VERMONT YANKEE
NUCLEAR POWER CORPORATION
185 OLD FERRY ROAD, PO BOX 7002, BRATTLEBORO, VT 05302-7002
(802) 257-5271

May 23, 2000
BVY 00-47

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

Subject: **Vermont Yankee Nuclear Power Station**
License No. DPR-28 (Docket No. 50-271)
Technical Specification Proposed Change No. 233
Local Power Range Monitor Calibration Frequency

Pursuant to 10CFR50.90, Vermont Yankee (VY) hereby proposes to amend its Facility Operating License, DPR-28, by incorporating the attached proposed change into the VY Technical Specifications (TS). This proposed change would revise the requirement prescribed in TS Table 4.1.2 and allow VY to increase the interval between Local Power Range Monitor (LPRM) calibrations from 1,000 equivalent full power hours to 2,000 megawatt-days/ton. Increasing the interval between required LPRM calibrations is acceptable because of improvements in fuel analytical bases, core monitoring processes, and nuclear instrumentation. In addition, a similar change has previously been approved by NRC for another boiling water reactor.

Attachment 1 to this letter contains supporting information and the safety assessment of the proposed change. Attachment 2 contains the determination of no significant hazards consideration. Attachment 3 provides the marked-up version of the current Technical Specification and Bases pages. Attachment 4 is the retyped Technical Specification and Bases pages.

VY has reviewed the proposed Technical Specification change in accordance with 10CFR50.92 and concludes that the proposed change does not involve a significant hazards consideration.

VY has also determined that the proposed change satisfies the criteria for a categorical exclusion in accordance with 10CFR51.22(c)(9) and does not require an environmental review. Therefore, pursuant to 10CFR51.22(b), no environmental impact statement or environmental assessment needs to be prepared for this change.

Upon acceptance of this proposed change by the NRC, VY requests that a license amendment be issued by November 15, 2000 for implementation within 60 days of its effective date.

A001

NRR 057

If you have any questions on this transmittal, please contact Mr. Jeffrey T. Meyer at (802) 258-4105.

Sincerely,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Samuel L. Newton
Vice President, Operations

STATE OF VERMONT)
)ss
WINDHAM COUNTY)

SALLY A. SANDSTRUM NOTARY PUBLIC WINDHAM COUNTY, VERMONT

Then personally appeared before me, Samuel L. Newton, who, being duly sworn, did state that he is Vice President, Operations of Vermont Yankee Nuclear Power Corporation, that he is duly authorized to execute and file the foregoing document in the name and on the behalf of Vermont Yankee Nuclear Power Corporation, and that the statements therein are true to the best of his knowledge and belief.

Sally A. Sandstrum, Notary Public
My Commission Expires February 10, 2003

Attachments

cc: USNRC Region 1 Administrator
USNRC Resident Inspector - VYNPS
USNRC Project Manager - VYNPS
Vermont Department of Public Service

Attachment 1

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 233

Local Power Range Monitor Calibration Frequency

Supporting Information and Safety Assessment of Proposed Change

INTRODUCTION

The purpose of this proposed change is to revise the Technical Specification (TS) surveillance requirement (SR) for periodic calibration of local power range monitors (LPRMs). The current requirement is stipulated by SR 4.1.A and is contained in TS Table 4.1.2, "Scram Instrument Calibration, Minimum Calibration Frequencies for Reactor Protection Instrument Channels" and specifies that LPRMs be calibrated at a minimum frequency of "every 1000 Equivalent Full Power Hours."

The proposed change will revise the calibration frequency requirement of "Every 1000 Equivalent Full Power Hours" to "Every 2,000 MWD/T average core exposure." By extending the LPRM calibration frequency, this surveillance may be scheduled to coincide with other LPRM testing and control rod pattern exchanges. This would provide for improved work scheduling, efficiency and the elimination of unnecessary surveillances.

A similar TS change, increasing the LPRM surveillance interval to 2,000 MWD/T, was previously approved by NRC for another boiling water reactor[1].

Conforming changes are also being made to the associated TS Bases.

BACKGROUND

The Local Power Range Monitor (LPRM) system consists of 20 LPRM assemblies, each containing four detectors. The 80 miniature fission chamber-type neutron detectors are positioned at various fixed locations on four horizontal planes throughout the reactor core. The LPRMs provide indication of local neutron flux to the Average Power Range Monitor (APRM) system, the Rod Block Monitor (RBM) system, and the process computer. LPRMs are grouped by axial and radial location to provide a representative indication of neutron flux to the six APRM channels. The APRMs provide indication of core average thermal power, and input to the Reactor Protection System. The RBM system develops indication of average local power from LPRMs around a selected control rod and prevents withdrawal of that rod when local power is above a preset limit. LPRM inputs to the process computer are used to develop core thermal performance indicators to verify that thermal power operation is within established limits.

Each LPRM detector contains a fission chamber. When neutrons interact with fissile material within the fission chamber, a signal is generated and conditioned, indicating neutron flux intensity, which is related to local power. Each LPRM assembly also contains a calibration tube for a Traversing Incore Probe (TIP). It is the TIP system that is used to calibrate the LPRMs to maintain design accuracy during operation. The TIP system provides a signal proportional to the gamma flux, which relates to neutron flux at the LPRM locations. The high precision signal is used for reliable calibration of the LPRMs by adjusting amplifier gains. The LPRMs, as calibrated by the TIP system, provide detailed information about the reactor neutron flux throughout the operating cycle.

---

[1] Letter from R. J. Fretz (NRR) to R. K. Edington (Entergy Operations, Inc.), "River Bend Station, Unit 1 – Issuance of Amendment Re: Changes to Local Power Range Monitor Calibration Frequency (TAC No. M98883)," June 11, 1999.

The TIP signals are used to perform LPRM channel calibrations to compensate for changes in detector sensitivity. Two different types of TIP detectors are used at boiling water reactors, like VY. These are either neutron fission or gamma flux detectors, the latter being referred to as "gamma TIPs." VY uses gamma TIPs, which provide more accurate determination of reactor power, since there is less uncertainty in the flux readings as compared to fission chambers. LPRM calibrations can only be performed while the reactor is operating at power because of the minimum sensitivity of the LPRM detectors.

LPRMs are calibrated periodically because of fuel changes and depletion of the fissile detection media. Through this process, instrument uncertainties in the measurement of core operating parameters may be minimized. Calibration data are obtained from the TIP system, using the moveable gamma detectors to measure the incore flux distribution for comparison with the LPRM readings.

At rated thermal power (RTP), 1,000 EFPH is about 42 days (i.e., 1,000 hours/24 hours/day), and 1,000 MWD/T is about 44 days (i.e., 1,000 MWD/T x 70.659 tons uranium in current cycle ÷ 1593 MWt RTP). Typically, during continuous operation at RTP, actual LPRM calibration occurs more frequently. The proposed change to the TS will approximately double the effective time interval between successive LPRM calibrations.

The plant process computer is used for data storage and to calculate what each LPRM should indicate by comparing TIP scans to present LPRM readings and calculating gain adjustment factors. LPRM gain adjustments are derived from the TIP data; these adjustments are made during the LPRM calibration procedure and are subsequently verified using the TIP system. The LPRMs are then calibrated by adjusting signal gains based on the calibration current required to produce a standard meter deflection. The amount by which the LPRM gains are adjusted is determined by the ratio of the calibrated LPRM reading to actual LPRM reading. This is defined as the gain adjustment factor (GAF) and is determined for each of the LPRM detectors.

VY FSAR Sections 7.5.6, 7.5.7, 7.5.8, and 7.5.9 provide additional discussion on LPRM, APRM, RBM, and TIP systems, respectively.

<u>Comparison to Standard Technical Specifications (STS)</u>

NUREG 1433, Revision 1, "Standard Technical Specifications General Electric Plants, BWR/4," dated April 7, 1995, contains SR 3.3.1.1.8, which specifies calibration of LPRMs at a frequency of 1,000 MWD/T average core exposure. This is approximately equivalent to the current VY SR, but does not reflect the combined improvements in fuel analytical bases, core monitoring processes, and nuclear instrumentation that justify longer test intervals. The proposed change does adopt STS calibration frequency units of "MWD/T" vice "equivalent full power hours."

SAFETY ASSESSMENT

SR 4.1.A requires that instrumentation systems be functionally tested and calibrated in accordance with TS Table 4.1.2. Currently, Table 4.1.2 establishes a minimum LPRM calibration frequency of every 1,000 equivalent full power hours. This proposed change would increase the interval between whole core LPRM calibrations to 2,000 megawatt-days per short ton (MWD/T). The increase in surveillance interval is based upon maintaining the uncertainty in power distribution thermal limits within the limits contained in NRC-approved topical report, NEDO-10958-P-A[2]. The calibration frequency is dependent upon the added uncertainty in the nodal power distribution due to LPRM-based operation between successive OD-1 runs and LPRM calibrations. This added uncertainty is limited by the total uncertainty (8.7%) allowed by the General Electric Thermal Analysis Basis (GETAB) safety limit analyses.

Calibration of LPRMs is done by performing the OD-1 (on-demand computer program, number 1) to collect axial neutron flux data. The original surveillance requirement was established based on using the P-1 (periodic computer program, number 1, for thermal limit calculation) monitoring process and older design LPRM chambers for core monitoring, which experienced certain inaccuracies between calibrations. Based on the known behavior of the LPRM chambers, and the monitoring interpolation processes, the allowable uncertainty contribution used to establish the 1,000 equivalent full power hours operating limit between successive LPRM calibrations was based primarily on the variations in LPRM sensitivity versus exposure behavior.

Evaluation of data from several plants indicates that the nodal power uncertainty resulting from performing thermal limit calculations in the LPRM mode is not substantially dependent upon the exposure interval between OD-1 runs and LPRM calibrations. This evaluation shows that the total uncertainty based on LPRM calibrations with a 2,000 MWD/T surveillance interval is still less than the total uncertainty of 8.7% assumed in the GETAB safety limit analysis.

Allowing 2,000 MWD/T between OD-1 runs and LPRM calibrations is based on detailed statistical evaluations of the uncertainty in LPRM monitoring cases run at exposure intervals, including a case at nearly 3,000 effective full power hours (EFPH) without OD-1 or LPRM calibration relative to the TIP monitoring cases immediately after OD-1. (EFPHs are approximately equal to MWD/T.) The calculations are based upon modern core monitoring systems that utilize nodal diffusion theory coupled with plant data, including improved nuclear instrumentation. The resulting nodal uncertainty combined with the other identified uncertainties must be less than the total uncertainty allowed by the GETAB safety limit. These statistical evaluations have been previously reviewed and found acceptable by NRC staff[3].

The Licensing Topical Reports (LTRs) considered in Reference 2 provide detailed statistical evaluations of the uncertainty in LPRM-based monitoring cases run at exposure intervals up to 2,991 EFPH (2,688 MWD/T). Based on the data examined, it was shown that this nodal power uncertainty did not significantly deviate with exposure. These evaluations provide the basis that the GETAB equivalent safety limit of 8.7% would not be exceeded. This is because of improved LPRM chambers (VY uses NA300 series), which exhibit consistent LPRM sensitivity throughout their useful nuclear life (up to 40,000 MWD/T), and to improved core monitoring systems. VY uses the improved core monitoring system—GE 3D MONICORE— which utilizes nodal diffusion theory, coupled with plant

---

[2] General Electric Licensing Topical Report NEDO-10958-P-A, "General Electric BWR Thermal Analysis Basis (GETAB) Data, Correlation and Design Application," January 1977.

[3] Letter from F. Akstulewicz (NRR) to G.A. Watford (GE), "Acceptance for Referencing of Licensing Topical Reports NEDC-32601P, 'Methodology and Uncertainties for Safety Limit MCPR Evaluations'; NEDC-32694P, 'Power Distribution Uncertainties for Safety Limit MCPR Evaluation'; and 'Amendment 25 to NEDE-24011-P-A on Cycle-Specific Safety Limit MCPR' (TAC Nos. M97490, M99069 and M97491)," dated March 11, 1999.

data and the improved nuclear instrumentation. The 3D-MONICORE models are based on accepted BWR calculational methods used to monitor on-line core performance.
The evaluations show that the equivalent total nodal uncertainty for the increased calibration interval of 2,000 MWD/T would be 7.6% for fission chamber TIPs and less than this for gamma TIPs. For analyzed cases, up to 2,688 MWD/T, the total nodal uncertainty remains less than the original GETAB requirement of 8.7%.

VY conforms to the GETAB analysis criteria and the applicable criteria of the LTRs reviewed per Reference 2. With the improvements VY has made in core monitoring systems, it is therefore acceptable to change the LPRM calibration frequency from 1,000 equivalent full power hours to 2,000 MWD/T.

Docket No. 50-271
BVY 00-47

Attachment 2

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 233

Local Power Range Monitor Calibration Frequency

Determination of No Significant Hazards Consideration

Determination of No Significant Hazards Consideration

Description of amendment request:

This proposed change revises the surveillance requirement prescribed in TS Table 4.1.2 and allows Vermont Yankee (VY) to increase the interval between Local Power Range Monitor (LPRM) calibrations from 1,000 equivalent full power hours to 2,000 megawatt days/ton. Increasing the interval between required LPRM calibrations is acceptable based on improvements in fuel analytical bases, core monitoring processes, and nuclear instrumentation.

The proposed change is supported by reference to General Electric Licensing Topical Reports and the NRC staff's finding that these topical reports are acceptable for referencing in license applications for this purpose.

Basis for no significant hazards determination:

Pursuant to 10CFR50.92, Vermont Yankee (VY) has reviewed the proposed change and concludes that the change does not involve a significant hazards consideration since the proposed change satisfies the criteria in 10CFR50.92(c).

1. The operation of Vermont Yankee Nuclear Power Station in accordance with the proposed amendment will not involve a significant increase in the probability or consequences of an accident previously evaluated.

   The revised surveillance requirement continues to ensure that the local power range monitor (LPRM) signal is adequately calibrated. This change will not alter the basic operation of process variables, structures, systems, or components as described in the safety analyses, and no new equipment is introduced by the change in LPRM surveillance interval. Therefore, the probability of accidents previously evaluated is unchanged.

   The consequences of an accident can be affected by the thermal limits existing at the time of the postulated accident, but LPRM chamber exposure has no significant effect on the calculated thermal limits because LPRM accuracy does not significantly deviate with exposure. For the extended calibration interval, the total nodal power uncertainty remains less than the uncertainty assumed in the thermal analysis basis safety limit, maintaining the accuracy of the thermal limit calculation. Therefore, the thermal limit calculation is not significantly affected by LPRM calibration frequency, and the consequences of an accident previously evaluated are unchanged.

   These changes do not affect the initiation of any event, nor do they negatively impact the mitigation of any event. Therefore, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. The operation of Vermont Yankee Nuclear Power Station in accordance with the proposed amendment will not create the possibility of a new or different kind of accident from any accident previously evaluated.

   The proposed change will not physically alter the plant or its mode of operation. As such, no new or different types of equipment will be installed, and the basic operation of installed equipment is unchanged. The methods governing plant operation and testing are consistent with current safety analysis assumptions. Therefore, the proposed changes will not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. The operation of Vermont Yankee Nuclear Power Station in accordance with the proposed amendment will not involve a significant reduction in a margin of safety.

   There is no impact on equipment design or fundamental operation, and there are no changes being made to safety limits or safety system settings that would adversely affect plant safety as a result of the proposed change. The margin of safety can be affected by the thermal limits existing prior to an accident; however, uncertainties associated with LPRM chamber exposure have no significant effect on the calculated thermal limits. The thermal limit calculation is not significantly affected because LPRM sensitivity with exposure is well defined. LPRM accuracy remains within the total nodal power uncertainty assumed in the thermal analysis basis, thus maintaining thermal limits and the safety margin.

   Since the proposed changes do not affect safety analysis assumptions or initial conditions, the margins of safety in the safety analyses are maintained. Therefore, the proposed changes do not involve a significant reduction in a margin of safety.

Docket No. 50-271
BVY 00-47

Attachment 3

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 233

Local Power Range Monitor Calibration Frequency

Marked-up Version of the Current Technical Specifications

TABLE 4.1.2

SCRAM INSTRUMENT CALIBRATION

MINIMUM CALIBRATION FREQUENCIES FOR REACTOR PROTECTION INSTRUMENT CHANNELS

Instrument Channel	Group(1)	Calibration Standard(4)	Minimum Frequency(2)
High Flux APRM			
Output Signal	B	Heat Balance	Once Every 7 Days
Output Signal (Reduced) (7)	B	Heat Balance	Once Every 7 Days
Flow Bias	B	Standard Pressure and Voltage Source	Refueling Outage
LPRM (LPRM ND-2-1-104(80))	B(5)	Using TIP System	~~Every 1000 Equivalent Full Power Hours~~ Every 2,000 MWD/T average core exposure (8)
High Reactor Pressure	B	Standard Pressure Source	Once/Operating Cycle
Turbine Control Valve Fast Closure	A	Standard Pressure Source	Every 3 Months
High Drywell Pressure	B	Standard Pressure Source	Once/Operating Cycle
High Water Level in Scram Discharge Volume	B	Water Level	Once/Operating Cycle
Low Reactor Water Level	B	Standard Pressure Source	Once/Operating Cycle
Turbine Stop Valve Closure	A	(6)	Refueling Outage
High Main Steam Line Radiation	B	Appropriate Radiation Source(3)	Refueling Outage
First Stage Turbine Pressure Permissive (PS-5-14(A-D))	A	Pressure Source	Every 6 Months and After Refueling
Main Steam Line Isolation Valve Closure	A	(6)	Refueling Outage

TABLE 4.1.2 NOTES

1. A description of the three groups is included in the bases of this Specification.

2. Calibration tests are not required when the systems are not required to be operable or are tripped. If tests are missed, they shall be performed prior to returning the systems to an operable status.

3. A current source provides an instrument channel alignment every 3 months.

4. Response time is not part of the routine instrument check and calibration, but will be checked every operating cycle.

5. Does not provide scram function.

6. Physical inspection and actuation.

7. The IRM and SRM channels shall be determined to overlap during each startup after entering the STARTUP/HOT STANDBY MODE and the IRM and APRM channels shall be determined to overlap during each controlled shutdown, if not performed within the previous 7 days.

add

8. The specified frequency is met if the calibration is performed within 1.25 times the interval specified, as measured from the previous performance.

BASES: 3.1 (Cont'd)

The requirement to have all scram functions, except those listed in Table 3.1.1, operable in the "Refuel" mode is to assure that shifting to this mode during reactor operation does not diminish the need for the reactor protection system.

The ability to bypass one instrument channel when necessary to complete surveillance testing will preclude continued operation with scram functions which may be either unable to meet the single failure criteria or completely inoperable. It also eliminates the need for an unnecessary shutdown if the remaining channels and subsystems are found to be operable. The conditions under which the bypass is permitted require an immediate determination that the particular function is operable. However, during the time a bypass is applied, the function will not meet the single failure criteria; therefore, it is prudent to limit the time the bypass is in effect by requiring that surveillance testing proceed on a continuous basis and that the bypass be removed as soon as testing is completed.

Sluggish indicator response during the perturbation test will be indicative of a plugged instrument line or closed instrument valves. This test assures the operability of the reactor pressure sensors as well as the reactor level sensors since both parameters are monitored through the same instrument lines.

The independence of the safety system circuitry is determined by operation of the scram test switch. Operation of this switch during the refueling outage and following maintenance on these circuits will assure their continued independence.

~~The calibration frequency, using the TIP system, specified for the LPRMs will provide assurance that the LPRM input to the APRM system will be corrected on a timely basis for LPRM detector depletion characteristics.~~

BASES: 4.1 REACTOR PROTECTION SYSTEM

A. The scram sensor channels listed in Tables 4.1.1 and 4.1.2 are divided into three groups: A, B and C. Sensors that make up Group A are the on-off type and will be tested and calibrated at the indicated intervals.

Group B devices utilize an analog sensor followed by an amplifier and bistable trip circuit. This type of equipment incorporates control room mounted indicators and annunciator alarms. A failure in the sensor or amplifier may be detected by an alarm or by an operator who observes that one indicator does not track the others in similar channels. The bistable trip circuit failures are detected by the periodic testing.

Group C devices are active only during a given portion of the operating cycle. For example, the IRM is active during start-up and inactive during full-power operation. Testing of these instruments is only meaningful within a reasonable period prior to their use.

The basis for a three-month functional test interval for group (A) and (B) sensors is provided in NEDC-30851P-A, "Technical Specification Improvement Analysis for BWR Reactor Protection Systems," March 1988.

SRM/IRM/APRM overlap Surveillances are established to ensure that no gaps in neutron flux indication exist from subcritical to power operation for monitoring core reactivity status.

The overlap between SRMs and IRMs is required to be demonstrated to ensure that reactor power will not be increased into a neutron flux region without adequate indication. This is required prior to withdrawing SRMs from the fully inserted position since indication is being transitioned from the SRMs to the IRMs.

The overlap between IRMs and APRMs is of concern when reducing power into the IRM range. On power increases, the system design will prevent further increases (by initiating a rod block) if adequate overlap is not maintained. Overlap between IRMs and APRMs exists when sufficient IRMs and APRMs concurrently have onscale readings such that the transition between the RUN and STARTUP/HOT STANDBY Modes can be made without either APRM downscale rod block, or IRM upscale rod block. Overlap between SRMs and IRMs similarly exists when, prior to withdrawing the SRMs from the fully inserted position, IRMs are above mid-scale on range 1 before SRMs have reached the upscale rod block.

As noted, IRM/APRM overlap is only required to be met during entry into STARTUP/HOT STANDBY Mode from the Run Mode. That is, after the overlap requirement has been met and indication has transitioned to the IRMs, maintaining overlap is not required (APRMs may be reading downscale once in the STARTUP/HOT STANDBY Mode).

If overlap for a group of channels is not demonstrated (e.g., IRM/APRM overlap), the reason for the failure of the Surveillance should be determined and the appropriate channel(s) declared inoperable. Only those appropriate channels that are required in the current condition should be declared inoperable.

INSERT 'A'

B. The ratio of MFLPD to FRP shall be checked once per day to determine if the APRM gains require adjustment. Because few control rod movements or power changes occur, checking these parameters daily is adequate.

Insert 'A'

LPRM gain settings are determined from the local flux profiles measured by the Traversing Incore Probe (TIP) System. This establishes the relative local flux profile for appropriate representative input to the APRM System. The 2,000 megawatt-days per short ton (MWD/T) frequency is based on operating experience with LPRM sensitivity changes, and that the resulting nodal power uncertainty, combined with other identified uncertainties, remains less than the total uncertainty (i.e., 8.7%) allowed by the GETAB safety limit analysis.

Docket No. 50-271
BVY 00-47

Attachment 4

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 233

Local Power Range Monitor Calibration Frequency

Retyped Technical Specification Pages

Listing of Affected Technical Specifications Pages

Replace the Vermont Yankee Nuclear Power Station Technical Specifications pages listed below with the revised pages. The revised pages contain vertical lines in the margin indicating the areas of change.

Remove	**Insert**
27	27
28	28
32	32
33	33
	33a

TABLE 4.1.2

SCRAM INSTRUMENT CALIBRATION

MINIMUM CALIBRATION FREQUENCIES FOR REACTOR PROTECTION INSTRUMENT CHANNELS

Instrument Channel	Group (1)	Calibration Standard (4)	Minimum Frequency (2)
High Flux APRM			
Output Signal	B	Heat Balance	Once Every 7 Days
Output Signal (Reduced) (7)	B	Heat Balance	Once Every 7 Days
Flow Bias	B	Standard Pressure and Voltage Source	Refueling Outage
LPRM (LPRM ND-2-1-104(80))	B (5)	Using TIP System	Every 2,000 MWD/T average core exposure (8)
High Reactor Pressure	B	Standard Pressure Source	Once/Operating Cycle
Turbine Control Valve Fast Closure	A	Standard Pressure Source	Every 3 Months
High Drywell Pressure	B	Standard Pressure Source	Once/Operating Cycle
High Water Level in Scram Discharge Volume	B	Water Level	Once/Operating Cycle
Low Reactor Water Level	B	Standard Pressure Source	Once/Operating Cycle
Turbine Stop Valve Closure	A	(6)	Refueling Outage
High Main Steam Line Radiation	B	Appropriate Radiation Source (3)	Refueling Outage
First Stage Turbine Pressure Permissive (PS-5-14(A-D))	A	Pressure Source	Every 6 Months and After Refueling
Main Steam Line Isolation Valve Closure	A	(6)	Refueling Outage

TABLE 4.1.2 NOTES

1. A description of the three groups is included in the bases of this Specification.

2. Calibration tests are not required when the systems are not required to be operable or are tripped. If tests are missed, they shall be performed prior to returning the systems to an operable status.

3. A current source provides an instrument channel alignment every 3 months.

4. Response time is not part of the routine instrument check and calibration, but will be checked every operating cycle.

5. Does not provide scram function.

6. Physical inspection and actuation.

7. The IRM and SRM channels shall be determined to overlap during each startup after entering the STARTUP/HOT STANDBY MODE and the IRM and APRM channels shall be determined to overlap during each controlled shutdown, if not performed within the previous 7 days.

8. The specified frequency is met if the calibration is performed within 1.25 times the interval specified, as measured from the previous performance.

BASES: 3.1 (Cont'd)

The requirement to have all scram functions, except those listed in Table 3.1.1, operable in the "Refuel" mode is to assure that shifting to this mode during reactor operation does not diminish the need for the reactor protection system.

The ability to bypass one instrument channel when necessary to complete surveillance testing will preclude continued operation with scram functions which may be either unable to meet the single failure criteria or completely inoperable. It also eliminates the need for an unnecessary shutdown if the remaining channels and subsystems are found to be operable. The conditions under which the bypass is permitted require an immediate determination that the particular function is operable. However, during the time a bypass is applied, the function will not meet the single failure criteria; therefore, it is prudent to limit the time the bypass is in effect by requiring that surveillance testing proceed on a continuous basis and that the bypass be removed as soon as testing is completed.

Sluggish indicator response during the perturbation test will be indicative of a plugged instrument line or closed instrument valves. This test assures the operability of the reactor pressure sensors as well as the reactor level sensors since both parameters are monitored through the same instrument lines.

The independence of the safety system circuitry is determined by operation of the scram test switch. Operation of this switch during the refueling outage and following maintenance on these circuits will assure their continued independence.

BASES:

4.1 REACTOR PROTECTION SYSTEM

A. The scram sensor channels listed in Tables 4.1.1 and 4.1.2 are divided into three groups: A, B and C. Sensors that make up Group A are the on-off type and will be tested and calibrated at the indicated intervals.

Group B devices utilize an analog sensor followed by an amplifier and bistable trip circuit. This type of equipment incorporates control room mounted indicators and annunciator alarms. A failure in the sensor or amplifier may be detected by an alarm or by an operator who observes that one indicator does not track the others in similar channels. The bistable trip circuit failures are detected by the periodic testing.

Group C devices are active only during a given portion of the operating cycle. For example, the IRM is active during start-up and inactive during full-power operation. Testing of these instruments is only meaningful within a reasonable period prior to their use.

The basis for a three-month functional test interval for group (A) and (B) sensors is provided in NEDC-30851P-A, "Technical Specification Improvement Analysis for BWR Reactor Protection Systems," March 1988.

SRM/IRM/APRM overlap Surveillances are established to ensure that no gaps in neutron flux indication exist from subcritical to power operation for monitoring core reactivity status.

The overlap between SRMs and IRMs is required to be demonstrated to ensure that reactor power will not be increased into a neutron flux region without adequate indication. This is required prior to withdrawing SRMs from the fully inserted position since indication is being transitioned from the SRMs to the IRMs.

The overlap between IRMs and APRMs is of concern when reducing power into the IRM range. On power increases, the system design will prevent further increases (by initiating a rod block) if adequate overlap is not maintained. Overlap between IRMs and APRMs exists when sufficient IRMs and APRMs concurrently have onscale readings such that the transition between the RUN and STARTUP/HOT STANDBY Modes can be made without either APRM downscale rod block, or IRM upscale rod block. Overlap between SRMs and IRMs similarly exists when, prior to withdrawing the SRMs from the fully inserted position, IRMs are above mid-scale on range 1 before SRMs have reached the upscale rod block.

As noted,IRM/APRM overlap is only required to be met during entry into STARTUP/HOT STANDBY Mode from the Run Mode. That is, after the overlap requirement has been met and indication has transitioned to the IRMs, maintaining overlap is not required (APRMs may be reading downscale once in the STARTUP/HOT STANDBY Mode).

If overlap for a group of channels is not demonstrated (e.g., IRM/APRM overlap), the reason for the failure of the Surveillance should be determined and the appropriate channel(s) declared inoperable. Only those appropriate channels that are required in the current condition should be declared inoperable.

BASES: 4.1 (Cont'd)

LPRM gain settings are determined from the local flux profiles measured by the Traversing Incore Probe (TIP) System. This establshes the relative local flux profile for appropriate representative input to the APRM System. The 2,000 megawatt-days per short ton (MWD/T) frequency is based on operating experience with LPLRM sensitivity changes, and that the resulting nodal power uncertainty, combined with other identified uncertainties, remains less than the total uncertainty (i.e., 8.7%) allowed by the GETAB safety limit analysis.

B. The ratio of MFLPD to FRP shall be checked once per day to determine if the APRM gains require adjustment. Because few control rod movements or power changes occur, checking these parameters daily is adequate.