August 17, 1990

Docket No. 50-410

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Mr. Lawrence Burkhardt III
Executive Vice President, Nuclear Operations
Niagara Mohawk Power Corporation
301 Plainfield Road
Syracuse, New York 13212

Dear Mr. Burkhardt:

SUBJECT: ISSUANCE OF AMENDMENT FOR NINE MILE UNIT 2 (TAC NO. 73877)

The Commission has issued the enclosed Amendment No. 21 to Facility Operating License No. NPF-69 for the Nine Mile Point Nuclear Station Unit No. 2 (NMP-2). The amendment consists of changes to the Technical Specifications in response to your application transmitted by letter dated October 5, 1989.

This amendment revises Technical Specifications, Sections 3/4.3.6, Instrumentation-Control Rod Block Instrumentation; 3/4.3.7, Instrumentation-Monitoring Instrumentation; 3/4.9.2, Refueling Operations-Instrumentation; and 3/4.9.10, Refueling Operations-Control Rod Removal. The Bases for Sections 3/4.9.2 and 3/4.9.10 are also revised to be consistent with changes made in the Technical Specifications. This revision is required to permit fuel loading in preparation for the second cycle of operation with multiple control rods withdrawn. This revision will also delete Technical Specifications, Section 3/4.10.7, Special Test Exceptions-Special Instrumentation-Initial Core Loading, which no longer applies.

A copy of the related Safety Evaluation is enclosed. A Notice of Issuance will be included in the Commission's next regular bi-weekly Federal Register notice.

Sincerely,

Robert E. Martin, Senior Project Manager
Project Directorate I-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 21 to NPF-69
2. Safety Evaluation

cc: w/enclosures
See next page

*See previous concurrence

PDI-1	PDI-1	PDI-1	OGC	PDI-1
CVogan	REMartin:rsc	DOudinot	MYoung*	RACapra
8/16/90	8/17/90	8/17/90	8/3/90	8/17/90

DOCUMENT NAME: AMEND 73877

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

NIAGARA MOHAWK POWER CORPORATION

DOCKET NO. 50-410

NINE MILE POINT NUCLEAR STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 21
License No. NPF-69

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Niagara Mohawk Power Corporation (the licensee) dated October 5, 1989, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-69 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, as revised through Amendment No. 21 are hereby incorporated into this license. Niagara Mohawk Power Corporation shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance to be implemented within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Robert A. Capra

Robert A. Capra, Director
Project Directorate I-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: August 17, 1990

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 21 TO FACILITY OPERATING LICENSE NO. NPF-69

DOCKET NO. 50-410

Revise Appendix A as follows:

Remove Pages	Insert Pages
XIV	XIV
XX	XX
3/4 3-60	3/4 3-60
3/4 3-61	3/4 3-61
3/4 3-63	3/4 3-63
3/4 3-89	3/4 3-89
3/4 9-3	3/4 9-3
3/4 9-4	3/4 9-4
3/4 9-14	3/4 9-14
3/4 9-15	3/4 9-15
3/4 10-7	--------
3/4 10-8	--------
B3/4 9-1	B3/4 9-1
B3/4 9-2	B3/4 9-2
--------	B3/4 9-3
B3/4 10-1	B3/4 10-1

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

BASES FOR SECTIONS 3.0/4.0

TABLE 3.3.6-1

CONTROL ROD BLOCK INSTRUMENTATION

TRIP FUNCTION	MINIMUM OPERABLE CHANNELS PER TRIP FUNCTION	APPLICABLE OPERATIONAL CONDITIONS	ACTION
1. Rod Block Monitor(a)			
a. Upscale	2	1*	60
b. Inoperative	2	1*	60
c. Downscale	2	1*	60
2. APRM			
a. Flow-Biased Neutron Flux-Upscale	4	1	61
b. Inoperative	4	1, 2, 5	61
c. Downscale	4	1	61
d. Neutron Flux-Upscale, Startup	4	2, 5	61
3. Source Range Monitor			
a. Detector Not Full In (b)	3	2	61
	2	5	61
b. Upscale(c)	3	2	61
	2	5	61
c. Inoperative(c)	3	2	61
	2	5	61
d. Downscale(d)	3	2	61
	2(f)	5	61
4. Intermediate Range Monitor			
a. Detector Not Full In	6	2, 5	61
b. Upscale	6	2, 5	61
c. Inoperative	6	2, 5	61
d. Downscale(e)	6	2, 5	61
5. Scram Discharge Volume Water Level - High, Float Switch	2	1, 2, 5**	62
6. Reactor Coolant System Recirculation Flow			
a. Upscale	2	1	62
b. Inoperative	2	1	62
c. Comparator	2	1	62
7. Reactor Mode Switch			
a. Shutdown Mode	2	3, 4	62
b. Refuel Mode	2	5	62

TABLE 3.3.6-1 (Continued)

CONTROL ROD BLOCK INSTRUMENTATION

TABLE NOTATIONS

* With THERMAL POWER greater than or equal to 30% of RATED THERMAL POWER.

** With more than one control rod withdrawn. Not applicable to control rods removed per Specification 3.9.10.1 or 3.9.10.2.

(a) The RBM shall be automatically bypassed when a peripheral control rod is selected.

(b) This function shall be automatically bypassed if detector count rate is greater than 100 cps or the IRM channels are on range 3 or higher.

(c) This function shall be automatically bypassed when the associated IRM channels are on range 8 or higher.

(d) This function shall be automatically bypassed when the IRM channels are on range 3 or higher.

(e) This function shall be automatically bypassed when the IRM channels are on range 1.

(f) During complete core spiral offloading and reloading, an SRM downscale rod block instrumentation channel is not required to be OPERABLE when the associated SRM channel is downscale.

ACTION

ACTION 60 - Declare the RBM inoperable and take the ACTION required by Specification 3.1.4.3.

ACTION 61 - With the number of OPERABLE Channels:

a. One less than required by the Minimum OPERABLE Channels per Trip Function requirement, restore the inoperable channel to OPERABLE status within 7 days or place the inoperable channel in the tripped condition within the next hour.

b. Two or more less than required by the Minimum OPERABLE Channels per Trip Function requirement, place at least one inoperable channel in the tripped condition within 1 hour.

ACTION 62 - With the number of OPERABLE channels less than required by the Minimum OPERABLE Channels per Trip Function requirement, place the inoperable channel in the tripped condition within 1 hour.

Table 3.3.6-2 (Continued)

CONTROL ROD BLOCK INSTRUMENTATION SETPOINTS

TRIP FUNCTION	TRIP SETPOINT	ALLOWABLE VALUE
6. Reactor Coolant System Recirculation Flow		
a. Upscale	≤108% rated flow	≤111% rated flow
b. Inoperative	NA	NA
c. Comparator	≤10% flow deviation	≤11% flow deviation
7. Reactor Mode Switch		
a. Shutdown Mode	NA	NA
b. Refuel Mode	NA	NA

* Specified in the CORE OPERATING LIMITS REPORT

** For fuel loading and startup from refueling the count rate may be less than 3 cps if the following conditions are met: the signal to noise ratio is greater than or equal to 5, and the signal is greater than 1.3 cps.

SURVEILLANCE REQUIREMENTS

4.3.7.6 (Continued)

c. Verifying, before withdrawal of control rods, that the SRM count rate is at least 3 cps* with the detector fully inserted.

*For fuel loading and startup from refueling the count rate may be less than 3 cps if the following conditions are met: (1) the signal-to-noise ratio is greater than or equal to 5 and (2) the signal is greater than 1.3 cps.

3/4.9.2 INSTRUMENTATION

LIMITING CONDITIONS FOR OPERATION

3.9.2 At least 2 source range monitor* (SRM) channels shall be OPERABLE and inserted to the normal operating level with:

a. Continuous visual indication of the required count rate in the control room,**

b. Audible indication in the control room,

c. One of the required SRM detectors located in the quadrant where CORE ALTERATIONS are being performed and the other required SRM detector located in an adjacent quadrant, and

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

APPLICABILITY: OPERATIONAL CONDITION 5.

ACTION:

With the requirements of the above specification not satisfied, immediately suspend all operations involving CORE ALTERATIONS and insert all insertable control rods.

SURVEILLANCE REQUIREMENTS

4.9.2 Each of the above required SRM channels shall be demonstrated OPERABLE by:

a. At least once per 12 hours:

   1. Performing a CHANNEL CHECK,

   2. Verifying the detectors are inserted to the normal operating level, and

   3. During CORE ALTERATIONS, verifying that the detector of an OPERABLE SRM channel is located in the core quadrant where CORE ALTERATIONS are being performed and another is located in an adjacent quadrant.

---

* The use of special movable detectors during CORE ALTERATIONS in place of the normal SRM nuclear detectors is permissible as long as these special detectors are connected to the normal SRM circuits.

** During complete core spiral offload and reload, only one of the required SRM channels must have continuous visual indication in the control room. No visual indication is required until after the first four fuel bundles have been placed in the core, and no visual indication is required when all but four bundles have been removed from the core.

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

4.9.2 (Continued)

b. Performing a CHANNEL FUNCTIONAL TEST:

1. Within 24 hours before the start of CORE ALTERATIONS, and
2. At least once per 7 days.

c. Verifying that the channel count rate is at least 3 cps*

1. Before control rod withdrawal,

2. Before and at least once per 12 hours during CORE ALTERATIONS, and

3. At least once per 24 hours,

Except that:

1. During complete core spiral offloading, the SRM count rate need not be maintained when the fuel assemblies around the SRM are removed.

2. Prior to and during complete core spiral reloading, the required count rate may be achieved by:

a) Use of a portable external source, or

b) Loading up to 4 fuel assemblies in cells containing inserted control rods around an SRM.

d. Verifying, within 8 hours before and at least once per 12 hours during the time any control rod is withdrawn that the shorting links have been removed from the RPS circuitry, unless adequate shutdown margin has been demonstrated per Specification 3.1.1 and the "one rod out" interlock is OPERABLE per Specification 3.9.1.

* The count rate may be less than 3 cps if the following conditions are met: (1) the signal-to-noise ratio is greater than or equal to 5, and (2) the signal is greater than 1.3 cps.

LIMITING CONDITIONS FOR OPERATION

3.9.10.2 Any number of control rods and/or control rod drive mechanisms may be removed from the core and/or reactor pressure vessel provided that at least the following requirements are satisfied until all control rods and control rod drive mechanisms are reinstalled and all control rods are inserted in the core.

a. The reactor mode switch is OPERABLE and locked in the Shutdown position or in the Refuel position per Specification 3.9.1, except that the Refuel position "one-rod-out" interlock may be bypassed, as required, for those control rods and/or control rod drive mechanisms to be removed, after the fuel assemblies have been removed as specified below.

b. The source range monitors (SRMs) are OPERABLE per Specification 3.9.2.

c. The SHUTDOWN MARGIN requirements of Specification 3.1.1 are satisfied.

d. All other control rods are either inserted or have the surrounding four fuel assemblies removed from the core cell.

e. The four fuel assemblies surrounding each control rod or control rod drive mechanism to be removed from the core and/or reactor vessel are removed from the core cell.

f. All fuel loading operations have been suspended.*

APPLICABILITY: OPERATIONAL CONDITION 5.

ACTION:

With the requirements of the above specification not satisfied, suspend removal of control rods and/or control rod drive mechanisms from the core and/or reactor pressure vessel and initiate action to satisfy the above requirements.

* Except during complete core spiral reload where the shorting links shall be removed and dedicated procedures shall be strictly followed.

SURVEILLANCE REQUIREMENTS

4.9.10.2.1 Within 4 hours before the start of removal of control rods and/or control rod drive mechanisms from the core and/or reactor pressure vessel and at least once per 24 hours thereafter until all control rods and control rod drive mechanisms are reinstalled and all control rods are inserted in the core, verify that:

a. The reactor mode switch is OPERABLE per Surveillance Requirement 4.3.1.1 or 4.9.1.2, as applicable, and locked in the Shutdown position or in the Refuel position per Specification 3.9.1

b. The SRM channels are OPERABLE per Specification 3.9.2

c. The SHUTDOWN MARGIN requirements of Specification 3.1.1 are satisfied.

d. All other control rods are either inserted or have the surrounding four fuel assemblies removed from the core cell. .

e. The four fuel assemblies surrounding each control rod and/or control rod drive mechanism to be removed from the core and/or reactor vessel are removed from the core cell.

f. All fuel loading operations have been suspended.*

4.9.10.2.2 Following replacement of all control rods and/or control rod drive mechanisms removed in accordance with this specification, perform a functional test of the "one-rod-out" Refuel position interlock, if this function had been bypassed.

* Except during complete core spiral reload where the shorting links shall be removed and dedicated procedures shall be strictly followed.

3/4.9 REFUELING OPERATIONS

BASES

3/4.9.1 REACTOR MODE SWITCH

Locking the OPERABLE reactor mode switch in the Shutdown or Refuel position, as specified, ensures that the restrictions on control rod withdrawal and refueling platform movement during the refueling operations are properly activated. These conditions reinforce the refueling procedures and reduce the probability of inadvertent criticality, damage to reactor internals or fuel assemblies, and exposure of personnel to excessive radioactivity.

3/4.9.2 INSTRUMENTATION

The OPERABILITY of at least two source range monitors ensures that redundant monitoring capability is available to detect changes in the reactivity condition of the core. The SRM's are provided to monitor the core during periods of station shutdown and to guide the operator during refueling operations and station startup. Requiring two operable SRM's, one in and one adjacent to any core quadrant where fuel or control rods are being moved, assures adequate monitoring of that quadrant during such alterations. The requirement of 3 counts per second provides assurance that neutron flux is being monitored.

A spiral unloading pattern is one by which the fuel in the outermost cells (four fuel bundles surrounding a control blade) is removed first. Unloading continues by removing the remaining outermost fuel by cell. The last cell removed will be adjacent to an SRM. Spiral reloading is the reverse of unloading. Spiral unloading and reloading will preclude the creation of flux traps (moderator filled or partially filled cells surrounded on all sides by fuel).

During spiral unloading, the SRM's shall have an initial count rate of at least 3 cps with all rods fully inserted. It is expected that the count rate of the SRM's will drop below 3 cps before all of the fuel is unloaded. Since there will be no reactivity additions, a lower number of counts will not present a hazard. When all of the fuel has been removed to the spent fuel storage pool, the SRM's will no longer be required. Requiring an SRM to be operational prior to fuel removal from around that SRM assures that the SRM's are OPERABLE and can be relied upon when the count rate goes below the required minimum.

During spiral reload, SRM operability will be verified by using a portable external source once every 12 hours until the required amount of fuel is loaded to maintain 3 cps. As an alternative to the above, four fuel assemblies will be loaded in cells containing control blades around one SRM to obtain the required count rate. The loading of up to four bundles around the SRMs before attaining the required count rate is permissible because analysis has shown that an array of four fuel bundles in any configuration will remain subcritical. Until these four assemblies have been loaded, the 3 cps (or 1.3 cps) requirement is not necessary.

3/4.9.3 CONTROL ROD POSITION

The requirement that all control rods be inserted during other CORE ALTERATIONS ensures that fuel will not be loaded into a cell without a control rod.

3/4.9.4 DECAY TIME

The minimum requirement for reactor subcriticality before fuel movement ensures that sufficient time has elapsed to allow the radioactive decay of the short-lived fission products. This decay time is consistent with the assumptions used in the accident analyses.

3/4.9.5 COMMUNICATIONS

The requirement for communications capability ensures that refueling station personnel can be promptly informed of significant changes in the facility status or core reactivity condition during movement of fuel within the reactor pressure vessel.

3/4.9.6 REFUELING PLATFORM

The OPERABILITY requirements ensure that (1) the refueling platform will be used for handling control rods and fuel assemblies within the reactor pressure vessel, (2) each crane and hoist has sufficient load capacity for handling fuel assemblies and control rods, and (3) the core internals and pressure vessel are protected from excessive lifting force in the event they are inadvertently engaged during lifting operations.

3/4.9.7 CRANE TRAVEL - SPENT FUEL STORAGE POOL

The restriction on movement of loads in excess of the nominal weight of a fuel assembly over other fuel assemblies in the storage pool ensures that in the event this load is dropped (1) the activity release will be limited to that contained in a single fuel assembly and (2) any possible distortion of fuel in the storage racks will not result in a critical array. This assumption is consistent with the activity release assumed in the safety analyses.

3/4.9.8 & 3/4.9.9 WATER LEVEL - REACTOR VESSEL AND WATER LEVEL - SPENT FUEL STORAGE POOL

The restrictions on minimum water level ensure that sufficient water depth is available to remove 99% of the assumed 10% iodine gap activity released from the rupture of an irradiated fuel assembly. This minimum water depth is consistent with the assumptions of the accident analysis.

3/4.9.10 CONTROL ROD REMOVAL

These specifications ensure that maintenance or repair of control rods or control rod drives will be performed under conditions that limit the probability of inadvertent criticality. The requirements for simultaneous removal of more than one control rod are more stringent since the SHUTDOWN MARGIN specification provides for the core to remain subcritical with only one control rod fully withdrawn.

3/4.9.10 CONTROL ROD REMOVAL (Continued)

This specification also permits the unloading of a significant portion of the reactor core for such purposes as removal of temporary control curtains, control rod drive maintenance, in-service inspection requirements, examination of the core support plate, etc. When the refueling interlock input signal from a withdrawn control rod is bypassed, administrative controls will be in effect to prohibit fuel from being loaded into that control cell.

These operations are performed with the mode switch in the "Refuel" position to provide the refueling interlocks normally available during refueling. In order to withdraw more than one control rod, it is necessary to bypass the refueling interlock on each withdrawn control rod. The requirement that the fuel assemblies in the cell controlled by a control rod be removed from the reactor core before the interlock can be bypassed insures that withdrawal of another control rod does not result in inadvertent criticality. Following the withdrawal of a rod from an empty cell, a second licensed operator will independently verify that the interlock bypassed is on the correct control rod. Once the control rod is withdrawn, it will be valved out of service. Each control rod essentially provides reactivity control for the fuel assemblies in the cell associated with the control rod. Thus, offloading the core results in a continuous reduction of core reactivity.

3/4.9.11 RESIDUAL HEAT REMOVAL AND COOLANT CIRCULATION

The requirement that at least one residual heat removal loop be OPERABLE or that an alternate method capable of decay heat removal be demonstrated and that an alternate method of coolant mixing be in operation ensures that (1) sufficient cooling capacity is available to remove decay heat and maintain the water in the reactor pressure vessel below 140°F as required during REFUELING and (2) sufficient coolant circulation would be available through the reactor core to assure accurate temperature indication and to distribute and prevent stratification of the poison in the event it becomes necessary to actuate the standby liquid control system.

The requirement to have two shutdown cooling mode loops OPERABLE when there is less than 22 feet 3 inches of water above the reactor vessel flange ensures that a single failure of the operating loop will not result in a complete loss of residual heat removal capability. With the reactor vessel head removed and 22 feet 3 inches of water above the reactor vessel flange, a large heat sink is available for core cooling. Thus, in the event of a failure of the operating RHR loop, adequate time is provided to initiate alternate methods capable of decay heat removal or emergency procedures to cool the core.

3/4.10 SPECIAL TEST EXCEPTIONS

BASES

3/4.10.1 PRIMARY CONTAINMENT INTEGRITY

The requirement for PRIMARY CONTAINMENT INTEGRITY is not applicable during the period when open vessel tests are being performed during the low-power PHYSICS TESTS.

3/4.10.2 ROD SEQUENCE CONTROL SYSTEM

In order to perform the tests required in the Technical Specifications it is necessary to bypass the sequence restraints on control rod movement. The additional surveillance requirements ensure that the specifications on heat generation rates and shutdown margin requirements are not exceeded during the period when these tests are being performed and that individual rod worths do not exceed the values assumed in the safety analysis.

3/4.10.3 SHUTDOWN MARGIN DEMONSTRATIONS

Performance of shutdown margin demonstrations with the vessel head removed requires additional restrictions in order to ensure that criticality does not occur. These additional restrictions are specified in this Limiting Condition for Operation.

3/4.10.4 RECIRCULATION LOOPS

This special test exception permits reactor criticality under no-flow conditions and is required to perform certain startup and PHYSICS TESTS while at low THERMAL POWER levels.

3/4.10.5 OXYGEN CONCENTRATION

Relief from the oxygen concentration specifications is necessary in order to provide access to the primary containment during the initial startup and testing phase of operation. Without this access, the startup and test program could be restricted and delayed.

3/4.10.6 TRAINING STARTUPS

This special test exception permits training startups to be performed with the reactor vessel depressurized at low THERMAL POWER and temperature while controlling RCS temperature with one RHR subsystem aligned in the shutdown cooling mode in order to minimize the discharge of contaminated water to the radioactive waste disposal system.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 21 TO FACILITY OPERATING LICENSE NO. NPF-69

NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT NUCLEAR POWER STATION, UNIT NO. 2

DOCKET NO. 50-410

1.0 INTRODUCTION

By letter dated October 5, 1989 (Reference 1), Niagara Mohawk Power Corporation (NMPC) requested an amendment to Facility Operating License No. NPR-69 for the Nine Mile Point Unit 2 (NMP-2) power plant. The proposed amendment would change Technical Specifications (TS) 3.3.6 (Table 3.3.6-1 and 2), 4.3.7.6, 3/4.9.2, 3/4.9.10.2 and associated Bases. The changes concern source range monitor operability requirements and multiple control rod removal during fuel loading and unloading operations. The primary purposes of the changes are to alter the source range monitor (SRM) minimum count rate requirement to bring it in line with recent General Electric (GE) analyses providing requirements for signal to noise ratios to be associated with various magnitudes of allowed minimum count rate, and to permit spiral fuel loading and unloading with multiple control rods withdrawn.

In addition to NMPC's current submittal providing the proposed TS changes and justification, relevant material for the review of the loading procedures is presented in Appendix 15E of the NMP-2 Updated Safety Analysis Report (USAR). This appendix presents proposed unload/reload procedure guidelines. It was submitted prior to the initial loading of NMP-2 to propose and justify spiral loading for the initial loading and subsequent unloading and reloading. The NRC staff review at that time accepted the spiral loading, but deferred conclusions on the unloading/reloading procedures. The significant difference in the first cycle loading from the currently proposed unloading/reloading procedures is in the area of control rod insertion during loading. For the first cycle, there was a complete set of blade guides available for the loading and all control rods were inserted before and during the loading process. Blade guides are necessary to prevent rod bending and thus permit rod insertion before fuel assemblies are inserted in a control cell (a control rod and the surrounding four fuel

assemblies). Blade guides in the initial loading would not become contaminated with fission products and could be stored anywhere after use. But subsequent reactor operation would require the (contaminated) blade guides used in unload/reload operations to be stored in the fuel pool. The space in the pool required for this storage is an undesirable use of the space needed for eventual fuel storage. These are double guides equivalent to two fuel assemblies and 185 guides would take up space on the order of 300 assemblies in the pool. Therefore, NMPC has proposed to carry out these operations with only a limited (15 or fewer) set of guides rather than the 185 otherwise required.

2.0 EVALUATION

The proposed operations and corresponding TS changes for NMP-2 concern primarily three areas; (1) SRM required count rate, (2) spiral loading/unloading operations and (3) spiral loading-unloading operations with multiple control rods withdrawn. The SRM count rate and spiral loading/unloading areas have been previously considered in a number of NRC staff reviews for other BWRs, and limits on operations similar to those proposed for NMP-2 have been approved. However, spiral loading/unloading without all rods initially (and subsequently) inserted has not been previously specifically addressed, although questions related to loading operations with (some) control rods withdrawn for maintenance have been considered by both the staff and GE.

Currently, the NMP-2 TS require a minimum count rate of 3 cps for the SRMs to be considered to be operable (or a surveillance check with a portable source). In the past year, the staff review of this requirement for several reactors (e.g., Limerick 2, Reference 2) has allowed this rate to be reduced when a sufficiently high signal to noise ratio has also been specified. The acceptance of this change is based on the staff review of GE analysis of the neutron counting system and the development of a relation between count rate and signal to noise ratio which ensures the same level of counting confidence (i.e., confidence that a significant fraction of the counts are real neutron counts) at lower rates as is provided at the current TS required count rate of 3 cps (which is associated with a signal to noise ratio of 2). The GE analysis for NMP-2 indicates a suitable combination is 1.3 cps with a signal to noise ratio equal to or greater than 5. This result is comparable to combinations previously approved by the staff and is acceptable for NMP-2. This change is incorporated with TS Table 3.3.6-2, TS 4.3.7.6 and 4.9.2, and Bases 3/4.9.2. These TS changes are acceptable.

Spiral loading and unloading, and particularly off (core) center spirals centered around an SRM to provide early (loading) or late (unloading) achievement of acceptable SRM count rate, have been approved for many BWRs, and are a standard approach for reloads. In particular, an SRM centered spiral loading procedure (using blade guides) was approved for NMP-2 first cycle loading. As with many of the approved procedures, the initial fuel loading (for both NMP-2 first cycle and proposed for subsequent cycles) puts a sufficient number of fuel assemblies next to an SRM (and source in first cycle) to get a suitable count rate, but also limits the number of assemblies so that

criticality can not be attained, even if no control rod were present (loaded cells would have control rods), until after the required neutron monitoring is evident. The loading then proceeds (with acceptable count rates, including other SRMs as they become adjacent to fuel) in a spiral about the initial location. The neutron source comes (directly or indirectly from gamma, neutron reactions) from the irradiated fuel used in the reload. For NMP-2, the TS requirement will be that four fuel assemblies may be loaded before the SRM must meet the count rate requirements (3 cps or 1.3 cps with signal/noise of 5). Based on past experience, this should be a sufficient number of assemblies for the count rate (if shutdown time is not overly extended), and 4 assemblies can not be critical. Calculations for other reactors have approved as many as 16 assemblies without criticality. The unloading procedures reverse the process, and the count rate may fall below the limit near the end of the process. Since the unloading procedure only removes fuel from the core (deviations are not permitted) there are no evident problems with criticality during the procedure. This spiral loading/unloading procedure (in slightly varying forms) has been reviewed and approved for many reactors and (in the form described in NMP-2 USAR appendix 15 E and in the current submittal) is acceptable for NMP-2. Aspects of this procedure, including the allowance for the loading of four assemblies before meeting the SRM count rate limit, not requiring SRM downscale rod block when an SRM is downscale (because it is not adjacent to fuel) and reducing requirements for visual indication of SRMs to match the procedures, have been incorporated in TS Table 3.3.6-1 (added footnote), TS 3.9.2 (added footnote), TS 4.9.2.C (added exception and footnote) and Bases 3/4.9.2. These TS changes are compatible with the approved procedures and are acceptable.

In addition to the straightforward spiral loading procedure, the NMP-2 submittal also includes procedures intended to limit the number of blade guides required to be used (and subsequently stored). This involves beginning the (empty core) spiral loading process (and concluding the unloading process) without all control rods inserted. During the loading process rods would be inserted only in control cells containing (any) fuel, or in a "batch" of control cells about to be loaded (using blade guides). The loading would proceed in "batches," with batch size dependent on the number of available guides (maximum of 15). The number of blade guides could range from 2 to 15, with 15 estimated to be the maximum number of control cells which could be handled in a shift.

The procedure guidelines are provided in NMP-2 USAR Appendix 15E. A brief outline of the loading/unloading procedure is as follows:

(1) Begin with no fuel in the core and all rods withdrawn (from last unloading) and all individual rod position input to the refueling

interlock logic for the rods bypassed (last unloading) so that refueling operations can be carried out with rods out.

(2) The loading proceeds by batches, beginning adjacent to an SRM.

(3) A blade guide is put in first control cell of the first batch.

(4) The rod position bypass for that first rod is removed.

(5) The hydraulic control unit (HCU) for that rod is activated.

(6) A rod coupling check is made.

(7) The rod is inserted full in.

(8) A refueling interlock functional check is made.

(9) The same procedures are followed for the other rods of this batch.

(10) An independent quality assurance (QA) check is performed for the batch to determine all interlock bypasses are removed and all rods are inserted.

(11) Fuel assemblies are loaded into the control cells of the batch.

(12) These procedures are followed for each batch until the core is loaded.

(13) Deviations from these procedures are not permitted.

(14) The unloading process proceeds similarly in reverse order.

Appendix 15E provides detailed refueling interlock logic bypass guidelines, and SRM/IRM (Intermediate Range Monitor) rod block input bypass guidelines for when count rates drop below minimum (TS) specified levels as the detectors are no longer surrounded by fuel.

A series of verifications and QA checks have been set up. There are two verification checkers on the refueling bridge, one a Senior Reactor Operator. In the control room, two control room operators serve as verifiers. There is a designated QA checker to perform all independent QA checks.

The loading (unloading) procedures assure that fuel is always added (removed) at the periphery of the fueled region with therefore minimum reactivity worth of the fuel being inserted (removed). There are no imbedded (therefore potentially high reactivity worth) regions to be fueled. The loading patterns are straight forward to follow, and deviations from the designated loading patterns are not permitted. During unloading, no fuel assembly may be moved into the core.

There have been concerns expressed in the past by both GE and the NRC staff relating to fuel loading without all control rods inserted. Principal documentation of such concerns are provided by GE in SIL No. 372, RIC SIL No. 039 and in a letter to the NRC, "Germane to Safety-Core Monitoring During Fuel Loading" (References 3, 4 and 5), and in the NRC Information Notice No. 83-35 (Reference 6). These documents discuss both loading without all control rods in and monitoring neutron flux during loading operation. The latter problem area has been addressed in spiral loading centered around an SRM such as used for NMP-2, and in the NMP-2 TS on SRM operability and scram readiness, and is not a concern in this review. The concerns expressed for loading without all rods inserted were directed at multiple rods withdrawn for maintenance during loading operations (after first removing the fuel assemblies in those control cells) and the possibility of subsequent insertion of fuel without first inserting the rods. GE analyses indicated a probability of slightly greater than 10^{-6} for a significant criticality event. This concern and analysis is not directly relevant to the question of rods out during spiral loading following dedicated procedures. GE has explicitly considered spiral loading procedures and has indicated (Reference 7) that the use of such a dedicated procedure is acceptable and does not fall within the area of its concerns related to rods removed for maintenance and is consistent with the GE safety evaluation in References 3, 4 and 5. The same type of comments apply to the previous staff concerns. A probabilistic analyses has been developed and presented in NMP-2 USAR Appendix 15 E.4 for the probability of a criticality event (similar to the event discussed above for maintenance rod withdrawals) when using the dedicated spiral loading procedures for NMP-2. The result was approximately 10^{-9} per refueling.

Based on the staff review of the procedures to be used for NMP-2, the GE view that such operations are not within the area of concern previously expressed for loading after rod withdrawals for maintenance, and the probability analysis indicating considerable improvement in probability of significant criticality when using such procedures, it is concluded that the proposed procedure suitably address concerns on loading without all rods inserted and the procedures are acceptable.

NMP-2 TS 3/4.9.10.2 has been changed to allow these acceptable fuel loading procedures. The existing restriction in this specification (in 3.9.10.2.f and 4.9.10.2.1.f) which requires that all fuel loading be suspended unless all control rods are inserted in the core is amended, by footnote, to provide an exception during complete core spiral reload where the shorting links shall be removed and dedicated procedures shall be strictly followed. (The "shorting links" removal provides a scram signal from individual SRMs, if needed). The change to TS 3/4.9.10.2 to allow this approved loading procedure is acceptable. It is noted that this TS does not permit loading operations when multiple rods are withdrawn for reasons other than the spiral loading with dedicated procedures. A change was also made to the corresponding Bases 3/4.9.10 briefly describing the procedure. It is acceptable.

An editorial change was made to Bases 3/4.9.8 and .9 altering the title. The change is acceptable.

Additionally, Technical Specifications, Section 3/4.10.7, Special Test Exceptions-Special Instrumentation-Initial Core Loading has been deleted. This section addressed initial core loading and, therefore, no longer applies. The change is acceptable.

3.0 SUMMARY

We have reviewed the reports submitted by the licensee for NMP-2 proposing, describing and justifying new operating procedures and changes to SRM count rate limits for unloading and loading the reactor for each cycle and the TS changes associated with the SRM limits and reloading procedures. Based on this review, we have concluded that appropriate documentation was submitted and the proposed TS changes satisfy staff positions and requirements in these areas. Operation in the modes proposed for NMP-2 is acceptable.

4.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change in a requirement with respect to the installation or use of the facility components located within the restricted areas as defined in 10 CFR Part 20 and to surveillance requirements. The staff has determined that this amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

5.0 CONCLUSION

The staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.
Dated: August 17, 1990

PRINCIPAL CONTRIBUTOR:
H. Richings

6.0 REFERENCES

1. Letter and Enclosure from C. Terry, NMPC, to USNRC, dated October 5, 1989, "Re: Nine Mile Point Unit 2."

2. Letter and Enclosure from R. Clark, NRC, to G. Hunger, Philadelphia Electric Company, dated April 9, 1990, "SRM Count Rate."

3. General Electric SIL No. 372, dated June 1982, "Recommended Technical Specifications for Fuel Loading."

4. General Electric RICSIL No. 039, dated February 10, 1989, "Fuel Core Reloading Procedures."

5. Letter and Attachment from G. Stramback, GE, to USNRC, dated March 2, 1989, "Germane to Safety - Core Monitoring During Fuel Loading."

6. USNRC IE Information Notice No. 83-35, dated May 31, 1983, "Fuel Movement with Control Rods Withdrawn at BWRs."

7. Memorandum and Attachment from K. Kumar, GE, to P. Yin, GE, dated November 17, 1989, "NMP-2 Core Offload/Reload Procedures."