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SUBJECT: Responds to GL 96-05, "Periodic Verification of Design-Basis Capability of SR MOVs."

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CP&L

**Carolina Power & Light Company**
Robinson Nuclear Plant
3581 West Entrance Road
Hartsville SC 29550

Robinson File No.: 13510
Serial: RNP-RA/97-0064

MAR 17 1997

United States Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, DC 20555

H.B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23
RESPONSE TO NRC GENERIC LETTER 96-05, "PERIODIC VERIFICATION OF DESIGN-BASIS CAPABILITY OF SAFETY-RELATED VALVES"

Gentlemen:

On September 18, 1996, the NRC staff issued Generic Letter (GL) 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves." This letter provides the Carolina Power & Light (CP&L) Company required 180-day response for the H.B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2.

Please refer any questions regarding this letter to me or to Mr. H. K. Chernoff of my staff at (803) 857-1437.

Sincerely,

Terry M. Wilkerson

T. M. Wilkerson
Manager - Regulatory Affairs

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JSK/klb
Enclosures
c: Mr. B. B. Desai, USNRC Senior Resident Inspector, HBRSEP
Ms. B. L. Mozafari, USNRC Project Manager, HBRSEP
Mr. L. A. Reyes, Regional Administrator, USNRC, Region II

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Affidavit

**State of South Carolina**
**County of Darlington**

C. S. Hinnant, having been first duly sworn, did depose and say that the information contained in letter 97-0064 is true and correct to the best of his information, knowledge and belief; and the sources of his information are officers, employees, contractors, and agents of Carolina Power & Light Company.

C S Hinnant

Sworn to and subscribed before me

this 17th day of March 1997

(Seal) Albert L Garron
Notary Public for South Carolina

My commission expires: March 22nd, 2005

# H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
# 180 DAY RESPONSE TO NRC GENERIC LETTER 96-05
# "PERIODIC VERIFICATION OF DESIGN-BASIS CAPABILITY OF SAFETY-RELATED VALVES"

NRC Generic Letter (GL) 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related Valves," dated September 18, 1996, requested the following action.

Requested Action

*Each addressee of this generic letter is requested to establish a program, or to ensure the effectiveness of its current program, to verify on a periodic basis that safety-related MOVs continue to be capable of performing their safety functions within the current licensing bases of the facility. The program should ensure that changes in required performance resulting from degradation (such as those caused by age) can be properly identified and accounted for. Addressees that have developed periodic verification programs in response to GL 89-10 should review those programs to determine whether any changes are appropriate in light of the information in this generic letter.*

The GL also contained a requirement for the following responses.

Required Response

All addressees are required to submit the following written responses to this generic letter:

*1. Within 60 days from the date of this generic letter, a written response indicating whether or not the addressee will implement the action(s) requested herein. If the addressee intends to implement the requested action(s), the addressee shall submit a schedule for completing implementation. If an addressee chooses not to implement the requested action(s), the addressee shall submit a description of any proposed alternative course of action, the schedule for completing the alternative course of action (if applicable), and the safety basis for determining the acceptability of the planned alternative course of action.*

*2. Within 180 days from the date of this generic letter, or upon notification to the NRC of completion of GL 89-10 (whichever is later), the addressee shall submit a written summary description of its MOV periodic verification program established in accordance with the Requested Actions paragraph or the alternative course of action established by the addressee in response to item 1 above.*

In the CP&L 60 day response, provided by letter dated November 14, 1996, CP&L committed to implement a MOV periodic verification program by March 16, 1997, that meets the intent of GL 96-05. However, full implementation has not yet been completed. CP&L plans to have the HBRSEP, Unit No. 2 MOV periodic verification program implemented by Refueling Outage 18, currently scheduled to begin in March, 1998. The following discussion outlines the program as it exists currently, and enhancements planned as a result of our involvement in the Joint Owners Group (JOG).

CP&L Response

CP&L's H.B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2 will implement a Motor Operated Valve (MOV) periodic verification program that will comply with the intent of GL 96-05, as outlined below. At the present time, HBRSEP has a periodic verification program that requires static testing of MOV's within the scope of GL 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance," every five years or three refueling outages whichever comes later. In addition our GL 89-10 close-out letter, dated December 28, 1995, also committed to perform one time dynamic testing of 10% of the MOV's within the scope of GL 89-10.

CP&L is aware that the current program does not address the potential for age-related degradation in accordance with GL 96-05. However, CP&L is a participant in JOG test program established by the Boiling Water Reactor Owners' Group (BWROG) and the Westinghouse Owners' Group (WOG), and will implement a program which will conform to the joint program. The scope of the valves in the MOV periodic verification program will be identical to the scope of the GL 89-10 program. The program will consist of three elements described below.

1. The first element is a static test program to periodically confirm that each affected MOV is set up to assure that it is capable of performing its required safety function. The existing static periodic verification program will be appropriately adjusted to satisfy the requirements of the JOG test program. CP&L will determine new test frequencies based on safety significance and margin. The safety significance of the MOVs was determined using the HBRSEP, Unit No. 2 Probabilistic Safety Assessment (PSA). The analysis was performed in accordance with the guidance provided in Nuclear Utilities Management and Resources Council (NUMARC) 93-05, "Guidelines for Optimizing Safety Benefits In Assuring the Performance of Motor Operated Valves." The safety significance of MOVs will be reviewed and updated using the current HBRSEP, Unit No. 2 PSA model and the guidance provided in Westinghouse Report V-EC-1658, Revision 0, "Risk Ranking Approach For Motor Operated Valves," that was submitted to the NRC via WOG letter OG-97-0019. Margin will be determined based on guidance provided in the Joint BWROG and WOG document, MPR-1807, Rev. 0, "Program on Motor-Operated Valve (MOV) Periodic Verification" submitted to NRC via WOG

letter OG-97-018. Test frequencies will be determined for each GL 96-05 MOV by Refueling Outage 18, currently scheduled to begin in March, 1998.

2. The second element is a dynamic test program. HBRSEP, Unit No. 2, in cooperation with the other JOG test program plants, will be performing Differential Pressure (DP) tests on a representative population of MOVs over a period of five years. The population of valves in the JOG test program was selected such that it would cover the range of the key factors which may influence potential degradation. The results of these tests will be used to verify, or if necessary, to modify the criteria in the interim test program. The dynamic tests will be performed and evaluated in accordance with the uniform specifications of the JOG test program, thereby ensuring that consistent results are obtained from the various participants.

   The JOG program provides for periodic assessment and evaluation of test results to ensure that findings are quickly fed back to member plants. The assessment frequency specified in the JOG program document is at least once annually. HBRSEP, Unit No. 2 will participate in the assessment and evaluation process and will adjust its periodic verification program as appropriate. HBRSEP, Unit No. 2 will address any applicable safety assessment issues identified by the NRC during its review of the JOG testing program and the resulting MOV test data.

3. At the completion of the dynamic test element, the results of the JOG program will be appropriately incorporated into CP&L's MOV periodic verification program for HBRSEP, Unit No. 2.

Northern States Power Company

Monticello Nuclear Generating Plant
2807 West Hwy 75
Monticello, Minnesota 55362-9637

March 13, 1997

Generic Letter 96-05

US Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 50-263 License No. DPR-22

180 Day Response to NRC Generic Letter 96-05
Periodic Verification of Design-Basis
Capability of Safety-Related Motor-Operated Valves

NRC Generic Letter 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves," dated September 18, 1996, was issued to (1) discuss the periodic verification of the capability of safety-related motor-operated valves (MOVs) to perform their safety functions consistent with the current licensing bases of nuclear plants, (2) request that addressees implement actions to establish or verify the effectiveness of programs concerning periodic verification of MOV capability, and (3) require that addressees provide to the NRC a written response relating to implementation of the actions requested by the generic letter.

Generic Letter 96-05 contains the following requested action.

> *Each addressee of this generic letter is requested to establish a program, or to ensure the effectiveness of its current program, to verify on a periodic basis that safety-related MOVs continue to be capable of performing their safety-related functions within the current licensing basis of the facility. The program should ensure that changes in required performance resulting from degradation (such as those caused by age) can be properly identified and accounted for. Addressees that have developed periodic verification programs in response to GL 89-10 should review those programs to determine whether any changes are appropriate in light of the information in this generic letter.*

Within sixty days of the date of the generic letter, addressees were required to provide the NRC a written response concerning implementation of Generic Letter 96-05. By letter dated November 15, 1996, the sixty day response for the Monticello Nuclear Generating Plant was submitted to the NRC. The Monticello sixty day response to Generic Letter 96-05 established the following commitment with respect to the generic letter requested actions.

1. Monticello will complete the actions requested by Generic Letter 96-05 for MOVs within Monticello's GL 89-10 program scope. Monticello will submit a summary report of requested information within 180 days of the date of the generic letter. The

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schedule for implementation of the MOV periodic verification program will be submitted with our 180 day summary report.

Generic Letter 96-05 also requested that within 180 days of the date of the generic letter, addressees submit a written summary description of their MOV periodic verification program. Attachment A to this submittal provides the required 180 day response for the Monticello Nuclear Generating Plant and satisfies the above committed to action.

This letter contains the following new NRC commitments.

1. The current periodic verification program is to be modified by implementation of the Joint Owners' Group (JOG) periodic verification program for those valves currently in the Monticello Generic Letter 89-10 MOV Program. This action supersedes and replaces Monticello's previous commitment established with the NRC by letter dated April 25, 1995, with subject, "Commitments Concerning NRC Inspection Report 50-263/95003 for closure of NRC Generic Letter 89-10, 'Safety-Related Motor-Operated Valves Testing and Surveillance,'" to perform a minimum of nine (9) supplemental (non base line) differential pressure tests.

Please contact Sam Shirey, Sr Licensing Engineer, at (612) 295-1449 if you require further information.

William J Hill

William J Hill
Plant Manager
Monticello Nuclear Generating Plant

c: Regional Administrator - III, NRC
NRR Project Manager, NRC
Sr Resident Inspector, NRC
State of Minnesota, Attn: Kris Sanda

Attachment: Affidavit to the US Nuclear Regulatory Commission

A - Generic Letter 96-05 180 Day Response Required Information

UNITED STATES NUCLEAR REGULATORY COMMISSION

NORTHERN STATES POWER COMPANY

MONTICELLO NUCLEAR GENERATING PLANT DOCKET NO. 50-263

180 DAY RESPONSE TO NRC GENERIC LETTER 96-05
PERIODIC VERIFICATION OF DESIGN-BASIS
CAPABILITY OF SAFETY-RELATED MOTOR-OPERATED VALVES

Northern States Power Company, a Minnesota corporation, by letter dated March 13, 1997, provides the required 180 day response to NRC Generic Letter 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves." This letter contains no restricted or other defense information.

NORTHERN STATES POWER COMPANY

By William J Hill
William J Hill
Plant Manager
Monticello Nuclear Generating Plant

On this 13th day of March 1997 before me a notary public in and for said County, personally appeared William J Hill, Plant Manager, Monticello Nuclear Generating Plant, and being first duly sworn acknowledged that he is authorized to execute this document on behalf of Northern States Power Company, that he knows the contents thereof, and that to the best of his knowledge, information, and belief the statements made in it are true and that it is not interposed for delay.

Marvin R Engen
Notary Public - Minnesota
Sherburne County
My Commission Expires January 31, 2000

MARVIN RICHARD ENGEN
NOTARY PUBLIC - MINNESOTA
My Comm. Exp. Jan. 31, 2000

Attachment A

Generic Letter 96-05 180 Day Response Required Information

NRC Generic Letter 96-05 requested addressees of the generic letter to establish a program, or to ensure the effectiveness of its current program, to verify on a periodic basis that safety-related Motor Operated Valves (MOVs) continue to be capable of performing their safety-related functions within the current licensing basis of the facility. The program should ensure that changes in required performance resulting from degradation (such as those caused by age) can be properly identified and accounted for. In addition, the generic letter requests that addressees that have developed periodic verification programs in response to GL 89-10 to review those programs to determine whether any changes are appropriate in light of the information in the generic letter.

Generic Letter 96-05 identifies the Monticello Nuclear Generating Plant as having established an acceptable MOV periodic verification program as evaluated by the NRC staff during the closure review of the Monticello Generic Letter 89-10 program (see NRC Inspection Report 50-263/95003, "Close-out Inspection of Generic Letter 89-10"). As requested by Generic Letter 96-05, Monticello has evaluated its MOV periodic verification program. Due to the availability of the recently established Joint Owners' Group (JOG) program, Monticello will modify its MOV periodic verification program. Provided below is a summary of Monticello's 1) current MOV periodic verification program, 2) modified MOV periodic verification program, and 3) schedule for transition to the modified program.

## 1. CURRENT MOV PERIODIC VERIFICATION PROGRAM

The current program for periodic verification of MOV design basis capability specifies the performance of static or, when practicable, dynamic testing based on risk and margin for Generic Letter 89-10 MOVs. Dynamic testing consists of a diagnostic stroke test with flow and differential pressure as near as possible to design basis conditions. Static testing consists of a diagnostic stroke test at no flow with zero or near zero differential pressure.

Probabilistic Risk Assessment (PRA) evaluations in conjunction with deterministic evaluations were employed to support categorization of the MOVs with respect to the periodicity of the testing. MOVs found to have a significant impact on the PRA (i.e. Fussel-Vessely > 0.1%) were ranked as priority 1. In addition, a deterministic evaluation of Monticello MOVs was performed in which insights from the PRA were combined with design basis information to establish the engineering reasons why an MOV may or may not be important. The deterministic evaluation resulted in additional MOVs being included in the priority 1 category. Valves with a minimum impact on the PRA (i.e. Fussel-Vessely < 0.1%) and which were not determined to be risk significant in the deterministic evaluation were ranked as priority 2.

MOV margin is indicative of the difference between available thrust (or torque) capable of being delivered by the actuator and the required thrust (or torque) demanded by the valve under design basis conditions. The determination of the MOV margin includes appropriate

uncertainties for 1) test equipment measurement accuracy, 2) stem lubrication degradation, 3) torque switch repeatability, 4) rate of loading, and 5) spring pack relaxation. MOV margin evaluations were employed to support categorization of the MOVs with respect to the periodicity and method of the testing and reflect margin above the included uncertainties.

Table 1 and 2 below provide matrices of the MOV periodic verification test frequency and test method based on MOV margin and priority. The current Monticello program also prescribes that if significant degradation (or lack of degradation) is found to occur between periodic tests, static or dynamic, the frequency and margins used for testing are to be reviewed and adjusted as necessary.

Table 1 - Test Frequency

| Criteria | Test Frequency |
|---|---|
| Priority 1 MOVs | Every 3 cycles |
| Priority 2 MOVs with Performance Margin < 10% | Every 3 cycles |
| Priority 2 MOVs with Performance Margin ≥ 10% | Every 6 cycles |

Table 2 - Test Method

| Criteria | Test Method |
|---|---|
| Gate Valves with Margin[1] < 25% | Static and Dynamic Test[2] |
| Globe Valves with Margin[1] < 10% | Static and Dynamic Test[2] |
| Gate Valves with Margin ≥ 25% | Static Test |
| Globe Valves with Margin ≥ 10% | Static Test |

1 Margin criteria for valves with thrust requirements which are not bounded by the EPRI PPM.

2 Dynamic test to be performed if practicable.

Comparison of Monticello static and dynamic test results were used to quantify rate of loading effects at Monticello and to develop a statistically based value for rate of loading margin. The rate of loading margin is applied to static test minimum thrust requirements to account for the rate of loading effect.

In order to quantify in-situ lubrication properties at Monticello, a stem lubricant degradation study has been undertaken. The purpose of the study is to quantify the effects on actuator thrust values due to degradation of stem/stem nut lubrication between preventive maintenance intervals. When possible, an “as found” diagnostic test is performed prior to scheduled valve maintenance or retesting. The “as found” test is performed prior to any stem lubrication, maintenance or other activities which may have some effect on stem factor. After the “as found” test is completed, a thorough stem cleaning and relubrication is performed. An "after-lubrication" test is then performed. A comparison of the “as found” and "after-lubrication" tests will show any thrust degradation which can be attributed to degradation of the lubricant. To address NRC staff concerns regarding the accuracy of data collected to evaluate stem

lubrication degradation, Monticello committed to enhance the data sample size for the stem lubrication study to a minimum of ten (10) tests.

The program's static and dynamic testing margin and frequency requirements were reviewed by the NRC and considered reasonable. However, the NRC was concerned that, as written, the periodic verification program would not require dynamic testing if all valves were upgraded above the specified margin requirements, as was planned, thus the program would not capture age related degradation effects. In response, Monticello committed to perform supplemental (non-baseline) dynamic testing, independent of margin, prior to completion of the third refueling cycle following the inspection. A minimum of nine (9) dynamic tests were committed to be performed over a period of three refueling cycles.

## 2. MODIFIED MOV PERIODIC VERIFICATION PROGRAM

Monticello has evaluated its MOV periodic verification program as requested by the generic letter. The current periodic verification program is to be modified as discussed below.

### Implementation of the Joint Owners' Group (JOG) Periodic Verification Program

The JOG periodic verification program will be used for the Monticello Generic Letter 89-10 MOVs to provide periodic verification that the valves are capable of performing their design basis functions. The objectives of the JOG program are to 1) provide an approach for static testing of MOVs based on importance and margin, 2) determine degradation related trends over a period of several years, and 3) use the acquired MOV degradation information to confirm, or if necessary to modify, the static MOV testing approach. The JOG program scope of applicability with respect to valve characteristics (valve type, disk and seat ring materials, guide rail and slot surface materials) has been reviewed and encompasses the applicable Monticello MOVs. The JOG periodic verification program is described in the report "Joint BWR and Westinghouse Owners' Group Program on Motor-Operated Valves (MOVs) Periodic Verification," NEDC- 32719, MPR-1807, Revision 0, March 1997.

In the modified MOV periodic verification program, static diagnostic testing is to be performed for Generic Letter 89-10 MOVs as specified by the JOG periodic verification program based on MOV risk prioritization and MOV performance margin. The current Monticello MOV risk prioritization categorizes an MOV as priority 1 or priority 2. The Monticello risk categories for periodic verification are to be modified to be consistent with the JOG risk categories of High, Medium and Low using a combination of plant specific deterministic and probabilistic evaluations. The current Monticello MOV margin criteria categorizes an MOV as having high margin or low margin. The MOV margin categories for periodic verification are to be modified to be consistent with the JOG margin categories of High, Medium and Low. Consistent with the current MOV periodic verification program and the JOG periodic verification program, MOV margin is to include appropriate uncertainties and reflects margin above the included uncertainties. The criteria for the frequency of static testing is presented in Table 3 below.

Table 3 - Criteria for Static Test Frequency

| Risk/Margin | Low Margin | Medium Margin | High Margin |
|---|---|---|---|
| High Risk | 1 Cycle | 2 Cycles | 3 Cycles |
| Medium Risk | 2 Cycles | 4 Cycles | 6 Cycles[1] |
| Low Risk | 3 Cycles | 6 Cycles[1] | 6 Cycles[1] |

1 Not to exceed 10 years.

Where: Low Margin: Margin < 5%
Medium Margin: 5% ≤ Margin < 10%
High Margin: 10% ≤ Margin

The risk and margin criteria used in the above table are preliminary and are based on judgment and experience developed from the Generic Letter 89-10 programs. The justification of the specific margin categories is to be confirmed in the JOG dynamic test program. The recommendations of the JOG and, if necessary, the test results on which they are based are to be reviewed by Monticello. The modified Monticello MOV periodic verification program is to be adjusted, as appropriate, based on the results of this review.

In the modified MOV periodic verification program, dynamic diagnostic testing is to be performed as specified by the JOG periodic verification program. The JOG will select the valve candidates for dynamic testing based on the potential MOV degradation mechanisms and a valve mix that is representative of the different valves. The dynamic tests will be performed by utilities participating in the program with the test results provided to the JOG Steering Committee for review. The recommendations of the JOG and, if necessary, the test results on which they are based are to be reviewed by Monticello. The modified Monticello MOV periodic verification program is to be adjusted, as appropriate, based on the results of this review.

Monticello's participation in the JOG periodic verification program is to replace Monticello's previous commitment established with the NRC by letter dated April 25, 1995, with subject, "Commitments Concerning NRC Inspection Report 50-263/95003 for closure of NRC Generic Letter 89-10, 'Safety-Related Motor-Operated Valves Testing and Surveillance,'" which committed to a minimum of nine (9) supplemental (non baseline) differential pressure tests. This commitment was established to provide reasonable assurance that the effects of age related degradation were appropriately accounted for in the Monticello MOV Program. NRC Generic Letter 96-05 states that an MOV periodic verification program "should ensure that changes in required performance resulting from degradation (such as those caused by age) can be properly identified and accounted for." The JOG program provides for the collection of information to evaluate potential degradations. An industry wide program allows this information to be obtained while minimizing potential adverse effects on the overall population of valves. Monticello's participation in the JOG in lieu of the committed to differential pressure tests should address the NRC staff's concern, identified in NRC Inspection Report 50-263/95003 regarding periodic dynamic testing of MOVs, in an acceptable manner.

**Additional Elements of the Modified MOV Periodic Verification Program**

As discussed above, dynamic testing of Monticello MOVs is to be performed as requested by the JOG. In addition to the JOG requested dynamic testing, Monticello will continue to perform dynamic testing when practicable as part of post maintenance testing activities. Commensurate with the maintenance activity performed (valve replacement or specific valve internal work, including modifications that could affect valve performance) dynamic diagnostic testing is to be performed to the extent practicable as part of the post maintenance testing for the activity.

A comparison of Monticello static diagnostic testing and plant specific dynamic diagnostic testing results will continue to be used to evaluate rate of loading effects. Future dynamic diagnostic testing performed at Monticello will be factored into the rate of loading margin.

To address NRC staff concerns regarding the accuracy of data collected to evaluate stem lubrication degradation, Monticello committed by letter dated April 25, 1995, with subject, "Commitments Concerning NRC Inspection Report 50-263/95003 for closure of NRC Generic Letter 89-10, 'Safety-Related Motor-Operated Valves Testing and Surveillance,'" to enhance the data sample size for the stem lubrication evaluation to a minimum of ten (10) tests. Monticello will complete the action committed to with respect to the evaluation of stem lubrication degradation and will appropriately factor this information into the modified MOV periodic verification program. The purpose of this evaluation is to quantify the effect of stem/stem nut lubrication degradation on actuator thrust values.

The modified MOV periodic verification program has taken into consideration safety-related MOVs that are not within the scope of Generic Letter 89-10. These MOVs are to be addressed by:

1) declaring the system (or train) inoperable when the MOV is in a non safety position, or

2) providing adequate confidence in the capability of the MOV to return to its safety position under design basis accident conditions.

   Confidence in the capability of an MOV to return to its safety position is to be provided by:

   a) maintaining the control switch settings for the MOVs based on evaluations which include degraded voltage considerations,

   b) maintaining the requirements for determining the MOV control switch settings, and

   c) evaluating industry operating experience and data from the modified Monticello MOV periodic verification program to determine if any adjustments to the control switches are required.

If torque switch adjustments are required, they are to be performed during the next appropriate scheduled maintenance activity. Periodic dynamic and static diagnostic testing will not be performed on these valves.

## 3. SCHEDULE FOR IMPLEMENTATION OF MODIFIED PROGRAM

Monticello is to modify MOV risk and margin categorizations to support implementation of static diagnostic testing at a frequency consistent with the JOG periodic verification program prior to the end of the cycle 18 refueling outage (the end of cycle 18 is currently scheduled for February 3, 1998). Monticello will perform dynamic diagnostic testing as requested by the JOG.