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March 31, 2005

Vermont Yankee
Docket No. 50-271

BVY 05-032

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: **Response to Request for Additional Information - Intermediate Range Monitor Surveillance Test Frequencies, Vermont Yankee Nuclear Power Station (TAC NO. MB9091)**

References: (1) USNRC letter to Entergy dated February 16, 2005 regarding Request for Additional Information - Intermediate Range Monitor Surveillance Test Frequencies, Vermont Yankee Nuclear Power Station (TAC NO. MB9091)
(2) Entergy letter to USNRC dated May 21, 2003 regarding Technical Specifications Proposed Change No. 260, Intermediate Range Monitor Surveillance Test Frequencies, BVY 03-49

This letter provides a response to the Nuclear Regulator Commission's (NRC) request for additional information (RAI) (Reference 1) concerning Vermont Yankee's[1] (VY) proposed license amendment (Reference 2).

Attachment 1 to this letter lists the individual RAIs along with the VY responses. Attachment 2 to this letter provides replacement pages to those provided in Reference 2, as referenced from the RAI responses in Attachment 1. These include replacements of retyped proposed TS and Bases pages and markups of current Technical Specification (CTS) pages.

This supplement to the license amendment request does not change VY's determination of no significant hazards consideration provided in Reference 2.

There are no new commitments being made in this submittal.

[1] Entergy Nuclear Vermont Yankee, LLC and Entergy Operations, Inc. are the licensees of the Vermont Yankee Nuclear Power Station

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If you have any questions or require additional information, please contact Mitch McCluskie at (802) 258-4187.

I declare under penalty of perjury that the foregoing is true and correct. Executed on March 31, 2005.

Sincerely,

Jay K. Thayer
Site Vice President
Entergy Nuclear Operations, Inc
Vermont Yankee Nuclear Power Station

Attachments:

1. Responses to Request for Additional Information Regarding Proposed License Amendment - Intermediate Range Monitor Surveillance Test Frequencies
2. Replacement Pages for Retyped Proposed TS and Bases, and Markups of CTS

cc: Mr. Richard B. Ennis, Project Manager
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ATTACHMENT 1 TO BVY 05-032

RESPONSES TO REQUEST FOR ADDITIONAL INFORMATION REGARDING PROPOSED LICENSE AMENDMENT - INTERMEDIATE RANGE MONITOR SURVEILLANCE TEST FREQUENCIES

ENTERGY NUCLEAR OPERATIONS, INC.
VERMONT YANKEE NUCLEAR POWER STATION
DOCKET NO. 50-271

RESPONSES TO REQUEST FOR ADDITIONAL INFORMATION REGARDING PROPOSED LICENSE AMENDMENT - INTERMEDIATE RANGE MONITOR SURVEILLANCE TEST FREQUENCIES

RAI 1:

The staff still needs information to make a determination that, in case of the unavailability of the IRMs (e.g., common cause failure), the plant could be safely operated. This discussion should provide enough information for the staff to make a determination that the proposed change did not result in an unforseen hazard or substantially greater potential for a known hazard event to occur. Provide justification that extending the surveillance test interval (STI) for the IRMs won't significantly increase the failure rate of the IRMs.

Response to RAI 1:

In the unlikely event that a common cause failure results in unavailability of all of the IRM channels, Vermont Yankee (VY) could be safely operated. This is due to the defense in depth of the VY design and administrative controls which are described below in the response to RAI 2.

The proposed license amendment (Reference 2) includes as Attachment 1 a safety assessment of each proposed change. The assessment of Change #1 describes the review of surveillance test history performed in support of the proposed change. This review included 333 IRM functional/calibration tests performed since August 1993. Out of this population of tests, only one failure was observed which affected the safety function. In addition, this failure only affected one of the six installed IRM instrument channels.

If the surveillance frequency had been once per 31 days instead of weekly, and if the reactor was not in the Run or Shutdown mode, this failure would have remained undetected for an additional 24 days. Since this failure only affected one IRM channel, at least one additional failure would have been required for loss of IRM High Flux trip capability. Since only one failure was found in the 10 year review period, the occurrence of an additional failure during the postulated 24 day interval would be extremely unlikely. In addition, although not required by the Technical Specifications, loss of trip capability would probably have required two additional simultaneous failures since each trip system has three IRM channels installed. Therefore, extending the IRM STI from weekly to once per 31 days would not result in a significant increase in the IRM failure rate.

In addition, extending the STI would result in reductions in: 1) potential unnecessary scrams, 2) excessive equipment test cycles, 3) potential instrument channel failures due to errors during test performance, and 4) the diversion of personnel and resources on unnecessary testing.

RAI 2:

In order for the NRC staff to determine the acceptability of the request based on a deterministic argument, the licensee should clearly state how the defense-in-depth philosophy will be maintained. In case of the unavailability of the IRM, which system will be used as a backup to the IRM so that the plant will not inadvertently go critical? Discuss whether this system is tested in accordance with the Technical Specification (TS) requirements. For example, if the credit is being taken for the rod block monitor or rod worth minimizer, then discuss how these systems meet the requirements of the IRM and are tested in accordance with the TSs. Also, if the credit is being taken for operator action, specify which diverse indication is used for prompting the operator action and state whether the operator action is taken within the required time assumed in the safety analysis.

Response to RAI 2:

In the Startup/Hot Standby Mode, the IRM High Flux trip is credited for mitigation of the continuous control rod withdrawal event. In addition, the IRMs are used to 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). If sufficient IRMs failed such that the IRM High Flux trip function lost trip capability the actions required by TS Table 3.1.1 would be taken. These actions include placing one channel or trip system in the tripped condition and inserting all operable control rods. TS Table 4.1.2 requires that the SRMs and IRMs be determined to overlap during each startup. Therefore, inoperable IRMs would be detected prior to neutron flux levels exceeding the range of the SRMs.

TS 3.3.B.5 requires the following:

> "Control rods shall not be withdrawn for startup or refueling unless at least two source range channels have an observed count rate greater than or equal to three counts per second."

TS 4.3.B.5 requires the following:

> "Prior to control rod withdrawal for startup or during refueling, verification shall be made that at least two source range channels have an observed count rate of at least three counts per second."

In the unlikely event that the IRM High Flux trip function lost trip capability in such a manner as to be undetectable, the APRM High Flux (reduced) trip function would be available to mitigate the continuous control rod withdrawal event. Effectively, the APRMs provide an additional neutron trip function in the Startup mode. TS Table 3.1.1 requires that the APRM High Flux (reduced) trip function be operable in the Refuel and Startup modes. Current TS Table 4.1.1 requires that a functional test of this trip function be performed "Before Each Startup & Weekly During Refueling."

In addition, other design features and administrative controls (e.g., RWM) would be available to prevent occurrence of the continuous control rod withdrawal event. Operating procedures prescribe withdrawal sequences that minimize the worth of individual control

rods and prevent reactivity excursions. Also per procedure, all control rod withdrawals are verified by a second qualified individual to ensure compliance with the withdrawal sequence. In addition the rod worth minimizer (RWM) system enforces compliance with the prescribed withdrawal sequence. TS 3.3.B.3 addresses RWM operability requirements for moving control rods below 20% power. Therefore, RWM will be available over the entire IRM monitoring range.

In the Refuel Mode, the IRMs are not credited for mitigation of any event and they are not used to monitor neutron flux levels since the reactor is shutdown. However, the IRM High Flux trip is required to be operable to provide protection against unexpected reactivity excursions. As stated above, the APRM High Flux (reduced) trip is required to be operable in the Refuel modes and would therefore be available to serve as a backup to the IRM High Flux trip. The refueling interlocks are credited with preventing criticality during refueling operations and are required to be operable by TS 3.12.A. The one-rod-out interlock ensures that, with the reactor mode switch in the Refuel position, only one control rod can be withdrawn at a time. TS 3.3.A.1 requires the core to be designed such that it will remain subcritical with the highest worth control rod fully withdrawn. These two requirements taken together ensure that the core will not become critical during refueling. In addition, per procedure, the Shutdown Margin mode of RWM is placed in service, if available, for control rod withdrawals while in the Refuel Mode. This function provides a software back-up to the one-rod-out interlock by limiting withdrawal of a second control rod when one rod is already withdrawn. The RWM Shutdown Margin mode is functionally tested at the beginning of the refueling outage prior to beginning control rod withdrawals. If the RWM Shutdown Margin mode is not operable, the one-rod-out interlock is functionally tested for the subject control rod prior to withdrawal of that rod.

As stated above, at least two SRMs are required to be operable during rod withdrawal in the Refuel Mode and only one rod can be withdrawn at a time (by design). Therefore, operator action will be prompted by diverse indications of neutron flux levels to prevent inadvertent criticality.

RAI 3:

Have there been any refueling/startup events (initiating events) that have required the IRM function? Also, describe any failure of the IRMs noted such that IRM function was lost.

Response to RAI 3:

Scram report records were researched and the following events involving a valid actuation of the IRM High Flux trip were identified.

In 1972, during startup testing, a control rod was intentionally withdrawn with a short period already present. The resulting flux increase was terminated by a full reactor scram from the IRM High Flux trip.

In 1973, an event occurred in which inadvertent control rod withdrawal in the Refuel mode resulted in a criticality event which was terminated by a full reactor scram from the IRM High Flux trip. The one-rod-out interlock had been bypassed, allowing two adjacent control rods

to be withdrawn. This event was reported to the U.S. Atomic Energy Commission as Abnormal Occurrence No. AO-73-71.

In 1974, an event occurred during a reactor startup in which the operator failed to range up the IRMs quickly enough to keep up with the rate of flux increase. The flux increase was terminated by a full reactor scram from the IRM High Flux trip.

In 1988, an event occurred during a reactor shutdown in which a main turbine pressure regulator malfunction caused reactor pressure and level fluctuations. The operating feedwater pump tripped on high water level, and when the standby feedwater pump was started the introduction of relatively cold water resulted in a full reactor scram from the IRM High Flux trip. This event was reported to the NRC as LER 88-09.

As stated in the proposed license amendment (Reference 2), the proposed surveillance interval extension will not impact the ability of the IRM system to function as designed when required. Therefore, for events similar to those listed above, there is a high degree of confidence that the IRMs will function as required to mitigate the event.

A search of the VY corrective action database was performed to determine if any IRM failures have occurred which resulted in a loss of the IRM High Flux trip function. No instances were found.

RAI 4:

Has the IRM equipment been replaced with updated equipment such that the drift information is not available for the new IRM equipment? If this is the case, justify the longer STI for the newer IRM equipment.

Response to RAI 4:

Some components of the IRM channels have been replaced with updated equipment. However, these replacements have no impact on the drift analysis. The drift information provided in the proposed license amendment (Reference 2) is applicable to the currently installed IRM instrument channels and demonstrates that the actual drift falls within the assumed drift in the associated setpoint calculation.

RAI 5:

Attachment 1 to the May 21, 2003, application indicates that data was excluded for obvious equipment replacement activities, illegible data, and multiple tests performed on the same day. Have any IRM surveillance tests been subsequently found to be performed incorrectly? If so, how were they discovered?

Response to RAI 5:

A search of the VY corrective action database was performed from May 21, 2003 to the present to determine if any IRM surveillance tests had been performed incorrectly. No instances were found.

RAI 6:

Attachment 1, Page 5 of the application states that it was not necessary to change the existing safe shutdown analysis to account for IRM failure or drift. Provide a similar discussion related to shutdown/refueling for the initiating events the IRMs are intended to mitigate.

Attachment 1, Page 1 of the application states that RPS IRM functions were not explicitly modeled in NEDC-30851P-A, because the events for which these functions provide protection are so mild that safety limits would not be violated. Yet the submittal states that NEDC-30851P-A did not propose to extend the surveillance interval for the IRMs. The NRC staff notes that NEDC-30851P-A, Supplement 1 did provide an analysis to increase the STI for the rod block monitor, and that both NEDC-30851P-A and supplement 1 were based on "at power" operation.

Response to RAI 6:

As discussed in Attachment 1, Page 5 of the proposed license amendment (Reference 2), the calculated drift allowances are incorporated in the setpoint calculation, along with other instrument uncertainty. As calculated, the projected instrument errors caused by drift are acceptable over the proposed calibration interval to preserve the safety analysis limit and affect a safe shutdown.

As stated above in the response to RAI 2, the IRMs are not credited for mitigation of any event in the Refuel Mode. The IRM High Flux trip is only required to be operable to provide protection against unexpected reactivity excursions. Therefore, the potential impact of IRM failure or drift on the analysis of refueling events is not applicable. The IRM High Flux trip is not required to be operable in the Hot or Cold Shutdown modes.

RAI 7:

During a conference call on December 13, 2004, the licensee confirmed that the IRM instrument channel functional test will be performed before shutdown, before startup and anytime during shutdown/refueling if it exceed 31 days. The wording in the TS change is confusing and could be interpreted differently. Clarify the wording to state the intent.

Response to RAI 7:

The wording of the Functional Test Minimum Frequency specified in Table 4.1.1 is being changed to clarify the intent. With the exception of the surveillance interval, the proposed wording matches that provided in Technical Specifications Proposed Change No. 259, Instrumentation Technical Specifications, submitted on April 25, 2003. Replacement markup and retyped proposed TS and Bases pages are provided in Attachment 2. The following proposed pages are affected by this change: 25 and 33a. In addition, Pages 27, 28 and 33a were changed by TS Amendment No. 219 which was issued since Proposed Change No. 260 was submitted. Therefore, replacements for these pages are also provided.

RAI 8:

The following comments apply to Appendix D to the VYNPS Setpoint Program Manual , "Instrument Uncertainty and Setpoint Design Guide," which was submitted to the NRC via Entergy letter dated July 21, 2003, and which is being used for the IRM drift evaluation:

a. Page 11, Summary: ".... testing data should be evaluated statistically to determine randomness." Please identify which test or tests will be used for this purpose.

b. Page 17, middle paragraph: "....95% tolerance interval...." Whereas confidence intervals have one specification (such as 95 or 95%), tolerance intervals have two components (such as 95/75). This paragraph does not make this distinction. Please correct this paragraph and all other references to tolerance intervals or limits.

c. Page 19, second equation: The expression MTE has a subscript "i" which is unexplained.

d. Page 22, middle equation: Explain where the constant 2.214 comes from.

e. Page 23, third line from the bottom: "Where drift is determined to have a linear relationship with time...." Please explain how linearity is to be tested.

f. Page 35, second line from the top: If linearity does not apply, is the square root transformation the only obvious alternative?

g. Page 35, Section 3.8.1, fifth line: "As explained in Section, ..." The Section number is missing.

h. Attachment G, Page 4, Section 2: Example is missing.

Response to RAI 8:

a. Appendix E of the VY Setpoint Program Manual, "Instrument Drift Analysis Design Guide" provides the guidance for the determination of Analyzed Drift (DA). Section 3.8, Methods for Verifying Normality, provides the guidance to assess normality (which is used to assess randomness). This section describes the following:

   Chi-Squared, χ^2, Goodness of Fit Test
   W Test
   D-Prime Test
   Probability Plots
   Coverage Analysis
   Sample Counting Within the 1σ and 2σ for the Group

b. The above tolerance interval should be considered together with the 95% confidence interval provided in the previous sentence. "95% tolerance interval" will be corrected to show "95%/95% tolerance interval".

c. The subscript "i" is used in other equations (refer to section 3.8) to delineate different devices (of the i^{th} device). For this case, the use of the subscript does not add any benefit and will therefore be removed.

d. The 2.124 value is used for Analyzed Drift (DA) to illustrate the difference between a device with a mild dependence between drift magnitude and time and a device with a strong dependence between drift magnitude and time. This value is being used in an example to demonstrate calculation methodologies and therefore has no specific basis.

e. Appendix E of the VY Setpoint Program Manual, "Instrument Drift Analysis Design Guide" provides the guidance for the determination of Analyzed Drift (DA). Section 3.10, Time-Dependent Drift Analysis, provides the guidance to assess the time dependence (linearity) associated with the analyzed drift. This section describes the following:
   Standard Deviation and Means at Different Calibration Intervals (Time Dependency Plot)
   XY Scatter Plots
   Instrument Resetting Evaluation
   Age-Dependent Drift Considerations

f. Upon further review of Section 3.8 of Appendix D to the VYNPS Setpoint Program Manual it was determined that the equations in that section for random uncertainties and biases are not limited to devices which can be considered internally linear. Therefore, the phrase "for devices which can be considered internally linear" will be deleted.

g. The missing section number is 3.10. This section number will be added.

h. The effective uncertainty is "±1.4%CS". This value will be added.

The changes specified above will be made during the next revision of the VY Setpoint Program Manual.

ATTACHMENT 2 TO BVY 05-032

REPLACEMENT PAGES FOR
RETYPED PROPOSED TS AND BASES,
AND MARKUPS OF CTS

ENTERGY NUCLEAR OPERATIONS, INC.
VERMONT YANKEE NUCLEAR POWER STATION
DOCKET NO. 50-271

TABLE 4.1.1

SCRAM INSTRUMENTATION AND LOGIC SYSTEMS FUNCTIONAL TESTS
MINIMUM FUNCTIONAL TEST FREQUENCIES FOR SAFETY INSTRUMENTATION, LOGIC SYSTEMS AND CONTROL CIRCUITS

Instrument Channel	Group[3]	Functional Test[7]	Minimum Frequency[4]
Mode Switch in Shutdown	A	Place Mode Switch in Shutdown	Each Refueling Outage
Manual Scram	A	Trip Channel and Alarm	Every 3 Months
IRM			
High Flux[10]	C	Trip Channel and Alarm[5]	Within 31 Days Before Entering STARTUP/HOT STANDBY[11] and Every 31 Days During STARTUP/HOT STANDBY, Every 31 Days During Refueling
Inoperative	C	Trip Channel and Alarm	Within 31 Days Before Entering STARTUP/HOT STANDBY[11] and Every 31 Days During STARTUP/HOT STANDBY, Every 31 Days During Refueling
APRM			
High Flux	B	Trip Output Relays[5]	Every 3 Months
High Flux (Reduced)	B	Trip Output Relays[5]	Before Each Startup & Weekly During Refueling[6]
Inoperative	B	Trip Output Relays	Every 3 Months
Flow Bias	B	Trip Output Relays[5]	Every 3 Months
High Reactor Pressure	B	Trip Channel and Alarm[5]	Every 3 Months
High Drywell Pressure	B	Trip Channel and Alarm[5]	Every 3 Months
Low Reactor Water Level[2][8]	B	Trip Channel and Alarm[5]	Every 3 Months
High Water Level in Scram Discharge Volume	B	Trip Channel and Alarm[5]	Every 3 Months
Main Steam Line Iso. Valve Closure	A	Trip Channel and Alarm	Every 3 Months
Turbine Con. Valve Fast Closure	A	Trip Channel and Alarm	Every 3 Months
Turbine Stop Valve Closure	A	Trip Channel and Alarm	Every 3 Months
Scram Test Switch (5A-S2(A-D))	A	Trip Channel and Alarm	Once each week (9)
First Stage Turbine Pressure - Permissive (PS-5-14(A-D))	A	Trip Channel and Alarm	Every 6 Months

TABLE 4.1.1 NOTES

1. Not used

2. An instrument check shall be performed on reactor water level and reactor pressure instrumentation once per day.

3. A description of the three groups is included in the basis of this Specification.

4. Functional 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.

5. This instrumentation is exempted from the Instrument Functional Test Definition (1.G.). This Instrument Functional Test will consist of injecting a simulated electrical signal into the measurement channels.

6. Frequency need not exceed weekly.

7. A functional test of the logic of each channel is performed as indicated. This coupled with placing the mode switch in shutdown each refueling outage constitutes a logic system functional test of the scram system.

8. The water level in the reactor vessel will be perturbed and the corresponding level indicator changes will be monitored. This test will be performed every month.

9. The automatic scram contactors shall be exercised once every week by either using the RPS channel test switches or performing a functional test of any automatic scram function. If the contactors are exercised using a functional test of a scram function, the weekly test using the RPS channel test switch is considered satisfied. The automatic scram contactors shall also be exercised after maintenance on the contactors.

10. When the IRM-High Flux trip function is required to be operable, an instrument check shall be performed on IRM instrumentation once per day.

11. Not required to be performed when entering STARTUP/HOT STANDBY MODE from RUN MODE until 12 hours after entering STARTUP/HOT STANDBY MODE.

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 IRM Output Signal(7)(10)(11)	C	Standard Voltage Source	Once/Operating Cycle
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
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. Deleted.

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.

9. APRM trip unit calibration only.

10. Neutron detectors are excluded.

11. Not required to be performed when entering STARTUP/HOT STANDBY MODE from RUN MODE until 12 hours after entering STARTUP/HOT STANDBY MODE.

BASES: 4.1 (Cont'd)

The calibration of the APRM High Flux Flow Bias trip units provides a check of the actual trip setpoints. If the trip setting is found to be less conservative than accounted for in the appropriate setpoint calculation, but is not beyond the Allowable Value specified in Table 3.1.1, the channel performance is still within the requirements of the plant safety analysis. However, if the trip setting is found to be less conservative than the Allowable Value specified in Table 3.1.1, the channel should be declared inoperable. Under these conditions, the setpoint should be readjusted to be equal to or more conservative than accounted for in the appropriate setpoint calculation. The specified trip unit calibration frequency (i.e., every 3 months) is consistent with the assumptions of the VYNPS setpoint methodology and the reliability analysis of NEDC-30851-P-A, "Technical Specification Improvement Analyses for BWR Reactor Protection System," March 1988.

IRM surveillance requirements are modified by Note 11 to Table 4.1.1 and Note 11 to Table 4.1.2 for functional and calibration testing, respectively. These Notes allow functional testing and calibration of IRM instrument channels to be performed within 12 hours of entering the STARTUP/HOT STANDBY MODE from the RUN MODE. This allowance is necessary since testing of IRM instrument channels cannot be performed in the RUN MODE without utilizing jumpers, lifted leads, or movable links. The 12 hour time period is considered to provide reasonable time to complete testing.

The IRM calibration requirements are modified by Note 10 to Table 4.1.2 to exclude neutron detectors from calibration of the IRM - High Flux instrument channels. This is acceptable because the neutron detectors are passive devices with minimal drift, and because of the difficulty of simulating a meaningful signal.

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.

TABLE 4.1.1

SCRAM INSTRUMENTATION AND LOGIC SYSTEMS FUNCTIONAL TESTS

MINIMUM FUNCTIONAL TEST FREQUENCIES FOR SAFETY INSTRUMENTATION, LOGIC SYSTEMS AND CONTROL CIRCUITS

Instrument Channel	Group[3]	Functional Test[7]	Minimum Frequency[4]
Mode Switch in Shutdown	A	Place Mode Switch in Shutdown	Each Refueling Outage
Manual Scram	A	Trip Channel and Alarm	Every 3 Months
IRM			
High Flux	C	Trip Channel and Alarm[5]	Before Each Startup & Weekly During Refueling[6]
Inoperative	C	Trip Channel and Alarm	Before Each Startup & Weekly During Refueling[6]
APRM			
High Flux	B	Trip Output Relays[5]	Every 3 Months
High Flux (Reduced)	B	Trip Output Relays[5]	Before Each Startup & Weekly During Refueling[6]
Inoperative	B	Trip Output Relays	Every 3 Months
Flow Bias	B	Trip Output Relays[5]	Every 3 Months
High Reactor Pressure	B	Trip Channel and Alarm[5]	Every 3 Months
High Drywell Pressure	B	Trip Channel and Alarm[5]	Every 3 Months
Low Reactor Water Level[2][8]	B	Trip Channel and Alarm[5]	Every 3 Months
High Water Level in Scram Discharge Volume	B	Trip Channel and Alarm[5]	Every 3 Months
Main Steam Line Iso. Valve Closure	A	Trip Channel and Alarm	Every 3 Months
Turbine Con. Valve Fast Closure	A	Trip Channel and Alarm	Every 3 Months
Turbine Stop Valve Closure	A	Trip Channel and Alarm	Every 3 Months
Scram Test Switch (5A-S2(A-D))	A	Trip Channel and Alarm	Once each week (9)
First Stage Turbine Pressure - Permissive (PS-5-14(A-D))	A	Trip Channel and Alarm	Every 6 Months

2 (10) 1

Within 31 Days Before entering STARTUP/HOT STANDBY[11] and Every 31 Days During STARTUP/HOT STANDBY, Every 31 Days During Refueling

TABLE 4.1.1 NOTES

1. Not used

2. An instrument check shall be performed on reactor water level and reactor pressure instrumentation once per day.

3. A description of the three groups is included in the basis of this Specification.

4. Functional 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.

5. This instrumentation is exempted from the Instrument Functional Test Definition (1.G.). This Instrument Functional Test will consist of injecting a simulated electrical signal into the measurement channels.

6. Frequency need not exceed weekly.

7. A functional test of the logic of each channel is performed as indicated. This coupled with placing the mode switch in shutdown each refueling outage constitutes a logic system functional test of the scram system.

8. The water level in the reactor vessel will be perturbed and the corresponding level indicator changes will be monitored. This test will be performed every month.

9. The automatic scram contactors shall be exercised once every week by either using the RPS channel test switches or performing a functional test of any automatic scram function. If the contactors are exercised using a functional test of a scram function, the weekly test using the RPS channel test switch is considered satisfied. The automatic scram contactors shall also be exercised after maintenance on the contactors.

10. When the IRM - High Flux trip function is required to be operable, an instrument check shall be performed on IRM instrumentation once per day. 2

11. Not required to be performed when entering STARTUP/HOT STANDBY MODE from RUN MODE until 12 hours after entering STARTUP/HOT STANDBY MODE. 1

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 Every 3 Months (9)
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
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
High Flux IRM Output Signal (7)(10)(11)	C	Standard Voltage Source	Once/Operating Cycle

3

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. Deleted.

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.

9. APRM trip unit calibration only.

10. Neutron detectors are excluded.

11. Not required to be performed when entering STARTUP/HOT STANDBY MODE from RUN MODE until 12 hours after entering STARTUP/HOT STANDBY MODE.

3

BASES: 4.1 (Cont'd)

The calibration of the APRM High Flux Flow Bias trip units provides a check of the actual trip setpoints. If the trip setting is found to be less conservative than accounted for in the appropriate setpoint calculation, but is not beyond the Allowable Value specified in Table 3.1.1, the channel performance is still within the requirements of the plant safety analysis. However, if the trip setting is found to be less conservative than the Allowable Value specified in Table 3.1.1, the channel should be declared inoperable. Under these conditions, the setpoint should be readjusted to be equal to or more conservative than accounted for in the appropriate setpoint calculation. The specified trip unit calibration frequency (i.e., every 3 months) is consistent with the assumptions of the VYNPS setpoint methodology and the reliability analysis of NEDC-30851-P-A, "Technical Specification Improvement Analyses for BWR Reactor Protection System," March 1988.

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.

<INSERT #1>

4

INSERT #1

IRM surveillance requirements are modified by Note 11 to Table 4.1.1 and Note ~~10~~ 11 to Table 4.1.2 for functional and calibration testing, respectively. These Notes allow functional testing and calibration of IRM instrument channels to be performed within 12 hours of entering the STARTUP/HOT STANDBY MODE from the RUN MODE. This allowance is necessary since testing of IRM instrument channels cannot be performed in the RUN MODE without utilizing jumpers, lifted leads, or movable links. The 12 hour time period is considered to provide reasonable time to complete testing.

The IRM surveillance requirements for functional testing "Before and During Each Startup & Once Every 31 Days During Refueling" are modified by Note 12 to Table 4.1.1. Note 12 to Table 4.1.1 states the "frequency need not exceed once every 31 days." As a result, within 31 days before entering the STARTUP/HOT STANDBY MODE and once every 31 days while the plant is in the STARTUP/HOT STANDBY MODE or REFUEL MODE, a functional test of the IRM instrument channels must be performed. The IRM instrument channel surveillance requirements may be satisfied with the performance of only one functional test of each of the required instrument channels prior to entering the STARTUP/HOT STANDBY MODE at the end of a refueling outage, provided the 31 day frequency (plus 25% Surveillance Frequency allowance) is not exceeded prior to entering the RUN MODE.

The IRM calibration requirements are modified by Note ~~9~~ 10 to Table 4.1.2 to exclude neutron detectors from calibration of the IRM – High Flux instrument channels. This is acceptable because the neutron detectors are passive devices with minimal drift, and because of the difficulty of simulating a meaningful signal.