints calculated by GEH ISM, meets the guidance of RIS 2006-17.

ENCLOSURE 2

RESPONSE TO REQUESTS FOR ADDITIONAL INFORMATION CONCERNING SETPOINT QUESTIONS

As discussed within Section 5.9 of Enclosure 1 to the Recirculation Riser Differential Pressure - High Function license amendment request (LAR), the values for the Recirculation Riser Differential Pressure - High (Break Detection), setpoints are:

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

Enclosure 3 provides sample calculation CA-04-098, Revision 1, entitled "Instrument Setpoint Calculation – Recirculation Riser Differential Pressure - High (LPCI Loop Select)," illustrates the MNGP specific implementation of the GEH ISM to determine the setpoints for this function. The derivation of the NTSP, AV, and AL for this function is provided in this calculation.

2. **For the Setpoint that is not determined to be SL-Related: Describe the measures to be taken to ensure that the associated instrument channel is capable of performing its specified safety functions in accordance with applicable design requirements and associated analyses. Include in your discussion information on the controls you employ to ensure that the As-Left trip setting after completion of periodic surveillance is consistent with your setpoint methodology. Also, discuss the plant corrective action processes (including plant procedures) for restoring channels to operable status when channels are determined to be "inoperable" or "operable but degraded." If the controls are located in a document other than the TS (e.g., plant test procedure), describe how it is ensured that the controls will be implemented.**

Response

The exact same processes are applied for setpoints determined to be non-SL-Related, such as the Recirculation Riser Differential Pressure – High (Break Detection) in TS Table 3.3.5.1-1, as those determined to be SL-Related. Therefore, the same administrative control practices, including entry into the corrective action program are applied for any non-SL-Related channels found to be "inoperable" or "operable but degraded.

Sections 4.4.11 and 4.4.14 of the MNGP Instrument Control Manual provide guidance on performing instrument surveillance testing and conduct of work completion reviews and closeout.

RESPONSE TO REQUESTS FOR ADDITIONAL INFORMATION CONCERNING SETPOINT QUESTIONS

Data found outside of specified limits during surveillance testing is required to be promptly entered into the corrective action process. When the AFT or ALT data does not meet the requirements the out of tolerance data must be reported to the Supervisor Maintenance (I&C). Attachment 1 to administrative procedure FP-PA-ARP-01, "CAP Action Request Process," requires under Category 13, "Technical Specifications," as part of the severity level determination process that any TS instrument that is outside of its AFT or ALT is considered a condition adverse to quality requiring entry of the condition into the Corrective Action Program (CAP) process.

The Supervisor Maintenance (I&C) (or designee) enters the condition into the CAP and the Shift Manager (or designee) is informed of the condition for review and determination of the impact on operability. The Supervisor Maintenance (I&C) is responsible for making an initial evaluation of any out of tolerance condition reported by the I&C Technician. The process is discussed in more detail below.

Surveillance procedures are assigned to I&C Technicians by the Supervisor Maintenance (I&C) or his designee for performance as required by the surveillance schedule. Prior to starting surveillance test, the Control Room Supervisor (CRS) must sign the "Approval to Commence" line on the record copy. During surveillance testing there are four possible results:

1. The instrument setpoint is found within the ALT; the results are recorded in the procedure and, from the TS perspective, no further action is required.

2. The setpoint is outside the ALT but within the AFT, the instrument setpoint is reset to within the ALT. From a TS perspective no further action is required.

3. The instrument setpoint is found conservative with respect to the AV but outside the AFT. In this case the setpoint is reset to the NTSP (within the ALT), and the channels response is evaluated by the Supervisor Maintenance (I&C).

   The Supervisor Maintenance (I&C) makes an initial evaluation of any out of tolerance condition where the channel is outside the AFT. Generally this evaluation requires the I&C technician to attempt to restore the out of tolerance device to within acceptable limits and show that it is capable of performing its design function as provided in the calibration surveillance. When making the initial evaluation, the following items should be addressed:

   - Does the out of tolerance condition exceed any TS limits?
   - Does the out of tolerance condition exceed any Section XI limits?

- Does the out of tolerance condition adversely affect the operability of the associated equipment and/or system? Consultation with Plant Engineering personnel is required if this is unclear.
- Does the out of tolerance device exhibit signs of a degraded/ degrading condition or indicate an unreliable instrument (repeat failures) based on available historical calibration information, maintenance log, System Engineering input, or other site resources?

If the channel is operating as expected, then the channel can be restored to service at the completion of the surveillance. A prompt verification of the channels condition is performed after the surveillance. The channel's as-found condition is entered into the CAP for further evaluation. If the channel is not operating as expected, the channel is inoperable.

4. The instrument setpoint is found non-conservative with respect to the AV. The Supervisor Maintenance (I&C) makes an initial evaluation of any out of tolerance condition, including a channel outside the AV. This evaluation generally follows the steps outlined above for item 3.

   The MNGP Instrument Control Manual requires when a channel is outside the AV that this be reported to the Shift Manager (or his designee). The Supervisor Maintenance (I&C) informs the Shift Manager who based upon the available information makes an immediate operability determination. The channel's as-found condition is entered into the CAP for evaluation. The surveillance shall not be continued until approved by the Shift Manager (or his designee).

   Evaluations and corrective action (maintenance/testing) is performed to correct the condition allowing the setpoint to be reset to the NTSP (within the ALT) and the channel to be declared OPERABLE and returned to service.

The NMC requests that the NRC SE for this license amendment clearly delineate that the Recirculation Riser Differential Pressure - High (LPCI Loop Select) has been reviewed by the NRC as part of this submittal and that it is not a safety-limit LSSS in accordance with 10 CFR 50.36(c)(1)(ii)(A). This action will avoid future repeat reviews for functions already determined by both the NMC and the NRC to not be safety limit related LSSS, reducing the time and effort involved in future resolution of the LSSS setpoint issue.

ENCLOSURE 2

RESPONSE TO REQUESTS FOR ADDITIONAL INFORMATION CONCERNING SETPOINT QUESTIONS

REFERENCES

1. NMC letter to NRC, "License Amendment Request: Revision to the Allowable Value and Channel Calibration Surveillance Interval for the Recirculation Riser Differential Pressure – High Function," (L-MT-07-055), dated September 25, 2007.

2. Email from P. Tam (NRC) to R. Loeffler (NMC) dated July 22, 2008, "Conference Call (Tentative) - Monticello Draft RAI re. Recirc. Riser Differential Pressure, Instrumentation (TAC MD6864)."

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

4. GE-NE-901-021-0492, DRF A00-01932-1, Setpoint Calculation Guidelines for the Monticello Nuclear Generating Plant, October 1992.

5. NEDC-31336P-A, Class III, General Electric Instrument Setpoint Methodology, September 1996.

6. 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.

7 U.S. NRC Regulatory Issue Summary 2006-17, "NRC Staff Position on the Requirements of 10 CFR 50.36, "Technical Specifications," Regarding Limiting Safety System Settings During Periodic Testing and Calibration of Instrument Channels," dated August 24, 2006.

ENCLOSURE 3

MONTICELLO NUCLEAR GENERATING PLANT

RESPONSE TO REQUESTS FOR ADDITIONAL INFORMATION FOR LICENSE AMENDMENT REQUEST REVISION TO THE ALLOWABLE VALUE AND CHANNEL CALIBRATION SURVEILLANCE INTERVAL FOR THE RECIRCULATION RISER DIFFERENTIAL PRESSURE – HIGH FUNCTION

CA-04-098, REVISION 1

INSTRUMENT SETPOINT CALCULATION

RECIRCULATION RISER DIFFERENTIAL PRESSURE – HIGH (LPCI LOOP SELECT)

29 Pages Follow

QF-0549 (FP-E-CAL-01), Rev. 1

NMC	**Calculation Signature Sheet**

Document Information

NMC Calculation (Doc) No: CA-04-098	Revision: 1
Title: Instrument Setpoint Calculation, Recirculation Riser Differential Pressure - High (LPCI Loop Select)	
Facility: ☒ MT ☐ PB ☐ PI ☐ PL ☐ HU/FT	Unit: ☒ 1 ☐ 2
Safety Class: ☒ SR ☐ Aug Q ☐ Non SR	
Special Codes: ☐ Safeguards ☐ Proprietary	
Calc Type (PassPort DOC-DESC-CODE): (if applicable, Palisades only)	

NOTE:	Print and sign name in signature blocks, as required.

Major Revisions

EC Number: 9799	☐ Vendor Calc
Vendor Name or Code: N/A	Vendor Doc No: N/A
Description of Revision: Increase break size and calibration interval	
Prepared by: DeWayne Uecker, [signature]	Date: 02/12/07
Reviewed by: [signature], Rhon Sanderson	Date: 02-12-07
Type of Review: ☒ Design Verification ☐ Tech Review ☐ Vendor Acceptance	
Method Used (For DV Only): ☒ Review ☐ Alternate Calc ☐ Test	
Approved by: FRED DOWKE [signature]	Date: 4-13-07

Minor Revisions

EC No:	☐ Vendor Calc:
Minor Rev. No:	
Description of Change:	
Pages Affected:	
Prepared by:	Date:
Reviewed by:	Date:
Type of Review: ☐ Design Verification ☐ Tech Review ☐ Vendor Acceptance	
Method Used (For DV Only): ☐ Review ☐ Alternate Calc ☐ Test	
Approved by:	Date:

(continued on next page)

NMC	**Calculation Signature Sheet**

EC No:	☐ Vendor Calc:
Minor Rev. No:	
Description of Change:	
Pages Affected:	
Prepared by:	Date:
Reviewed by:	Date:
Type of Review: ☐ Design Verification ☐ Tech Review ☐ Vendor Acceptance	
Method Used (For DV Only): ☐ Review ☐ Alternate Calc ☐ Test	
Approved by:	Date:

EC No:	☐ Vendor Calc:
Minor Rev. No:	
Description of Change:	
Pages Affected:	
Prepared by:	Date:
Reviewed by:	Date:
Type of Review: ☐ Design Verification ☐ Tech Review ☐ Vendor Acceptance	
Method Used (For DV Only): ☐ Review ☐ Alternate Calc ☐ Test	
Approved by:	Date:

EC No:	☐ Vendor Calc:
Minor Rev. No:	
Description of Change:	
Pages Affected:	
Prepared by:	Date:
Reviewed by:	Date:
Type of Review: ☐ Design Verification ☐ Tech Review ☐ Vendor Acceptance	
Method Used (For DV Only): ☐ Review ☐ Alternate Calc ☐ Test	
Approved by:	Date:

NMC

Calculation Signature Sheet

NOTE:	This table is used for data entry into the PassPort Controlled Documents Module, reference tables. If the calculation references and inputs are all listed in the calculation directly, then only the inputs and outputs need to be listed here. If the calculation invokes this form for the list of references and inputs, then list them all here. Only the input and output references need to be entered in PassPort.

Associated Document References:

#	Document Name	Document Number	Doc Revision	Control Doc and Doc Type (i.e. in Pass-Port) :	Type (input, output, general ref):
1	Appendix I (GE Methodology Instrumentation & Controls)	ESM-03.02-APP-I	4	☒ PROC	Input
2	Instrument Drift Analysis, Barton Model 580A-0 Differential Pressure Indicating Switches	04-097	0	☒ CALC	Input
3	Monticello Component Master List (CML)	N/A	N/A	☐	Input
4	Environmental Qualification (50.49) of Barton Pressure Switch, Model 580A-0	98-012	5	☒ CALC	Input
5	Model 580A-0 Differential Pressure Indicating Switch	NX-17298	1	☒ VTM	Input
6	Determination of Instrument Service Conditions for Input into Setpoint Calculations	95-027	1	☒ CALC	Input
7	Monticello Nuclear Generating Plant SAFER/GESTR ECCS-LOCA Analysis - LPCI Loop Selection Detectable Break Area	GE-NE-0000-0052-3113-P-R0, eDRF 0000-0052-3106	September 2006	☐	Input
8	Monticello Technical Specifications	TECH-SPECS	147	☒ LIC	

NMC	Calculation Signature Sheet

9	ISP-RHR-0552-01	REACTOR RECIRCULATION LOOPS DP, LPCI SELECT INTERLOCK CHANNEL FUNCTIONAL TEST	0	☒ PROC	output
10	ISP-RHR-0552-02	REACTOR RECIRCULATION LOOPS DP, LPCI SELECT INTERLOCK CHANNEL CALIBRATION	1	☒ PROC	output
11	C.4-B.05.14.A	EARTHQUAKE	11	☒ PROC	output
12				☐	
13				☐	
14				☐	

Add additional lines if needed.

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Associated Equipment or System References:

#	Facility	Unit	System	Equipment Type	Equipment Number
1	MT	1	REC	INDREC	DPIS-2-129A
2	MT	1	REC	INDREC	DPIS-2-129B
3	MT	1	REC	INDREC	DPIS-2-129C
4	MT	1	REC	INDREC	DPIS-2-129D
5					
6					
7					

NMC	Calculation Signature Sheet

8					
9					
10					

Add additional lines if needed.

Superseded Calculations

Facility	Calc Document Number	Title

Add additional lines if needed.

QF-0526 (FP-E-MOD-07) Rev. 0

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Fleet Modification Process

Design Verification Assignment

Document or Mod Number: EC9799 Rev.: 1 Date: 12/02/2007
Title: Instrument Setpoint Calculation, Recirculation Riser Differential Pressure – High (LPCI Loop Select)

Initial Verification Assignment:

Verifier Name	Discipline
Rhon Sanderson	Electrical / I&C

Design Verification Method: ☒ Design Review ☐ Alternate Calculation ☐ Qualification Testing

Document(s) to be Verified: Calculation CA-04-098, Revision 1.
Verification Instructions: Calculation to be verified and comments addressed in accordance with fleet procedure FP-E-MOD-07.
Document(s) Requiring Technical Review Only:

Verifiers Assigned By: [signature] Date: 2/12/07

Subsequent Verification Assignment:

The following Verifiers are approved after the initial assignment of design verifiers.

Verifier Name	Discipline	Assigned by	Date

Professional Engineer Assignment (as required):

The following professional engineers are licensed in this state and are able to certify design documents in accordance with applicable State law or statute:

P.E. Name	Discipline	P.E. Number

NMC
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Design Review Checklist

Document Number/ Title: CA-04-098, Rev. 01, Instrument Setpoint Calculation, Recirculation Riser Differential Pressure - High (LPCI Loop Select)

Verifier's Name/ Discipline: Rhon Sanderson, Electrical Engineer [signature], 02-12-07

DESIGN REVIEW CONSIDERATIONS:		Yes	No	N/A
1.	Were the inputs correctly selected and incorporated into design?	☒	☐	☐
2.	Are assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent re-verifications when the detailed design activities are completed?	☒	☐	☐
3.	Are the appropriate quality and quality assurance requirements specified?	☒	☐	☐
4.	Are the applicable codes, standards, and regulatory requirements including issue and addends properly identified and are their requirements for design met?	☒	☐	☐
5.	Have applicable construction and operating experience been considered?	☒	☐	☐
6.	Have the design interface requirements been satisfied?	☐	☐	☒
7.	Was an appropriate design method used?	☒	☐	☐
8.	Is the output reasonable compared to inputs?	☒	☐	☐
9.	Are the specified parts, equipment and processes suitable for the required application?	☒	☐	☐
10.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?	☒	☐	☐
11.	Have adequate maintenance features and requirements been specified?	☐	☐	☒
12.	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?	☐	☐	☒
13.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?	☐	☐	☒
14.	Has the design properly considered radiation exposure to the public and plant personnel?	☒	☐	☐
15.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?	☒	☐	☐
16.	Have adequate pre-operational, subsequent periodic test, and inspection requirements been appropriately specified, including acceptance criteria?	☒	☐	☐
17.	Are adequate handling, storage, cleaning, and shipping requirements specified?	☐	☐	☒
18.	Are adequate identification requirements specified?	☐	☐	☒
19.	Are requirements for record preparation, review, approval, and retention adequately specified?	☐	☐	☒

COMMENTS: ☒ None ☐ Attached (Use Form QF-0528)

MONTICELLO NUCLEAR GENERATING PLANT		3494
TITLE:	**CALCULATION COVER SHEET**	Revision 17
		Page 1 of 1

Title *Instrument Setpoint Calculation, Recirculation Riser Differential Pressure - High (LPCI Loop Select)* CA- *04* - *098* Rev. *1*

10 CFR50.59 Screening or Evaluation No: *SCR-06-0594*

Associated Reference(s): *EC 9799*

Does this calculation:	YES	NO	Calc No(s), Rev(s), Add(s)
Supercede another calculation?	☐	☒	
Augment (credited by) another calculation?	☐	☒	
Affect the Fire Protection Program per Form 3765?	☐	☒	If Yes, attach Form 3765
Affect piping or supports?	☐	☒	If Yes, attach Form 3544
Affect IST Program Valve or Pump Reference Values, and/or Acceptance Criteria?	☐	☒	If Yes, inform IST Coordinator and provide copy of calculation

What systems are affected?

DBD Section (if any): B.03.04

Topic Code (See Form 3805): N/A

Structure Code (See Form 3805): N/A

Other Comments: A Techncial Specifications amendment is required before the results of Revision 1 of this calculation can be implemented.

Prepared by: DuWayne Wacker / [signature] Date: 02/12/2007
Print/Signature

M/cah

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MONTICELLO NUCLEAR GENERATING PLANT		CA-04-098
TITLE:	**Instrument Setpoint Calculation Recirculation Riser Differential Pressure – High (LPCI Loop Select)**	Revision 1
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1. PURPOSE

The purpose of this calculation is to derive Trip Setpoints and Allowable Values for the Recirculation Riser Differential Pressure – High (LPCI Loop Select) Differential Pressure Switches DPIS-2-129A, B, C, and D.

This calculation is being performed in support of the 24-Month Fuel Cycle Extension and the Improved Technical Specification (ITS) projects. Instrument drift uncertainties and the corresponding setpoints for the differential pressure switches are being evaluated for a nominal 12-month calibration interval. Allowable Values are determined in this calculation, along with the associated instrument uncertainties, Trip Setpoints, and As Found Tolerances.

Revision 1 of this calculation is performed to incorporate the results of the ECCS-LOCA analysis (Input 4.9) that was performed to increase the minimum break size required to be detected by the LPCI Loop Select logic. This change will calculate a new Technical Specification Allowable Value considering a 24-month calibration interval.

2. METHODOLOGY

This calculation is performed in accordance with ESM-03.02-APP-I (Input 4.1). The General Electric Setpoint Methodology is a statistically based methodology. It recognizes that most of the uncertainties that affect instrument performance are subject to random behavior, and utilizes statistical (probability) estimates of the various uncertainties to achieve conservative, but reasonable, predictions of instrument channel uncertainties. The objective of the statistical approach to setpoint calculations is to achieve a workable compromise between the need to ensure instrument trips when appropriate, and the need to avoid spurious trips that may unnecessarily challenge safety systems or disrupt plant operation.

Analyzed Drift values for the Differential Pressure Indicating Switches (DPIS) covered by this calculation were derived in Calculation CA-04-097 (Input 4.2).

The methodology for determining instrument setpoints is not described in the USAR or its references.

3. ACCEPTANCE CRITERIA

The setpoints and Allowable Values should be selected to assure that the Analytical Limit is not exceeded when all applicable instrumentation uncertainties are considered. A setpoint value is established with a 95%/95% tolerance interval as a criteria of uncertainties. That is, there is a 95% probability that the constructed limits contain 95% of the population of interest for a 24-month +25% calibration interval.

4. INPUTS

4.1 Engineering Standards Manual ESM-03.02-APP-I, Appendix I (GE Methodology Instrumentation & Controls), Revision 4. The ESM provides plant specific guidance on the implementation of the General Electric guidelines (Reference 10.1) and methodology (Reference 10.2).

4.2 CA-04-097, Revision 0, Addendum 0, Instrument Drift Analysis, Barton Model 580A-0 Differential Pressure Indicating Switches.

AD (Analyzed Drift for 30 Months)	+3.5 ± 13.6 inWC

4.3 Monticello Component Master List (CML). The CML contains instrument information relating to the installed equipment as listed in Section 6.2.1.1. The CML also provides the recent calibration records and maintenance history for the instruments included in this calculation.

4.4 CA-98-012, Revision 5, Addendum 0, Environmental Qualification (50.49) of Barton Pressure Switch, Model 580A-0. Data obtained from this input is used in determining the seismic uncertainty and the required accident duration for the switches. This information is used in Sections 6.2.1.2 and 6.2.1.3.

4.5 Vendor Technical Manual NX-17298, Revision 1, Barton Manual No. 84K1, 1984, "ITT Barton Model 580A-0 Differential Pressure Indicating Switch." The following specifications are used in determining the deadband and accuracy specifications. These specifications are used in Sections 6.2.1.3 and Section 6.7.

Switch Repeatability	±1.0% of full scale
DBE Accuracy	±10.0% of full scale
Normal Temperature Effect	2% per 50°F
Switch Deadband	10% full scale differential pressure, Max.
Temperature Limits	Abnormal 40°F min. to 150°F Max.

4.6 Qualification Verification Test Report R3-580A-29 for ITT Barton Models 580A, 581A and 583A Mild Environment Differential Pressure Switch Instruments, incorporated by reference into Input 4.4. Data obtained from this input is used in the determination of the seismic effect, and is shown in Section 6.2.1.3.

4.7 Calculation CA-95-027, Revision 1, Addendum 0, Determination of Instrument Service Conditions for Input into Setpoint Calculations. These switches are not included in CA-95-027. Since these instruments are located in the general floor area of the 935' elevation of the Reactor Building, the environmental data from PS-2-3-53A and B, which are located on instrument rack C-122, will be used. Seismic levels for racks C-121 and

C-122 are listed in Attachment 2 to CA-95-027. Data obtained from this input is listed in Section 6.2.1.2.

4.8 Instrument Calibration Worksheets from Input 4.3 contain the As Found tolerances of the devices used to calibrate the differential pressure switches. Data obtained from this input is used in Section 6.2.1.6.

Input Calibration Device	Description	As Found Tolerance
XPC-9055	W&T 0-280" Pneumatic Calibrator	±0.5 inWC
XPC-9056	W&T 0-280" Pneumatic Calibrator	±0.5 inWC
XPC-9058A	0-10 psig Beta Pneumatic Calibrator	±0.008 psi (±0.22 inWC)

4.9 GE-NE-0000-0052-3113-P-R0, eDRF 0000-0052-3106, September 2006, "Monticello Nuclear Generating Plant SAFER/GESTR ECCS-LOCA Analysis - LPCI Loop Selection Detectable Break Area." This evaluation recalculates the small break Loss-of-Coolant Accident (LOCA) assuming the failure of LPCI Loop Selection Logic System such that LPCI injects into the broken recirculation loop for all small breaks up to 0.4 ft^2. Furthermore, analysis is reported that determines the minimum pressure differential, which would need to be reliably measured, in order to assure accurate actuation of the LPCI Loop Selection Logic System for break sizes as low as 0.4 ft^2.

4.10 Monticello Technical Specifications, Amendment 147.

Section	Allowable Value	Function	Calibration Requirement
Table 3.3.5.1-1 Function 2.j	≤ 24.0 inWC	Recirculation Riser Differential Pressure - High (Break Detection)	SR 3.3.5.1.6 12 months

5. ASSUMPTIONS

5.1 These instruments have historically been calibrated on a once per year frequency. Since the calibration frequency was recently increased to once per cycle by the MNGP Preventive Maintenance Optimization effort, a drift analysis (Input 4.2) was performed as part of the 24-Month Fuel Cycle Extension Project. Due to the relatively large instrument drift and small available margins, the calibration interval for these instruments could not be extended to 24 months.

Therefore, Revision 0 of this calculation and the Monticello Technical Specifications (Input 4.10) used a calibration frequency of once per 12 months. Due to the increase in available margin due to the reanalysis of the minimum detectable break size (Input 4.9), Revision 1 will be performed for a 24-month calibration interval. The calculation takes into account the 25% grace period allowed by the Technical Specifications.

5.2 Per Input 4.6, Barton Model 288A Differential Pressure Indicating Switches were seismically qualified to maintain both structural integrity and function. Per Input 4.4 these test results are applicable to the Model 580A-0 instruments installed at MNGP. Review of Input 4.6 shows that a setpoint shift of +3.2% of range occurred following the seismic testing. While the testing was performed at seismic levels well in excess of the levels that would be seen in the plant, calibration of the tested instrument was not verified until after the seismic testing was complete. Therefore, it is not possible to determine at what seismic level the setpoint shifts occurred. Since this is a relatively large error compared to the available margin, an acceptable Allowable Value cannot be calculated if seismic errors are included.

The LPCI Loop Select instrumentation is not required for safe shutdown following a design basis earthquake, neither is an earthquake assumed to occur concurrently with a loss of coolant accident. Therefore, it is acceptable to exclude seismic errors from the calculation of the Allowable Value provided that measures are in place to recalibrate the instruments after a seismic event. Due to the increase in available margin due to the reanalysis of the minimum detectable break size (Input 4.9), Revision 1 will consider all applicable instrument errors, including seismic effects. The procedural requirements implemented for Revision 0 of this calculation may be removed (see Future Need 8.2).

6. ANALYSIS

6.1 Instrument Channel Arrangement

6.1.1 Channel Diagram:

The only instrument analyzed in this calculation is a differential pressure indicating switch, therefore a channel diagram is unnecessary.

Channel Function:

Per References 10.3, 10.20 and 10.21, the LPCI Break Detection System determines which Recirculation loop is broken and selects the unbroken Recirculation loop to be used for LPCI injection. If neither loop is broken, a pre-selected loop (Loop B) is used for injection. The subject differential pressure switches are configured to actuate if

Loop A pressure is greater than Loop B pressure. If so, then the switch contacts close, and thus cause the LPCI injection to align to Loop A. Otherwise, the logic selects Loop B for LPCI injection.

6.2 Instrument Definition and Determination of Device Uncertainty Terms

6.2.1 DEVICE 1

6.2.1.1 Instrument Definition:

Component ID:	DPIS-2-129A; -129B; -129C; -129D	**Input**
Location:	DPIS-2-129A/C – Rx Bldg 1st Floor West – 935' C-121 DPIS-2-129B/D – Rx Bldg 1st Floor East – 935' C-122	4.3
Manufacturer:	Barton	4.3
Model Number:	580A-0	4.3
Range:	-138.6 to +138.6 inWC (-5 to +5 psid)	4.3
Input Signal:	-138.6 to +138.6 inWC (-5 to +5 psid)	4.3
Output Range:	Contact opens/closes	4.3

6.2.1.2 Process and Physical Interfaces:

The differential pressure switches are installed in the Reactor Building. The applicable environmental conditions for the Reactor Building are as follows:

Calibration Conditions:		**Input**
Temperature:	65 - 90 degree F	4.7
Radiation:	Negligible (Background)	4.7
Pressure:	Ambient	4.7
Humidity:	20 - 90%	4.7
Calibration Interval:	30 months (24 months + 25%)	5.1

Normal Plant Conditions:		**Reference**
Temperature:	60 - 104 degree F	4.7
Radiation:	Negligible (Background)	4.7
Pressure:	Ambient	4.7
Humidity:	20 - 100%	4.7

Trip Environmental Conditions:		**Reference**
Temperature:	104 °F Max.	Note 1
Radiation:	Negligible (Background)	Note 1
Pressure:	Ambient	Note 1

Humidity:	100% Max.	Note 1
Seismic Conditions (ZPA):	0.56g (C-121) 0.38g (C-122)	4.7

Note 1: Per Input 4.4, the instrument function time required for these switches corresponds to 10 minutes under LOCA conditions. Per Input 4.7, the DBA LOCA (inside containment) does not affect pressure, temperature, humidity or radiation service conditions outside containment for instrument function times less than 10 minutes. Post Accident conditions are not applicable, as the instrument performs its safety-related function within ten minutes of accident initiation; therefore, the trip environment corresponds to normal reactor building environmental conditions.

Process Conditions:		**Reference**
Temperature:	60 - 104 degree F	Note 1
Pressure:	Reactor Pressure	Note 2

Note 1: These switches are connected to static pressure legs. The water in the sensing lines will be at normal Reactor Building temperatures.

Note 2: These switches measure the differential pressure between the recirculation loops and will be at nominal reactor pressure. Both sensing lines have equal elevation drops within and outside of the drywell. Therefore, any environmental changes will affect both sensing lines equally.

6.2.1.3 Individual Device Accuracy (A_N & A_T):

Term	Specified	Value	Reference
VA:	±1.0% Full Scale	±2.78 inWC	4.5, Note 1
ATE:	±2.0% Full Scale / 50°F	±1.56 inWC	4.5, Note 2
OPE:	N/A	0	4.5, Note 3
SPE:	Negligible	0	4.5, Note 4
SE:	±10.0% Full Scale	±27.72 inWC	4.5, Note 5
RE:	N/A	0	Note 6
HE:	Negligible	0	Note 7
PSE:	N/A	0	Note 8
REE:	N/A	0	Note 8

Note 1: Per Input 4.5, accuracy is specified as ±1.0% of full scale (differential pressure). With a full scale differential pressure of 277.2 inWC (-138.6 to +138.6 inWC [-5 to +5 psid]) the repeatability is ±2.78 inWC, therefore;

VA = ± 2.78 inWC

Note 2: The calibration temperature range is 65°F to 90°F. Accuracy Temperature Effect (ATE) is based on the widest temperature variation outside of the calibration temperature range. Using the trip environment temperature range of 60°F to 104°F results in temperature ranges of 5° (65°F - 60°F) and 14° (104°F - 90°F). Therefore the ATE is based on the number of degrees in excess of 90°F. Per Input 4.5, the switch setpoint has a nominal temperature effect shift of ±2.0% full scale / 50°F.

$$ATE = \pm(2.0\% \times Span) \times \frac{104-90}{50}$$
$$ATE = \pm(0.02 \times 277.2) \times \frac{104-90}{50}$$
$$ATE = \pm 1.56 \text{ inWC}$$
$$ATE_N = ATE_T = ATE = \pm 1.56 \text{ inWC}$$

Note 3: Per Input 4.5, the Barton 580A-0 indicating switch rupture-proof differential pressure units consist of an opposing bellows unit assembly and removable pressure housings. The movable bellows are rigidly connected by a dual valve stem that passes through the center plate. Valve seats in the passage through the center plate form a seal with the valves spaced on the stem. Any difference in pressure causes the bellows to move until the spring effect of the unit balances out the force thus generated. If the bellows are subjected to a pressure difference greater than the differential pressure range of the unit (Over Pressurization), a valve mounted on the center stem seals against its corresponding valve seat. As the valve closes, it "traps" the fill liquid in the bellows; thus the bellows are fully supported and cannot be ruptured regardless of the over pressure applied. Since opposed valves are provided, full protection is afforded against an "over-range" in either direction. Over Pressure Effect (OPE) is therefore not applicable.

OPE = 0

Note 4: Per Input 4.5, the differential pressure units have negligible static pressure shift. Therefore:

SPE = 0

Note 5: Input 4.5 specifies a ±10.0% of full scale shift during a Design Basis Event, including seismic effects. Since seismic effects are not specified separately, this error will be considered as the seismic error for the trip environment in addition to the ATE listed above. Therefore:

$$SE_T = \pm 10\% \times \text{Span}$$
$$SE_T = \pm 10\% \times 277.2$$
$$SE_T = \pm 27.72 \text{ inWC}$$

Normal vibration errors are assumed to be included within the drift allowance. Therefore:

$$SE_N = 0$$

Note 6: Since, all snap-action switching components are metallic (except housing), they are not susceptible to normal radiation effects and RE should not contribute to instrument uncertainty. Additionally, per Section 6.2.1.2, radiation conditions are negligible for this application. Therefore;

$$RE = 0$$

Note 7: The differential pressure sensing unit is hermetically sealed. An elastomer ring acts as a seal between the bezel and the case and insures a moisture, fume and dust free atmosphere for the indicator and switch mechanism. The vendor does not specify a distinct Humidity effect, and based on the construction of the device, as described above, any affects due to humidity are judged to be negligible. Therefore;

$$HE = 0$$

Note 8: Electro-Mechanical DPIS switches are not susceptible to Power Supply Effects (PSE), and RFI/EMI Effects (REE); therefore, no errors are introduced due to these effects;

$$PSE = 0$$
$$REE = 0$$

$$A_N = \sqrt{VA^2 + ATE^2 + OPE^2 + SPE^2 + SE_N{}^2 + RE^2 + HE^2 + PSE^2 + REE^2}$$
$$A_N = \sqrt{2.78^2 + 1.56^2 + 0^2 + 0^2 + 0^2 + 0^2 + 0^2 + 0^2 + 0^2}$$
$$A_N = \pm 3.19 \text{ inWC}$$

$$A_T = \sqrt{VA^2 + ATE^2 + OPE^2 + SPE^2 + SE_T{}^2 + RE^2 + HE^2 + PSE^2 + REE^2}$$
$$A_T = \sqrt{2.78^2 + 1.56^2 + 0^2 + 0^2 + 27.72^2 + 0^2 + 0^2 + 0^2 + 0^2}$$
$$A_T = \pm 27.91\,\text{inWC}$$

6.2.1.4 Individual Device Drift:

Vendor Drift is not specified. Input 4.2 performs an analysis using instrument calibration history.

AD = ± 13.6 inWC + 3.5 inWC Bias

AD is used in place of VD and DTE, since the Analyzed Drift is considered to include drift temperature effects.

Therefore;

$D_{Random} = AD_{Random} = \pm 13.6$ inWC
$D_{Bias} = AD_{Bias} = + 3.5$ inWC

6.2.1.5 As Left Tolerance (ALT):

The existing ALT of ± 1.0 inWC (Input 4.3) is less than the rated switch repeatability. A suggested limit on the ALT will be determined based on repeatability and calibration instruments (C_1 and C_{1STD} are defined in Section 6.2.1.6):

$$ALT = \sqrt{VA^2 + C_1{}^2 + C_{1STD}{}^2}$$
$$ALT = \sqrt{2.78^2 + 0.5^2 + 0.5^2}$$
$$ALT = 2.8\,\text{inWC}$$

Although the existing ALT of ± 1.0 inWC is less than the rated switch repeatability, it has been successfully used for a number of years. However, to provide for easier calibration, a new ALT within the above calculated value will be specified. Therefore the ALT will be increased to 2.5 inWC:

ALT = ± 2.5 inWC

6.2.1.6 Device Calibration Error:

Term	Value	Sigma	Reference
C_1:	± 0.5 inWC	3	Note 1
C_{1STD}:	± 0.5 inWC	3	Note 2
ALT:	± 2.5 inWC	3	6.2.1.5

Note 1: Multiple M&TE has been used to calibrate the DPIS. Use of the As-Found Tolerances accounts for calibration error (including readability) of the calibration devices. The worst case As Found Tolerance is used to represent the input MTE accuracy. Predominately, a digital Beta calibrator has been used, which has an As Found Tolerance of ±0.22 inWC. Less frequently however, Wallace and Tiernan calibrators with accuracies of ±0.5 inWC have been used. Per Input 4.8 the largest As Found Tolerance value for the MTE is ± 0.5 inWC. For conservatism, the ±0.5 inWC value is used.

Note 2: In accordance with Input 4.1, C_{1STD} is considered to be equal to C_1.

Calibration term values are considered to be 3-sigma values since they are controlled by 100% testing. Individual calibration error terms are combined using the SRSS method and normalized to a 2-sigma confidence.

$$C = \pm\frac{2}{3}\sqrt{C_1^{\,2} + C_{1STD}^{\,2} + ALT^2}$$

$$C = \pm\frac{2}{3}\sqrt{0.5^2 + 0.5^2 + 2.5^2}$$

$$C = \pm 1.74 \text{ inWC}$$

6.3 Determination of Loop/Channel Values

6.3.1 Determination of Loop Accuracy:

As there is only one device in the instrument loop, $A_{LN} = A_N$ and $A_{LT} = A_T$; therefore,

A_{LN} = ± 3.19 inWC
A_{LT} = ± 27.91 inWC

6.3.2 Determination of Loop Calibration Error:

As there is only one device in the instrument loop, C_L = C; therefore,

$C_L = \pm 1.74$ inWC

6.3.3 Determination of Loop Drift:

As there is only one device in the instrument loop, D_L = D; therefore,

$D_{LRandom} = \pm 13.6$ inWC (≤30 Months)
$D_{LBias} = + 3.5$ inWC (≤30 Months)

6.4 Determination of Primary Element Accuracy (PEA) and Process Measurement Accuracy (PMA)

6.4.1 Primary Element Accuracy

The DPIS measures the differential in pressure between the two recirculation pump risers. As shown in References 10.10 through 10.19, the sensing lines connect to the recirculation risers at approximately the same elevations and are subject to nominal reactor pressure. Therefore, Primary Element Accuracy is negligible in comparison to other error terms.

PEA = 0

6.4.2 Process Measurement Accuracy

As shown in References 10.10 through 10.19, the sensing lines have approximately the same elevation drop within the drywell. Therefore, any temperature changes within the drywell will have equal effects on each of the two sensing lines to each of the subject differential pressure switches. Therefore, Process Measurement Accuracy is negligible in comparison to other error terms.

PMA = 0

6.5 Determination of Other Uncertainty Terms

The switching mechanism actuates in response to mechanical movement of the differential pressure bellows mechanism; therefore, the error terms listed in the table below are not applicable to these electro/mechanical type DPIS switches.

Term	Value
Indicator Readability/Operator Reading Error (ORE)	0
Resistors, Multiplexers, etc.	0
Software Errors	0
Degradation of Insulation Resistance (IRE)	0

6.6 Allowable Value and Operating Setpoint

6.6.1 Allowable Value (AV):

Per Reference 10.3, the LPCI break detection system determines which recirculation loop is broken and selects the unbroken recirculation loop to be used for LPCI injection. If neither loop is broken, a pre-selected loop (Loop B) is used for injection. The system makes the loop selection by comparing the pressure in the five riser pipes on one recirculation loop with the pressure in the corresponding risers on the other recirculation loop. The unbroken recirculation loop has a higher pressure than the broken loop. Such an indication (as determined by a one-out-of-two-twice logic) causes the LPCI flow to be injected into the unbroken loop.

Operational controls have been incorporated into plant operating procedures (Reference 10.5), based on recommendations from Reference 10.4, to limit the allowed flow imbalance between recirculation loops during normal steady-state operations, to enhance the ability of the loop selection logic to detect breaks. This ensures that recirculation line breaks are not masked by normal operating differential pressure between loops, caused by flow imbalance. Reference 10.22 agrees that with the recommended operating restrictions, a recirculation line break of greater than or equal to 0.1 ft^2 will result in correct detection by the LPCI Loop Selection Logic. Reference 10.23, performed for the ITS conversion project, provides recirculation loop flow mismatch requirements to minimize the effect of flow mismatch on the ECCS-LOCA analysis and to enhance the capability of the LPCI loop selection login to detect breaks in the recirculation loops. The mismatch values provided for the LPCI loop selection concerns match the values in Reference 10.4.

The ECCS-LOCA analysis has been performed to increase the minimum detectable break size to 0.4 ft^2 (Input 4.9). This analysis shows that a 30 psi difference will exist across the recirculation loops considering the maximum flow mismatch.

To ensure that the switch will trip prior to going off scale, the Analytical Limit used in this calculation will be 5 psid, which corresponds to the top end of the calibrated switch range:

$AL \leq 5$ psid (138.6 inWC)

Note: The AL used in this calculation is limited by the range of the installed instrumentation. If a switch of larger range was installed, an AL approaching 30 psid could be justified by the ECCS-LOCA analysis.

In order to provide an even value AV, a margin value of 10.6 inWC is included (although not required) in the computation of the Allowable Value and the Nominal Trip Setpoint ($NTSP_1$).

Term	Value (inWC)	Sigma	Reference
A_{LT}	27.91	2	Section 6.3.1
C_L	1.74	2	Section 6.3.2
PMA	0	NA	Section 6.4.2
PEA	0	NA	Section 6.4.1
IRE	NA	NA	Section 6.5
ORE	NA	NA	Section 6.5
Other	NA	NA	Section 6.5
Margin	10.6	NA	Note Above

Since the switch has both a trip and a reset requirement, the adjustment for single-side of interest is not used in this calculation.

$$AV \leq AL - \left(\sqrt{A_{LT}^2 + C_L^2}\right) - Margin$$

$$AV \leq 138.6 - \left(\sqrt{27.91^2 + 1.74^2}\right) - 10.6$$

$$AV \leq 100.0 \text{ inWC}$$

The current Technical Specification AV of ≤ 24.0 inWC (Input 4.10) will be changed to ≤ 100.0 inWC.

6.6.2 Nominal Trip Setpoint ($NTSP_1$):

Term	Value (inWC)	Sigma	Reference
A_{LT}	± 27.91 inWC	2	Section 6.3.1
$D_{LRandom}$	± 13.6 inWC	2	Section 6.3.3
D_{LBias}	+ 3.5 inWC	NA	Section 6.3.3
C_L	± 1.74 inWC	2	Section 6.3.2
PEA	0	NA	Section 6.4.1
PMA	0	NA	Section 6.4.2
IRE	0	NA	Section 6.5
ORE	0	NA	Section 6.5
Other	0	NA	Section 6.5
Margin	10.6	NA	Section 6.6.1

Per Input 4.1, the NTSP is determined by the following equation.

$$NTSP_1 \le AL - \left(\sqrt{A_{LT}^2 + D_{LRandom}^2 + C_L^2}\right) - D_{LBias} - Margin$$

$$NTSP_1 \le 138.6 - \left(\sqrt{27.91^2 + 13.6^2 + 1.74^2}\right) - 3.5 - 10.6$$

$$NTSP_1 \le 93.4 \text{ inWC}$$

6.6.3 LER Avoidance Evaluation ($NTSP_2$):

The purpose of the LER Avoidance Evaluation is to assure that there is sufficient margin provided between the current AV and the NTSP to reasonably avoid violations of the AV. For a single instrument channel, a Z value of greater than 1.29 provides sufficient margin between the NTSP and the AV. Therefore, $NTSP_2$ is calculated to provide an upper bound for the NTSP based on LER avoidance criteria.

$$Sigma_{LER} = \left(\frac{1}{2}\right)\left(\sqrt{A_{LN}^2 + C_L^2 + D_{LRandom}^2}\right)$$

$$Sigma_{LER} = \left(\frac{1}{2}\right)\left(\sqrt{3.19^2 + 1.74^2 + 13.6^2}\right)$$

$$Sigma_{LER} = 7.04$$

$$NTSP_2 \le AV - (Z \times Sigma_{LER}) - D_{LBias}$$

$$NTSP_2 \le 100.0 - (1.29 \times 7.04) - 3.5$$

$$NTSP_2 \le 87.4 \text{ inWC}$$

Therefore, a $NTSP_2 \leq 87.4$ inWC will result in a Z greater than 1.29 and provide sufficient margin between the NTSP and the Allowable Value.

6.6.4 Selection of Operating Setpoint (NTSP):

$NTSP_2$ will be used as the controlling NTSP for the upper limit for the As Left Tolerance. The Nominal Trip Setpoint must be separated from $NTSP_2$ by at least the ALT.

$$NTSP < NTSP_2 - ALT$$
$$NTSP < 87.4 - 2.5$$
$$NTSP < 84.9 \text{ inWC}$$

The existing NTSP is less than 84.9 inWC and will be used:

NTSP = 15.0 inWC

6.6.5 Establishing As Found Tolerance (AFT):

An As Found Tolerance is calculated to provide an upper and lower acceptable limit for use during calibration.

$$AFT = \pm\left(\sqrt{ALT^2 + D_{LRandom}{}^2} + D_{LBias}\right)$$

$$AFT = \pm\left(\sqrt{ALT^2 + D_{LRandom}{}^2} + D_{LBias}\right)$$
$$AFT = \pm\left(\sqrt{\left(\frac{2.5 \times 2}{3}\right)^2 + 13.6^2} + 3.5\right)$$
$$AFT = \pm 17.2 \text{ inWC}$$

AFT = ± 17.0 inWC (Rounded)

6.6.6 Required Limits Evaluation:

The As Found Tolerance is less than the difference between the Trip Setpoint and the Allowable Value, and is greater than the As Left Tolerance. Therefore, the As Found Tolerance, as computed in Section 6.6.5, is acceptable. The As Found Tolerance of ± 9.0 inWC will be changed to ± 17.0 inWC.

6.6.7 Spurious Trip Avoidance Evaluation:

A spurious trip avoidance evaluation assures that there is a reasonable probability that spurious trips will not occur during normal operation. The operation of the break detection circuit does not "trip" any equipment; it only identifies which of the two loops has a lower riser pressure than the other. Therefore, a spurious trip avoidance evaluation is not necessary.

6.6.8 Elevation Correction:

Per Section 6.2.1.2, the sensing lines for these switches are connected to the associated risers at the same approximate elevations. The water contained in the sensing legs are generally at the same temperature, and thus the weight of the water in the two lines cancel out. Therefore, the DPIS switches do not require elevation correction.

6.7 Switch Reset

In order to verify that the switches properly identify the broken loop, switch reset requirements must be added. The switches have a rated fixed deadband of approximately 10% of full scale (Input 4.5) or approximately 27.7 inWC, which is not adjustable. This establishes a nominal reset value of the following approximate value.

$$\text{Reset} = \text{TS} - \text{Deadband}$$

$$\text{Reset} = 15.0 - 27.7$$

$$\text{Reset} = -12.7 \text{ inWC}$$

Per the discussion in Section 6.6.1, a broken recirculation loop will have a line pressure at least 30 psid lower than the unbroken recirculation loop. Upon the condition where the broken loop is the A loop, if operation had caused a differential pressure of greater than the setpoint, the switches could have changed state, and this reset must operate for proper loop selection. Correct selection of the broken loop for break sizes of less than 0.4 ft^2 is not important.

If the switch reset occurs at a value less than or equal to the Analytical Limit in the opposite direction, i.e., -138.6 psid, the proper loop will be selected for a 0.4 ft^2 break. The same general errors apply to the reset value as to the setpoint. Therefore, since the magnitude of the reset value is slightly smaller than the magnitude of the setpoint value, the reset value is adequate.

To ensure proper control of the reset value, the As Found Limit is established at a maximum magnitude equal to that of the positive As Found Limit of the setpoint.

AFT $Limit_{Reset} \geq$ -32.0 psid

7. CONCLUSIONS

Attachment 1 graphically shows the relationships of the results of this calculation.

Term	Value	Section
A_{LN}	± 3.19 inWC	6.3.1
A_{LT}	± 27.91 inWC	6.3.1
$D_{LRandom}$	± 13.6 inWC	6.3.3
D_{LBias}	+ 3.5 inWC	6.3.3
C_L	± 1.74 inWC	6.3.2
PEA	0	6.4.1
PMA	0	6.4.2
ORE	0	6.5
IRE	0	6.5
Elevation Correction	N/A	6.6.8
ALT	± 2.5 inWC	6.2.1.5
AFT	± 17.0 inWC	6.6.5
AL (Analytical Limit)	≤ 138.6 inWC (5.0 psid)	6.6.1
Margin Used for Computing AV and $NTSP_1$	10.6 inWC	6.6.1
ITS AV (Allowable Value)	≤ 100.0 inWC	6.6.1
$NTSP_1$	≤ 93.4 inWC	6.6.2
$NTSP_2$ (LER Avoidance)	≤ 87.4 inWC	6.6.3
Trip Setpoint (NTSP)	15.0 inWC	6.6.4
Reset As Found Limit	≥ -32.0 inWC	6.7

Based on these results, it is concluded that the Analytical Limit is not exceeded when all applicable uncertainties are considered.

This calculation determined an Allowable Value of ≤ 100.0 inWC for use in the MNGP Technical Specifications. The current instrument setpoint of 15 inWC does not change. A new ALT of ± 2.5 inWC is determined. This calculation also determined a new As Found Limit (≥ -32 inWC) for the reset of these switches. Following approval of the TS amendment request, the AFT will be changed to ± 17.0 inWC.

8. FUTURE NEEDS

8.1 Process Setpoint Change Request to implement the Allowable Value, As Left Tolerance, As Found Tolerance, and reset limit changes for the Recirculation Riser Differential Pressure – High setpoint following approval of the TS license amendment (OTHA 01073703-01).

8.2 Revise Ops Man C.4-B.05.14.A to remove the requirement to calibrate DPIS-2-129A, B, C, D following a seismic event; approval of the TS license amendment is required (OTHA 01073703-02).

9. ATTACHMENTS

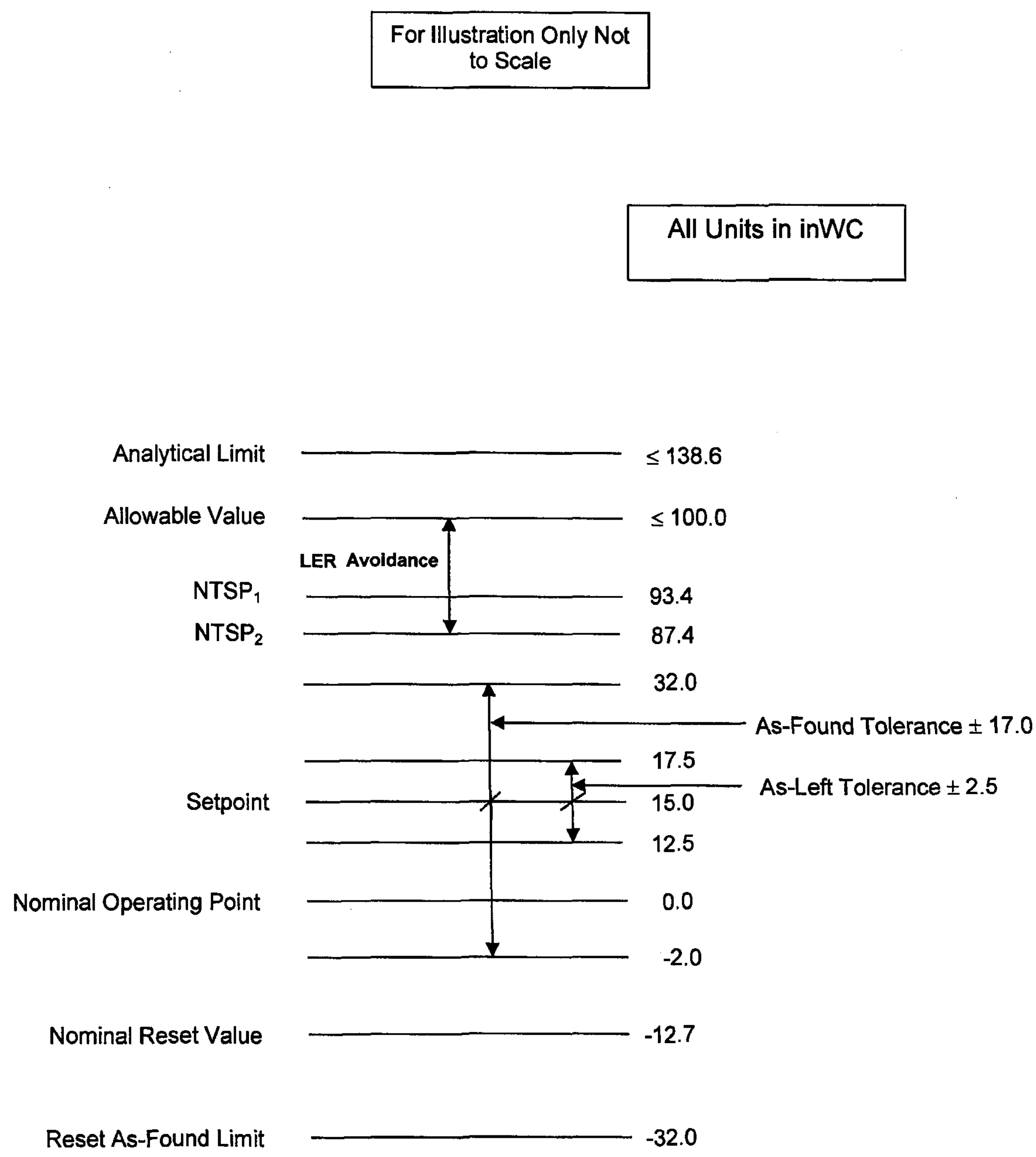
1. Setpoint Relationships

10. REFERENCES

10.1 GE-NE-901-021-0492, DRF A00-01932-1, Setpoint Calculation Guidelines for the Monticello Nuclear Generating Plant, October 1992.
10.2 General Electric Instrument Setpoint Methodology, NEDC-31336P-A, September 1996.
10.3 UFSAR Updated Final Safety Analysis Report, Revision 22, Section 6.2.
10.4 General Electric Boiling Water Reactor Operating Experience Report (OER) Reference Number 74, Revision 2, March 30. 1973, "Limitation of Asymmetric Speed Operation of Recirculation Pumps."
10.5 Ops Manual B.01.04-05, Rev. 21, Reactor Recirculation System, System Operation. Nonconforming Item Report 91-087 Recirculation Loop DP – LPCI Loop Select Interlock Switches.
10.6 CAP033391, "LPCI Loop Selection Logic may not meet USAR break size detection requirement." This CAP is evaluated in ACE004209.
10.7 GE Letter dated April 3, 1992, "Monticello Nuclear Generating Plant, LPCI Loop Selection Logic Setpoint Drift."
10.8 GENE-637-008-0393, DRF AOO-05572, May 1993, "Monticello LPCI Loop Selection Logic Set-Point."
10.9 MDE-16-1086, DRF AOO-02590, March 1986, "Assessment Of The ECCS Performance Of The Monticello Nuclear Generating Plant With No Recirculation Pump Trip."

10.10 NF-96201, Rev. 75, Recirculation Piping Loop "A".
10.11 NF-96202, Rev. 75, Recirculation Piping Loop "B".
10.12 NQ-74179, Rev. 75, REW-14-1 Drywell Instrument Piping @ 246° Penetration X-51-F, Instrument Number DPIS 2-129D.
10.13 NQ-74180, Rev. 75, REW-15-1 Drywell Instrument Piping @ 246° Penetration X-51-A, Instrument Number DPIS 2-129B.
10.14 NQ-74181, Rev. 75, REW-19-1 Drywell Instrument Piping @ 246° Penetration X-51-E, Instrument Number DPIS 2-129D.
10.15 NQ-74182, Rev. 75, REW-20-1 Drywell Instrument Piping @ 246° Penetration X-51-D, Instrument Number DPIS 2-129B.
10.16 NQ-74185, Rev. 75, REW-16-1 Drywell Instrument Piping @ 45° Penetration X-52-D, Instrument Number DPIS 2-129C.
10.17 NQ-74186, Rev. 75, REW-17-1 & REW-18-1 Drywell Instrument Piping @ 45° Penetration X-52-C, Instrument Number DPIS 2-129A.
10.18 NQ-74194, Rev. 75, REW-21-1 Drywell Instrument Piping @ 45° Penetration X-52-B, Instrument Number DPIS 2-129C.
10.19 NQ-74195, Rev. 75, REW-22-1 & REW-23-1 Drywell Instrument Piping @ 45° Penetration X-52-A, Instrument Number DPIS 2-129A.
10.20 NX-7905-46-5, Rev. 75, Residual Heat Removal System Schematic Diagram.
10.21 NX-7905-46-9, Rev. 75, Residual Heat Removal System Schematic Diagram.
10.22 Correspondence C000806338, From M. F. Dinville to M. H. Clarity, Dated January 19, 1973, "SAC Action Item #105, Review of LPCI Selection Logic to Determine if an Unreviewed Safety Question Exists."
10.23 GE-NE-0000-0038-7978, R0, Class III, April 2005, Recirculation Loop Flow Mismatch Requirements.
10.24 ISP-RHR-0552-01, Revision 0, Reactor Recirculation Loops dP, LPCI Select Interlock Channel Functional Test.
10.25 ISP-RHR-0552-02, Revision 0, Reactor Recirculation Loops dP, LPCI Select Interlock Channel Calibration.
10.26 C.4-B.05.14.A, Revision 10, Earthquake.

MONTICELLO NUCLEAR GENERATING PLANT		CA-04-098
TITLE:	Instrument Setpoint Calculation Recirculation Riser Differential Pressure – High (LPCI Loop Select) Setpoint Relationships	Revision 1 Attachment 1 Page 1 of 1



ENCLOSURE 4

MONTICELLO NUCLEAR GENERATING PLANT

**RESPONSE TO REQUESTS FOR ADDITIONAL INFORMATION
FOR LICENSE AMENDMENT REQUEST
REVISION TO THE ALLOWABLE VALUE AND CHANNEL CALIBRATION
SURVEILLANCE INTERVAL FOR THE RECIRCULATION RISER
DIFFERENTIAL PRESSURE – HIGH FUNCTION**

GENERAL ELECTRIC – HITACHI

PROPRIETARY INFORMATION AFFIDAVITS

2 AFFIDAVITS ENCLOSED

6 Pages Follow

GE-Hitachi Nuclear Energy Americas LLC

AFFIDAVIT

I, James F. Harrison, state as follows:

(1) I am Vice President, Fuel Licensing, Regulatory Affairs, GE-Hitachi Nuclear Energy Americas LLC ("GEH"), have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in Enclosure 1 of GEH letter, GEH-MNGP-LPCI-01, David J. Robare (GEH) to Alan V. Wojchouski (Nuclear Management Company), *Transmittal - Response to Request for Additional Information (RAI) Regarding Monticello Nuclear Generating Plant LPCI Loop Select Logic - RAIs 2 through 4,* dated June 23, 2008. The GEH proprietary information in Enclosure 1, which is entitled *GEH Responses to NRC RAIs 2 through 4,* is identified by a dotted underline inside double square brackets [[This sentence is an example.{3}]]. Figures and large equation objects containing GEH proprietary information are identified with double square brackets before and after the object. In each case, the superscript notation {3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GEH relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GEH's competitors without license from GEH constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information which reveals aspects of past, present, or future GEH customer-funded development plans and programs, resulting in potential products to GEH;

d. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b. above.

(5) To address 10 CFR 2.390(b)(4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GEH, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GEH, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties, including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or subject to the terms under which it was licensed to GEH. Access to such documents within GEH is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist, or other equivalent authority for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GEH are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2), above, is classified as proprietary because it contains the detailed results including the results, qualification data, and methodology for the determination of the magnitude of friction between the control balde and the fuel channel. These methods have been developed by GEH, at a total cost in excess of one million dollars. The reporting, evaluation and interpretations of the results, as they relate to the BWR, was achieved at a significant cost to GEH.

The development of the methodology along with the interpretation and application of the analytical results is derived from the extensive experience database that constitutes a major GEH asset.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GEH's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GEH's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GEH.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GEH's competitive advantage will be lost if its competitors are able to use the results of the GEH experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GEH would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GEH of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 23rd day of June 2008.

James F. Harrison
Vice President, Fuel Licensing
Regulatory Affairs
GE-Hitachi Nuclear Energy Americas LLC

GE-Hitachi Nuclear Energy Americas LLC

AFFIDAVIT

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(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GEH relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

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(8) The information identified in paragraph (2), above, is classified as proprietary because it contains the detailed results and conclusions from evaluations, utilizing analytical models and methods, including computer codes, which GEH has developed, obtained NRC approval of, and applied to perform evaluations of transient and accident events in the GEH Boiling Water Reactor ("BWR"). The development and approval of these system, component, and thermal hydraulic modes and computer codes were achieved at a significant cost to GE, on the order of several million dollars..

The development of the methodology along with the interpretation and application of the analytical results is derived from the extensive experience database that constitutes a major GEH asset.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GEH's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GEH's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

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