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SOUTHERN COMPANY
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Docket Nos. 50-321
50-366

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

Edwin I. Hatch Nuclear Plant
Request to Revise Technical Specifications:
18- to 24-Month Fuel Cycle Extension

Ladies and Gentlemen:

In accordance with the provisions of 10 CFR 50.90, Southern Nuclear Operating Company (SNC) hereby requests changes to Operating License Nos. DPR-57 and NPF-5, and Appendices A thereto for the Edwin I. Hatch Nuclear Plant (HNP) Units 1 and 2, respectively. The license amendment proposes that Surveillance Requirements (SRs) be changed as identified to support the implementation of a 24-month fuel cycle.

This request is intended to implement longer fuel cycles for Hatch Units 1 and 2 during the next operating cycles, Cycle 21 (for Unit 1) and Cycle 18 (for Unit 2). This license amendment request supports the 24-month fuel cycle conversion. This request is similar in format and content to the First Energy Perry Nuclear Power Plant Fuel Cycle Extension, which was reviewed and approved by the NRC through a Safety Evaluation Report and License Amendment dated August 31, 2000. As demonstrated in the license amendment request, the proposed changes do not adversely impact safety.

Enclosure 1 to this letter contains a discussion of the methodology used to evaluate the acceptability of the change to a 24-month fuel cycle. Enclosure 2 contains the Drift Study Cross Reference. Enclosure 3 contains the HNP-specific Drift Analysis Design Guide, which was used in the development of this submittal. Enclosure 4 contains the Bases for Change Request for Extended Intervals. Enclosure 5 contains the Bases for Change Request for Reduced Intervals. Enclosure 6 contains the 10 CFR 50.92 Evaluation and Environmental Assessment. Enclosure 7 contains the page change instructions and the revised Technical Specifications pages (Unit 1 and Unit 2). Enclosure 8 contains the associated marked-up Technical Specifications pages (Unit 1 and Unit 2). Enclosure 9 contains the revised Technical Specifications Bases pages (Unit 1 and Unit 2) provided for information only. Enclosure 10 contains the marked-up Technical Specifications Bases pages (Unit 1 and Unit 2) also provided for information only.

In compliance with the requirements of 10 CFR 51.41, Enclosure 6 provides detailed information concerning the environmental effects of the HNP Unit 1 and Unit 2 twenty-four-month fuel cycle and demonstrates the proposed action has no individual or cumulative adverse effect upon the human environment. This information is provided to aid the Commission in complying with Section 102(2) of the National Environmental Policy Act.

A001

The following six areas of revision are proposed by this License Amendment request:

1. Proposed revisions to SR intervals from 18 to 24 months based upon the results of the HNP Performance History Review and HNP Instrument Drift Study.

2. Proposed revisions to SR requirements for float switches from CHANNEL CALIBRATIONS to CHANNEL FUNCTIONAL TESTS, based upon methods of operation.

3. Proposed revisions to SR intervals from 3 to 24 months based upon methods of operation and results of the HNP Performance History Review.

4. Proposed revisions to SR intervals from 18 to 6 months based upon results of the HNP Performance History Review, HNP Instrument Drift Study and the plant's preferred operational and testing procedures.

5. One proposed Allowable Value revision required by the results of the HNP Instrument Drift Study. The Allowable Value revision involved Technical Specifications Table 3.3.5.1-1, Function 2.f, for each unit.

6. Proposed administrative revisions to the Technical Specifications Bases supporting the preceding areas of revision.

This submittal assumes the approval of the May 21, 2001, Edwin I. Hatch Nuclear Plant Unit 2 request for the deletion of response time testing from Table 3.3.1.1-1, Functions 3 and 4. The response time test SR (SR 3.3.1.1.16) was not evaluated for interval extension for these line items. Issuance of this amendment is requested by March 23, 2002, to support the Unit 1 Cycle 21 implementation of the 24-month fuel cycle conversion.

In accordance with the requirements of 10 CFR 50.91, a copy of this letter and all applicable enclosures will be sent to the designated State official of the Environmental Protection Division of the Georgia Department of Natural Resources.

Mr. H. L. Sumner, Jr. states he is Vice President of Southern Nuclear Operating Company and is authorized to execute this oath on behalf of Southern Nuclear Operating Company, and to the best of his knowledge and belief, the facts set forth in this letter are true.

Respectfully submitted,

Lewis Sumner

H. L. Sumner, Jr.

Sworn to and subscribed before me this 20th *day of* September *2001.*

Elaine E. Bolton
Notary Public

Commission Expiration Date: May 25, 2003

TWL/eb

Enclosures:

1. Methodology Summary and Compliance with Generic Letter 91-04
2. Drift Study Cross Reference
3. Instrument Drift Analysis Methodology - Drift Analysis Design Guide
4. Bases for Change Request for Extended Intervals
5. Bases for Change Request for Reduced Intervals
6. 10 CFR 50.92 Evaluation and Environmental Assessment
7. Revised Technical Specifications Pages
8. Marked-Up Technical Specifications Pages
9. Revised Bases Pages
10. Marked-Up Bases Pages

cc: Southern Nuclear Operating Company
Mr. P. H. Wells, Nuclear Plant General Manager
SNC Document Management (R-Type A02.001)

U.S. Nuclear Regulatory Commission, Washington, D.C.
Mr. L. N. Olshan, Project Manager - Hatch

U.S. Nuclear Regulatory Commission, Region II
Mr. L. A. Reyes, Regional Administrator
Mr. J. T. Munday, Senior Resident Inspector - Hatch

State of Georgia
Mr. L. C. Barrett, Commissioner - Department of Natural Resources

Edwin I. Hatch Nuclear Plant
Request to Revise Technical Specifications: 18- to 24-Month Fuel Cycle Extension

Volume 1

Letter of Request
Enclosures 1 through 6

SOUTHERN COMPANY
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Enclosure 1

Edwin I. Hatch Nuclear Plant
Request to Revise Technical Specifications:
18- to 24-Month Fuel Cycle Extension

Methodology Summary and Compliance with Generic Letter 91-04

1.0 SUMMARY

This proposed license amendment involves a revision to the Edwin I. Hatch Nuclear Plant (HNP) Unit 1 and Unit 2 Technical Specifications (TS) to change the operating cycle length from 18 months to 24 months. If approved by the NRC, Southern Nuclear Operating Company (SNC) will implement longer fuel cycles for HNP Unit 1 during operating Cycle 21 (Spring 2002) and for Unit 2 during operating Cycle 18 (Spring 2003). This license amendment request is submitted in support of the 24-month fuel cycle conversion. As demonstrated in the request, the proposed change will not adversely impact safety. This request is being submitted to the Nuclear Regulatory Commission (NRC) as a Cost Beneficial Licensing Action, and is similar to amendments issued for a number of other nuclear units.

The proposed TS changes were evaluated in accordance with the guidance provided in NRC Generic Letter (GL) 91-04, "Changes in Technical Specification Surveillance Intervals to Accommodate a 24 Month Fuel Cycle."[1] Enclosure 2 contains the HNP Drift Study Cross Reference. Enclosure 3 contains the HNP Instrument Drift Analysis Methodology - Drift Analysis Design Guide used in the developing this submittal. Enclosure 4 contains the Bases for the Change Request for Extended Intervals. Enclosure 5 contains the Bases for the Change Request for Reduced Intervals. Enclosure 6 contains the 10 CFR 50.92 Evaluation and Environmental Assessment. Enclosure 7 contains the page change instructions and the revised TS pages. Enclosure 8 contains the marked-up TS pages. Enclosure 9 contains the page change instructions and the revised TS Bases pages provided for information only. Enclosure 10 contains the marked-up TS Bases pages also provided for information only.

Historical surveillance test data and associated maintenance records were reviewed in evaluating the effect of the proposed change on safety. In addition, the licensing basis was reviewed for each revision to ensure it was not invalidated. Based upon the results of these reviews, it is concluded there is no adverse effect on plant safety due to increasing the Surveillance Requirement (SR) test intervals from 18 to 24 months and the continued application of SR 3.0.2.

2.0 METHODOLOGY

In Generic Letter (GL) 91-04,[1] the NRC provided generic guidance for evaluating a 24-month surveillance test interval for TS SRs and specified the evaluation steps needed to justify a 24-month surveillance interval. The following discussion defines each step outlined by the NRC and provides a description of the methodology used by the HNP staff to complete the evaluation for each specific TS SR line item. This methodology is very similar to the methodology used to justify extensions for a 24-month fuel cycle at the First Energy Perry Nuclear Power Plant. The NRC approved the Perry methodology in a Safety Evaluation Report and license amendment dated August 31, 2000.[2]

A. Non-Instrumentation Changes

GL 91-04[1] identifies three steps to evaluate non-instrumentation changes:

Step 1:

...licensees should evaluate the effect on safety of the change in surveillance intervals to accommodate a 24-month fuel cycle. This evaluation should support a conclusion that the effect on safety is small.

HNP Evaluation

Each SR interval being changed was evaluated with respect to its effect on plant safety. The following information provides a description of the purpose of surveillance testing and a general description of the methodology utilized to justify the conclusion that extending the testing interval will have a minimal effect on safety.

The purpose of surveillance testing is to verify through the performance of the specified SRs that the tested TS Function/Feature will perform as assumed in the associated safety analysis. By periodically testing the TS Function/Feature, the availability of the associated Function/Feature is confirmed. As such, with the extension of HNP's operating cycle and the associated extension of the refueling cycle surveillance test interval (a reduction in Frequency), a longer period of time will exist between performances of a surveillance test. If a failure resulting in the loss of a safety function occurs during the operating cycle and that failure would be detected only by performing the periodic TS SR, the increase in the SR testing interval will result in a decrease in the associated Function's availability and thus, have a potential impact on safety.

Each associated non-instrumentation SR was evaluated to demonstrate the potential impact on availability, if any, is small as a result of the change to a 24-month Frequency. A program plan defining the scope of the analysis to be performed (e.g., failure history analysis) and the methods for performing the analysis was developed. The process included:

- Identifying the 18-month surveillances in the TS.
- Determining the plant tests that verified the operation of the equipment associated with the surveillance.
- Collecting the test history associated with the Function.
- Evaluating the test history results.

The evaluations were based upon the fact that the Function/Feature is tested on a more frequent basis during the operating cycle by other plant programs (e.g., pump flow rate tested quarterly), or is designed to be single failure proof, or is highly reliable.

As an example, justifications for extending the LOGIC SYSTEM FUNCTIONAL TESTS are provided based upon more frequent testing of system components and the high reliability of system design.

The more frequent testing may include the performance of CHANNEL CHECKS which verify that the instrument loop (i.e., transmitter and indication) is functional, and the system parameters (e.g. pump flow, system pressure, etc.) are within expected values. More frequent testing also includes CHANNEL FUNCTIONAL TESTS that verify the operation of circuits associated with alarms, interlocks, displays, trip functions, time delays and channel failure trips. Where a CHANNEL CHECK or CHANNEL FUNCTIONAL TEST is not required, normally the circuit is simple and these checks will not provide any additional assurance the components are functional. In several cases (e.g., switches), the more frequent testing may not verify the operation of the circuits directly associated with the switch, but may verify the operation of other circuits associated with the Function with which the switch is associated. In most cases, the same circuit (with the exception of the open loop associated with the switch) is used for manual operation of a pump and for pump automatic start functions. In these cases, the CHANNEL CHECKS and CHANNEL FUNCTIONAL TESTS will also test most of the circuit associated with the initiation push button, with the exception of the switch itself and the wire to connect the switch to the circuit.

Additional testing, such as inservice pump or valve testing, will also verify that the power and control circuits associated with the specific TS components, relays and contacts associated with these components are operational. Inservice programs test components based upon performance-oriented schedules. The Maintenance Rule (MR) also supports testing based upon safety significant components and their unavailability or performance. Decreased component performance requires increased testing. Some system components may not be tested more frequently based upon the impact on plant operation [e.g., emergency core cooling system (ECCS) injection valves]. However, performance of these components is tracked on the basis of system availability and increased failures or maintenance will be identified and corrected as a part of the plant's maintenance program.

Additionally, as stated by the NRC in the Safety Evaluation Report issued for the Peach Bottom Atomic Power Station Units 2 and 3 surveillance interval extension from 18 to 24 months,[3] industry reliability studies for boiling water reactors (BWRs), prepared by the BWR Owners Group,[4] show that overall safety system reliability is not dominated by logic system reliability, but by mechanical component reliability (e.g., pumps and valves) that are consequently tested on a more frequent basis, usually by the Inservice Testing Program. Since the probability of a relay or contact failure is small relative to the probability of mechanical component failure, increasing the LOGIC SYSTEM FUNCTIONAL TEST interval represents no significant change in overall safety system unavailability.

STEP 2:

Licensees should confirm that historical maintenance and surveillance data do not invalidate this conclusion.

HNP Evaluation

The surveillance test history of the affected SRs was evaluated. This evaluation consisted of a review of surveillance test results and associated maintenance records. Only SR test failures were evaluated because failures detected by other plant activities, such as preventative maintenance tasks or surveillance tests performed at shorter intervals than 24 months were assumed to continue to detect failures. This review of surveillance test history validated the conclusion that the impact, if any, on system availability will be small as a result of the change to a 24-month testing Frequency.

STEP 3:

...licensees should confirm that the performance of surveillances at the bounding surveillance interval limit provided to accommodate a 24-month fuel cycle would not invalidate any assumption in the plant licensing basis.

HNP Evaluation

As part of the evaluation of each SR, the impact of the changes against the assumptions in the HNP licensing basis was reviewed. In general, these changes have no impact on the plant-licensing basis. However, in some cases, the change does require a change to licensing-basis information provided in the HNP Unit 1 and Unit 2 Final Safety Analysis Reports (FSARs). Appropriate FSAR changes will be incorporated and docketed under the 10 CFR 50.59 and 10 CFR 50.71(e) processes.

The MR Program trends failures that affect the safety functions of equipment. Any degradation in performance due to the extension of surveillance or maintenance activities will be captured under the existing MR Program.

B. Instrumentation (CHANNEL CALIBRATION Changes):

GL 91-04[1] identifies 7 steps for the evaluation of instrumentation changes.

STEP 1:

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

HNP Evaluation

The effect of longer calibration intervals on the TS instrumentation was evaluated by performing a review of the surveillance test history for the affected instrumentation, including, where necessary, an instrument drift study. The failure history evaluation and drift study demonstrates that, except on rare occasions, instrument drift has not exceeded the current allowable limits.

HNP has been pursuing the replacement of older model transmitters with newer qualified Rosemount transmitters. Several of the Rosemount transmitters used in the early 1990's were replaced due to being on the list of suspect transmitters for the oil loss issue. This generic Rosemount failure mode was identified during 1986 and 1987, based upon the failure of five Rosemount model 1153 HD5PC differential pressure transmitters at Northeast Utilities' (NU) Millstone Nuclear Power Station, Unit 3 documented in NRC Information Notice No. 89-42, "Failure of Rosemount Models 1153 and 1154 Transmitters,"(5) and NRC Bulletin No. 90-01, "Loss of Fill-oil in Transmitters Manufactured by Rosemount".(6)

During power operation, the Millstone operators noted that the signals from the Rosemount 1153 transmitters were deviating from redundant channel signals and that the transmitters were indicating reduced levels of process noise. Further investigation by the NRC and Rosemount lead to identification of the root cause as oil loss from the Rosemount sealed sensing module. NRC Bulletin No. 90-01(6) and Supplement 1(7) to the Bulletin defined specific replacement and testing criteria for any suspected transmitters. Additionally Supplement 1 defined a maturity period after which the probability of failure due to oil loss is greatly reduced and monitoring of the transmitters may be performed at longer intervals (not exceeding 24 months).

For HNP Units 1 and 2, all affected Rosemount transmitters have been replaced or have successfully exceeded the psi-month maturity time as documented by the NRC in the SER issued to Plant Hatch on December 15, 1994. There are no ongoing actions or enhanced surveillance monitoring programs for these transmitters.

STEP 2:

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

HNP Evaluation

HNP has performed drift evaluations, based upon a Hatch-Specific Drift Analysis Design Guide (Enclosure 3) using Microsoft Excel Spreadsheets based upon EPRI

TR-103335, "Guidelines for Instrument Calibration Extension/Reduction Programs" Rev. 1.[8] The EPRI IPASS software Version 2.2, Quattro-Pro, and Lotus 1-2-3 applications were also used to verify the analysis.

The HNP design guide utilizes the as-found/as-left (AFAL) analysis methodology to statistically determine drift for current calibration intervals. Using recommendations from the EPRI TR-103335 and NRC review comments to the TR, the time dependence of the current drift was evaluated, where possible, and conservative assumptions were made in extrapolating current drift values to new drift values to be used for a 24-month fuel cycle.

The AFAL methodology utilizes historical data obtained from surveillance tests. The raw calibration data is conditioned prior to use for the drift calculation. The conditioning consists of eliminating tests or individual data points that do not reflect actual drift. The removed data is generally limited to data associated or affected by:

- Instrument failures,
- Procedural problems that affect the calibration data,
- M&TE problems that affect the calibration data, or
- Human performance problems that affect the calibration data.

In limited cases, statistical outliers not meeting the above criteria were removed from the sample set. In each case, the values were well outside the expected performance conditions and in most cases, resulted in equipment replacement or repair during the next calibration. The HNP trending program, in the future, will require a prompt analysis of any instrument performance substantially outside of expected conditions. This performance will then result in timely replacement of the instrument or an evaluation of the impact of the instrument's performance on the assumptions and values used in the drift or setpoint analysis. These actions will effectively identify failures and potential failures of the instrumentation.

After the calibration data was properly conditioned, spreadsheets were used to calculate the difference between the current as-found value and the previous as-left value. This difference is the drift and can be expressed in units, percent of span, or percent of setting.

For each calibration point, the spreadsheet is used to determine the following:

- Tolerance interval (95%/95% for this analysis),
- Standard deviation,
- Mean.

The Excel spreadsheets were also used to perform other statistical analysis operations to identify outliers and determine normality of the data. Additional analyses were performed to verify that appropriate groupings were used and to determine if specific indications of a time drift magnitude correlation exist. The final calculation of the tolerance interval is based upon a Time Dependence Analysis (normally a binning technique) performed using Microsoft Excel spreadsheets.

For instruments that were recently installed or where the drift analysis process could not be applied, a different methodology was utilized to demonstrate that the drift was acceptable. For each instrument where the EPRI program was not utilized to evaluate the drift data, a summary of the methodology is contained in the specific discussion of the change contained in Enclosures 4 and 5.

STEP 3:

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

HNP Evaluation

In accordance with the methodology described in the previous section, the magnitude of instrument drift was determined with a high degree of confidence and a high degree of probability for a bounding calibration interval of 30 months for each instrument make and model number and range. The associated instruments, including manufacturer and model number for each affected TS SR, where drift analysis was performed, are listed in Enclosure 2, with the drift methodology provided as Enclosure 3.

STEP 4:

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

HNP Evaluation

HNP uses both the "Trip Setpoint Methodology for the Edwin I. Hatch Nuclear Plant Analog Transmitter Trip System Instrumentation" submitted for NRC approval in combination with the Analog Transmitter Trip System Instrumentation[9,10] and ISA-RP67.04.[11] Since the ATTS methodology is not identical to the published GE setpoint methodology provided in NEDC 31336P-A[12], setpoint assessments in which the calculated 30-month drift values replaced the vendor or assumed drift values from each setpoint calculation were performed. The Nominal Trip Setpoints (NTSPs) and Allowable Values were assessed, considering the 30-month drift. Setpoint calculations will be revised to consider 30 month drift and to develop NTSPs and Allowable Values. Where this new NTSP is more conservative than the plant setting, plant setpoints have been revised or will be revised prior to exceeding 22.5 months of operation (18 months + 25%). Where the NTSP is less conservative than the plant setting, the plant setpoints were not changed. Where it was not possible to accommodate the projected drift by adjusting plant settings (higher potential for spurious trip), Allowable Values and NTSPs were both changed. In each of these cases, there was sufficient margin within the existing safety analysis to accommodate the revision in the Allowable Values without revising the safety analysis.

Where the evaluation identified there was insufficient operating margin to allow for setpoint changes (e.g., spurious trip avoidance probability was low), the Analytical Limit or Allowable Values were evaluated for adjustment. The following SRs required changes to the Allowable Value to accommodate an extension to a 24-month fuel cycle:

Unit	Table Item	Description	Current Allowable Value	Revised Allowable Value
1	Table 3.3.5.1-1, Item 2.f	Low Pressure Coolant Injection Pump start time delay relays for pumps A, B and C	from ≥ 9 and ≤ 11 seconds	from ≥ 9 and ≤ 15 seconds
2	Table 3.3.5.1-1, Item 2.f	Low Pressure Coolant Injection Pump start time delay relays for pumps A, B and C	from ≥ 9 and ≤11 seconds	from ≥ 9 and ≤ 15 seconds

If an instrument was not in service long enough to establish a calculated drift number, the surveillance interval was extended to a 24-month interval based upon other, more frequent testing (92-day CHANNEL FUNCTIONAL TEST, including calibration if necessary) or justification based upon information obtained from the instrument manufacturer.

In no case was it necessary to change the existing analytical limit or safety analysis to accommodate a larger instrument drift error.

STEP 5:

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

HNP Evaluation

As discussed in the previous sections, the calculated drift values were compared to drift allowances in the setpoint calculation, other uncertainty analysis, and the GE design basis. For instrument strings that provide process variable indication, an evaluation was performed, as shown in Enclosure 2, to verify the instruments could still be effectively utilized to perform a safe plant shutdown.

In no case was it necessary to change the existing safe shutdown analysis to account for failures or drift.

STEP 6:

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

HNP Evaluation

In the cases where the extrapolated drift was less than the value assumed in the HNP calculations, there was no change to plant surveillance procedures. The plant setpoint calculations will be revised to incorporate the new drift values and to indicate NTSPs and Allowable Values prior to license amendment implementation.

For cases where the extrapolated drift was greater than the value assumed in the setpoint calculation, the setpoint assessments were developed to calculate a new NTSP. Where the existing plant setpoint is conservative to the NTSP, no changes were made to the plant surveillance procedures. Where the existing plant setpoint is less conservative than the NTSP, the plant setpoint calculation and the associated plant surveillance procedures will be revised prior to license amendment implementation. The plant surveillance procedures were verified to appropriately reflect the assumptions and conditions of the setpoint calculations.

The assumptions in the safety and setpoint analysis were properly reflected in the acceptance criteria for plant surveillance procedures prior to the evaluation of these procedures for changes in Frequency. The review determined that the acceptance criteria do not require revision due to the change in the surveillance test Frequency for any of the associated TS functions.

STEP 7:

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

HNP Evaluation

Instruments with TS calibration surveillance frequencies extended to 24 months will be monitored and trended. As-found and as-left calibration data will be recorded for each calibration activity and an evaluation of changes from previous calibrations will be evaluated for trends. This will identify occurrences of instruments found outside of their Allowable Value, or instruments whose performance is not as assumed in the drift or setpoint analysis.

When as-found conditions are outside the Allowable Value, an evaluation will be performed to determine if the assumptions made to extend the calibration frequency are still valid, to evaluate the effect on plant safety, and to evaluate instrument OPERABILITY.

In addition, the HNP trending program will address setpoints found to be outside of their Leave As Is Zone. (LAIZ). This LAIZ is based upon either added margin or a portion of the expected drift for the instruments. The HNP trending program will require that any time a setpoint value is found outside the LAIZ, an additional evaluation be performed to ensure the instruments performance is still enveloped by the assumptions in the drift or setpoint analysis. The trending program will also plot setpoint or transmitter AFAL values to verify that the performance of the instruments is within expected boundaries and that adverse trends (repeated directional changes in AFAL even of smaller magnitudes) are detected and evaluated.

The MR Program trends failures which affect the safety functions of equipment. Any degradation in performance due to the extension of surveillance or maintenance activities will be captured under the existing MR Program.

3.0 CONCLUSION

As described in the above discussion, the evaluations to justify a change in surveillance intervals necessary to support a 24-month fuel cycle have been completed. These evaluations have been determined to conform to the guidance provided in GL 91-04.[1] The specific evaluations for each HNP TS SR being changed are contained in Enclosures 4 and 5 for both the non-instrumentation changes and the instrumentation changes. In addition, a Significant Hazards Consideration was performed in accordance with 10 CFR 50.92 for these changes and is included as Enclosure 6.

4.0 COMMITMENTS WITHIN THIS LETTER

1. The MR Program trends failures which affect the safety functions of equipment. Any degradation in performance due to the extension of surveillance or maintenance activities will be captured under the existing MR Program.

2. Instruments with TS calibration surveillance frequencies extended to 24 months will be monitored and trended. As-found and as-left calibration data for each calibration activity

will be recorded. This will identify occurrences of instruments found outside of their Allowable Value, or instruments whose performance is not as assumed in the drift or setpoint analysis.

When as-found conditions are outside the Allowable Value, an evaluation will be performed to determine whether the assumptions made to extend the calibration frequency are still valid, and to assess the effect on plant safety and instrument OPERABILITY.

In addition, the HNP trending program will address setpoints for TS calibration surveillance frequencies extended to 24 months found to be outside of their LAIZ. This LAIZ is based upon either added margin or a portion of the expected drift for the instruments. The HNP trending program will require that any time a setpoint value is found outside the LAIZ, an additional evaluation be performed to ensure the instruments performance is still enveloped by the assumptions in the drift or setpoint analysis. The trending program will also plot setpoint or transmitter AFAL values to verify that the performance of the instruments is within expected boundaries and that adverse trends (repeated directional changes in AFAL even of smaller magnitudes) are detected and evaluated.

3. Appropriate procedures and programs will be revised prior to, or in conjunction with, implementation of the license amendment.

4. Allowable Value changes will be implemented appropriately in conjunction with the license amendment.

5.0 REFERENCES

1. NRC Generic Letter No. 91-04, "Changes in Technical Specification Surveillance Intervals to accommodate a 24 Month Fuel Cycle," dated April 2, 1991.

2. NRR Safety Evaluation Report for First Energy Perry Nuclear Power Plant approving 24-month fuel cycle extension, dated August 3, 2000.

3. NRR Safety Evaluation Report for Peach Bottom Atomic Power Station Units 2 and 3 License Amendments 179 and 182, respectively, Operating Licenses DPR-44 and DPR-56, Dockets D50-277 and D50-278, dated August 2, 1993.

4. "Industry Reliability Studies for Boiling Water Reactors (BWRs)," NEDC 30936P.

5. "Failure of Rosemount Models 1153 and 1154 Transmitters," NRC Information Notice No. 89-42.

6. "Loss of Fill-Oil in Transmitters Manufactured by Rosemount," NRC Bulletin No. 90-01, March 9, 1990.

7. "Loss of Fill-Oil in Transmitters Manufactured by Rosemount," NRC Bulletin No. 90-01, Supplement 1, December 22, 1992.

8. "Statistical Analysis of Instrument Calibration Data, Guidelines for Instrument Calibration Extension/Reduction Programs," EPRI TR-103335, Revision 1, October 1998.

9. NRR Safety Evaluation Report for Amendment 103 to the Facility Operating License No DPR-57 for the Edwin I. Hatch Nuclear Plant Unit 1. dated December 7, 1984.

10. NRR Safety Evaluation Report for Amendment 67 to the Facility Operating License No DPR-57 for the Edwin I. Hatch Nuclear Plant Unit 2. dated November 6, 1986.

11. ISA RP67.04 Part II-1994, "Methodologies for the Determination of Setpoints for Nuclear Safety-Related Instrumentation."

12. "General Electric Instrument Setpoint Methodology, " NEDC 31336P-A.

Enclosure 2

Edwin I. Hatch Nuclear Plant
Request to Revise Technical Specifications:
18- to 24-Month Fuel Cycle Extension

Drift Study Cross Reference

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.1.1-1 (2.b)	1B31N014A	Rosemount	1151DP6B22T	SNC-007
3.3.1.1-1 (2.b)	1B31N014B	Rosemount	1151DP6B22MB	SNC-007
3.3.1.1-1 (2.b)	1B31N014C	Rosemount	1151DP6B22MB	SNC-007
3.3.1.1-1 (2.b)	1B31N014D	Rosemount	1151DP6B22T	SNC-007
3.3.1.1-1 (2.b)	1B31N024A	Rosemount	1151DP6B22T	SNC-007
3.3.1.1-1 (2.b)	1B31N024B	Rosemount	1151DP6B22MB	SNC-007
3.3.1.1-1 (2.b)	1B31N024C	Rosemount	1151DP6B22MB	SNC-007
3.3.1.1-1 (2.b)	1B31N024D	Rosemount	1151DP6B22T	SNC-007
3.3.1.1-1 (2.b)	2B31N014A	Rosemount	1151DP0953-0001	SNC-007
3.3.1.1-1 (2.b)	2B31N014B	Rosemount	1151DP0953-0001	SNC-007
3.3.1.1-1 (2.b)	2B31N014C	Rosemount	1151DP0953-0001	SNC-007
3.3.1.1-1 (2.b)	2B31N014D	Rosemount	1151DP0953-0001	SNC-007
3.3.1.1-1 (2.b)	2B31N024A	Rosemount	1151DP0953-0001	SNC-007
3.3.1.1-1 (2.b)	2B31N024B	Rosemount	1151DP0953-0001	SNC-007
3.3.1.1-1 (2.b)	2B31N024C	Rosemount	1151DP0953-0001	SNC-007
3.3.1.1-1 (2.b)	2B31N024D	Rosemount	1151DP0953-0001	SNC-007
3.3.1.1-1 (3)	1B21N078A	Rosemount	1153GB8PAN0097	SNC-010
3.3.1.1-1 (3)	1B21N078B	Rosemount	1153GB8PAN0097	SNC-010
3.3.1.1-1 (3)	1B21N078C	Rosemount	1153GB8PAN0097	SNC-010
3.3.1.1-1 (3)	1B21N078D	Rosemount	1153GB8PAN0097	SNC-010
3.3.1.1-1 (3)	2B21N078A	Rosemount	1153GB8PAN0097	SNC-010
3.3.1.1-1 (3)	2B21N078B	Rosemount	1153GB8PAN0097	SNC-010
3.3.1.1-1 (3)	2B21N078C	Rosemount	1153GB8PAN0097	SNC-010
3.3.1.1-1 (3)	2B21N078D	Rosemount	1153GB8PAN0097	SNC-010
3.3.1.1-1 (4)	1B21N080A	Rosemount	1154DP4RJ	SNC-013
3.3.1.1-1 (4)	1B21N080B	Barton	764	SNC-001
3.3.1.1-1 (4)	1B21N080C	Barton	764	SNC-001
3.3.1.1-1 (4)	1B21N080D	Barton	764	SNC-001
3.3.1.1-1 (4)	2B21N080A	Barton	764	SNC-001
3.3.1.1-1 (4)	2B21N080B	Barton	764	SNC-001

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.1.1-1 (4)	2B21N080C	Barton	764	SNC-001
3.3.1.1-1 (4)	2B21N080D	Rosemount	1154DP4RJ	SNC-013
3.3.1.1-1 (6)	1C71N050A	Rosemount	1154GP4RJ	SNC-012
3.3.1.1-1 (6)	1C71N050B	Rosemount	1154GP4RJ	SNC-012
3.3.1.1-1 (6)	1C71N050C	Rosemount	1154GP4RJ	SNC-012
3.3.1.1-1 (6)	1C71N050D	Rosemount	1154GP4RJ	SNC-012
3.3.1.1-1 (6)	2C71N050A	Rosemount	1154GP4RJ	SNC-012
3.3.1.1-1 (6)	2C71N050B	Rosemount	1154GP4RJ	SNC-012
3.3.1.1-1 (6)	2C71N050C	Rosemount	1154GP4RJ	SNC-012
3.3.1.1-1 (6)	2C71N050D	Rosemount	1154GP4RJ	SNC-012
3.3.2.2	1C32N004A	Rosemount	1151DP4S22B2L4P1	SNC-007
3.3.2.2	1C32N004B	Rosemount	1151DP4S22B2L4P1	SNC-007
3.3.2.2	1C32N004C	Rosemount	1151DP4S22B2L4P1	SNC-007
3.3.2.2	2C32N004A	Rosemount	1151DP4S22B2L4P1	SNC-007
3.3.2.2	2C32N004B	Rosemount	1151DP4S22B2L4P1	SNC-007
3.3.2.2	2C32N004C	Rosemount	1151DP4S22B2L4P1	SNC-007
3.3.3.1-1 (1)	1B21N090A	Rosemount	1153GB9RC	SNC-009
3.3.3.1-1 (1)	1B21N090D	Rosemount	1153GB9RC	SNC-009
3.3.3.1-1 (1)	2B21N090A	Barton	763	SNC-002
3.3.3.1-1 (1)	2B21N090D	Barton	763	SNC-002
3.3.3.1-1 (2.a)	1B21N085A	Barton	764	SNC-001
3.3.3.1-1 (2.a)	1B21N085B	Barton	764	SNC-001
3.3.3.1-1 (2.a)	2B21N085A	Barton	764	SNC-001
3.3.3.1-1 (2.a)	2B21N085B	Barton	764	SNC-001
3.3.3.1-1 (2.b)	1B21N091A	Barton	764	SNC-001
3.3.3.1-1 (2.b)	1B21N091B	Barton	764	SNC-001
3.3.3.1-1 (2.b)	1B21N091C	Barton	764	SNC-001
3.3.3.1-1 (2.b)	1B21N091D	Barton	764	SNC-001
3.3.3.1-1 (2.b)	2B21N091A	Barton	764	SNC-001
3.3.3.1-1 (2.b)	2B21N091B	Barton	764	SNC-001
3.3.3.1-1 (2.b)	2B21N091C	Barton	764	SNC-001
3.3.3.1-1 (2.b)	2B21N091D	Barton	764	SNC-001
3.3.3.1-1 (2.c)	1B21N093A	Rosemount	1153DB4PA	SNC-011
3.3.3.1-1 (2.c)	1B21N093B	Rosemount	1153DB4PA	SNC-011
3.3.3.1-1 (2.c)	1B21N095A	Barton	764	SNC-001

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.3.1-1 (2.c)	1B21N095B	Barton	764	SNC-001
3.3.3.1-1 (2.c)	2B21N093A	Rosemount	1153DB4PA	SNC-011
3.3.3.1-1 (2.c)	2B21N093B	Rosemount	1153DB4PA	SNC-011
3.3.3.1-1 (2.c)	2B21N095A	Barton	764	SNC-001
3.3.3.1-1 (2.c)	2B21N095B	Barton	764	SNC-001
3.3.3.1-1 (2.d)	1B21N027	Rosemount	1154DP5RJ	SNC-013
3.3.3.1-1 (2.d)	2B21N027	Rosemount	1154DP5RJ	SNC-013
3.3.4.2.a	1B21N091A	Barton	764	SNC-001
3.3.4.2.a	1B21N091B	Barton	764	SNC-001
3.3.4.2.a	1B21N091C	Barton	764	SNC-001
3.3.4.2.a	1B21N091D	Barton	764	SNC-001
3.3.4.2.a	2B21N091A	Barton	764	SNC-001
3.3.4.2.a	2B21N091B	Barton	764	SNC-001
3.3.4.2.a	2B21N091C	Barton	764	SNC-001
3.3.4.2.a	2B21N091D	Barton	764	SNC-001
3.3.4.2.b	1B21N120A	Rosemount	1153GB8PAN0097	SNC-010
3.3.4.2.b	1B21N120B	Rosemount	1153GB8PAN0097	SNC-010
3.3.4.2.b	1B21N122A	Rosemount	1153GB8PAN0097	SNC-010
3.3.4.2.b	1B21N122B	Rosemount	1153GB8PAN0097	SNC-010
3.3.4.2.b	2B21N120A	Rosemount	1153GB8PAN0097	SNC-010
3.3.4.2.b	2B21N120B	Rosemount	1153GB8PAN0097	SNC-010
3.3.4.2.b	2B21N122A	Rosemount	1153GB8PAN0097	SNC-010
3.3.4.2.b	2B21N122B	Rosemount	1153GB8PAN0097	SNC-010
3.3.5.1-1 (1.a)	1B21N091A	Barton	764	SNC-001
3.3.5.1-1 (1.a)	1B21N091B	Barton	764	SNC-001
3.3.5.1-1 (1.a)	1B21N091C	Barton	764	SNC-001
3.3.5.1-1 (1.a)	1B21N091D	Barton	764	SNC-001
3.3.5.1-1 (1.a)	2B21N091A	Barton	764	SNC-001
3.3.5.1-1 (1.a)	2B21N091B	Barton	764	SNC-001
3.3.5.1-1 (1.a)	2B21N091C	Barton	764	SNC-001
3.3.5.1-1 (1.a)	2B21N091D	Barton	764	SNC-001
3.3.5.1-1 (1.b)	1E11N094A	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (1.b)	1E11N094B	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (1.b)	1E11N094C	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (1.b)	1E11N094D	Rosemount	1154GP4RJ	SNC-012

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.5.1-1 (1.b)	2E11N094A	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (1.b)	2E11N094B	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (1.b)	2E11N094C	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (1.b)	2E11N094D	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (1.c)	1B21N090A	Barton	763	SNC-002
3.3.5.1-1 (1.c)	1B21N090B	Barton	763	SNC-002
3.3.5.1-1 (1.c)	1B21N090C	Barton	763	SNC-002
3.3.5.1-1 (1.c)	1B21N090D	Barton	763	SNC-002
3.3.5.1-1 (1.c)	2B21N090A	Barton	763	SNC-002
3.3.5.1-1 (1.c)	2B21N090B	Barton	763	SNC-002
3.3.5.1-1 (1.c)	2B21N090C	Barton	763	SNC-002
3.3.5.1-1 (1.c)	2B21N090D	Barton	763	SNC-002
3.3.5.1-1 (1.d)	1E21N051A	Barton	764	SNC-001
3.3.5.1-1 (1.d)	1E21N051B	Barton	764	SNC-001
3.3.5.1-1 (1.d)	2E21N051A	Barton	764	SNC-001
3.3.5.1-1 (1.d)	2E21N051B	Barton	764	SNC-001
3.3.5.1-1 (2.a)	1B21N091A	Barton	764	SNC-001
3.3.5.1-1 (2.a)	1B21N091B	Barton	764	SNC-001
3.3.5.1-1 (2.a)	1B21N091C	Barton	764	SNC-001
3.3.5.1-1 (2.a)	1B21N091D	Barton	764	SNC-001
3.3.5.1-1 (2.a)	1E11K125A	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.a)	1E11K125B	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.a)	1E11K126	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.a)	1E11K70A	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.a)	1E11K70B	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.a)	1E11K75A	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.a)	1E11K75B	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.a)	2B21N091A	Barton	764	SNC-001
3.3.5.1-1 (2.a)	2B21N091B	Barton	764	SNC-001
3.3.5.1-1 (2.a)	2B21N091C	Barton	764	SNC-001
3.3.5.1-1 (2.a)	2B21N091D	Barton	764	SNC-001
3.3.5.1-1 (2.a)	2E11K125A	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.a)	2E11K125B	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.a)	2E11K126	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.a)	2E11K70A	Struthers-Dunn	236ABX135NE	SNC-025

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.5.1-1 (2.a)	2E11K70B	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.a)	2E11K75A	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.a)	2E11K75B	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.b)	1E11K125A	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.b)	1E11K125B	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.b)	1E11K126	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.b)	1E11K70A	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.b)	1E11K70B	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.b)	1E11K75A	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.b)	1E11K75B	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.b)	1E11N094A	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (2.b)	1E11N094B	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (2.b)	1E11N094C	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (2.b)	1E11N094D	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (2.b)	2E11K125A	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.b)	2E11K125B	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.b)	2E11K126	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.b)	2E11K70A	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.b)	2E11K70B	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.b)	2E11K75A	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.b)	2E11K75B	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.b)	2E11N094A	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (2.b)	2E11N094B	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (2.b)	2E11N094C	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (2.b)	2E11N094D	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (2.c)	1B21N090A	Rosemount	1153GB9RC	SNC-009
3.3.5.1-1 (2.c)	1B21N090B	Barton	763	SNC-002
3.3.5.1-1 (2.c)	1B21N090C	Barton	763	SNC-002
3.3.5.1-1 (2.c)	1B21N090D	Rosemount	1153GB9RC	SNC-009
3.3.5.1-1 (2.c)	2B21N090A	Barton	763	SNC-002
3.3.5.1-1 (2.c)	2B21N090B	Barton	763	SNC-002
3.3.5.1-1 (2.c)	2B21N090C	Barton	763	SNC-002
3.3.5.1-1 (2.c)	2B21N090D	Barton	763	SNC-002
3.3.5.1-1 (2.d)	1B21N090B	Barton	763	SNC-002
3.3.5.1-1 (2.d)	1B21N090C	Barton	763	SNC-002

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.5.1-1 (2.d)	1B21N090E	Rosemount	1153GB9RC	SNC-009
3.3.5.1-1 (2.d)	1B21N090F	Rosemount	1153GB9RC	SNC-009
3.3.5.1-1 (2.d)	2B21N090B	Barton	763	SNC-002
3.3.5.1-1 (2.d)	2B21N090C	Barton	763	SNC-002
3.3.5.1-1 (2.d)	2B21N090E	Barton	763	SNC-002
3.3.5.1-1 (2.d)	2B21N090F	Barton	763	SNC-002
3.3.5.1-1 (2.e)	1B21N085A	Barton	764	SNC-001
3.3.5.1-1 (2.e)	1B21N085B	Barton	764	SNC-001
3.3.5.1-1 (2.e)	2B21N085A	Barton	764	SNC-001
3.3.5.1-1 (2.e)	2B21N085B	Barton	764	SNC-001
3.3.5.1-1 (2.f)	1E11K125A	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.f)	1E11K125B	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.f)	1E11K126	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.f)	1E11K70A	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.f)	1E11K70B	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.f)	1E11K75A	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.f)	1E11K75B	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.f)	2E11K125A	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.f)	2E11K125B	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.f)	2E11K126	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.f)	2E11K70A	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.f)	2E11K70B	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.f)	2E11K75A	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.f)	2E11K75B	Struthers-Dunn	236ABX135NE	SNC-025
3.3.5.1-1 (2.g)	1E11N082A	Barton	764	SNC-001
3.3.5.1-1 (2.g)	1E11N082B	Barton	764	SNC-001
3.3.5.1-1 (2.g)	2E11N082A	Barton	764	SNC-001
3.3.5.1-1 (2.g)	2E11N082B	Barton	764	SNC-001
3.3.5.1-1 (3.a)	1B21N091A	Barton	764	SNC-001
3.3.5.1-1 (3.a)	1B21N091B	Barton	764	SNC-001
3.3.5.1-1 (3.a)	1B21N091C	Barton	764	SNC-001
3.3.5.1-1 (3.a)	1B21N091D	Barton	764	SNC-001
3.3.5.1-1 (3.a)	2B21N091A	Barton	764	SNC-001
3.3.5.1-1 (3.a)	2B21N091B	Barton	764	SNC-001
3.3.5.1-1 (3.a)	2B21N091C	Barton	764	SNC-001

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.5.1-1 (3.a)	2B21N091D	Barton	764	SNC-001
3.3.5.1-1 (3.b)	1E11N094A	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (3.b)	1E11N094B	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (3.b)	1E11N094C	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (3.b)	1E11N094D	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (3.b)	2E11N094A	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (3.b)	2E11N094B	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (3.b)	2E11N094C	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (3.b)	2E11N094D	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (3.c)	1B21N093B	Rosemount	1153DB4PA	SNC-011
3.3.5.1-1 (3.c)	1B21N095B	Barton	764	SNC-001
3.3.5.1-1 (3.c)	2B21N093B	Rosemount	1153DB4PA	SNC-011
3.3.5.1-1 (3.c)	2B21N095B	Barton	764	SNC-001
3.3.5.1-1 (3.e)	1E41N062B	Rosemount	1154DP4RJ	SNC-013
3.3.5.1-1 (3.e)	1E41N062D	Rosemount	1154DP4RJ	SNC-013
3.3.5.1-1 (3.e)	2E41N062B	Rosemount	1154DP4RJ	SNC-013
3.3.5.1-1 (3.e)	2E41N062D	Rosemount	1154DP4RJ	SNC-013
3.3.5.1-1 (3.f)	1E41N051	Barton	764	SNC-001
3.3.5.1-1 (3.f)	2E41N051	Barton	764	SNC-001
3.3.5.1-1 (4.a)	1B21K752A	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (4.a)	1B21K752B	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (4.a)	1B21K754A	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (4.a)	1B21K754B	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (4.a)	1B21K756A	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (4.a)	1B21K756B	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (4.a)	1B21N091A	Barton	764	SNC-001
3.3.5.1-1 (4.a)	1B21N091B	Barton	764	SNC-001
3.3.5.1-1 (4.a)	1B21N091C	Barton	764	SNC-001
3.3.5.1-1 (4.a)	1B21N091D	Barton	764	SNC-001
3.3.5.1-1 (4.a)	2B21K752A	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (4.a)	2B21K752B	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (4.a)	2B21K754A	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (4.a)	2B21K754B	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (4.a)	2B21K756A	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (4.a)	2B21K756B	Agastat	ETR14D3N002	SNC-015

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.5.1-1 (4.a)	2B21N091A	Barton	764	SNC-001
3.3.5.1-1 (4.a)	2B21N091B	Barton	764	SNC-001
3.3.5.1-1 (4.a)	2B21N091C	Barton	764	SNC-001
3.3.5.1-1 (4.a)	2B21N091D	Barton	764	SNC-001
3.3.5.1-1 (4.b)	1E11N094A	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (4.b)	1E11N094B	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (4.b)	1E11N094C	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (4.b)	1E11N094D	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (4.b)	2B21K752A	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (4.b)	2B21K752B	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (4.b)	2E11N094A	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (4.b)	2E11N094B	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (4.b)	2E11N094C	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (4.b)	2E11N094D	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (4.c)	1B21K752A	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (4.c)	1B21K752B	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (4.c)	2B21K752A	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (4.c)	2B21K752B	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (4.d)	1B21K752A	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (4.d)	1B21K752B	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (4.d)	1B21N095A	Barton	764	SNC-001
3.3.5.1-1 (4.d)	1B21N095B	Barton	764	SNC-001
3.3.5.1-1 (4.d)	2B21K752A	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (4.d)	2B21K752B	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (4.d)	2B21N095A	Barton	764	SNC-001
3.3.5.1-1 (4.d)	2B21N095B	Barton	764	SNC-001
3.3.5.1-1 (4.e)	1E21N052A	Barton	763	SNC-002
3.3.5.1-1 (4.e)	1E21N052B	Barton	763	SNC-002
3.3.5.1-1 (4.e)	1E21N055A	Barton	763	SNC-002
3.3.5.1-1 (4.e)	1E21N055B	Barton	763	SNC-002
3.3.5.1-1 (4.e)	2E21N052A	Barton	763	SNC-002
3.3.5.1-1 (4.e)	2E21N052B	Barton	763	SNC-002
3.3.5.1-1 (4.e)	2E21N055A	Barton	763	SNC-002
3.3.5.1-1 (4.e)	2E21N055B	Barton	763	SNC-002
3.3.5.1-1 (4.f)	1E11N055A	Barton	763	SNC-002

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.5.1-1 (4.f)	1E11N055B	Barton	763	SNC-002
3.3.5.1-1 (4.f)	1E11N055C	Rosemount	1154GP8RJ	SNC-012
3.3.5.1-1 (4.f)	1E11N055D	Barton	763	SNC-002
3.3.5.1-1 (4.f)	1E11N056A	Rosemount	1154GP8RJ	SNC-012
3.3.5.1-1 (4.f)	1E11N056B	Barton	763	SNC-002
3.3.5.1-1 (4.f)	1E11N056C	Barton	763	SNC-002
3.3.5.1-1 (4.f)	1E11N056D	Barton	763	SNC-002
3.3.5.1-1 (4.f)	2E11N055A	Barton	763	SNC-002
3.3.5.1-1 (4.f)	2E11N055B	Barton	763	SNC-002
3.3.5.1-1 (4.f)	2E11N055C	Barton	763	SNC-002
3.3.5.1-1 (4.f)	2E11N055D	Barton	763	SNC-002
3.3.5.1-1 (4.f)	2E11N056A	Barton	763	SNC-002
3.3.5.1-1 (4.f)	2E11N056B	Barton	763	SNC-002
3.3.5.1-1 (4.f)	2E11N056C	Barton	763	SNC-002
3.3.5.1-1 (4.f)	2E11N056D	Barton	763	SNC-002
3.3.5.1-1 (4.g)	1B21K754A	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (4.g)	1B21K754B	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (4.g)	1B21K756A	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (4.g)	1B21K756B	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (4.g)	2B21K754A	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (4.g)	2B21K754B	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (4.g)	2B21K756A	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (4.g)	2B21K756B	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (5.a)	1B21K752A	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (5.a)	1B21K752B	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (5.a)	1B21K754A	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (5.a)	1B21K754B	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (5.a)	1B21K756A	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (5.a)	1B21K756B	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (5.a)	1B21N091A	Barton	764	SNC-001
3.3.5.1-1 (5.a)	1B21N091B	Barton	764	SNC-001
3.3.5.1-1 (5.a)	1B21N091C	Barton	764	SNC-001
3.3.5.1-1 (5.a)	1B21N091D	Barton	764	SNC-001
3.3.5.1-1 (5.a)	2B21K752A	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (5.a)	2B21K752B	Agastat	FTR14D3EC750	SNC-015

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.5.1-1 (5.a)	2B21K754A	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (5.a)	2B21K754B	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (5.a)	2B21K756A	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (5.a)	2B21K756B	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (5.a)	2B21N091A	Barton	764	SNC-001
3.3.5.1-1 (5.a)	2B21N091B	Barton	764	SNC-001
3.3.5.1-1 (5.a)	2B21N091C	Barton	764	SNC-001
3.3.5.1-1 (5.a)	2B21N091D	Barton	764	SNC-001
3.3.5.1-1 (5.b)	1B21K752A	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (5.b)	1B21K752B	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (5.b)	1E11N094A	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (5.b)	1E11N094B	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (5.b)	1E11N094C	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (5.b)	1E11N094D	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (5.b)	2B21K752A	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (5.b)	2B21K752B	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (5.b)	2E11N094A	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (5.b)	2E11N094B	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (5.b)	2E11N094C	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (5.b)	2E11N094D	Rosemount	1154GP4RJ	SNC-012
3.3.5.1-1 (5.c)	1B21K752A	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (5.c)	1B21K752B	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (5.c)	2B21K752A	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (5.c)	2B21K752B	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (5.d)	1B21K752A	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (5.d)	1B21K752B	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (5.d)	1B21N095A	Barton	764	SNC-001
3.3.5.1-1 (5.d)	1B21N095B	Barton	764	SNC-001
3.3.5.1-1 (5.d)	2B21K752A	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (5.d)	2B21K752B	Agastat	FTR14D3EC750	SNC-015
3.3.5.1-1 (5.d)	2B21N095A	Barton	764	SNC-001
3.3.5.1-1 (5.d)	2B21N095B	Barton	764	SNC-001
3.3.5.1-1 (5.e)	1E21N052A	Barton	763	SNC-002
3.3.5.1-1 (5.e)	1E21N052B	Barton	763	SNC-002
3.3.5.1-1 (5.e)	1E21N055A	Barton	763	SNC-002

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.5.1-1 (5.e)	1E21N055B	Barton	763	SNC-002
3.3.5.1-1 (5.e)	2E21N052A	Barton	763	SNC-002
3.3.5.1-1 (5.e)	2E21N052B	Barton	763	SNC-002
3.3.5.1-1 (5.e)	2E21N055A	Barton	763	SNC-002
3.3.5.1-1 (5.e)	2E21N055B	Barton	763	SNC-002
3.3.5.1-1 (5.f)	1E11N055A	Barton	763	SNC-002
3.3.5.1-1 (5.f)	1E11N055B	Barton	763	SNC-002
3.3.5.1-1 (5.f)	1E11N055C	Rosemount	1154GP8RJ	SNC-012
3.3.5.1-1 (5.f)	1E11N055D	Barton	763	SNC-002
3.3.5.1-1 (5.f)	1E11N056A	Rosemount	1154GP8RJ	SNC-012
3.3.5.1-1 (5.f)	1E11N056B	Barton	763	SNC-002
3.3.5.1-1 (5.f)	1E11N056C	Barton	763	SNC-002
3.3.5.1-1 (5.f)	1E11N056D	Barton	763	SNC-002
3.3.5.1-1 (5.f)	2E11N055A	Barton	763	SNC-002
3.3.5.1-1 (5.f)	2E11N055B	Barton	763	SNC-002
3.3.5.1-1 (5.f)	2E11N055C	Barton	763	SNC-002
3.3.5.1-1 (5.f)	2E11N055D	Barton	763	SNC-002
3.3.5.1-1 (5.f)	2E11N056A	Barton	763	SNC-002
3.3.5.1-1 (5.f)	2E11N056B	Barton	763	SNC-002
3.3.5.1-1 (5.f)	2E11N056C	Barton	763	SNC-002
3.3.5.1-1 (5.f)	2E11N056D	Barton	763	SNC-002
3.3.5.1-1 (5.g)	1B21K754A	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (5.g)	1B21K754B	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (5.g)	1B21K756A	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (5.g)	1B21K756B	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (5.g)	2B21K754A	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (5.g)	2B21K754B	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (5.g)	2B21K756A	Agastat	ETR14D3N002	SNC-015
3.3.5.1-1 (5.g)	2B21K756B	Agastat	ETR14D3N002	SNC-015
3.3.5.2-1 (1)	1B21N091A	Barton	764	SNC-001
3.3.5.2-1 (1)	1B21N091B	Barton	764	SNC-001
3.3.5.2-1 (1)	1B21N091C	Barton	764	SNC-001
3.3.5.2-1 (1)	1B21N091D	Barton	764	SNC-001
3.3.5.2-1 (1)	2B21N091A	Barton	764	SNC-001
3.3.5.2-1 (1)	2B21N091B	Barton	764	SNC-001

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.5.2-1 (1)	2B21N091C	Barton	764	SNC-001
3.3.5.2-1 (1)	2B21N091D	Barton	764	SNC-001
3.3.5.2-1 (2)	1B21N093A	Rosemount	1153DB4PA	SNC-011
3.3.5.2-1 (2)	1B21N095A	Barton	764	SNC-001
3.3.5.2-1 (2)	2B21N093A	Rosemount	1153DB4PA	SNC-011
3.3.5.2-1 (2)	2B21N095A	Barton	764	SNC-001
3.3.6.1-1 (1.a)	1B21N081A	Rosemount	1154DP5RJ	SNC-013
3.3.6.1-1 (1.a)	1B21N081B	Rosemount	1154DP5RJ	SNC-013
3.3.6.1-1 (1.a)	1B21N081C	Barton	764	SNC-001
3.3.6.1-1 (1.a)	1B21N081D	Barton	764	SNC-001
3.3.6.1-1 (1.a)	2B21N081A	Barton	764	SNC-001
3.3.6.1-1 (1.a)	2B21N081B	Rosemount	1154DP5RJ	SNC-013
3.3.6.1-1 (1.a)	2B21N081C	Barton	764	SNC-001
3.3.6.1-1 (1.a)	2B21N081D	Barton	764	SNC-001
3.3.6.1-1 (1.c)	1B21N086A	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	1B21N086B	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	1B21N086C	Barton	764	SNC-001
3.3.6.1-1 (1.c)	1B21N086D	Barton	764	SNC-001
3.3.6.1-1 (1.c)	1B21N087A	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	1B21N087B	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	1B21N087C	Barton	764	SNC-001
3.3.6.1-1 (1.c)	1B21N087D	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	1B21N088A	Barton	764	SNC-001
3.3.6.1-1 (1.c)	1B21N088B	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	1B21N088C	Barton	764	SNC-001
3.3.6.1-1 (1.c)	1B21N088D	Barton	764	SNC-001
3.3.6.1-1 (1.c)	1B21N089A	Barton	764	SNC-001
3.3.6.1-1 (1.c)	1B21N089B	Barton	764	SNC-001
3.3.6.1-1 (1.c)	1B21N089C	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	1B21N089D	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	2B21N086A	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	2B21N086B	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	2B21N086C	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	2B21N086D	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	2B21N087A	Rosemount	1154DP7RJ	SNC-013

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.6.1-1 (1.c)	2B21N087B	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	2B21N087C	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	2B21N087D	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	2B21N088A	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	2B21N088B	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	2B21N088C	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	2B21N088D	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	2B21N089A	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	2B21N089B	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	2B21N089C	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.c)	2B21N089D	Rosemount	1154DP7RJ	SNC-013
3.3.6.1-1 (1.f)	2U61N101A	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N101B	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N101C	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N101D	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N102A	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N102B	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N102C	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N102D	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N103A	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N103B	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N103C	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N103D	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N104A	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N104B	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N104C	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N104D	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N105A	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N105B	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N105C	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N105D	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N106A	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N106B	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N106C	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N106D	Transmation	3610DRA / 3620DRA	SNC-004

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.6.1-1 (1.f)	2U61N107A	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N107B	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N107C	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N107D	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N108A	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N108B	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N108C	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N108D	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N109A	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N109B	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N109C	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N109D	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N110A	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N110B	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N110C	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N110D	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N111A	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N111B	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N111C	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N111D	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N112A	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N112B	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N112C	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N112D	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N113A	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N113B	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N113C	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N113D	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N114A	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N114B	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N114C	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N114D	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N115A	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N115B	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N115C	Transmation	3610DRA / 3620DRA	SNC-004

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.6.1-1 (1.f)	2U61N115D	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N116A	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N116B	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N116C	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (1.f)	2U61N116D	Transmation	3610DRA / 3620DRA	SNC-004
3.3.6.1-1 (2.a)	1B21N080A	Rosemount	1154DP4RJ	SNC-013
3.3.6.1-1 (2.a)	1B21N080B	Barton	764	SNC-001
3.3.6.1-1 (2.a)	1B21N080C	Barton	764	SNC-001
3.3.6.1-1 (2.a)	1B21N080D	Barton	764	SNC-001
3.3.6.1-1 (2.a)	2B21N080A	Barton	764	SNC-001
3.3.6.1-1 (2.a)	2B21N080B	Barton	764	SNC-001
3.3.6.1-1 (2.a)	2B21N080C	Barton	764	SNC-001
3.3.6.1-1 (2.a)	2B21N080D	Rosemount	1154DP4RJ	SNC-013
3.3.6.1-1 (2.b)	1C71N050A	Rosemount	1154GP4RJ	SNC-012
3.3.6.1-1 (2.b)	1C71N050B	Rosemount	1154GP4RJ	SNC-012
3.3.6.1-1 (2.b)	1C71N050C	Rosemount	1154GP4RJ	SNC-012
3.3.6.1-1 (2.b)	1C71N050D	Rosemount	1154GP4RJ	SNC-012
3.3.6.1-1 (2.b)	2C71N050A	Rosemount	1154GP4RJ	SNC-012
3.3.6.1-1 (2.b)	2C71N050B	Rosemount	1154GP4RJ	SNC-012
3.3.6.1-1 (2.b)	2C71N050C	Rosemount	1154GP4RJ	SNC-012
3.3.6.1-1 (2.b)	2C71N050D	Rosemount	1154GP4RJ	SNC-012
3.3.6.1-1 (3.a)	1E41N057A	Barton	764	SNC-001
3.3.6.1-1 (3.a)	1E41N057B	Barton	764	SNC-001
3.3.6.1-1 (3.a)	2E41N057A	Barton	764	SNC-001
3.3.6.1-1 (3.a)	2E41N057B	Barton	764	SNC-001
3.3.6.1-1 (3.b)	1E41N058A	Barton	763	SNC-002
3.3.6.1-1 (3.b)	1E41N058B	Barton	763	SNC-002
3.3.6.1-1 (3.b)	1E41N058C	Barton	763	SNC-002
3.3.6.1-1 (3.b)	1E41N058D	Barton	763	SNC-002
3.3.6.1-1 (3.b)	2E41N058A	Barton	763	SNC-002
3.3.6.1-1 (3.b)	2E41N058B	Barton	763	SNC-002
3.3.6.1-1 (3.b)	2E41N058C	Barton	763	SNC-002
3.3.6.1-1 (3.b)	2E41N058D	Barton	763	SNC-002
3.3.6.1-1 (3.c)	1E41N055A	Barton	764	SNC-001
3.3.6.1-1 (3.c)	1E41N055B	Barton	764	SNC-001

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.6.1-1 (3.c)	1E41N055C	Barton	764	SNC-001
3.3.6.1-1 (3.c)	1E41N055D	Barton	764	SNC-001
3.3.6.1-1 (3.c)	2E41N055A	Barton	764	SNC-001
3.3.6.1-1 (3.c)	2E41N055B	Barton	764	SNC-001
3.3.6.1-1 (3.c)	2E41N055C	Barton	764	SNC-001
3.3.6.1-1 (3.c)	2E41N055D	Rosemount	1154GP6RJ	SNC-012
3.3.6.1-1 (3.d)	1E11N094C	Rosemount	1154GP4RJ	SNC-012
3.3.6.1-1 (3.d)	1E11N094D	Rosemount	1154GP4RJ	SNC-012
3.3.6.1-1 (3.d)	1E41N058A	Barton	763	SNC-002
3.3.6.1-1 (3.d)	1E41N058B	Barton	763	SNC-002
3.3.6.1-1 (3.d)	1E41N058C	Barton	763	SNC-002
3.3.6.1-1 (3.d)	1E41N058D	Barton	763	SNC-002
3.3.6.1-1 (3.d)	2E11N094C	Rosemount	1154GP4RJ	SNC-012
3.3.6.1-1 (3.d)	2E11N094D	Rosemount	1154GP4RJ	SNC-012
3.3.6.1-1 (3.d)	2E41N058A	Barton	763	SNC-002
3.3.6.1-1 (3.d)	2E41N058B	Barton	763	SNC-002
3.3.6.1-1 (3.d)	2E41N058C	Barton	763	SNC-002
3.3.6.1-1 (3.d)	2E41N058D	Barton	763	SNC-002
3.3.6.1-1 (3.h)	1E51N663C	GE	184C5988G201	SNC-021
3.3.6.1-1 (3.h)	1E51N663D	GE	184C5988G201	SNC-021
3.3.6.1-1 (3.h)	1E51N664C	GE	184C5988G201	SNC-021
3.3.6.1-1 (3.h)	1E51N664D	GE	184C5988G201	SNC-021
3.3.6.1-1 (3.h)	2E51N663C	GE	184C5988G201	SNC-021
3.3.6.1-1 (3.h)	2E51N663D	GE	184C5988G201	SNC-021
3.3.6.1-1 (3.h)	2E51N664C	GE	184C5988G201	SNC-021
3.3.6.1-1 (3.h)	2E51N664D	GE	184C5988G201	SNC-021
3.3.6.1-1 (4.a)	1E51N057A	Rosemount	1154DP5RJ	SNC-013
3.3.6.1-1 (4.a)	1E51N057B	Barton	764	SNC-001
3.3.6.1-1 (4.a)	2E51N057A	Barton	764	SNC-001
3.3.6.1-1 (4.a)	2E51N057B	Barton	764	SNC-001
3.3.6.1-1 (4.b)	1E51N058A	Barton	763	SNC-002
3.3.6.1-1 (4.b)	1E51N058B	Barton	763	SNC-002
3.3.6.1-1 (4.b)	1E51N058C	Barton	763	SNC-002
3.3.6.1-1 (4.b)	1E51N058D	Barton	763	SNC-002
3.3.6.1-1 (4.b)	2E51N058A	Barton	763	SNC-002

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.6.1-1 (4.b)	2E51N058B	Barton	763	SNC-002
3.3.6.1-1 (4.b)	2E51N058C	Barton	763	SNC-002
3.3.6.1-1 (4.b)	2E51N058D	Barton	763	SNC-002
3.3.6.1-1 (4.c)	1E51N085A	Barton	764	SNC-001
3.3.6.1-1 (4.c)	1E51N085B	Barton	764	SNC-001
3.3.6.1-1 (4.c)	1E51N085C	Barton	764	SNC-001
3.3.6.1-1 (4.c)	1E51N085D	Barton	764	SNC-001
3.3.6.1-1 (4.c)	2E51N085A	Barton	764	SNC-001
3.3.6.1-1 (4.c)	2E51N085B	Barton	764	SNC-001
3.3.6.1-1 (4.c)	2E51N085C	Barton	764	SNC-001
3.3.6.1-1 (4.c)	2E51N085D	Barton	764	SNC-001
3.3.6.1-1 (4.d)	1E11N094A	Rosemount	1154GP4RJ	SNC-012
3.3.6.1-1 (4.d)	1E11N094B	Rosemount	1154GP4RJ	SNC-012
3.3.6.1-1 (4.d)	1E51N058A	Barton	763	SNC-002
3.3.6.1-1 (4.d)	1E51N058B	Barton	763	SNC-002
3.3.6.1-1 (4.d)	1E51N058C	Barton	763	SNC-002
3.3.6.1-1 (4.d)	1E51N058D	Barton	763	SNC-002
3.3.6.1-1 (4.d)	2E11N094A	Rosemount	1154GP4RJ	SNC-012
3.3.6.1-1 (4.d)	2E11N094B	Rosemount	1154GP4RJ	SNC-012
3.3.6.1-1 (4.d)	2E51N058A	Barton	763	SNC-002
3.3.6.1-1 (4.d)	2E51N058B	Barton	763	SNC-002
3.3.6.1-1 (4.d)	2E51N058C	Barton	763	SNC-002
3.3.6.1-1 (4.d)	2E51N058D	Barton	763	SNC-002
3.3.6.1-1 (4.g)	1E51N663A	GE	184C5988G201	SNC-021
3.3.6.1-1 (4.g)	1E51N663B	GE	184C5988G201	SNC-021
3.3.6.1-1 (4.g)	1E51N664A	GE	184C5988G201	SNC-021
3.3.6.1-1 (4.g)	1E51N664B	GE	184C5988G201	SNC-021
3.3.6.1-1 (4.g)	2E51N663A	GE	184C5988G201	SNC-021
3.3.6.1-1 (4.g)	2E51N663B	GE	184C5988G201	SNC-021
3.3.6.1-1 (4.g)	2E51N664A	GE	184C5988G201	SNC-021
3.3.6.1-1 (4.g)	2E51N664B	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	1G31N661A	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	1G31N661D	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	1G31N661E	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	1G31N661H	GE	184C5988G201	SNC-021

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.6.1-1 (5.b)	1G31N661J	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	1G31N661M	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	1G31N662A	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	1G31N662D	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	1G31N662E	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	1G31N662H	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	1G31N662J	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	1G31N662M	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	2G31N661A	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	2G31N661D	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	2G31N661E	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	2G31N661H	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	2G31N661J	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	2G31N661M	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	2G31N662A	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	2G31N662D	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	2G31N662E	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	2G31N662H	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	2G31N662J	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.b)	2G31N662M	GE	184C5988G201	SNC-021
3.3.6.1-1 (5.d)	1B21N081A	Rosemount	1154DP5RJ	SNC-013
3.3.6.1-1 (5.d)	1B21N081B	Rosemount	1154DP5RJ	SNC-013
3.3.6.1-1 (5.d)	1B21N081C	Barton	764	SNC-001
3.3.6.1-1 (5.d)	1B21N081D	Barton	764	SNC-001
3.3.6.1-1 (5.d)	2B21N081A	Barton	764	SNC-001
3.3.6.1-1 (5.d)	2B21N081B	Rosemount	1154DP5RJ	SNC-013
3.3.6.1-1 (5.d)	2B21N081C	Barton	764	SNC-001
3.3.6.1-1 (5.d)	2B21N081D	Barton	764	SNC-001
3.3.6.1-1 (6.a)	1B31N079A	Barton	764	SNC-001
3.3.6.1-1 (6.a)	1B31N079D	Barton	764	SNC-001
3.3.6.1-1 (6.a)	2B31N079A	Barton	764	SNC-001
3.3.6.1-1 (6.a)	2B31N079D	Barton	764	SNC-001
3.3.6.1-1 (6.b)	1B21N080A	Rosemount	1154DP4RJ	SNC-013
3.3.6.1-1 (6.b)	1B21N080B	Barton	764	SNC-001
3.3.6.1-1 (6.b)	1B21N080C	Barton	764	SNC-001

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.6.1-1 (6.b)	1B21N080D	Barton	764	SNC-001
3.3.6.1-1 (6.b)	2B21N080A	Barton	764	SNC-001
3.3.6.1-1 (6.b)	2B21N080B	Barton	764	SNC-001
3.3.6.1-1 (6.b)	2B21N080C	Barton	764	SNC-001
3.3.6.1-1 (6.b)	2B21N080D	Rosemount	1154DP4RJ	SNC-013
3.3.6.2-1 (1)	1B21N081A	Rosemount	1154DP5RJ	SNC-013
3.3.6.2-1 (1)	1B21N081B	Rosemount	1154DP5RJ	SNC-013
3.3.6.2-1 (1)	1B21N081C	Barton	764	SNC-001
3.3.6.2-1 (1)	1B21N081D	Barton	764	SNC-001
3.3.6.2-1 (1)	2B21N081A	Barton	764	SNC-001
3.3.6.2-1 (1)	2B21N081B	Rosemount	1154DP5RJ	SNC-013
3.3.6.2-1 (1)	2B21N081C	Barton	764	SNC-001
3.3.6.2-1 (1)	2B21N081D	Barton	764	SNC-001
3.3.6.2-1 (2)	1C71N050A	Rosemount	1154GP4RJ	SNC-012
3.3.6.2-1 (2)	1C71N050B	Rosemount	1154GP4RJ	SNC-012
3.3.6.2-1 (2)	1C71N050C	Rosemount	1154GP4RJ	SNC-012
3.3.6.2-1 (2)	1C71N050D	Rosemount	1154GP4RJ	SNC-012
3.3.6.2-1 (2)	2C71N050A	Rosemount	1154GP4RJ	SNC-012
3.3.6.2-1 (2)	2C71N050B	Rosemount	1154GP4RJ	SNC-012
3.3.6.2-1 (2)	2C71N050C	Rosemount	1154GP4RJ	SNC-012
3.3.6.2-1 (2)	2C71N050D	Rosemount	1154GP4RJ	SNC-012
3.3.6.3-1 (1)	1B21N120A	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (1)	1B21N120B	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (1)	1B21N120C	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (1)	1B21N120D	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (1)	2B21N120A	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (1)	2B21N120B	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (1)	2B21N120C	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (1)	2B21N120D	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (2)	1B21N120A	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (2)	1B21N120B	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (2)	1B21N120C	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (2)	1B21N120D	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (2)	1B21N122A	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (2)	1B21N122B	Rosemount	1153GB8PAN0097	SNC-010

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.6.3-1 (2)	1B21N122C	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (2)	1B21N122D	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (2)	2B21N120A	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (2)	2B21N120B	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (2)	2B21N120C	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (2)	2B21N120D	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (2)	2B21N122A	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (2)	2B21N122B	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (2)	2B21N122C	Rosemount	1153GB8PAN0097	SNC-010
3.3.6.3-1 (2)	2B21N122D	Rosemount	1153GB8PAN0097	SNC-010
3.3.8.2.2.a	1C71K751A	ASCO	214B70	SNC-017
3.3.8.2.2.a	1C71K751B	ASCO	214B70	SNC-017
3.3.8.2.2.a	1C71K751C	ASCO	214B70	SNC-017
3.3.8.2.2.a	1C71K751D	ASCO	214B70	SNC-017
3.3.8.2.2.a	1C71K751E	ASCO	214B70	SNC-017
3.3.8.2.2.a	1C71K751F	ASCO	214B70	SNC-017
3.3.8.2.2.a	1C71K756A	Agastat	F7022	SNC-016
3.3.8.2.2.a	1C71K756B	Agastat	F7022	SNC-016
3.3.8.2.2.a	1C71K756C	Agastat	F7022	SNC-016
3.3.8.2.2.a	1C71K756D	Agastat	F7022	SNC-016
3.3.8.2.2.a	1C71K756E	Agastat	F7022	SNC-016
3.3.8.2.2.a	1C71K756F	Agastat	F7022	SNC-016
3.3.8.2.2.a	2C71K751A	ASCO	214B70	SNC-017
3.3.8.2.2.a	2C71K751B	ASCO	214B70	SNC-017
3.3.8.2.2.a	2C71K751C	ASCO	214B70	SNC-017
3.3.8.2.2.a	2C71K751D	ASCO	214B70	SNC-017
3.3.8.2.2.a	2C71K751E	ASCO	214B70	SNC-017
3.3.8.2.2.a	2C71K751F	ASCO	214B70	SNC-017
3.3.8.2.2.a	2C71K756A	Agastat	E7022	SNC-016
3.3.8.2.2.a	2C71K756B	Agastat	E7022	SNC-016
3.3.8.2.2.a	2C71K756C	Agastat	E7022	SNC-016
3.3.8.2.2.a	2C71K756D	Agastat	E7022	SNC-016
3.3.8.2.2.a	2C71K756E	Agastat	E7022	SNC-016
3.3.8.2.2.a	2C71K756F	Agastat	E7022	SNC-016
3.3.8.2.2.b	1C71K752A	ASCO	214A261	SNC-018, 032

Technical Specifications Table Item or LCO	MPL No.	Manufacturer	Model No.	Drift Study
3.3.8.2.2.b	1C71K752B	ASCO	214A261	SNC-018, 032
3.3.8.2.2.b	1C71K752C	ASCO	214A261	SNC-018, 032
3.3.8.2.2.b	1C71K752D	ASCO	214A261	SNC-018, 032
3.3.8.2.2.b	1C71K752E	ASCO	214A261	SNC-018, 032
3.3.8.2.2.b	1C71K752F	ASCO	214A261	SNC-018, 032
3.3.8.2.2.b	2C71K752A	ASCO	214A261	SNC-018, 032
3.3.8.2.2.b	2C71K752B	ASCO	214A261	SNC-018, 032
3.3.8.2.2.b	2C71K752C	ASCO	214A261	SNC-018, 032
3.3.8.2.2.b	2C71K752D	ASCO	214A261	SNC-018, 032
3.3.8.2.2.b	2C71K752E	ASCO	214A261	SNC-018, 032
3.3.8.2.2.b	2C71K752F	ASCO	214A261	SNC-018, 032
3.3.8.2.2.c	1C71K753A	ASCO	214A262	SNC-019, 033
3.3.8.2.2.c	1C71K753B	ASCO	214A262	SNC-019, 033
3.3.8.2.2.c	1C71K753C	ASCO	214A262	SNC-019, 033
3.3.8.2.2.c	1C71K753D	ASCO	214A262	SNC-019, 033
3.3.8.2.2.c	1C71K753E	ASCO	214A262	SNC-019, 033
3.3.8.2.2.c	1C71K753F	ASCO	214A262	SNC-019, 033
3.3.8.2.2.c	2C71K753A	ASCO	214A262	SNC-019, 033
3.3.8.2.2.c	2C71K753B	ASCO	214A262	SNC-019, 033
3.3.8.2.2.c	2C71K753C	ASCO	214A262	SNC-019, 033
3.3.8.2.2.c	2C71K753D	ASCO	214A262	SNC-019, 033
3.3.8.2.2.c	2C71K753E	ASCO	214A262	SNC-019, 033
3.3.8.2.2.c	2C71K753F	ASCO	214A262	SNC-019, 033

Enclosure 3

Edwin I. Hatch Nuclear Plant
Request to Revise Technical Specifications:
18- to 24-Month Fuel Cycle Extension

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History of Revisions

Rev. No.	Approval Date	Reason & Description Change
0	3/1/2001	Initial Issue
1	5/4/2001	Revised Time Bin Limits of Section 3.9.3.1 for items c, d, e, and f, to ensure that upper bin limits for semi-annual, annual, and 18-month calibrations cover the normal TS allowance. Revised page 20 of the body of this document and pages 8 and I1 of Appendix A, the example drift study.
2	8/22/2001	Replaced Appendix A entirely. Therefore, no revision bars are shown on the Appendix.

Enclosure 3

Edwin I. Hatch Nuclear Plant
Request to Revise Technical Specifications:
18- to 24-Month Fuel Cycle Extension

Drift Analysis Design Guide

1. OBJECTIVE/PURPOSE

The objective of this Design Guide is to provide the necessary detail and guidance to perform drift analyses using past calibration history data for the purposes of:

- Quantifying component/loop drift characteristics within defined probability limits to gain an understanding of the expected behavior for the component/loop by evaluating past performance
- Estimating component/loop drift for integration into setpoint calculations
- Analysis aid for reliability centered maintenance practices (e.g., optimizing calibration frequency)
- Establishing a technical basis for extending calibration and surveillance intervals using historical calibration data
- Evaluating extended surveillance intervals in support of longer fuel cycles
- Trending device performance based on extended surveillance intervals

2. DRIFT ANALYSIS SCOPE

The scope of this design guide is limited to the calculation of the expected performance for a component, group of components or loop, utilizing past calibration data. The Drift Studies are the final product of the data analysis and will document the use of the drift data for the purposes listed in Section 1. The Setpoint/Uncertainty calculations will incorporate the values documented in the Drift Studies for the applications specific to a given loop or component.

The approaches described within this design guide can be applied to all devices that are surveilled or calibrated where As-Found and As-Left data is recorded. The scope of this design guide includes, but is not limited to, the following list of devices:

- Transmitters (Differential Pressure, Flow, Level, Pressure, Temperature, etc.)
- Bistables (Master & Slave Trip Units, Alarm Units, etc.)
- Indicators (Analog, Digital)
- Switches (Differential Pressure, Flow, Level, Position, Pressure, Temperature, etc.)
- Signal Conditioners/Converters (Summers, E/P Converters, Square Root Converters, etc.)
- Recorders (Temperature, Pressure, Flow, Level, etc.)
- Monitors & Modules (Radiation, Neutron, H_2O_2, Pre-Amplifiers, etc.)
- Relays (Time Delay, Undervoltage, Overvoltage, etc.)

Note that a given device or device type may be justified not to require drift analysis in accordance with this design guide, if appropriate. For the 24-Month Fuel Cycle Extension Project, if calibration intervals are to be extended for instrumentation, and the associated drift is not analyzed per this design guide, justification should be provided as a part of the project documentation.

3. DISCUSSION/METHODOLOGY

3.1. Methodology Options

This design guide is written to provide the methodology necessary for the analysis of As-Found versus As-Left calibration data, as a means of characterizing the performance of a component or group of components via the following methods:

3.1.1. Electric Power Research Institute (EPRI) has developed a guideline to provide nuclear plants with practical methods for analyzing historic component calibration data to predict component performance via a simple spreadsheet program (e.g., Excel, Lotus 1-2-3). This design guide is written in close adherence to this guideline, Reference 7.1.1.

3.1.2. Commercial Grade Software programs other than Microsoft Excel (e.g. IPASS, Lotus 1-2-3, SYSTAT, etc.), that will perform the functions necessary to evaluate drift, may be utilized providing:

- the intent of this design guide is met as outlined in Reference 7.1.1,
- software is used only as a tool to produce hard copy outputs which will be independently verified.

3.1.3. The EPRI IPASS software, version 2.03, may be used to perform or independently verify certain portions of the drift analysis. The IPASS software does not have the functionality to perform many of the functions required by the drift analysis, such as time dependency functions, and therefore, should only be used in conjunction with other software products to produce or verify an entire drift study.

3.1.4. For the 24 Month Cycle Extension Project, the final products of the data analyses are the hard copy drift studies, which will be formatted in accordance with the example drift study contained in Appendix A. The electronic files of the drift studies are an intermediate step from raw data to final product and are not controlled as QA files. The drift study is independently verified using different software than that used to create the drift study. The review of the drift study will include a summary tabulation of results from each program to provide visual evidence of the acceptability of the results of the review.

3.2. Data Analysis Discussion

The following data analysis methods were evaluated for use at E. I. Hatch Nuclear Plant: 1) As-Found Versus Setpoint, 2) Worst Case As-Found Versus As-Left, 3) Combined Calibration Data Points Analysis, and 4) As-Found Versus As-Left. The evaluation concluded that the As-Found versus As-Left methodology provided results that were more representative of the data and has been chosen for use by this Design Guide. Statistical tests not covered by this design guide may be utilized providing the Engineer performing the analysis adequately justifies the use of the tests.

3.2.1. As-Found Versus As-Left Calibration Data Analysis

The As-Found versus As-Left calibration data analysis is based on calculating drift by subtracting the previous As-Left component setting from the current As-Found setting. Each calibration point is treated as an independent set of data for purposes of characterizing drift across the full, calibrated span of the component/loop. By evaluating As-Found versus As-Left data for a component/loop or a similar group of components/loops, the following information may be obtained:

- The typical component/loop drift between calibrations (Random in nature)

- Any tendency for the component/loop to drift in a particular direction (Bias)
- Any tendency for the component/loop drift to increase in magnitude over time (Time Dependency)
- Confirmation that the selected setting or calibration tolerance is appropriate or achievable for the component/loop

3.2.1.1. General Features of As-Found Versus As-Left Analysis

- The methodology evaluates historical calibration data only. The method does not monitor on-line component output; data is obtained from component calibration records.
- Present and future performance is predicted based on statistical analysis of past performance.
- Data is readily available from component calibration records. Data can be analyzed from plant startup to the present or only the most recent data can be evaluated.
- Since only historical data is evaluated, the method is not intended as a tool to identify individual faulty components, although it can be used to demonstrate that a particular component model or application historically performs poorly.
- A similar class of components, i.e., same make, model, or application, is evaluated. For example, the method can determine the drift of all analog indicators of a certain type installed in the control room.
- The methodology is less suitable for evaluating the drift of a single component over time, due to statistical analysis penalties that occur with smaller sample sizes.
- The methodology obtains a value of drift for a particular model, loop, or function that can be used in component or loop uncertainty and setpoint calculations.
- The methodology is designed to support the analysis of longer calibration intervals due to fuel cycle extensions and is consistent with the NRC expectations described in Reference 7.3.3. Values for instrument drift developed in accordance with this Design Guide will be applied in accordance with References 7.2.1 and / or 7.2.4, as appropriate.

3.2.1.2. Error and Uncertainty Content in As-Found Versus As-Left Calibration Data

The As-Found versus the As-Left data includes several sources of uncertainty over and above component drift. The difference between As-Found and previous As-Left data encompasses the following error terms as a minimum: reference accuracy, Measurement and Test Equipment (M&TE) errors, and instrument drift. (References 7.2.1 and 7.2.4 are the setpoint calculation methodology documents for use at Hatch. Depending on the methods used, there may be no specific term for M&TE errors within the existing calculation. However, for those calculations, there is generally a "Calibration Error" term, which consists mainly of M&TE errors. Therefore, this term is also considered to be included in the As-Found and As-Left data comparisons.) The drift is <u>not</u> assumed to encompass the errors associated with temperature effect, since the temperature difference between the two calibrations is not quantified, and is not anticipated to be significant. Additional instruction for the use of As-Found and As-Left data may be found in Reference 7.1.2. The following possible contributors could be within the measured variation, but are not necessarily considered.

- Accuracy errors present between any two consecutive calibrations
- Measurement and test equipment error between any two consecutive calibrations
- Personnel-induced or human-related variation or error between any two consecutive calibrations
- Normal temperature effects due to a difference in ambient temperature between any two consecutive calibrations
- Power Supply variations between any two consecutive calibrations
- Environmental effects on component performance, e.g., radiation, humidity, vibration, etc., between any two consecutive calibrations that cause a shift in component output
- Misapplication, improper installation, or other operating effects that affect component calibration between any two consecutive calibrations
- True drift representing a change, time-dependent or otherwise, in component/loop output over the time period between any two consecutive calibrations

3.2.1.3. Potential Impacts of As-Found Versus As-Left Data Analysis

Many of the bulleted items listed in step 3.2.1.2 are not expected to have a significant effect on the measured As-Found and As-Left settings. Because there are so many independent parameters contributing to the possible variance in calibration data, they will all be considered together and termed the component's Analyzed Drift (ADR or DA) uncertainty. This approach has the following potential impacts on an analysis of the component's calibration data:

- The magnitude of the calculated variation may exceed any assumptions or manufacturer predictions regarding drift. Attempts to validate manufacturer's performance claims should consider the possible contributors listed in step 3.2.1.2 to the calculated drift.

- The magnitude of the calculated variation that includes all of the above sources of uncertainty may mask any "true" time-dependent drift. In other words, the analysis of As-Found versus As-Left data may not demonstrate any time dependency. This does not mean that time-dependent drift does not exist, only that it could be so small that it is negligible in the cumulative effects of component uncertainty, when all of the above sources of uncertainty are combined.

3.3. Confidence Interval

This Design Guide recommends a single confidence interval level to be used for performing data analyses and the associated calculations.

NOTE: The default Tolerance Interval Factor (TIF) for all drift studies, performed using this Design Guide, will be chosen for a 95%/95% probability and confidence, although this is not specifically required in every situation. This term means that the results have a 95% confidence (γ) that at least 95% of the population will lie between the stated interval (P) for a sample size (n). Components that perform functions that support a specific

Technical Specification value, TRM value or are associated with the safety analysis assumptions or inputs will always be analyzed at a 95%/95% confidence interval. Components/loops that fall into this level must:

- Be included in the data group (or be justified to apply the results per the guidance of Reference 7.1.1) if the analyzed drift value is to be applied to the component/loop in a Setpoint/Uncertainty Calculation.
- Use the 95/95% TIF for determination of the Analyzed Drift term. (See step 3.4.2.1 and Table 1 – 95%/95%Tolerance Interval Factors.)
- Be evaluated in the Setpoint/Uncertainty Calculation for application of the Analyzed Drift term. (For example, the ADR term may include the normal temperature effects for a given device, but due to the impossibility of separating out that specific term, an additional temperature uncertainty may be included in the Setpoint/Uncertainty Calculation.).

3.4. Calibration Data Collection

3.4.1. Sources Of Data

The sources of data to perform a drift analysis are Surveillance Tests, Calibration Procedures and other calibration processes (calibration files, calibration sheets for Balance of Plant devices, Preventative Maintenance, etc.).

3.4.2. How Much Data To Collect

3.4.2.1. The goal is to collect enough data for the instrument or group of instruments to make a statistically valid pool. There is no hard fast number that must be attained for any given pool. Table 1 provides the 95%/95% TIF for various sample pool sizes; it should be noted that the smaller the pool the larger the penalty. A tolerance interval is a statement of confidence that a certain proportion of the total population is contained within a defined set of bounds. For example, a 95%/95% TIF indicates a 95% level of confidence that 95% of the population is contained within the stated interval. (Note: For cases where the exact count is not contained within the table, linear interpolation of the values should be used to determine the Tolerance Interval Factor.)

Table 1 – 95%/95%Tolerance Interval Factors

Sample Size	95%/95%	Sample Size	95%/95%	Sample Size	95%/95%
≥ 2	37.674	≥ 23	2.673	≥ 120	2.205
≥ 3	9.916	≥ 24	2.651	≥ 130	2.194
≥ 4	6.370	≥ 25	2.631	≥ 140	2.184
≥ 5	5.079	≥ 26	2.612	≥ 150	2.175
≥ 6	4.414	≥ 27	2.595	≥ 160	2.167
≥ 7	4.007	≥ 30	2.549	≥ 170	2.160
≥ 8	3.732	≥ 35	2.490	≥ 180	2.154
≥ 9	3.532	≥ 40	2.445	≥ 190	2.148
≥ 10	3.379	≥ 45	2.408	≥ 200	2.143
≥ 11	3.259	≥ 50	2.379	≥ 250	2.121
≥ 12	3.162	≥ 55	2.354	≥ 300	2.106
≥ 13	3.081	≥ 60	2.333	≥ 400	2.084
≥ 14	3.012	≥ 65	2.315	≥ 500	2.070
≥ 15	2.954	≥ 70	2.299	≥ 600	2.060

Sample Size	95%/95%	Sample Size	95%/95%	Sample Size	95%/95%
≥ 16	2.903	≥ 75	2.285	≥ 700	2.052
≥ 17	2.858	≥ 80	2.272	≥ 800	2.046
≥ 18	2.819	≥ 85	2.261	≥ 900	2.040
≥ 19	2.784	≥ 90	2.251	1000	2.036
≥ 20	2.752	≥ 95	2.241	∞	1.960
≥ 21	2.723	≥ 100	2.233		
≥ 22	2.697	≥ 110	2.218		

3.4.2.2. Different information may be needed, depending on the analysis purpose, therefore, the total population of components - all makes, models, and applications - that will be analyzed must be known. (e.g., all Rosemount Trip Units)

3.4.2.3. Once the total population of components is known, the components should be separated into functionally equivalent groups. Each grouping is treated as a separate population for analysis purposes. (e.g., starting with all Rosemount 1153 Differential Pressure Transmitters as the initial group and breaking them down into various sub-groups - Different Range Codes, Large vs. Small Turn Down Factors, Level vs. Flow Applications, etc.).

3.4.2.4. Not all components or available calibration data points need to be analyzed within each group in order to establish statistical performance limits for the group. Acquisition of data should be considered from different perspectives.

- For each grouping, a large enough sample of components should be randomly selected from the population, so there is assurance that the evaluated components are representative of the entire population. By randomly selecting the components and confirming that the behavior of the randomly selected components is similar, a basis for not evaluating the entire population can be established. For sensors, a random sample from the population should include representation of all desired component spans and functions.
- For each selected component in the sample, enough historic calibration data should be provided to ensure that the component's performance over time is understood.
- Due to the difficulty of determining the total sample set, developing specific sampling criteria is difficult. A sampling method must be used which ensures that various instruments calibrated at different frequencies are included. The sampling method must also ensure that the different component types, operating conditions and other influences on drift are included. Because of the difficulty in developing a valid sampling program, it is often simpler to evaluate all available data for the required instrumentation within the chosen time period. This eliminates changing sample methods, should groups be combined or split, based on plant conditions or performance. For the purposes of this guide, specific justification in the drift study will be required to document any sampling plan.

3.5. Categorizing Calibration Data

3.5.1. Grouping Calibration Data

One analysis goal should be to combine functionally equivalent components (components with similar design and performance characteristics) into a single group. In some cases, all components of a particular manufacturer make and model can be combined into a single sample. In other cases, virtually no grouping of data beyond a particular component make, model, and specific span or application may be possible. Some examples of possible groupings include, but are not limited to, the following:

3.5.1.1. Small Groupings

- All devices of same manufacturer, model and range, covered by the same Surveillance Test
- All trip units used to monitor a specific parameter (assuming that all trip units are the same manufacturer, model and range)

3.5.1.2. Larger Groupings

- All transmitters of a specific manufacturer, model that have similar spans and performance requirements
- All Rosemount trip units with functionally equivalent model numbers
- All control room analog indicators of a specific manufacturer and model

3.5.2. Rationale for Grouping Components into a Larger Sample

- A single component analysis may result in too few data points to make statistically meaningful performance predictions.
- Smaller sample sizes associated with a single component may unduly penalize performance predictions by applying a larger TIF to account for the smaller data set. Larger sample sizes reflect a greater understanding and assurance of representative data that in turn, reduces the uncertainty factor.
- Large groupings of components into a sample set for a single population ultimately allows the user to state the plant-specific performance for a particular make and model of component. For example, the user may state, "Main Steam Flow Transmitters have historically drifted by less than 1%", or "All control room indicators of a particular make and model have historically drifted by less than 1.5%".
- An analysis of smaller sample sizes is more likely to be influenced by non-representative variations of a single component (outliers).
- Grouping similar components together, rather than analyzing them separately, is more efficient and minimizes the number of separate calculations that must be maintained.

3.5.3. Considerations when Combining Components into a Single Group

Grouping components together into a sample set for a single population does not have to become a complicated effort. Most components can be categorized readily into the appropriate population. Consider the following guidelines when grouping functionally equivalent components together.

- If performed on a type-of-component basis, component groupings should usually be established down to the manufacturer make and model, as a minimum. For example, data from Rosemount and General Electric transmitters should not be combined in the same drift analysis. The principles of operation are different for the various manufacturers, and combining the data could mask some trend for one type of component. This said, it might be desirable to combine groups of components for certain studies. If dissimilar component types are combined, a separate analysis of each component type should still be completed to ensure analysis results of the mixed population are not misinterpreted or misapplied.

- Sensors of the same manufacturer make and model, but with different calibrated spans or elevated zero points, can possibly still be combined into a single group. For example, a single analysis that determines the drift for all Rosemount 1153 pressure transmitters installed onsite might simplify the application of the results. Note that some manufacturers provide a predicted accuracy and drift value for a given component model, regardless of its span. However, the validity of combining components with a variation of span, ranging from tens of pounds to several thousand pounds, should be confirmed. As part of the analysis, the performance of components within each span should be compared to the overall expected performance to determine if any differences are evident between components with different spans.
- Components combined into a single group should be exposed to similar calibration or surveillance conditions, as applicable. Note that the term operating condition was not used in this case. Although it is desirable that the grouped components perform similar functions, the method by which the data is obtained for this analysis is also significant. If half the components are calibrated in the summer at 90°F and the other half in the winter at 40°F, a difference in observed drift between the data for the two sets of components might exist. In many cases, ambient temperature variations are not expected to have a large effect since the components are located in environmentally controlled areas.

3.5.4. Verification that Data Grouping is Appropriate

- Combining functionally equivalent components into a single group for analysis purposes may simplify the scope of work; however, some level of verification should be performed to confirm that the selected component grouping is appropriate. As an example, the manufacturer may claim the same accuracy and drift specifications for two components of the same model, but with different ranges, e.g., 0-5 PSIG and 0-3000 PSIG. However, in actual application, components of one range may perform differently than components of another range.
- Standard statistics texts provide methods that can be used to determine if data from similar types of components can be pooled into a single group. If different groups of components have essentially equal variances and means at the desired statistical level, the data for the groups can be pooled into a single group.
- When evaluating groupings, care must be taken not to split instrument groups only because they are calibrated on a different time frequency. Differences in variances may be indicative of a time dependent component to the device drift. The separation of these groups may later mask a time-dependence for the component drift.
- A t-Test (two samples assuming unequal variances) should also be performed on the proposed components to be grouped. The t-Test returns the probability associated with a Student's t-Test to determine whether two samples are likely to have come from the same two underlying populations

that have unequal variances. If for example, the proposed group contains 5 sub-groups the t-Tests should be performed on all possible combinations for the groupings. However, if there is no plausible engineering explanation for the two sets of data being incompatible, the groups should be combined, despite the results of the t-Test. The following formula is used to determine the test statistic value t.

$$t' = \frac{\overline{x}_1 - \overline{x}_2 - \Delta_0}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \qquad \text{(Ref. 7.3.5)}$$

Where ;

t' - test statistic

n - Total number of data points

x - Mean of the samples

s^2 - Pooled variance

Δ_0 - Hypothesized mean difference

The following formula is used to estimate the degrees of freedom for the test statistic.

$$df = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{\left(\frac{s_1^2}{n_1}\right)^2}{n_1 - 1} + \frac{\left(\frac{s_2^2}{n_2}\right)^2}{n_2 - 1}}$$

Where;

Values are as previously defined.

3.5.5. Examples of Proven Groupings:

- All control room indicators receiving a 4-20mADC (or 1-5VDC) signal. Notice that a combined grouping may be possible even though the indicators have different indication spans. For example, a 12 mADC signal should move the indicator pointer to the 50% of span position on each indicator scale, regardless of the span indicated on the face plate (exceptions are non-linear meter scales).
- All control room bistables of similar make or model tested monthly for Technical Specification surveillance. Note that this assumes that all bistables are tested in a similar manner and have the same input range, e.g., a 1-5VDC or 4-20mADC spans.
- A specific type of pressure transmitter used for similar applications in the plant in which the operating and calibration environment does not vary significantly between applications or location.
- A group of transmitters of the same make and model, but with different spans, given that a review confirms that the transmitters of different spans have similar performance characteristics.

3.5.6. Using Data from Other Nuclear Power Plants:

- It is acceptable, although not recommended, to pool Hatch specific data with data obtained from other utilities providing the requirements of step 3.5.4 are met and the data can be verified to be of high quality. In this case the data must also be verified to be acceptable for grouping. Acceptability may be defined by verification of grouping, and an evaluation of calibration procedures, Measurement and Test Equipment used, and defined setting tolerances. Where there is agreement in calibration method (starting at zero increasing to 100 percent and decreasing to 0 taking data every 25%), calibration equipment, and area environment (if performance is affected by the temperature), there is a good possibility that the groups may be combined. Previously collected industry information may not have sufficient information about the manner of collection to allow combining with plant specific data.

3.6. Outlier Analysis

An outlier is a data point significantly different in value from the rest of the sample. The presence of an outlier or multiple outliers in the sample of component or group data may result in the calculation of a larger than expected sample standard deviation and tolerance interval. Calibration data can contain outliers for several reasons. Outlier analyses can be used in the initial analysis process to help to identify problems with data that require correction. Examples include:

- *Data Transcription Errors* - Calibration data can be recorded incorrectly either on the original calibration data sheet or in the spreadsheet program used to analyze the data.
- *Calibration Errors* - Improper setting of a device at the time of calibration would indicate larger than normal drift during the subsequent calibration.
- *Measuring & Test Equipment Errors* - Improperly selected or miscalibrated test equipment could indicate drift, when little or no drift was actually present.
- *Scaling or Setpoint Changes* - Changes in scaling or setpoints can appear in the data as larger than actual drift points unless the change is detected during the data entry or screening process.
- *Failed Instruments* - Calibrations are occasionally performed to verify proper operation due to erratic indications, spurious alarms, etc. These calibrations may be indicative of component failure (not drift), which would introduce errors that are not representative of the device performance during routine conditions.
- *Design or Application Deficiencies* - An analysis of calibration data may indicate a particular component that always tends to drift significantly more than all other similar components installed in the plant. In this case, the component may need an evaluation for the possibility of a design, application, or installation problem. Including this particular component in the same population as the other similar components may skew the drift analysis results.

3.6.1. Detection of Outliers

There are several methods for determining the presence of outliers. This design guide utilizes the Critical Values for t-Test (Extreme Studentized Deviate). The t-Test utilizes the values listed in Table 2 with an upper significance level of 5% to compare a given data point against. Note that the critical value of t increases as the sample size increases. This signifies that as the sample size grows, it is more likely that the sample is truly representative of the population. The t-Test assumes that the data is normally distributed.

Table 2 - Critical Values For t-Test

Sample Size	Upper 5% Significance Level	Sample Size	Upper 5% Significance Level
≤ 3	1.15	22	2.60
4	1.46	23	2.62
5	1.67	24	2.64
6	1.82	25	2.66
7	1.94	≤ 30	2.75
8	2.03	≤ 35	2.82
9	2.11	≤ 40	2.87
10	2.18	≤ 45	2.92
11	2.23	≤ 50	2.96
12	2.29	≤ 60	3.03
13	2.33	≤ 70	3.09
14	2.37	≤ 75	3.10
15	2.41	≤ 80	3.14
16	2.44	≤ 90	3.18
17	2.47	≤ 100	3.21
18	2.50	≤ 125	3.28
19	2.53	≤ 150	3.33
20	2.56	>150	4.00
21	2.58		

3.6.2. t-Test Outlier Detection Equation

$$t = \frac{|x_i - \bar{x}|}{s}$$

(Ref. 7.1.1)

Where;

X_i - An individual sample data point

$\bar{X}$ - Mean of all sample data points

s - Standard deviation of all sample data points

t - Calculated value of extreme studentized deviate that is compared to the critical value of t for the sample size.

3.6.3. Outlier Expulsion

This design guide does not permit multiple outlier tests or passes. The removal of poor quality data as listed in Section 3.6 is not considered removal of outliers, since it is merely assisting in identifying data errors. However, after removal of poor quality data as listed in Section 3.6, certain data points can still appear as outliers when the outlier analysis is performed. These "unique outliers" are not consistent with the other data collected; and could be judged as erroneous points, which tend to skew the representation of the distribution of the data. However, for the general case, since these outliers may accurately represent instrument performance, only one (1) additional unique outlier (as indicated by the t-Test, may be removed from the drift data. However, for special cases, with specific justification, up to 2.5% of the population will be allowed for removal as additional outliers, per this design guide. After removal of poor quality data and the removal of the unique outlier(s) (if necessary), the remaining drift data is known as the Final Data Set.

For transmitters, or other devices with multiple calibration points, the general process will be to use the calibration point with the worst case drift values. This is determined by comparing the different calibration points and using the one with the largest error, determined by adding the absolute value of the drift mean to 2 times the drift standard deviation. The data set with the largest of those terms will be used throughout the rest of the analysis, after outlier removal, as the Final Data Set. (Note that it is possible to use a specific calibration point and neglect the others, only if that is the single point of concern for all devices in the data set.)

The data set basic statistics (i.e., the Mean, Median, Standard Deviation, Variance, Minimum, Maximum, Kurtosis, Skewness, Count and Average Time Interval Between Calibrations) should be computed and displayed for the data set prior to removal of the unique outlier and for the Final Data Set, if different.

3.7. Methods For Verifying Normality

A test for normality can be important because many frequently used statistical methods are based upon an assumption that the data is normally distributed. This assumption applies to the analysis of component calibration data also. For example, the following analyses may rely on an assumption that the data is normally distributed:

- Determination of a tolerance interval that bounds a stated proportion of the population based on calculation of mean and standard deviation
- Identification of outliers
- Pooling of data from different samples into a single population

The normal distribution occurs frequently and is an excellent approximation to describe many processes. Testing the assumption of normality is important to confirm that the data appears to fit the model of a normal distribution, but tests will not prove that the normal distribution is a correct model for the data. At best, it can only be found that the data is reasonably consistent with the characteristics of a normal distribution, and that the treatment of a distribution as normal is conservative. For example, some tests for normality will only allow the rejection of the hypothesis that the data is not normally distributed. A group of data passing the test does not mean the data is normally distributed; it only means that there is no evidence to say that it is not normally distributed. However, because of the wealth of industry evidence that drift can be conservatively represented by a normal distribution, a group of data passing these tests will be considered as normally distributed without adjustments to the standard deviation of the data set.

Distribution-free techniques are available when the data is not normally distributed; however, these techniques are not as well known and often result in penalizing the results by calculating tolerance intervals that are substantially larger than the normal distribution equivalent. Because of this fact, there is a good reason to demonstrate that the data is normally distributed or can be bounded by the assumption of normality.

Analytically verifying that a sample appears to be normally distributed usually invokes a form of statistics known as hypothesis testing. In general, a hypothesis test includes the following steps:

1) Statement of the hypothesis to be tested and any assumptions
2) Statement of a level of significance to use as the basis for acceptance or rejection of the hypothesis
3) Determination of a test statistic and a critical region
4) Calculation of the appropriate statistics to compare against the test statistic
5) Statement of conclusions

The following sections discuss various ways in which the assumption of normality can be verified to be consistent with the data or can be claimed to be a conservative representation of the actual data. Analytical hypothesis testing and subjective graphical analyses are discussed. If any of the analytical hypothesis tests (Chi-Squared, D Prime, or W Test) are passed, the coverage analysis and additional graphical analyses are not required. The following are methods for assessing normality:

3.7.1. Chi-Squared, x^2, Goodness of Fit Test

This well-known test is stated as a method for assessing normality in References 7.1.1 and 7.1.2. The x^2 test compares the actual distribution of sample values to the expected distribution. The expected values are calculated by using the normal mean and standard deviation for the sample. If the distribution is normally or approximately normally distributed, the difference between the actual versus expected values should be very small. And, if the distribution is not normally distributed, the differences should be significant.

3.7.1.1. Equations To Perform The x^2 Test

1) First calculate the mean for the sample group

$$\overline{X} = \frac{\sum X_i}{n} \qquad \text{(Ref. 7.1.1)}$$

Where;

X_i - An individual sample data point

$\overline{X}$ - Mean of all sample data points

n - Total number of data points

2) Second calculate the standard deviation for the sample group

$$s = \sqrt{\frac{n\sum x^2 - \left(\sum x\right)^2}{n(n-1)}}$$

(Ref. 7.1.1)

Where;

x - Sample data values (x1, x2, x3, ...)

s - Standard deviation of all sample data points

n - Total number of data points

3) Third the data must be divided into bins to aid in determination of a normal distribution. The number of bins selected is up to the individual performing the analysis. Refer to Reference 7.1.1 for further guidance. For most applications, a 12-bin analysis will be performed on the drift data. See Section 4.4.

4) Fourth calculate the x^2 value for the sample group

$$x^2 = \sum \frac{(O_i - E_i)^2}{E_i} \qquad E_i = NP_i \qquad \text{(Ref. 7.1.1)}$$

Where;

E_i - Expected values for the sample

N - Total number of samples in the population

P_i - Probability that a given sample will be contained in a bin

O_i - Observed sample values (O_1, O_2, O_3, ...)
x^2 - Chi squared result

5) Fifth, calculate the degrees of freedom. The degrees of freedom term is computed as the number of bins used for the chi-square computation minus the constraints. In all cases for these drift calculations, since the count, mean and standard deviation are computed, the constraints term is equal to three.
6) Sixth, compute the Chi squared per degree of freedom term (X_0^2). This term is merely the Chi squared term computed in step 4 above, divided by the degrees of freedom.
7) Finally, evaluate the results. The results are evaluated in the following manner, as prescribed in Reference 7.1.1. If the Chi squared result computed in step 4 is less than or equal to the degrees of freedom, the assumption that the distribution is normal will not be rejected. If the value from step 4 is greater than the degrees of freedom, then one final check will be made. The degrees of freedom and X_0^2 are used to look up the probability of obtaining a X_0^2 term greater than the observed value, in percent. (See Table C-3 of Reference 7.1.1.) If the lookup value is greater than or equal to 5%, then the assumption of normality will not be rejected. However, if the lookup value is less than 5%, the assumption of normality is rejected.

3.7.2. W Test

Reference 7.1.4 recommends this test for sample sizes less than 50. The W Test calculates a test statistic value for the sample population and compares the calculated value to the critical values for W, which are tabulated in Reference 7.1.4. The W Test is a lower-tailed test. Thus if the calculated value of W is less than the critical value of W, the assumption of normality would be rejected at the stated significance level. If the calculated value of W is larger than the critical value of W, there is no evidence to reject the assumption of normality. Reference 7.1.4 establishes the methods and equations required for performing a W Test.

3.7.3. D-Prime (D') Test

Reference 7.1.4 recommends this test for moderate to large sample sizes, greater than or equal to 50. The D′ Test calculates a test statistic value for the sample population and compares the calculated value to the values for the D′ percentage points of the distribution, which are tabulated in Reference 7.1.4. The D′ Test is two-sided, which means that the two-sided percentage limits at the stated level of significance must bound the calculated D′ value. For the given sample size, the calculated value of D′ must lie within the two values provided in the Reference 7.1.4 table in order to accept the hypothesis of normality.

3.7.3.1. Equations To Perform The D′ Test

1) First, calculate the linear combination of the sample group. (Note: Data must be placed in ascending order of magnitude, prior to the application of this formula.)

$$T = \sum \left[\left(i - \frac{n+1}{2} \right) \times x_i \right] \qquad \text{(Ref. 7.1.4)}$$

Where;

T - linear combination

x_i - An individual sample data point

i - The number of the sample point

n - Total number of data points

2) Second, calculate the S^2 for the sample group.

$$S^2 = (n-1)s^2$$ (Ref. 7.1.4)

Where;

S^2 - Sum of the Squares about the mean

s^2 - Unbiased estimate of the sample population variance

n - Total number of data points

3) Third, calculate the D′ value for the sample group.

$$D' = \frac{T}{S}$$ (Ref. 7.1.4)

4) Finally, evaluate the results. If the D' value lies within the acceptable range of results (for the given data count) per Table 5 of Reference 7.1.4, for the P = 0.025 and 0.975, then the assumption of normality is not rejected. (If the exact data count is not contained within the tables, the critical value limits for the D' value should be linearly interpolated to the correct data count.) If however, the value lies outside that range, the assumption of normality is rejected.

3.7.4. Probability Plots

Probability plots are discussed, since a graphical presentation of the data can reveal possible reasons for why the data is or is not normal. A probability plot is a graph of the sample data with the axes scaled for a normal distribution. If the data is normal, the data will tend to follow a straight line. If the data is non-normal, a nonlinear shape should be evident from the graph. This method of normality determination is subjective, and is not required if the numerical methods show the data to be normal, or if a coverage analysis is used. The types of probability plots used by this design guide are as follows:

- *Cumulative Probability Plot* - an XY scatter plot of the Final Data Set plotted against the percent probability (P_i) for a normal distribution. P_i is calculated using the following equation:

$$P_i = \frac{100 \times \left(i - \frac{1}{2}\right)}{n}$$ (Ref. 7.1.1)

where; i = sample number i.e. 1,2,...

n = sample size

NOTE: Refer, as necessary, to Appendix C Section C.4 of Reference 7.1.1.

- *Normalized Probability Plot* - an XY scatter plot of the Final Data Set plotted against the probability for a normal distribution expressed in multiples of the standard deviation.

3.7.5. Coverage Analysis

A coverage analysis is discussed for cases in which the hypothesis tests reject the assumption of normality, but the assumption of normality may still be a conservative representation of the data. The coverage analysis involves the use of a histogram of the Final Data Set, overlaid with the equivalent probability distribution curve for the normal distribution, based on the data sample's mean and standard deviation. Visual examination of the plot is used, and the kurtosis is analyzed to determine if the distribution of the data is near normal. If the data is near normal, then a normal distribution model is derived, which adequately covers the set of drift data, as observed. This normal distribution will be used as the model for the drift of the device.

Sample counting is used to determine an acceptable normal distribution. The Standard Deviation of the group is computed. The number of times the samples are within ± two Standard Deviations of the mean is computed. The count is divided by the total number of samples in the group to determine a percentage. For information, the percentage of samples within ± one Standard Deviation of the mean may also be computed. The following table provides the percentages that should be within these values for a normal distribution:

Table 3 – Values For A Normal Distribution

	Percentages for a Normal Distribution
1 Standard Deviation	68.27%
2 Standard Deviations	95.45%

If the percentage of data within the two standard deviations tolerance is greater than the value in Table 3 for a given data set, the existing standard deviation is acceptable to be used for the encompassing normal distribution model. However, if the percentage is less than required, the standard deviation of the model will be enlarged, such that the required percentage fall within the ± two Standard Deviations bounds of Table 3. The required multiplier for the standard deviation in order to provide this coverage is termed the Normality Adjustment Factor (NAF). If no adjustment is required, the NAF is equal to one (1).

3.8. Binomial Pass/Fail Analysis For Distributions Considered Not To Be Normal

A pass/fail criteria for component performance simply compares the As-Found versus As-Left surveillance drift data against a pre-defined acceptable value of drift. If the drift value is less than the pass/fail criteria, that data point passes; if it is larger than the pass/fail criteria, it fails. By comparing the total number of passes to the number of failures, a probability can be computed for the expected number of component passes in the population. Note that the term failure in this instance does not mean that the component actually failed, only that it exceeded the selected pass/fail criteria for the analysis. Often the pass/fail criteria will be established at a point that clearly demonstrates acceptable component performance. The equations used to determine the Failure Proportion, Normal, Minimum and Maximum Probabilities are as follows:

Failure Proportion

P_f = x/n where;

x = Number of values exceeding the pass/fail criteria (Failures) (Ref. 7.1.1)

n = Total number of drift values in the sample

Normal Probability that a value will pass

$P \quad = 1\text{-}P_f$ (Ref. 7.1.1)

Minimum Probability that a value will pass

$$P_l = 1-\frac{x}{n}-z\times\sqrt{\left(\frac{1}{n}\right)\times\left(\frac{x}{n}\right)\times\left(1-\frac{x}{n}\right)}$$ (Ref. 7.1.1)

Maximum Probability that a value will pass

$$P_u = 1-\frac{x}{n}+z\times\sqrt{\left(\frac{1}{n}\right)\times\left(\frac{x}{n}\right)\times\left(1-\frac{x}{n}\right)}$$ (Ref. 7.1.1)

where;

P_l = the minimum probability that a value will pass

P_u = the maximum probability that a value will pass

z = the standardized normal distribution value corresponding to the desired confidence level, e.g., z = 1.96 for a 95% confidence level.

The Binomial Pass/Fail Analysis is a good tool for verifying that drift values calculated for calibration extensions are appropriate for the interval. See Reference 7.1.1 for the necessary detail to perform a pass/fail analysis.

3.9. Time-Dependent Drift Analysis

The component/loop drift calculated in the previous sections represented a predicted performance limit, without any consideration of whether the drift may vary with time between calibrations or component age. This section discusses the importance of understanding the time-related performance and the impact of any time-dependency on an analysis. Understanding the time dependency can be either important or unimportant, depending on the application. A time dependency analysis is important whenever the drift analysis results are intended to support an extension of calibration intervals.

3.9.1. Limitations of Time Dependency Analyses

Reference 7.1.1 performed drift analysis for numerous components at several nuclear plants as part of the project. The data evaluated did not demonstrate any significant time-dependent or age-dependent trends. Time dependency may have existed in all of the cases analyzed, but was insignificant in comparison to other uncertainty contributors. Because time dependency cannot be completely ruled out, there should be an ongoing evaluation to verify that component drift continues to meet expectations whenever calibration intervals are extended.

3.9.2. Scatter (Drift Interval) Plot

A drift interval plot is an XY scatter plot that shows the Final Data Set plotted against the time interval between tests for the data points. This plot method relies upon the human eye to discriminate the plot for any trend in the data to exhibit a time dependency. A prediction line can be added to this plot which shows a "least squares" fit of the data over time. This can provide visual evidence of an increasing or decreasing mean over time, considering all drift data. An increasing standard deviation is indicated by a trend towards increasing "scatter" over the increased calibration intervals.

3.9.3. Standard Deviations and Means at Different Calibration Intervals (Binning Analysis)

This analysis technique is the most recommended method of determining time dependent tendencies in a given sample pool. The test consists simply of segregating the drift data into different groups (Bins) corresponding to different ranges of calibration or surveillance intervals and comparing the standard deviations and means for the data in the various groups. The purpose of this type of analysis is to determine if the standard deviation or mean tends to become larger as the time interval between calibrations increases.

3.9.3.1. The data that is available will be placed in interval bins. The intervals that will normally be used will coincide with Technical Specification calibration intervals plus the allowed tolerance as follows:

a. 0 to 45 days (covers most weekly and monthly calibrations)

b. 46 to 135 days (covers most quarterly calibrations)

c. 136 to 230 days (covers most semi-annual calibrations)

d. 231 to 460 days (covers most annual calibrations)

e. 461 to 690 days (covers most old refuel cycle calibrations)

f. 691 to 900 days (covers most extended refuel cycle calibrations)

g. > 900 days covers missed and forced outage refueling cycle calibrations.

Data will naturally fall into these time interval bins based on the calibration requirements for the subject instrument loops. Only on occasion will a device be calibrated on a much longer or shorter interval than that of the rest of the population within its calibration requirement group. Therefore, the data will naturally separate into groups for analysis.

3.9.3.2. Different bin splits may be used, but must be evaluated for data coverage and acceptable data groupings.

3.9.3.3. For each bin, where there is data, the mean (average), standard deviation, average time interval and data count will be computed.

3.9.3.4. To determine if time dependency does or does not exist, the data needs to be distributed across multiple bins, with a sufficient population of data in each of two or more bins to consider the statistical results for those bins to be valid. Normally the minimum expected distribution that would allow evaluation is defined below.

a. A bin will be considered valid in the final analysis if it holds more than five data points and more than ten percent of the total data count.

b. At least two bins, including the bin with the most data, must be left for evaluation to occur.

The distribution percentages listed in these criteria are somewhat arbitrary, and thus engineering evaluation can modify them for a given evaluation.

The mean and standard deviations of the valid bins are plotted versus average time interval on a diagram. This diagram can give a good visual indication of whether or not the mean or standard deviation of a data set is increasing significantly over time interval between calibrations.

NOTE: If multiple valid bins do NOT exist for a given data set, then the plot is not to be shown, and the regression analyses are not to be performed. The reasoning is that there is not enough diversity in the calibration intervals analyzed to make meaningful conclusions about time dependency from the existing data. Unless overwhelming evidence to the contrary exists in the scatter plot, the single bin data set will be established as moderately time dependent for the purposes of extrapolation of the drift value.

3.9.4. Regression Analyses and Plots

Regression Analyses can often provide very valuable data for the determination of time dependency. A standard regression analysis within an EXCEL spreadsheet will plot the drift data versus time, with a prediction line showing the trend. It will also provide Analysis of Variance (ANOVA) table printouts, which contain information required for various numerical tests to determine level of dependency between two parameters (time and drift value). Note that regression analyses are only to be performed if multiple valid bins are determined from the binning analysis.

Regression Analyses are to be performed on the Final Data Set drift values and on the Absolute Value of the Final Data Set drift values. The Final Data Set drift values show trends for the mean of the data set, and the Absolute Values show trends for the standard deviation over time.

Regression Plots

The following are descriptions of the two plots generated by these regressions.

- *Drift Regression* - an XY scatter plot that fits a line through the final drift data plotted against the time interval between tests for the data points using the "least squares" method to predict values for the given data set. The predicted line is plotted through the actual data for use in predicting drift over time. It is important to note that statistical outliers can have a dramatic effect upon the regression line.
- *Absolute Value Drift Regression* - an XY scatter plot that fits a line through the Absolute Value of the final drift data plotted against the time interval between tests for the data points using the "least squares" method to predict values for the given data set. The predicted line is plotted through the actual data for use in predicting drift, in either direction, over time. It is important to note that statistical outliers can have a dramatic effect upon the regression line.

Regression Time Dependency Analytical Tests

Typical spreadsheet software includes capabilities to include ANOVA tables with regression analyses. ANOVA tables give various statistical information, which can allow certain numerical tests to be employed to search for time dependency of the drift data. For each of the two regressions (drift regression and absolute value drift regression), the following ANOVA parameters will be used to determine if time dependency of the drift data is evident. All tests listed should be evaluated, and if time dependency is indicated by any of the tests, the data should be considered as time dependent.

- *R Squared Test* - The R Squared value, printed out in the ANOVA table, is a relatively good indicator of time dependency. If the value is greater than 0.3, then it appears that the data does closely conform to a linear function, and therefore, should be considered time dependent.

- *P Value Test* - A P Value for X Variable 1 (as indicated by the ANOVA table for an EXCEL spreadsheet) less than 0.05 is indicative of time dependency.
- *Significance of F Test* - An ANOVA table F value greater than the critical F-table value (for a 0.25% probability, the number of data points for the regression, and two degrees of freedom for the numerator) would indicate a time dependency. In an EXCEL spreadsheet, the FINV function can be used to return critical values from the F distribution. To return the critical value of F, use the significance level (in this case 0.025 or 2.5%) as the probability argument to FINV, 2 as the numerator degrees of freedom, and the data count minus two as the denominator. If the F value in the ANOVA table exceeds the critical value of F, then the drift is considered time dependent.

NOTE: For each of these tests, if time dependency is indicated, the plots should be observed to determine the reasonableness of the result. The tests above generally assess the possibility that the function of drift is linear over time, not necessarily that the function is significantly increasing over time. Time dependency can be indicated even when the plot shows the drift to remain approximately the same or decrease over time. Generally, a decreasing drift over time is not expected for instrumentation, nor is a case where the drift function crosses zero. Under these conditions, the extrapolation of the drift term would normally be established assuming no time dependency, if extrapolation of the results is required beyond the analyzed time intervals between calibrations.

3.9.5. Additional Time Dependency Analyses

- *Instrument Resetting Evaluation* - For data sets that consist of a single calibration interval the time dependency determination may be accomplished simply by evaluating the frequency at which instruments require resetting. This type of analysis is particularly useful when applied to extend monthly Technical Specification surveillances to quarterly. However, is less useful for instruments such as sensors or relays that may be reset at each calibration interval regardless of whether the instrument was already in calibration.

  The Instrument Resetting Evaluation may be performed only if the devices in the sample pool are shown to be stable, not requiring adjustment (i.e. less than 5% of the data shows that adjustments were made). Care also must be taken when mechanical connections or flex points may be exercised by the act of checking calibration (actuation of a bellows or switch movement), where the act of checking the actuation point may have an affect on the next reading. Methodology for calculating the drift is as follows:

  Monthly As-Found/As-Left

  (As-Found Current Calibration - As-Left Previous Calibration) or

  $AF_1 - AL_2$ (Ref. 7.1.1)

  Quarterly As-Found/As-Left using Monthly Data

  $(AF_1 - AL_2) + (AF_2 - AL_3) + (AF_3 - AL_4)$ (Ref. 7.1.1)

3.9.6. Age-Dependent Drift Considerations

Age-dependency is the tendency for a component's drift to increase in magnitude as the component ages. This can be assessed by plotting the As-Found value for each calibration minus the previous calibration As-Left value of each component over the period of time for which data is available. Random fluctuations around zero may obscure any age-dependent drift trends. By plotting the absolute values of the As-Found versus As-Left calibration data, the tendency for the magnitude of drift to increase with time can be assessed. This analysis is generally not performed as a part of a standard drift study, but can be used when establishing maintenance practices.

3.10. Calibration Point Drift

For devices with multiple calibration points (e.g., transmitters, indicators, etc.) the Drift-Calibration Point Plot is a useful tool for comparing the amount of drift exhibited by the group of devices at the different calibration points. The plot consists of a line graph of tolerance interval as a function of calibration point. This is useful to understand the operation of an instrument, but is not normally included as a part of a standard drift study.

3.11. Drift Bias Determination

If an instrument or group of instruments consistently drifts predominately in one direction, the drift is assumed to have a bias. When the absolute value of the calculated average for the sample pool exceeds the values in Table 4 for the given sample size and calculated standard deviation, the average is treated as a bias to the drift term. The application of the bias must be carefully considered separately, so that the overall treatment of the analyzed drift remains conservative. Refer to Example 1 below.

Table 4 – Maximum Values of Non-Biased Mean

Sample Size (n)	Normal Deviate (t) @ 0.025 for 95% Confidence	Maximum Value of Non-Biased Mean (x_{crit}) For Given STDEV (s)								
		s ≥ 0.10%	s ≥ 0.25%	s ≥ 0.50%	s ≥ 0.75%	s ≥ 1.00%	s ≥ 1.50%	s ≥ 2.00%	s ≥ 2.50%	s ≥ 3.00%
≤5	2.571	0.115	0.287	0.575	0.862	1.150	1.725	2.300	2.874	3.449
≤10	2.228	0.070	0.176	0.352	0.528	0.705	1.057	1.409	1.761	2.114
≤15	2.131	0.055	0.138	0.275	0.413	0.550	0.825	1.100	1.376	1.651
≤20	2.086	0.047	0.117	0.233	0.350	0.466	0.700	0.933	1.166	1.399
≤25	2.060	0.041	0.103	0.206	0.309	0.412	0.618	0.824	1.030	1.236
≤30	2.042	0.037	0.093	0.186	0.280	0.373	0.559	0.746	0.932	1.118
≤40	2.021	0.032	0.080	0.160	0.240	0.320	0.479	0.639	0.799	0.959
≤60	2.000	0.026	0.065	0.129	0.194	0.258	0.387	0.516	0.645	0.775
≤120	1.980	0.018	0.045	0.090	0.136	0.181	0.271	0.361	0.452	0.542
>120	1.960	Values Computed Per Equation Below								

The maximum values of non-biased mean (Xcrit) for a given standard deviation (s) and sample size (n) is calculated using the following formula:

$$x_{crit} = t \times \frac{s}{\sqrt{n}}$$ (Ref. 7.3.7)

Where;

Xcrit = Maximum value of non-biased mean for a given s & n, expressed in %

t = Normal Deviate for a t-distribution @ 0.025 for 95% Confidence

s = Standard Deviation of sample pool

n = Sample pool size

Example of determining and applying bias to the analyzed drift term:

1) Transmitter Group With a Biased Mean - A group of transmitters are calculated to have a standard deviation of 1.150%, mean of –0.355% with a count of 47. From Table 4, the maximum value that a negligible mean could be is ± 0.258%. Therefore, the mean value is significant, and must be considered. The analyzed drift term for a 95%/95% tolerance interval level is shown as DA = –0.355% ± 1.150% x 2.408 (TIF from Table 1 for 47 samples) or DA = –0.355% ± 2.769%. For conservatism, the DA term for the positive direction is not reduced by the bias value where as the negative direction is summed with the bias value, so DA = + 2.769%, – 3.124%.

2) Transmitter Group With a Non-Biased Mean - A group of transmitters are calculated to have a standard deviation of 1.150%, mean of 0.100% with a count of 47. From Table 4, the maximum value that a negligible mean could be is ± 0.258%. Therefore, the mean value is insignificant, and can be neglected. The analyzed drift term for a 95%/95% tolerance interval level is shown as DA = ± 1.150% x 2.408 (TIF from Table 1 for 47 samples) or DA = ± 2.769%.

3.12. Time Dependent Drift Uncertainty

When calibration intervals are extended beyond the range for which historical data is available, the statistical confidence in the ability to predict drift is reduced. The bias and the random portions of the drift will be extrapolated separately, but in the same manner. Where the analysis shows slight to moderate time dependency or time dependency is indeterminate, the formula below will be used.

$$DA_{Extended} = DA \times \sqrt{\frac{Rqd\_Calibration\_Interval}{Max\_FDS\_Time\_Interval}}$$

Where: $DA_{Extended}$ = the newly determined, extrapolated Drift Bias or Random Term

DA = the bias or random drift term from the Final Data Set

Max_FDS_Time_Interval = the maximum observed time interval within the Final Data Set

Rqd_Calibration_Interval = the worst case calibration interval, once the calibration interval requirement is changed.

This method assumes that the drift to time relationship is not linear. Where there is indication of a strong relationship between drift and time the following formula may be used.

$$DA_{Extended} = DA \times \left[\frac{Rqd\_Calibration\_Interval}{Max\_FDS\_Time\_Interval}\right]$$

Where the terms are the same as defined above.

Where it can be shown that there is no relationship between surveillance interval and drift, the drift value determined may be used for other time intervals without change. However, for conservatism, due to the uncertainty involved in extrapolation to time intervals outside of the analysis period, drift values that show minimal or no particular time dependency will generally be treated as moderately time dependent, for the purposes of the extrapolation.

3.13. Shelf Life Of Analysis Results

Any analysis result based on performance of existing components has a shelf life. In this case, the term shelf life is used to describe a period of time extending from the present into the future during which the analysis results are considered valid. Predictions for future component/loop performance are based upon our knowledge of past calibration performance. This approach assumes that changes in component/loop performance will occur slowly or not at all over time. For example, if evaluation of the last ten years of data shows the component/loop drift is stable with no observable trend, there is little reason to expect a dramatic change in performance during the next year. However, it is also difficult to claim that an analysis completed today is still a valid indicator of component/loop performance ten years from now. For this reason, the analysis results should be re-verified periodically (every 3-5 years).

Depending on the type of component/loop, the analysis results are also dependent on the method of calibration, the component/loop span, and the M&TE accuracy. Any of the following program or component/loop changes should be evaluated to determine if they affect the analysis results.

- Changes to M&TE accuracy
- Changes to the component or loop (e.g. span, environment, manufacturer, model, etc.)
- Calibration procedure changes that alter the calibration methodology

4. PERFORMING AN ANALYSIS

Drift data for Technical Specification and TRM related instruments will be collected as a part of the Plant Hatch evaluations for extension of plant surveillance to support a 24-Month Fuel Cycle or extended quarterly calibrations. The collected data will be entered into Microsoft Excel spreadsheets, grouped by manufacturer and model number. All data will also be entered into the IPASS software program. Analysis will be performed using both IPASS and EXCEL spreadsheets. The IPASS analyses are all embedded in the software and it is not possible to follow each specific analysis. The IPASS analysis will be repeated in the spreadsheet, to trace errors or changes. The discussion provided in this section is to assist in setting up a spreadsheet and performing the independent analysis. For IPASS analysis see the IPASS User's Manual (Reference 7.1.5).

Microsoft Excel spreadsheets generally compute values to an approximate 15 decimal resolution, which is well beyond any required rounding for engineering analyses. However, for printing and display purposes, most values are displayed to lesser resolution. It is possible that hand computations with will produce slightly different results, because of using rounded numbers in initial and intermediate steps, but the Excel computed values are considered highly accurate in comparison. Values with significant differences between the original computations and the computations of the independent verifier will be investigated to ensure that the Excel spreadsheet is properly computing the required values.

4.1. Populating The Spreadsheet

4.1.1. For A New Analysis

4.1.1.1. The Responsible Engineer will determine the component group to be analyzed (e.g., all Rosemount Trip Units). The Responsible Engineer should determine the possible sub-groups within the large groupings, which from an engineering perspective, might show different drift characteristics, and therefore, may warrant separation into smaller groups. This would entail looking at the manufacturer, model, calibration span, setpoints, time intervals, specifications, locations, environment, etc., as necessary.

4.1.1.2. The Responsible Engineer will develop a list of component numbers, manufacturers, models, component types, brief descriptions, surveillance tests, calibration procedures and calibration information (spans, setpoints, etc.).

4.1.1.3. The Responsible Engineer will determine the data to be collected, following the guidance of Sections 3.4 through 3.6 of this Design Guide.

4.1.1.4. The Data Entry Person will identify, locate and collect data for the component group to be analyzed (e.g., all Surveillance Tests for the Rosemount Transmitters completed to present).

4.1.1.5. The Data Entry Person will sort the data by surveillance test or calibration procedure if more than one test/procedure is involved.

4.1.1.6. The Data Entry Person will sequentially sort the surveillance or calibration sheets descending, by date, starting with the most recent date.

4.1.1.7. The Data Entry Person will enter the Surveillance or Calibration Procedure Number, Tag Numbers, Required Trips, Indications or Outputs, Date, As-Found and As-Left values on the appropriate data entry sheet.

4.1.1.8. The Responsible Engineer will verify the data entered.

4.1.1.9. The Responsible Engineer will review the notes on each calibration data sheet to determine possible contributors for excluding data. The notes should be condensed and entered onto the EXCEL spreadsheet for the applicable calibration points. Where appropriate and obvious, the Responsible Engineer should remove the data that is invalid for calculating drift for the device.

4.1.1.10.The Responsible Engineer will calculate the time interval for each drift point by subtracting the date from the previous calibration from the date of the subject calibration. (If the data is not valid for either the As-Left or As-Found calibration information, then the value will not be computed for this data point.)

4.1.1.11.The Responsible Engineer will calculate the Drift value for each calibration by subtracting the As-Left value from the previous calibration from the As-Found value of the subject calibration. (If the data is not valid for either the As-Left or As-Found calibration information, then the value will not be computed for this data point.)

4.2. Spreadsheet Performance Of Basic Statistics

Separate data columns are created for each calibration point within the calibrated span of the device. The % Span of each calibration point should closely match from device to device within a given analysis. Basic statistics include, at a minimum, determining the number of data points in the sample, the average drift, the average time interval between calibrations, standard deviation of the drift, variance of the drift, minimum drift value, maximum drift value, kurtosis, and skewness contained in each data column. This section provides the specific details for using Microsoft Excel. Other spreadsheet programs, statistical or Math programs that are similar in function, are acceptable for use to perform the data analysis, provided all analysis requirements are met.

4.2.1. Determine the number of data points contained in each column for each initial group by using the "COUNT" function. Example cell format = **COUNT(C2:C133)**. The Count function returns the number of all populated cells within the range of cells C2 through C133.

4.2.2. Determine the average for the data points contained in each column for each initial group by using the "AVERAGE" function. Example cell format = **AVERAGE(C2:C133)**. The Average function returns the average of the data contained within the range of cells C2 through C133. This average is also known as the mean of the data. This same method should be used to determine the average time interval between calibrations.

4.2.3. Determine the standard deviation for the data points contained in each column for each initial group by using the "STDEV" function. Example cell format **=STDEV(C2:C133)**. The Standard Deviation function returns the measure of how widely values are dispersed from the mean of the data contained within the range of cells C2 through C133. Formula used by Microsoft Excel to determine the standard deviation:

STD (Standard Deviation of the sample population): (Ref. 7.3.5)

$$s = \sqrt{\frac{n\sum x^2 - \left(\sum x\right)^2}{n(n-1)}}$$

Where;

x - Sample data values (x_1, x_2, x_3, ...)

s - Standard deviation of all sample data points

n - Total number of data points

4.2.4. Determine the variance for the data points contained in each column for each initial group by using the "VAR" function. Example cell format **=VAR(C2:C133)**. The Variance function returns the measure of how widely values are dispersed from the mean of the data contained within the range of cells C2 through C133. Formula used by Microsoft Excel to determine the variance:

VAR (Variance of the sample population): (Ref. 7.3.5)

$$s^2 = \frac{n\sum x^2 - \left(\sum x\right)^2}{n(n-1)}$$

Where;

x - Sample data values (x_1, x_2, x_3, ...)

s^2 - Variance of the sample population

n - Total number of data points

4.2.5. Determine the kurtosis for the data points contained in each column for each initial group by using the "KURT" function. Example cell format **=KURT(C2:C133)**. The Kurtosis function returns the relative peaked-ness or flatness of the distribution within the range of cells C2 through C133. Formula used by Microsoft Excel to determine the kurtosis:

$$KURT = \left\{\frac{n(n+1)}{(n-1)(n-2)(n-3)}\sum\left(\frac{x_i - \bar{x}}{s}\right)^4\right\} - \frac{3(n-1)^2}{(n-2)(n-3)}$$ (Ref. 7.3.5)

Where ;

x - Sample data values (x_1, x_2, x_3, ...)

n - Total number of data points

s - Sample Standard Deviation

4.2.6. Determine the skewness for the data points contained in each column for each initial group by using the "SKEW" function. Example cell format **=SKEW(C2:C133).** The Skewness function returns the degree of symmetry around the mean of the cells contained within the range of cells C2 through C133. Formula used by Microsoft Excel to determine the skewness:

$$SKEW = \frac{n(n+1)}{(n-1)(n-2)}\sum\left(\frac{x_i - \bar{x}}{s}\right)^3$$

(Ref. 7.3.5)

Where;

x - Sample data values (x_1, x_2, x_3, ...)

n - Total number of data points

s - Sample Standard Deviation

4.2.7. Determine the maximum value for the data points contained in each column for each initial group by using the "MAX" function. Example cell format **=MAX(C2:C133).** The Maximum function returns the largest value of the cells contained within the range of cells C2 through C133.

4.2.8. Determine the minimum value for the data points contained in each column for each initial group by using the "MIN" function. Example cell format **=MIN(C2:C133).** The Minimum function returns the smallest value of the cells contained within the range of cells C2 through C133.

4.2.9. Determine the median value for the data points contained in each column for each initial group by using the "MEDIAN" function. Example cell format **=MEDIAN(C2:C133).** The median is the number in the middle of a set of numbers; that is, half the numbers have values that are greater than the median, and half have values that are less. If there is an even number of numbers in the set, then MEDIAN calculates the average of the two numbers in the middle.

4.2.10. Where sub-groups have been combined in a data set, which have engineering reasons for the possibility that the data should be separated, analyze the statistics and component data of the sub-groups to determine the acceptability for combination.

4.2.11. Perform a t-Test in accordance with step 3.5.4 on each possible sub-group combination to test for the acceptability of combining the data.

Acceptability for combining the data is indicated when the absolute value of the Test Statistic (t Stat) is greater than the [t Critical two-tail]. Example: t Stat for combining sub-group A & B may be 0.703, which is larger than the t Critical two-tail of 0.485. However, as a part of this process, the Responsible Engineer should ensure that the indication unacceptability does not mask time dependency. In other words, if the only difference in the groupings is that of the calibration interval, the differences in the data characteristics could exist because of time dependent drift. If this is the only difference, the data should be combined, even though the tests show that it may not be appropriate.

4.3. Outlier Detection And Expulsion

Refer to Section 3.7 for a detailed explanation of Outliers.

4.3.1. Obtain the Critical Values for the t-Test from Table 2, which is based on the sample size of the data contained within the specified range of cells, use the COUNT value to determine the sample size.

4.3.2. Perform the outlier test for all the samples. For any values that show up as outliers, analyze the initial input data to determine if the data is erroneous. If so, remove the data in the earlier pages of the spreadsheet, and re-run all of the analysis up to this point. Continue this process until all erroneous data has been removed.

4.3.3. If appropriate, if any outliers are still displayed, remove the worst-case outlier as a statistical outlier, per step 3.6.3 above. Only for a special case may up to 2.5% of the population be removed as outliers; and if this is done, the justification must be provided. Once this outlier(s) have been removed, the remaining data set is the Final Data Set.

4.3.4. For transmitters, or other devices with multiple calibration points, the general process will be to use the calibration point with the worst case drift values. This is determined by comparing the different calibration points and using the one with the largest error, determined by adding the absolute value of the mean to 2 times the standard deviation. The data set with the largest of those terms will be used throughout the rest of the analysis, after outlier removal, as the Final Data Set. (Note that it is possible to use a specific calibration point and neglect the others, only if that is the single point of concern for all devices in the data set.)

4.3.5. Recalculate the Average, Median, Standard Deviation, Variance, Minimum, Maximum, Kurtosis, Skewness, Count and Average Time Interval Between Calibrations for the Final Data Set.

4.4. Normality Tests

To test for normality of the Final Data Set, the first step is to perform the required hypothesis testing. For Final Data Sets with 50 or more data points, the hypothesis testing can be done with either the Chi-Square (3.7.1) or the D' Tests (3.7.3). If the Final Data Set has less than 50 data points, the W Test (3.7.2) or Chi-Square Test may be used. The Chi-Square test should generally be performed with 12 bins of data, starting from [$-\infty$ to (mean-2.5σ)], and bin increments of 0.5σ, ending at [(mean+2.5σ) to $+\infty$]. (Since the same bins are to be used for the histogram in the coverage analysis, the work for these two tasks may be combined.) If the data passes either of the tests, only the passed test need be shown in the spreadsheet. However, if the assumption of normality is rejected by both of the hypothesis tests, the results of both tests should be presented.

If the assumption of normality is rejected by both tests, then a coverage analysis should be performed as described in Section 3.7.5. As explained above the for Chi-Square test, the coverage analysis and histogram will be established with a 12 bin approach unless inappropriate for the application.

If an adjustment is required to the standard deviation to provide a normal distribution that adequately covers the data set, then the required multiplier to the standard deviation (Normality Adjustment Factor (NAF)) will be determined iteratively in the coverage analysis. This multiplier will produce a normal distribution model for the drift, which shows adequate data population from the Final Data Set within the $\pm 1\sigma$ and $\pm 2\sigma$ bands of the model.

4.5. Time Dependency Testing

Time dependency testing is only required for instruments for which the calibration intervals are being extended. Time dependency is evaluated through the use of a scatter (drift interval) plot, binning analysis, and regression analyses. The methods for each of these are detailed below.

4.5.1. Scatter Plot

The scatter plot is performed under a new page to the spreadsheet entitled "Scatter Plot" or "Drift Interval Plot". The Final Data Set, including drift values and associated times between calibrations are copied into the first two columns of the new page of the spreadsheet. The chart function of EXCEL is used to merely chart the data with the x axis being the calibration interval and the y axis being the drift value. The prediction line should be added to the chart, along with the equation of the prediction line. This plot provides visual indication of the trend of the mean, and somewhat obscurely, of any increases in the scatter of the data over time.

4.5.2. Binning Analysis

The binning analysis is performed under a separate page of the EXCEL spreadsheet. The Final Data Set is copied onto the first two columns, and then split by bins 1 through 8 into the time intervals as defined in Section 3.9.3.1. A table is set up to compute the standard deviation, mean, average time interval, and count of the data in each time bin. Similar equation methods are used here as described in Section 4.2 above, when characterizing the drift data set. Another table is used to evaluate the validity of the bins, based on population per the criteria of Section 3.9.3.4. If multiple valid bins are not established, the time dependency analysis stops at this page, and no regression analyses are performed.

The standard deviations, means and average time intervals are tabulated, and a plot is generated to show the variation of the bin averages and standard deviations versus average time interval, if multiple bins are established. This plot can be used to establish whether standard deviations and means are significantly increasing over time between calibrations.

4.5.3. Regression Analyses

The regression analyses are performed in accordance with the requirements of Section 3.9.4, given that multiple valid time bins were established in the binning analysis. New pages should be created for the Drift Regression and the Absolute Value Drift Regression. The Final Data Set should be copied into the first columns of each of these pages, and the blank lines should be removed. On the Absolute Value Regression page, a third column should be created, which merely takes the absolute value of the drift column.

For each of the two Regression Analyses, use the following steps to produce the regression analysis output. Using the "Data Analysis" package under "Tools" in Microsoft EXCEL, the Regression option should be chosen. The Y range will be established as the Drift (or Absolute Value of Drift) data range, and the X range should be the calibration time intervals. The output range should be established on the same page of the spreadsheet, directly to the right of the data already entered. The option for the residuals should be established as "Line Fit Plots". The regression computation should then be performed. The output of the regression routine will be a list of residuals, an ANOVA table listing, and a plot of the Drift (or Absolute Value of Drift) versus the Time Interval Between Calibrations. A prediction line will be included on the plot. Add a cell close to the ANOVA table listing which establishes the Critical Value of F, using the guidance of Section 3.9.4 for the Significance of F Test. This will utilize the FINV function of Microsoft EXCEL.

Analyze the results in the Drift Regression ANOVA table for R Square, P Value, and F Value, using the guidance of Section 3.9.4. If any of these analytical means shows time dependency in the Drift Regression, the mean of the data set should be established as strongly time dependent if the slope of the prediction line significantly increases over time from an initially positive value (or decreases over time from an initially negative value), without crossing zero within the time interval of the regression analysis. This increase can also be validated by observing the results of the binning analysis plot for the mean of the bins, and by observing the scatter plot prediction line.

Analyze the results in the Absolute Value of Drift Regression ANOVA table for R Square, P Value, and F Value, using the guidance of Section 3.9.4. If any of these analytical means shows time dependency, the standard deviation of the data set should be established as strongly time dependent if the slope of the prediction line significantly increases over time. This increase can also be validated by observing the results of the binning analysis plot for the standard deviation of the bins, and by observing any discernible increases in data scatter as time increases on the scatter plot.

Regardless of the results of the analytical regression tests, if the plots tend to indicate significant increases in either the mean or standard deviation over time, those parameters should be judged to be strongly time dependent. Otherwise, for conservatism, the data will always be considered to be moderately time dependent if extrapolation of the data is necessary, to accommodate the uncertainty involved in the extrapolation process, since no data has generally been taken at time intervals as large as those proposed.

4.6. Calculate The Analyzed Drift Value

The first step in determining the Analyzed Drift Value is to determine the required time interval for which the value must be computed. For the majority of the cases, the required nominal calibration time interval will be 24 months, or a maximum of 30 months. Since the average time intervals will generally be computed in days, the conservative value for a 30-Month calibration interval will be established as 915 days.

The Analyzed Drift Value generally consists of two separate components - a random term and a bias term. If the mean of the Final Data Set is significant per the criteria in Section 3.11, a bias term will be considered. If no extrapolation is necessary, the bias term will be set equal to the mean of the Final Data Set. Extrapolation of this term will be performed in one of two methods, as determined by the degree of time dependency established in the time dependency analysis. If the mean is determined to be strongly time dependent, the following equation will be used, which extrapolates the value in a linear fashion.

$$DA_{30Mo.bias} = \bar{x} \times \frac{915\_Days}{Max\_FDS\_Time\_Interval}$$

It the mean is determined to be moderately time dependent, the following equation will be used to extrapolate the mean. (Note that this equation will also generally be used for cases where no time dependency is evident, because of the uncertainty in defining a drift value beyond analysis limits.)

$$DA_{30Mo.bias} = \bar{x} \times \sqrt{\frac{915\_Days}{Max\_FDS\_Time\_Interval}}$$

The random portion of the Analyzed Drift is calculated by multiplying the standard deviation of the Final Data Set by the Tolerance Interval Factor for the sample size and by the Normality Adjustment Factor, if required from the Coverage Analysis, and extrapolating the final result in a fashion similar to the methods shown above for the bias term. Use the following procedure to perform the operation.

4.6.1. Use the COUNT value of the Final Data Set to determine the sample size.

4.6.2. Obtain the appropriate Tolerance Interval Factor (TIF) for the size of the sample set. Table 1 lists the 95%/95% TIFs; refer to Standard statistical texts for other TIF multipliers. Note: TIFs other than 95%/95% must be specifically justified.

4.6.3. For a generic data analysis, multiple Tolerance Interval Factors may be used, providing a clear tabulation of results is included in the analysis, showing each value for the multiple levels of TIF.

4.6.4. Multiply the Tolerance Interval Factor by the standard deviation for the data points contained in the Final Data Set and by the Normality Adjustment Factor determined in the Coverage Analysis (if applicable).

4.6.5. If the analyzed drift term calculated above is applied to the existing calibration interval, application of additional drift uncertainty is not necessary.

4.6.6. When calculating drift for calibration intervals that exceed the historical calibration intervals, use the following equations, depending on whether the data is shown to be strongly time dependent or moderately time dependent.

For a Strongly Time Dependent random term, use the following equation.

$$DA_{30Mo.random} = \sigma \times TIF \times NAF \times \frac{915\_Days}{Max\_FDS\_Time\_Interval}$$

For a Moderately Time Dependent random term, use the following equation. (Note that this equation will also generally be used for cases where no time dependency is evident, because of the uncertainty in defining a drift value beyond analysis limits.)

$$DA_{30Mo.random} = \sigma \times TIF \times NAF \times \sqrt{\frac{915\_Days}{Max\_FDS\_Time\_Interval}}$$

Where: σ = Standard Deviation of the Final Data Set

TIF = Tolerance Interval Factor from Table 1

NAF = Normality Adjustment Factor from the Coverage Analysis (If Applicable)

Max_FDS_Time_Interval = the maximum observed time interval within the Final Data Set

The Analyzed Drift Value is not comprised of drift alone; this value also contains errors from M&TE and device reference accuracy. It could also include other effects, but it is conservative to assume the other effects are not included, since they cannot be quantified and since they are not expected to fully contribute to the errors observed.

4.6.7. Since random errors are always expressed as ± errors, specific consideration of directionality is not generally a concern. However, for bistables and switches, the directionality of any bias error must be carefully considered. Because of the fact that the As-Found and As-Left setpoints are recorded during calibration, the drift values determined up to this point in the drift study are representative of a drift in the setpoint, not in the indicated value.

Per Reference 7.1.2, error is defined as the algebraic difference between the indication and the ideal value of the measured signal. In other words,

error = indicated value - ideal value (actual value)

For devices with analog outputs, a positive error means that the indicated value exceeds the actual value, which would mean that if a bistable or switching mechanism used that signal to produce an actuation on an increasing trend, the actuation would take place **prior to** the actual variable reaching the value of the intended setpoint. As analyzed so far in the drift study, the drift of a bistable or switch causes just the opposite effect. A positive Analyzed Drift would mean that the **setpoint** is higher than intended; thereby causing actuation to occur **after** the actual variable has exceeded the intended setpoint.

A bistable or switch can be considered to be a black box, which contains a sensing element or circuit and an ideal switching mechanism. At the time of actuation, the switch or bistable can be considered an indication of the process variable. Therefore, a positive shift of the setpoint can be considered to be a negative error. In other words, if the switch setting was intended to be 500 psig, but actually switched at 510 psig, at the time of the actuation, the switch "indicated" that the process value was 500 psig when the process value was actually 510 psig. Thus,

error = indicated value (500 psig) - actual value (510 psig) = -10 psig

Therefore, a positive shift of the setpoint on a switch or bistable is equivalent to a negative error, as defined by Reference 7.1.2. **Therefore, for clarity and consistency with the treatment of other bias error terms, the sign of the bias errors of a bistable or switch will be reversed, in order to comply with the convention established by Reference 7.1.2.**

5. CALCULATIONS

5.1. Drift Studies / Calculation

The Drift Studies / Calculations should be performed in accordance with the methodology described above, with the following documentation requirements.

5.1.1. The title includes the Manufacturer/Model number of the component group analyzed.

5.1.2. The calculation objective will:

5.1.2.1. describe, at a minimum, that the objective of the calculation is to document the drift analysis results for the component group, and extrapolate the drift value to the required calibration period (if applicable),

5.1.2.2. provide a list for the group of all pertinent information in tabular form (e.g. Tag Numbers, Manufacturer, Model Numbers, ranges and calibration spans), and

5.1.2.3. describe any limitations on the application of the results. For instance, if the analysis only applies to a certain range code, the objective will state this fact.

5.1.3. The method of solution will describe, at a minimum, a summary of the methodology used to perform the drift analysis outlined by this Design Guide. Exceptions taken to this Design Guide will be included in this section including basis and references for exceptions.

5.1.4. The actual calculation/analysis will provide:

5.1.4.1. A listing of data which was removed, and the justification for doing so

5.1.4.2. List of references

5.1.4.3. A narrative discussion of the specific activities performed for this calculation

5.1.4.4. Results and conclusions, including

- Manufacturer and model number analyzed
- bias and random Analyzed Drift values, as applicable
- The applicable Tolerance Interval Factors (provide detailed discussion and justification if other than 95%/95%)
- applicable drift time interval for application
- normality conclusion
- statement of time dependency observed, as applicable
- limitations on the use of this value in application to uncertainty calcs, as applicable
- limitations on the application if the results to similar instruments, as applicable

5.1.5. Attachments, including the following information:

5.1.5.1. Input data with notes on removal and validity

5.1.5.2. Computation of drift data and calibration time intervals

5.1.5.3. Outlier summary, including Final Data Set and basic statistical summaries

5.1.5.4. Chi-Square Test Results (If Applicable)

5.1.5.5. W Test or D' Test Results (If Applicable)

5.1.5.6. Coverage analysis, including histogram, percentages in the required sigma bands, and Normality Adjustment Factor (if applicable)

5.1.5.7. Scatter Plot with prediction line and equation

5.1.5.8. Binning Analysis Summaries for Bins and Plots (as applicable)

5.1.5.9. Regression Plots, ANOVA Tables, and Critical F Values

5.1.5.10.Derivation of the Analyzed Drift values, with summary of conclusions

5.2. Setpoint/Uncertainty Calculations

To apply the results of the drift analyses to a specific device or loop, a setpoint/uncertainty calculation will be performed, revised or evaluated in accordance with References 7.2.1

and/or 7.2.4, as appropriate. Per Section 3.2.1.2 above, the Analyzed Drift term characterizes the Reference Accuracy, M&TE (or calibration error) and drift error terms for the analyzed device, loop, or function. In order to save time, a comparison between these terms (or subset of these terms) in an existing setpoint calculation to the Analyzed Drift can be made. If the terms within the existing calculation bound the Analyzed Drift term, then the existing calculation is conservative as is, and does not specifically require revision. If revision to the calculation is necessary, the Analyzed Drift term may be incorporated into the calculation, setting the Reference Accuracy, M&TE (or calibration error), and drift terms for the analyzed devices to zero.

When comparing the results to setpoint calculations which have more than one device in the instrument loop which has been analyzed for drift, comparisons can be made between the DA terms and the original terms on a device-by-device basis, or on a total loop basis. Care should be taken to properly combine terms for comparison in accordance with References 7.2.1 and 7.2.4, as appropriate.

When applying the drift study results of bistables or switches to a setpoint calculation, the preparer should fully understand the directionality of any bias terms within DA and apply the bias terms accordingly. (See Section 4.6.7 above.)

6.0 DEFINITIONS

95%/95% -	Standard statistics term meaning that the results have a 95% confidence (γ) that at least 95% of the population will lie between the stated interval (P) for a sample size (n).	Ref. 7.1.1
Analyzed Drift (DA) – Synonymous with ADR	A term representing the errors determined by a completed drift analysis for a group. Uncertainties that may be represented by the analyzed drift term are component accuracy errors, M&TE errors, personnel-induced or human related errors, ambient temperature and other environmental effects, power supply effects, misapplication errors and true component drift.	Section 3.2.1.3
As-Found (FT) -	The condition in which a channel, or portion of a channel, is found after a period of operation and before recalibration.	Ref. 7.1.3
As-Left (CT) -	The condition in which a channel, or portion of a channel, is left after calibration or final setpoint device verification.	Ref. 7.1.3
Bias (B) -	A shift in the signal zero point by some amount.	Ref. 7.1.1
Calibrated Span (CS) -	The maximum calibrated upper range value less the minimum calibrated lower range value.	Ref. 7.1.1
Calibration Interval -	The elapsed time between the initiation or successful completion of calibrations or calibration checks on the same instrument, channel, instrument loop, or other specified system or device.	Ref. 7.1.1
Chi-Square Test -	A test to determine if a sample appears to follow a given probability distribution. This test is used as one method for assessing whether a sample follows a normal distribution.	Ref. 7.1.1
Confidence Interval -	An interval that contains the population mean to a given probability.	Ref. 7.1.1
Coverage Analysis -	An analysis to determine whether the assumption of a normal distribution effectively bounds the data. A histogram is used to graphically portray the coverage analysis.	Ref. 7.1.1
Cumulative Distribution -	An expression of the total probability contained within an interval from -∞ to some value x.	Ref. 7.1.1
D-Prime Test -	A test to verify the assumption of normality for moderate to large sample sizes.	Ref. 7.1.1
Dependent -	In statistics, dependent events are those for which the probability of all occurring at once is different than the product of the probabilities of each occurring separately. In setpoint determination, dependent uncertainties are those uncertainties for which the sign or magnitude of one uncertainty affects the sign or magnitude of another uncertainty.	Ref. 7.1.1
Drift -	An undesired change in output over a period of time where change is unrelated to the input, environment, or load.	Ref. 7.1.2
Error -	The algebraic difference between the indication and the ideal value of the measured signal.	Ref. 7.1.2
Final Data Set -	The set of data that will be analyzed for normality, time dependence, and used to determine the drift value. This data has all outliers and erroneous data removed.	Section 3.6.3
Functionally Equivalent -	Components with similar design and performance characteristics that can be combined to form a single population for analysis purposes.	Ref. 7.1.1
Histogram -	A graph of a frequency distribution.	Ref. 7.1.1

Independent -	In statistics, independent events are those in which the probability of all occurring at once is the same as the product of the probabilities of each occurring separately. In setpoint determination, independent uncertainties are those for which the sign or magnitude of one uncertainty does not affect the sign or magnitude of any other uncertainty.	Ref. 7.1.1
Instrument Channel -	An arrangement of components and modules as required to generate a single protective action signal when required by a plant condition. A channel loses its identity where single protective action signals are combined.	Ref. 7.1.2
Instrument Range -	The region between the limits within which a quantity is measured, received or transmitted, expressed by stating the lower and upper range values.	Ref. 7.1.2
Kurtosis -	A characterization of the relative peaked-ness or flatness of a distribution compared to a normal distribution. A large kurtosis indicates a relatively peaked distribution and a small kurtosis indicates a relatively flat distribution.	Ref. 7.1.1
M&TE -	Measurement and Test Equipment.	Ref. 7.1.1
Maximum Span -	The component's maximum upper range limit less the maximum lower range limit.	Ref. 7.1.1
Mean -	The average value of a random sample or population.	Ref. 7.1.1
Median -	The value of the middle number in an ordered set of numbers. Half the numbers have values that are greater than the median and half have values that are less than the median. If the data set has an even number of values, the median is the average of the two middle values.	Ref. 7.1.1
Module -	Any assembly of interconnected components that constitutes an identifiable device, instrument or piece of equipment. A module can be removed as a unit and replaced with a spare. It has definable performance characteristics that permit it to be tested as a unit.	Ref. 7.1.2
Normality Adjustment Factor -	A multiplier to be used for the standard deviation of the Final Data Set to provide a drift model that adequately covers the population of drift points in the Final Data Set.	Section 3.7.5
Normality Test -	A statistics test to determine if a sample is normally distributed.	Ref. 7.1.1
Outlier -	A data point significantly different in value from the rest of the sample.	Ref. 7.1.1
Population -	The totality of the observations with which we are concerned. A true population consists of all values, past, present and future.	Ref. 7.1.1
Probability -	The branch of mathematics which deals with the assignment of relative frequencies of occurrence (confidence) of the possible outcomes of a process or experiment according to some mathematical function.	Ref. 7.3.7
Prob. Density Function -	An expression of the distribution of probability for a continuous function.	Ref. 7.1.1
Probability Plot -	A type of graph scaled for a particular distribution in which the sample data will plot as approximately a straight line if the data follows that distribution. For example, normally distributed data will plot as a straight line on a probability plot scaled for a normal distribution; the data may not appear as a straight line on a graph scaled for a different type of distribution.	Ref. 7.1.1
Proportion -	A segment of a population that is contained by an upper and lower limit. Tolerance intervals determine the bounds or limits of a proportion of the population, not just the sampled data. The proportion (P) is the second term in the tolerance interval value (e.g. 95%/99%).	Ref. 7.3.7
Random -	Describing a variable whose value at a particular future instant cannot be predicted exactly, but can only be estimated by a probability distribution function.	Ref. 7.1.1

Raw Data -	As found minus As-Left calibration data used to characterize the performance of a functionally equivalent group of components.	Ref. 7.1.1
Reference Accuracy -	A number or quantity that defines a limit that errors will not exceed when a device is used under specified operating conditions.	Ref. 7.1.2
Sample -	A subset of a population.	Ref. 7.1.1
Sensor -	The portion of an instrument channel that responds to changes in a plant variable or condition and converts the measured process variable into a signal. e.g., electric or pneumatic	Ref. 7.1.2
Signal Conditioning -	One or more modules that perform signal conversion, buffering , isolation or mathematical operations on the signal as needed.	Ref. 7.1.2
Skewness -	A measure of the degree of symmetry around the mean.	Ref. 7.1.1
Span -	The algebraic difference between the upper and lower values of a calibrated span.	Ref. 7.1.2
Standard Deviation -	A measure of how widely values are dispersed from the population mean.	Ref. 7.1.1
Surveillance Interval -	The elapsed time between the initiation or successful completion of a surveillance or surveillance check on the same component, channel, instrument loop, or other specified system or device.	Ref. 7.1.1
Time-Dependent Drift -	The tendency for the magnitude of component drift to vary with time.	Ref. 7.1.1
Time-Dependent Drift Uncertainty -	The uncertainty associated with extending calibration intervals beyond the range of available historical data for a given instrument or group of instruments.	Ref. 7.1.1
Time-Independent Drift -	The tendency for the magnitude of component drift to show no specific trend with time.	Ref. 7.1.1
Tolerance -	The allowable variation from a specified or true value.	Ref. 7.1.2
Tolerance Interval -	An interval that contains a defined proportion of the population to a given probability.	Ref. 7.1.1
Trip Setpoint -	A predetermined value for actuation of the final actuation device to initiate protective action.	Ref. 7.1.2
t-Test -	For this Design Guide the t-Test is used to determine: 1) if a sample is an outlier of a sample pool. 2) if two groups of data originate from the same pool.	Ref. 7.1.1
Uncertainty -	The amount to which an instrument channel's output is in doubt (or the allowance made therefore) due to possible errors either random or systematic which have not been corrected for. The uncertainty is generally identified within a probability and confidence level.	Ref. 7.1.1
Variance -	A measure of how widely values are dispersed from the population mean.	Ref. 7.1.1
W Test -	A test to verify the assumption of normality for sample size less than 50.	Ref. 7.1.1

7.0 REFERENCES

7.1 Industry Standards and Correspondence

7.1.1 EPRI TR-103335R1, "Statistical Analysis of Instrument Calibration Data - Guidelines for Instrument Calibration Extension/Reduction Programs," October 1998.

7.1.2 ISA-RP67.04-Part II-1994, "Recommended Practice, Methodologies for the Determination of Setpoints for Nuclear Safety-Related Instrumentation."

7.1.3 ISA-S67.04-Part I-1994, "Standard, Methodologies for the Determination of Setpoints for Nuclear Safety-Related Instrumentation."

7.1.4 ANSI N15.15-1974, "Assessment of the Assumption of Normality (Employing Individual Observed Values)."

7.1.5 CM-106752-R2, Users Manual: IPASS (Rev. 2), "Instrument Performance Analysis Software System for As-Found-As-Left (AFAL) Data," July 1999.

7.1.6 NRC to EPRI Letter, "Status Report on the Staff Review of EPRI Technical Report TR-103335, "Guidelines for Instrument Calibration Extension/Reduction Program"," dated March 1994.

7.1.7 Regulatory Guide 1.105, Rev. 2, "Instrument Setpoints."

7.1.8 GE NEDC 31336P-A "General Electric Instrument Setpoint Methodology."

7.1.9 DOE Research and Development Report No. WAPD-TM-1292, February 1981, "Statistics for Nuclear Engineers and Scientists Part 1: Basic Statistical Inference."

7.2 Calculations and Programs

7.2.1 E. I. Hatch Nuclear Plant ATTS Trip Setpoint Methodology.

7.2.2 SINH 90-017, "E. I. Hatch Nuclear Plant, SCS Calculation Unit 2," Rev. 5.

7.2.3 SMNH 89-071, "E. I. Hatch Nuclear Plant, SCS Calculation Unit 1," Rev. 4.

7.2.4 Hatch Project I&C/EQ Desktop Instructions IDI 4.0, "Preparation of Instrument Setpoint Calculations," Rev. 0.

7.3 Miscellaneous

7.3.1 IPASS (Instrument Performance Analysis Software System), Revision 2.03, created by EDAN Engineering in conjunction with EPRI.

7.3.2 NRC Status Report on the Staff Review of EPRI Technical Report TR-103335 "Guidelines For Instrument Calibration Extension/Reduction Programs, "Dated March 1994.

7.3.3 NRC Generic Letter 91-04, "Changes in Technical Specification Surveillance Intervals to Accommodate a 24-Month Fuel Cycle."

7.3.4 MPAC, Maintenance Planning and Control System.

7.3.5 Microsoft Excel Version 97SR-2, Spreadsheet Program.

7.3.6 Microsoft Access Version 97SR-2, Database Program.

7.3.7 Statistics for Nuclear Engineers and Scientists Part 1: Basic Statistical Inference, William J. Beggs; February 1981.

Enclosure 4

Edwin I. Hatch Nuclear Plant
Request to Revise Technical Specifications:
18- to 24-Month Fuel Cycle Extension

Bases for Change Request for Extended Intervals

A description of and the justification for each proposed Technical Specifications (TS) change is provided below.

TS 3.1.7 Standby Liquid Control (SLC) System

As stated in the Edwin I. Hatch Nuclear Plant (HNP) Unit 2 Final Safety Analysis Report (FSAR), paragraph 4.2.3.4.2, the SLC System, which is manually initiated from the main control room (MCR), injects a boron neutron absorber solution into the reactor if the operator believes the reactor cannot be shut down or kept shutdown with control rods. The SLC System is required only to shut down the reactor and keep the reactor from going critical again as it cools. The SLC System is used only in the highly improbable event that not enough control rods can be inserted into the reactor core to accomplish shutdown and cooldown in the normal manner. The SLC System is required for postulated anticipated transient without scram (ATWS) events determined by the Emergency Operating Procedures (EOPs) when it is determined the reactor cannot be shut down prior to suppression pool temperature reaching the boron injection initiation temperature (BIIT).

The boron solution tank, the test tank, the two positive-displacement pumps, the two explosive valves, and associated local valves and controls are mounted in the reactor building. The solution is pumped into the reactor pressure vessel (RPV) and discharged near the bottom of the core shroud, so it mixes with the cooling water rising through the core. The boron-10 isotope absorbs thermal neutrons and thereby terminates the nuclear fission chain reaction in the uranium fuel.

The following Surveillance Requirements (SRs) were evaluated relative to extending their respective testing intervals. These SRs ensure the availability of safety functions that respond to plant transients and design basis events. Potential time-based considerations, such as failure types and frequencies, as well as other qualitative measures of system availability, were evaluated during this effort. The evaluation results and an explanation of how the results justify the surveillance interval extension are detailed below:

SR 3.1.7.8 Verify flow through one SLC subsystem from pump into reactor pressure vessel.

The surveillance test interval of this SR is being increased from 18 months (on a STAGGERED TEST BASIS) to 24 months (on a STAGGERED TEST BASIS), for a maximum interval of 30 months, including the 25% grace period. This SR ensures the SLC System is capable of injecting into the RPV by verifying a flow path and also by firing one of the explosive valves. As described in the HNP TS Bases, the SLC System is a backup safety system to the Control Rod Drive (CRD) System. In the event of a low probability failure of the CRD System, the SLC System is designed to bring the reactor subcritical during the most reactive point in core life. The SLC System is designed so that all active components are single failure proof. In addition, each SLC System pump is tested during the operating cycle on a quarterly basis in accordance with SR 3.1.7.7 [Inservice Testing Program (ISTP)] to verify system capacity. SRs 3.1.7.2 (every 24 hours) and 3.1.7.3 (every 24 hours) ensure the temperature in the SLC System tank and SLC pump suction piping is maintained to prevent the precipitation of borated solution. SR 3.1.7.4 (every 31 days) verifies the continuity of the charge in the explosive valves. These tests ensure the SLC System components are OPERABLE and an open flow path exists during the operating cycle. Finally, the explosive valves and all other system components are designed to be highly reliable.

Based upon the inherent system and component reliability and the testing performed during the operating cycle, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.1.7.9 Verify all heat traced piping between storage tank and pump suction is unblocked.

The surveillance test interval of this SR is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR is also performed once within 24 hours after pump suction piping temperature is restored within the Region A limits of Figure 3.1.7-2. This SR helps to ensure the SLC System is capable of injecting into the RPV by verifying a flow path through the heat traced piping between the storage tank and the pump suction. As described in the TS Bases, the SLC System is a backup safety system to the CRD System. In the event of a low probability failure of the CRD System, the SLC System is designed to bring the reactor subcritical during the most reactive point in the core life. The SLC System is designed so that all active components are single failure proof. In addition, each SLC System pump is tested during the operating cycle on a quarterly basis in accordance with SR 3.1.7.7 (ISTP) to verify system capacity. SRs 3.1.7.2 (every 24 hours) and 3.1.7.3 (every 24 hours) verify the temperature in the SLC System tank and SLC pump suction piping to prevent the precipitation of borated solution. Verification of the pump suction temperature confirms operation of the heat tracing associated with this section of the piping. This SR is also required once within 24 hours after the pump suction piping temperature is restored within the Region A limits of Figure 3.1.7-2, in case of failure of SR 3.1.7.3, thus verifying that precipitation of borated solution did not cause blockage. These tests combine to ensure the SLC System is OPERABLE during the operating cycle.

Based upon the inherent system and component reliability, and the testing performed during the operating cycle, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

TS 3.1.8 Scram Discharge Volume (SDV) Vent and Drain Valves

As stated in Unit 2-FSAR paragraph 4.2.3.2.2.3, water displaced by the CRD pistons during a scram goes to the scram discharge volume (SDV). During normal plant operation, the SDV is empty and vented to atmosphere through its open vent and drain valves. When a scram occurs, upon a signal from the Reactor Protection System (RPS), these vent and drain valves are closed to isolate the SDV, to contain the reactor water. Per the TS Bases, this limits the amount of reactor coolant discharged so that adequate core cooling is maintained and offsite doses remain within the limits of 10 CFR 100. Lights in the MCR indicate the position of these valves. Redundant vent and drain valves ensure single-failure-proof capability for isolating the scram discharge header.

The following SR was evaluated relative to extending its respective testing interval. This SR ensures the availability of safety functions that respond to plant transients and design basis events. Potential time-based considerations, such as failure types and frequencies, as well as other qualitative measures of system availability, were evaluated during this effort. The evaluation results and an explanation of how the results justify the surveillance interval extension are discussed below:

SR 3.1.8.3 Verify each SDV vent and drain valve:

a. Closes in ≤ 45 seconds (≤ 60 seconds for Unit 2) after receipt of an actual or simulated scram signal; and

b. Opens when the actual or simulated scram signal is reset.

The surveillance test interval of this SR is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the SDV vent and drain valves close in ≤ 45 seconds (≤ 60 seconds for Unit 2) after receipt of an actual or simulated scram signal; and open when the actual or simulated scram signal is reset. SR 3.1.8.2 (every 92 days) requires that the SDV vent and drain valves be cycled fully closed and fully open during the operating cycle. SR 3.1.8.2 ensures the mechanical components and a portion of the valve logic remain OPERABLE. This test does not ensure the logic of the SDV vent and drain valves is OPERABLE; however, logic systems are inherently more reliable than other plant components. This is acknowledged in the NRC Safety Evaluation Report (SER),(1) dated August 2, 1993, relating to the extension of Peach Bottom Atomic Power Station, Units 2 and 3, surveillance interval extension from 18 to 24 months as follows:

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

Because of the inherent equipment reliability of logic systems (as demonstrated by years of operating experience in the nuclear and non-nuclear industry), and more frequent stroke testing of the subject valves to prove valve function, it was concluded that the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history was performed to validate the above conclusion. This results of this review demonstrate that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

TS 3.3.1.1 Reactor Protection System (RPS) Instrumentation

As stated in the TS Bases, the RPS initiates a reactor scram when one or more monitored parameters exceed their specified limits, to preserve the integrity of the fuel cladding and the Reactor Coolant System (RCS) and minimize the energy that must be absorbed following a loss of coolant accident (LOCA). This can be accomplished either automatically or manually. TS 3.3.1.1 requires that each RPS instrumentation channel be demonstrated OPERABLE by the performance of LOGIC SYSTEM FUNCTIONAL TESTS, CHANNEL FUNCTIONAL TESTS, and CHANNEL CALIBRATIONS, as applicable, for the operational conditions at the frequencies shown in Table 3.3.1.1-1.

The following SRs for the RPS trip functions were evaluated relative to extending their respective testing intervals. These SRs ensure the RPS will function as designed during an analyzed event. Potential time-based considerations, such as instrument drift, failure types and frequencies, as well as other qualitative measures of system availability, were evaluated during this effort. The evaluation results and an explanation of how the results justify the surveillance interval extension are discussed below:

Table 3.3.1.1-1 Reactor Protection System Instrumentation
Function 1.a IRM - Neutron Flux - High

As stated in the TS Bases, the intermediate range monitors (IRMs) monitor neutron flux levels from the upper range of the source range monitors (SRMs) to the lower range of the average power range monitors (APRMs). The IRMs are capable of generating trip signals that can be used to prevent fuel damage resulting from abnormal operating occurrences (AOOs) in the intermediate power range. In this power range, the most significant source of reactivity change is due to control rod withdrawal. The IRMs are also capable of limiting other reactivity excursions during startup, such as cold-water injection events, although no credit is specifically assumed. General Electric (GE)-manufactured instruments provide this Function.

SR 3.3.1.1.13 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This change applies to both MODES 2 and 5 (when a cell containing fuel has its control rod withdrawn). GE neutron monitors and GE trip units perform this Function. For the GE neutron monitors and trip unit, no drift calculation was performed. This is acceptable, because of the design requirements for the instruments and more frequent CHANNEL CHECKS per SR 3.3.1.1.1 (every 12 hours), CHANNEL FUNCTIONAL TESTS per SRs 3.3.1.1.4 and 3.3.1.1.5 (every 7 days), and range overlap tests per SRs 3.3.1.1.6 (prior to withdrawing the SRMs from the fully inserted position) and 3.3.1.1.7 (performed during entry into MODE 2 from MODE 1 if not performed within previous 7 days) performed when this equipment is required to be OPERABLE. The IRMs are only required when the Unit is in MODE 2 or MODE 5 (when a cell containing fuel has its control rod withdrawn). During power operation, MODE 1, the IRM trip is inactive. Before the IRM detectors are used for operation, an overlap check is performed to determine if the instruments are reading and tracking with the power range per SR 3.3.1.1.7 or the source range neutron detectors per SR 3.3.1.1.6, as applicable. Furthermore, when the IRM trip is required to be OPERABLE, a CHANNEL FUNCTIONAL TEST is performed on the IRM trip function in accordance with SRs 3.3.1.1.4 (every 7 days) and 3.3.1.1.5 (every 7 days).

Based upon the above discussion, the effect, if any, of this proposed change on system operation is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.1.1.15 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This change applies to both MODE 2 and MODE 5 (when a cell containing fuel has its control rod withdrawn). This SR ensures RPS logic for IRM Neutron Flux - High in MODE 2 and MODE 5 (when a cell containing fuel has its control rod withdrawn) will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LOGIC SYSTEM FUNCTIONAL TEST (LSFT) is acceptable, because the IRM in MODE 2 or MODE 5 (when a cell containing fuel has its control rod withdrawn) is verified to be operating properly by the performance of CHANNEL CHECKS per SR 3.3.1.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.4 (every 7 days) and 3.3.1.1.5 (every 7 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.1.1-1 Reactor Protection System Instrumentation
Function 1.b IRM - Inop

As stated in the TS Bases, this trip signal ensures that a minimum number of IRMs are OPERABLE. Whenever an IRM mode switch is moved to any position other than "Operate," the detector voltage drops below a preset level, or when a module is not plugged in, an inoperative trip signal will be received by the RPS unless the IRM is bypassed. Since only one IRM in each trip system may be bypassed, only one IRM in each RPS trip system may be inoperable without resulting in an RPS trip signal. This Function is not specifically credited in the safety analysis, but it is retained for the overall redundancy and diversity of the RPS as required by the NRC-approved licensing basis. GE-manufactured instruments provide this Function.

SR 3.3.1.1.15 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures RPS logic for IRM - Inop in MODE 2 and MODE 5 (when a cell containing fuel has its control rod withdrawn) will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LOGIC SYSTEM FUNCTIONAL TEST (LSFT) is acceptable, because the IRM in MODE 2 or MODE 5 (when a cell containing fuel has its control rod withdrawn) is verified to be operating properly by the performance of CHANNEL FUNCTIONAL TESTS per SRs 3.3.1.1.4 (every 7 days) and 3.3.1.1.5 (every 7 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof, and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.1.1-1 Reactor Protection System Instrumentation
Function 2.a APRM - Neutron Flux - High (Setdown)

As stated in the TS Bases, the APRM channels receive input signals from the local power range monitors (LPRMs) within the reactor core to provide an indication of the power distribution and local power changes. The APRM channels average these LPRM signals to provide a continuous indication of average reactor power from a few percent to > 100% Rated Thermal Power (RTP). For operation at low power (i.e., MODE 2), the APRM Neutron Flux - High (Setdown) Function is capable of generating a trip signal that prevents fuel damage resulting from abnormal operating transients in this power range. For most operation at low power levels, the APRM Neutron Flux - High (Setdown) Function will provide a secondary scram to the IRM Neutron Flux - High Function because of the relative setpoints. No specific safety analyses take direct credit for the APRM Neutron Flux - High (Setdown) Function. However, this Function indirectly ensures before the reactor mode switch is placed in the run position, reactor power does not exceed 25% RTP (SL 2.1.1.1) when operating at low RPV pressure and low core flow. Therefore, it indirectly prevents fuel damage during significant reactivity increases with THERMAL POWER < 25% RTP. GE-manufactured instruments provide this Function.

SR 3.3.1.1.13 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This change applies to MODE 2 only. GE neutron monitors and GE trip units perform this Function. For the GE neutron monitors and trip unit, no drift calculation was performed. This is acceptable, because of the design requirements for the instruments and more frequent CHANNEL CHECKS per SR 3.3.1.1.1 (every 12 hours), LPRM calibrations per SR 3.3.1.1.8 (every 1000 EFP hours), and CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.10 (every 184 days). Prior to use for MODE 2 operation, overlap between IRM and APRM channels is checked per SR 3.3.1.1.7 to verify the instruments are consistently reading and tracking.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.1.1-1 Reactor Protection System Instrumentation
Function 2.b APRM - Simulated Thermal Power - High

As stated in the TS Bases, this Function monitors neutron flux to approximate the thermal power being transferred to the reactor coolant. The APRM neutron flux is electronically filtered with a time constant representative of the fuel heat transfer dynamics to generate a signal proportional to the thermal power in the reactor. The trip level is varied as a function of recirculation drive flow (i.e., at lower core flows the setpoint is reduced proportional to the reduction in power experienced as core flow is reduced with a fixed control rod pattern) but is clamped at an upper limit that is always lower than the APRM Neutron Flux - High Function Allowable Value. The APRM Simulated Thermal Power - High Function provides protection against transients where thermal power increases slowly (such as the loss of feedwater heating event) and protects the fuel cladding integrity by ensuring that the MINIMUM CRITICAL POWER RATIO (MCPR) Safety Limit (SL) is not exceeded. During these events, the thermal power increase does not significantly lag the neutron flux response, and because of a lower trip setpoint, will initiate a scram before the high neutron flux scram. For rapid neutron flux increase events, thermal power lags the neutron flux and the APRM Neutron Flux - High Function will provide a scram signal before the APRM Simulated Thermal Power - High Function setpoint and associated time delay are exceeded.

SR 3.3.1.1.13 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This change applies to MODE 1 only. Extension of this SR is acceptable, because the operation of the circuits associated with the Simulated Thermal Power Trip are verified by more frequent CHANNEL CHECKS per SR 3.3.1.1.1 (every 12 hours), Comparison Tests between APRM power and calculated power per SR 3.3.1.1.2 (every 7 days when THERMAL POWER is ≥ 25% RTP), LPRM Calibrations per SR 3.3.1.1.8 (every 1000 EFP hours), and CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.10 (every 184 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry.

Flow inputs developed by Rosemount Transmitters are used to develop the setpoint for this Function.

An evaluation of the surveillance interval extension was performed, based upon the approach described in NRC Generic Letter (GL) 91-04.(2) The drift associated with the Rosemount transmitters was evaluated, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.(3) The drift for the extended surveillance interval was appropriately considered in the development of the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.1.1-1 Reactor Protection System Instrumentation
Function 2.c APRM - Neutron Flux - High

The APRM channels provide the primary indication of neutron flux within the core and respond almost instantaneously to neutron flux increases. As stated in the TS Bases, the APRM Neutron Flux - High Function is capable of generating a trip signal to prevent fuel damage or excessive RCS pressure. For the FSAR overpressurization protection analysis, the APRM Neutron Flux - High Function is assumed to terminate the main steam isolation valve (MSIV) closure event and, along with the safety/relief valves (S/RVs), limits the peak RPV pressure to less than the ASME Code limits. The control rod drop accident (CRDA) analysis takes credit for the APRM Neutron Flux - High Function to terminate the CRDA. GE-manufactured instruments provide this Function.

SR 3.3.1.1.13 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This change applies to MODE 1 only. GE neutron monitors and GE trip units perform this Function. For the GE neutron monitors and trip units, no drift calculation was performed. This is acceptable because of the design requirements for the instruments and more frequent testing (as detailed below). Extension of this SR is acceptable, because the operation of the circuits associated with the APRM Neutron Flux - High Function are verified by more frequent CHANNEL CHECKS per SR 3.3.1.1.1 (every 12 hours), Comparison Tests between APRM power and calculated power per SR 3.3.1.1.2 (every 7 days when THERMAL POWER is ≥ 25% RTP), LPRM Calibrations per SR 3.3.1.1.8 (every 1000 EFP hours), and CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.10 (every 184 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.1.1-1 Reactor Protection System Instrumentation
Function 2.e APRM - Two-out-of-Four Voter

As stated in the TS Bases, the APRM Two-out-of-Four Voter Function provides the interface between the APRM functions, including the OPRM Upscale Function and the final RPS trip system logic. As such, it is required to be OPERABLE in the MODES where the APRM Functions are required, and is necessary to support the safety analysis applicable to each of those functions. Therefore, the Two-out-of-Four Voter Function is required to be OPERABLE in MODES 1 and 2.

SR 3.3.1.1.15 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures RPS logic for APRM Two-out-of-Four Voter will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the APRM is verified to be operating properly by the performance of CHANNEL CHECKS per SR 3.3.1.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.10 (every 184 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.1.1.16 Verify the RPS RESPONSE TIME is within limits.
The surveillance test interval for this SR, as applied to this Function, is being increased from once every 18 months (performed on a STAGGERED TEST BASIS) to once every 24 months (performed on a STAGGERED TEST BASIS), for a maximum interval of 30 months, including the 25% grace period. This SR ensures the RPS trip logic functions within the response time assumed in the analyses of the applicable analyzed event. Extending the interval between response time tests for this Function is acceptable, because the APRM is verified to be operating properly by the performance of CHANNEL CHECKS per SR 3.3.1.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.10 (every 184 days). This testing ensures a significant portion of the RPS circuitry is operating properly and will detect

significant failures of this circuitry. Neutron detectors are excluded from response time testing, because the principles of detector operation virtually ensure an instantaneous response time. Additional justification for extending the surveillance test interval is that the RPS network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.1.1-1 Reactor Protection System Instrumentation
Function 2.f APRM - OPRM Upscale

As stated in the TS Bases, the OPRM Upscale Function provides compliance with General Design Criteria (GDC) 10 and GDC 12, thereby providing protection from exceeding the fuel MCPR SL due to anticipated thermal-hydraulic power oscillations. The following three algorithms are used for detecting thermal-hydraulic instability-related neutron flux oscillations:

- Period based.
- Amplitude based.
- Growth rate.

All three algorithms are implemented in the OPRM Upscale Function; however, the safety analysis takes credit only for the period-based detection algorithm. The remaining algorithms provide defense in depth and additional protection against unanticipated oscillations. OPRM Upscale Function OPERABILITY for TS purposes is based only upon the period-based detection algorithm.

The OPRM Upscale Function receives input signals from the LPRMs within the reactor core, which are combined into "cells" for evaluation by the OPRM algorithms. The OPRM Upscale Function is required to be OPERABLE when the plant is in MODE 1. Within the region of power-flow operation where anticipated events could lead to thermal-hydraulic instability and related neutron flux oscillations, the automatic trip is enabled when THERMAL POWER, as indicated by APRM Simulated Thermal Power, is ≥ 25% RTP and reactor core flow, as indicated by recirculation drive flow, is < 60% of rated flow.

An OPRM Upscale trip is issued from an APRM channel when the period based detection algorithm in that channel detects oscillatory changes in the neutron flux, indicated by the combined signals of the LPRM detectors in a cell, with period confirmations and relative cell amplitude exceeding specified setpoints. One or more cells in a channel exceeding the trip conditions will result in a channel trip. An OPRM Upscale trip is also issued from the channel if either the growth-rate or amplitude-based algorithm detects growing oscillatory changes in the neutron flux for one or more cells in that channel. There is no Allowable Value for this Function.

SR 3.3.1.1.13 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This change applies to MODE 1 only. GE neutron monitors and GE trip units perform this

Function, with Rosemount transmitters providing the flow inputs to determine when this Function is enabled.

For the GE neutron monitors and trip unit, no drift calculation was performed. The drift performance of the Rosemount transmitters was evaluated, based upon the approach described in GL 91-04, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] However, since no Allowable Values are provided and specific accuracy requirements are not present in the TS, the effect of instrument drift on the setpoint was not specifically considered. The flow input is only used as a permissive point to bypass the trip. This permissive value is a nominal value, and the drift of the instrument does not specifically impact the selection of the setpoint. The bypass is verified to not be bypassed as reactor power exceeds the power and flow levels.

Extension of this variable is acceptable, because the operation of the circuits associated with the OPRM Upscale trip are verified by more frequent CHANNEL CHECKS per SR 3.3.1.1.1 (every 12 hours), LPRM Calibrations per SR 3.3.1.1.8 (every 1000 EFP hours), and CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.10 (every 184 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.1.1.17 Verify OPRM is not bypassed when APRM Simulated Thermal Power is ≥ 25% and recirculation drive flow is < 60% of rated recirculation drive flow.

The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. GE neutron monitors, GE trip units, and Rosemount transmitters are used to enable the OPRM Upscale Function. For the GE neutron monitors and trip units, no drift calculations were performed. This is acceptable because of the design requirements for the instruments; other more frequent testing, and because no Allowable Values are provided. Specific accuracy requirements are not provided in the TS.

Extension of this variable is acceptable, because the operation of the circuits associated with the OPRM Upscale trip are verified by more frequent CHANNEL CHECKS per SR 3.3.1.1.1 (every 12 hours), LPRM Calibrations per SR 3.3.1.1.8 (every 1000 EFP hours), and CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.10 (every 184 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.1.1-1 Reactor Protection System Instrumentation
Function 3 Reactor Vessel Steam Dome Pressure - High

As stated in the TS Bases, an increase in the RPV pressure during reactor operation compresses the steam voids and results in a positive reactivity insertion. This causes the neutron flux and THERMAL POWER transferred to the reactor coolant to increase, which could challenge the integrity of the fuel cladding and the reactor coolant pressure boundary (RCPB). No specific safety analysis takes direct credit for this Function. However, the RPV Steam Dome Pressure - High Function initiates a scram for transients that results in a pressure increase, counteracting the pressure increase by rapidly reducing core power. For the FSAR overpressurization protection analysis, the reactor scram (the analyses conservatively assume a scram on the APRM Neutron Flux - High signal, not the RPV Steam Dome Pressure - High signal), along with the S/RVs, limits the peak RPV pressure to less than the ASME Code Section III limits.

SR 3.3.1.1.13 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months including the 25% grace period. Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked, and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.9 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.1.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in the development of the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.1.1.15 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures RPS logic for Reactor Vessel Steam Dome Pressure - High will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the RPS is verified to be operating properly throughout the operating cycle by the performance of more frequent CHANNEL CHECKS per SR 3.3.1.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.9 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test

interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.1.1-1 Reactor Protection System Instrumentation
Function 4 Reactor Vessel Water Level - Low, Level 3

As stated in the TS Bases, low RPV water level indicates the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage can result. Therefore, a reactor scram is initiated at Level 3 to substantially reduce the heat generated in the fuel from fission. The Reactor Vessel Water Level - Low, Level 3 Function is assumed in the analysis of the recirculation line break. The reactor scram reduces the amount of energy required to be absorbed and, along with the actions of the Emergency Core Cooling Systems (ECCS), ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

Reactor vessel water level - low, Level 3 signals are initiated from four level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the RPV. The Function is required in MODES 1 and 2 where considerable energy exists in the RCS resulting in the limiting events analyzed. ECCS initiations at reactor vessel water level - low low, Level 2 and low low low, Level 1 provide sufficient protection for level transients in all other MODES.

SR 3.3.1.1.13 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months including the 25% grace period. Barton and Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked, and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.9 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.1.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in the development of the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.1.1.15 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures RPS logic for Reactor Vessel Water Level - Low, Level 3 will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the RPS is verified to be operating properly throughout the operating cycle by the performance of more frequent CHANNEL CHECKS per SR 3.3.1.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.9 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.1.1-1 Reactor Protection System Instrumentation
Function 5 Main Steam Isolation Valve - Closure

As stated in the TS Bases, an MSIV closure results in loss of the main turbine and the condenser as a heat sink for the nuclear steam supply system, and indicates a need to shut down the reactor to reduce heat generation. Therefore, a reactor scram is initiated on a Main Steam Isolation Valve - Closure signal before the MSIVs are completely closed, in anticipation of the complete loss of the normal heat sink and subsequent overpressurization transient. However, for the overpressurization protection, the APRM Neutron Flux - High Function, along with the S/RVs, limits the peak RPV pressure to less than the ASME Code limits. That is, the direct scram on position switches for MSIV closure events is not assumed in the overpressurization analysis. Additionally, MSIV closure is assumed in transients such as low steam line pressure, manual closure of MSIVs, and high steam line flow. The reactor scram reduces the amount of energy required to be absorbed and, along with the actions of the ECCS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46. Automatic closure of the MSIVs is initiated when conditions indicate a steam line break. The main steam line (MSL) isolation scram setting is selected to give the earliest positive indication of isolation valve closure.

SR 3.3.1.1.13 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Local limit switches perform this Function. Limit switches are mechanical devices that require mechanical setting only; drift is not applicable to these devices. In addition, proper operation of the limit switch is verified by the performance of CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.9 (every 92 days). Therefore, an increase in surveillance interval to accommodate a 24-month fuel cycle does not affect limit switches relative to drift.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.1.1.15 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures RPS logic for MSIV - Closure will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the performance of CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.9 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.1.1-1 Reactor Protection System Instrumentation
Function 6 Drywell Pressure - High

As stated in the TS Bases, high pressure in the drywell could indicate a break in the RCPB. A reactor scram is initiated to minimize the possibility of fuel damage and to reduce the amount of energy being added to the coolant and the drywell. The Drywell Pressure - High Function is a secondary scram signal to reactor vessel water level - low, Level 3 for LOCA events inside the drywell. However, no credit is taken for a scram initiated from this Function for any Design Basis Accident (DBA) analyzed in the FSAR. This Function was not specifically credited in the safety analysis, but is retained for the overall redundancy and diversity of the RPS as required by the NRC-approved licensing basis. The Allowable Value was selected to be as low as possible and indicative of a LOCA inside primary containment. The Function is required in MODES 1 and 2 where considerable energy exists in the RCS, resulting in the limiting events analyzed.

SR 3.3.1.1.13 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months including the 25% grace period. Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.9 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.1.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in the development of the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.1.1.15 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures RPS logic for Drywell Pressure - High will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the performance of CHANNEL CHECKS per SR 3.3.1.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.9 (every 92 days). This testing ensures a significant portion of the circuitry is

operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.1.1-1 Reactor Protection System Instrumentation
Function 7 SDV Water Level - High

As stated in the TS Bases, the SDV receives the water displaced by the motion of the CRD pistons during a reactor scram. Should this volume fill to a point where there is insufficient volume to accept the displaced water, control rod insertion will be hindered. Therefore, a reactor scram is initiated while the remaining free volume is still sufficient to accommodate the water from a full core scram. The two types of SDV Water Level - High Functions are inputs to the RPS logic. No credit for a scram initiated from these Functions is assumed in any event analyzed in the FSAR. However, they are retained to ensure the RPS remains OPERABLE. Two diverse types of level instruments perform this Function.

Table 3.3.1.1-1 Reactor Protection System Instrumentation
Function 7.a SDV Water Level - High - Resistance Temperature Detector

SR 3.3.1.1.12 Perform CHANNEL FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 92 days to 24 months, for a maximum interval of 30 months, including the 25% grace period. This involves changing the SR for this Function from the 92-day CHANNEL FUNCTIONAL TEST (SR 3.3.1.1.9) to the proposed 24-month CHANNEL FUNCTIONAL TEST (SR 3.3.1.1.12). An evaluation of the surveillance interval extension was performed, based upon the approach described in GL 91-04.[(2)] FCI thermal level switches and associated electronics perform this Function. The thermal level switches consist of a thermal probe that provides input to electronic level switches in the MCR. Opposing temperature elements within the probe send a relatively large signal if the probe is uncovered, and a very small signal if the probe is covered with water, with the corresponding indication being either covered or uncovered. These are discrete devices, for which instrument drift does not apply. Additionally, these devices are highly reliable. Therefore, an increase in nominal surveillance interval to

24 months does not affect the level switches relative to drift, and the extension of this SR interval is justified, based upon a review of the surveillance test history.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the calibration test demonstrates that failures are rarely observed during this SR activity and no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.1.1.13 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. An evaluation of the surveillance interval extension was performed, based upon the approach described in GL 91-04.[2] FCI thermal level switches and associated electronics perform this Function. The thermal level switches consist of a thermal probe that provides input to electronic level switches in the MCR. Opposing temperature elements within the probe send a relatively large signal if the probe is uncovered, and a very small signal if the probe is covered with water, with the corresponding indication being either covered or uncovered. It is not possible to adjust the setpoint of these instruments after installation. These are discrete devices, like float switches, for which instrument drift does not apply. The calibration for this device does not adjust the system to fine-tune the SDV water level at which the trip occurs. Rather, this calibration adjusts the devices, so that the trip action operates properly. Therefore, the extension of this SR interval is justified, based upon a review of the surveillance test history.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the calibration test demonstrates that failures are rarely observed during this SR activity and no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.1.1.15 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures RPS logic for SDV Water Level – High will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.1.1-1 Reactor Protection System Instrumentation
Function 7.b SDV Water Level - High - Float Switch

SR 3.3.1.1.12 Perform CHANNEL FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being established with a nominal SR interval of 24 months, for a maximum interval of 30 months, including the 25% grace period. The surveillance is also being changed from a CHANNEL CALIBRATION (SR 3.3.1.1.13) to a CHANNEL FUNCTIONAL TEST (SR 3.3.1.1.12). Magnetrol float switches perform this Function. The float switches are mechanical devices that require mechanical setting at the proper level only. The devices cannot be significantly adjusted, without a physical change in the location of the installation. Therefore, the CHANNEL CALIBRATION is not a proper requirement for this type of device; a CHANNEL FUNCTIONAL TEST is much more appropriate.

An evaluation of the surveillance interval extension was performed, based upon the approach described in GL 91-04.[2] Because these float switches cannot be significantly calibrated and are mechanical devices in nature, drift does not apply to the devices. Therefore, an increase in surveillance interval does not affect the float switches relative to accuracy. Therefore, the extension of this SR test interval is based upon a review of the surveillance test history.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the surveillance tests satisfying this SR (57SV-C11-001-1(2)S) demonstrates that failures are rarely observed during this SR activity. For both units, over the time period monitored (1990 through 1998), only one SDV float switch failed a surveillance test. The single Category D safety function failure occurred when the 2C11-N013F float was found damaged during a performance of 57SV-C11-001-2S. This was the only Category D safety function failure involving this SR.

This single failure is not indicative of a time-based failure mechanism and does not represent a repetitive failure. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.1.1.15 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures RPS logic for SDV Water Level – High will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.1.1-1 Reactor Protection System Instrumentation
Function 8 Turbine Stop Valve - Closure

As stated in the TS Bases, closure of the turbine stop valves (TSVs) results in the loss of a heat sink that produces RPV pressure, neutron flux, and heat flux transients that must be limited. Therefore, a reactor scram is initiated at the start of TSV closure in anticipation of the transients that will result from the closure of these valves. The TSV - Closure Function is the primary scram signal for the turbine trip event analyzed in the FSAR. This Function must be enabled at THERMAL POWER ≥ 28% RTP. Pressure switches sensing turbine first-stage pressure automatically accomplish this bypass Function; therefore, opening the turbine bypass valves may affect this Function.

SR 3.3.1.1.11 Verify Turbine Stop Valve – Closure and Turbine Control Valve Fast Closure, Trip Oil Pressure – Low Functions are not bypassed when THERMAL POWER is ≥ 28 RTP.

The surveillance test interval for this SR, as applied to this Function, is being increased from 184 days (Unit 1) and 18 Months (Unit 2) to 24 months, for a maximum interval of 30 months, including the 25% grace period. The THERMAL POWER permissive signal that enables the Turbine Stop Valve – Closure trip is provided by SOR pressure switches that sense turbine first-stage pressure.

An evaluation of the surveillance interval extension for the pressure switches was performed, based upon GL 91-04.[(2)] Newer Model SOR pressure switches were recently installed for greater reliability in the performance of this Function. Historical as-found and as-left calibration information is not available to perform a statistical drift analysis, based upon the recommendations of EPRI TR-103335.[(3)] Therefore, the instrument uncertainty was determined by extrapolating vendor specifications to the maximum calibration interval of 30 months. This drift value was appropriately considered in the determination of the plant setpoints for the switches. The new instrument drift-monitoring program will ensure the drift value used in the setpoint determination for this application is conservative relative to actual switch performance.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history was performed to validate the above conclusion. The results of this review demonstrate that no failure will invalidate the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.1.1.13 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months including the 25% grace period. Local limit switches perform this Function. Limit switches are mechanical devices that require mechanical adjustment only; drift is not applicable to these devices. In addition, proper operation of the limit switch is verified by the performance of CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.9 (every 92 days). Therefore, an increase in surveillance interval to accommodate a 24-month fuel cycle does not affect the limit switches relative to drift.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.1.1.15 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months including the 25% grace period. This SR ensures RPS logic for Turbine Stop Valve - Closure will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the performance of CHANNEL FUNCTIONAL TEST per SR 3.3.1.1.9 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.1.1.16 Verify the RPS RESPONSE TIME is within limits. (Unit 2 only)
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures RPS trip logic functions within the response time assumed in the analyses of the applicable analyzed event. Extending the interval between response time tests for this Function is acceptable, because the RPS is verified to be operating properly throughout the operating cycle by the performance of CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.9 (every 92 days). This testing ensures a significant portion of the RPS circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the RPS network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.1.1-1 Reactor Protection System Instrumentation
Function 9 Turbine Control Valve Fast Closure, Trip Oil Pressure - Low

As stated in the TS Bases, fast closure of the TCVs results in the loss of a heat sink that produces RPV pressure, neutron flux, and heat flux transients that must be limited. Therefore, a reactor scram is initiated on TCV fast closure in anticipation of the transients that result from the closure of these valves. The TCV Fast Closure, Trip Oil Pressure - Low is the primary scram signal for the generator load rejection event analyzed in the FSAR. For this event, the reactor scram reduces the amount of energy required to be absorbed and, along with the actions of the End of Cycle Recirculation Pump Trip (EOC-RPT) System, ensures the MCPR SL is not exceeded. TCV Fast Closure, Trip Oil Pressure - Low signals are initiated by the electrohydraulic control (EHC) fluid pressure at each control valve. This Function must be enabled at THERMAL POWER ≥ 28% RTP. Pressure switches sensing turbine first-stage pressure accomplish this bypass function automatically; therefore, opening the turbine bypass valves may affect this Function.

SR 3.3.1.1.11 Verify Turbine Stop Valve – Closure and Turbine Control Valve Fast Closure, Trip Oil Pressure – Low Functions are not bypassed when THERMAL POWER is ≥ 28 RTP.

The surveillance test interval for this SR, as applied to this Function, is being increased from 184 days (Unit 1) and 18 Months (Unit 2) to 24 months, for a maximum interval of 30 months, including the 25% grace period. The THERMAL POWER permissive signal that enables the Turbine Control Valve Fast Closure, Trip Oil Pressure – Low trip is provided by SOR pressure switches that sense turbine first stage pressure.

An evaluation of the surveillance interval extension for the pressure switches was performed, based upon GL 91-04.[(2)] Newer Model SOR pressure switches were recently installed for greater reliability in the performance of this Function. Historical as-found and as-left calibration information is not available to perform a statistical drift analysis, based upon the recommendations of EPRI TR-103335.[(3)] Therefore, the instrument uncertainty was determined by extrapolating vendor specifications to the maximum calibration interval of 30 months. This drift value was appropriately considered in the determination of the plant setpoints for the switches. The new instrument drift-monitoring program will ensure the drift value used in the setpoint determination for this application is conservative relative to actual switch performance.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history was performed to validate the above conclusion. The results of this review demonstrate that no failure will invalidate the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.1.1.13 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period.

An evaluation of the surveillance interval extension was performed, based upon GL 91-04.[2] Newer Model SOR pressure switches were recently installed for greater reliability in the performance of this Function. Historical as-found and as-left calibration information is not available to perform a statistical drift analysis, based upon the recommendations of EPRI TR-103335.[3] Therefore, the instrument uncertainty was determined by extrapolating vendor specifications to the maximum calibration interval of 30 months. This drift value was appropriately considered in the determination of the plant setpoints for the switches. The new instrument drift-monitoring program will ensure the drift value used in the setpoint determination for this application is conservative relative to actual switch performance.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.1.1.15 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures RPS logic for the TCV Fast, Trip Oil Pressure - Low will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the performance of more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.9 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

> "Industry reliability studies for boiling water reactors (BWRs), prepared by the BWR Owners Group (NEDC-30936P) show that the overall safety systems' reliabilities are not dominated by the reliabilities of the logic system, but by that of the mechanical components, (e.g., pumps and valves), which are consequently tested on a more frequent basis. Since the probability of a relay or contact failure

is small relative to the probability of mechanical component failure, increasing the Logic System Functional Test interval represents no significant change in the overall safety system unavailability."

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.1.1.16 Verify the RPS RESPONSE TIME is within limits.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures RPS trip logic functions within the response time assumed in the analyses of the applicable analyzed event. Extending the interval between response time tests for this Function is acceptable, because the RPS is verified to be operating properly throughout the operating cycle by the performance of CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.9 (every 92 days). This testing ensures a significant portion of the RPS circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the RPS network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.1.1-1 Reactor Protection System Instrumentation
Function 10 Reactor Mode Switch - Shutdown Position

As stated in the TS Bases, the Reactor Mode Switch - Shutdown Position Function provides signals, via the manual scram logic channels, to each of the four RPS logic channels, which are redundant to the automatic protective instrumentation channels and provide manual reactor trip capability. This Function was not specifically credited in the safety analysis, but is retained for the overall redundancy and diversity of the RPS as required by the NRC-approved licensing basis. The reactor mode switch is a single switch with four channels, each of which provides input into one of the RPS logic channels. There is no Allowable Value for this Function, since the channels are mechanically actuated based solely on reactor mode switch position.

SR 3.3.1.1.12 Perform CHANNEL FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the entire channel will perform the intended function. No instrumentation is involved with this Function; therefore, drift is of no effect when increasing the surveillance interval. Extending the surveillance test interval for this CHANNEL FUNCTIONAL TEST is acceptable, because major portions of the circuits required to shut down the reactor are verified by more frequent CHANNEL FUNCTIONAL TESTS of other RPS components per SRs 3.3.1.1.5 (every 7 days) and 3.3.1.1.9 (every 92 days).

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.1.1.15 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures RPS logic for the Reactor Mode Switch - Shutdown Position will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because major portions of the circuits required to shutdown the reactor are verified by other more frequent CHANNEL FUNCTIONAL TESTS of other RPS components per SRs 3.3.1.1.5 (every 7 days) and 3.3.1.1.9 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.1.1-1 Reactor Protection System Instrumentation
Function 11 Manual Scram

As stated in the TS Bases, the Manual Scram push button channels provide signals, via the manual scram logic channels, to each of the four RPS logic channels that are redundant to the automatic protective instrumentation channels and provide manual reactor trip capability. It is retained for the overall redundancy and diversity of the RPS Function as required by the NRC-approved licensing basis. There is one Manual Scram pushbutton channel for each of the four RPS logic channels. In order to cause a scram, it is necessary that at least one channel in each trip system be actuated. There is no Allowable Value for this Function, since the channels are mechanically actuated based solely on the position of the pushbutton.

SR 3.3.1.1.15 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures RPS circuit for the manual scram will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because major portions of the circuits required to shutdown the reactor are verified by other more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.5 (every 7 days) and SR 3.3.1.1.9 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.1.2-1 Source Range Monitor Instrumentation
Function 1 Source Range Monitor

As stated in the TS Bases, the SRMs provide the operator with information relative to the neutron level at very low flux levels in the core. As such, the operator uses the SRM indication to monitor the approach to criticality and to determine when criticality is achieved. The SRMs are maintained fully inserted until the count rate is greater than a minimum allowed count rate. (A control rod block is set at this condition.) After SRM to intermediate range monitor (IRM) overlap is demonstrated (as required by SR 3.3.1.1.6), the SRMs are normally fully withdrawn from the core. The SRM subsystem of the Neutron Monitoring System (NMS) consists of four channels. Each of the SRM channels can be bypassed, but only one at any given time, by the operation of a bypass switch. Each channel includes one detector that can be physically positioned in the core. Each detector assembly consists of a miniature fission chamber with associated cabling, signal conditioning equipment, and electronics associated with the various SRM functions. The signal conditioning equipment converts the current pulses from the fission chamber to analog DC currents that correspond to the count rate. Each channel also includes indication, alarm, and control rod blocks. However, this LCO specifies OPERABILITY requirements only for the monitoring and indication functions of the SRMs. During refueling, shutdown, and low power operations, the primary indication of neutron flux levels is provided by the SRMs or special movable detectors connected to the normal SRM circuits. The SRMs provide monitoring of reactivity changes during fuel or control rod movement and give the MCR operator early indication of subcritical multiplication that could be indicative of an approach to criticality.

The following SR was evaluated relative to extending its testing interval. This SR ensures the availability of safety functions that respond to plant transients and design basis events. Potential time-based considerations, such as instrument drift, failure types and frequencies, as well as other qualitative measures of system availability, were evaluated during this effort. The evaluation results and an explanation of how the results justify the surveillance interval extension are discussed below:

SR 3.3.1.2.7 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Extending the SRM calibration interval from 18 months to 24 months is acceptable for the following reasons: SRMs are not required to measure neutron level, just changes in neutron level. SRMs satisfy their design function when shutdown, if calibration is sufficient to ensure neutron level is observable when the reactor is shutdown, and this is verified at least every 24 hours when the reactor is shutdown. The IRMs must be OPERABLE in MODE 2, with the IRM readings on Range 2 or below. SRMs have no safety function and are not assumed to function during any event analyzed in the FSAR. Additionally, SRM response to reactivity changes is distinctive and well known to plant operators, and SRM response is closely monitored during these reactivity changes. There is also more frequent testing, including FUNCTIONAL TESTS performed per SR 3.3.1.2.5 (every 7 days) or SR 3.3.1.2.6 (every 31 days when IRMs are on Range 2 or below) and CHANNEL CHECKS per SR 3.3.1.2.1 (every 12 hours) or SR 3.3.1.2.3 (every 24 hours). Therefore, any substantial degradation of the SRMs will be evident prior to the scheduled performance of these tests.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the associated surveillance demonstrates that failures for this safety function are rarely observed. For the associated surveillance tests, over the time period monitored (1990 through 1999), there were 14 performances of the surveillance tests which satisfy this SR. Over that span there were only two Category D safety function failures for this safety function. These failures involved:

1. During a performance of 57SV-C51-007-1S, the SRM B high voltage could not be adjusted. The high voltage power supply was replaced and the SRM channel was tested satisfactorily.

2. During a performance of 57SV-C51-007-2S, the SRM B pre-regulator was found inoperable and was replaced. The SRM channel was tested satisfactorily.

These failures are not indicative of a time-based failure mechanism and do not represent repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

TS 3.3.2.1 Control Rod Block Instrumentation

As stated in the TS Bases, control rods provide the primary means for control of reactivity changes. Control rod block instrumentation includes channel sensors, logic circuitry, switches, and relays that are designed to ensure the fuel cladding integrity SL, and specified fuel design limits are not violated during postulated transients and accidents. During high-power operation, the rod block monitor (RBM) provides protection for control rod withdrawal error events. During low-power operations, control rod blocks from the rod worth minimizer (RWM) enforce specific control rod sequences designed to mitigate the consequences of the CRDA. During shutdown conditions, control rod blocks from the Reactor Mode Switch - Shutdown Position Function ensure that all control rods remain inserted to prevent inadvertent criticality.

The following SRs were evaluated relative to extending their respective testing intervals. These SRs ensure the availability of safety functions that respond to plant transients and design basis events. Potential time-based considerations, such as instrument drift, failure types and frequencies, as well as other qualitative measures of system availability, were evaluated during this effort. The evaluation results and an explanation of how the results justify the surveillance interval extension are discussed below:

Table 3.3.2.1-1 Control Rod Block Instrumentation
Function 1 Rod Block Monitor

As stated in the TS Bases, the purpose of the RBM is to limit control rod withdrawal if localized neutron flux exceeds a predetermined setpoint during control rod manipulations. It is assumed to function to block further control rod withdrawal to preclude a violation of the MCPR SL or a specified acceptable fuel design limit (SAFDL). The RBM supplies a trip signal to the Reactor Manual Control System (RMCS) to appropriately inhibit control rod withdrawal during power operation above the low power range setpoint. The RBM has two channels, either of which can initiate a control rod block when the channel output exceeds the control rod block setpoint. One RBM channel inputs into one RMCS rod block circuit and the other RBM channel inputs into the second RMCS rod block circuit.

The RBM channel signal is generated by averaging a set of local power range monitor (LPRM) signals at various core heights surrounding the control rod being withdrawn. A signal from one of the four redundant average power range monitor (APRM) channels supplies a reference signal for one of the RBM channels, and a signal from another APRM channel supplies the reference signal to the second RBM channel. This reference signal is used to determine which RBM range setpoint (low, intermediate, or high) is enabled. If the APRM is indicating less than the low-power range setpoint, the RBM is automatically bypassed. The RBM is also automatically bypassed if a peripheral control rod is selected. A rod block signal is also generated if an RBM Downscale trip or an inoperable trip occurs. The Downscale trip will occur if the RBM channel signal decreases below the Downscale trip setpoint after the RBM signal has been normalized. The inoperable trip will occur during the nulling (normalization) sequence, if: the RBM channel fails to null, too few LPRM inputs are available, a module is not plugged in, or the function switch is moved to any position other than "Operate."

SR 3.3.2.1.4 Verify the RBM:

a. Low Power Range - Upscale Function is not bypassed when THERMAL POWER is ≥ 29% and < 64% RTP.

b. Intermediate Power Range - Upscale Function is not bypassed when THERMAL POWER is ≥ 64% and < 84% RTP.

c. High Power Range - Upscale Function is not bypassed when THERMAL POWER is ≥ 84% RTP.

The surveillance test interval for this SR, as applied to table Functions 1.a, 1.b, and 1.c, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the bypasses are disabled for the Upscale Functions at the percent of power ranges required. Neutron detectors are excluded from the SR, because they are passive devices, with minimal drift, and because of the difficulty of simulating a meaningful signal. Neutron detectors are adequately tested by RPS CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.2 (every 7 days when THERMAL POWER is ≥ 25% of RTP) and the RPS LPRM calibrations per SR 3.3.1.1.8 (every 1000 EFP hours).

The signal used to determine the appropriate setpoint range is received from the APRMs. GE neutron monitors provide this signal, and the internal logic to the GE RBM provides the appropriate bypasses. For the GE neutron monitors and RBM logic circuits, no drift calculation was performed. This is acceptable because of the design requirements for the instruments and more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.2.1.1 (every 184 days). Prior to use for operation, overlap is checked between IRM and APRM channels per RPS SR 3.3.1.1.7 to determine if the instruments are consistently reading and tracking, as applicable. The operation of the circuits associated with Neutron Flux - High are verified by more frequent CHANNEL CHECKS per SR 3.3.1.1.1 (every 12 hours), Comparison Tests between APRM power and calculated power per SR 3.3.1.1.2 (every 7 days when THERMAL POWER is ≥ 25% of RTP), LPRM calibrations per SR 3.3.1.1.8 (every 1000 EFP hours), and CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.10 (every 184 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of the APRM circuitry. In addition, CHANNEL FUNCTIONAL TESTS are performed on the control rod block for neutron flux upscale per SR 3.3.2.1.1 (every 184 days). Therefore, any substantial degradation of the control rod blocks will be evident prior to the scheduled performance of these tests.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.2.1.7 Perform CHANNEL CALIBRATION.

The surveillance test interval for this SR, as applied to table Functions 1.a, 1.b, 1.c, and 1.e, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures proper operation and calibration of the RBM Upscale and Downscale trip circuitry. Neutron detectors are excluded from the SR because they are passive devices, with minimal drift, and because of the difficulty of simulating a meaningful signal. Neutron detectors are adequately tested in by RPS CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.2 (every 7 days when THERMAL POWER is ≥ 25% of RTP) and the RPS LPRM Calibrations per SR 3.3.1.1.8 (every 1000 effective full power hours).

More frequent CHANNEL FUNCTIONAL TESTS are performed on the control rod block for neutron flux upscale (Low, Intermediate, and High), Inop, and Downscale per SR 3.3.2.1.1 (every 184 days). Therefore, any substantial degradation of the control rod blocks will be evident prior to the scheduled performance of these tests. GE neutron monitors and GE trip units perform this Function. Drift calculations were not performed for the GE Neutron Monitors and trip units. This is acceptable because of the design requirements for the instruments and the more frequent CHANNEL FUNCTIONAL TESTS.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.2.1-1 Control Rod Block Instrumentation
Function 2 Rod Worth Minimizer

The RWM is automatically bypassed when power is above a specified value. Power level is determined from the APRM power signal. The automatic bypass setpoint must be verified periodically to be ≥ 10% of RTP. If the RWM low power setpoint is nonconservative, the RWM is considered inoperable. Alternately, the low power setpoint channel can be placed in the conservative condition (nonbypass). If placed in the nonbypassed condition, the SR is met, and the RWM is not considered inoperable.

SR 3.3.2.1.5 Verify the RWM is not bypassed when THERMAL POWER is < 10% RTP.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR is implemented by operating procedures that perform this check during startup and shutdown operations. Because of the required checks during startup and shutdown, the surveillance interval requirements are inherently satisfied. The purpose of this SR is to verify the accuracy of the bypass setting for the RWMs, such that RWMs are not bypassed at power levels below 10% of RTP.

The THERMAL POWER signal used to enable the RWM is generated by the APRMs. Per Unit 2 FSAR paragraph 7.6.2.2.4, the APRM value from the LPRM inputs is adjusted by a digitally entered factor to allow calibration of the APRM to core THERMAL POWER based upon heat balance. Per FSAR subsection 7.10.4, power level for automatic cutout of the NUMAC-RWM function is set nominally at 22.5% of RTP. The difference between the 22.5% power level of the automatic cutout and the 10% requirement in the TS is to account for difficulties in accurately measuring low power levels.

The APRM power signals from the LPRMs are continuously adjusted during power operation to maintain accuracy of the APRM power reading within 2% of the value based on heat balance equations. At lower power levels, APRMs are adjusted frequently, based on plant conditions, to maintain a high degree of accuracy. Therefore, the length of this surveillance interval does not affect the accuracy of the APRM power signal.

Additionally the operation of the APRM circuits associated with the bypass function are verified by more frequent CHANNEL CHECKS per SR 3.3.1.1.1 (every 12 hours), verification of overlap from APRMs to IRMs every 7 days during entry into MODE 2 from MODE 1 per SR 3.3.1.1.7, LPRM calibrations per SR 3.3.1.1.8 (every 1000 EFP hours), and CHANNEL FUNCTIONAL TESTS per SR 3.3.1.1.10 (every 184 days). This testing ensures the THERMAL POWER circuitry is operating properly and with the necessary accuracy. This testing will also detect significant failures of this circuitry. The RWM circuitry is tested on a more frequent basis through CHANNEL CHECKS per SR 3.3.2.1.2 and 3.3.2.1.3 (every 92 days, with mode limitations as noted in the TS). This testing will detect significant failures of the RWM circuitry.

The more frequent testing and calibration, along with the continuous adjustment of the APRM power signal, ensure the THERMAL POWER input to the RWM is functional and accurate. These factors also ensure there will be no change in system availability, based on the change to a 24-month surveillance interval.

Table 3.3.2.1-1 Control Rod Block Instrumentation
Function 3 Reactor Mode Switch - Shutdown Position

As stated in the TS Bases, during MODES 3 and 4, and during MODE 5 when the reactor mode switch is required to be in the shutdown position, the core is assumed to be subcritical; therefore, no positive reactivity insertion events are analyzed. The Reactor Mode Switch - Shutdown Position control rod withdrawal block ensures the reactor remains subcritical by blocking control rod withdrawal, thereby preserving the assumptions of the safety analysis.

SR 3.3.2.1.6 Perform CHANNEL FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months including the 25% grace period. This SR is not required until 1 hour after the reactor mode switch is in the shutdown position. This SR ensures the entire channel will perform the intended function. The mode switch contacts are verified when the switch is first taken to shutdown by insertion of a mode switch position scram signal. The only section of the circuit not tested is the direct interface with the CRD unit, which prevents control rod movement. More frequent CHANNEL FUNCTIONAL TESTS are performed on the control rod block for neutron flux upscale (Low, Intermediate, and High), Inop, and Downscale per SR 3.3.2.1.1 (every 184 days). Therefore, any substantial degradation of the mode switch position or control rod blocks will be evident prior to the scheduled performance of these tests.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

TS 3.3.2.2 Feedwater and Main Turbine Trip High Water Level Instrumentation

As stated in the TS Bases, the feedwater and main turbine high water level trip instrumentation is designed to detect a potential failure of the Feedwater Level Control System that causes excessive feedwater flow. With excessive feedwater flow, the water level in the RPV rises toward the high water level setpoint, causing the trip of the two feedwater pump turbines and the main turbine. A trip of the feedwater pump turbines limits further increase in RPV water level by limiting further addition of feedwater to the RPV. A trip of the main turbine and closure of the stop valves protect the turbine from damage due to water entering the turbine. The feedwater and main turbine high-water level trip instrumentation is assumed to be capable of providing a turbine trip in the design basis transient analysis for a feedwater controller failure, maximum demand event. The high-level trip indirectly initiates a reactor scram from the main turbine trip (above 28% RTP) and trips the feedwater pumps, thereby terminating the event. The reactor scram mitigates the reduction in MCPR.

The following SRs were evaluated relative to extending their respective testing intervals. These SRs ensure the availability of safety functions that respond to plant transients and DBAs. Potential time-based considerations, such as instrument drift, failure types and frequencies, as well as other qualitative measures of system availability, were evaluated during this effort. The results of these evaluation and an explanation of how the results justify the surveillance interval extension are discussed below:

SR 3.3.2.2.2 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR as applied to this Function is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Rosemount transmitters and Yokagawa trip units perform this Function.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.(2) The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.(3) The drift for the extended surveillance interval was appropriately considered in the development of the associated plant setpoints.

An evaluation of the surveillance interval extension for the Yokagawa trip units was performed, based upon GL 91-04.(2) Because the Yokagawa trip units are a new installation, and only a small number are installed, historical as-found and as-left calibration information is not available to perform a statistical drift analysis, based upon the recommendations of EPRI TR-103335.(3) A review of the available as-found and as-left data (24 calibration tests) does show that these switches were always found within the Acceptable Tolerance. Therefore, the instrument uncertainty was determined by extrapolating vendor specifications to the maximum calibration interval of 30 months. This drift value was appropriately considered in the determination of the plant setpoints for the switches. The new instrument drift-monitoring program will ensure the drift value used in the setpoint determination for this application is conservative relative to actual switch performance.

Additionally, CHANNEL FUNCTIONAL TESTS are performed on the trip units on a more frequent basis per SR 3.3.2.2.1 (every 92 days). Therefore, significant degradation in system performance will be detected prior to performance of the subject calibrations.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.2.2.3 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the logic for the feedwater and main turbine high water level trip instrumentation will function as designed to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because major portions of the circuits required are verified on a more frequent basis by the CHANNEL FUNCTIONAL TESTS per SR 3.3.2.2.1 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

TS 3.3.3.1 Post-Accident Monitoring (PAM) Instrumentation

As stated in the TS Bases, the primary purpose of the PAM instrumentation is to display plant variables that provide information required by the MCR operators during accident situations. This information provides the necessary support for the operator to take the manual actions for which no automatic control is provided and that are required for safety systems to accomplish their safety functions for design basis events. The instruments that monitor these variables are designated as Type A, Category 1, and non-Type A, Category 1 in accordance with Regulatory Guide (RG) 1.97.[4] The OPERABILITY of the accident monitoring instrumentation ensures there is sufficient information available on selected plant parameters to monitor and assess plant status and behavior following an accident. This capability is consistent with the recommendations of the FSAR. The following discussions are provided for the PAM signals of concern for this TS extension. These Functions are post-accident monitoring and are only required to function after a DBA. The required Functions are not affected by plant operating time or time between refueling outages.

The following SRs were evaluated relative to extending their respective testing intervals. These SRs ensure the availability of safety functions that monitor plant transients and design basis events. Potential time-based considerations, such as failure types and frequencies, as well as other qualitative measures of system availability, were evaluated during this effort. The results of these evaluation and an explanation of how the results justify the surveillance interval extension are discussed below:

Table 3.3.3.1-1 Post Accident Monitoring Instrumentation
Function 1 Reactor Steam Dome Pressure

As stated in the TS Bases, reactor steam dome pressure is a Type A variable provided to support monitoring of RCS integrity and verify ECCS operation. Two independent pressure transmitters with a range of 0 to 1500 psig monitor pressure. Wide-range recorders are the primary indication used by the operator during an accident. Therefore, the PAM specification addresses specifically this portion of the instrument channel.

SR 3.3.3.1.2 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. A separate drift evaluation was not performed for the PAM instruments based upon the design of the PAM instruments and equipment history. The following discussion supports this conclusion.

The PAM Function is supported by a combination of process transmitters, indicators and recorders. These components differ from other TS instruments in that they are not associated with a single action point but may be required to function anywhere within their range capability. An additional difference, based upon the time of function, is the process and environmental conditions that may be present when the instruments are required. Trip devices function during the first several seconds of an accident (normally prior to any significant environment changes) to prevent or mitigate the consequences. The PAM devices must maintain their function after the accident has occurred and track the progress of the event and event mitigation over a long period of time. PAM instruments are designed to operate in a wide variety of environments (ranging from normal to high temperature, high radiation, and high humidity) and to maintain functionality. However, these instruments are not expected to function with the same high degree of accuracy demanded of accident detection and mitigation trip devices. The PAM devices are expected to maintain sufficient accuracy to detect trends or the existence or non-existence of a condition within wider boundaries (e.g., Is there water in the RPV?).

The PAM instruments are designed with a high degree of accuracy and reliability. Where possible, the indicators and recorders used for PAM are compared with other channels of instruments measuring the same variable to determine OPERABILITY for normal conditions. Where multiple channels of indication are available, comparisons are normally performed once per shift, but CHANNEL CHECKS are specifically required once per month, per SR 3.3.3.1.1. These tests verify that the indication and recording instruments are acceptable. For the transmitters, the primary error contributor for normal operations is "drift". However, for post accident conditions the major errors are associated with the change in process conditions, and the change in environment conditions. These other errors are significantly larger than the errors associated with "drift." A drift analysis will not verify that these devices will maintain acceptable accuracy for the post-accident conditions. Additionally, no specific accuracy requirements are noted within TS, and recent BWROG direction indicates that EOP Action Values utilizing PAM indication can be considered nominal values, since the accident analyses have adequate margin to account for instrumentation errors. Based upon:

1. The fact that neither the TS nor the EOPs have specific accuracy requirements.
2. PAM instrumentation is designed to be highly reliable and accurate.
3. Cross CHANNEL CHECKS are performed on all instruments possible on a more frequent basis per SR 3.3.3.1.1 (every 31 days).
4. For most PAM instrumentation, drift is not a primary error contributor during the time that operation of the equipment is required.

For the reasons cited above, a drift calculation for these instruments is not necessary and a review of the surveillance test history provides an acceptable method to determine if the instrument calibration interval can be extended to a 24-month operating cycle.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.3.1-1 Post Accident Monitoring Instrumentation
Function 2 Reactor Vessel Water Level

As stated in the TS Bases, RPV water level is a Category 1 variable for all ranges and is also a Type A variable for the -150 inches to +60 inches range. They are provided to support monitoring of core cooling and to verify ECCS operation. Four different range channels provide the PAM Reactor Vessel Water Level Function. The water level channels measure from 400 inches above the steam dryer skirt down to a point just below the bottom of the active fuel. Independent differential pressure transmitters for each required channel measure the water level. The output from these channels is recorded on independent pen recorders or read on indicators, which is the primary indication used by the operator during an accident. Therefore, the PAM specification deals specifically with this portion of the instrument channel.

The RPV water level instruments are uncompensated for variation in reactor water density and are calibrated to be most accurate at operational pressure and temperature. Temperature corrections are made, where appropriate, based upon drywell temperature.

SR 3.3.3.1.2 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. A separate drift evaluation was not performed for the PAM instruments based upon the design

of the PAM instruments and equipment history. (See the justification for Function 1 of Table 3.3.3.1-1.)

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.3.1-1 Post Accident Monitoring Instrumentation
Function 3 Suppression Pool Water Level

As stated in the TS Bases, suppression pool water level is a Category 1 variable, provided to detect a breach in the RCPB. This variable is also used to verify and provide long-term surveillance of ECCS functions. The wide-range and narrow-range suppression pool water level measurement provides the operator with sufficient information to assess the status of both the RCPB and the water supply to the ECCS. The wide-range water level indicators monitor the suppression pool water level from the centerline of the ECCS suction lines to the top of the pool, while the narrow-range water level indicators monitor the water level around its normal level. Two wide-range and two narrow-range suppression pool water level signals are transmitted from separate differential pressure transmitters and are continuously recorded on recorders (for the narrow-range signals) and read on indicators (for the wide-range signals) in the MCR. These recorders are the primary indication used by the operator during an accident. Therefore, the PAM specification addresses specifically this portion of the instrument channel.

SR 3.3.3.1.2 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. A separate drift evaluation was not performed for the PAM instruments based upon the design of the PAM instruments and equipment history. (See the justification for Function 1 of Table 3.3.3.1-1.)

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the associated surveillance tests demonstrates that failures for this safety function are rarely observed, considering the number of surveillance test performances completed on these loops. For the associated surveillance tests (57SV-T48-004-2S and 57SV-T48-006-1(2)S) over the time period monitored (1990 through 1999), 121 performances of the surveillance tests that satisfy this SR were performed. Over that span, only three Category D safety function failures occurred. These failures involved:

1. During a performance of 57SV-T48-004-2S, transmitter 2T48-N021B was out of tolerance and could not be calibrated. The transmitter was replaced, and the test was completed satisfactorily.

2. During a performance of 57SV-T48-004-2S recorder 2T48-R607A was sluggish to respond to input variations. The high level setpoint cam follower was found binding

against the cam. The cam follower was adjusted, and the recorder was recalibrated satisfactorily.

3. During a performance of 57SV-T48-004-2S, the high setpoint for the recorder 2T48-R607B red pen exceeded the TS limit. The alarm setpoint was re-adjusted, and the recorder was recalibrated satisfactorily

These failures are not indicative of a time-based failure mechanism and do not represent repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.3.1-1 Post Accident Monitoring Instrumentation
Function 4 Drywell Pressure

As stated in the TS Bases, drywell pressure is a Category 1 variable provided to detect breach of the RCPB and verify ECCS functions that operate to maintain RCS integrity. Three different range drywell pressure channels receive signals that are transmitted from separate pressure transmitters and are continuously recorded and displayed on six MCR recorders. These recorders are the primary indication used by the operator during an accident. Therefore, the PAM specification addresses specifically this portion of the instrument channel.

SR 3.3.3.1.2 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. A separate drift evaluation was not performed for the PAM instruments based upon the design of the PAM instruments and equipment history. See the justification for Function 1 of Table 3.3.3.1-1.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the surveillance tests used to satisfy this SR (57SV-T48-005-1(2)S) demonstrates that failures affecting this safety function are rarely observed during this SR activity. For both units, over the time period monitored (1990 through 1999), only one Category D safety function failure occurred. This failure involved transmitter 1T48-N023B. The transmitter was found out of tolerance and could not be properly calibrated. The transmitter was replaced.

This failure is not indicative of a time-based failure mechanism and does not represent a repetitive failure. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.3.1-1 Post Accident Monitoring Instrumentation
Function 5 Drywell Area Radiation (High Range)

As stated in the TS Bases, drywell area radiation (high range) is a Category 1 variable provided to monitor the potential of significant radiation releases and to provide release assessment for use by operators in determining the need to invoke site emergency plans. Two radiation signals are transmitted from separate monitors and are continuously recorded on two recorders in the MCR. These recorders are the primary indication used by the operator during an accident. Therefore, the PAM specification addresses specifically this portion of the instrument channel.

SR 3.3.3.1.2 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. A separate drift evaluation was not performed for the PAM instruments based upon the design of the PAM instruments and equipment history. (See the justification for Function 1 of Table 3.3.3.1-1.)

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the associated calibration tests (57SV-CAL-012-0S and 57SV-D11-019-1(2)S) demonstrates that failures affecting this safety function are rarely observed during this SR activity. For both units, over the time period monitored (1990 through 2000), the associated surveillance tests were reviewed, and only one Category D safety function failure occurred. That failure involved the inability to calibrate the C post LOCA logarithmic radiation monitor during performance of 57SV-CAL-012-0S. Troubleshooting revealed the Femtoammeter board had failed. The board was replaced, and the monitor was tested satisfactorily.

This unique failure is not indicative of a time-based failure mechanism and does not represent a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.3.1-1 Post Accident Monitoring Instrumentation
Function 6 Primary Containment Isolation Valve Position

As stated in the TS Bases, primary containment isolation valve (PCIV) position is provided for verification of containment integrity. In the case of PCIV position, the important information is the isolation status of the containment penetration. The LCO requires one channel of valve position indication in the MCR to be OPERABLE for each active PCIV in a containment penetration flow path, i.e., two total channels of PCIV position indication for a penetration flow path with two active valves. For containment penetrations with only one active PCIV having MCR indication, Note (b) requires a single channel of valve position indication to be OPERABLE. This is sufficient to redundantly verify the isolation status of each isolable penetration via indicated status of the active valve, as applicable, and prior knowledge of passive valve or system boundary status. If a penetration flow path is isolated, position indication for the PCIV(s) in the associated penetration flow path is not needed. Therefore, the position indication for valves in an isolated penetration flow path is not required to be OPERABLE. The indication for each PCIV consists of green and red indicator lights that illuminate to indicate whether the PCIV is fully open, fully closed, or in a mid-position. Therefore, the PAM specification deals specifically with this portion of the instrumentation channel.

SR 3.3.3.1.2 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months including the 25% grace period. A separate drift evaluation was not performed for the PAM instruments based upon the design of the PAM instruments and equipment history. See the justification for Function 1 of Table 3.3.3.1-1.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.3.1-1 Post Accident Monitoring Instrumentation
Function 7 Drywell H_2, Concentration
Function 8 Drywell O_2 Concentration

As stated in the TS Bases, drywell hydrogen and oxygen analyzers are Type A instruments provided to detect high hydrogen or oxygen concentration conditions that represent a potential for containment breach. This variable is also important in verifying the adequacy of mitigating actions. High hydrogen and oxygen concentration is measured by two independent analyzers and continuously recorded on two recorders in the MCR. The analyzers have the capability for sampling both the drywell and the torus. The available 0 - 10% range of these analyzers satisfies the criteria of RG 1.97.[4] These recorders are the primary indication used by the operator during an accident. Therefore, the PAM specification deals specifically with this portion of the instrument channel.

SR 3.3.3.1.2 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months including the 25% grace period. A separate drift evaluation was not performed for the PAM instruments based upon the design of the PAM instruments and equipment history. (See the justification for Function 1 of Table 3.3.3.1-1.)

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.3.1-1 Post Accident Monitoring Instrumentation
Function 9 Suppression Pool Water Temperature

As stated in the TS Bases, suppression pool water temperature is a Type A variable provided to detect a condition that could potentially lead to containment breach and verify the effectiveness of ECCS actions taken to prevent containment breach. The suppression pool water temperature instrumentation allows operators to detect trends in suppression pool water temperature in sufficient time to take action to prevent steam-quenching vibrations in the suppression pool. Fifteen active resistance temperature detector (RTD) elements are used for RG 1.97 compliance. Eleven of these devices are grouped together to provide an average measure of the temperature in the upper region of the suppression pool. These input to a single recorder. The other four RTDs are used to measure the lower region of the suppression pool and are spaced almost equilaterally. They input to two recorders. However, to ensure the average temperature of the suppression pool is monitored, only two of these RTDs per quadrant are needed, since other means are available to ensure the average bulk suppression pool temperature is known if a few of the RTDs are inoperable. These recorders are the primary indication used by the operator during an accident. Therefore, the PAM Specification addresses specifically this portion of the instrument channels.

SR 3.3.3.1.2 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. A separate drift evaluation was not performed for the PAM instruments based upon the design of the PAM instruments and equipment history. (See the justification for Function 1 of Table 3.3.3.1-1.)

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the surveillance tests used to satisfy this SR (57SV-T47-002-1(2)S) demonstrates that failures affecting this safety function are rarely observed during this SR activity. For both units, over the time period monitored (1990 through 2000), only one Category D safety function failure occurred. This failure involved a loss of the alarm microprocessor memory data during performance of 57SV-T47-002-1S.

This failure is not indicative of a time-based failure mechanism and does not represent a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.3.1-1 Post Accident Monitoring Instrumentation
Function 10 Drywell Temperature in Vicinity of Reactor Level Instrument Reference Leg

As stated in the TS Bases, drywell temperature in the vicinity of RPV level instrument reference legs is a Type A variable provided to measure Drywell temperature so that proper compensation of reactor water level instruments can be accomplished. The drywell temperature is measured by six RTDs in the vicinity of the associated reference legs with the output being recorded on pen recorders in the MCR. This is the primary indication used by the operator during an accident. Therefore, the PAM specification deals specifically with this portion of the instrumentation channel.

SR 3.3.3.1.2 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. A separate drift evaluation was not performed for the PAM instruments based upon the design

of the PAM instruments and equipment history. (See the justification for Item 1 of Table 3.3.3.1-1.)

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the calibration tests demonstrates that failures affecting this safety function are rarely observed during this SR activity. For both units, over the time period monitored (1990 through 2000), only one Category D safety function failure occurred. This failure involved a loss of the alarm microprocessor memory data during performance of 57SV-T47-002-1S.

This failure is not indicative of a time-based failure mechanism and does represent a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.3.1-1 Post Accident Monitoring Instrumentation
Function 11 Diesel Generator Parameters
a. Output Voltage, b. Output Current, c. Output Power, and d. Battery Voltage

As stated in the TS Bases, diesel generator (DG) parameters are Type A variables provided to allow the operator to ensure proper operation of the DGs and to control the DGs post accident. Each of the four parameters (output voltage, output current, output power, and battery voltage) is monitored for each of the two unit-specific DGs and the swing DG and is read on indicators in the MCR. These are the primary indications used by the operator during an accident. Therefore, the PAM specification addresses specifically this portion of the instrument channels.

SR 3.3.3.1.2 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. A separate drift evaluation was not performed for the PAM instruments based upon the design of the PAM instruments and equipment history. (See the justification for Function 1 of Table 3.3.3.1-1.)

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.3.1-1 Post Accident Monitoring Instrumentation
Function 12 RHR Service Water Flow

As stated in the TS Bases, RHR service water flow is a Type A variable provided to support the containment cooling Function. The RHR Service Water flow signals are transmitted from separate flow transmitters (one per subsystem) and are continuously read on two MCR indicators. These indicators are the primary indication used by the operator during an accident. Therefore, the PAM specification addresses specifically this portion of the instrument channel.

SR 3.3.3.1.2 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. A separate drift evaluation was not performed for the PAM instruments based upon the design of the PAM instruments and equipment history. (See the justification for Function 1 of Table 3.3.3.1-1.)

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

TS 3.3.3.2 Remote Shutdown System

As stated in the TS Bases, the Remote Shutdown System provides the MCR operator with sufficient instrumentation and controls to place and maintain the plant in a safe shutdown condition from a location other than the MCR. This capability is necessary to protect against the possibility of the MCR becoming inaccessible. A safe shutdown condition is defined as MODE 3. With the plant in MODE 3, the Reactor Core Isolation Cooling (RCIC) System, the SR/Vs, and the Residual Heat Removal (RHR) Shutdown Cooling System can be used to remove core decay heat and meet all safety requirements. The long-term supply of water for the RCIC and the ability to operate shutdown cooling from outside the MCR allow extended operation in MODE 3. In the event that the MCR becomes inaccessible, the operators can establish control at the remote shutdown panel and place and maintain the plant in MODE 3. Not all controls and necessary transfer switches are located at the remote shutdown panel. Some controls and transfer switches will have to be operated locally at the switchgear, motor control panels, or other local stations. The plant automatically reaches MODE 3 following a plant shutdown and can be maintained safely in MODE 3 for an extended period of time.

The OPERABILITY of the Remote Shutdown System control and instrumentation functions ensures there is sufficient information available on selected plant parameters to place and maintain the plant in MODE 3 should the MCR become inaccessible. The Remote Shutdown System is required to provide equipment at appropriate locations outside the MCR with a design capability to promptly shut down the reactor to MODE 3, including the necessary instrumentation and controls, to maintain the plant in a safe condition in MODE 3.

The following SRs were evaluated relative to extending their respective testing intervals. These SRs ensure the availability of safety functions that respond to plant transients and design basis events. Potential time-based considerations, such as instrument drift, failure types and frequencies, as well as other qualitative measures of system availability, were evaluated during this effort. The evaluation results and an explanation of how the results justify the surveillance interval extension are discussed below:

SR 3.3.3.2.2 Verify each required control circuit and transfer switch is capable of performing the intended function.

The surveillance test interval for this SR as applied to this Function is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Operation of the equipment from the remote shutdown panel is not necessary. This SR can be satisfied by performance of a continuity check. This test is essentially a LOGIC SYSTEM FUNCTIONAL TEST for the transfer circuits associated with shifting indication and control from the MCR to the remote shutdown panel. The justification for extending LSFTs is also valid for the extension of this SR. As stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for this SR demonstrates that safety function failures are rarely observed during this SR activity, especially considering the large number of surveillance tests used to satisfy this SR. For the associated surveillance tests, over the time period monitored, only four Category D safety function failures occurred. These failures are:

1. During a performance of 34SV-B31-001-2S, valve 2B31-F023B did not stroke from the remote shutdown panel. A loose wire was found on the S16 switch at the remote shutdown panel. The wire was tightened, and the valve was successfully stroked.

2. During a performance of 34SV-C82-003-2S, the annunciator did not come in when switch was placed in EMERG position. Troubleshooting revealed two wires landed on S6 switch contact with one lug in a position to prevent the contact from closing properly.

3. During a performance of 34SV-E51-005-1S, proper RCIC flow and discharge pressure could not be established.

4. During a performance of 34SV-R43-012-2S, the DG tripped. The problem was traced to high resistance on the breaker spring motor toggle switch.

Four failures out of the large number of tests performed represent a very low failure rate. The failures that occurred do not suggest a time-based failure mechanism and do represent a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.3.2.3 Perform CHANNEL CALIBRATION for each required instrumentation channel.

The surveillance test interval for this SR as applied to this Function is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. The subject SR ensures the remote shutdown instrumentation will function as designed during an analyzed event. Extending the SR Frequency is acceptable, because the instrumentation and systems are designed to be highly reliable. A drift evaluation was not performed on the remote shutdown instrumentation because of the design and reliability of the instrumentation.

The purpose of this instrumentation is to provide a means to safely shut down the reactor following an event where operation from the MCR cannot be accomplished. Several of the instruments that are being extended are only energized when the remote shutdown panel is placed in service or for testing. For these instruments, the change in the CHANNEL CALIBRATION interval will have no impact. This conclusion is based upon the fact that, in the deenergized state, no time dependent factors will cause a change in the input/output relationship of the deenergized device, and all energized components of the loop are used for MCR display and confirmed to be functional. There is a required monthly CHANNEL CHECK per SR 3.3.3.2.1 of all energized Remote Shutdown System instruments performed that compares the reading of the remote shutdown instruments to the MCR instruments. This CHANNEL CHECK provides an effective means to demonstrate the OPERABILITY of the monitoring instrumentation used at the remote shutdown panel during the operating cycle. Any gross failure or excessive drift of these instruments will be detected by this SR test. Therefore, based upon the above discussion, it was determined that a drift calculation for these instruments is not necessary, and a review of the surveillance test history provides an acceptable method to determine if the instrument calibration interval can be extended to a 24-month operating cycle.

Based upon the design of the instrumentation and more frequent testing, it was concluded that the effect, if any, on system availability is minimal as a result of the change in the surveillance test interval.

A review of the surveillance test history for this SR demonstrates that safety function failures are rarely observed during this SR activity, especially considering the large number of surveillance tests used to satisfy this SR. For the associated surveillance tests, over the time period monitored, only one Category D safety function failure occurred. This failure involved the inability to calibrate a drywell pressure loop during performance of 57SV-C82-007-2S. The problem was traced to a faulty power supply. The power supply was replaced, and the loop was calibrated satisfactorily.

This single failure out of the large number of test performances represents a very low failure rate. The failure that occurred does not suggest a time-based failure mechanism and does not represent a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

TS 3.3.4.1 End of Cycle Recirculation Pump Trip (EOC-RPT) Instrumentation

As stated in the TS Bases, the EOC-RPT instrumentation initiates a recirculation pump trip (RPT) to reduce the peak RPV pressure and power resulting from turbine trip or generator load rejection transients to provide additional margin to core thermal MCPR SLs. The need for the additional negative reactivity in excess of that normally inserted on a scram reflects end of cycle reactivity considerations. Depending upon the MCPR Operating Limit (OL), flux shapes at the end of cycle can be such that the control rods will not be able to ensure thermal limits are maintained by inserting sufficient negative reactivity during the first few feet of rod travel upon a scram caused by either TSV - Closure or Turbine Control Valve (TCV) Fast Closure, Trip Oil Pressure - Low. The physical phenomenon involved is that the void reactivity feedback due to a pressurization transient can add positive reactivity at a faster rate than the control rods can add negative reactivity. The EOC-RPT allows a margin improvement, which in turn allows a reduction in the MCPR OL.

The EOC-RPT instrumentation is composed of sensors that detect initiation of closure of the TSVs or fast closure of the TCVs, combined with relays, logic circuits, and fast acting circuit breakers that interrupt power from the recirculation pump motor generator (MG) set generators to each of the recirculation pump motors. The channels include electronic equipment (e.g., trip relays) that compare measured input signals with pre-established setpoints. When the setpoint is exceeded, the channel output relay actuates, which then outputs an EOC-RPT signal to the trip logic. When the RPT breakers trip open, the recirculation pumps coast down under their own inertia. The EOC-RPT has two identical trip systems, either of which can actuate an RPT. The EOC-RPT initiation logic is designed to be single failure proof and therefore is highly reliable.

Each EOC-RPT trip system is a two-out-of-two logic for each Function; thus, either two TSV - Closure or two TCV Fast Closures, Trip Oil Pressure - Low signals are required for a trip system to actuate. If either trip system actuates, both recirculation pumps will trip. There are two EOC-RPT breakers in series per recirculation pump. One trip system trips one of the two EOC RPT breakers for each recirculation pump, and the second trip system trips the other EOC-RPT breaker for each recirculation pump.

The following SRs were evaluated relative to extending their respective testing intervals. These SRs ensure the availability of safety functions that respond to plant transients and design basis events. Potential time-based considerations, such as instrument drift, failure types and frequencies, as well as other qualitative measures of system availability, were evaluated during this effort. The evaluation results and an explanation of how the results justify the surveillance interval extension are discussed below:

LCO 3.3.4.1.a.1 EOC-RPT Instrumentation Function -- TSV - Closure

SR 3.3.4.1.2 Verify TSV – Closure and TCV Fast Closure, Trip Oil Pressure – Low Functions are not bypassed when THERMAL POWER is ≥ 28 RTP.

The surveillance test interval for this SR, as applied to this Function, is being increased from 184 days (Unit 1) and 18 Months (Unit 2) to 24 months, for a maximum interval of 30 months, including the 25% grace period. The THERMAL POWER permissive signal that enables the Turbine Stop Valve – Closure trip is provided by SOR pressure switches that sense turbine first stage pressure.

An evaluation of the surveillance interval extension for the pressure switches was performed, based upon GL 91-04.[2] Newer Model SOR pressure switches were recently installed for greater reliability in the performance of this Function. Historical as-found and as-left calibration information is not available to perform a statistical drift analysis, based upon the recommendations of EPRI TR-103335.[3] Therefore, the instrument uncertainty was determined by extrapolating vendor specifications to the maximum calibration interval of 30 months. This drift value was appropriately considered in the determination of the plant setpoints for the switches. The new instrument drift-monitoring program will ensure the drift value used in the setpoint determination for this application is conservative relative to actual switch performance.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history was performed to validate the above conclusion. The results of this review demonstrate that no failure will invalidate the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.4.1.3 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR as applied to this Function is being increased from 18 months to 24 months, for a maximum interval of 30 months including the 25% grace period. Local limit switches provide the TSV Function. Limit switches are mechanical devices that require mechanical adjustment only; drift is not applicable to these devices. Therefore, an increase in surveillance interval to accommodate a 24-month fuel cycle does not affect limit switches relative to drift. Extending the surveillance test interval is acceptable, because the Function is verified to be operating properly by the performance of more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.4.1.1 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry.

Based upon the design of the instrumentation and more frequent testing, it was concluded that the effect, if any, on system availability is minimal as a result of the change in the surveillance test interval.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.4.1.4 Perform LOGIC SYSTEM FUNCTIONAL TEST including breaker actuation.
The surveillance test interval for this SR as applied to this Function is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the logic for TSV - Closure will function as designed in response to an analyzed condition. Extending the interval between LSFT for this Function is acceptable, because the EOC-RPT is verified to be operating properly throughout the operating cycle by the performance of more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.4.1.1 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

> "Industry reliability studies for boiling water reactors (BWRs), prepared by the BWR Owners Group (NEDC-30936P) show that the overall safety systems'

reliabilities are not dominated by the reliabilities of the logic system, but by that of the mechanical components, (e.g., pumps and valves), which are consequently tested on a more frequent basis. Since the probability of a relay or contact failure is small relative to the probability of mechanical component failure, increasing the Logic System Functional Test interval represents no significant change in the overall safety system unavailability."

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.4.1.5 Verify the SYSTEM RESPONSE TIME is within limits.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures EOC – RPT Instrumentation trip logic functions within the response time assumed in the analyses of the applicable analyzed event. Extending the interval between response time tests for this Function is acceptable, because the EOC – RPT Instrumentation is verified to be operating properly throughout the operating cycle by the performance of CHANNEL FUNCTIONAL TESTS per SR 3.3.4.1.1 (every 92 days). This testing ensures a significant portion of the EOC – RPT Instrumentation trip circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the EOC – RPT Instrumentation trip network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history was performed to validate the above conclusion. The results of this review demonstrate that no failure will invalidate the conclusion that the effect, if any, of this proposed change on system availability is minimal.

LCO 3.3.4.1.a.2 EOC-RPT Instrumentation Function -- TCV Fast Closure, Trip Oil Pressure - Low

SR 3.3.4.1.2 Verify TSV – Closure and TCV Fast Closure, Trip Oil Pressure – Low Functions are not bypassed when THERMAL POWER is ≥ 28 RTP.

The surveillance test interval for this SR, as applied to this Function, is being increased from 184 days (Unit 1) and 18 months (Unit 2) to 24 months, for a maximum interval of 30 months, including the 25% grace period. The THERMAL POWER permissive signal that enables the Turbine Control Valve Fast Closure, Trip Oil Pressure – Low trip is provided by SOR pressure switches that sense turbine first stage pressure.

An evaluation of the surveillance interval extension for the pressure switches was performed, based upon GL 91-04.[(2)] Newer Model SOR pressure switches were recently installed for greater reliability in the performance of this Function. Historical as-found and as-left calibration information is not available to perform a statistical drift analysis, based upon the recommendations of EPRI TR-103335.[(3)] Therefore, the instrument uncertainty was determined by extrapolating vendor specifications to the maximum calibration interval of 30 months. This drift value was appropriately considered in the determination of the plant setpoints for the switches. The new instrument drift-monitoring program will ensure the drift value used in the setpoint determination for this application is conservative relative to actual switch performance.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history was performed to validate the above conclusion. The results of this review demonstrate that no failure will invalidate the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.4.1.3 Perform CHANNEL CALIBRATION.

The surveillance test interval for this SR as applied to this Function is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. An evaluation of the surveillance interval extension was performed, based upon GL 91-04.[(2)] Newer Model SOR pressure switches were recently installed for greater reliability in the performance of this Function. Therefore, historical as-found and as-left calibration information is not available to perform a statistical drift analysis, based upon the recommendations of EPRI TR-103335.[(3)] Therefore, the instrument uncertainty was determined by extrapolating vendor specifications to the maximum calibration interval of 30 months. This drift value was appropriately considered in the determination of the plant setpoints for the switches. The new instrument drift-monitoring program will ensure the drift value used in the setpoint determination for this application is conservative relative to actual switch performance.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.4.1.4 Perform LOGIC SYSTEM FUNCTIONAL TEST including breaker actuation.

The surveillance test interval for this SR as applied to this Function is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the logic for the TCV Fast Closure, Trip Oil Pressure - Low will function as designed in response to an analyzed condition. Extending the interval between LSFT for this Function is acceptable, because the EOC-RPT is verified to be operating properly throughout the operating cycle by the performance of more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.4.1.1 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.4.1.5 Verify the SYSTEM RESPONSE TIME is within limits.

The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures EOC – RPT Instrumentation trip logic functions within the response time assumed in the analyses of the applicable analyzed event. Extending the interval between response time tests for this Function is acceptable, because the EOC – RPT Instrumentation is verified to be operating properly throughout the operating cycle by the performance of CHANNEL FUNCTIONAL TESTS per SR 3.3.4.1.1 (every 92 days). This testing ensures a significant portion of the EOC – RPT Instrumentation trip circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the EOC – RPT Instrumentation trip network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

> "Industry reliability studies for boiling water reactors (BWRs), prepared by the BWR Owners Group (NEDC-30936P) show that the overall safety systems' reliabilities are not dominated by the reliabilities of the logic system, but by that of the mechanical components, (e.g., pumps and valves), which are consequently tested on a more frequent basis. Since the probability of a relay or contact failure

is small relative to the probability of mechanical component failure, increasing the Logic System Functional Test interval represents no significant change in the overall safety system unavailability."

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history was performed to validate the above conclusion. The results of this review demonstrate that no failure will invalidate the conclusion that the effect, if any, of this proposed change on system availability is minimal.

TS 3.3.4.2 Anticipated Transient Without Scram Recirculation Pump Trip (ATWS-RPT) Instrumentation

As stated in the TS Bases, the ATWS-RPT System initiates an RPT, adding negative reactivity, following events in which a scram does not (but should) occur, to lessen the effects of an ATWS event. Tripping the recirculation pumps adds negative reactivity from the increase in steam voiding in the core area as core flow decreases. When the reactor vessel water level - ATWS-RPT level or reactor steam dome pressure - high setpoint is reached, the recirculation pump drive motor breakers trip. The ATWS-RPT System includes sensors, relays, bypass capability, circuit breakers, and switches that are necessary to cause initiation of an RPT.

The following SRs were evaluated relative to extending their respective testing intervals. These SRs ensure the availability of safety functions that respond to plant transients and design basis events. Potential time-based considerations, such as instrument drift, failure types and frequencies, as well as other qualitative measures of system availability, were evaluated during this effort. The evaluation results and an explanation of how the results justify the surveillance interval extension are discussed below:

***Function 3.3.4.2.a Reactor Vessel Water Level* - ATWS-RPT Level**

As stated in the TS Bases, low RPV water level indicates the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage can result. Therefore, the ATWS-RPT System is initiated at a low level to aid in maintaining level above the top of the active fuel. The reduction of core flow reduces the neutron flux and THERMAL POWER and, therefore, the rate of coolant boiloff. RPV water level signals are initiated from four level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the RPV.

SR 3.3.4.2.3 Perform CHANNEL CALIBRATION.
a. Reactor Vessel Water Level - ATWS-RPT Level: ≥ -73 inches;

The surveillance test interval for this SR as applied to this Function is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and Rosemount trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.4.2.2 (92 days). A CHANNEL CHECK is also performed per SR 3.3.4.2.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in the development of the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.4.2.4 Perform LOGIC SYSTEM FUNCTIONAL TEST including breaker actuation.

The surveillance test interval for this SR as applied to this Function is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the performance of more frequent CHANNEL CHECKS per SR 3.3.4.2.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.4.2.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Function 3.3.4.2.b Reactor Steam Dome Pressure - High

As stated in the TS Bases, excessively high RPV pressure may rupture the RCPB. An increase in the RPV pressure during reactor operation compresses the steam voids and results in a positive reactivity insertion. This increases neutron flux and THERMAL POWER, which could potentially result in fuel failure and overpressurization. The Reactor Steam Dome Pressure - High Function initiates an RPT for transients that result in a pressure increase, counteracting the pressure increase by rapidly reducing core power generation. For the overpressurization event, the RPT aids in the termination of the ATWS event and, along with the S/RVs, limits the peak RPV pressure to less than the ASME Code Section III limits. Reactor Steam Dome Pressure - High signals are initiated from four pressure transmitters that monitor reactor steam dome pressure.

SR 3.3.4.2.3.b Perform CHANNEL CALIBRATION.
b. Reactor Steam Dome Pressure - High: ≤ 1175 psig.

The surveillance test interval for this SR as applied to this Function is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and Rosemount trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.4.2.2 (92 days).). A CHANNEL CHECK is also performed per SR 3.3.4.2.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.4.2.4 Perform LOGIC SYSTEM FUNCTIONAL TEST including breaker actuation.

The surveillance test interval for this SR as applied to this Function is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the performance of more frequent CHANNEL CHECKS per SR 3.3.4.2.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.4.2.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

> "Industry reliability studies for boiling water reactors (BWRs), prepared by the BWR Owners Group (NEDC-30936P) show that the overall safety systems'

reliabilities are not dominated by the reliabilities of the logic system, but by that of the mechanical components, (e.g., pumps and valves), which are consequently tested on a more frequent basis. Since the probability of a relay or contact failure is small relative to the probability of mechanical component failure, increasing the Logic System Functional Test interval represents no significant change in the overall safety system unavailability."

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

TS 3.3.5.1 Emergency Core Cooling System (ECCS) Instrumentation

As stated in the TS Bases, the purpose of the ECCS instrumentation is to initiate appropriate responses from the systems to ensure the fuel is adequately cooled in the event of a DBA or transient. For most AOOs and DBAs, a wide range of dependent and independent parameters are monitored. The ECCS instrumentation actuates:

- Core Spray (CS) System.
- Low Pressure Coolant Injection (LPCI) mode of RHR.
- High Pressure Coolant Injection (HPCI) System.
- Automatic Depressurization System (ADS).
- Diesel generators.

The following SRs were evaluated relative to extending their respective testing intervals. These SRs ensure the availability of safety functions that respond to plant transients and design basis events. Potential time-based considerations, such as instrument drift, failure types and frequencies, as well as other qualitative measures of system availability, were evaluated during this effort. The evaluation results and an explanation of how the results justify the surveillance interval extension are discussed below:

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 1.a CS System - Reactor Vessel Water Level - Low Low Low, Level 1
As stated in the TS Bases, low RPV water level indicates the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage can result. Core Spray (CS), associated DGs, and Plant Service Water (PSW) Turbine Building isolation are initiated at Level 1 to ensure CS is available to prevent or minimize fuel damage.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and Rosemount trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1-1 (every 12 hours). Therefore, an

increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 1.b CS System - Drywell Pressure - High

As stated in the TS Bases, high pressure in the drywell could indicate a break in the RCPB. CS, associated DGs, and PSW Turbine Building isolation are initiated upon receipt of the Drywell Pressure - High Function in order to minimize the possibility of fuel damage. The Drywell

Pressure - High Function, along with the Reactor Water Level - Low Low Low, Level 1 Function, is directly assumed in the analysis of the recirculation line break. The core cooling function of the ECCS, along with the scram action of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.(2) The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.(3) The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 1.c CS System - Reactor Steam Dome Pressure – Low (Injection Permissive)

As stated in the TS Bases, low reactor steam dome pressure signals are used as permissives for the CS. This ensures, prior to opening the CS injection valves, the RPV pressure has fallen to a value below these subsystems' maximum design pressure. The Reactor Steam Dome Pressure - Low is one of the functions assumed to be OPERABLE and capable of permitting initiation of the ECCS during the transients analyzed in the FSAR. In addition, the Reactor Steam Dome Pressure - Low Function is directly assumed in the analysis of the recirculation line break. The core cooling function of the ECCS, along with the scram action of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Rosemount and Barton transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is

operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 1.d CS System - Core Spray Pump Discharge Flow - Low (Bypass)

As stated in the TS Bases, the minimum flow instruments are provided to protect the associated CS pump from overheating when the pump is operating and the associated injection valve is not fully open. The minimum flow line valve is opened when low flow is sensed, and the valve is automatically closed when the flow rate is adequate to protect the pump. The CS Pump Discharge Flow - Low Function is assumed to be OPERABLE and capable of closing the minimum flow valves to ensure the CS flows assumed during the transients and accidents analyzed in the FSAR are met. The core cooling function of the ECCS, along with the scram action of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 2.a LPCI System - Reactor Vessel Water Level - Low Low Low, Level 1

As stated in the TS Bases, low RPV water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage can result. LPCI, associated DGs, and PSW Turbine Building isolation are initiated at Level 1 to ensure the flooding function is available to prevent or minimize fuel damage.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and Rosemount trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during

the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the associated surveillance tests demonstrates that failures affecting this safety function are rarely observed during this SR activity. For both units, over the time period monitored, only one Category D safety function failure occurred. This failure involved a relay failure during the performance of RHR System LPCI LSFT & Auto Actuation surveillance test 42SV-E11-001-1S. The relay was replaced and the test was completed satisfactorily. Twelve performances of the RHR System LPCI LSFT & Auto

Actuation surveillance tests for both units over the span of 1991 to 1999 were reviewed, and the results show this is a unique failure.

This unique single failure is not indicative of a time-based failure mechanism and does not represent a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 2.b LPCI System - Drywell Pressure - High

As stated in the TS Bases, high pressure in the drywell could indicate a break in the RCPB. LPCI, associated DGs, and PSW Turbine Building isolation are initiated upon receipt of the Drywell Pressure - High Function in order to minimize the possibility of fuel damage. The Drywell Pressure - High Function, along with the Reactor Water Level - Low Low Low, Level 1 Function, is directly assumed in the analysis of the recirculation line break. The core cooling function of the ECCS, along with the scram action of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is

operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the associated surveillance tests demonstrates that failures affecting this safety function are rarely observed during this SR activity. For both units, over the time period monitored, only one Category D safety function failure occurred. This failure involved a relay failure during the performance of RHR System LPCI LSFT & Auto Actuation surveillance test 42SV-E11-001-1S. The relay was replaced and the test was completed satisfactorily. Twelve performances of the RHR System LPCI LSFT & Auto Actuation surveillance tests for both units over the span of 1991 to 1999 were reviewed, and the results show this is a unique failure.

This unique single failure is not indicative of a time-based failure mechanism and does not represent a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 2.c LPCI System - Reactor Steam Dome Pressure – Low (Injection Permissive)

As stated in the TS Bases, low reactor steam dome pressure signals are used as permissives for the LPCI. This ensures, prior to opening the LPCI injection valves, the RPV pressure has fallen to a value below these subsystems' maximum design pressure. The Reactor Steam Dome Pressure - Low is one of the functions assumed to be OPERABLE and capable of permitting initiation of the ECCS during the transients analyzed in the FSAR. In addition, the Reactor Steam Dome Pressure - Low Function is directly assumed in the analysis of the recirculation line break. The core cooling function of the ECCS, along with the scram action of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton and Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during

the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04. The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335. The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the associated surveillance tests demonstrates that failures affecting this safety function are rarely observed during this SR activity. For both units, over the time period monitored, there were only two Category D safety function failures as detailed below:

1. During performance of surveillance test 42SV-E11-001-1S, a relay failed. The relay was replaced, and the retest was completed satisfactorily. Twelve performances of 42SV-E11-001-1(2)S for both units over the span of 1991 to 1999 were reviewed, and the results show this is a unique failure.

2. During performance of surveillance test 42SV-E11-004-2S, a relay failed to actuate. The problem was traced to the valve 2E11-F009 limit switch that was found to be out of adjustment. Thirteen performances of 42SV-E11-004-1(2)S for both units over the span of 1990 to 1999 were reviewed, and the results show this is a unique failure.

Each single failure described above is unique and, thus, is not indicative of a time-based failure mechanism. Neither failure represents a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 2.d LPCI System - Reactor Steam Dome Pressure – Low (Recirculation Discharge Valve Permissive)

As stated in the TS Bases, low reactor steam dome pressure signals are used as permissives for recirculation discharge valve closure. This ensures the LPCI subsystems inject into the proper RPV location assumed in the safety analysis. The Reactor Steam Dome Pressure - Low is one of the Functions assumed to be OPERABLE and capable of closing the valve during the transients analyzed in the FSAR. The core cooling function of the ECCS, along with the scram action of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46. The Reactor Steam Dome Pressure - Low Function is directly assumed in the analysis of the recirculation line break.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton and Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.(2) The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.(3) The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the associated surveillance tests demonstrates that failures affecting this safety function are rarely observed during this SR activity. For both units, over the time period monitored, only two Category D safety function failures occurred as detailed below:

1. During performance of surveillance test 42SV-E11-001-1S, a relay failed. The relay was replaced and the test was completed satisfactorily. Twelve performances of 42SV-E11-001-1(2)S for both units over the span of 1991 to 1999 were reviewed, and the results show this is a unique failure.

2. During performance of surveillance test 42SV-E11-004-2S, a relay failed to actuate. The problem was traced to the valve 2E11-F009 limit switch that was found to be out of adjustment. Thirteen performances of 42SV-E11-004-1(2)S for both units over the span of 1990 to 1999 were reviewed, and the results show this is a unique failure.

Each single failure described above is unique and, thus, is not indicative of a time-based failure mechanism. Neither failure represents a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 2.e LPCI System - Reactor Vessel Shroud Level - Level 0

As stated in the TS Bases, the Level 0 function is provided as a permissive to allow the RHR System to be manually aligned from the LPCI mode to the suppression pool cooling/spray or drywell spray modes. The permissive ensures water in the RPV is approximately two-thirds core height before the manual transfer is allowed. This ensures LPCI is available to prevent or minimize fuel damage. This function may be overridden during accident conditions as allowed by plant procedures. RPV Shroud Level-Level 0 Function is implicitly assumed in the analysis of the recirculation line break, since the analysis assumes that no LPCI flow diversion occurs when reactor water level is below Level 0.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04[(2)]. The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335[(3)]. The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 2.f ***LPCI System*** **- Low Pressure Coolant Injection Pump Start – Time Delay Relay**

As stated in the TS Bases, the purpose of this time delay is to stagger the start of the LPCI pumps that are in each of Divisions 1 and 2, thus limiting the starting transients on the 4.16 kV emergency buses. This Function is only necessary when power is being supplied from the standby power source (DG). The LPCI Pump Start-Time Delay Relays are assumed to be OPERABLE in the accident and transient analyses requiring ECCS initiation. That is, the analyses assume that the pumps will initiate when required and excess loading will not cause failure of the power sources.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Struthers Dunn Time Delay Relays perform this Function.

An evaluation of the surveillance interval extension for the time delay relays was performed, based upon the approach described in GL 91-04.[2] The drift associated with the time delay relays was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints. The drift for the extended surveillance interval relative to Allowable Value was also considered, and as a result, the Allowable Value is changed from "9 - 11 seconds" to "9 to 15 seconds."

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the associated surveillance tests [57SV-E11-006-1(2)S] demonstrates that failures affecting this safety function are rarely observed during this SR activity. For both units, over the time period monitored (1991 through 1999), there were only three instances of Category D safety function failures. Two of the failures involved time delay relays that did not trip and the third failure involved a time delay relay found to be Inoperable. The associated surveillance tests for both units were reviewed. The results indicated a total of 77 relay calibrations with only three of Category D safety function failures.

Although the failure mechanisms were not specifically determined these failures do not appear to be indicative of a time-based failure mechanism. The limited number of failures is not indicative of a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the associated surveillance tests demonstrates that failures affecting this safety function are rarely observed during this SR activity. For both units, over the time period monitored, only one Category D safety function failure occurred. This failure involved a relay failure during the performance of RHR System LPCI LSFT & Auto Actuation surveillance test 42SV-E11-001-1S. The relay was replaced and the test was completed satisfactorily. Twelve performances of RHR System LPCI LSFT & Auto Actuation surveillance tests for both units over the span of 1991 to 1999 were reviewed, and the results show this is a unique failure.

This unique single failure is not indicative of a time-based failure mechanism and does not represent a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 2.f LPCI System - Low Pressure Coolant Injection Pump Start – Time Delay Relay; Pumps A, B, D
Allowable Value ≥ 9 seconds and ≤ 11 seconds

The follow justification supports a proposed change in the TS Allowable Value (AV) for the LPCI pump start time delay relays as stated in TS Table 3.3.5.1-1, Function 2.f.

The current Allowable Value range for the LPCI pump start time delay relays is ≥ 9 seconds and ≤ 11 seconds for pumps A, B, and D. The following discussion provides justification to change the Allowable Value range for the LPCI pump start time delay relay to ≥ 9 seconds and ≤ 15 seconds.

The purpose of the time delay range is to have the timing sequence set as follows:

1. Long enough so that most of the starting transient of the first pump is complete before starting the second pump on the same 4160 V emergency bus, and

2. Fast enough to maintain the overall ECCS response time within the constraints of the LOCA analysis.

It is desired to extend the higher range of the time delays for these pumps to a value that will support the proposed 24-month SR based upon the drift analysis conclusion, while maintaining the values specified within the LOCA analysis. The HNP LOCA analysis(7) incorporates values for some ECCS performance parameters that are more conservative than the expected equipment performance. The intent was to perform the analysis in a very conservative manner relative to the expected equipment performance to support relaxation of equipment requirements. This analysis is the basis for relaxing the Allowable Value range for the LPCI pump start time delay relay.

LPCI is an independent operating mode of the RHR System. There are two LPCI subsystems, each consisting of two motor-driven pumps and piping and valves to transfer water from the suppression pool to the RPV via the corresponding recirculation loop. The LPCI subsystems are designed to provide core cooling at low RPV pressure. Upon receipt of an initiation signal, all four LPCI pumps are automatically started. All pumps start immediately if power is provided by the 1D (Unit 2 - 2D) Startup Auxiliary Transformer (SAT). If power is provided the by the 1C (Unit 2 - 2C) SAT or the DGs, the C pump will start within 1 second after AC power is available. Pumps A, B, and D are started approximately 10 seconds after AC power is available.

The purpose of the Low Pressure Coolant Injection Pump Start - Time Delay Relay Function is to stagger the start the LPCI pumps that are in Divisions 1 and 2, thus limiting the starting transients on the 4160V emergency buses. The Function is, therefore, only necessary when power is being supplied from the emergency diesels. The LPCI Pump Start–Time Delay Relays are assumed to be OPERABLE in the accident and transient analyses requiring ECCS initiation. That is, the analyses assume the pumps will initiate when required and excess loading will not cause failure of the emergency power sources. The lower range of the Allowable Value (≥ 9 seconds) remains the same; therefore, the Function to preclude excessive loading of the emergency power sources is not affected.

The LPCI subsystem monitors the pressure in the reactor to ensure that, before an injection valve opens, the reactor pressure has fallen to a value below the LPCI System's maximum design pressure. Additionally, instruments are provided to close the recirculation pump discharge valves to ensure that LPCI flow does not bypass the core when it injects into the recirculation lines.

The HNP LOCA analysis assumes that the maximum allowable time delay from the LOCA initiating signal to the LPCI pumps operating at rated speed and capable of rated flow is 64 seconds. The analysis also conservatively assumes a 21-second emergency DG startup time within maximum allowable time delay. This startup time is assumed from the initiation of the LOCA/LOSP signal to the 4160-V buses being powered from the emergency sources. The existing HNP TS require start up of the DGs from a standby condition within 12 seconds following an ECCS initiation signal. (SR 3.8.1.10). Since required power is available to the 4160-V buses 9 seconds sooner than that assumed in the safety analysis, increasing the upper range for the LPCI pump time delay relay by 4 seconds does not invalidate the analysis conclusions. Therefore, an upper range Allowable Value of ≤ 15 seconds will continue to support the ECCS Instrumentation Function as assumed in the safety analysis.

The proposed range of the LPCI pump time delay relays is ≥ 9 seconds and ≤ 15 seconds. This range supports the actual plant drift evaluations performed and will ensure ECCS instrumentation Function for extending the CHANNEL CALLIBRATION and LOGIC SYSTEM FUNCTIONAL TEST from 18 months to 30 months, including a 25% grace period.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 2.g LPCI System - Low Pressure Coolant Injection Pump Discharge Flow - Low (Bypass)

As stated in the TS Bases, the minimum flow instruments are provided to protect the associated LPCI pump from overheating when the pump is operating and the associated injection valve is not fully open. The minimum flow line valve is opened when low flow is sensed, and the valve is automatically closed when the flow rate is adequate to protect the pump. The LPCI Pump Discharge Flow - Low Function is assumed to be OPERABLE and capable of closing the minimum flow valves to ensure the LPCI flows assumed during the events analyzed in the FSAR are met. The core cooling function of the ECCS, along with the scram action of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04[(2)]. The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335[(3)]. The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.

The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the associated surveillance tests demonstrates that failures affecting this safety function are rarely observed during this SR activity. For both units, over the time period monitored, only one Category D safety function failure occurred. This failure involved a relay failure during the performance of RHR System LPCI LSFT & Auto Actuation surveillance test 42SV-E11-001-1S. The relay was replaced and the test was completed satisfactorily. Twelve performances of the RHR System LPCI LSFT & Auto Actuation surveillance tests for both units over the span of 1991 to 1999 were reviewed, and the results show this is a unique failure.

This unique single failure is not indicative of a time-based failure mechanism and does not represent a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 3.a HPCI System - Reactor Vessel Water Level – Low Low, Level 2

As stated in the TS Bases, low RPV water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage can result. Therefore, the HPCI System is initiated at Level 2 to maintain level above the top of the active fuel. While HPCI is not assumed to be OPERABLE in any DBA or transient analysis, the Reactor Vessel Water Level - Low Low, Level 2 is one of the functions capable of initiating HPCI during the transients analyzed in the FSAR and during a LOCA. The core cooling function of the ECCS, along with the scram action of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and Rosemount trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.(2) The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.(3) The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 3.b HPCI System - Drywell Pressure - High

As stated in the TS Bases, high pressure in the drywell could indicate a break in the RCPB. The HPCI System is initiated upon receipt of the Drywell Pressure - High Function in order to minimize the possibility of fuel damage. While HPCI is not assumed to be OPERABLE in any DBA or transient analysis, the Drywell Pressure - High Function is capable of initiating HPCI during a LOCA. The core cooling function of the ECCS, along with the scram action of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 3.c HPCI System - Reactor Vessel Water Level – High, Level 8

As stated in the TS Bases, high RPV water level indicates sufficient cooling water inventory exists in the RPV such that there is no danger to the fuel. Therefore, the Level 8 signal is used to trip the HPCI turbine to prevent overflow into the MSLs. The Reactor Vessel Water Level - High, Level 8 Function is not assumed in the accident and transient analyses. It was retained since it is a potentially significant contributor to risk.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton and Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 3.d HPCI System - Condensate Storage Tank Level – Low

As stated in the TS Bases, low level in the condensate storage tank (CST) indicates the unavailability of an adequate supply of makeup water from this normal source. Normally the suction valves between HPCI and the CST are open, and upon receiving a HPCI initiation signal, water for HPCI injection is taken from the CST. However, if the water level in the CST falls below a pre-selected level, first the suppression pool suction valves automatically open, and then the CST suction valve automatically closes. This ensures an adequate supply of makeup water is available to the HPCI pump. To prevent losing suction to the pump, the suction valves are interlocked so that the suppression pool suction valves must be open before the CST suction valve automatically closes. While HPCI is not assumed to be OPERABLE in any DBA or transient analysis, the Function is implicitly assumed if HPCI is to be utilized, since the long-term use of HPCI during a DBA requires the HPCI suction source to be the suppression pool.

SR 3.3.5.1.3 Perform CHANNEL FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from once every 92 days to once every 24 months, for a maximum interval of 30 months, including the 25% grace period. The SR is also being changed from a CHANNEL CALIBRATION to a CHANNEL FUNCTIONAL TEST. Magnetrol and Robertshaw float switches perform this Function. The float switches are mechanical devices that require mechanical setting at the proper level only. The devices cannot be significantly adjusted, without a physical change in the location of the installation. Therefore, the CHANNEL CALIBRATION is not a proper requirement for this type of device, and a CHANNEL FUNCTIONAL TEST is much more appropriate.

An evaluation of the surveillance interval extension was performed, based upon the approach described in GL 91-04.[2] Because these float switches cannot be significantly calibrated and are mechanical devices in nature, drift does not apply to the devices. Therefore, an increase in surveillance interval does not affect the float switches relative to accuracy. Thus, the extension of this SR test interval is based upon a review of the surveillance test history.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that failures are rarely observed during this SR activity and no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 3.e HPCI System - Suppression Pool Water Level – High

As stated in the TS Bases, excessively high suppression pool water level can result in the loads on the suppression pool exceeding design values should blowdown of RPV pressure through the S/RVs occur. Therefore, signals indicating high suppression pool water level are used to transfer the suction source of HPCI from the CST to the suppression pool to eliminate the possibility of HPCI continuing to provide additional water from a source outside containment. To prevent losing suction to the pump, the suction valves are interlocked so that the suppression pool suction valves must be open before the CST suction valve automatically closes. While HPCI is not assumed to be OPERABLE in any DBA or transient analysis, this Function is implicitly assumed if HPCI is to be utilized, since the long-term use of HPCI during a DBA requires the HPCI suction source to be the suppression pool.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[(2)] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[(3)] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for this parameter reveals that only a single Category D safety function failure occurred. The single Category D safety function failure for this parameter involved transmitter 1E41-N062B. The transmitter was not responding properly and could not be calibrated satisfactorily. During the subsequent maintenance activity, air was purged from the sensing lines, and the transmitter was calibrated satisfactorily. Air entering the sensing lines is not a time-based failure mechanism. The review of the surveillance history shows that this was the only Category D failure of this type for all of the ATTS transmitters over the entire data sample (over 1500 calibration tests).

Because this was the only failure of this type, a pattern of repetitive failures is not indicated. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.

The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 3.f HPCI System - High Pressure Coolant Injection Pump Discharge Flow – Low (Bypass)

As stated in the TS Bases, the minimum flow instruments are provided to protect the HPCI pump from overheating when the pump is operating and the associated injection valve is not fully open. The minimum flow line valve is opened when low flow is sensed, and the valve is automatically closed when the flow rate is adequate to protect the pump. Although HPCI is not assumed to be OPERABLE in any DBA or transient analysis, the High Pressure Coolant Injection Pump Discharge Flow - Low Function is capable of closing the minimum flow valve to ensure the HPCI flow provided, if HPCI is utilized during the transients and accidents analyzed in the FSAR, is adequate. The core cooling function of the ECCS, along with the scram action of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.(2) The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.(3) The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints. The drift for the extended surveillance interval relative to Allowable Value was also considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 4.a ADS Trip System A - Reactor Vessel Water Level - Low Low Low, Level 1

As stated in the TS Bases, low RPV water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage can result. Therefore, ADS receives one of the signals necessary for initiation from this Function. The Reactor Vessel Water Level - Low Low Low, Level 1 is one of the Functions assumed to be OPERABLE and capable of initiating the ADS during the accidents analyzed in the FSAR. The core cooling function of the ECCS, along with the scram action of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and Rosemount trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.(2) The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.(3) The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 4.b ADS Trip System A - Drywell Pressure - High

As stated in the TS Bases, high pressure in the drywell could indicate a break in the RCPB. Therefore, ADS receives one of the signals necessary for initiation from this Function in order to minimize the possibility of fuel damage. The Drywell Pressure - High is assumed to be OPERABLE and capable of initiating the ADS during the accidents analyzed in the FSAR. The core cooling function of the ECCS, along with the scram action of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 4.c ADS Trip System A - Automatic Depressurization System Initiation Timer

As stated in the TS Bases, the purpose of the ADS Initiation Timer is to delay depressurization of the RPV to allow the HPCI System time to maintain RPV water level. Since the rapid depressurization caused by ADS operation is one of the most severe transients on the RPV, its occurrence should be limited. By delaying initiation of the ADS Function, the operator is given the chance to monitor the success or failure of the HPCI System to maintain water level, and then to decide whether or not to allow ADS to initiate, to delay initiation further by recycling the timer, or to inhibit initiation permanently. The Automatic Depressurization System Initiation Timer Function is assumed to be OPERABLE for the accident analyses of the FSAR that require ECCS initiation and assume failure of the HPCI System.

There are two ADS Initiation Timer relays, one in each of the two ADS trip systems. The Allowable Value for the ADS Initiation Timer is chosen so that there is still time after depressurization for the low-pressure ECCS subsystems to provide adequate core cooling.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Agastat Time Delay Relays perform this Function.

An evaluation of the surveillance interval extension for the time delay relays was performed, based upon the approach described in GL 91-04.[2] The drift associated with the time delay relays was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the associated surveillance tests (57SV-B21-017-1(2)S) demonstrates that failures affecting this safety function are rarely observed during this SR activity. For both units, over the time period monitored (1991 through 1999), there were only two instances of Category D safety function failures. Both failures involved time delay relays found to be Inoperable. The associated surveillance tests for both units were reviewed. The results indicated a total of 85 relay calibrations with only two Category D safety function failures.

Although the failure mechanisms were not specifically determined these failures do not appear to be indicative of a time-based failure mechanism. The limited number of failures is not indicative of a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 4.d ADS Trip System A - Reactor Vessel Water Level – Low, Level 3 (Confirmatory)

As stated in the TS Bases, the Reactor Vessel Water Level - Low, Level 3 Function is used by the ADS only as a confirmatory low water level signal. The ADS receives one of the signals necessary for initiation from reactor vessel water level - low low low, Level 1 signals. In order to prevent spurious initiation of the ADS due to spurious Level 1 signals, a Level 3 signal must also be received before ADS initiation commences.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[(2)] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[(3)] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 4.e ADS Trip System A - Core Spray Pump Discharge Pressure - High

As stated in the TS Bases, the Pump Discharge Pressure - High signals from the CS and LPCI pumps are used as permissives for ADS initiation, indicating there is a source of low-pressure cooling water available once the ADS has depressurized the RPV. Pump Discharge Pressure - High is one of the Functions assumed to be OPERABLE and capable of permitting ADS initiation during the events analyzed in the FSAR with an assumed HPCI failure. For these events, the ADS depressurizes the RPV so that the low-pressure ECCS can perform the core cooling functions. This core cooling function of the ECCS, along with the scram action of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.(2) The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.(3) The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 4.f ADS Trip System A - Low Pressure Coolant Injection Pump Discharge Pressure - High

As stated in the TS Bases, the Pump Discharge Pressure - High signals from the CS and LPCI pumps are used as permissives for ADS initiation, indicating that there is a source of low pressure cooling water available once the ADS has depressurized the RPV. Pump Discharge Pressure - High is one of the Functions assumed to be OPERABLE and capable of permitting ADS initiation during the events analyzed in the FSAR with an assumed HPCI failure. For these events, the ADS depressurizes the RPV so that the low-pressure ECCS can perform the core cooling functions. This core cooling function of the ECCS, along with the scram action of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton and Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A

CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.(2) The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.(3) The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 4.g ADS Trip System A - Automatic Depressurization System Low Water Level Actuation Timer

As stated in the TS Bases, one of the signals required for ADS initiation is Drywell Pressure - High. However, if the event requiring ADS initiation occurs outside the drywell (e.g., MSL break outside containment), a high drywell pressure signal may never be present. Therefore, the ADS Low Water Level Actuation Timer is used to bypass the Drywell Pressure - High Function after a certain time period has elapsed. Operation of the ADS Low Water Level Actuation Timer Function is not assumed in any accident analysis. The instrumentation is retained in the TS, because the ADS is part of the primary success path for mitigation of a DBA. There are four ADS Low Water Level Actuation Timer relays, two in each of the two ADS trip systems. The Allowable Value for the ADS Low Water Level Actuation Timer is chosen to ensure there is still time after depressurization for the low-pressure ECCS subsystems to provide adequate core cooling.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Agastat Time Delay Relays perform this Function.

An evaluation of the surveillance interval extension for the time delay relays was performed, based upon the approach described in GL 91-04.[(2)] The drift associated with the time delay relays was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[(3)] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the associated surveillance tests (57SV B21-017-1(2)S) demonstrates that failures affecting this safety function are rarely observed during this SR activity. For both units, over the time period monitored (1991 through 1999), only two instances of Category D safety function failures occurred. Both failures involved time delay relays found to be inoperable. The associated surveillance tests for both units were reviewed. The results indicated a total of 85 relay calibrations, with only two Category D safety function failures.

Although the failure mechanisms were not specifically determined, the failures do not appear to be indicative of a time-based failure mechanism. The limited number of failures is not indicative of a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 5.a ADS Trip System B - Reactor Vessel Water Level - Low Low Low, Level 1

As stated in the TS Bases, low RPV water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage can result. Therefore, ADS receives one of the signals necessary for initiation from this Function. The Reactor Vessel Water Level - Low Low Low, Level 1 is one of the Functions assumed to be OPERABLE and capable of initiating the ADS during the accidents analyzed in the FSAR. The core cooling function of the ECCS, along with the scram action of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and Rosemount trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI

TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 5.b ADS Trip System B - Drywell Pressure - High

As stated in the TS Bases, high pressure in the drywell could indicate a break in the RCPB. Therefore, ADS receives one of the signals necessary for initiation from this Function in order to minimize the possibility of fuel damage. The Drywell Pressure - High is assumed to be OPERABLE and capable of initiating the ADS during the accidents analyzed in the FSAR. The core cooling function of the ECCS, along with the scram action of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 5.c ADS Trip System B - ADS Initiation Timer

As stated in the TS Bases, the purpose of the ADS Initiation Timer is to delay depressurization of the RPV to allow the HPCI System time to maintain RPV water level. Since the rapid depressurization caused by ADS operation is one of the most severe transients on the RPV, its occurrence should be limited. By delaying initiation of the ADS Function, the operator is given the chance to monitor the success or failure of the HPCI System to maintain water level, and then to decide whether or not to allow ADS to initiate, to delay initiation further by recycling the timer, or to inhibit initiation permanently. The Automatic Depressurization System Initiation Timer Function is assumed to be OPERABLE for the accidents analyzed in the FSAR that require ECCS initiation and assume failure of the HPCI System.

There are two ADS Initiation Timer relays, one in each of the two ADS trip systems. The Allowable Value for the ADS Initiation Timer is chosen so that there is still time after depressurization for the low-pressure ECCS subsystems to provide adequate core cooling.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Agastat Time Delay Relays perform this Function.

An evaluation of the surveillance interval extension for the time delay relays was performed, based upon the approach described in GL 91-04.[(2)] The drift associated with the time delay relays was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[(3)] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the associated surveillance tests (57SV-B21-017-1(2)S) demonstrates that failures affecting this safety function are rarely observed during this SR activity. For both units, over the time period monitored (1991 through 1999), there were only two instances of Category D safety function failures. Both failures involved time delay relays found to be Inoperable. The associated surveillance tests for both units were reviewed. The results indicated a total of 85 relay calibrations with only two Category D safety function failures.

Although the failure mechanisms were not specifically determined these failures do not appear to be indicative of a time-based failure mechanism. The limited number of failures is not indicative of a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 5.d ADS Trip System B - Reactor Vessel Water Level – Low, Level 3 (Confirmatory)

As stated in the TS Bases, the Reactor Vessel Water Level - Low, Level 3 function is used by the ADS only as a confirmatory low water level signal. ADS receives one of the signals necessary for initiation from reactor vessel water level - low low low, Level 1 signals. In order to prevent spurious initiation of the ADS due to spurious Level 1 signals, a Level 3 signal must also be received before ADS initiation commences.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 5.e ADS Trip System B - Core Spray Pump Discharge Pressure - High

As stated in the TS Bases, the Pump Discharge Pressure - High signals from the CS and LPCI pumps are used as permissives for ADS initiation, indicating that there is a source of low pressure cooling water available once the ADS has depressurized the RPV. Pump Discharge Pressure - High is one of the functions assumed to be OPERABLE and capable of permitting ADS initiation during the events analyzed in the FSAR with an assumed HPCI failure. For these events, the ADS depressurizes the RPV so that the low-pressure ECCS can perform the core cooling functions. This core cooling function of the ECCS, along with the scram action of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.(2) The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.(3) The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for this parameter reveals only a single Category D safety function occurred. The single Category D safety function failure for this parameter involved transmitter 2E21-N055A. The transmitter could not be calibrated and was subsequently replaced. The review of the surveillance history shows that this was the only Category D failure of this type for all of the ATTS transmitters over the entire data sample (over 1500 calibration tests).

Because this was the only failure of this type it does not indicate a repetitive pattern. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

> "Industry reliability studies for boiling water reactors (BWRs), prepared by the BWR Owners Group (NEDC-30936P) show that the overall safety systems' reliabilities are not dominated by the reliabilities of the logic system, but by that of the mechanical components, (e.g., pumps and valves), which are consequently tested on a more frequent basis. Since the probability of a relay or contact failure

is small relative to the probability of mechanical component failure, increasing the Logic System Functional Test interval represents no significant change in the overall safety system unavailability."

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 5.f ADS Trip System B - Low Pressure Coolant Injection Pump Discharge Pressure - High

As stated in the TS Bases, the Pump Discharge Pressure - High signals from the CS and LPCI pumps are used as permissives for ADS initiation, indicating that there is a source of low pressure cooling water available once the ADS has depressurized the RPV. Pump Discharge Pressure - High is one of the functions assumed to be OPERABLE and capable of permitting ADS initiation during the events analyzed in the FSAR with an assumed HPCI failure. For these events, the ADS depressurizes the RPV so that the low-pressure ECCS can perform the core cooling functions. This core cooling function of the ECCS, along with the scram action of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton and Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04. The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335. The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period.

This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.1-1 Emergency Core Cooling System Instrumentation
Function 5.g ADS Trip System B - Automatic Depressurization System Low Water Level Actuation Timer

As stated in the TS Bases, one of the signals required for ADS initiation is Drywell Pressure - High. However, if the event requiring ADS initiation occurs outside the drywell (e.g., MSL break outside containment), a high drywell pressure signal may never be present. Therefore, the ADS Low Water Level Actuation Timer is used to bypass the Drywell Pressure - High Function after a certain time period has elapsed. Operation of the ADS Low Water Level Actuation Timer Function is not assumed in any accident analysis. The instrumentation is retained in the TS, because the ADS is part of the primary success path for mitigation of a DBA. There are four ADS Low Water Level Actuation Timer relays, two in each of the two ADS trip systems. The Allowable Value for the ADS Low Water Level Actuation Timer is chosen to ensure there is still time after depressurization for the low-pressure ECCS subsystems to provide adequate core cooling.

SR 3.3.5.1.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Agastat Time Delay Relays perform this Function.

An evaluation of the surveillance interval extension for the time delay relays was performed, based upon the approach described in GL 91-04.[(2)] The drift associated with the time delay relays was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the associated surveillance tests (57SV-B21-017-1(2)S) demonstrates that failures affecting this safety function are rarely observed during this SR activity. For both units, over the time period monitored (1991 through 1999), there were only two instances of Category D safety function failures. Both failures involved time delay relays found to be Inoperable. The associated surveillance tests for both units were reviewed. The results indicated a total of 85 relay calibrations with only two Category D safety function failures.

Although the failure mechanisms were not specifically determined these failures do not appear to be indicative of a time-based failure mechanism. The limited number of failures is not indicative of a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.1.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the ECCS logic for specific trips will function as designed in response to an analyzed condition. Justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

TS 3.3.5.2 Reactor Core Isolation Cooling (RCIC) System Instrumentation

As stated in the TS Bases, the purpose of the RCIC System instrumentation is to initiate actions to ensure adequate core cooling when the RPV is isolated from its primary heat sink (the main condenser) and normal coolant makeup flow from the Reactor Feedwater System is unavailable, such that RCIC System initiation occurs and maintains sufficient reactor water level so initiation of the low pressure ECCS pumps does not occur. The RCIC System may be initiated by automatic means. Automatic initiation occurs for conditions of reactor vessel water level - low low, Level 2. The RCIC test line isolation valve is closed on a RCIC initiation signal to allow full system flow.

The RCIC System also monitors the water levels in the CST and the suppression pool, since these are the two sources of water for RCIC operation. Reactor grade water in the CST is the normal source. Upon receipt of a RCIC initiation signal, the CST suction valve is automatically signaled to open (it is normally in the open position) unless the pump suction valves from the suppression pool are open. If the water level in the CST falls below a preselected level, first the suppression pool suction valves automatically open, and then the CST suction valve automatically closes.

The RCIC System provides makeup water to the reactor until the RPV water level reaches the high water level (Level 8) trip, at which time the RCIC steam supply and cooling water supply valves close. (The injection valve also closes due to the closure of the steam supply valve.) The RCIC System restarts if RPV level again drops to the low-level initiation point (Level 2).

The RCIC System is not an Engineered Safety Feature (ESF) System and no credit is taken in the safety analyses for RCIC System operation. Extending the SR Frequency is acceptable, because the RCIC System, along with the RCIC System initiation logic, is designed to be highly reliable.

The following SRs were evaluated relative to extending their respective testing intervals. These SRs ensure the availability of safety functions that respond to plant transients and design basis events. Potential time-based considerations, such as instrument drift, failure types and frequencies, as well as other qualitative measures of system availability, were evaluated during this effort. The evaluation results and an explanation of how the results justify the surveillance interval extension are discussed below:

Table 3.3.5.2-1 Reactor Core Isolation Cooling System Instrumentation
Function 1 Reactor Vessel Water Level – Low Low, Level 2

As stated in the TS Bases, low RPV water level indicates that normal feedwater flow is insufficient to maintain RPV water level and that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage can result. Therefore, the RCIC System is initiated at Level 2 to assist in maintaining water level above the top of the active fuel.

SR 3.3.5.2.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and Rosemount trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.2.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.2.1 (every 12 hours). Therefore, an increase

in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04[2]. The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335[3]. The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.2.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the RCIC logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.2.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.2.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.2-1 Reactor Core Isolation Cooling System Instrumentation
Function 2 Reactor Vessel Water Level – High, Level 8

As stated in the TS Bases, high RPV water level indicates that sufficient cooling water inventory exists in the RPV such that there is no danger to the fuel. Therefore, the Level 8 signal is used to close the RCIC steam supply and cooling water supply valves to prevent overflow into the MSLs. (The injection valve also closes due to the closure of the steam supply valve.)

SR 3.3.5.2.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton and Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.5.2.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.5.2.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[(2)] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[(3)] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.2.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the RCIC logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.5.2.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.5.2.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.2-1 Reactor Core Isolation Cooling System Instrumentation
Function 3 Condensate Storage Tank Level – Low

As stated in the TS Bases, low level in the CST indicates the unavailability of an adequate supply of makeup water from this normal source. Normally, the suction valve between the RCIC pump and the CST is open, and upon receiving a RCIC initiation signal, water for RCIC injection is taken from the CST. However, if the water level in the CST falls below a pre-selected level, first the suppression pool suction valves automatically open, and then the CST suction valve automatically closes. This ensures an adequate supply of makeup water is available to the RCIC pump. To prevent losing suction to the pump, the suction valves are interlocked so that the suppression pool suction valves must be open before the CST suction valve automatically closes.

SR 3.3.5.2.3 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from once every 92 days to once every 24 months, for a maximum interval of 30 months, including the 25% grace period. The surveillance is also being changed from a CHANNEL CALIBRATION to a CHANNEL FUNCTIONAL TEST. Robertshaw float switches perform this Function. The float switches are mechanical devices that require mechanical setting at the proper level only. The devices cannot be significantly adjusted, without a physical change in the location of the installation. Therefore, the CHANNEL CALIBRATION is not a proper requirement for this type of device, and a CHANNEL FUNCTIONAL TEST is much more appropriate.

An evaluation of the surveillance interval extension was performed, based upon the approach described in GL 91-04.[2] Because these float switches cannot be significantly calibrated and are mechanical devices in nature, drift does not apply to the devices. Therefore, an increase in surveillance interval does not affect the float switches relative to accuracy. Therefore, the extension of this SR test interval is based upon a review of the surveillance test history.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that failures are rarely observed during this SR activity and no identified failure invalidates the conclusion that the effect, if any, on system availability is minimal from a change to a 184-day surveillance interval.

SR 3.3.5.2.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the RCIC logic for specific trips will function as designed in response to an analyzed condition. Justification for extending the surveillance test interval is that the network,

including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.5.2-1 Reactor Core Isolation Cooling System Instrumentation
Function 4 Suppression Pool Water Level – High

As stated in the TS Bases, excessively high suppression pool water level can result in the loads on the suppression pool exceeding design values, should there be a blowdown of the RPV pressure through the S/RVs. Therefore, signals indicating high suppression pool water level are used to transfer the suction source of RCIC from the CST to the suppression pool to eliminate the possibility of RCIC continuing to provide additional water from a source outside primary containment. To prevent losing suction to the pump, the suction valves are interlocked so that the suppression pool suction valves must be open before the CST suction valve automatically closes.

SR 3.3.5.2.3 Perform CHANNEL FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from once every 92 days to once every 24 months, for a maximum interval of 30 months, including the 25% grace period. The surveillance is also being changed from a CHANNEL CALIBRATION to a CHANNEL FUNCTIONAL TEST. Robertshaw float switches perform this Function. The float switches are mechanical devices that require mechanical setting at the proper level only. The devices cannot be significantly adjusted, without a physical change in the location of the installation. Therefore, the CHANNEL CALIBRATION is not a proper requirement for this type of device, and a CHANNEL FUNCTIONAL TEST is much more appropriate.

An evaluation of the surveillance interval extension was performed, based upon the approach described in GL 91-04.[(2)] Because these float switches cannot be significantly calibrated and are mechanical devices in nature, drift does not apply to the devices. Therefore, an increase in surveillance interval does not affect the float switches relative to accuracy. Therefore, the extension of this SR test interval is based upon a review of the surveillance test history. Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that failures are rarely observed during this SR activity. Out of 27 performances observed since January 1, 1997, only one Category D failure was observed. On October 5, 1997, during performance of the surveillance procedure, it was discovered the vent valve for switch 1E51-N062A was defective and would not open. After application of demineralized water to the line, the valve operated properly.

Since this is the only observance of this type of failure, it is considered a unique failure with no time-based failure mechanism. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.5.2.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the RCIC logic for specific trips will function as designed in response to an analyzed condition. Justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

TS 3.3.6.1 Primary Containment Isolation Instrumentation

As stated in the TS Bases, the primary containment isolation instrumentation automatically initiates closure of appropriate PCIVs. The function of the PCIVs, in combination with other accident mitigation systems, is to limit fission product release during and following postulated DBAs. Primary containment isolation within the time limits specified for the isolation valves designed to close automatically ensures the release of radioactive material to the environment will be consistent with the assumptions used in the analyses for a DBA.

The following SRs were evaluated relative to extending their respective testing intervals. These SRs ensure the availability of safety functions that respond to plant transients and design basis events. Potential time-based considerations, such as instrument drift, failure types and frequencies, as well as other qualitative measures of system availability, were evaluated during this effort. The evaluation results and an explanation of how the results justify the surveillance interval extension are discussed below:

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 1.a Main Steam Line Isolation - Reactor Vessel Water Level - Low Low Low, Level 1

As stated in the TS Bases, low RPV water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage could result. Therefore, isolation of the MSIVs and other interfaces with the RPV occurs to prevent offsite dose limits from being exceeded. The Reactor Vessel Water Level - Low Low Low, Level 1 Function is one of the many Functions assumed to be OPERABLE and capable of providing isolation signals. The Reactor Vessel Water Level - Low Low Low, Level 1 Function associated with isolation is assumed in the analysis of the recirculation line break. The isolation of the MSLs on Level 1 supports actions to ensure offsite dose limits are not exceeded for a DBA.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton and Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.6.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.(2) The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.(3) The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending

the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.7 Verify the ISOLATION SYSTEM RESPONSE TIME is within limits. (Unit 2 only)

The surveillance test interval for this SR, as applied to this Function, is being increased from once every 18 months on a STAGGERED TEST BASIS to once every 24 months on a STAGGERED TEST BASIS for a maximum interval of 30 months, including the 25% grace period. Channel sensors are excluded from this testing. This SR ensures the trip logic functions within the response time assumed in the analyses of the applicable analyzed event. Extending the surveillance test interval for the response time tests is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the Primary Containment and Drywell Isolation Instrumentation network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 1.b Main Steam Line Isolation - Main Steam Line Pressure – Low

As stated in the TS Bases, low MSL pressure with the reactor at power indicates that there may be a problem with the turbine pressure regulation, which can result in a low RPV water level condition and the RPV cooling down more than 100°F/hour if the pressure loss is allowed to continue. The Main Steam Line Pressure - Low Function is directly assumed in the analysis of the pressure regulator failure. For this event, closure of the MSIVs ensures the RPV temperature change limit (100°F/hour) is not reached. In addition, this Function supports actions to ensure SL 2.1.1.1 is not exceeded. (This Function closes the MSIVs prior to pressure decreasing below 785 psig, which results in a scram due to MSIV closure, thus reducing reactor power to < 25% of RTP.)

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the performance of more frequent CHANNEL CALIBRATIONS per SR 3.3.6.1.3 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 1.c Main Steam Line Isolation - Main Steam Line Flow - High

As stated in the TS Bases, Main Steam Line Flow - High is provided to detect a break of the MSL and to initiate closure of the MSIVs. If the steam is allowed to continue flowing out of the break, the reactor will depressurize and the core could uncover. If the RPV water level decreases too far, fuel damage could occur. Therefore, the isolation is initiated on high flow to prevent or minimize core damage. The Main Steam Line Flow - High Function is directly assumed in the analysis of the main steam line break (MSLB). The isolation action, along with the scram function of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46, and offsite doses do not exceed the 10 CFR 100 limits.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton and Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). A

CHANNEL CHECK is also performed per SR 3.3.6.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.7 Verify the ISOLATION SYSTEM RESPONSE TIME is within limits. (Unit 2-only)
The surveillance test interval for this SR, as applied to this Function, is being increased from once every 18 months on a STAGGERED TEST BASIS to once every 24 months on a

STAGGERED TEST BASIS for a maximum interval of 30 months, including the 25% grace period. Channel sensors are excluded from this testing. This SR ensures the trip logic functions within the response time assumed in the analyses of the applicable analyzed event. Extending the surveillance test interval for the RESPONSE TIME test is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the Primary Containment and Drywell Isolation Instrumentation network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 1.d Main Steam Line Isolation - Condenser Vacuum - Low

As stated in the TS Bases, the Condenser Vacuum - Low Function is provided to prevent overpressurization of the main condenser in the event of a loss of the main condenser vacuum. Since the integrity of the condenser is an assumption in offsite dose calculations, the Condenser Vacuum - Low Function is assumed to be OPERABLE and capable of initiating closure of the MSIVs. MSIV closure is initiated to prevent the addition of steam that leads to additional condenser pressurization and possible rupture of the diaphragm installed to protect the turbine exhaust hood, thereby preventing a potential radiation leakage path following an accident.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CALIBRATIONS per SR 3.3.6.1.3 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 1.e Main Steam Line Isolation - Main Steam Tunnel Temperature - High

As stated in the TS Bases, area temperature is provided to detect a leak in the RCPB and provides diversity to the high flow instrumentation. The isolation occurs when a very small leak has occurred. If the small leak is allowed to continue without isolation, offsite dose limits may be reached. However, credit for these instruments is not taken in any transient or accident analysis in the FSAR, since bounding analyses are performed for large breaks, such as MSLBs. Area temperature signals are initiated from RTDs (for the Main Steam Tunnel Temperature - High Function) located in the area being monitored.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This Function is performed by Weed RTDs with GE trip units. The RTDs are not calibrated, and as such, instrument drift does not apply to these devices. The trip units are functionally checked, and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units, or any other loop components, relative to drift. Therefore, the change in SR Frequency of the CHANNEL CALIBRATION does not affect the drift interval for any loop components. Therefore, a drift analysis was not performed for any of the loop components.

The calibration procedures require a comparison of RTD readings with other inservice RTDs and calibration of the remaining loop components, which meets the TS requirements. The TS Definition for CHANNEL CALIBRATION states:

> "Calibration of instrument channels with resistance temperature detector (RTD) or thermocouple sensors may consist of an inplace qualitative assessment of sensor behavior and normal calibration of the remaining adjustable devices in the channel."

Extending the surveillance test interval for the CHANNEL CALIBRATION is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). These checks confirm the major portions of the monitoring loop are maintained within allowances.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 1.f Main Steam Line Isolation - Turbine Building Area Temperature - High

As stated in the TS Bases, area temperature is provided to detect a leak in the RCPB and provides diversity to the high flow instrumentation. The isolation occurs when a very small leak has occurred. If the small leak is allowed to continue without isolation, offsite dose limits may be reached. However, credit for these instruments is not taken in any transient or accident analysis in the FSAR, since bounding analyses are performed for large breaks, such as MSLBs. Area temperature signals are initiated from a thermocouple/temperature switch combination (for the Turbine Building Area Temperature - High Function) located in the area being monitored.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Fenwal temperature switches (Unit 1) or L&N thermocouples and Transmation temperature switches (Unit 2) perform this Function. The calibration procedures require an OPERABILITY check of the thermocouples and calibration of the remaining loop components, which meets the TS. The TS Definition for CHANNEL CALIBRATION states:

"Calibration of instrument channels with resistance temperature detector (RTD) or thermocouple sensors may consist of an inplace qualitative assessment of sensor behavior and normal calibration of the remaining adjustable devices in the channel."

The loop OPERABILITY is also verified on a more frequent basis by CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). These tests confirm the major portions of the monitoring loop are maintained within allowances. The thermocouples are not calibrated, and as such, instrument drift does not apply to these devices.

An evaluation of the surveillance interval extension for the temperature switches was performed, based upon the approach described in GL 91-04.[2] The drift associated with the temperature switches was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for this SR demonstrates that safety function failures are rarely observed during this SR activity, especially considering the large number of instruments tested. Unit 1 uses Fenwall temperature switches that are calibrated every 18 months (test includes check of trip point). Unit 2 uses Transmation temperature switches that are functionally tested quarterly. (CHANNEL FUNCTIONAL TEST includes check of trip point).

On Unit 1, for the associated surveillance tests (57SV-U61-001-1S), over the time period monitored (1996 through 1999), 193 calibrations were performed with only two Category D safety function failures. Both failures involved switches that could not be calibrated. These failures were:

1. Switch 1U61-N113A could not be adjusted properly.

2. Switch 1U61-N113B would not repeat.

On Unit 2, for the associated surveillance tests (57SV-U61-001-2S), over the time period monitored (1995 through 2000), there were over 1600 calibrations performed without any Category D safety function failures.

Two failures out of the large number of temperature switches tested represent a very low failure rate. The failures that occurred do not suggest a time-based failure mechanism. Therefore, these failures do not represent a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period.

This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation System Instrumentation
Function 2.a Primary Containment Isolation - Reactor Vessel Water Level – Low Level 3

As stated in the TS Bases, low RPV water level indicates that the capability to cool the fuel may be threatened. The valves whose penetrations communicate with the primary containment are isolated to limit the release of fission products. The isolation of the primary containment on Level 3 supports actions to ensure offsite dose limits of 10 CFR 100 are not exceeded. The Reactor Vessel Water Level - Low, Level 3 Function associated with isolation is implicitly assumed in the FSAR analysis, as these leakage paths are assumed to be isolated post LOCA.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton and Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked, and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). A CHANNEL CHECK is also per SR 3.3.6.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI

TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 2.b Primary Containment Isolation - Drywell Pressure - High

As stated in the TS Bases, high drywell pressure can indicate a break in the RCPB inside the primary containment. The isolation of some of the primary containment isolation valves on high drywell pressure supports actions to ensure offsite dose limits of 10 CFR 100 are not exceeded. The Drywell Pressure - High Function, associated with isolation of the primary containment, is implicitly assumed in the FSAR accident analysis, as these leakage paths are assumed to be isolated post LOCA.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.

The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.6.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 2.c Primary Containment Isolation - Drywell Radiation - High

As stated in the TS Bases, high drywell radiation indicates possible gross failure of the fuel cladding. Therefore, when Drywell Radiation - High is detected, isolation is initiated to limit the release of fission products. However, this Function is not assumed in any transient or accident analysis in the FSAR, because other leakage paths (e.g., MSIVs) are more limiting.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. For the Drywell Radiation - High instruments, correct operation is confirmed by a Channel Check per SR 3.3.6.1.1 (every 12 hours) and a CHANNEL FUNCTIONAL TEST per SR 3.3.6.1.2 (every 92 days). The radiation detector is calibrated using a calibrated source as an input signal to the detector. The source check is performed by exposing the sensor-converter to a known source in a constant geometry. Source checks of radiation monitors are subject to far more uncertainties than electronic calibration checks because of source decay problems, positioning of the sources, signal strength, and the sensor response curves of that particular monitoring system. Because of the uncertainties associated with the calibration methods for these devices, any drift evaluation will provide no true indication of the instruments performance over time.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

> "Industry reliability studies for boiling water reactors (BWRs), prepared by the BWR Owners Group (NEDC-30936P) show that the overall safety systems' reliabilities are not dominated by the reliabilities of the logic system, but by that of the mechanical components, (e.g., pumps and valves), which are consequently tested on a more frequent basis. Since the probability of a relay or contact failure is small relative to the probability of mechanical component failure, increasing the

> Logic System Functional Test interval represents no significant change in the overall safety system unavailability."

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 2.d Primary Containment Isolation - Reactor Building Exhaust Radiation – High

As stated in the TS Bases, high secondary containment exhaust radiation is an indication of possible gross failure of the fuel cladding. The release may have originated from the primary containment due to a break in the RCPB. When Exhaust Radiation - High is detected, valves whose penetrations communicate with the primary containment atmosphere are isolated to limit the release of fission products. The Exhaust Radiation - High signals are initiated from radiation detectors that are located near the ventilation exhaust ductwork coming from the reactor building zone.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL CALIBRATION Tests per SR 3.3.6.1.3 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 2.e Primary Containment Isolation - Refueling Floor Exhaust Radiation – High

As stated in the TS Bases, high secondary containment exhaust radiation is an indication of possible gross failure of the fuel cladding. The release may have originated from the primary containment due to a break in the RCPB. When Exhaust Radiation - High is detected, valves whose penetrations communicate with the primary containment atmosphere are isolated to limit the release of fission products. The Exhaust Radiation - High signals are initiated from radiation detectors that are located near the ventilation exhaust ductwork coming from the refueling floor zones.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL CALIBRATION Tests per SR 3.3.6.1.3 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 3.a HPCI System Isolation - HPCI Steam Line Flow – High

As stated in the TS Bases, the HPCI Steam Line Flow-High Function is provided to detect a break of the HPCI steam lines and initiate closure of the HPCI steam line isolation valves. If the steam is allowed to continue flowing out of the break, the reactor will depressurize and the core can uncover. Therefore, the isolations are initiated on high flow to prevent or minimize core damage. The isolation action, along with the scram function of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46. Specific credit for this Function is not assumed in the FSAR accident analysis, since the bounding analysis is performed for large breaks (e.g., recirculation and MSL breaks). However, these instruments prevent the HPCI steam line breaks from becoming bounding.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton and Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.6.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 3.b HPCI System Isolation - HPCI Steam Supply Line Pressure – Low

As stated in the TS Bases, low MSL pressure indicates the pressure of the steam in the HPCI turbine may be too low to continue operation of the HPCI turbine. This isolation is for equipment protection and is not assumed in any transient or accident analysis in the FSAR. However, it also provides a diverse signal to indicate a possible system break. These instruments are included in TS because of the potential for risk due to possible failure of the instruments preventing HPCI initiation.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.6.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending

the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 3.c HPCI System Isolation - HPCI Turbine Exhaust Diaphragm Pressure – High

As stated in the TS Bases, high turbine exhaust diaphragm pressure indicates that the pressure may be too high to continue operation of the HPCI turbine. That is, one of two exhaust diaphragms has ruptured and pressure is reaching turbine casing pressure limits. This isolation is for equipment protection and is not assumed in any transient or accident analysis in the FSAR. These instruments are included in the TS because of the potential for risk due to possible failure of the instruments preventing HPCI initiation.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton and Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.6.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

<u>Table 3.3.6.1-1 Primary Containment Isolation Instrumentation</u>
Function 3.d HPCI System Isolation - Drywell Pressure – High

As stated in the TS Bases, high drywell pressure can indicate a break in the RCPB. The HPCI isolation of the turbine exhaust vacuum breakers is provided to prevent communication with the drywell when high drywell pressure exists. A potential leakage path exists via the turbine exhaust. The isolation is delayed until the system becomes unavailable for injection (i.e., low steam line pressure). The isolation of the HPCI turbine exhaust by Drywell Pressure - High is indirectly assumed in the FSAR accident analysis, because the turbine exhaust leakage path is not assumed to contribute to offsite doses.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton and Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.6.1.1 (every 12 hours). Therefore, an increase

in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.(2) The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.(3) The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 3.e HPCI System Isolation - HPCI Pipe Penetration Room Temperature - High

As stated in the TS Bases, area and differential temperature sensors are provided to detect a leak from the associated system steam piping. The isolation occurs when a very small leak has occurred and is diverse to the high flow instrumentation. If the small leak is allowed to continue without isolation, offsite dose limits may be reached. These Functions are not assumed in any transient or accident analysis in the FSAR, since bounding analyses are performed for large breaks (e.g., recirculation or MSL breaks). Area and Differential Temperature - High signals are initiated from RTDs that are appropriately located to protect the system that is being monitored. Two instruments monitor each area.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This Function is performed by Weed RTDs with GE trip units. The RTDs are not calibrated, and as such, instrument drift does not apply to these devices. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units, or any other loop components, relative to drift. Therefore, the change in surveillance Frequency of the CHANNEL CALIBRATION does not affect the drift interval for any of the loop components. Therefore, a drift analysis was not performed for any of the loop components.

The calibration procedures require a comparison of RTD readings with inservice RTDs and calibration of the remaining loop components, which meets the TS requirements. The TS Definition for CHANNEL CALIBRATION states:

> "Calibration of instrument channels with resistance temperature detector (RTD) or thermocouple sensors may consist of an inplace qualitative assessment of sensor behavior and normal calibration of the remaining adjustable devices in the channel."

Extending the surveillance test interval for the CHANNEL CALIBRATION is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). These checks confirm the major portions of the monitoring loop are maintained within allowances.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is

operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 3.f HPCI System Isolation - Suppression Pool Area Ambient Temperature - High

As stated in the TS Bases, area and differential temperature sensors are provided to detect a leak from the associated system steam piping. The isolation occurs when a very small leak has occurred and is diverse to the high flow instrumentation. If the small leak is allowed to continue without isolation, offsite dose limits may be reached. These Functions are not assumed in any transient or accident analysis in the FSAR, since bounding analyses are performed for large breaks (e.g., recirculation or MSL breaks). Area and Differential Temperature - High signals are initiated from RTDs that are appropriately located to protect the system that is being monitored. Two instruments monitor each area.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This Function is performed by Weed RTDs with GE trip units. The RTDs are not calibrated, and as such, instrument drift does not apply to these devices. The trip units are functionally checked, and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units, or any other loop components, relative to drift. Therefore, the change in surveillance Frequency of the CHANNEL CALIBRATION does not affect the drift interval for any of the loop components. Therefore, a drift analysis was not performed for any of the loop components.

The calibration procedures require a comparison of RTD readings with inservice RTDs and calibration of the remaining loop components, which meets the TS requirements. The TS Definition for CHANNEL CALIBRATION states:

> "Calibration of instrument channels with resistance temperature detector (RTD) or thermocouple sensors may consist of an inplace qualitative assessment of sensor behavior and normal calibration of the remaining adjustable devices in the channel."

Extending the surveillance test interval for the CHANNEL CALIBRATION is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). These checks confirm the major portions of the monitoring loop are maintained within allowances.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.

The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 3.g HPCI System Isolation - Suppression Pool Area Temperature - Time Delay Relays

As stated in the TS Bases, the Suppression Pool Area Temperature - Time Delay Relays are provided to allow all the other systems that may be leaking into the pool area (as indicated by the high temperature) to be isolated before HPCI and/or RCIC are automatically isolated. This ensures maximum HPCI and RCIC System operation by preventing isolations due to leaks in other systems. These Functions are not assumed in any transient or accident analysis in the FSAR.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the performance of CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.4 (every 184 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 3.h HPCI System Isolation - Suppression Pool Area Differential Temperature - High

As stated in the TS Bases, area and differential temperatures are provided to detect a leak from the associated system steam piping. The isolation occurs when a very small leak has occurred and is diverse to the high flow instrumentation. If the small leak is allowed to continue without isolation, offsite dose limits may be reached. These Functions are not assumed in any FSAR transient or accident analysis, since bounding analyses are performed for large breaks (e.g., recirculation or MSL breaks). Area and Differential Temperature - High signals are initiated from

RTDs that are appropriately located to protect the system that is being monitored. Two instruments monitor each area.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.

The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This Function is performed by Weed RTDs with GE trip units. The RTDs are not calibrated, and as such, instrument drift does not apply to these devices.

Each differential temperature loop consists of three trip units total -- two temperature trip units and one differential temperature trip unit. The differential temperature trip unit provides the trip function applicable to this SR. The temperature trip units may also provide a trip function; however, that trip function corresponds to a different SR. Each temperature trip unit receives an area temperature signal from the RTDs, processes the RTD signal, and outputs an analog signal to the differential temperature trip unit. The differential temperature trip unit compares the analog temperature signals from the two temperature trip units, and trips when the differential between the two signals reaches the setpoint.

This calibration SR applies to the two temperature trip units and the analog signals they generate to produce the differential temperature signal. CHANNEL FUNCTIONAL TESTS for the differential temperature trip units, per SR 3.3.6.1.2 (every 92 days), verify the calibration of the differential trip units.

An evaluation of the surveillance interval extension for the GE trip units which generate the temperature signals used for the differential temperature trip was performed, based upon the approach described in GL 91-04.[2] The drift associated with the trip units was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

The calibration procedures require a comparison of RTD readings with inservice RTDs and calibration of the remaining loop components, which meets the TS requirements. The TS Definition for CHANNEL CALIBRATION states:

> "Calibration of instrument channels with resistance temperature detector (RTD) or thermocouple sensors may consist of an inplace qualitative assessment of sensor behavior and normal calibration of the remaining adjustable devices in the channel."

Extending the surveillance test interval for the CHANNEL CALIBRATION is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). These checks confirm the major portions of the monitoring loop are maintained within allowances.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

<u>**Table 3.3.6.1-1 Primary Containment Isolation Instrumentation**</u>
Function 3.i HPCI System Isolation - Emergency Area Cooler Temperature - High

As stated in the TS Bases, area and differential temperature sensors are provided to detect a leak from the associated system steam piping. The isolation occurs when a very small leak has occurred and is diverse to the high flow instrumentation. If the small leak is allowed to continue without isolation, offsite dose limits may be reached. These Functions are not assumed in any FSAR transient or accident analysis, since bounding analyses are performed for large breaks (e.g., recirculation or MSL breaks). Area and Differential Temperature - High signals are initiated from RTDs that are appropriately located to protect the system that is being monitored. Two instruments monitor each area.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This Function is performed by Weed RTDs with GE trip units. The RTDs are not calibrated, and as such, instrument drift does not apply to these devices. The trip units are functionally checked

and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units, or any other loop components, relative to drift. Therefore, the change in surveillance Frequency of the CHANNEL CALIBRATION does not affect the drift interval for any of the loop components. Therefore, a drift analysis was not performed for any of the loop components.

The calibration procedures require a comparison of RTD readings with inservice RTDs and calibration of the remaining loop components, which meets the TS requirements. The TS Definition for CHANNEL CALIBRATION states:

> Calibration of instrument channels with resistance temperature detector (RTD) or thermocouple sensors may consist of an inplace qualitative assessment of sensor behavior and normal calibration of the remaining adjustable devices in the channel."

Extending the surveillance test interval for the CHANNEL CALIBRATION is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). These checks confirm the major portions of the monitoring loop are maintained within allowances.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

> "Industry reliability studies for boiling water reactors (BWRs), prepared by the BWR Owners Group (NEDC-30936P) show that the overall safety systems' reliabilities are not dominated by the reliabilities of the logic system, but by that of the mechanical components, (e.g., pumps and valves), which are consequently tested on a more frequent basis. Since the probability of a relay or contact failure is small relative to the probability of mechanical component failure, increasing the

Logic System Functional Test interval represents no significant change in the overall safety system unavailability."

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 4.a RCIC System Isolation - RCIC Steam Line Flow – High

As stated in the TS Bases, the RCIC Steam Line Flow-High Function is provided to detect a break of the RCIC steam line and initiate closure of the RCIC steam line isolation valves. If the steam is allowed to continue flowing out of the break, the reactor will depressurize and the core can uncover. Therefore, the isolations are initiated on high flow to prevent or minimize core damage. The isolation action, along with the scram function of the RPS, ensures the fuel peak cladding temperature remains below the limits of 10 CFR 50.46. Specific credit for these Functions is not assumed in any accident analysis in the FSAR, since the bounding analysis is performed for large breaks such as recirculation and MSL breaks. However, these instruments prevent the RCIC steam line breaks from becoming bounding.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton and Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.6.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an

analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 4.b RCIC System Isolation - RCIC Steam Supply Line Pressure – Low

As stated in the TS Bases, low steam line pressure indicates the pressure of the steam in the RCIC turbine may be too low to continue operation of the RCIC turbine. This isolation is for equipment protection and is not assumed in any FSAR transient or accident analysis. However, they also provide a diverse signal to indicate a possible system break. These instruments are included in TS because of the potential for risk due to possible failure of the instruments preventing RCIC initiation.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.6.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.(2) The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI

TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 4.c RCIC System Isolation - RCIC Turbine Exhaust Diaphragm Pressure – High

As stated in the TS Bases, high turbine exhaust diaphragm pressure indicates the pressure may be too high to continue operation of the RCIC turbine. That is, one of two exhaust diaphragms ruptured, and pressure is reaching turbine casing pressure limits. These isolations are for equipment protection and are not assumed in any transient or accident analysis in the FSAR. These instruments are included in the TS because of the potential for risk due to possible failure of the instruments preventing RCIC initiation.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.6.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[(2)] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[(3)] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 4.d RCIC System Isolation - Drywell Pressure – High

As stated in the TS Bases, high drywell pressure can indicate a break in the RCPB. The RCIC isolation of the turbine exhaust vacuum breakers is provided to prevent communication with the drywell when high drywell pressure exists. A potential leakage path exists via the turbine exhaust. The isolation is delayed until RCIC becomes unavailable for injection (i.e., low steam line pressure). The isolation of the RCIC turbine exhaust by Drywell Pressure - High is indirectly assumed in the FSAR accident analysis, because the turbine exhaust leakage path is not assumed to contribute to offsite doses.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton and Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.6.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 4.e RCIC System Isolation - RCIC Suppression Pool Ambient Area Temperature - High

As stated in the TS Bases, area and differential temperatures sensors are provided to detect a leak from the associated system steam piping. The isolation occurs when a very small leak has occurred and is diverse to the high flow instrumentation. If the small leak is allowed to continue without isolation, offsite dose limits may be reached. These Functions are not assumed in any FSAR transient or accident analysis, since bounding analyses are performed for large breaks (e.g., recirculation or MSL breaks). Area and Differential Temperature - High signals are initiated from RTDs that are appropriately located to protect the system that is being monitored. Two instruments monitor each area.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This Function is performed by Weed RTDs with GE trip units. The RTDs are not calibrated, and as such, instrument drift does not apply to these devices. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units, or any other loop components, relative to drift. Therefore, the change in surveillance Frequency of the CHANNEL CALIBRATION does not affect the drift interval for any of the loop components. Therefore, a drift analysis was not performed for any of the loop components.

The calibration procedures require a comparison of RTD readings with inservice RTDs and calibration of the remaining loop components, which meets the TS requirements. The TS Definition for CHANNEL CALIBRATION states:

> "Calibration of instrument channels with resistance temperature detector (RTD) or thermocouple sensors may consist of an inplace qualitative assessment of

> sensor behavior and normal calibration of the remaining adjustable devices in the channel."

Extending the surveillance test interval for the CHANNEL CALIBRATION is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). These checks confirm the major portions of the monitoring loop are maintained within allowances.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.

The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 4.f RCIC System Isolation - Suppression Pool Area Temperature - Time Delay Relays

As stated in the TS Bases, the Suppression Pool Area Temperature-Time Delay Relays are provided to allow all the other systems that may be leaking into the pool area (as indicated by the high temperature) to be isolated before HPCI and/or RCIC are automatically isolated. This ensures maximum HPCI and RCIC System operation by preventing isolations due to leaks in other systems. These Functions are not assumed in any FSAR transient or accident analysis.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the performance of CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.4 (every 184 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 4.g RCIC System Isolation - RCIC Suppression Pool Area Differential Temperature - High

As stated in the TS Bases, area and differential temperature sensors are provided to detect a leak from the associated system steam piping. The isolation occurs when a very small leak has occurred and is diverse to the high flow instrumentation. If the small leak is allowed to continue without isolation, offsite dose limits may be reached. These Functions are not assumed in any FSAR transient or accident analysis , since bounding analyses are performed for large breaks (e.g., recirculation or MSL breaks). Area and Differential Temperature - High signals are initiated from RTDs that are appropriately located to protect the system that is being monitored. Two instruments monitor each area.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This Function is performed by Weed RTDs with GE trip units. The RTDs are not calibrated, and as such, instrument drift does not apply to these devices.

Each Differential Temperature Loop consists of three trip units total -- two temperature trip units and one differential temperature trip unit. The differential temperature trip unit provides the trip function applicable to this TS. The temperature trip units may also provide a trip function; however, that trip function corresponds to a different SR. Each temperature trip unit receives an area temperature signal from RTDs, processes the RTD signal, and outputs an analog signal to the differential temperature trip unit. The differential temperature trip unit compares the analog temperature signals from the two temperature trip units and trips when the differential between the two signals reaches the setpoint.

This calibration SR applies to the two temperature trip units and the analog signals they generate to produce the differential temperature signal. CHANNEL FUNCTIONAL TESTS for the differential temperature trip units, per SR 3.3.6.1.2 (every 92 days), verify the calibration of the differential trip units.

An evaluation of the surveillance interval extension for the GE trip units which generate the temperature signals used for the differential temperature trip was performed, based upon the approach described in GL 91-04.[(2)] The drift associated with the trip units was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[(3)] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

The calibration procedures require a comparison of RTD readings with inservice RTDs and calibration of the remaining loop components, which meets the TS requirements. The TS Definition for CHANNEL CALIBRATION states:

> "Calibration of instrument channels with resistance temperature detector (RTD) or thermocouple sensors may consist of an inplace qualitative assessment of sensor behavior and normal calibration of the remaining adjustable devices in the channel."

Extending the surveillance test interval for the CHANNEL CALIBRATION is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). These checks confirm the major portions of the monitoring loop are maintained within allowances.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 4.h RCIC System Isolation - Emergency Area Cooler Temperature - High

As stated in the TS Bases, area and differential temperature sensors are provided to detect a leak from the associated system steam piping. The isolation occurs when a very small leak has occurred and is diverse to the high flow instrumentation. If the small leak is allowed to continue without isolation, offsite dose limits may be reached. These Functions are not assumed in any FSAR transient or accident analysis, since bounding analyses are performed for large breaks (e.g., recirculation or MSL breaks). Area and Differential Temperature - High signals are initiated from RTDs that are appropriately located to protect the system that is being monitored. Two instruments monitor each area.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This Function is performed by Weed RTDs with GE trip units. The RTDs are not calibrated, and as such, instrument drift does not apply to these devices. The trip units are functionally checked

and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units, or any other loop components, relative to drift. Therefore, the change in surveillance Frequency of the CHANNEL CALIBRATION does not affect the drift interval for any of the loop components. Therefore, a drift analysis was not performed for any of the loop components.

The calibration procedures require a comparison of RTD readings with inservice RTDs and calibration of the remaining loop components, which meets the TS requirements. The TS Definition for CHANNEL CALIBRATION states:

> "Calibration of instrument channels with resistance temperature detector (RTD) or thermocouple sensors may consist of an inplace qualitative assessment of sensor behavior and normal calibration of the remaining adjustable devices in the channel."

Extending the surveillance test interval for the CHANNEL CALIBRATION is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). These checks confirm the major portions of the monitoring loop are maintained within allowances.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 5.a RWCU System Isolation - Area Temperature - High

As stated in the TS Bases, RWCU area temperature sensors are provided to detect a leak from the RWCU System. The isolation occurs even when very small leaks have occurred. If the small leak continues without isolation, offsite dose limits may be reached. Credit for these instruments is not taken in any FSAR transient or accident analysis, since bounding analyses are performed for large breaks (e.g., recirculation or MSL breaks). Area temperature signals are initiated from temperature elements that are located in the area that is being monitored. Six RTDs provide input to the Area Temperature - High Function (two per area).

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This Function is performed by Weed RTDs with GE trip units. The RTDs are not calibrated, and as such, instrument drift does not apply to these devices. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units, or any other loop components, relative to drift. Therefore, the change in surveillance Frequency of the CHANNEL CALIBRATION does not affect the drift interval for any of the loop components. Therefore, a drift analysis was not performed for any of the loop components.

The calibration procedures require a comparison of RTD readings with inservice RTDs and calibration of the remaining loop components, which meets the TS requirements. The TS Definition for CHANNEL CALIBRATION states:

> "Calibration of instrument channels with resistance temperature detector (RTD) or thermocouple sensors may consist of an inplace qualitative assessment of sensor behavior and normal calibration of the remaining adjustable devices in the channel."

Extending the surveillance test interval for the CHANNEL CALIBRATION is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). These checks confirm the major portions of the monitoring loop are maintained within allowances.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 5.b RWCU System Isolation - Area Ventilation Differential Temperature - High

As stated in the TS Bases, RWCU area ventilation differential temperature sensors are provided to detect a leak from the RWCU System. The isolation occurs even when very small leaks have occurred. If the small leak continues without isolation, offsite dose limits may be reached. Credit for these instruments is not taken in any FSAR transient or accident analysis, since bounding analyses are performed for large breaks (e.g., recirculation or MSL breaks). Area ventilation differential temperature signals are initiated from temperature elements that are located in the area that is being monitored. Twelve RTDs provide input to the Area Ventilation Differential Temperature - High Function.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period.

This Function is performed by Weed RTDs with GE trip units. The RTDs are not calibrated, and as such, instrument drift does not apply to these devices.

Each differential temperature loop consists of three trip units total -- two temperature trip units and one differential temperature trip unit. The differential temperature trip unit provides the trip function applicable to this TS. The temperature trip units may also provide a trip function; however, that trip function corresponds to a different SR. Each temperature trip unit receives an area temperature signal from RTDs, processes the RTD signal, and outputs an analog signal to the differential temperature trip unit. The differential temperature trip unit compares the analog temperature signals from the two temperature trip units and trips when the differential between the two signals reaches the setpoint.

This calibration SR applies to the two temperature trip units and the analog signals they generate to produce the differential temperature signal. CHANNEL FUNCTIONAL TESTS for the differential temperature trip units, per SR 3.3.6.1.2 (every 92 days), verify the calibration of the trip units.

An evaluation of the surveillance interval extension for the GE trip units which generate the temperature signals used for the differential temperature trip was performed, based upon the approach described in GL 91-04.[(2)] The drift associated with the trip units was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[(3)] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

The calibration procedures require a comparison of RTD readings with inservice RTDs and calibration of the remaining loop components, which meets the TS requirements. The TS Definition for CHANNEL CALIBRATION states:

> "Calibration of instrument channels with resistance temperature detector (RTD) or thermocouple sensors may consist of an inplace qualitative assessment of sensor behavior and normal calibration of the remaining adjustable devices in the channel."

Extending the surveillance test interval for the CHANNEL CALIBRATION is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). These checks confirm the major portions of the monitoring loop are maintained within allowances.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period.

This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 5.c RWCU System Isolation - SLC System Initiation

As stated in the TS Bases, the isolation of the RWCU System is required when the SLC System has been initiated to prevent dilution and removal of the boron solution by the RWCU System. SLC System initiation signal is initiated from the SLC pump start signal. There is no Allowable Value associated with this Function, since the channel is mechanically actuated, based solely on the position of the SLC System initiation switch. This Function is only required to close one of the Group 5 RWCU isolation valves, since the signal only provides input into one of the two trip systems.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the RWCU isolation logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because most of the circuits associated with this Function are verified to be operating properly by the performance of SLC pump testing in accordance with the Inservice Testing Program (SR 3.1.7.7) and the CHANNEL FUNCTIONAL TESTS associated with other RWCU isolation channels. This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the associated surveillance tests demonstrates that failures are rarely observed during this SR activity. For both units, over the time period monitored (1990 through 1999), only one Category D safety function failure occurred. That is, during performance of 42SV-T61-001-1S, the failure of flow switch 1T46-N011B prevented a fan from starting. The switch was replaced, and the retest was completed satisfactorily.

This unique failure does not suggest a time-based failure mechanism and does not represent a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 5.d RWCU System Isolation - Reactor Vessel Water Level – Low Low, Level 2

As stated in the TS Bases, low RPV water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage could result. Therefore, isolation of some interfaces with the RPV occurs to isolate the potential sources of a break. The isolation of the RWCU System on Level 2 supports actions to ensure the fuel peak cladding temperature remains below the limits of 10 CFR 50.46. The Reactor Vessel Water Level - Low Low, Level 2 Function associated with RWCU isolation is not directly assumed in the FSAR safety analysis, because the RWCU System line break is bounded by breaks of larger systems (recirculation and MSL breaks are more limiting).

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton and Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.6.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.(2) The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI

TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.

The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the system logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 6.a RHR Shutdown Cooling System Isolation - Reactor Steam Dome Pressure – High

As stated in the TS Bases, the Reactor Steam Dome Pressure - High Function is provided to isolate the shutdown cooling portion of the RHR System. This interlock is provided only for equipment protection to prevent an intersystem LOCA scenario, and credit for the interlock is not assumed in the any FSAR transient or accident analysis.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.6.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the RHR System Isolation logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.1-1 Primary Containment Isolation Instrumentation
Function 6.b RHR Shutdown Cooling System Isolation - Reactor Vessel Water Level – Low, Level 3

As stated in the TS Bases, low RPV water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage can result. Therefore, isolation of some RPV interfaces occurs to begin isolating the potential sources of a break. The Reactor Vessel Water Level - Low, Level 3 Function associated with RHR Shutdown Cooling System isolation is not directly assumed in safety analyses because a break of the RHR Shutdown Cooling System is bounded by any break of a recirculation or main steam line. The RHR Shutdown Cooling System isolation on Level 3 supports actions to ensure the RPV water level does not drop below the top of the active fuel during an RPV draindown event caused by a leak (e.g., pipe break or inadvertent valve opening) in the RHR Shutdown Cooling System.

SR 3.3.6.1.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton and Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.6.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.1.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the RHR System Isolation logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.1.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.1.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry.

Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

TS 3.3.6.2 Secondary Containment Isolation Instrumentation

As stated in the TS Bases, the secondary containment isolation instrumentation automatically initiates closure of appropriate secondary containment isolation valves (SCIVs) and starts the Standby Gas Treatment (SGT) System. The function of these systems, in combination with other accident mitigation systems, is to limit fission product release during and following a postulated DBA. Secondary containment isolation and establishment of vacuum with the SGT System within the assumed time limits ensures fission products that leak from primary containment following a DBA, or are released outside primary containment, or are released during certain operations when primary containment is not required to be OPERABLE are maintained within applicable limits. The isolation signals generated by the secondary containment isolation instrumentation are implicitly assumed in the LCO and the FSAR safety analysis to initiate closure of valves and start the SGT System to limit offsite doses.

The following SRs were evaluated relative to extending their respective testing intervals. These SRs ensure the availability of safety functions that respond to plant transients and design basis events. Potential time-based considerations, such as instrument drift, failure types and frequencies, as well as other qualitative measures of system availability, were evaluated during this effort. The evaluation results and an explanation of how the results justify the surveillance interval extension are discussed below:

Table 3.3.6.2-1 Secondary Containment Isolation Instrumentation
Function 1 Reactor Vessel Water Level - Low Low, Level 2

As stated in the TS Bases, low RPV water level indicates the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage can result. An isolation of the secondary containment and actuation of the SGT System are initiated to minimize the potential of an offsite dose release. The RPV Water Level - Low Low, Level 2 Function is one of the Functions assumed to be OPERABLE and capable of providing isolation and initiation signals. The isolation and initiation systems on RPV water level - low low, Level 2 support actions to ensure any offsite releases are within the limits calculated in the safety analysis.

RPV water level - low low, Level 2 signals are initiated from level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the RPV. Four channels of RPV Water Level - Low Low, Level 2 Function are available and are required to be to ensure no single instrument failure can preclude the isolation function.

SR 3.3.6.2.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Barton and Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.2.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.6.1.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.2.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the secondary containment isolation Instrumentation logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.2.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.2.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

> "Industry reliability studies for boiling water reactors (BWRs), prepared by the BWR Owners Group (NEDC-30936P) show that the overall safety systems' reliabilities are not dominated by the reliabilities of the logic system, but by that of the mechanical components, (e.g., pumps and valves), which are consequently

tested on a more frequent basis. Since the probability of a relay or contact failure is small relative to the probability of mechanical component failure, increasing the Logic System Functional Test interval represents no significant change in the overall safety system unavailability."

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the associated surveillance tests demonstrates that failures are rarely observed during this SR activity. For both units, over the time period monitored (1990 through 1999), only one Category D safety function failure occurred. That is, during performance of 42SV-T46-001-1S, the failure of flow switch 1T46-N011B prevented a fan from starting. The switch was replaced, and the test was completed satisfactorily.

This unique failure does not suggest a time-based failure mechanism and is not considered to represent a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.2-1 Secondary Containment Isolation Instrumentation
Function 2 Drywell Pressure – High

As stated in the TS Bases, high drywell pressure can indicate a break in the RCPB. An isolation of the secondary containment and actuation of the SGT System are initiated in order to minimize the potential of an offsite dose release. The isolation on high drywell pressure supports actions to ensure any offsite releases are within the limits calculated in the safety analysis. The Drywell Pressure - High Function associated with isolation is not assumed in any FSAR transient or accident analysis. However, the Function is retained for the overall redundancy and diversity of the secondary containment isolation instrumentation as required by the NRC-approved licensing basis.

SR 3.3.6.2.4 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Rosemount transmitters and GE trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.2.2 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.6.2.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.(2) The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.(3) The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.2.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.

The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the secondary containment isolation Instrumentation logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.2.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.2.2 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history for the associated surveillance tests demonstrates that failures are rarely observed during this SR activity. For both units, over the time period monitored (1990 through 1999), only one Category D safety function failure occurred. That is, during performance of 42SV-T46-001-1S, the failure of flow switch 1T46-N011B prevented a fan from starting. The switch was replaced and the test was completed satisfactorily.

This unique failure does not suggest a time-based failure mechanism and is not considered to represent a pattern of repetitive failures. Therefore, no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.2-1 Secondary Containment Isolation Instrumentation
Function 3 Reactor Building Exhaust Radiation – High

As stated in the TS Bases, high secondary containment exhaust radiation is an indication of possible gross failure of the fuel cladding. The release may have originated from the primary containment due to a break in the RCPB or the refueling floor due to a fuel handling accident. When Exhaust Radiation - High is detected, secondary containment isolation and actuation of the SGT System are initiated to limit the release of fission products as assumed in the FSAR safety analysis.

SR 3.3.6.2.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the secondary containment isolation Instrumentation logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.2.1 (every 12 hours) and CHANNEL CALIBRATION Tests per SR 3.3.6.2.3 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.2-1 Secondary Containment Isolation Instrumentation
Function 4 Refueling Floor Exhaust Radiation – High

As stated in the TS Bases, high secondary containment exhaust radiation is an indication of possible gross failure of the fuel cladding. The release may have originated from the primary containment due to a break in the RCPB or the refueling floor due to a fuel handling accident. When Exhaust Radiation - High is detected, secondary containment isolation and actuation of the SGT System are initiated to limit the release of fission products as assumed in the FSAR safety analyses.

SR 3.3.6.2.5 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the secondary containment isolation Instrumentation logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.2.1 (every 12 hours) and CHANNEL CALIBRATION Tests per SR 3.3.6.2.3 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this

circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

TS 3.3.6.3 Low Low Set (LLS) Instrumentation

As stated in the TS Bases, the LLS logic and instrumentation are designed to mitigate the effects of postulated thrust loads on the S/RV discharge lines by preventing subsequent actuations with an elevated water leg in the S/RV discharge line. It also mitigates the effects of postulated pressure loads on the torus shell or suppression pool by preventing multiple actuations in rapid succession of the S/RVs subsequent to their initial actuation.

Upon initiation, the LLS logic will assign preset opening and closing setpoints to four pre-selected S/RVs. These setpoints are selected such that the LLS S/RVs will stay open longer; thus, releasing more steam (energy) to the suppression pool, and, hence, more energy (and time) will be required for repressurization and subsequent S/RV openings. The LLS logic increases the time between (or prevents) subsequent actuations to allow the high water leg created from the initial S/RV opening to return to (or fall below) its normal water level; thus, reducing thrust loads from subsequent actuations to within their design limits. In addition, the LLS is designed to limit S/RV subsequent actuations to one valve, so torus loads will also be reduced.

The LLS Instrumentation logic is arranged in two divisions with Logic channels A and C in one division and Logic channels B and D in the other division. Each LLS logic channel (e.g., Logic A channel) controls one LLS valve. The LLS logic channels will not actuate their associated LLS valves at their LLS setpoints until the arming portion of the associated LLS logic is satisfied. Arming occurs when any one of the 11 S/RVs opens, as indicated by a signal from one of the redundant pressure switches located on its tailpipe, coincident with a high RPV pressure signal. Each division receives tailpipe arming signals from dedicated tailpipe pressure switches on each of the 11 S/RVs, six in one LLS logic (e.g., Logic C) and five in the other LLS logic (e.g., Logic A). Each LLS logic (e.g., Logic A) receives the reactor pressure-arming signal from a different RPV pressure transmitters and trip units. These arming signals seal in until reset. The arming signal from one logic is sent to the other logic within the same division and performs the same function as the tailpipe-arming signal (i.e., Logic A will arm if it has received a high RPV pressure signal and Logic C has armed).

After arming, opening of each LLS valve is by a two-out-of-two logic from two RPV pressure transmitters and two trip units set to trip at the required LLS opening setpoint. The LLS valve recloses when RPV pressure has decreased to the reclose setpoint of one of the two trip units used to open the valve (one-out-of-two logic).

The following SRs were evaluated relative to extending their respective testing intervals. These SRs ensure the availability of safety functions that respond to plant transients and design basis events. Potential time-based considerations, such as instrument drift, failure types and frequencies, as well as other qualitative measures of system availability, were evaluated during this effort. The evaluation results and an explanation of how the results justify the surveillance interval extension are discussed below:

Table 3.3.6.3-1 Low-Low Set Instrumentation
Function 1 Reactor Steam Dome Pressure - High

As stated in the TS Bases, the Reactor Steam Dome Pressure - High Function is used in conjunction with the tailpipe pressure signal to arm the LLS logic. Arming occurs when any one of the 11 S/RVs opens, as indicated by a signal from one of the redundant pressure switches located on its tailpipe, coincident with a high reactor pressure signal.

SR 3.3.6.3.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Rosemount transmitters and GE and Rosemount trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.3.4 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.6.3.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.(2) The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.(3) The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.3.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period.

This SR ensures the Low Low Set Instrumentation logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.3.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.3.4 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.3-1 Low-Low Set Instrumentation
Function 2 Low Low Set Pressure Setpoints

As stated in the TS Bases, after arming, opening of each LLS valve is by a two-out-of-two logic from two RPV pressure transmitters and two trip units set to trip at the required LLS opening setpoint. The LLS valve re-closes when RPV pressure has decreased to the re-close setpoint of one of the two trip units used to open the valve (one-out-of-two logic).

SR 3.3.6.3.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. Rosemount transmitters and GE and Rosemount trip units perform this Function. The trip units are functionally checked and the setpoint is verified. If necessary, the setpoint is recalibrated during the more frequent CHANNEL FUNCTIONAL TESTS per SR 3.3.6.3.4 (every 92 days). A CHANNEL CHECK is also performed per SR 3.3.6.3.1 (every 12 hours). Therefore, an increase in the surveillance interval to accommodate a 24-month fuel cycle does not affect the trip units relative to drift.

An evaluation of the surveillance interval extension for the transmitters was performed, based upon the approach described in GL 91-04.[2] The drift associated with the transmitters was determined, applying an HNP-specific methodology, based upon the recommendations of EPRI TR-103335.[3] The drift for the extended surveillance interval was appropriately considered in developing the associated plant setpoints.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.3.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the LLS Instrumentation logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the more frequent performance of CHANNEL CHECKS per SR 3.3.6.3.1 (every 12 hours) and CHANNEL FUNCTIONAL TESTS per SR 3.3.6.3.4 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

Table 3.3.6.3-1 Low-Low Set Instrumentation
Function 3 Tailpipe Pressure Switch

As stated in the TS Bases, the tailpipe pressure switches provide an arming signal that is initiated when the associated S/RV has opened. The tailpipe pressure switches provide a direct input into the LLS logic, with each of the two LLS divisions receiving an arming signal from redundant pressure switches for each of the 11 S/RVs.

SR 3.3.6.3.5 Perform CHANNEL CALIBRATION.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months including the 25% grace period. Pressure controls pressure switches perform this Function. These switches are factory set and are not field adjustable. Each time this SR is performed, the settings of the switches are

checked versus the required setting tolerance. If the switch does not actuate within the tolerance, the switches are replaced. Between the two units, there are a total of 44 pressure switches, which are tested every outage. Over the subject period of analysis, no failures of these switches were ever observed and; therefore, no replacements were required. This means that all observed settings were found to be within tolerance for the entire 90-month study period, with no calibrations. Therefore, a rigorous drift study was not performed for these instruments. The existing plant settings are acceptable for extension of this SR to a 24-month operating cycle, and a historical failure review was performed for the procedures that implement this requirement.

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

SR 3.3.6.3.6 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months, including the 25% grace period. This SR ensures the LLS Instrumentation logic for specific trips will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the performance of CHANNEL FUNCTIONAL TESTS for the portion of the channel outside primary containment per SR 3.3.6.3.2 (every 92 days), and Channel Functional tests for the portion of the channel inside containment prior to entering MODE 2 during each scheduled outage > 72 hours when entry is made into primary containment per SR 3.3.6.3.3 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.

TS 3.3.7.1 Main Control Room Environmental Control (MCREC) System Instrumentation

As stated in the TS Bases, the MCREC System is designed to provide a radiologically controlled environment to ensure the habitability of the MCR for the safety of MCR operators under all plant conditions. Two independent MCREC subsystems are each capable of fulfilling the stated safety function. The instrumentation and controls for the MCREC System automatically initiate action to pressurize the MCR to minimize the consequences of radioactive material in the MCR environment. In the event of a Control Room Air Inlet Radiation - High signal, the MCREC System is automatically started in the pressurization mode. The air is then recirculated through the charcoal filter, and sufficient outside air is drawn in through the normal intake to maintain the MCR slightly pressurized relative to the turbine building.

The following SR was evaluated relative to extending the testing intervals. This SR ensures the availability of safety functions that respond to plant transients and design basis events. Potential time-based considerations, such as failure types and frequencies, as well as other qualitative measures of system availability, were evaluated during this effort. The evaluation results and an explanation of how the results justify the surveillance interval extension are discussed below:

SR 3.3.7.1.4 Perform LOGIC SYSTEM FUNCTIONAL TEST.
The surveillance test interval for this SR, as applied to this Function, is being increased from 18 months to 24 months, for a maximum interval of 30 months including the 25% grace period. This SR ensures the MCREC System Instrumentation logic will function as designed in response to an analyzed condition. Extending the surveillance test interval for the LSFT is acceptable, because the Function is verified to be operating properly by the performance of more frequent CHANNEL CHECKS per SR 3.3.7.1.1 (every 24 hours), CHANNEL FUNCTIONAL TESTS per SR 3.3.7.1.2 (every 31 days), and CHANNEL CALIBRATION Tests per SR 3.3.7.1.3 (every 92 days). This testing ensures a significant portion of the circuitry is operating properly and will detect significant failures of this circuitry. Additional justification for extending the surveillance test interval is that the network, including the actuating logic, is designed to be single failure proof and, therefore, is highly reliable. Furthermore, as stated in Ref. 1:

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

Based upon the above discussion, the effect, if any, of this proposed change on system availability is minimal.

A review of the surveillance test history demonstrates that no identified failure invalidates the conclusion that the effect, if any, of this proposed change on system availability is minimal.