# ATTACHMENT A

Niagara Mohawk Power Corporation
License No. DPR-63
Docket No. 50-220

## Proposed Changes to Technical Specifications and Bases

Existing pages 9, 17, 18, 22, 26, 202, 204, 228, 231, 233 and 251 will be replaced with the attached revised pages. These pages have been retyped in their entirety with marginal markings to indicate the changes.



TSTECH

| SAFETY LIMIT | LIMITING SAFETY SYSTEM SETTING |
|---|---|

2.1.1 FUEL CLADDING INTEGRITY

Applicability:

Applies to the interrelated variables associated with fuel thermal behavior.

Objective:

To establish limits on the important thermal-hydraulic variables to assure the integrity of the fuel cladding.

Specification:

a. When the reactor pressure is greater than 800 psia and the core flow is greater than 10%, the existence of a Minimum Critical Power Ratio (MCPR) less than the Safety Limit Critical Power Ratio (SLCPR) (Reference 12) shall constitute violation of the fuel cladding integrity safety limit.

b. When the reactor pressure is less than or equal to 800 psia or core flow is less than 10% of rated, the core power shall not exceed 25% of rated thermal power.

2.1.2 FUEL CLADDING INTEGRITY

Applicability:

Applies to trip settings on automatic protective devices related to variables on which the fuel loading safety limits have been placed.

Objective:

To provide automatic corrective action to prevent exceeding the fuel cladding safety limits.

Specification:

Fuel cladding limiting safety system settings shall be as follows:

a. The flow biased APRM scram and rod block analytical limits shall be established according to the following relationships:

$S = (0.55W + 67\%)T$ with a maximum value of 122%

$S_{RB} = (0.55W + 63\%)T$ with a maximum value of 118%

WHERE:

$S$ or $S_{RB}$ = The respective scram or rod block analytical limit

$W$ = Loop Recirculation Flow as a percentage of the loop recirculation flow which produces a rated core flow of 67.5 MLB/HR

The abnormal operational transients applicable to operation of the plant have been analyzed throughout the spectrum of planned operating conditions up to the thermal power condition of 1850 MWt. The analyses were based upon plant operation in accordance with the operating map given in Reference 11. In addition, 1850 MWt is the licensed maximum power level, and represents the maximum steady-state power which shall not knowingly be exceeded.

Conservatism is incorporated in the transient analyses in estimating the controlling factors, such as void reactivity coefficient, control rod scram worth, scram delay time, peaking factors, and axial power shapes. These factors are selected conservatively with respect to their effect on the applicable transient results as determined by the current analysis model. This transient model, evolved over many years, has been substantiated in operation as a conservative tool for evaluating reactor dynamic performance. Results obtained from a General Electric boiling water reactor have been compared with predictions made by the model. The comparisons and results are summarized in Reference 2.

The absolute value of the void reactivity coefficient used in the analysis is conservatively estimated to be about 25% greater than the nominal maximum value expected to occur during the core lifetime. The scram worth used has been derated to be equivalent to approximately 80% of the total scram worth of the control rods. The scram delay time and rate of rod insertion allowed by the analyses are conservatively set equal to the longest delay and slowest insertion rate acceptable by Technical Specifications. The effect of scram worth, scram delay time and rod insertion rate, all conservatively applied, are of greatest significance in the early portion of the negative reactivity insertion. The rapid insertion of negative reactivity is assured by the time requirements for 5% and 20% insertion. By the time the rods are 60% inserted, approximately four dollars of negative reactivity have been inserted which strongly turns the transient, and accomplishes the desired effect. The times for 50% and 90% insertion are given to assure proper completion of the expected performance in the earlier portion of the transient, and to establish the ultimate fully shutdown steady-state condition.

This choice of using conservative values of controlling parameters and initiating transients at the design power level, produces more pessimistic answers than would result by using expected values of control parameters and analyzing at higher power levels.

a. The Average Power Range Monitoring (APRM) system, which is calibrated using heat balance data taken during steady-state conditions, reads in percent of rated thermal power. Because fission chambers provide the basic input signals, the APRM system responds directly to average neutron flux. During transients, the instantaneous rate of heat transfer from the fuel (reactor thermal power) is less than the instantaneous neutron flux due to the time constant of the fuel. Therefore, during abnormal operational transients, the thermal power of the fuel will be less than that indicated by the neutron flux at the scram setting. Analyses [5, 6, 8, 9, 10, 11, 13, 16] demonstrate that with an analytical limit of 122%, none of the abnormal operational transients analyzed violate the fuel safety limit and there is a substantial margin from fuel damage. |

However, in response to expressed beliefs[7] that variation of APRM flux scram with recirculation flow is a prudent measure to assure safe plant operation during the design confirmation phase of plant operation, the scram setting will be varied with recirculation flow.

An increase in the APRM scram trip setting would decrease the margin present before the fuel cladding integrity safety limit is reached. The APRM scram trip setting was determined by an analysis of margins required to provide a reasonable range for maneuvering during operation. Reducing this operating margin would increase the frequency of spurious scrams which have an adverse effect on reactor safety because of the resulting thermal stresses. Thus, the APRM scram trip setting was selected because it provides adequate margin for the fuel cladding integrity safety limit yet allows operating margin that reduces the possibility of unnecessary scrams.

The scram trip setting must be adjusted to ensure that the LHGR transient peak is not increased for any combination of FRTP and CMFLPD. The scram setting is adjusted in accordance with Specification 2.1.1a when the core maximum fraction of limiting power density exceeds the fraction of rated thermal power.

Reactor power level may be varied by moving control rods or by varying the recirculation flow rate. The APRM system provides a control rod block to prevent rod withdrawal beyond a given point at a constant recirculation flow rate, and thus to protect against the condition of a MCPR less than the SLCPR. This rod block trip setting, which is automatically varied with recirculation flow rate, prevents an increase in the reactor power level to excessive values due to control rod withdrawal. The flow variable trip setting provides substantial margin from fuel damage, assuming a steady-state operation at the trip setting, over the entire recirculation flow range. The margin to the safety limit increases as the flow decreases for the specified trip setting versus flow relationship; therefore, the worst case MCPR which could occur during steady-state operation is at 118% of rated thermal power because of the APRM rod block analytical limit. The actual power distribution in the core is established by specified control rod sequences and is monitored continuously by the in-core LPRM system. As with the APRM scram trip setting, the APRM rod block trip setting is adjusted downward if the core maximum fraction of limiting power density exceeds the fraction of rated thermal power, thus, preserving the APRM rod block safety margin.

b. Normal operation of the automatic recirculation pump control will be in excess of 30% rated flow; therefore, little operation below 30% flow is anticipated. For operation in the startup mode while the reactor is at low pressure, the IRM scram setting is 12% of rated neutron flux. Although the operator will set the IRM scram trip at 12% of rated neutron flux or less, the actual scram setting can be as much as 2.5% of rated neutron flux greater. This includes the margins discussed above. This provides adequate margin between the setpoint and the safety limit at 25% of rated power. The margin is adequate to accommodate anticipated maneuvers associated with power plant startup. There are a few possible sources of rapid reactivity input to the system in the low power flow condition. Effects of increasing pressure at zero or low void content are

## REFERENCES FOR BASES 2.1.1 AND 2.1.2 FUEL CLADDING


(1) General Electric BWR Thermal Analysis Basis (GETAB) Data, Correlation and Design Application, NEDO-10958 and NEDE-10958.

(2) Linford, R. B., "Analytical Methods of Plant Transient Evaluations for the General Electric Boiling Water Reactor," NEDO-10801, February 1973.

(3) UFSAR Section XV-A and B.

(4) UFSAR Section XV-A and B.

(5) UFSAR Section XV-A and B.

(6) UFSAR Section XV-A and B.

(7) Letters, Peter A. Morris, Director of Reactor Licensing, USAEC, to John E. Logan, Vice-President, Jersey Central Power and Light Company, dated November 22, 1967 and January 9, 1968.

(8) UFSAR Section XV-A and B.

(9) Letter, T. J. Brosnan, Niagara Mohawk Power Corporation, to Peter A. Morris, Division of Reactor Licensing, USAEC, dated February 28, 1972.

(10) Letter, Philip D. Raymond, Niagara Mohawk Power Corporation, to A. Giambusso, USAEC, dated October 15, 1973.

(11) Nine Mile Point Nuclear Power Station Unit 1 Load Line Limit Analysis, NEDO 24012, May, 1977.

(12) Licensing Topical Report "General Electric Standard Application for Reactor Fuel," NEDE-24011-P-A, latest approved revision.

(13) Nine Mile Point Nuclear Power Station Unit 1, Extended Load Line Limit Analysis, License Amendment Submittal (Cycle 6), NEDO-24185, April 1979.

(14) General Electric SIL 299 "High Drywell Temperature Effect on Reactor Vessel Water Level Instrumentation."

(15) Letter (and attachments) from C. Thomas (NRC) to J. Charnley (GE) dated May 28, 1985, "Acceptance for Referencing of Licensing Topical Report NEDE-24011-P-B, Amendment 10."

(16) GE-NE-208-22-1193, Revision 2, "Recirculation Flow Unit Surveillance Frequency Extension Analysis for Niagara Mohawk Power Corporation, Nine Mile Point Unit One," dated December 9, 1994.

c. As shown in Sections XV-B.3.1 and 3.5*, rapid Station transients due to isolation valve or turbine trip valve closures result in coincident high-flux and high-pressure transients. Therefore, the APRM trip, although primarily intended for core protection, also serves as backup protection for pressure transients.

In addition to the above-mentioned Limiting Safety System Setting, other reactor protection system devices (LCO 3.6.2) serve as secondary backup to the Limiting Safety System Setting chosen. These are as follows:

The primary containment high-pressure scram serves as backup to high reactor pressure scram in the event of lifting of the safety valves. As discussed in Section VIII-A.2.1*, a pressure in excess of 3.5 psig due to steam leakage or blowdown to the drywell will trip a scram well before the core is uncovered.

A low condenser vacuum situation will result in loss of the main reactor heat sink, causing an increase in reactor pressure. The scram feature provided, therefore, anticipates the reactor high-pressure scram. A loss of main condenser vacuum is analyzed in Section XV-B.3.1.8*.

The scram dump volume high-level scram trip assures that scram capability will not be impaired because of insufficient scram dump volume to accommodate the water discharge from the control-rod-drive hydraulic system as a result of a reactor scram (Section X-C.2.10)*.

In the event of main-steam-line isolation valve closure, reactor pressure will increase. A reactor scram is, therefore, provided on main-steam-line isolation valve position and anticipates the high reactor pressure scram trip.

*UFSAR

TABLE 4.6.2a (cont'd)

INSTRUMENTATION THAT INITIATES SCRAM

Surveillance Requirement

| Parameter | Sensor Check | Instrument Channel Test | Instrument Channel Calibration |
|---|---|---|---|
| (8) Shutdown Position of Reactor Mode Switch | None | Once during each major refueling outage | None |
| (9) Neutron Flux | | | |
| (a) IRM | | | |
| (i) Upscale | (f) | (f) | (f) |
| (ii) Inoperative | (f) | (f) | (f) |
| (b) APRM | | | |
| (i) Upscale | None | Once per 3 months | Once per week[m]<br>Once per 3 months[n]<br>Once per year[q]<br>Once per operating cycle[r] |
| (ii) Inoperative | None | Once per 3 months | None |
| (iii) Downscale | None | Once per 3 months | Once per week[m]<br>Once per 3 months |
| (10) Turbine Stop Valve Closure | None | Once per 3 months | Once per operating cycle |
| (11) Generator Load Rejection | None | Once per 3 months | Once per 3 months |

(n) This calibration consists of the APRM units except for items covered by notes (q) and (r).

(o) A channel may be placed in an inoperable status for up to 6 hours for required surveillances without placing the Trip System in the tripped condition provided at least one Operable Instrument Channel in the same trip system is monitoring that parameter.

With one channel required by Table 3.6.2a inoperable in one or more Parameters, place the inoperable channel and/or that trip system in the tripped condition* within 12 hours.

With two or more channels required by Table 3.6.2a inoperable in one or more Parameters:

1. Within one hour, verify sufficient channels remain Operable or tripped* to maintain trip capability for the Parameter, 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 Specification 3.6.2a for that Parameter.

* 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 Specification 3.6.2a for the parameter 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.

(p) May be bypassed during reactor coolant system pressure testing and/or control rod scram time testing.

(q) This calibration shall consist of the recirculation flow square rooters and summers.

(r) This calibration shall consist of the recirculation flow transmitters.

TABLE 3.6.2g (cont'd)

INSTRUMENTATION THAT INITIATES CONTROL ROD WITHDRAWAL BLOCK

Limiting Condition for Operation

| Parameter | Minimum No. of Tripped or Operable Trip Systems | Minimum No. of Operable Instrument Channels per Operable Trip System | Set Point | Reactor Mode Switch Position in Which Function Must Be Operable: Shutdown | Refuel | Startup | Run |
|---|---|---|---|---|---|---|---|
| (4) Recirculation Flow | | | | | | | |
| a. Comparator Off Normal | 2 | 1 | ≤6.59% | | | | x |
| b. Flow Unit Inoperative | 2 | 1 | --- | | | | x |
| c. Flow Unit Upscale | 2 | 1 | ≤104.33% | | | | x |
| (5) Refuel Platform and Hoists | 2(f) | 1 | --- | | x | | |
| (6) Mode Switch in Shutdown | 1 | 1 | --- | x | | | |

AMENDMENT NO. 142

## TABLE 4.6.2g (cont'd)

## INSTRUMENTATION THAT INITIATES CONTROL ROD WITHDRAWAL BLOCK

### Surveillance Requirement

| Parameter | Sensor Check | Instrument Channel Test | Instrument Channel Calibration |
|---|---|---|---|
| (3) APRM | | | |
| a. Inoperative | None | Once per 3 months | None |
| b. Upscale (Biased by Recirculation Flow) | None | Once per 3 months | Once per 3 months[j]<br>Once per year[k]<br>Once per operating cycle[l] |
| c. Downscale | None | Once per 3 months | Once per 3 months |
| (4) Recirculation Flow | | | |
| a. Comparator Off Normal | None | Once per 3 months | Once per 3 months[j]<br>Once per year[k]<br>Once per operating cycle[l] |
| b. Flow Unit Inoperative | None | Once per 3 months | Once per 3 months |
| c. Flow Unit Upscale | None | Once per 3 months | Once per 3 months[j]<br>Once per year[k]<br>Once per operating cycle[l] |

## NOTES FOR TABLES 3.6.2g and 4.6.2g

(a) No more than one of the four SRM inputs to the single trip system shall be bypassed.

(b) No more than one of the four IRM inputs to each instrument channel shall be bypassed. These signals may be bypassed when the APRMs are onscale.

(c) No more than one of the four APRM inputs to each instrument channel shall be bypassed provided that the APRM in the other instrument channel in the same core quadrant is not bypassed. No more than two C or D level LPRM inputs to an APRM shall be bypassed and only four LPRM inputs to only one APRM shall be bypassed in order for the APRM to be considered operable. In the Run mode of operation, bypass of two chambers from one radial core location in any one APRM shall cause that APRM to be considered inoperative. A Travelling In-Core Probe (TIP) chamber may be used as a substitute APRM input if the TIP is positioned in close proximity to the failed LPRM it is replacing. If one APRM in a quadrant is bypassed and meets all requirements for operability with the exception of the requirement of at least one operable chamber at each radial location, it may be returned to service and the other APRM in that quadrant may be removed from service for test and/or calibration only if no control rod is withdrawn during the calibration and/or test.

(d) May be bypassed in the startup and refuel positions of the reactor mode switch when the IRMs are onscale.

(e) This function may be bypassed when the count rate is ≥ 100 cps.

(f) One sensor provides input to each of two instrument channels. Each instrument channel is in a separate trip system.

(g) Calibrate and/or test prior to startup and normal shutdown. Thereafter, test once per week until no longer required.

(h) The actuation of either or both trip systems will result in a rod block.

(i) 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 other operable channel in the same Trip System is monitoring that Parameter.

(j) This calibration consists of the flow flow unit except for items covered by notes (k) and (l).

(k) This calibration shall consist of the recirculation flow square rooters and summers.

(l) This calibration shall consist of the recirculation flow transmitters.

## BASES FOR 3.6.2 AND 4.6.2 PROTECTIVE INSTRUMENTATION

The set points on the generator load rejection and turbine stop valve closure scram trips are set to anticipate and minimize the consequences of turbine trip with failure of the turbine bypass system as described in the bases for Specification 2.1.2. Since the severity of the transients is dependent on the reactor operating power level, bypassing of the scrams below the specified power level is permissible.

Although the operator will set the setpoints at the values indicated in Tables 3.6.2.a-1, the actual values of the various set points can differ appreciably from the value the operator is attempting to set. The deviations include inherent instrument error, operator setting error and drift of the set point. These errors are compensated for in the transient analyses by conservatism in the controlling parameter assumptions as discussed in the bases for Specification 2.1.2. The deviations associated with the set points for the safety systems used to mitigate accidents have negligible effect on the initiation of these systems. These safety systems have initiation times which are orders of magnitude greater than the difference in time between reaching the nominal set point and the worst set point due to error. The maximum allowable set point deviations are listed below:

The APRM Scram and Rod Block and Recirculation Flow Upscale and Comparator setpoints have been derived based on GE Setpoint Methodology as outlined in NEDC-31336, "GE Instrumentation Setpoint Methodology." In this methodology, the setpoint is defined as three values, Nominal Trip Setpoint, Allowable Values and Analytical Limit. Table 3.6.2.g shows nominal trip setpoints. The corresponding allowable values are as follows:

Neutron Flux
- APRM Scram, allowable value is 55W + 65.25% maximum at 120.25% of rated flux
- APRM Rod Block, allowable value is 55W + 61% maximum at 116% of rated flux
- IRM, ±2.5% of rated neutron flux

Recirculation Flow Upscale, allowable value is 105.81% of rated flow
Recirculation Flow Comparator, allowable value is 8.88% of rated flow

Reactor Pressure, ±15.8 psig

Containment Pressure ±0.053 psig

Reactor Water Level, ±2.6 inches of water

Main Steam Line Isolation Valve Position, ±2.5% of stem position

Scram Discharge Volume, +0 and -1 gallon

Condenser Low Vacuum, ±0.5 inches of mercury

## ATTACHMENT B

**Niagara Mohawk Power Corporation**
**License No. DPR-63**
**Docket No. 50-220**

**Supporting Information and No Significant Hazards Consideration Analysis**

## BACKGROUND

The recirculation flow monitoring instrumentation at Nine Mile Point Unit 1 (NMP1) consists of two separate recirculation flow units which receive processed signals from the same five flow monitoring elements in the recirculation piping. Each flow unit provides its four divisional APRM upscale scram and two APRM control rod withdrawal block channels with input for flow biasing. The flow units also have three internal operability monitoring trip functions which can initiate a control rod withdrawal block: Comparator Off Normal, Flow Unit Inoperative, and Flow Unit Upscale. These flow unit rod block trips do not perform any safety-related functions since the APRM upscale scram and rod block trip setpoints are clamped at their rated recirculation flow values and the safety analyses use the analytical values corresponding to rated recirculation flow. This instrumentation is depicted graphically in Final Safety Analysis Report Figure VIII-12.

Technical Specification Table 4.6.2.a, Item (9)(b)(i), and Table 4.6.2.g, Items (3)b and (4)a and c, currently specify an instrument channel calibration frequency of once per three months for the APRM flow-biased upscale scram and rod blocks as well as the recirculation flow units and associated rod blocks. Because the NMP1 design consists of one flow trip unit per division, performance of these surveillances requires application of a one-half scram signal through the APRM instruments for a lengthy period of time (up to 30 hours per surveillance interval) and increases the likelihood of inadvertent scrams. Eliminating the flow transmitter, square rooters and summers from the quarterly surveillance will significantly reduce the amount of time the plant is in a one-half scram condition. Therefore, to minimize the length of time NMP1 is in a one-half scram condition, Niagara Mohawk has evaluated extending the calibration frequency for the flow transmitters, square rooters and summers common to both the APRM and recirculation flow trip channels.

Niagara Mohawk proposes to change Section 2.1.2, "Fuel Cladding Integrity," Table 4.6.2a, "Instrumentation that Initiates Scram," and Tables 3.6.2g/4.6.2g, "Instrumentation that Initiates Control Rod Withdrawal Block." Limiting Safety System Setting 2.1.2a reflects the new analytical limits for the flow biased APRM scram and rod block. The changes to Tables 4.6.2.a and 4.6.2.g will revise the surveillance interval for the recirculation flow instrumentation common to the APRM upscale scram and upscale control rod withdrawal block to once per operating cycle for the flow transmitters and once per year for the summers and square rooters. The proposed changes to Table 3.6.2.g will make associated changes to the recirculation flow comparator off normal and flow unit upscale setpoints. To reflect the changes in the analytical limit for the flow biased APRM scram and rod block and nominal trip setpoints associated with the flow unit corresponding to the new surveillance interval, changes are also proposed to the Bases for Sections 2.1.2, 2.2.2, and 3.6.2/4.6.2. Attachment C, GE-NE-208-22-1193,

"Recirculation Flow Unit Surveillance Frequency Extension Analysis by Niagara Mohawk Power Corporation Nine Mile Point Unit One," provides the bases for revised setpoints.

DESCRIPTION OF PROPOSED CHANGES

Item a. on 2.1.2 Specification (page 9):

Existing:

a. The flow biased APRM scram and rod block trip setting shall be established according to the following relationships:

$S \leq (0.55W + 65\%)T$ with a maximum value of 120%
$S_{RB} \leq (0.55W + 55\%)T$ with a maximum value of 110%

WHERE:

S or $S_{RB}$ = The respective scram or rod block setpoint
W = Loop Recirculation Flow as a percentage of the loop circulation flow which produces a rated core flow of 67.5 MLB/HR

*Proposed:*

*a. The flow biased APRM scram and rod block analytical limits shall be established according to the following relationships:*

*$S = (0.55W + 67\%)T$ with a maximum value of 122%*
*$S_{RB} = (0.55W + 63\%)T$ with a maximum value of 118%*

*WHERE:*

*S or $S_{RB}$ = The respective scram or rod block analytical limit*
*W = Loop Recirculation Flow as a percentage of the loop circulation flow which produces a rated core flow of 67.5 MLB/HR*

Bases for 2.1.2 Fuel Cladding (pages 17 and 18):

The bases for Section 2.1.2 have been changed to reflect the increase in analytical limits to 122% of rated flux for the APRM flow biased scram and 118% of rated flow of rated flux for the flow biased rod block.

References for Bases 2.1.1 and 2.1.2 (page 22):

Add new reference 16

(16) GE-NE-208-22-1193, Revision 2, "Recirculation Flow Unit Surveillance Frequency Extension Analysis for Niagara Mohawk Power Corporation, Nine Mile Point Unit One," dated December 9, 1994.

Item c on Bases for 2.2.2 (page 26):

Existing:

c. As shown in Sections XV-B.3.1 and 3.5*, rapid Station transients due to isolation valve or turbine trip valve closures result in coincident high-flux and high-pressure

transients. Therefore, the APRM trip, although primarily intended for core protection, also serves as backup protection for pressure transients.

Although the operator will set the scram setting at less than or equal to that required by Specification 2.1.2a, the actual neutron flux setting can be as much as 2.7 percent of rated neutron flux above the specified value. This includes the errors discussed above. The flow bias could vary as much as one percent of rated recirculation flow above or below the indicated point.

*Proposed:*

*c.* *As shown in Sections XV-B.3.1 and 3.5*, rapid Station transients due to isolation valve or turbine trip valve closures result in coincident high-flux and high-pressure transients. Therefore, the APRM trip, although primarily intended for core protection, also serves as backup protection for pressure transients.*

Item (9)(b) on Table 4.6.2a (page 202):

| | | | | | Instrument Channel Calibration |
|---|---|---|---|---|---|
| Existing: | (9) | Neutron Flux | | | |
| | | (a) | ... | | |
| | | (b) | APRM | | |
| | | | (i) | Upscale | Once per week(m)<br>Once per 3 months |
| *Proposed:* | *(9)* | *Neutron Flux* | | | |
| | | *(a)* | *...* | | |
| | | *(b)* | *APRM* | | |
| | | | *(i)* | *Upscale* | *Once per week(m)*<br>*Once per 3 months(n)*<br>*Once per year(q)*<br>*Once per operating cycle(r)* |

Note (n) on Table 4.6.2.a (page 204):

Existing: (n) Deleted

*Proposed:* *(n)* *This calibration consists of the APRM units except for items covered by notes (q) and (r).*

Add New Notes (q) and (r):

(q) This calibration shall consist of the recirculation flow square rooters and summers.

(r) This calibration shall consist of the recirculation flow transmitters.

Item (4) on Table 3.6.2.g (page 228):

| | | | | Setpoint |
|---|---|---|---|---|
| Existing: | (4) | Recirculation Flow | | |
| | | (a) | Comparator Off Normal | ≤6.8% |
| | | (b) | Flow Unit Inoperative | ... |
| | | (c) | Flow Unit Upscale | ≤103.7% |
| *Proposed:* | *(4)* | *Recirculation Flow* | | |
| | | *(a)* | *Comparator Off Normal* | *≤6.59%* |
| | | *(b)* | *Flow Unit Inoperative* | *...* |
| | | *(c)* | *Flow Unit Upscale* | *≤104.33%* |

Items (3) and (4) on Table 4.6.2.g (page 231):

| | | | | Instrument Channel Calibration |
|---|---|---|---|---|
| Existing: | (3) | APRM | | |
| | | (a) | Inoperative | None |
| | | (b) | Upscale (Biased by Recirculation Flow) | Once per 3 months |
| | | (c) | Downscale | Once per 3 months |
| | (4) | Recirculation Flow | | |
| | | (a) | Comparator Off Normal | Once per 3 months |
| | | (b) | Flow Unit Inoperative | Once per 3 months |
| | | (c) | Flow Unit Upscale | Once per 3 months |
| *Proposed:* | *(3)* | *APRM* | | |
| | | *(a)* | *Inoperative* | *None* |
| | | *(b)* | *Upscale (Biased by Recirculation Flow)* | *Once per 3 months*[j]<br>*Once per year*[k]<br>*Once per operating cycle*[l] |
| | | *(c)* | *Downscale* | *Once per 3 months* |
| | *(4)* | *Recirculation Flow* | | |
| | | *(a)* | *Comparator Off Normal* | *Once per 3 months*[j]<br>*Once per year*[k]<br>*Once per operating cycle*[l] |
| | | *(b)* | *Flow Unit Inoperative* | *Once per 3 months* |
| | | *(c)* | *Flow Unit Upscale* | *Once per 3 months*[j]<br>*Once per year*[k]<br>*Once per operating cycle*[l] |

Add New Note (j), (k), and (l) on Table 4.6.2.g (page 233):

(j) This calibration shall consist of the flow unit except for items covered by notes (k) and (l).

(k) This calibration shall consist of the recirculation flow square rooters and summers.

(l) This calibration shall consist of the recirculation flow transmitters.

Bases for 3.6.2 and 4.6.2 (page 251):

Existing:

Neutron Flux

APRM Scram, ±2.3% of rated neutron flux (analytical limit is 120% of rated flux)
APRM Rod Block, ±2.3% of rated neutron flux (analytical limit is 110% of rated flux)
IRM, ±2.5% of rated neutron flux

Recirculation Flow Upscale, ±1.6% of rated recirculation flow (analytical limit is 107.1% of rated flow)
Recirculation Flow Comparator, ±2.09% of rated recirculation flow (analytical limit is 10% of rated flow)

*Proposed:*

*The APRM Scram and Rod Block and Recirculation Flow Upscale and Comparator setpoints have been derived based on GE Setpoint Methodology as outlined in NEDC-31336, "GE Instrumentation Setpoint Methodology." In this methodology, the setpoint is defined as three values, Nominal Trip Setpoint, Allowable Values and Analytical Limit. Table 3.6.2g shows nominal trip setpoints. The corresponding allowable values are as follows:*

*Neutron Flux*

*APRM Scram, allowable value is 55W + 65.25% maximum at 120.25% of rated flux*
*APRM Rod Block, allowable value is 55W + 61% maximum at 116% of rated flux*
*IRM ±2.5% of rated neutron flux*

*Recirculation Flow Upscale, allowable value is 105.81% of rated flow*
*Recirculation Flow Comparator, allowable value is 8.88% of rated flow*

EVALUATION

Setpoints in safety-related instruments are selected to provide sufficient margin between the trip setpoint and the safety limits to account for inaccuracies, drift, and calibration uncertainties. Safety limits are established so that there is reasonable assurance that parameters which could challenge the integrity of the reactor physical barriers will remain within acceptable limits during anticipated operational occurrences and accidents. Calibrations are performed on a periodic basis to ensure that setpoints for plant components and instruments that monitor and control emergency systems are maintained within their prescribed limits.

Technical Specification Amendment No. 130, dated July 23, 1992, previously extended the calibration interval for the recirculation flow instrumentation from monthly to once per 3 months. As part of the justification for that amendment, Niagara Mohawk reviewed the

historical performance of the recirculation flow unit and confirmed that the actual monthly drift was consistent with design specification model assumptions. The model assumptions were then used to extrapolate monthly drift values to quarterly drift values.

To justify the proposed extension of the calibration interval to once per year for the recirculation flow square rooters and summers, and once per operating cycle for the flow transmitters, General Electric (GE) evaluated the drift characteristics and setpoints of the recirculation flow instrumentation in accordance with the approved setpoint methodology documented in GE document NEDC-31336, "GE Instrument Setpoint Methodology." This setpoint methodology was approved by the Staff in an SER dated February 9, 1993.

GE analyzed drift data for the recirculation flow transmitters, square rooters, summers, flow units, and APRMs trip units and calculated the plant specific drift characteristics of the instrumentation. The data was then extrapolated to a minimum 15 months for the flow transmitters, square rooters and summers. This data was then combined with the calculated 3 month drift values for the flow trip units using the GE setpoint methodology to establish new setpoints for the recirculation flow rod blocks and APRM trips. The existing analytical limits specified in the Bases for the recirculation flow upscale rod block (107.1% of rated flow) and the flow comparator rod block (10% of rated flow) were used. Also, based on the new methodology, tolerances associated with setpoints are no longer used. Thus, Bases of Limiting Safety System Setting 2.2.2, "Reactor Coolant System," was changed to delete reference to these values for the APRM flow biased scram.

The existing Technical Specification analytical limits for the APRM scram (120% of rated flux) and APRM rod block (110% rated flux) are changed to 122% and 118% respectively. The following addresses the impact of the proposed change on those transient events previously analyzed for NMP1.

The high neutron flux scram setpoint limits neutron flux excursions during postulated anticipated operational occurrences such that the fuel rod mechanical integrity is maintained. The current technical specification setpoint for this flow-biased APRM High Neutron Flux Scram allows approximately 20% margin between the rated rod line and the flow-biased flux scram line throughout most of the core flow range. This setpoint is currently clamped at a maximum value of 120% power at 100% core flow and beyond. The existing analyses demonstrate the conservative nature of the 120% high neutron flux scram for all design basis transient events.

Section XV of the UFSAR was reviewed to assess the potential impact of the proposed 2% increase on the responses of the transient events. Twenty-five transient events were analyzed in Section XV. The analytical value assumed in these analyses for the high neutron flux scram was previously 120% and is proposed to be increased to 122%.

Of these events, the following four were identified as limiting for the Minimum Critical Power Ratio (MCPR) consideration:

- Turbine Trip without Bypass,
- Feedwater Controller Failure Maximum Demand,
- Loss of 100°F Feedwater Heating,
- Control Rod Withdrawal Error.

The first three events are core-wide transients while the last event is a localized bundle power excursion event. These transients, along with the Main Steam Isolation Valve (MSIV) closure with direct (position) scram and the MSIV closure with no scram events, are analyzed on a cycle-specific basis as part of the reload licensing submittal. The remaining nineteen events are considered not limiting and therefore were analyzed only for USAR application.

*Reload Licensing Analysis Events*

Both the Turbine Trip without Bypass and the Feedwater Controller Failure Maximum Demand events are terminated by a reactor scram on turbine stop valve fast closure signal. Therefore, the increase in the high neutron flux scram signal has no impact on the severity of these transient events.

The Loss of 100°F Feedwater Heating event is a subcooling increase event which results in a core thermal power and neutron flux increase. This event was analyzed for the current cycle which resulted in peak neutron flux and surface heat flux response of 116% and 115%, respectively. Since the peak neutron flux is below the scram setpoint of 120%, no reactor scram was initiated. Therefore, the proposed setpoint increase for the high neutron flux scram from 120% to 122% has no adverse impact on the 100°F Loss of Feedwater Heating event.

The Control Rod Withdrawal Error event is mitigated by the setpoint of the APRM flow-biased rod block system. The severity of this event is dependent on the rod block setpoint chosen. However, current analytical practice does not take credit for the function of the flow-biased rod block system when simulating the Control Rod Withdrawal Error event for NMP1. Therefore, although this parameter is increased by 8%, there is no adverse impact on the Control Rod Withdrawal Error event analysis results.

The MSIV closure event is terminated by a reactor scram signal when the MSIV position switches are at $\leq$10 percent closed from full open. Therefore, the increase in the high neutron flux scram setpoint will not affect the responses of this event. The MSIV closure event with no scram is not affected by the high neutron flux scram setpoint.

*USAR Transient Events*

Of the nineteen transient events analyzed, the following events involved reactor neutron flux increase and were reviewed for the potential impact due to the proposed high neutron flux scram setpoint increase:

- Inadvertent Startup of Cold Recirculation Loop
- Recirculation Flow Controller Malfunction - Increase Flow

The combination of increasing recirculation flow and decreasing core inlet enthalpy during an Inadvertent Startup of Cold Recirculation Loop causes reactor power to rise such that the high neutron flux scram signal is reached early in the event. The fuel average surface heat flux also increases from an initial value of 91% of rated to peak value of about 100% of rated. The proposed 2% increase for the high neutron flux scram setpoint would result in an increase in the fuel average surface heat flux response. However, there is a significant margin between the surface heat flux value response for this event and the limiting MCPR events. As such, any small change to the fuel surface heat flux response due to the high neutron flux scram setpoint increase would not result in the fuel thermal

margin requirements for the Inadvertent Startup of Cold Recirculation Loop to exceed the MCPR limits set by the limiting reload analysis events.

The reactor neutron flux for the Recirculation Flow Controller Malfunction - Increase Flow event also showed an increasing trend from its initial value. However, the peak response for this parameter (about 104% of rated) is significantly below the high neutron flux scram setpoint. Therefore, the proposed setpoint increase for the high neutron flux scram setpoint does not affect the response of this transient event.

*__Miscellaneous Considerations__*

In addition to the reload specific and UFSAR specific events, the potential impact of the proposed increased high neutron flux scram setpoint on the following events are addressed:

- Turbine Trip with no Bypass at Partial Power (below steam bypass capacity)
- MSIV Closure with Flux Scram

The Turbine Trip at Partial Power (below the steam bypass capacity) was not included in the NMP1 UFSAR. At this low power level, the automatic scram on turbine stop valve fast closure is bypassed since the pressurization transient is expected to be within the turbine bypass capacity. From a design basis viewpoint, if the turbine bypass operation is not assumed, this event will be terminated by either a high dome pressure scram or a high neutron flux scram signal. Although the high pressure scram will most likely be the mitigating scram signal, the proposed increase in the high neutron flux scram setpoint would have negligible impact on the transient responses. At this low power range, the off-rated thermal limit requirement offers sufficient margin to accommodate any small change in the fuel transient responses.

NMP1 currently analyzes the overpressure event with no scram following the closure of all MSIVs. By letter dated July 21, 1994 (NMP1L0837) Niagara Mohawk submitted an Application for Amendment to reduce the number of safety valves from sixteen to nine. This analysis assumed a scram on high neutron flux (120 percent of rated flux). Results of the analysis indicated that peak pressure in the reactor vessel would be 1353 psig. This proposed increase in high neutron flux scram at 122 percent of rated flux results in peak pressure of 1358 psig, which remains below the safety limit of 1375 psig.

__CONCLUSION__

The proposed changes extend the calibration interval for the recirculation flow square rooters and summers from once every three months to once per year and for the flow transmitters from once per quarter to once per operating cycle. New values are also proposed for the recirculation flow upscale and comparator rod block setpoints specified in the Technical Specifications. The associated analytical limits for the APRM flow biased scram and rod block were increased. Analysis shows that MCPR limits have not been exceeded for any transient event previously analyzed. The new surveillance intervals and setpoints are based on plant specific instrument drift values and are calculated using the GE setpoint methodology documented in NEDC-31336. The methodology in NEDC-31336 accounts for inaccuracies, drift and calibration uncertainties and provides assurance that safety system actuation (i.e., reactor scram or control rod withdrawal block) will occur

prior to the associated system parameters (neutron flux and recirculation flow) exceeding their analytical limits.

Calibration of the flow square rooters and summers once per year and once per operating cycle for the flow transmitters is compatible with plant operating experience. The APRM and recirculation flow instrumentation systems will continue to be calibrated every three months except for the recirculation flow square rooters and summers which will be calibrated once per year and the flow transmitters once per operating cycle. In addition, the entire APRM and recirculation flow instrumentation systems will still be subject to Instrument Channel Tests every three months. These tests, together with the calibration of the flow square rooters and summers once per year and the flow transmitters once per operating cycle, will assure that system reliability and availability are maintained at their current levels. Therefore, there is reasonable assurance that operation of NMP1 in the proposed manner will not endanger the public health and safety and that issuance of the proposed amendment will not be inimical to the common defense and security.

<u>NO SIGNIFICANT HAZARDS CONSIDERATION ANALYSIS</u>

10 CFR § 50.91 requires that at the time a licensee requests an amendment, it must provide to the Commission its analysis using the standards in 10 CFR § 50.92 concerning the issue of no significant hazards consideration. Therefore, in accordance with 10 CFR § 50.91, the following analysis has been performed:

<u>The operation of Nine Mile Point Unit 1, in accordance with the proposed amendment, will not involve a significant increase in the probability or consequences of an accident previously evaluated.</u>

The proposed changes extend the calibration interval for the recirculation flow square rooters, summers and transmitters and revise the setpoints for the recirculation flow upscale and comparator rod block trips. The associated analytical limits for APRM flow biased scram and rod block increase by 2% and 8% respectively. Setpoints are for plant protective functions (i.e., scram and rod block) which respond to an accident or transient. The scram and rod block function responds to mitigate the consequences of an accident or transient. Therefore, a change to the setpoints cannot increase the probability of these accidents or transients. Likewise, changes to surveillance intervals for the protective functions which respond to an accident or transient cannot increase the probability. In fact, the proposed increase in the surveillance intervals reduce the probability of an inadvertent scram by reducing the duration that the plant is in the one-half scram condition.

The new surveillance intervals, setpoints and allowable setpoint deviations are calculated using the approved GE setpoint methodology documented in NEDC-31336. The methodology in NEDC-31336 provides assurance that safety system actuation (i.e., reactor scram or control rod withdrawal block) will occur prior to the associated system parameters (neutron flux and recirculation flow) exceeding their analytical limits. Based upon re-evaluation of NMP1 accidents and transients, it has been shown that the fuel thermal limits are not significantly impacted. Therefore, the consequences of an accident or transient has not significantly increased.

Thus, plant response to previously analyzed accidents remains within previously determined limits. Therefore, the operation of Nine Mile Point Unit 1, in accordance with the proposed amendment, will not involve a significant increase in the probability or consequences of an accident previously evaluated.

<u>The operation of Nine Mile Point Unit 1, 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>

The proposed changes to extend the calibration frequency do not represent a physical change to the plant as described in the NMP1 Final Safety Analysis Report (Updated). However, this change results in increasing the analytical limits for the APRM flow based scram and rod block by 2% and 8% respectively. The proposed changes do not alter the plant configuration and the initial conditions used for the design basis accident analysis are still valid. Thus, no potential initiating events are created which would cause any new or different kinds of accidents. As such, the plant initial conditions utilized for the design basis accident analysis are still valid. Therefore, operation of Nine Mile Point Unit 1 in accordance with the proposed change will not create the possibility of a new or different kind of accident from any previously assessed.

<u>The operation of Nine Mile Point Unit 1, in accordance with the proposed amendment, will not involve a significant reduction in a margin of safety.</u>

The analytical limits for the APRM flow biased scram and rod block increase by 2% and 8% respectively. The trip units in the APRM and recirculation flow instrumentation systems will continue to be calibrated every three months. In addition, the entire APRM and recirculation flow instrumentation systems will still be subject to Instrument Channel Tests every three months. These tests, together with the calibration of the flow square rooters and summers once per year and the flow transmitters once per operating cycle, will assure that system reliability and availability are maintained at their current levels. Re-analysis of the design basis transients was performed utilizing these new values. The results showed that the increase had an insignificant effect on the consequences of these events. Therefore, the proposed amendment will not involve a significant reduction in the margin of safety.

14