ATTACHMENT A

NIAGARA MOHAWK POWER CORPORATION
LICENSE NO. NPF-69
DOCKET NO. 50-410

Proposed Changes to Technical Specifications

Replace existing pages 2-3, 3/4 3-1, 3/4 3-1a, 3/4 3-2, 3/4 3-4, 3/4 3-7, 3/4 3-9, 3/4 3-64, 3/4 3-65, B3/4 3-1, and B3/4 3-2 with the attached revised pages. These pages have been retyped in their entirety with marginal markings to indicate changes to the text.

TABLE 2.2.1-1

REACTOR PROTECTION SYSTEM INSTRUMENTATION SETPOINTS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUE
1. Intermediate Range Monitor, - Neutron Flux - High	≤120/125 divisions of full scale	≤122/125 divisions of full scale
2. Average Power Range Monitor:		
a. Neutron Flux - Upscale, Setdown	≤15% of RATED THERMAL POWER	≤20% of RATED THERMAL POWER
b. Flow-Biased Simulated Thermal Power - Upscale		
1) Flow-Biased 2) High-Flow-Clamped	≤0.58 (W-ΔW)[a] + 59%, with a maximum of ≤113.5% of RATED THERMAL POWER	≤0.58 (W-ΔW)[a] + 62%, with a maximum of ≤115.5% of RATED THERMAL POWER
c. Fixed Neutron Flux - Upscale	≤118% of RATED THERMAL POWER	≤120% of RATED THERMAL POWER
d. Inoperative	NA	NA
e. 2-Out-Of-4 Voter	NA	NA
3. Reactor Vessel Steam Dome Pressure - High	≤1052 psig	≤1072 psig
4. Reactor Vessel Water Level - Low, Level 3	≥159.3 in. above instrument zero*	≥157.8 in. above instrument zero
5. Main Steam Line Isolation Valve - Closure	≤8% closed	≤12% closed
6. Main Steam Line Radiation [b] - High	≤3.0 x full-power background	≤3.6 x full-power background
7. Drywell Pressure - High	≤1.68 psig	≤1.88 psig

* See Bases Figure B3/4 3-1.

(a) The Average Power Range Monitor Scram Function varies as a function of recirculation loop drive flow (W). ΔW is defined as the difference in indicated drive flow (in percent of drive flow which produces rated core flow) between two loop and single loop operation at the same core flow. ΔW=0 for two loop operation. ΔW=5% for single loop operation.

(b) See footnote (**) to Table 3.3.2-2 for trip setpoint during hydrogen addition test.

3/4.3 INSTRUMENTATION

3/4.3.1 REACTOR PROTECTION SYSTEM INSTRUMENTATION

LIMITING CONDITIONS FOR OPERATION

3.3.1 As a minimum, the reactor protection system instrumentation channels shown in Table 3.3.1-1 shall be OPERABLE.

APPLICABILITY: As shown in Table 3.3.1-1.

ACTION:

a. With one channel required by Table 3.3.1-1 inoperable in one or more Functional Units, place the inoperable channel and/or that trip system in the tripped condition* within 12 hours. The provisions of Specification 3.0.4 are not applicable.

b. With two or more channels required by Table 3.3.1-1 inoperable in one or more Functional Units:

   1. Within one hour, verify sufficient channels remain OPERABLE or tripped* to maintain trip capability in the Functional Unit, and

   2. Within 6 hours, place the inoperable channel(s) in one trip system and/or that trip system** in the tripped condition*, and

   3. Within 12 hours, restore the inoperable channels in the other trip system to an OPERABLE status or tripped*.

   Otherwise, take the ACTION required by Table 3.3.1-1 for the Functional Unit.

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* An inoperable channel or trip system need not be placed in the tripped condition where this would cause the Trip Function to occur. In these cases, if the inoperable channel is not restored to OPERABLE status within the required time, the ACTION required by Table 3.3.1-1 for the Functional Unit shall be taken.

For Functional Units 2.a, 2.b, 2.c, and 2.d, inoperable channels shall be placed in the tripped condition to comply with Action a. Because these Functional Units provide trip inputs to both trip systems, placing either trip system in trip is not applicable. For Functional Units 2.a, 2.b, 2.c, and 2.d, Action b.3 applies without regard to "in the other trip systems."

** This ACTION applies to that trip system with the most inoperable channels; if both trip systems have the same number of inoperable channels, the ACTION can be applied to either trip system. Action b.2 is not applicable for Functional Units 2.a, 2.b, 2.c, and 2.d.

SURVEILLANCE REQUIREMENTS

4.3.1.1 Each reactor protection system instrumentation channel shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL FUNCTIONAL TEST, and CHANNEL CALIBRATION operations for the OPERATIONAL CONDITIONS and at the frequencies shown in Table 4.3.1.1-1.

4.3.1.2 LOGIC SYSTEM FUNCTIONAL TESTS and simulated automatic operation of all channels shall be performed at least once per 18 months, except Table 4.3.1.1-1, Functions 2.a, 2.b, 2.c, 2.d, and 2.e. Functions 2.a, 2.b, 2.c, and 2.d do not require LOGIC SYSTEM FUNCTIONAL TESTS. For Function 2.e, tests shall be performed at least once per 24 months. LOGIC SYSTEM FUNCTIONAL TEST for Function 2.e includes simulating APRM trip conditions at the APRM channel inputs to the voter channel to check all combinations of two tripped inputs to the 2-out-of-4 voter logic in the voter channels.

4.3.1.3 The REACTOR PROTECTION SYSTEM RESPONSE TIME of each required reactor trip functional unit shall be demonstrated to be within its limit at least once per 18 months. Neutron detectors, Functions 2.a, 2.b, 2.c, 2.d, and Function 2.e digital electronics are exempt from response time testing. Each test shall include at least one channel per Trip System so that all channels are tested at least once per N times 18 months, where N is the total number of redundant channels in a specific reactor Trip System.

TABLE 3.3.1-1

REACTOR PROTECTION SYSTEM INSTRUMENTATION

	FUNCTIONAL UNIT	APPLICABLE OPERATIONAL CONDITIONS	MINIMUM OPERABLE CHANNELS PER TRIP SYSTEM (a)	ACTION
1.	Intermediate Range Monitors:			
	a. Neutron Flux - High	2	3	1
		3, 4	3	2
		5(b)	3	3
	b. Inoperative	2	3	1
		3, 4	3	2
		5	3	3
2.	Average Power Range Monitor(c):			
	a. Neutron Flux - Upscale, Setdown	2	3(l)	1
		5(k)	3(l)	3
	b. Flow Biased Simulated Thermal Power - Upscale	1	3(l)	4
	c. Fixed Neutron Flux - Upscale	1	3(l)	4
	d. Inoperative	1, 2	3(l)	1
		5(k)	3(l)	3
	e. 2-Out-Of-4 Voter	1, 2	2	1
		5(k)	2	3
3.	Reactor Vessel Steam Dome Pressure - High	1, 2(d)	2	1
4.	Reactor Vessel Water Level - Low, Level 3	1, 2	2	1

TABLE NOTATIONS

(a) A channel may be placed in an inoperable status for up to 6 hours for required surveillance without placing the Trip System in the tripped condition provided at least one OPERABLE channel in the same Trip System is monitoring that parameter.

(b) Unless adequate shutdown margin has been demonstrated per Specification 3.1.1, and the Refuel position one-rod-out interlock is OPERABLE per Specification 3.9.1, the shorting links shall be removed from the RPS circuitry prior to and during the time any control rod is withdrawn.*

(c) An APRM channel is inoperable if there are less than 3 LPRM inputs per level or less than 20 LPRM inputs to an APRM channel.

(d) This function is not required to be OPERABLE when the reactor pressure vessel head is removed per Specification 3.10.1.

(e) This function shall be automatically bypassed when the reactor mode switch is not in the Run position.

(f) This function is not required to be OPERABLE when PRIMARY CONTAINMENT INTEGRITY is not required.

(g) Also actuates the standby gas treatment system.

(h) With any control rod withdrawn. Not applicable to control rods removed per Specification 3.9.10.1 or 3.9.10.2.

(i) This function shall be automatically bypassed when turbine first stage pressure is less than or equal to 136.4** psig, equivalent to THERMAL POWER less than 30% of RATED THERMAL POWER.

(j) Also actuates the EOC-RPT system.

(k) Required to be OPERABLE only during shutdown margin demonstrations performed per Specification 3.10.3.

(l) Since each APRM provides inputs to both trip systems, the minimum operable channels specified in Table 3.3.1-1 are the total APRM channels required (i.e., it is not on a trip system basis). The 6 hour allowed test time to complete a channel surveillance test (Note (a) above) is applicable provided at least two OPERABLE channels are monitoring that parameter.

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* Not required for control rods removed per Specification 3.9.10.1 or 3.9.10.2.

** To allow for instrument accuracy, calibration and drift, a setpoint of less than or equal to 125.8 psig turbine first stage pressure shall be used.

TABLE 4.3.1.1-1

REACTOR PROTECTION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL FUNCTIONAL TEST	CHANNEL CALIBRATION(a)	OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED
1. Intermediate Range Monitors:				
a. Neutron Flux - High	S/U, S,(b) S	S/U(c), W, R(d) W	R R	2 3, 4, 5
b. Inoperative	NA	W	NA	2, 3, 4, 5
2. Average Power Range Monitor(e):				
a. Neutron Flux - Upscale, Setdown	D, (b) D	SA(i) SA	R R	2 5(n)
b. Flow-Biased Simulated Thermal Power - Upscale	D	SA(h)	W(g), R(f)	1
c. Fixed Neutron Flux - Upscale	D	SA	W(g), R	1
d. Inoperative	NA	SA	NA	1, 2, 5(n)
e. 2-Out-Of-4 Voter	D	SA	NA	1, 2, 5(n)
3. Reactor Vessel Steam Dome Pressure - High	S	Q	R(k)	1, 2
4. Reactor Vessel Water Level - Low, Level 3	S	Q	R(k)	1, 2
5. Main Steam Line Isolation Valve - Closure	NA	Q	R	1
6. Main Steam Line Radiation - High	S	Q	R	1, 2(j)
7. Drywell Pressure - High	S	Q	R(k)	1, 2(l)

REACTOR PROTECTION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

TABLE NOTATIONS

(a) Neutron detectors may be excluded from CHANNEL CALIBRATION.

(b) The IRM and SRM channels shall be determined to overlap for at least 1/2 decade during each startup after entering OPERATIONAL CONDITION 2, and the IRM and APRM channels shall be determined to overlap for at least 1/2 decade during each controlled shutdown, if not performed within the previous 7 days.

(c) Within 24 hours before startup, if not performed within the previous 7 days.

(d) Perform a CHANNEL FUNCTIONAL TEST with the mode switch in Startup/Hot Standby and the plant in the COLD SHUTDOWN or REFUEL Condition.

(e) The LPRMs shall be calibrated at least once per 1000 effective full-power hours (EFPH) using the TIP system.

(f) Calibration includes the flow input function.

(g) This calibration shall consist of the adjustment of the APRM channel to conform to the power values calculated by a heat balance during OPERATIONAL CONDITION 1 when THERMAL POWER ≥25% of RATED THERMAL POWER. Adjust the APRM channel if the absolute difference is greater than 2% of RATED THERMAL POWER. Any APRM channel gain adjustment made in compliance with Specification 3.2.2 shall not be included in determining the absolute difference.

(h) CHANNEL FUNCTIONAL TEST shall include the flow input function, excluding the flow transmitter.

(i) Not required to be performed when entering Mode 2 from Mode 1 until 12 hours after entering Mode 2.

(j) This function is not required to be OPERABLE when the reactor pressure vessel head is removed per Specification 3.10.1.

(k) Perform the calibration procedure for the trip unit setpoint at least once per 92 days.

(l) This function is not required to be OPERABLE when PRIMARY CONTAINMENT INTEGRITY is not required to be OPERABLE per Special Test Exception 3.10.1.

(m) With any control rod withdrawn. Not applicable to control rods removed per Specification 3.9.10.1 or 3.9.10.2.

(n) Required to be OPERABLE only during shutdown margin demonstrations performed per Specification 3.10.3.

TABLE 4.3.6-1

CONTROL ROD BLOCK INSTRUMENTATION SURVEILLANCE REQUIREMENTS

TRIP FUNCTION	CHANNEL CHECK	CHANNEL FUNCTIONAL TEST	CHANNEL CALIBRATION (a)	OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED
1. Rod Block Monitor				
a. Upscale	NA	SA(c)	R	1*
b. Inoperative	NA	SA(c)	NA	1*
c. Downscale	NA	SA(c)	R	1*
2. Source Range Monitors				
a. Detector Not Full In	NA	S/U(b), W	NA	2, 5
b. Upscale	NA	S/U(b), W	Q	2, 5
c. Inoperative	NA	S/U(b), W	NA	2, 5
d. Downscale	NA	S/U(b), W	Q	2, 5
3. Intermediate Range Monitors				
a. Detector Not Full In	NA	S/U(b), W	NA	2, 5
b. Upscale	NA	S/U(b), W	Q	2, 5
c. Inoperative	NA	S/U(b), W	NA	2, 5
d. Downscale	NA	S/U(b), W	Q	2, 5
4. Scram Discharge Volume				
Water Level - High, Float Switch	NA	Q	R	1, 2, 5**

TABLE 4.3.6-1 (Continued)

CONTROL ROD BLOCK INSTRUMENTATION SURVEILLANCE REQUIREMENTS

TRIP FUNCTION	CHANNEL CHECK	CHANNEL FUNCTIONAL TEST	CHANNEL CALIBRATION (a)	OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED
5. Reactor Coolant System Recirculation Flow				
a. Upscale	NA	SA	R	1
b. Inoperative	NA	SA	NA	1
c. Comparator	NA	SA	R	1
6. Reactor Mode Switch				
a. Shutdown Mode	NA	R	NA	3, 4
b. Refuel Mode	NA	R	NA	5

BASES

3/4.3.1 REACTOR PROTECTION SYSTEM INSTRUMENTATION

The reactor protection system (RPS) automatically initiates a reactor scram to:

a. Preserve the integrity of the fuel cladding.

b. Preserve the integrity of the reactor coolant system.

c. Minimize the energy which must be adsorbed following a loss-of-coolant accident, and

d. Prevent inadvertent criticality.

This specification provides the Limiting Conditions for Operation necessary to preserve the ability of the system to perform its intended function even during periods when instrument channels may be out of service because maintenance is being performed. When necessary, one channel may be made inoperable for brief intervals to conduct required surveillance.

The reactor protection system is made up of two independent trip systems. There are usually four channels to monitor each parameter, and there are two channels in each trip system. The outputs of the channels in a trip system are combined in a logic so that either channel will trip that trip system. The tripping of both trip systems will produce a reactor scram. The APRM system is divided into four APRM channels and four 2-out-of-4 voter channels. Each APRM channel provides inputs to each of the four voter channels. The four voter channels are divided into two groups of two each, with each group of two providing inputs to one RPS trip system. The system is designed to allow one APRM channel, but no voter channels, to be bypassed. Note (l) to Table 3.3.1-1 states that the Minimum Operable Channels in Table 3.3.1-1 for the APRM Functional Units (except the 2-out-of-4 voter Functional Unit) are the total number of APRM channels required and are not on a trip system basis. Therefore, when only one required APRM is inoperable, Action a is the only Action required to be entered. This Action requires the APRM to be restored to operable status or placed in the tripped condition within 12 hours. As stated in Action a, footnote *, placing either trip system in trip is not applicable since the APRM channels are not on a trip system basis. When two or more required APRMs are inoperable, Action b is entered. Action b.1 requires verification of trip capability in the affected functional unit within one hour (i.e., one APRM operable and one APRM in the tripped condition). Action b.2, as stated in footnote **, is not applicable since the APRM channels are not on a trip system basis. Action b.3 requires that the remaining required inoperable APRM be restored to operable status within 12 hours.

The system meets the intent of IEEE-279 for nuclear power plant protection systems. Specified surveillance intervals and surveillance and maintenance outage times have been determined in accordance with NEDC-30851P-A, "Technical Specification Improvement Analyses for BWR Reactor Protection System," and NEDC-32410P-A, "Nuclear Measurement Analysis and Control Power Range Neutron Monitor (NUMAC-PRNM) Retrofit Plus Option III Stability Trip Function." The bases for the trip settings of the RPS are discussed in the bases for Specification 2.2.1. When a channel is placed in an inoperable status solely for performance of required surveillances, entry into LCO and required ACTIONS may be delayed, provided the associated function maintains RPS trip capability.

BASES

The measurement of response time at the specified frequencies provides assurance that the protective functions associated with each channel are completed within the time limit assumed in the safety analyses. Response time may be demonstrated by any series of sequential, overlapping or total channel test measurement, provided such tests demonstrate the total channel response time as defined. Sensor response time verification may be demonstrated by either (1) inplace, onsite, or offsite test measurements, or (2) utilizing replacement sensors with certified response times.

3/4.3.2 ISOLATION ACTUATION INSTRUMENTATION

This specification ensures the effectiveness of the instrumentation used to mitigate the consequences of accidents by prescribing the OPERABILITY trip setpoints for isolation of the reactor systems. When necessary, one channel may be inoperable for brief intervals to conduct required surveillance. Specified surveillance intervals and surveillance and maintenance outage times have been determined in accordance with NEDC-30851P-A, Supplement 2, "Technical Specification Improvement Analyses for BWR Isolation Instrumentation Common to RPS and ECCS Instrumentation," and with NEDC-31677P-A, "Technical Specification Improvement Analyses for BWR Isolation Actuation Instrumentation." When a channel is placed in an inoperable status solely for performance of required surveillances, entry into LCO and required ACTIONS may be delayed, provided the associated function maintains primary containment isolation capability. Some of the trip settings may have tolerances explicitly stated where both the high and low values are critical and may have a substantial effect on safety. The setpoints of other instrumentation, where only the high or low end of the setting has a direct bearing on safety, are established at a level away from the normal operating range to prevent inadvertent actuation of the systems involved.

Except for the MSIVs, the FSAR Chapter 15 safety analysis does not address individual sensor response times or the response times of the logic systems to which the sensors are connected. For AC-operated valves, it is assumed that the AC power supply is lost and is restored by startup of the emergency diesel generators. In this event, a time of 13 seconds is assumed before the valve starts to move. In addition to the pipe break, the failure of the DC-operated valve is assumed; thus the signal delay (sensor response) is concurrent with the 13-second diesel startup. The safety analysis considers an allowable inventory loss in each case which in turn determines the valve speed in conjunction with the 13-second delay. It follows that checking the valve speeds and the 13-second time for establishing emergency power will establish the response time for the isolation functions.

Operation with a trip set less conservative than its Trip Setpoint but within its specified Allowable Value is acceptable on the basis that the difference between each Trip Setpoint and the Allowable Value is an allowance for instrument drift specifically allocated for each trip in the safety analysis. The Trip Setpoint and Allowable Value also contain additional margin for instrument accuracy and calibration capability.

ATTACHMENT B

NIAGARA MOHAWK POWER CORPORATION
LICENSE NO. NPF-69
DOCKET NO. 50-410

Supporting Information and No Significant Hazards Consideration Analysis

INTRODUCTION

The Nine Mile Point Unit 2 (NMP2) Reactor Protection System (RPS) consists of two independent, functionally identical trip systems, A and B. Each trip system is divided into two independent, functionally identical trip channels A1, A2, B1, and B2. The RPS logic is arranged such that at least one of two channels in each trip system must deenergize to cause a reactor scram. This is referred to as one-out-of-two-taken-twice logic. Six Average Power Range Monitors (APRM) channels, A through F, provide input to the four RPS trip channels. One APRM channel is required to operate in each RPS trip system to accomplish a plant scram.

The NMP2 APRM System provides the operator with neutron flux information from approximately 1 percent to 125 percent rated core thermal power. The system provides trip signals to the RPS to ensure that the reactor will automatically scram if conditions in the core threaten the overall integrity of the cladding due to excessive power generation. The current NMP2 APRM System consists of six channels, each receiving inputs from 21 or 22 Local Power Range Monitors (LPRMs). Each APRM channel averages the inputs from its assigned LPRMs and provides an output signal proportional to the average of the LPRM flux signals. LPRM assignments are made such that each APRM channel receives local neutron flux signals from all four axial locations in the core and from LPRMs in a representative radial distribution.

Because of the LPRM assignments to specific APRM channels and the precise arrangement of LPRM detector selection for each APRM channel, each APRM channel will provide a signal proportional to the average neutron flux of the reactor core. The recirculation flow units provide APRM trip units with a signal proportional to total recirculation driving flow. The flow signal is used to "bias" or vary the scram (or rod block) setpoint when operating at significant power levels in the core. This provides a flow biased trip setpoint which increases as power increases due to increased recirculation flow.

The purpose of the NMP2 Rod Block Monitor (RBM) is to limit control rod withdrawal if localized neutron flux exceeds a predetermined setpoint during operator control rod manipulations. Each of the two RBM channels uses input signals from a number of LPRM channels to prevent control rod withdrawal by applying a trip signal to the Reactor Manual Control System (RMCS). The RMCS is designed to prevent rod movement (rod block) which could be potentially unsafe, leading to possible fuel damage or reactor scram. The trip is initiated when RBM output exceeds the rod block setpoint.

By letter dated July 11, 1994, the Commission issued Generic Letter 94-02, "Long-Term Solutions and Upgrade of Interim Operating Recommendations for Thermal-Hydraulic Instabilities in Boiling Water Reactors." Generic Letter 94-02 requested that licensees submit a plan describing the long-term stability solution option it had selected and the associated implementation schedule. As indicated in our letter dated November 8, 1994, Niagara Mohawk Power Corporation (NMPC) selected Option III, as delineated in NEDO-31960, BWR Owners' Group Long-Term Solutions Licensing Methodology, to address the thermal-hydraulic stability issue at NMP2. Specifically, NMPC elected to replace the current APRM System with the General Electric Nuclear Measurement Analysis and Control (NUMAC) Power Range Neutron Monitor (PRNM) with core stability monitoring function. The NUMAC-PRNM monitors groups of LPRM signals and, together with the Oscillation Power Range Monitor (OPRM), initiates a reactor SCRAM upon identification of neutron flux oscillations characteristic of a thermal-hydraulic instability. Accordingly, the NUMAC-PRNM meets the detection and suppression criteria of General Design Criteria-12, Suppression of Reactor Power Oscillations.

The proposed Technical Specification (TS) changes are consistent with General Electric Licensing Topical Report, NEDC-32410P-A, "Nuclear Measurement Analysis and Control Power Range Neutron Monitor (NUMAC-PRNM) Retrofit Plus Option III Stability Trip Function," with some minor deviations. NEDC-32410P-A provides licensees guidance for the review and evaluation of the NUMAC-PRNM modification, specific actions required by a licensee to conform to the Topical Report, and "marked up" TSs to support the modification. Attachment C, Plant-Specific Information Required for NUMAC-PRNM Retrofit, provides a table which lists the required utility actions delineated in the Topical Report and NMP2's response. The Topical Report was approved by the Commission by letter dated September 5, 1995, to the NUMAC Projects Manager. In their acceptance letter, Section 5.0, Plant-Specific Actions, the Commission requested certain information from licensees referencing NEDC-32410P-A for implementation of the NUMAC-PRNM. This information is provided in Attachment D. Supplement 1 to NEDC-32410P-A provided clarifications to NEDC-32410P-A and developed specific proposed TSs to implement the OPRM. Information in Supplement 1 relating to response time testing requirements has been included in this submittal. Supplement 1 was approved by the NRC by letter to the NUMAC Project Manager dated December 26, 1996. Attachment E provides a "marked up" copy of our current TSs.

The PRNM modification is scheduled to be installed during our next refueling outage (RFO6) currently planned for the Spring of 1998. Accordingly, NMPC requests approval of this amendment by April 1, 1998 to support our outage planning schedule.

EVALUATIONS

Changes to Table 2.2.1-1, RPS Instrumentation Setpoints, Item 2, APRM

As a result of the NUMAC-PRNM modification, APRM Functional Unit 2.e, 2-out-of-4 voter, will be added to Table 2.2.1-1. This addition is consistent with the 2-out-of-4 voter function being added to Table 3.3.1-1, RPS Instrumentation, to facilitate minimum operable channel definition, associated actions and applicable operational conditions. Neither a "trip setpoint" nor "allowable value" is applicable and is indicated as such. The NUMAC-PRNM 2-out-of-4 voter is discussed in detail later in this evaluation.

Topical Report NEDC-32410P-A suggested some "name" changes to the existing TS APRM functional units to achieve standardized terminology and consistency with the Improved TS (ITS) terminology. NMPC has determined that the proposed "name" changes could result in confusion and that the existing functional unit descriptions are adequate. Therefore, no "name" changes will be made.

*Changes to Table 3.3.1-1, RPS Instrumentation, associated Table Notations, and Footnotes * and ** to LCO 3.3.1*

TS Table 3.3.1-1, RPS Instrumentation, currently requires that a minimum of two APRM channels per RPS trip system be operable assuring that the safety function can be accomplished in the event of a single failure of any one APRM channel. Table 3.3.1-1 also requires that an APRM be declared inoperable if there are less than 2 LPRM inputs per level or less than 14 LPRM inputs to an APRM channel. Limiting Condition for Operation (LCO) 3.3.1, Action a. and b., Footnote * currently indicates that an inoperable channel or trip system need not be placed in the tripped condition where this would cause the trip function to occur. Footnote ** indicates that LCO 3.3.1, Action b.2 applies to that trip system with the most inoperable channels. The proposed TS changes will make revisions to Table 3.3.1-1, associated Table Notations, and to Footnotes * and ** as required to implement the NUMAC-PRNM modification. In addition, the 2-out-of-4 voter function will be added as APRM Function 2.e to Table 3.3.1-1. This "pseudo-function" is being added to facilitate minimum operable channel definition, associated actions and applicable operational conditions.

With the installation of the NUMAC-PRNM system, the APRM system will be configured with a total of 4 APRM channels and four 2-out-of-4 trip voter channels which provide input to the RPS system. The trip outputs from all four APRM channels provides input to each of the four voters so that each of the inputs to the RPS is a voted result of all four APRM channels. The four voter channels are divided into two groups of two each, with each group of two providing inputs to one RPS trip system. This retains all existing Power Range Monitor (PRM) to RPS electrical connections. The NUMAC-PRNM system is designed to allow one APRM channel, but no voter channels to be bypassed. A trip from one unbypassed APRM will result in a half-trip in all four of the voter units, but no trip inputs to either RPS trip system. These APRM related "half scrams" will appear only as alarm and indication, but are otherwise contained within the four voter channels. A trip from any two unbypassed APRM channels will result in a full trip in each of the four voter channels, which in turn results in two trip inputs into each RPS trip system resulting in a full scram.

Accordingly, in the 4 APRM channel configuration, any two of the four APRM channels and one 2-out-of-4 voter channel in each RPS trip system are required to function for the APRM safety trip function to be accomplished. Therefore, the proposed TS change requires three of the four APRM channels be operable. This assures at least two APRM channels to each of the 2-out-of-4 voter channels in the event of a single APRM channel failure and one APRM channel bypassed. Also, the proposed TS requires a minimum of two 2-out-of-4 voter channels per RPS trip system (i.e., all four voter channels). This assures that at least one voter channel per RPS trip system is available even in the event of a single voter channel failure. The 2-out-of-4 voter functional units are required in Operational Conditions (OCs) 1, 2, and 5 (as required) which is consistent with the other APRM functions. If the requirements of Table 3.3.1-1 are not met, the required Actions will be taken.

The 2-out-of-4 logic module is designed for simplicity to assure very high reliability, and can itself detect loss of input signals from the APRM channels (dynamically encrypted to assure no passive fault at the interface will go undetected). This feature, in combination with highly reliable digital electronics implementing the APRM functions and the on-line automatic self-test functions that include monitoring signals returned from the voter channel, assures that the replacement 4 APRM channel configuration will provide reliability equal or greater than the current system relative to the safety trip functions.

Note "b" to Table 3.3.1-1 requires that unless adequate shutdown margin has been demonstrated per Specification 3.1.1, and the Refuel position one-rod-out interlock is OPERABLE per Specification 3.9.1, the shorting links shall be removed from the RPS circuitry prior to and during the time any control rod is withdrawn. NMPC proposes to delete Note "b" from the Applicable Operational Conditions for the APRM Neutron Flux-Upscale, Setdown function. As noted in the Topical Report, the primary purpose of the non-coincidence mode is to put the SRM trips into the RPS logic and to put the SRM and IRM trips in non-coincidence mode to increase coverage during some refueling and test conditions. Although not required by the Topical, Table 3.3.1-1 will continue to require that the Neutron Flux-Upscale, Setdown function, the inoperative function and the 2-out-of-4 voter function be required in OC5 during shutdown margin tests performed per Specification 3.10.3. Specification 3.10.3 currently requires that the SRMs be operable with the RPS circuitry "shorting links" removed.

Note "c" to Table 3.3.1-1 requires a minimum of two LPRM inputs per level and 14 LPRM inputs to an APRM channel for an APRM channel to be operable. Note "c" will change to require three LPRM inputs per level and 20 LPRM inputs to an APRM channel for an APRM channel to be considered operable. As indicated in NEDC-32410P-A, Section 3.2.1.1, this change provides an equal or improved overall core neutron flux average with reduced sensitivity to individual detector degradation or failure. The minimum number of required detectors per APRM channel increases somewhat from the current configuration but no sharing is required. Table Note "(l)", has been added to Table 3.3.1-1 to describe the NUMAC-PRNM channel configuration and to reference Note (a). Note (l) varies slightly from the proposed Note (l) in the Topical to provide additional clarification of the channel configuration.

Changes to LCO 3.3.1, Action a. and b., Footnotes * and ** are also required based on the NUMAC-PRNM configuration. All four APRM channels provide input to all four voter units, and therefore both trip systems (i.e., APRM channels are no longer associated with one trip system). Accordingly, when a channel is inoperable, requirements to place "that" trip system in the tripped condition or to trip "that" system with the most inoperable channels is not applicable. Also, references to "the other trip system" are no longer applicable. The proposed changes make these Footnotes consistent with the changes proposed to Table 3.3.1-1 as described above and as proposed in NEDC-32410P-A.

Changes to Surveillance Requirement 4.3.1.2, Reactor Protection System Logic System Functional Tests

TS Surveillance Requirement (SR) 4.3.1.2 currently requires that a Logic System Functional Test (LSFT) and simulated automatic operation of RPS channels be performed at least once per 18 months. The proposed TS changes would delete the LSFT requirements for APRM functions except the 2-out-of-4 voter function and establish the testing frequency for the

voter function as once per 24 months. The proposed change also adds a clarification that the LSFT is only required to include the voting "logic" of the 2-out-of-4 voter channels.

As indicated in NEDC-32410P-A, Section 8.3.5.3, virtually all the PRNM equipment is tested by the Channel Functional Tests. The periodic LPRM calibrations (1000 full power hours) provide an indirect test of all LPRM interfaces including detectors. Finally, the design of the PRNM allows virtually all testing and routine adjustments to be performed with no changes to the configuration (e.g., no disconnecting wires), so the risk of problems caused by normal operation of the system is greatly reduced.

Based on these combination of factors, a 24 month testing interval is appropriate. The only portion of the logic of the PRNM that is not directly confirmed by other tests is the actual voting logic through and including the voter output relays. The voting logic is tested with automatic self-test using pulse tests, and the output relays are actuated during functional tests, but the overlap between those is confirmed using LSFT. Note that the Topical Report used the words "... do not require separate Logic System Functional Tests." The word "separate" was deleted for clarity.

Table 4.3.1.1-1, Reactor Protection Instrumentation Surveillance Requirements (Channel Check, Channel Functional Test, Channel Calibration) and Associated Table Notations

Channel Check

Table 4.3.1.1-1, RPS Instrumentation SRs, requires a shiftly channel check be performed on each of the RPS APRM functions (except for the Inoperative function), a channel check of the Neutron Flux-Upscale, Setdown function prior to each startup and, as required by Note (f), a daily channel check of the Flow-Biased Simulated Thermal Power-Upscale function to verify measured core flow to be in the range of established core flow at the existing loop flow (APRM%). The proposed changes would delete the channel check prior to startup and require that a daily channel check be performed on each of the APRM functions, except for the Inoperative function. Also, Note (f) would be revised and relocated to a channel calibration requirement. In addition, the 2-out-of-4 voter function would be added as APRM Functional Unit 2.e with a daily channel check requirement.

NEDC-32410P-A, Section 8.3.4.1, Channel Check/Instrument Check, states that plants such as NMP2 with four full channels of recirculation flow instrumentation (four transmitters on each loop, eight total), should delete any requirement for daily flow signal comparison (Note (f)) and replace this requirement with the Channel Functional Test described below and automatic comparison of all four total recirculation flow values. For flow signal processing, NUMAC-PRNM includes significantly improved flow signal processing accuracy and stability and expands the automatic comparison logic to compare all flow signals to detect flow changes in one channel and reduced susceptibility to individual flow channel changes. The improved processing, most of which is now digital, and reduced drift in combination with four fully redundant flow transmitters and improved failure detection provide adequate assurance that the signals will either be within limits or alarmed between Channel Functional Tests. Also, the frequency of "S/U" or "Prior to each reactor startup" is redundant to the requirements of SR 3.0.4 which requires the surveillance to be performed and current prior to entry into the applicable operational

conditions. Therefore, removal of this frequency is, in part, administrative. Therefore, deleting the channel check prior to startup and revising the channel check frequency from shiftly to daily will have insignificant impact on the reliability of the APRM functions.

In addition, NEDC-32410P-A, Section 8.3.4.1 recommends plants with shiftly channel checks should change to daily channel checks. The NRCs SER of NEDC-32410P-A, citing the NUMAC-PRNM self check capabilities, found these changes acceptable.

Channel Functional Test

A Channel Functional Test is currently required for the Neutron Flux-Upscale, Setdown function within 24 hours prior to startup (if not performed within the previous 7 days - Note (c)) and weekly. A Channel Functional Test for the Flow-Biased Simulated Thermal Power-Upscale and Fixed Neutron Flux-Upscale is also required 24 hours prior to startup as described in Note "c" and quarterly. A Channel Functional Test for the Inoperative function is required to be performed quarterly. The proposed changes would require that the APRM functions Channel Functional Tests be performed on a semi-annual frequency. New Note (i) will be added to the Neutron Flux-Upscale, Setdown function allowing operation in OC 2 for up to 12 hours prior to performing the test after entering OC 2 from OC 1. New Note (h) will be added to the Flow-Biased Simulated Thermal Power-Upscale Function indicating that the functional test shall include the flow input function, excluding the transmitter. The 2-out-of-4 voter will be added as Functional Unit 2.e with a channel functional test frequency consistent with the other APRM functions (i.e., semi-annually).

As indicated in NEDC-32410P-A, 8.3.4.2.3, the NUMAC-PRNM contains extensive self-testing which will detect most hardware failures with an equivalent surveillance interval of about one hour. Failures that are not directly tested will most likely be detected by the Channel Check which includes monitoring to confirm the self-test function is still operating, but are assumed only to be found as part of the Channel Functional Test. Functions are accomplished using the same hardware and processing paths that are exercised or monitored by self-test, so one set of tests effectively tests all functions. Analog hardware is limited to the initial input devices and is highly reliable with virtually no drift. Processing is digital, so it is very unlikely that a failure will occur that will not be detected by one or more test paths. Built in hardware monitors include dynamic monitoring of CPU output by output modules and a watchdog timer. As part of the automatic self-test, the 2-out-of-4 voter channels monitor the APRM channel signals to assure they continue to meet dynamic encoding requirements. The signals are processed and returned to one of the APRM channels to provide a "closed loop" monitor of the voter channels.

The combination of the above provides adequate confidence that a sufficient number of channels will either continue to operate between Semi-Annual Channel Functional Tests, or that failures will be detected either by the automatic self-test or channel checks. The tests are required to be performed periodically while in the applicable OCs. The required periodic frequency has been determined to be sufficient verification that the APRMs are properly functioning. Performing a reactor startup does not impact the ability of the monitors to perform their required function. Therefore, an additional surveillance, required to be performed "prior to a reactor startup," is an unnecessary performance of a surveillance. Also, this frequency of "S/U" or "Prior to each reactor startup" is redundant to the requirements of SR 3.0.4 which require the surveillance to be performed and current prior to entry into the applicable operational conditions. Therefore, the removal of this

frequency is, in part, administrative. Therefore, performing semi-annual Channel Functional Tests and deleting the requirement to perform these tests prior to startup (Notation (c)) is acceptable. NEDC-32410P-A, Section 6, System Failure Analysis, includes a detailed discussion of the failure analysis performed to confirm that the proposed surveillance intervals yield an equal or lower unavailability of the safety functions for the replacement PRNM compared to the current system.

UFSAR, Appendix 15H, Mode Switch Misoperation, discusses mode switch contact and mode switch operating mechanism malfunctions, including failures of mode switch contacts to open or close properly. Specifically, Appendix 15H consists of a NRC concern (i.e., Question F421.27) and NMPC's response. As part of our response, NMPC committed to performing an APRM channel functional test 24 hours prior to startup if not performed in the previous 7 days (i.e., Technical Specification Table 4.3.1.1-1 Note (c)).

The existing PRM system does not have any indication of the actual position of the mode switch contacts. The failure of the mode switch contacts to close when the mode switch is placed in the RUN position will result in a lower (setdown) setpoint being enforced. The result would be the APRMs providing half scrams or full scrams at reactor powers of 15 percent or greater. The failure of the mode switch contacts to open when the mode switch is in any position other than RUN would result in the setdown scram being disabled. Therefore, the surveillance requirement, delineated in Note (c), was implemented to verify that the proper setpoint was being enforced prior to a plant startup.

The NUMAC PRNM indicates the actual position of the mode switch contacts in the display header of each APRM unit. The APRM displays the state of its associated mode switch contact by indicating "RUN MODE" (contact closed) and "SETDOWN" (contact open) in the display header. The APRM also graphically displays the appropriate setpoints on the main or "APRM Bargraphs" display. There is enough difference in the position of the indicated setpoints, between the "RUN MODE" and "SETDOWN" conditions, that it is easy to determine which setpoint is currently being enforced. The plant operator performing the daily channel check will verify that each APRM unit displays the proper indication for the actual position of the reactor mode switch. Additionally, the semi-annual channel functional test surveillance requirement will verify the proper function of the mode switch contact by verification that the Neutron Flux - Upscale, Setdown setpoint is being enforced when required. Therefore, the removal of Note (c), "Within 24 hours before startup, if not performed within the previous 7 days," with respect to Mode Switch Misoperation is acceptable.

New Note (i) will be added to the Neutron Flux-Upscale, Setdown function allowing operation for up to 12 hours in OC 2 to perform the functional test when entering OC 2 from OC 1. As discussed in the Improved Technical Specifications (ITS), testing of OC 2 required APRM functions cannot be performed in OC 1 without utilizing jumpers, lifted leads or moveable lines. This note allows entry into OC 2. Twelve hours is based on operating experience and in consideration of providing a reasonable time in which to complete the SR. New Note (h) will be added to the Flow-Biased Simulated Thermal Power-Upscale Function clarifying that the functional test shall include the flow input function, excluding the transmitter.

Channel Calibration/OCs for Which Surveillance is Required

A semi-annual channel calibration is currently required for the Neutron Flux-Upscale, Setdown function. A channel calibration for the Flow-Biased Simulated Thermal Power-Upscale is required weekly (Note (h) applies which requires the adjustment of the APRM flow-biased channel to conform to a calibrated flow signal), semi-annually and, during a refuel outage (Note (i) applies which requires a calibration which will verify the 6 ± 0.6 seconds simulated thermal power time constant). The Fixed Neutron Flux-Upscale calibration is required weekly and semi-annually. A channel calibration for the Inoperative function is not required. The proposed changes would revise the semi-annual calibrations of the Neutron Flux-Upscale, Setdown, Flow-Biased Simulated Thermal Power-Upscale and Fixed Neutron Flux-Upscale to a refuel cycle frequency and delete Notes (i) and (h). The Flow-Biased Simulated Thermal Power-Upscale refuel cycle calibration is clarified by a revised Note (f) which requires that the calibration include the flow input function. A channel calibration of the 2-out-of-4 voter function is not applicable and will be indicated as such. OC requirements of 1, 2, and 5(n) will be added for the voter function which is consistent with the OC requirements of the other APRM functions.

The calibration interval is generally determined by drift of analog components, the number of which is significantly reduced in the replacement system. The only analog components that remain for the main signal processing are input isolation amplifiers (one per LPRM and one per flow input), a sample-and-hold circuit, and an A/D converter (one on each of the two ASP Modules). These analog components are highly reliable and very stable with virtually no drift. In addition, the sample-and-hold circuit and A/D converters are tested as part of the automatic self-test.

The PRNM replaces all analog processing hardware, including that used in the current design for flow processing, with digital processing that has no drift. All trip comparators, implemented with analog hardware in the current design, are replaced by digital logic. Finally, one of the most sensitive signals, the flow processing, is automatically compared between channels. Any digital failures will be identified by the automatic self-test, Channel Check, or in very rare cases by the Channel Functional Test. The automatic self-test includes steps that check the performance and accuracy of the sample and hold circuits and the A/D converters, and the related processing. Self-test logic also periodically tests the input amplifiers and processing for accuracy. In addition, Channel Functional Tests include an automated "cal check" which will check the performance of all of the analog amplifiers and the entire processing loop.

The combined improvement justifies the factor of three increase in calibration interval (semi-annual to refuel cycle), particularly in that the calibration will actually be checked at the Channel Functional Test and self-test frequencies. The elimination of the separate analog flow processing hardware, and replacement by primarily digital processing justifies calibration intervals for the flow channels the same as the rest of the APRM channel.

The nominal 6-second time constant used to determine the Simulated Thermal Power is determined by analog components in the current design. In the replacement design, the 6-second time constant is determined digitally, the accuracy of which is dependent only on the "clock" used by the processor. The clock that generates the reference time base for all timed processes in the APRM is confirmed as part of the calibration process and monitored by "comparison" to other independent clocks in the system as part of the automatic self-

test. Once correct design performance is confirmed as part of the design verification and validation process, no further action is required to confirm the 6-second time constant for the Simulated Thermal Power calculation other than confirming the accuracy of the time base. Therefore, deleting the separate requirement to check the 6-second time constant (i.e., Note (i)) is justified.

The calibration of the APRM signals to thermal power (Note (g)) is primarily compensating for detector changes, but also checks LPRM input amplifiers in the APRM. That remains unchanged from the current design. Therefore, the ITS interval of seven days is justified.

New Note (f) was added to the Flow-Biased Simulated Thermal Power-Upscale function to clarify that the calibration includes the flow input function. Existing Note (h), which requires adjustment of the APRM flow-biased channel during the weekly calibration, was deleted because the calibration of the flow hardware is included in the overall channel calibration.

Changes to TS 4.3.1.3 Response Time Testing

Topical Report NEDC-32410P-A, Section 8.3.4.4.4, recommends that the response time testing for the APRM functions be deleted and that a requirement to conduct response time testing of the voter function be added. Response time testing of RPS instrumentation, as well as an exemption from testing neutron detectors, is specified in existing TS 4.3.1.3. However, specific response time testing requirements have been relocated from the TS to the USAR. Accordingly, the proposed changes will be made to the USAR as well as TS 4.3.1.3.

As indicated in NEDC-321410P-A, Section 8.3.4.4.3, the response time of the system from LPRM detector inputs to the "coil" of the voter output relays is entirely determined by the digital processing. The remainder of the response time for the APRM functions is determined by the relays and contactors in the RPS.

The time required for the digital processing remains constant, within predictable statistical variations, with maximum values included in the design requirements and confirmed as part of the design process. As long as the time base in the digital equipment remains correct within limits, and the response time of the RPS relays remains within specification, the system response times of the APRM functions will be met. Of the 0.09 seconds allowed for response times of the APRM scram functions, 0.04 is allocated to the digital processing (LPRM inputs to voter outputs) and 0.05 is allocated to the RPS relays, including the final scram contactor.

The time base in the digital equipment is confirmed as part of the calibration process on 18- or 24-month intervals, the same interval as currently required for the response time testing. In addition, automatic self-test functions compare the independent APRM clocks and will detect any significant change in frequency. Consequently, separate response time testing of the digital electronics would be redundant and is not necessary. Therefore, deletion of testing of the digital portion of the APRM function is justified provided testing of the RPS relay portion is retained.

The response time test for the PRNM covers three primary components: the voter output solid state relays, the "K12" interface relays between the voter and the RPS logic, and the RPS scram contactors. The "K12" interface relays and the RPS scram contactors are unchanged by the PRNM. The voter output solid state relays are in place of electro-magnetic relays used in the current PRM. The "K12" interface relays are used only for the neutron monitoring system, whereas the RPS scram contactors are shared by all RPS functions.

For the current PRM design, each "K12" relay is associated with one APRM channel, except for two channels that have two "K12" relays each. The response time testing for the current PRM system tests each APRM a minimum of once per three plant operating cycles (per current TS requirement of 18 months times the number of redundant channels [N]). Response time testing of each associated RPS scram contactor is tested as part of an APRM response time test at least every two plant operating cycles The RPS scram contactor response time is also typically included in response time tests for MSIV Closure, Turbine Stop Valve Closure, and Turbine Control Valve Fast Closure, each of which has response time requirements (0.10 seconds or less total) and rate of test similar to that for the APRM scram functions.

For the replacement PRNM, the number of "K12" relays remain unchanged, as do the RPS scram contactors and the interrelation of the "K12" relays and the RPS scram contactors. The "K12" relays and scram contactors are equally distributed among the voter channels. The proposed test frequency will continue to test each RPS relay logic channel per the current TS requirements (18 months times the number of redundant channels [N]). It is considered very unlikely that the solid state voter output relays will degrade in response time while still functioning correctly during the once per six months functional testing. Even if it did, the contribution is likely to be insignificant because the nominal response time is less than 0.001 seconds, so even a factor of 10 increase is less than 20% of the total time. Further, it is likely that if there is a degradation, it will be somewhat systematic and will be detected by tests of any of the outputs. At least one voter output relay will, by default be tested for each "K12" test.

The planned response time testing of the APRM functions of the 2-out-of-4 voter will be at the minimum frequency specified in TS. Both of the two redundant 2-out-of-4 voter outputs (X or Y) for two 2-out-of-4 voters will be tested each refueling cycle, based on a maximum 24 month cycle. This will result in all of the 2-out-of-4 voter output relays, and the associated K12 relays, being tested once per two refueling cycles. This will test the four K14 (scram) contactors in the trip channel fed by the voter output being tested. Thus, each K14 contactor will be tested at least once per two refueling cycles.

The planned testing will test both outputs of one 2-out-of-4 voter channel per each trip system each cycle. The net result of this is that the response time of the minimum "K12" relay and the RPS scram contactor hardware required to initiate a scram is actually tested every plant operating cycle.

Table 4.3.6-1, Control Rod Block Instrumentation Surveillance Requirements

Rod Block Monitor and Reactor Coolant System Recirculation Flow-Channel Functional Test

Table 4.3.6-1, Control Rod Block Instrumentation Surveillance Requirements, currently requires that a Channel Functional Test of the Rod Block Monitor and Reactor Coolant System Recirculation Flow functions be performed 24 hours prior to startup and quarterly. The proposed changes would require a semi-annual functional test and would delete Note (b), which requires a Channel Functional Test 24 hours before startup.

As indicated in NEDC-32410P-A, Section 8.5.4.2.3, the NUMAC equipment which performs the recirculation flow processing, the RBM, and the APRM functions contains extensive self-testing which will detect most hardware failures. Failures that might not be detected by the automatic self-test are in components with limited impact on the function or highly reliable components (e.g., resistors, capacitors). All functions are accomplished using the same hardware and processing paths that are exercised or monitored by self-test, so one set of tests effectively tests all functions. Analog hardware is limited to the initial input devices and is highly reliable with virtually no drift. All processing is digital, so it is very unlikely that a failure will occur that will not be detected by one or more test paths. Built in hardware monitors include dynamic monitoring of CPU output by output modules and a watchdog timer. The combination of the above provides adequate confidence that a sufficient number of channels will either continue to operate between semi-annual Channel Functional Tests or that failures will be detected either by the automatic self-test or in some cases RPS channel checks. Section 6 of NEDC-32410P-A describes the failure analysis performed to compare the control rod block reliabilities to those of the current PRM.

Note (b) requires that a channel functional check be performed within 24 hours before startup (if not performed within the previous 7 days). These surveillance tests are required to be performed periodically while in the applicable OCs. The required periodic frequency has been determined to be sufficient verification that the RBM and recirculation flow rod blocks are properly functioning. Performing a reactor startup does not impact the ability of the monitors to perform their required function. Therefore, an additional surveillance, required to be performed "prior to a reactor startup," is an unnecessary performance of a surveillance.

Rod Block Monitor and Reactor Coolant System Recirculation Flow Channel Calibration

Table 4.3.6-1 currently requires that a channel calibration of the Rod Block Monitor and Reactor Coolant System Recirculation Flow functions be performed quarterly. The proposed changes would require a refuel cycle frequency calibration.

As indicated in NEDC-32410P-A, Section 8.5.4.3.3, calibration interval is generally determined by drift of analog components. In the NUMAC-PRNM, all analog processing is limited to the APRM (LPRM and flow input processing). The RBM performs all calculations digitally, and therefore is not subject to drift. These are already covered by channel functional tests and automatic self-test in the APRM. Further, any drift in the LPRM signals is nulled out as part of the RBM logic which looks only for change over a short

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period of time. Therefore, a channel calibration interval of every refueling outage, the same as proposed for the RPS instrumentation functions, is adequate for the RBM and the recirculation flow control rod block functions.

Bases Changes

As recommended by the Topical, a brief discussion of the NUMAC-PRNM system and 2-out-of-4 voter channels has been added to Bases Section 3/4.3.1, Reactor Protection System Instrumentation. In addition to the words recommended by the Topical, further clarification of Note (l) to Table 3.3.1-1 has been included. This discussion provides a summary of the information presented above and is considered an administrative change which will have no adverse affect on plant operations.

ADDITIONAL ISSUES

NUMAC-PRNM Interface with Plant Computer System Via Multi-Vendor Data Acquisition System (MVD)

The NUMAC-PRNM interface to the plant computer is a multiplexed fiber-optic data link, except for the sequence of events monitoring for which existing interfaces are being retained. To allow connection to existing interfaces in the plant computer system, an intermediate "Multi-Vendor DAS" (MVD) will be added to transform the digital information on the multiplexed fiber-optic data link to a form that can be accepted by the existing plant computer system.

The existing PRM system uses analog amplifiers with resistor divider networks to produce the required voltage signals for LPRM, APRM and recirculation flow signals. Each LPRM, APRM and recirculation flow output comes from a separate analog module. The PRM outputs are connected to analog input cards in the plant computer system.

The replacement NUMAC-PRNM system will provide the LPRM, APRM and recirculation flow values in digital form on multiplexed fiber-optic data links. The PRNM system also provides APRM upscale, downscale, bypass, and inop; RBM upscale, downscale, bypass and inop: flow reference; and flow compare signals in digital form on the multiplexed fiber-optic data links. The data is transferred from each APRM chassis to the two RBM chassis to the MVD unit. The MVD receives the digital information on multiplexed fiber-optic data links and produces analog outputs via "A/D Output cards" and bi-stable digital outputs via digital output cards to connect to the existing plant computer system.

The MVD also has a connection to the Ethernet to provide bi-directional communication between the PRNM system and the 3D Monicore computer. Data available to the 3D Monicore computer includes stability data, LPRM/APRM gains, LPRM I/V test data, etc. In addition, 3D Monicore can send percent core thermal power for APRM gain calculations and LPRM gain adjustment factors to the PRNM system. The gain-adjustment factors are applied only after manual acceptance of the factors at the PRNM equipment.

The MVD is a microprocessor controlled VME bus based assembly that uses commercial components. Software to control the unit and databases to identify points, assign analog outputs, and assign position in data streams are downloaded into the MVD as part of the setup process. The MVD unit logic includes several "health" checks to assure correct

operation. All multiplexed messages include error checking codes to detect messages "damaged" during transmission. Critical messages from the PRNM to the MVD include diagnostic assessments which can detect loss of incoming signals. Internal checks in the MVD include hardware checks to assure that the MVD is continuing to function and is assessing all of the hardware. These checks include clock monitors, memory monitors and remote device "response" monitors.

MVD health checks, error checking, man-machine interfaces and software/hardware diagnostics are design features that monitor system integrity and minimize the effects of the new failure modes introduced by the MVD. These modes and effects are evaluated in a Failure Modes and Effects Analysis developed specifically for the MVD. Integration of the microprocessor based MVD into the operating practices of Neutron Monitoring will include configuration of the MVD system integrity functions to minimize the failure effects. In addition, operator actions to operate and maintain the MVD will be implemented into applicable procedures.

CONCLUSIONS

The proposed NUMAC-PRNM modification and associated TS changes will not adversely affect the ability of the Reactor Protection System Instrumentation and Control Rod Block Instrumentation to perform its intended function. As stated in NEDC-32410P-A, the replacement system has improved channel trip accuracy compared to the current system and meets or exceeds system requirements assumed in setpoint analysis. In addition, the channel response time is within acceptable limits and the channel indicated accuracy is improved over the current system. Also, the proposed changes do not cause a plant parameter for any analyzed event to fall outside of acceptable limits. The surveillance testing and frequencies proposed will assure reliability of the RPS and Control Rod Block instrumentation. Consequently, the proposed modification and associated TS changes will not adversely effect the health and safety of the public and will not be inimical to the common defense or safety of the public.

NO SIGNIFICANT HAZARDS CONSIDERATION ANALYSIS

10CFR50.91 requires that at the time a licensee requests an amendment, it must provide to the Commission its analysis, using the standards in Section 50.92 about the issue of no significant hazards consideration. Therefore, in accordance with 10CFR50.91 and 10CFR50.92, the following analysis has been performed:

The operation of Nine Mile Point Unit 2, in accordance with the proposed amendment, will not involve a significant increase in the probability or consequences of an accident previously evaluated.

As discussed in NEDC-32410P-A, the NUMAC-PRNM modification and associated changes to the TS involve systems that are intended to detect the symptoms of certain events or accidents and initiate mitigating actions. The worst case failure of the systems involved would be a failure to initiate mitigative actions (i.e., scram or rod block), but no failure can cause an accident and therefore the probability of precursors of any accidents previously evaluated is not increased. The NUMAC-PRNM system performs the same operations as the existing equipment, reduces the need for tedious operator actions during normal

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conditions, and allows the operator to focus more on overall plant conditions. Automatic self-test and increased operator information available with the NUMAC-PRNM system is likely to reduce the burden during off-normal conditions as well. The NUMAC-PRNM system is compatible with the environmental conditions at the mounting location (e.g., temperature, humidity, seismic, electromagnetic fields) such that system performance will not be degraded when compared to the system being replaced. Therefore, the proposed change will not result in a significant increase in the probability of any accidents previously evaluated.

The proposed changes to the RPS and Control Rod Block instrumentation TSs are necessitated by the NUMAC-PRNM replacement. As discussed in the evaluation, in the 4 APRM channel configuration, any two of the four APRM channels and one 2-out-of-4 voter channel in each RPS trip system are required to function for the APRM safety trip function to be accomplished. Therefore, the proposed TS change requires that 3 of the 4 APRM channels be operable. This assures at least two APRM channels to each of the 2-out-of-4 voter channels are available in the event of a single APRM channel failure and one APRM is bypassed. Also, the proposed TS requires a minimum of two 2-out-of-4 voter channels per RPS trip system (i.e., all four voter channels). This assures that at least one voter channel per trip RPS trip system is available even in the event of a single voter channel failure. Surveillance testing requirements were revised to take advantage of certain features of the NUMAC-PRNM (digital) replacement of the existing analog APRM system. These advantages included improved accuracy, stability, self-testing, reduced drift, and constant time for digital processing. Testing of the RPS and Control Rod Block instrumentation will continue to be performed as described in the evaluation to assure that the reliability and performance of these systems will not be adversely affected.

The proposed NUMAC-PRNM replacement system has been specifically designed to assure that the system response times meet the current acceptance limits (worst case). As a result, due to statistical variations resulting from the sampling and update cycles, the response time is typically faster than required in order to assure the required response time is always met.

The architecture of the NUMAC-PRNM system has reduced segmentation compared to the existing PRM system. Examples of the reduced segmentation are combining previously separate functions, several input channels sharing an input board, and a central loop processor for many channels. The replacement equipment includes up to 5 LPRM inputs on a single module compared to one per module on the current system. Up to 17 LPRM signals are processed through one preprocessor. The recirculation flow signals are processed in the same hardware as the LPRM processing. The net effect of these architectural aspects is that there are some single failures that cause a greater loss of "sub-functionality" than in the current system. However, other architectural and functional aspects have an offsetting effect. Redundant power supplies are used so that a single failure of AC power has no effect on the overall NUMAC-PRNM system functions while still resulting in a half scram, as does the current system. Continuous automatic self-test also assures that if a single failure does occur, it is much more likely to be detected immediately. The net effect is that from a total system level, there is no increased risk of loss of critical functionality or reduction in safety margins due to the architecture of the replacement system.

Failure analysis indicates that a software common cause failure is not a significant contributor to the unavailability of the NUMAC-PRNM. However, in spite of that conclusion, means are provided within the system to mitigate the effects of such a failure and alert an operator. Therefore, such a failure, even if it occurred, will not increase the consequences of a previously evaluated accident. To reduce the likelihood of common cause failures of software controlled functions, thorough and careful verification and validation (V&V) activities are performed both for the requirements and the implementing software design. In addition, the software is designed to limit the loading that external systems or equipment can place on the system, thus significantly reducing the risk that some abnormal dynamic condition external to the system can cause an overload. For conservatism, however, despite these V&V activities, common cause failures of software controlled functions due to residual software design faults are assumed to occur. Both the software and hardware are designed to manage the consequences of such failures. Safety outputs are designed to be fail safe by requiring dynamic update of output modules or data signals, where failure to update the information is detected by simple receiving hardware, which in turn, forces a trip. This aspect covers all but rather complex failures where the hardware or software executes a portion of the overall logic but fails to process some portion of the new information (inputs "freeze") or some portion of the logic (outputs "freeze"). To help reduce the likelihood of complex failures, a watchdog timer is used which is updated by a very simple software routine that in turn monitors the operational cycle time of all tasks in the system. The software design is such that as long as all tasks are updating at the design rate, it is likely that software controlled functions are executing as intended. Conversely, if any task fails to update at the design rate, that is a strong indication of at least some unanticipated condition. If such a condition occurs, its watchdog timer will not be updated, the computer will be restarted, and the outputs will detect an abnormal condition and provide an alarm.

It is very difficult to quantify a software common cause failure rate. Analyses for the current system did consider common cause failures and assessed them to be at a rate of about 0.3 times the random failure rate. The reference analysis uses a field basis for the random rates. The analysis for the replacement design uses conservative estimates for failure rates of equipment that are actually a little higher than those assumed for the current equipment. The methodology being applied concludes that the common mode failure rate for the replacement system is somewhat higher than the current system. However, that is offset by more frequent surveillance tests performed by the self-test that result in an estimated slightly lower unavailability for the NUMAC-PRNM scram function compared to the current PRM system. The USAR, in general, considers the failure rate of the function, not that of sub-components. On that basis, there will not be an increase, due to software common cause failure, in the probability of a malfunction analyzed in the USAR.

The NUMAC-PRNM human-machine interface design does not introduce an increased burden or constraints on the operators' ability to adequately respond to an accident such that there would be more severe consequential effects. The information available to the operators is the same as with the current system. No actions are required by the operator to obtain information normally used and equivalent to that available with the current equipment. However, the replacement system does provide more direct accessible information regarding the condition of the equipment, including automatic self-test, which can aid the operator in diagnosing unusual situations beyond those defined in the licensing basis.

The replacement system has a significantly lower power requirement and is generally smaller, reducing somewhat the seismic loading on the panels. The equipment qualification also includes EMI emissions which, combined with the fact that the replacement equipment is mounted in its own cabinet (replaces all of the current equipment), minimizes the likelihood of significant impact on other existing equipment.

The replacement equipment makes increased use of qualified optical methods to provide both safety and functional isolation between safety-related and nonsafety-related systems. Where fiber optic methods cannot be used, the isolation provided is comparable to or better than that provided in the current system.

The net electrical and thermal load for the replacement system is less than that for the current system. Accordingly, the replacement system has adequate cabinet cooling and no forced cooling is required.

The replacement system meets or exceeds all applicable requirements for separation, independence and grounding. The use of fiber optic connections between the APRM and RBM improves the separation and reduces the dependence of the system on common grounds. However, for noise rejection, the equipment design and manufacturing requirements assure improved grounding of the actual equipment. No change in wiring or grounding external to the panels containing the replacement equipment is necessary for correct operation of the replacement equipment.

NEDC-32410P-A, Section 3.2.3, discusses different plant configurations for recirculation flow channels, including the case where plants currently (before implementing the NUMAC PRNM system) have four flow channels. Absence of any discussion in the LTR related to separation for plants originally having four flow channels implies that those plants are expected to meet full separation requirements. The LTR includes a further statement that "The criterion is to maintain equal or better protection against single failures while allowing bypassing of the APRM channel that processes the flow signal."

The NMPC NUMAC PRNM system has four recirculation flow channels, but the flow input circuits for two of the four are not separated from each other outside the PRNM panel. As a result, a single failure that causes both of these flow signals to go high could, depending on the specific value, cause the APRM flow biased trip setpoint in two channels to go to the clamped setpoint. If, at the same time, a third channel is bypassed, the APRM flow-biased trip setpoint for the APRM system could be non-conservative. (NOTE: The flow signals are compared to one another. Should the flow signals not be within specified limits, an alarm and a control rod block would be initiated.)

Despite the fact that two of the four flow input circuits are not separated from each other outside the PRNM panel, the replacement system is judged to be adequate with the current field routing of flow signals and meets the LTR criteria. This conclusion is based on the fact that there is no credible fault in the circuits within the duct, in which the flow signals are routed, that can damage the other circuits. Also, there is no credible external fault that can damage the circuits inside the duct. Therefore, it is concluded that the separation between the two flow input circuits is adequate to meet the system single failure requirements in that no credible single failure will disable the flow inputs to more than one APRM channel. Additionally, there are no reload licensing transient analyses that take credit for the flow-biased simulated thermal power scram setpoint.

The replacement design has been specifically designed to have the same or more conservative "fail safe" failure modes as the current system. For example, in the case of a single power bus failure, the current system loses about one half of the LPRM information and an output trip occurs. For the replacement system, that failure still results in an output trip, but no LPRM information is lost. In the current system, a static failure in several areas in the system could result in a "fail-as-is" state of the outputs. In the replacement system, dynamic coupling starting in the main processor and going to the final output virtually eliminates "fail-as-is" failure modes and replaces them with "fail tripped" modes.

The replacement system has the same loss of power failure mode as the current system relative to the trip outputs and for loss of AC power. For loss of DC power, the replacement system in most cases continues to operate normally due to redundancy of the power supplies. Therefore, the consequences are no different or improved compared to those considered in the USAR.

Both the current system and the replacement system automatically startup on application of power (or re-application). However, the replacement system may take slightly longer to reach normal operation due to initializing activities. However, no USAR evaluations take credit for rapid start of the PRM. Therefore, the slightly longer startup time from point of power application is bounded by the USAR analysis. Upon application of power, once the system is set up for the specific application, it automatically returns to those settings upon application of power. All such setup parameters are stored in non-volatile memory.

Human - machine interfaces (HMI) failures in the current system could be related to misadjusted settings, incorrect reading of meters, and failure to return the equipment to the normal operating configuration. There are comparable failure modes for some of these in the digital system where an erroneous potentiometer adjustment in the current system is equivalent to an erroneous digital entry in the replacement system. Certain potential "failure to reconfigure" errors in the current system have no counterpart in the replacement system because any "reconfiguration" is automatically returned to normal by the system. Also, since parameters are available for review at any time, even if an error such as a digital entry error occurs, it is more likely that the error would be almost immediately detected by recognition that the displayed value is not the correct one. Failure analysis of the current system assumes certain rates of human error. The rates for the replacement system will be lower, and hence are bounded by the USAR analysis. The NUMAC-PRNM system has been approved as an acceptable neutron monitoring replacement by the NRC.

Therefore, based on the above discussions, the proposed change will not result in a significant increase in the consequences of any accident previously evaluated.

<u>The operation of Nine Mile Point Unit 2, in accordance with the proposed amendment, will not create the possibility of a new or different kind of accident from any accident previously evaluated.</u>

NMPC proposes to replace the existing RPS APRM system with the NUMAC-PRNM system and make associated changes to the RPS and Control Rod Block TS instrumentation sections. As discussed in NEDC-32410P-A, no new system level failure modes are created with the replacement system. The NUMAC-PRNM modification and associated changes to the TSs involve systems that are intended to detect the symptoms of certain events or accidents and initiate mitigating actions. The worst case failure of the systems involved

would be a failure to initiate mitigative actions (i.e., scram or rod block), but no failure can cause an accident. This is unchanged from the current system. The proposed changes do not modify the basic functional requirements of the affected equipment, create any new system interfaces or interactions nor create any new system failure modes or sequence of events that could lead to an accident. The replacement system is more tolerant of degraded power than the current system. Software common cause failures can at most cause the system to fail to perform its safety function. As with system level failures, software failures could fail to initiate actions to mitigate the consequences of an accident, but would not cause one. Surveillance testing will continue to be performed to assure reliability and maintain current performance levels.

The NUMAC-PRNM system is a digital system with software (firmware) control. As such, it has "central" processing points and software controlled digital processing where the current system has analog and discrete component processing. The result is that the specific failures of hardware and potentially common cause software are different from the current system. Also, automatic self-test results in some cases in a direct trip as a result of a hardware failure where the current system may have remained "as is." However, when these are evaluated at the system level, there are no new effects. In general, the USAR assumes simplistic failure modes (relays for example) but does not specifically evaluate effects added by the NUMAC-PRNM such as self-test detection and automatic trip or alarm. The effects of software common cause failures are mitigated by hardware design and system architecture. The replacement system is fully qualified to operate in its installed location and will not affect other equipment. The NUMAC-PRNM system has been approved as an acceptable neutron monitoring replacement by the NRC. Therefore, the proposed change will not create the possibility of a new or different kind of accident from any previously evaluated.

<u>The operation of Nine Mile Point Unit 2, in accordance with the proposed amendment, will not involve a significant reduction in a margin of safety.</u>

The proposed modification and associated TS changes will not adversely affect the performance characteristics of the RPS and Control Rod Block instrumentation nor will it affect the ability of the subject instrumentation to perform its intended function. As stated in NEDC-32410P-A, the replacement system has improved channel trip accuracy compared to the current system and meets or exceeds system requirements assumed in setpoint analysis. Also, the channel response time is within acceptable limits, the channel indicated accuracy is improved over the current system, and the replacement system does not cause a plant parameter for any analyzed event to fall outside of acceptable limits. The surveillance testing and frequencies proposed will assure reliability of the RPS and Control Rod Block instrumentation. In addition, the subject equipment was qualified, where appropriate, to assure its intended safety function is performed. Therefore, the proposed changes do not involve a significant reduction in a margin of safety.

ATTACHMENT C

Plant-Specific Information Required for NUMAC PRNM Retrofit

Section No.	Utility Action Required	Response
2.3.4	Confirm that the actual plant configuration is included in the variations covered in the Power Range Neutron Monitor (PRNM) Licensing Topical Report (LTR) [NEDC-32410P-A], and the configuration alternative(s) being applied for the replacement PRNM are covered by the PRNM LTR. Document in the *plant specific licensing submittal* for the PRNM project the actual current plant configuration and the configuration of the replacement PRNM, and document confirmation that those are covered by the PRNM LTR. For any changes to the plant operator's panel, document in the submittal the human factors review actions that were taken to confirm compatibility with existing plant commitments and procedures.	The current Nine Mile Point Unit 2 (NMP2) configuration and the replacement PRNM configuration are covered by the following PRNM LTR sections: Existing / Replacement APRMs: 2.3.3.1.1 / 2.3.3.1.2 RBMs: 2.3.3.2.1 / 2.3.3.2.2 Flow Units: 2.3.3.3.1 / 2.3.3.3.2 Rod Control: 2.3.3.4.1 / 2.3.3.4.2 Panel Interface: 2.3.3.6.1 / 2.3.3.6.2 Changes made to the plant operators panel will be reviewed to ensure compliance with the NMP2 human factors manual, "Human Factors Manual for Future Control Room Design Changes," and documented on a Design Input Checklist. This manual is based, in general, on NUREG-0700, Guidelines for Control Room Design Reviews.

Section No.	Utility Action Required	Response
3.4	As part of the *plant specific licensing submittal*, the utility should document the following:	
	• The pre-modification flow channel configuration, and any changes planned.	• The current flow channel configuration consists of four reactor water recirculation flow units. Each flow unit receives an input from two flow transmitters, one in each of the two recirculation flow loops (eight transmitters total). A single joystick bypass switch also inputs to the flow units, allowing only one flow unit to be bypassed at a time. Flow units A and C provide an input to APRM channels A, C, and E and RBM A. Flow units B and D provide an input to APRM channels B, D, and F and RBM B. The replacement PRNM system will utilize all eight existing reactor water recirculation flow transmitters and will maintain the existing PRNM system flow channel functions. Recirculation flow channel separation requirements are evaluated as previously discussed in this submittal.
	• Document the APRM trips currently applied at the plant. If different from those documented in the PRNM LTR, document the plan to change to those in the LTR.	• The existing APRM system initiates the following RPS trips: • Flow-biased simulated thermal power (STP) upscale trip • APRM neutron flux upscale trip • APRM neutron flux high (setdown) trip • INOP trip (APRM calibrate-operate switch not in operate, interlock in the instrument is open, number of "bypassed" LPRMs exceeds a predetermined number) These trips are consistent with the PRNM LTR. The replacement NUMAC PRNM system will retain the existing RPS trips and setpoints. The INOP trip of the replacement PRNM system will not include the minimum number of LPRMs criteria, as discussed in LTR Section 3.2.10.
	• Document the current status related to ARTS and the planned post modification status.	• ARTS has not been implemented and will not be implemented with the PRNM replacement.

Section No.	Utility Action Required	Response
4.4.1.11	The PRNM LTR identifies requirements that are expected to encompass most specific plant commitments relative to the PRNM replacement project but may not be complete and may not apply to all plants. The utility must confirm that the requirements identified in the PRNM LTR address all of those identified in the plant commitments. Therefore, the *plant specific licensing submittal* should identify the specific requirements applicable for the plant, confirm that any clarifications included in the PRNM LTR apply to the plant, and document the specific requirements that the replacement PRNM is intended to meet for the plant.	The existing PRM system was designed in accordance with the following IEEE Standards and Regulatory Guides: IEEE 279-1971, Criteria for Protection Systems for Nuclear Power Generating Stations IEEE 317-1976, Electrical Penetration Assemblies in Containment Structures for Nuclear Power Generating Stations IEEE 323-1971, Qualifying Class 1E Equipment for Nuclear Power Generating Stations IEEE 336-1971, Standard Installation, Inspection, and Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities IEEE 338-1971, Criteria for the Periodic Surveillance Testing of Nuclear Power Generating Station Safety Systems IEEE 344-1971, Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations RG 1.47, Rev. 0, Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems RG 1.63, Rev. 2, Electric Penetration Assemblies in Containment Structures for Nuclear Power Plants The replacement NUMAC PRNM system will meet the same requirements as the existing PRNM system with one qualification, the 2/4 modules cannot be bypassed (see LTR Section 4.4.1.1.11). In addition, the replacement PRNM system is designed to meet RG 1.75, Rev. 2, with respect to the scope of the replacement system. In some cases, the adequacy of separation or isolation is based on analysis. Those analyses will be referenced in the UFSAR. As part of the improvement with the PRNM installation, cable separation group identification will be extended into the PRNM panel up to the connections to electronic sub-assemblies. (The current system has cable identification only up to the panel terminal boards.) Replacement equipment will be separated physically and electrically. Where interfaces occur between redundant channels or between safety and non-safety equipment, appropriate isolation devices will be used.

Section No.	Utility Action Required	Response
4.4.2.2.1.4	Plant specific action will confirm that the maximum control room temperatures plus mounting panel temperature rise, allowing for heat load of the PRNM equipment, does not exceed the temperatures presented in the PRNM LTR, and that control room humidity is maintained within the limits stated in the PRNM LTR. This evaluation will normally be accomplished by determining the operating temperature of the current equipment which will be used as a bounding value because the heat load of the replacement system is less than the current system while the panel structure, and thus cooling, remains essentially the same. Documentation of the above action, including the specific method used for the required confirmation, should be included in *plant specific licensing submittals*.	All safety-related equipment located in the control room is qualified to a temperature of 120°F (48.9°C) within the panels. The control room is designed for a normal temperature of 75°F (23.9°C) with a maximum temperature of 90°F (32.2°C) which provides a margin to account for internal temperature rise within the safety-related panels. The relative humidity in the control room is 20% to 50%. As discussed in the PRNM LTR, the replacement PRNM equipment is designed to operate in a temperature of 5 to 50°C (41 to 122°F) and a relative humidity of 10 to 90%. The heat load of the new equipment is less than the heat load of the existing equipment. Also, the maximum design operating temperature of the new equipment is greater than that of the existing equipment. Therefore, the new equipment will be operated within its temperature design limits. In addition, the relative humidity in the control room is maintained within the limits for the new equipment. The MVD is computer interfacing equipment and is not within the scope of NEDC-32410P-A. The MVD will reside within panel 2CEC*PNL608 and will, therefore, be designed to operate under applicable temperature and humidity limits.
4.4.2.2.2.4	Plant specific action will confirm that the maximum control room pressure does not exceed the limits presented in the PRNM LTR. Any pressure differential from inside to outside the mounting panel is assumed to be negligible since the panels are not sealed and there is no forced cooling or ventilation. Documentation of this action and the required confirmation should be included in *plant specific licensing submittals*.	The control room elevation is about 306 ft. above sea level and is maintained at a positive pressure of about 1/8 IN WG. Thus, the control room pressure will be within the limits of 13 psia to 16 psia for which the new equipment is qualified.

Section No.	Utility Action Required	Response
4.4.2.2.3.4	Plant specific action will confirm that the maximum control room radiation levels do not exceed the limits stated in the PRNM LTR. Documentation of this action and the required confirmation should be included in *plant specific licensing submittals*.	The maximum allowable dose rate in the control room is <0.2 mrem/hour. An exposure rate of 0.2 mrem/hour would yield a 40 year TID of 70 rem. These maximum control room radiation levels are much less than the 1x10E-3 rads/hour dose rate and 1x10E+3 rads TID for which the NUMAC PRNM equipment is qualified. The MVD is part of the process computer and is not within the scope of NEDC-32410P-A. The MVD will reside within panel 2CEC*PNL608 which is in a mild environment. Therefore, no additional qualifications are required for the MVD.
4.4.2.3.4	Plant specific action or analysis will confirm that the maximum seismic accelerations at the mounting locations of the equipment (control room floor acceleration plus panel amplification) for both OBE and SSE spectrums do not exceed the limits stated in the PRNM LTR. Documentation of this action and the required confirmation should be included in *plant specific licensing submittals*.	An analysis was performed to qualify the NUMAC PRNM equipment for NMP2. The OBE and SSE required response spectra for the NUMAC PRNM equipment envelop the OBE and SSE spectra to which the equipment would be subjected at NMP2. The MVD will be seismically mounted inside panel 2CEC*PNL608 and will be included in the panel seismic qualification.
4.4.2.4.4	Plant specific actions will confirm that the electromagnetic environment in the control room cabinets is within the envelope of the GE tests. The utility should establish or document practices to control emission sources, maintain good grounding practices and maintain equipment and cable separation. 1. Controlling Emissions a. <u>Portable transceivers (walkie-talkies):</u> Establish practices to prevent operation of portable transceivers in close proximity of equipment sensitive to such emissions. (NOTE: The qualification levels used for the NUMAC PRNM exceed those expected to result from portable transceivers, even if such transceivers are operated immediately adjacent to the NUMAC equipment).	GE testing confirms the replacement PRNM equipment operates within the envelope of the existing equipment. Existing NMP2 control room environment has no detrimental affect on the present system. Other NUMAC equipment is already installed in the NMP2 control room and is functioning properly. In addition, the following procedural steps are in place: 1. <u>Controlling Emissions</u> a. <u>Portable transceivers</u>: The use of portable radios at NMP2 is procedurally controlled. The use of portable radios in the plant is restricted with some areas of the plant posted with caution signs forbidding the use of portable radios.

Section No.	Utility Action Required	Response
4.4.2.4.4 (cont'd)	b. ARC welding: Establish practices to assure that ARC welding activities do not occur in the vicinity of equipment sensitive to such emissions, particularly during times when the potentially sensitive equipment is required to be operational for plant safety. (NOTE: The qualification levels used for NUMAC PRNM minimize the likelihood of detrimental effects due to ARC welding as long as reasonable ARC welding control and shielding practices are used.)	b. ARC Welding: ARC welding at NMP2 is procedurally controlled and permits for arc welding in the plant are reviewed by System Engineering or Maintenance personnel, Fire Protection personnel and the SSS to determine the impact of the welding to assure there are no adverse effects on plant systems. Arc welding is not prohibited in the NMP2 main control room where NUMAC-PRNM will be installed; however, this activity is restricted because of the potential effects of EMI and fire hazard. Whenever possible, bolting or similar fastening methods are specified in plant modification design drawings to avoid welding in the main control room. If welding is necessary, planning prior to welding would evaluate the adequacy of shielding and consider plant operating status to ensure reasonable welding controls are used.
	c. Limit emissions from new equipment: Establish practices for new equipment and plant modifications to assure that they either do not produce unacceptable levels of emissions, or installation shielding, filters, grounding or other methods prevent such emissions from reaching other potentially sensitive equipment. These practices should address both radiated emissions and conducted emissions, particularly conducted emissions on power lines and power distribution systems. Related to power distribution, both the effects of new equipment injecting noise on the power system and the power system conducting noise to the connected equipment should be addressed. (NOTE: The qualification of the PRNM equipment includes emissions testing.)	c. Limit emissions from new equipment: Changes to the plant are procedurally controlled and consider electro-magnetic interference/radio frequency interference (EMI/RFI) susceptibility, electromagnetic compatibility (EMC) and EMI/RFI control.

Section No.	Utility Action Required	Response
4.4.2.4.4 (cont'd)	2. Grounding Practices a. Existing grounding system: The specific details and effectiveness of the original grounding system in BWRs varied significantly. As part of the modification process, identify any known or likely problem areas based on previous experience and include in the modification program either an evaluation step to determine if problems actually exist, or include corrective action as part of the modification. (NOTE: The PRNM equipment is being installed in place of existing PRM electronics which is generally more sensitive to EMI than the NUMAC equipment. As long as the plant has experienced no significant problems with the PRM, no problems are anticipated with the PRNM provided grounding is done in a comparable manner.) b. Grounding practices for new modifications: New plant modifications process should include a specific evaluation of ground methods to be used to assure both that the new equipment is installed in a way equivalent to the conditions used in qualification. (NOTE: NUMAC PRNM equipment qualification is performed in a panel assembly comparable to that used in the plant.)	2. Grounding Practices a. Existing grounding system: The existing PRM system grounding was designed and installed in accordance with industry standards. There are no known or suspected problems with the existing PRM system grounding. Accordingly, no problems are expected with the replacement PRNM system. b. Grounding practices for new modifications: Grounding for the new PRNM equipment will be designed and installed in accordance with industry standards and site procedures.

Section No.	Utility Action Required	Response
4.4.2.4.4 (cont'd)	3. <u>Equipment and cable separation</u> a. <u>Cabling</u>: Establish cabling practices to assure that signal cables with the potential to be "receivers" are kept separate from cables that are sources of noise. (NOTE: The original PRM cable installation requirements met this objective. The replacement PRNM uses the same cable routes and paths, so unless some specific problem has been identified in the current system, no special action should be necessary for the PRNM modification.) b. <u>Equipment</u>: Establish equipment separation and shielding practices for the installation of new equipment to simulate that equipment's qualification condition, both relative to susceptibility and emissions. (NOTE: The original PRM cabinet design met this objective. The replacement PRNM uses the same mounting cabinet, and used an equivalent mounting assembly for qualification. No special action should be necessary for the PRNM modification.) The *plant specific licensing submittals* should identify the practices that are in place or will be applied for the PRNM modification to address each of the above items.	3. <u>Equipment and Cable Separation</u>: a. <u>Cabling</u>: The original PRM signal cables are routed separately from power cables. No specific problems have been identified with the existing cable separation. Within the scope of the replacement PRNM system, the same separation practices are followed. Therefore, no special action is necessary for the PRNM modification. b. <u>Equipment</u>: The replacement PRNM equipment will be installed in accordance with General Electric's design. No special equipment separation and shielding practices are required beyond GE's design to meet the susceptibility and emissions qualifications of the equipment.

Section No.	Utility Action Required	Response
6.6	The utility must confirm applicability of the system failure analysis conclusions contained in the PRNM LTR by the following actions. (These confirmations and conclusions should be documented in the *plant specific licensing submittal* for the PRNM modification.)	
	1. Confirm that the events defined in EPRI Report No. NP-2230 or in Appendices F and G of Reference 11 of the PRNM LTR, encompass the events that are analyzed for the plant;	1. The EPRI Report NP-2230, "ATWS: A Reappraisal, Part 3: Frequency of Anticipated Transients," identifies thirty-seven BWR transient categories. Of the thirty-seven categories, the following ten categories were defined as limiting transients for General Electric BWRs in the EPRI report: 1. Load Rejection 2. Turbine Trip 3. MSIV Closure 4. Loss of Condenser Vacuum 5. Pressure Regulator Fails Open 6. Pressure Regulatory Fails Closed 7. Feedwater, Increasing Flow at Power 8. Feedwater, Low Flow 9. Loss of Offsite Power 10. Loss of Auxiliary Power These ten transients are included in those evaluated in Chapter 15 of the NMP2 USAR. Therefore, the events described in EPRI Report NP-2230 encompass the events analyzed for NMP2.
	2. Confirm that the configuration implemented by the plant is within the limits described in the LTR; and	2. The configuration of the NUMAC PRNM system which will be installed at NMP2 is described in LTR Section 2.3.4 and is within the limits described in NEDC-32410P-A. The MVD is "computer interfacing equipment" and is not within the scope of NEDC-32410P-A. The MVD provides the interface between the RBMs and the PMS computer and the 3D Monicore computer. The plant computers are not part of the failure analysis in NEDC-32410P-A, therefore, the MVD is not required to be analyzed for

Section No.	Utility Action Required	Response
6.6 (cont'd)	3. Prepare a plant specific 10CFR50.59 evaluation of the modification per the applicable plant procedures. [Reference 11 of the LTR is NEDC-30851P-A, "Technical Specification Improvement Analysis for BWR Reactor Protection System," dated March 1988.]	levels of failures evaluated in NEDC-32410P-A. However, NMPC will document failure analysis of the MVD at the level required by the site procedures. 3. A plant-specific 10CFR50.59 evaluation of the PRNM system modification has been prepared in accordance with site procedures.
7.6	The plant specific action required for FSAR updates will vary between plants. In all cases, however, existing FSAR documents should be reviewed to identify areas that have descriptions specific to the current PRM using the general guidance of Sections 7.2 through 7.5 of the PRNM LTR to identify potential areas impacted. The utility should include in the *plant specific licensing submittal* a statement of the plans for updating the plant FSAR for the PRNM project.	The NMP2 USAR will be revised appropriately in accordance with 10CFR50.71(e).

Section No.	Utility Action Required	Response
8.3.1.4	Utility actions necessary to implement technical specification changes to APRM RPS Trip Function:	
	a) Delete the APRM Downscale function, if currently used, from the RPS Instrumentation "function" table, the related surveillance requirements and if applicable the related setpoint, and related descriptions in the bases sections.	a) The current NMP2 RPS Instrumentation "function" table, Table 3.3.1-1, does not include a downscale trip. Therefore, no change is required.
	b) Delete the APRM Flow-biased Neutron Flux Upscale function, if currently used, from the RPS Instrumentation "function" table, the related surveillance requirements and if applicable the related setpoint, and related descriptions in the bases sections. Replace these with the corresponding entries for APRM Simulated Thermal Power--High and APRM Neutron Flux--High functions. Perform analysis necessary to establish setpoints for added trips.	b) The current TSs do not include a APRM Flow Biased Neutron Flux Upscale Trip. Therefore, no change is required.
	c) Add the APRM Neutron Flux--High (Setdown) function, if not currently used, to the RPS Instrumentation "function" table, add the related surveillance requirements and if applicable the related setpoints, and related descriptions in the bases sections. Perform analysis necessary to establish setpoints for added trips.	c) The current TSs already include a APRM Neutron Flux Upscale, Setdown Trip. Therefore, no change is required.
	d) Utilities may choose to retain existing "names" for the APRM functions or use slightly different ones. The submittal should identify names that will be used if different from those in this report.	d) NMPC will retain the current "names" for the APRM functions.

Section No.	Utility Action Required	Response
8.3.1.4 (cont'd)		**Name use in LTR** / **Name use in TS** Neutron Flux - Upscale (Setdown) / Neutron Flux - Upscale (Setdown) Simulated Thermal Power - Upscale / Flow Biased Simulated Thermal Power - Upscale Neutron Flux - Upscale / Fixed Neutron Flux - Upscale Inoperative / Inoperative
	e) Add a "2-Out-Of-4 Voter" pseudo function to the RPS Instrumentation "function" table.	e) A "2-Out-Of-4 Voter" function entry has been proposed for the RPS Instrumentation Tables.
	f) Modify the Bases descriptions of the APRM Inoperative function as needed to reflect the replacement PRNM system.	f) The Inoperative function is currently not described in the Bases. Therefore, it is not necessary to add such a description.
8.3.2.4	Utility actions necessary to implement technical specification changes for the Minimum Operable APRM Channels:	
	a) For the 4 APRM channel replacement configuration, revise the RPS Instrumentation "function" table to show 3 APRM channels shared by both trip systems for each APRM function shown (after any additions or deletions per paragraph 8.3.1.4). Add a "2-out-of-4 voter" function with 2 channels under the "minimum operable channels." For plants with Technical Specifications that include a footnote calling for removing shorting links, remove the references to the footnote related to APRM (retain references for SRM and IRM) and delete any references to APRM channels in the footnote ... For smaller	a) NMPC's proposed TS changes include the items described in the PRNM LTR. The proposed RPS Instrumentation requirements Table presents each APRM function and the 2/4 Voters as single line item entries, consistent with NMP2's current TS format. The footnote calling for removal of the shorting links related to APRM channels in OC 5 will be deleted. As previously discussed, NMP2 will retain operability requirements during SDM tests in OC 5.

Section No.	Utility Action Required	Response
8.3.2.4 (cont'd)	core plants, delete the notes for and references to special conditions related to loss of LPRMs from the "other" APRM.	
	b) Review action statements to see if changes are required. If the improvements documented in Reference 11 have not been implemented then changes will likely be required to implement the 12-hour and 6-hour operation times discussed above for fewer than the minimum required channels. If Improved Technical Specifications (ITS) are applied to the plant, action statements remain unchanged.	b) The existing NMP2 TSs have the 12-hour and 6-hour operations time, and are therefore consistent with the PRNM LTR marked up TSs.
	c) Revise the Bases section as needed to replace the descriptions of the current 6 or 8 APRM channel systems and bypass capability with a corresponding description of the 4 APRM system, 2-out-of-4 voters (2 per RPS trip system), and allowed one APRM channel bypass total.	c) The proposed changes replace the description of the current 6 channel system with a description of the NUMAC-PRNM system.

Section No.	Utility Action Required	Response
8.3.3.4	Utility actions necessary to implement technical specification changes for APRM Applicable Modes of Operation:	
	a) APRM Neutron Flux Upscale, Setdown Trip. Change Tech Spec "applicable modes" entry, if required, to be Mode 2 (startup). Delete references to actions and surveillance requirements associated with other modes. Delete any references to notes associated with "non-coincidence mode and correct notes as required. Revise "Bases" descriptions as required.	a) The current TSs requires that this function be operable in OC 2 and OC 5 during SDM demonstrations. This is consistent with the ITS. However, requiring this function to be operable in OC 5 during SDM demonstrations is not required by the LTR. The reference to the requirement to have the shorting links removed will be deleted.
	b) APRM Simulated Thermal Upscale Trip. Retain as is unless this function is being added to replace the APRM Flow-biased Neutron Flux Trip.	b) No change required.
	c) APRM Neutron Flux Upscale Trip. Retain as is unless this function is being added to replace the APRM Flow-biased Neutron Flux trip.	c) No change required.
	d) APRM Inop Trip. Delete requirements for operation in modes other than Mode 1 and Mode 2 (run and start-up). Revise the "Bases" descriptions as needed.	d) The current TSs requires that this function be operable in OC 1, 2, and 5 during SDM demonstrations. This change is consistent with the ITS. However, the requirement to have this function operable in OC 5 during SDM demonstrations is not required by the LTR.

Section No.	Utility Action Required	Response
	Utility actions necessary to implement technical specification changes for APRM Required Surveillances and Calibrations:	
8.3.4.1.4	<u>Channel Check/Instrument Test</u>:	
	a) For plants without Channel Check requirements, add once per 12 hour or once per day channel check requirement for the three APRM flux based functions. No Channel Check requirements are added for APRM Inop Trip. Plants with once per 12 hour or once per shift requirements may change them to once per day.	a) NMP2 TSs currently require channel checks once a shift. The proposed TS change revises the frequency to daily.
	b) For plants with 4 full recirculation flow channels and with Tech Specs that call for daily or other channel check requirements for flow comparisons under APRM Flow Biased Simulated Thermal Power Trip, delete those requirements. Move any note reference related to verification of flow signal to Channel Functional Test entry.	b) Existing Note (f) which required daily verification that measured core flow to be in the range of established core flow will be deleted. New Note (h) which requires that the Channel Functional Test include the flow input function, has been added to the functional test entry (NMP2 has 4 full recirculation flow channels).
8.3.4.2.4	<u>Channel Functional Test</u>:	
	a) Delete existing channel functional test requirements and replace with a requirement for a Channel Functional Test frequency of each 184 days (6 months) [delete any specific requirement related to start-up or shutdown except for the APRM Neutron Flux-High (Setdown) function as noted in Paragraph 8.3.4.2.2(1) of the PRNM LTR]. Add a notation that both the APRM channels and the 2-out-of-4 voter channels are to be included in the Channel Functional Test.	a) The proposed TS change implements the requirements described in the PRNM LTR. Functional testing of the 2-out-of-4 voter channels is accomplished by a separate table entry for the voters with a semi-annual frequency.

Section No.	Utility Action Required	Response
8.3.4.2.4 (cont'd)	b) Add a notation for the APRM Simulated Thermal Power Upscale function that the test shall include the recirculation flow processing, excluding the flow transmitters.	b) The proposed TS change, new Note (h), implements the requirements described in the PRNM LTR.
	c) CAUTION: Plants that have not implemented the APRM surveillance improvements of Reference 11, or those that have continued to use a weekly surveillance of some portion of APRM functions to accomplish a weekly surveillance of scram contactors, may need to implement or modify surveillance actions to continue to provide a once per week functional test of scram contactors. (Prior to changes defined in Reference 11, the weekly APRM functional test also provides a weekly test of all automatic scram contactors.)	c) The APRM surveillance improvements of LTR Reference 11 have been implemented. The Manual Scram Channel Functional Test (currently included in TS) provides a weekly functional test of the scram contactors.
8.3.4.3.4	<u>Channel Calibrations</u>:	
	a) Replace current calibration interval with either 18 or 24 months except for APRM Inop. Retain Inop requirement as is.	a) The proposed TS change revises APRM channel calibration frequency to once per 18 months. This is consistent with the requirements described in the PRNM LTR.
	b) Delete any requirement for flow calibration and calibration of the 6 second time constant separate from overall calibration of the APRM Simulated Thermal Power--High function.	b) The proposed amendment deletes existing Note (h), which requires that the calibration consist of adjustment of the APRM flow-biased channel, and Note (i), the requirement to calibrate the 6 second time constant. Note (f) was added to identify that the calibration includes the flow input function.
	c) Replace the every 3 day frequency for calibration of APRM power against thermal power with a 7 day frequency if applicable.	c) Current NMP2 TS require an APRM heat balance calibration on a frequency of once per 7 days. This is consistent with the requirements described in the PRNM LTR.
	d) Revise Bases text as required.	d) No bases changes are required.

Section No.	Utility Action Required	Response
8.3.4.4.4	<u>Response Time Testing</u>: Delete response time testing requirements for APRM functions. Replace it with a response time testing requirement for the 2-out-of-4 voter "pseudo" function to include the output solid-state relays of the voter channel through the final RPS trip channel contactors. Frequency of response time testing shall be determined using four 2-out-of-4 voter channels, but tests may alternate use of 2-out-of-4 voter outputs provided each APRM/RPS interfacing relay is tested at least once per eight refueling cycles (based on a maximum 24 month cycle), and each RPS scram contactor is tested at least once per four refueling cycles. Each 2-out-of-4 voter output shall be tested at no less than half the frequency of the tests of the APRM/RPS interface relays. Tests shall alternate such that one logic train for each RPS trip system is tested every two cycles.	Response time testing is required per existing Specification 4.3.1.3. However, specific response time testing requirements have been moved to the USAR. Accordingly, the proposed changes will be made to the USAR as well as the TSs. Response time testing of the voters will be added to the USAR. The planned response time testing of the APRM functions of the 2-out-of-4 voter will be at the minimum frequency specified in Technical Specifications. Both of the two redundant 2-out-of-4 voter outputs (X or Y) for two 2-out-of-4 voters will be tested each refueling cycle, based on a maximum 24 month cycle. This will result in all of the 2-out-of-4 voter output relays, and the associated K12 relays, being tested once per two refueling cycles. This will test the four K14 (scram) contactors in the trip channel fed by the voter output being tested. Thus, each K14 contactor will be tested at least once per two refueling cycles. The planned testing will test both outputs of one 2-out-of-4 voter channel per each trip system each cycle. The net result of this is that the response time of the minimum "K12" relay and the RPS scram contactor hardware required to initiate a scram is actually tested every plant operating cycle.
8.3.5.4	Utility actions necessary to implement technical specification changes for APRM Logic System Functional Testing (LSFT): Revise Tech Specs to change the interval for LSFT from 18 months to 24 months unless the utility elects to retain the 18-month interval for plant scheduling purposes. Delete any LSFT requirements associated with the APRM channels and move it to the 2-out-of-4 voter channel. Include testing of the 2-out-of-4 voting logic and any existing LSFTs covering RPS relays.	The proposed TS adds functional testing of the 2-out-of-4 trip voter logic as described in the PRNM LTR to be performed every 24 months. Page 32 of the staff's Safety Evaluation Report indicates that the LTR proposed an 18-month interval for the LSFT. This is incorrect. The proposed TS reflect the 24-month frequency actually included in the LTR. Also, the word "separate" was removed from the LTR version.

Section No.	Utility Action Required	Response
8.3.6.1	Utility actions necessary to implement technical specification changes for APRM Setpoints: Add to or delete from the appropriate document any changed RPS setpoint information. If ARTS is being implemented concurrently with the PRNM modification, either include the related Tech Spec submittal information with the PRNM information in the plant specific submittal, or reference the ARTS submittal in the PRNM submittal. In the *plant specific submittal,* identify what changes, if any, are being implemented and identify the basis or method used for the calculation of setpoints and where the setpoint information or changes will be recorded.	 No changes to RPS setpoint information is necessary.
8.4	Utility actions necessary to implement technical specification changes for OPRM Related RPS Trip Functions: The required actions are in Sections 8.4.1.4, 8.4.2.4, 8.4.3.4, 8.4.4.1.4, 8.4.4.2.4, 8.4.4.3.4, 8.4.4.4, 8.4.5.4, and 8.4.6.1 of the PRNM LTR.	 The OPRM related TS changes will be submitted at a later date.
8.5.1.4	Utility actions necessary to implement technical specification changes for APRM/RBM Related Control Rod Block Functions: If ARTS will be implemented concurrently with the PRNM modification, include or reference those changes in the *plant specific PRNM submittal.* Implement the applicable portion of the below described changes via modifications to the Tech Specs and related procedures and documents. In the *plant specific submittal,* identify functions currently in the plant Tech Specs and which changes are being implemented. NOTE: A utility may choose not to delete some or all of the items identified in the PRNM LRT from the plant Tech Specs.	 ARTS will not be implemented. Therefore, no changes are required.

Section No.	Utility Action Required	Response
8.5.2.4	Utility actions necessary to implement technical specification changes for Minimum Number of Operable APRM/ RBM Related Control Rod Block Channels: Change the minimum number of APRM channels to three, if APRM functions are retained in TS. No additional action is required relative to minimum operable channels beyond that required by 8.5.1.4 above.	The minimum number of operable APRM channels for control rod block instrumentation is not currently in TS. Therefore, no change to TS is required.
8.5.3.4	Utility actions necessary to implement technical specification changes for Applicable Modes of Operation for APRM/RBM Related Control Rod Blocks: No action required relative to modes during which the function must be available beyond that required by 8.5.1.4 above unless APRM functions are retained in TS and include operability requirements for mode 5. In that case, delete such requirements.	APRM functions for control rod block instrumentation are not currently in TS. Therefore, no change to TSs is required.
	Utility actions necessary to implement technical specification changes for APRM/RBM Related Control Block Required Surveillances and Calibrations:	
8.5.4.1.4	<u>Channel Check</u>: Delete any requirements for instrument or channel checks related to RBM and, where applicable, recirculation flow rod block functions (non-ARTS plants), and APRM functions. Identify in the plant specific PRNM submittals if any checks are currently included in Tech Specs, and confirm that they are being deleted.	Rod block monitor and reactor coolant system recirculation flow channel checks do not exist in the current TS. Therefore, no changes are required.
8.5.4.2.4	<u>Channel Functional Test</u>: Change Channel Functional Test requirements to identify a frequency of every 184 days (6 months). In the *plant specific licensing submittal*, identify current Tech Spec test frequencies that will be changed to 184 days (6 months).	The proposed changes will change the Channel Functional Test frequency from quarterly to semi-annually.

Section No.	Utility Action Required	Response
8.5.4.3.4	Channel Calibrations: Change channel calibration requirements to identify a frequency of every 24 months. In the *plant specific licensing submittal*, identify current Tech Spec test frequencies that will be changed to 24 months.	The proposed changes will change the channel calibration frequency from quarterly to a refuel cycle.
8.5.4.4.4	Response Time Testing: None. [There currently are no response time testing requirements; none are proposed by the PRNM LTR.]	N/A
8.5.5.4	Utility actions necessary to implement technical specification changes for APRM/RBM Related Control Block Logic System Functional Testing: None. [There currently are no logic system functional testing requirements; none are proposed by the PRNM LTR.]	N/A
8.5.6.1	Utility actions necessary to implement technical specification changes for APRM/RBM Related Control Block Setpoints: Add to or delete from the appropriate document any changed control rod block setpoint information. If ARTS is being implemented concurrently with the PRNM modification, either include the related Tech Spec submittal information with the PRNM information in the *plant specific submittal*, or reference the ARTS submittal in the PRNM submittal. In the *plant specific submittal*, identify what changes, if any, are being implemented and identify the basis or method used for calculation of setpoints and where the setpoint information or changes will be recorded.	ARTS is not being implemented and no setpoint changes are required.

Section No.	Utility Action Required	Response
9.1.3	Utility Quality Assurance Program: As part of the *plant specific licensing submittal*, the utility should document the established program that is applicable for the project modification. The submittal should also document for the project what scope is being performed by the utility and what scope is being supplied by others. For scope supplied by others, document the utility actions taken or planned to define or establish requirements for the project, to assure those requirements are compatible with the plant specific configuration. Actions taken or planned by the utility to assure compatibility of the GE quality program with the utility program should also be documented. Utility planned level of participation in the overall V&V process for the project should be documented, along with utility plans for software configuration management and provision to support any required changes after delivery should be documented.	The PRNM modification will be controlled under the project management program as described in Nuclear Division Directive NDD-PTM, "Project and Task Management," and Nuclear Division Interface Procedure NIP-PTM-01, "General Project and Task Management." General Electric (GE) is providing all of the design and installation details for the PRNM modification in panels 2CEC*PNL608 and 2CEC*PNL603 and the 3D Monicore computer system. All work supplied by General Electric is performed under General Electric's Quality Assurance Program which meets the requirements of 10CFR50 Appendix B and ANSI/ASME NQA-1. NMPC audits GE's quality assurance program periodically to assure compliance. The design and documents supplied by General Electric will be reviewed by NMPC in accordance with NMPC's programs and procedures. Niagara Mohawk Power Corporation (NMPC) is providing the design changes to the other systems affected by the PRNM project and are not within the GE work scope. NMPC will utilize the same programs and procedures for their work scope as for GE's work scope. Included in the NMPC work scope are software modifications to the Safety Parameter Display System (SPDS), Emergency Response Data System (ERDS), and various plant computer graphic displays. Software Quality control is provided by Nuclear Division Directive NDD-NCS, "Nuclear Computer Systems," and procedure NIP-NCS-01, "Nuclear Computer Software Control." Included within existing NMPC procedures is a reference to information that provides guidance for the licensing of analog to digital upgrades. NMPC has reviewed the Factory Acceptance Test (FAT) procedures and the Verification and Validation (V&V) procedures for the NUMAC PRNM system. NMPC will participate in the FAT testing of the NUMAC PRNM prior to shipment of the equipment. Firmware provided by GE will be controlled at the plant under applicable procedures. GE will maintain control of any firmware changes required after initial delivery.

ATTACHMENT D

Plant-Specific Actions Listed in the NRC Safety Evaluation

A. **Confirm the applicability of NEDC-32410P-A, including clarifications and reconciled differences between the specific plant design and the topical report design descriptions.**

NEDC-32410P-A is applicable to NMP2. Clarifications and reconciliations between the plant specific design and the topical report description are detailed in the matrix provided in Attachment C of this evaluation.

B. **Confirm the applicability of BWROG topical reports that address PRNMS and associated instability functions, setpoints and margins.**

The BWROG topical reports which address PRNMS and the associated instability functions, setpoints and margins are not applicable to this proposal. The applicability of these reports will be addressed in the proposal associated with the implementation of the instability-related OPRM trips.

C. **Provide plant-specific revised Technical Specifications (TS) for the PRNMS functions consistent with NEDC-32410, Appendix H.**

Revised TSs for the PRNMS functions consistent with NEDC-32410P-A, Appendix H, are provided as Attachment A to this submittal.

D. **Confirm that the plant-specific environmental conditions are enveloped by the PRNMS equipment environmental qualification values.**

Plant specific environmental conditions are enveloped by the PRNMS equipment environmental qualification values.

E. **Confirm that administrative controls are provided for manually bypassing APRM/OPRM channels or protective functions, and for controlling access to the panel and the APRM/OPRM channel bypass switch.**

NMP2 administrative procedures will provide controls for manually bypassing APRM/OPRM channels or protective functions and will control access to the bypass controls.

F. **Confirm that any changes to the plant operator's panel have received human factors reviews per plant-specific procedures.**

The Conceptual Design Input for modification PN2Y93MX002, Reactor Stability - Oscillation Power Range Monitor, requires that a human factors review be performed (i.e., a modification to the plant operator's control panel). Changes made to the plant operator's control panel are reviewed to ensure compliance with the NMP2 human factors manual, Human Factors Manual for Future Control Room Design Changes, and documented on the Design Impact Checklist.

ATTACHMENT E

"MARKED-UP" COPY OF CURRENT TECHNICAL SPECIFICATIONS"

TABLE 2.2.1-1

REACTOR PROTECTION SYSTEM INSTRUMENTATION SETPOINTS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUE
1. Intermediate Range Monitor, - Neutron Flux - High	≤120/125 divisions of full scale	≤122/125 divisions of full scale
2. Average Power Range Monitor:		
a. Neutron Flux - Upscale, Setdown	≤15% of RATED THERMAL POWER	≤20% of RATED THERMAL POWER
b. Flow-Biased Simulated Thermal Power - Upscale		
1) Flow-Biased 2) High-Flow-Clamped	≤0.58 (W-ΔW)[a] + 59%, with a maximum of ≤113.5% of RATED THERMAL POWER	≤0.58 (W-ΔW)[a] + 62%, with a maximum of ≤115.5% of RATED THERMAL POWER
c. Fixed Neutron Flux - Upscale	≤118% of RATED THERMAL POWER	≤120% of RATED THERMAL POWER
d. Inoperative	NA	NA
e. 2-Out-of-4 Voter	NA	NA
3. Reactor Vessel Steam Dome Pressure - High	≤1052 psig	≤1072 psig
4. Reactor Vessel Water Level - Low, Level 3	≥159.3 in. above instrument zero*	≥157.8 in. above instrument zero
5. Main Steam Line Isolation Valve - Closure	≤8% closed	≤12% closed
6. Main Steam Line Radiation [b] - High	≤3.0 x full-power background	≤3.6 x full-power background
7. Drywell Pressure - High	≤1.68 psig	≤1.88 psig

* See Bases Figure B3/4 3-1.

(a) The Average Power Range Monitor Scram Function varies as a function of recirculation loop drive flow (W). ΔW is defined as the difference in indicated drive flow (in percent of drive flow which produces rated core flow) between two loop and single loop operation at the same core flow. ΔW=0 for two loop operation. ΔW=5% for single loop operation.

(b) See footnote (**) to Table 3.3.2-2 for trip setpoint during hydrogen addition test.

3/4.3 INSTRUMENTATION

3/4.3.1 REACTOR PROTECTION SYSTEM INSTRUMENTATION

LIMITING CONDITIONS FOR OPERATION

3.3.1 As a minimum, the reactor protection system instrumentation channels shown in Table 3.3.1-1 shall be OPERABLE.

APPLICABILITY: As shown in Table 3.3.1-1.

ACTION:

a. With one channel required by Table 3.3.1-1 inoperable in one or more Functional Units, place the inoperable channel and/or that trip system in the tripped condition* within 12 hours. The provisions of Specification 3.0.4 are not applicable.

b. With two or more channels required by Table 3.3.1-1 inoperable in one or more Functional Units:

1. Within one hour, verify sufficient channels remain OPERABLE or tripped* to maintain trip capability in the Functional Unit, and
2. Within 6 hours, place the inoperable channel(s) in one trip system and/or that trip system** in the tripped condition*, and
3. Within 12 hours, restore the inoperable channels in the other trip system to an OPERABLE status or tripped*.

Otherwise, take the ACTION required by Table 3.3.1-1 for the Functional Unit.

For Functional Units 2.a., 2.b, 2.c, and 2.d, inoperable channels shall be placed in the tripped condition to comply with Action a. Because these Functional Units provide trip inputs to both trip systems, placing either trip system in trip is not applicable. For Functional Units 2.a., 2.b, 2.c, and 2.d, Action b.3 applies without regard to "in the other trip systems."

* An inoperable channel or trip system need not be placed in the tripped condition where this would cause the Trip Function to occur. In these cases, if the inoperable channel is not restored to OPERABLE status within the required time, the ACTION required by Table 3.3.1-1 for the Functional Unit shall be taken.

** This ACTION applies to that trip system with the most inoperable channels; if both trip systems have the same number of inoperable channels, the ACTION can be applied to either trip system. Action b.2 is not applicable for Functional Units 2.a., 2.b., 2.c., and 2.d.

SURVEILLANCE REQUIREMENTS

4.3.1.1 Each reactor protection system instrumentation channel shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL FUNCTIONAL TEST, and CHANNEL CALIBRATION operations for the OPERATIONAL CONDITIONS and at the frequencies shown in Table 4.3.1.1-1.

4.3.1.2 LOGIC SYSTEM FUNCTIONAL TESTS and simulated automatic operation of all channels shall be performed at least once per 18 months.

4.3.1.3 The REACTOR PROTECTION SYSTEM RESPONSE TIME of each required reactor trip functional unit shall be demonstrated to be within its limit at least once per 18 months. Neutron detectors are exempt from response time testing. Each test shall include at least one channel per Trip System so that all channels are tested at least once per N times 18 months, where N is the total number of redundant channels in a specific reactor Trip System.

, except Table 4.3.1.1-1, Functions 2.a, 2.b, 2.c, 2.d, and 2.e. Functions 2.a, 2.b, 2.c, and 2.d do not require ~~separate~~ LOGIC SYSTEM FUNCTIONAL TESTS. For Function 2.e, tests shall be performed at least once per 24 months. LOGIC SYSTEM FUNCTIONAL TEST for Function 2.e includes simulating APRM trip conditions at the APRM channel inputs to the voter channel to check all combinations of two tripped inputs to the 2-out-of-4 voter logic in the voter channels.

, Functions 2.a, 2.b, 2.c, 2.d, and Function 2.e digital electronics

TABLE 3.3.1-1

REACTOR PROTECTION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	APPLICABLE OPERATIONAL CONDITIONS	MINIMUM OPERABLE CHANNELS PER TRIP SYSTEM (a)	ACTION
1. Intermediate Range Monitors:			
a. Neutron Flux - High	2 3, 4 5(b)	3 3 3	1 2 3
b. Inoperative	2 3, 4 5	3 3 3	1 2 3
2. Average Power Range Monitor(c):			
a. Neutron Flux - Upscale, Setdown	2 5(b)(k)	~~2~~ 3(l) ~~2~~ 3(l)	1 3
b. Flow Biased Simulated Thermal Power - Upscale	1	~~2~~ 3(l)	4
c. Fixed Neutron Flux - Upscale	1	~~2~~ 3(l)	4
d. Inoperative	1, 2 5(k)	~~2~~ 3(l) ~~2~~ 3(l)	1 3
e. 2-Out-Of-4 Voter	1, 2 5(k)	2 2	1 3
3. Reactor Vessel Steam Dome Pressure - High	1, 2(d)	2	1
4. Reactor Vessel Water Level - Low, Level 3	1, 2	2	1

TABLE 3.3.1-1 (Continued)

REACTOR PROTECTION SYSTEM INSTRUMENTATION

TABLE NOTATIONS

(a) A channel may be placed in an inoperable status for up to 6 hours for required surveillance without placing the Trip System in the tripped condition provided at least one OPERABLE channel in the same Trip System is monitoring that parameter.

(b) Unless adequate shutdown margin has been demonstrated per Specification 3.1.1, and the Refuel position one-rod-out interlock is OPERABLE per Specification 3.9.1, the shorting links shall be removed from the RPS circuitry prior to and during the time any control rod is withdrawn.*

(c) An APRM channel is inoperable if there are less than ~~2~~ 3 LPRM inputs per level or less than ~~14~~ 20 LPRM inputs to an APRM channel.

(d) This function is not required to be OPERABLE when the reactor pressure vessel head is removed per Specification 3.10.1.

(e) This function shall be automatically bypassed when the reactor mode switch is not in the Run position.

(f) This function is not required to be OPERABLE when PRIMARY CONTAINMENT INTEGRITY is not required.

(g) Also actuates the standby gas treatment system.

(h) With any control rod withdrawn. Not applicable to control rods removed per Specification 3.9.10.1 or 3.9.10.2.

(i) This function shall be automatically bypassed when turbine first stage pressure is less than or equal to 136.4** psig, equivalent to THERMAL POWER less than 30% of RATED THERMAL POWER.

(j) Also actuates the EOC-RPT system.

(k) Required to be OPERABLE only during shutdown margin demonstrations performed per Specification 3.10.3. (l)

(l) Since each APRM provides inputs to both trip systems, the Minimum Operable Channels specified in Table 3.3.1-1 are the total APRM channels required (i.e., it is not on a trip system basis). The 6 hour allowed test time to complete a channel surveillance test (Note (a) above) is applicable provided at least two OPERABLE channels are monitoring that parameter.

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* Not required for control rods removed per Specification 3.9.10.1 or 3.9.10.2.

** To allow for instrument accuracy, calibration and drift, a setpoint of less than or equal to 125.8 psig turbine first stage pressure shall be used.

TABLE 4.3.1.1-1

REACTOR PROTECTION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL FUNCTIONAL TEST	CHANNEL CALIBRATION(a)	OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED
1. Intermediate Range Monitors:				
a. Neutron Flux - High	S/U, S,(b)	S/U(c), W, R(d)	R	2
	S	W	R	3, 4, 5
b. Inoperative	NA	W	NA	2, 3, 4, 5
2. Average Power Range Monitor(e):				
a. Neutron Flux - Upscale, Setdown	~~S/U, S,(b)~~ D	~~S/U(e), W~~ SA(i)	~~SA~~ R	2
	~~S~~ D	~~W~~ SA	~~SA~~ R	5(n)
b. Flow-Biased Simulated Thermal Power - Upscale	~~S~~ D(f)	~~S/U(c), Q~~ SA(h)	W(g)(h), ~~SA, R(i)~~ R(f)	1
c. Fixed Neutron Flux - Upscale	~~S~~ D	~~S/U(c), Q~~ SA	W(g), ~~SA~~ R	1
d. Inoperative	NA	~~Q~~ SA	NA	1, 2, 5(n)
e. 2-Out-of-4 Voter	D	SA	NA	1, 2, 5(n)
3. Reactor Vessel Steam Dome Pressure - High	S	Q	R(k)	1, 2
4. Reactor Vessel Water Level - Low, Level 3	S	Q	R(k)	1, 2
5. Main Steam Line Isolation Valve - Closure	NA	Q	R	1
6. Main Steam Line Radiation - High	S	Q	R	1, 2(j)
7. Drywell Pressure - High	S	Q	R(k)	1, 2(l)

REACTOR PROTECTION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

TABLE NOTATIONS

(a) Neutron detectors may be excluded from CHANNEL CALIBRATION.

(b) The IRM and SRM channels shall be determined to overlap for at least 1/2 decade during each startup after entering OPERATIONAL CONDITION 2, and the IRM and APRM channels shall be determined to overlap for at least 1/2 decade during each controlled shutdown, if not performed within the previous 7 days.

(c) Within 24 hours before startup, if not performed within the previous 7 days.

(d) Perform a CHANNEL FUNCTIONAL TEST with the mode switch in Startup/Hot Standby and the plant in the COLD SHUTDOWN or REFUEL Condition.

(e) The LPRMs shall be calibrated at least once per 1000 effective full-power hours (EFPH) using the TIP system.

Calibration includes the flow input function

(f) ~~Verify measured core flow (total core flow) to be in the range of established core flow at the existing loop flow (APRM%).~~

(g) This calibration shall consist of the adjustment of the APRM channel to conform to the power values calculated by a heat balance during OPERATIONAL CONDITION 1 when THERMAL POWER ≥25% of RATED THERMAL POWER. Adjust the APRM channel if the absolute difference is greater than 2% of RATED THERMAL POWER. Any APRM chann gain adjustment made in compliance with Specification 3.2.2 shall not be included in determining the absolute difference.

Channel Functional Test shall include the flow input function, excluding the flow transmitter

(h) ~~This calibration shall consist of the adjustment of the APRM flow-biased channel to conform to a calibrated flow signal.~~

(i) ~~This calibration shall consist of verifying the 6 ± 0.6 seconds simulated thermal power time constant.~~ Not required to be performed when entering Mode 2 from Mode 1 until 12 hours after entering Mode 2

(j) This function is not required to be OPERABLE when the reactor pressure vessel head is removed per Specification 3.10.1.

(k) Perform the calibration procedure for the trip unit setpoint at least once per 92 days.

(l) This function is not required to be OPERABLE when PRIMARY CONTAINMENT INTEGRITY is not required to be OPERABLE per Special Test Exception 3.10.1.

(m) With any control rod withdrawn. Not applicable to control rods removed per Specification 3.9.10.1 or 3.9.10.2.

(n) Required to be OPERABLE only during shutdown margin demonstrations performed per Specification 3.10.3.

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TABLE 4.3.6-1

CONTROL ROD BLOCK INSTRUMENTATION SURVEILLANCE REQUIREMENTS

TRIP FUNCTION	CHANNEL CHECK	CHANNEL FUNCTIONAL TEST	CHANNEL CALIBRATION(a)	OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED
1. Rod Block Monitor				
a. Upscale	NA SA(c)	S/~~U~~(b)(c), ~~Q(c)~~	~~Q~~ R	1*
b. Inoperative	NA SA(c)	S/~~U~~(b)(c), ~~Q(c)~~	NA	1*
c. Downscale	NA SA(c)	S/~~U~~(b)(c), ~~Q(c)~~	~~Q~~ R	1*
2. Source Range Monitors				
a. Detector Not Full In	NA	S/U(b), W	NA	2, 5
b. Upscale	NA	S/U(b), W	Q	2, 5
c. Inoperative	NA	S/U(b), W	NA	2, 5
d. Downscale	NA	S/U(b), W	Q	2, 5
3. Intermediate Range Monitors				
a. Detector Not Full In	NA	S/U(b), W	NA	2, 5
b. Upscale	NA	S/U(b), W	Q	2, 5
c. Inoperative	NA	S/U(b), W	NA	2, 5
d. Downscale	NA	S/U(b), W	Q	2, 5
4. Scram Discharge Volume				
Water Level - High, Float Switch	NA	Q	R	1, 2, 5**

TABLE 4.3.6-1 (Continued)

CONTROL ROD BLOCK INSTRUMENTATION SURVEILLANCE REQUIREMENTS

TRIP FUNCTION			CHANNEL CHECK	CHANNEL FUNCTIONAL TEST	CHANNEL CALIBRATION(a)	OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED
5.	Reactor Coolant System Recirculation Flow					
	a.	Upscale	NA	~~S/U(b), Q~~ SA	~~Q~~ R	1
	b.	Inoperative	NA	~~S/U(b), Q~~ SA	NA	1
	c.	Comparator	NA	~~S/U(b), Q~~ SA	~~Q~~ R	1
6.	Reactor Mode Switch					
	a.	Shutdown Mode	NA	R	NA	3, 4
	b.	Refuel Mode	NA	R	NA	5

BASES

3/4.3.1 REACTOR PROTECTION SYSTEM INSTRUMENTATION

The reactor protection system (RPS) automatically initiates a reactor scram to:

a. Preserve the integrity of the fuel cladding.

b. Preserve the integrity of the reactor coolant system.

c. Minimize the energy which must be adsorbed following a loss-of-coolant accident, and

d. Prevent inadvertent criticality.

This specification provides the Limiting Conditions for Operation necessary to preserve the ability of the system to perform its intended function even during periods when instrument channels may be out of service because maintenance is being performed. When necessary, one channel may be made inoperable for brief intervals to conduct required surveillance.

Insert

The reactor protection system is made up of two independent trip systems. There are usually four channels to monitor each parameter, and there are two channels in each trip system. The outputs of the channels in a trip system are combined in a logic so that either channel will trip that trip system. The tripping of both trip systems will produce a reactor scram. The system meets the intent of IEEE-279 for nuclear power plant protection systems. Specified surveillance intervals and surveillance and maintenance outage times have been determined in accordance with NEDC-30851P-A, "Technical Specification Improvement Analyses for BWR Reactor Protection System," and MDE-78-0485, "Technical Specification Improvement Analysis for Nine Mile Point Nuclear Station, Unit 2." The bases for the trip settings of the RPS are discussed in the bases for Specification 2.2.1. When a channel is placed in an inoperable status solely for performance of required surveillances, entry into LCO and required ACTIONS may be delayed, provided the associated function maintains RPS trip capability.

The measurement of response time at the specified frequencies provides assurance that the protective functions associated with each channel are completed within the time limit assumed in the safety analyses. Response time may be demonstrated by any series of sequential, overlapping or total channel test measurement, provided such tests demonstrate the total channel response time as defined. Sensor response time verification may be demonstrated by either (1) inplace, onsite, or offsite test measurements, or (2) utilizing replacement sensors with certified response times.

NEDC-32410P-A, "Nuclear Measurement Analysis and Control Power Range Neutron Monitor (NUMAC-PRNM) Retrofit Plus Option III Stability Trip Function"

SINGLE REQUEST

RIDS SHEET ____________ DATE: ____________

LABELS ____________ TIME: ____________

REQUESTED BY: ____________

SHEETS ANO	LABELS ANO

FILE PACKAGE ______________________________

COMPLETED

DATE: ____________ TIME: ____________

DRP-17