NMC
Committed to Nuclear Excellence

Monticello Nuclear Generating Plant
2807 West County Road 75
Monticello, MN 55362-9637

Operated by Nuclear Management
Company LLC

May 18, 2001

US Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

10 CFR Part 50
Section 50.90

MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 50-263 License No. DPR-22

License Amendment Request
Control Rod Drive and Core Monitoring Technical Specification Changes

Attached is a request for a change in the Technical Specifications (TS), Appendix A of the Operating License for the Monticello Nuclear Generating Plant. This request is submitted pursuant to and in accordance with the provisions of 10 CFR Part 50, Section 50.90.

The purpose of this License Amendment Request is to revise several Technical Specification (TS) sections. It will delete a redundant requirement for valving out control rod drives, revise control rod accumulator operability requirements, and add the option to hydraulically isolate control rod drives. It will also correct an inconsistency in core monitoring describing when source range monitors are required to be operable.

Exhibit A contains the Proposed Change, Reasons for Change, a Safety Evaluation, a Determination of No Significant Hazards Consideration and an Environmental Assessment. Exhibit B contains current Technical Specification pages marked up with the proposed change. Exhibit C contains revised Monticello Technical Specification pages. Exhibit D is a Letter from General Electric to NSP, "Monticello Technical Specification Change to Unload the Core," September 30, 1982.

This letter contains no restricted or other defense information.

NMC requests approval of the attached amendment prior to the next Monticello refueling outage, currently scheduled for fall 2001. We also request a period of up to 45 days following receipt of this license amendment to implement the changes.

A001

This submittal does not contain any new NRC commitments and does not modify any prior commitments. Please contact Sam Shirey, Sr. Licensing Engineer, at (763) 295-1449 if you require additional information related to this request.

by Byron D. Day
Byron D. Day
Plant Manager
Monticello Nuclear Generating Plant

Subscribed to and sworn before me this 18th day of May, 2001.

Samuel I. Shirey
Notary

SAMUEL I. SHIREY
NOTARY PUBLIC - MINNESOTA
My Comm. Exp. Jan. 31, 2005

c: Regional Administrator-III, NRC
NRR Project Manager, NRC
Sr. Resident Inspector, NRC
Minnesota Department of Commerce
J Silberg, Esq.

Attachments:
Exhibit A – Evaluation of Proposed Change to the Monticello Technical Specifications
Exhibit B – Current Monticello Technical Specification Pages Marked Up With Proposed Change
Exhibit C – Revised Monticello Technical Specification Pages
Exhibit D – Letter from General Electric to NSP, "Monticello Technical Specification Change to Unload the Core," September 30, 1982

License Amendment Request for CRD Technical Specification Changes

Evaluation of Proposed Change to the Monticello Technical Specifications

Pursuant to 10 CFR Part 50, Section 50.90, Nuclear Management Company (NMC) hereby proposes the following changes to Appendix A, of Facility Operating License DPR-22, Technical Specification (TS) and Bases for Monticello Nuclear Generating Plant as described below. Exhibit B contains marked up pages, and Exhibit C contains clean typed pages.

Change 1 – Delete Four Rod Group Paragraph (page 82)

Background

Currently, there are several places where requirements for inoperable control rods exist, including TS Sections 3.3.A, 3.3.C, and 3.3.D.

Description of Proposed Changes and Reasons for Changes

TS Section 3.3.C pertains to scram insertion times. The last sentence of this section provides guidance when a control rod may be valved out of service, and is inconsistent with the content of this section. For this reason, and the fact that control rod drive operability requirements are listed elsewhere in Section 3.3, this sentence is being deleted.

Safety Evaluation

The sentence proposed to be deleted allows one control rod in any four rod group to be valved out of service provided the requirements of Specifications 3.3.A and 3.3.C are met. This paragraph states a specific pattern in which a control rod is allowed to be inoperable. Section 3.3.A also controls the pattern of inoperable rods through a process of analysis which verifies shutdown margin. Therefore, deleting this paragraph and deferring control rod operability to Section 3.3.A provides greater flexibility without a reduction in safety.

Change 2 – Control Rod Accumulator Operability (pages 82, and 91)

Background

Currently TS Section 3.3.D.1 allows a rod accumulator to be inoperable provided no other control rod in the nine-rod square array around this rod has an inoperable accumulator. This wording does not specifically state where in the nine-rod square array the control rod would be, or how far apart the rods are required to be. With one rod accumulator inoperable, there is no conflict. However, should an accumulator for a second rod become inoperable, it is possible to configure the two nine-rod arrays such that current TS would be adhered to, but the General Electric Banked Position Withdrawal Sequence (BPWS) would not be adhered to. The General Electric banked position withdrawal sequence (BPWS) states:

Inoperable rods not fully inserted shall be separated from each other in all directions by at least two control rod cells.

Description of Proposed Changes and Reasons for Changes
In TS Section 3.3.D.1, revise the description and associated Bases for the control rod array affected by an inoperable accumulator. The current description contains the phrase "the nine-rod square array" which could be interpreted in a non-conservative manner. A clearer description is utilized in Standard Technical Specifications (STS) (Ref. 1) Section 3.1.3.D, which states:

Two or more inoperable control rods not in compliance with banked position withdrawal sequence (BPWS) and not separated by two or more OPERABLE control rods.

The proposed change would utilize similar wording of:

"....provided that no other control rod within two control rod cells in any direction has a:"

This proposed wording is considered less prone to misinterpretation. This proposed change also adds an explanation to the Bases (page 91).

Safety Evaluation
Technical Specification (TS) Section 3.3.D.1 and its basis as presently worded can be interpreted in a non-conservative manner. It allows one rod accumulator in the nine-rod square array to be inoperable, provided that no other control rod around this rod has an inoperable accumulator. A non-conservative interpretation could allow two inoperable control rod accumulators to be closer than allowed by the Banked Position Withdrawal Sequence (BPWS). Based on discussions with General Electric (GE), the purpose of a TS requirement for accumulator operability is based on initial condition assumptions made in the BPWS analysis documented in General Electric report NEDO-21231.

The TS as written (*nine-rod square array*) does not state where in an array the inoperable accumulator is located. With more than one accumulator inoperable, if the operator misinterpreted the intent of the nine-rod square array requirement, a condition not meeting the BPWS requirements could be considered to meet the current Monticello TS. Rewording the phrase to: *"provided that no other control rod within two control rod cells in any direction has a:"* clearly defines an area where a second inoperable accumulator would not be allowed. This bounds the current TS, and is equivalent to the BPWS wording. It provides greater assurance of meeting the BPWS requirements when more than one control rod accumulator is inoperable.

Change 3 – Control Rod Accumulator Hydraulic Isolation (pages 82, and 91)

Background

Currently, Monticello TS Section 3.3.D.1 allows an inoperable accumulator to only be electrically disarmed once the control rod is fully inserted. In the STS Bases for Section 3.1.3, Action C.1 and C.2, disarmed is defined as being either electrically or hydraulically isolated.

Also, in Amendment 86, dated July 12, 1993, the NRC approved changes which revised the surveillance requirements associated with TS Section 3.3.A.2, Reactivity Margin – Stuck Control Rods." Part of this change deleted weekly control rod exercise testing. A related Bases sentence should have been deleted with Amendment 86.

Description of Proposed Changes and Reasons for Changes

The proposed change to TS Section 3.3.D.1 would add an option to allow hydraulic isolation of control rod drives in addition to electrical isolation similar to STS. This will provide a second method of isolating a control rod drive with an inoperable accumulator and provides equivalent assurance the drive cannot be inadvertently withdrawn. The revised paragraph is moved to just before Section 3.3.D.1 so that it also applies during refueling (Section 3.3.D.2).

Delete sentence in Bases Section 3.3.C that discusses weekly exercise testing of control rod drives. This should have been deleted along with the associated surveillance requirement in Amendment 86.

Safety Evaluation

A second allowable method of isolation is being added to ensure a control rod with an inoperable accumulator cannot be withdrawn. The last paragraph of Specification 3.3.D.1 currently states:

> *If a control rod with an inoperable accumulator is inserted "full-in" and its directional control valves are electrically disarmed, it shall not be considered to have an inoperable accumulator.*

The proposed change adds the option to hydraulically isolate the drive to prevent inadvertent withdrawal and not consider the accumulator inoperable. Hydraulic isolation provides an additional method of isolating the drive that is equivalent to electrical isolation. Both methods disarm the control rod drive and preclude the possibility of inadvertent rod withdrawal during subsequent operations.

Inadvertent withdrawal with the drive hydraulically isolated is not a credible scenario. For a drive to withdraw it must first complete an insert segment for the drive to unlatch, and then complete the withdraw segment. The duration of the insert signal is controlled by reactor manual control system (RMCS) logic, and must be adequate to unlatch the drive while normal hydraulic pressure is available. Even if the isolation valves leak when the drive is hydraulically isolated, there will not be sufficient pressure to unlatch the drive. Therefore withdrawal while hydraulically isolated is impossible.

Cooling water normally provided to the drives extends control rod drive lifetime, but is not required for drive operability. Lack of cooling water, which could be caused by hydraulic isolation, causes no operability concerns. Typical hydraulic isolation will not, however, isolate drive cooling. General Electric (GE) Hydraulic Control Unit Operations and Maintenance Instructions GEI-92807B recognizes both methods as techniques to isolate fully inserted drives.

Relocating the isolation requirements to before Section 3.3.D.1 clarifies that it applies in Refuel as well as in Startup and Run modes. With the control rod fully inserted, the function of the accumulator is not required and there is no reduction in plant safety if the accumulator is isolated. Therefore, allowing this exception during refueling does not effect plant safety.

Change 4 - Monitoring Prior to Core Alterations (pages 207 and 209)

Background

TS Section 3.10.B.2 lists operability requirements and allows exception with no more than two fuel assemblies present in the core quadrant associated with the SRM. Section 4.10.B is not consistent with Section 3.10.B.2 as it does not include this same exception.

Description of Proposed Changes and Reasons for Changes

In Section 4.10.B, add the qualifier that source range monitors (SRMs) only need to be functionally tested when there are more than two fuel assemblies present in any reactor quadrant. An explanation is being added to the associated Bases. The comparable section in STS (Ref. 1), SR 3.3.1.2.4, does not require the surveillance to be met with less than or equal to four fuel assemblies present in any reactor quadrant. Therefore, this proposed change is conservative with respect to STS, and is consistent with current Monticello TS Section 3.10.B.2.a.

Safety Evaluation

A function of SRMs during core alterations is to monitor for unexpected criticality. However, as discussed in Exhibit D attached, with two or fewer fuel bundles in each core quadrant (and adjacent to an SRM), criticality is not considered possible. Therefore, with two or less fuel bundles per quadrant, response checks are unnecessary. The proposed change will also result in reduced exposures from source handling and reduced potential for contamination.

As stated in Section 3.10.B.2, no minimum count rate is required with less than two bundles per quadrant. Under the conditions of two bundles or less in each quadrant, SRMs are not required to be operable; therefore, response checks should also not be required. This proposed change would simply reduce surveillance testing to that time when the instrument is required to be operable and make Section 4.10.B consistent with Section 3.10.B.2.a.

No Significant Hazards Consideration

Nuclear Management Company (NMC) proposes to revise the Monticello Nuclear Generating Plant (MNGP) Technical Specifications (TS), Appendix A to the Operating License. This change will delete a redundant requirement for valving out a control rod drive, revise control rod accumulator operability requirements, and add the option to hydraulically isolate control rod drives. It will also correct an inconsistency in core monitoring describing when source range monitors are required to be operable.

The proposed amendment has been evaluated to determine whether it constitutes a significant hazards consideration as required by 10 CFR Part 50, Section 50.91, using standards provided in Section 50.92. This analysis is provided below:

1. *The proposed amendment will not involve a significant increase in the probability or consequences of an accident previously evaluated.*

Deleting the paragraph which specifies one specific pattern of control rod inoperability does not degrade the safe operation of the plant as inoperable control rods must still be analyzed to meet shutdown requirements.

Revising the operability requirements for control rod accumulators from "*a nine-rod square array*" to: "*provided that no other control rod within two control rod cells in any direction has a:*" is a clarification. No technical requirements are changed, therefore, the probability or consequences of previous evaluations of accidents have not been affected. This change will assure conformance with the Banked Position Withdrawal Sequence (BPWS) analysis documented in General Electric (GE) report NEDO-21231. No changes in plant equipment will occur.

The proposed change adds the option to hydraulically isolate the drive to prevent inadvertent drive withdrawal and not consider the accumulator inoperable. This provides a method of isolating a control rod drive with an inoperable accumulator in addition to electrical isolation when the control rod is fully inserted. A statement on when an inoperable accumulator is allowed is being relocated so that it also applies during refueling. Since in refueling, the plant is already shutdown, the accumulators are not required. As such, this change does not increase the probability or consequences of an accident previously evaluated.

A qualifier is being added that source range monitors (SRMs) only need to be functionally tested when there are more than two fuel assemblies present in any reactor quadrant. Criticality is not considered possible with two or less fuel bundles in each quadrant and adjacent to an SRM. Since this change will only allow bypassing SRM functional checks when two fuel bundles or less are present in each quadrant, this change cannot result in an inadvertent criticality. This proposed change would reduce surveillance testing to that time when the instrument is required to be operable and provide consistency between specifications.

The proposed Technical Specification changes do not introduce new equipment or new equipment operating modes, nor do the proposed changes alter existing system relationships. The proposed amendment does not introduce new failure modes. Based on the above justification, the proposed amendment will have no impact on the probability or consequences of an accident.

2. *The proposed amendment will not create the possibility of a new or different kind of accident from any accident previously analyzed.*

This change does not degrade the safe operation of the plant as inoperable control rods must still be analyzed to meet existing shutdown reactivity requirements. It will assure conformance with the Banked Position Withdrawal Sequence analysis documented in General Electric report NEDO-21231. No changes in plant equipment will occur.

Adding hydraulic isolation will not create the possibility of a new or different kind of accident from any accident previously analyzed.

Since this change will only allow bypassing SRM functional checks with two fuel bundles or less present in each quadrant, this change cannot result in an inadvertent criticality.

The proposed Technical Specification changes do not introduce new equipment or new equipment operating modes, nor do the proposed changes alter existing system relationships. The proposed amendment does not introduce new failure modes. Based on the above justification, the proposed amendment will not create the possibility of a new or different kind of accident from any accident previously analyzed.

3. *The proposed amendment will not involve a significant reduction in the margin of safety.*

Revising the control rod operability requirement does not degrade the safe operation of the plant.

Hydraulic isolation provides a method of isolating the drive in addition to the current electrical isolation. Both methods disarm the control rod drive and preclude the possibility of inadvertent drive withdrawal during subsequent operations. Adding applicability during refueling has little impact on safety as the drive is required to be fully inserted prior to isolation. As such, they do not involve a significant reduction in the margin of safety.

Since this change will only allow bypassing SRM functional checks with two fuel bundles or less present in each quadrant, this change cannot result in an inadvertent criticality.

Based on the above justification, the proposed Technical Specification change does not involve a significant reduction in the margin of safety.

Environmental Assessment

Nuclear Management Company has evaluated the proposed change and determined that:

1. The change does not involve a significant hazards consideration.

2. The change does not involve a significant change in the type or significant increase in the amounts of any effluent that may be released offsite.

3. The change does not involve a significant increase in individual or cumulative occupational radiation exposure.

Accordingly, the proposed change meets the eligibility criterion for categorical exclusion set forth in 10 CFR Part 51, Section 51.22(c)(9). Therefore, pursuant to 10 CFR Part 51, Section 51.22(b), an environmental assessment of the proposed change is not required.

References

1) NUREG-1433, Standard Technical Specifications, General Electric Plants, BWR/4, Rev. 1, 04/07/95

2) General Electric Procedure 246-GP-54 Rev 9, "Customer Site Handling and Inspection of GE New Fuel Bundles, Channels, and Channel Fasteners"

Current Monticello Technical Specification Pages Marked Up
With Proposed Change

This exhibit consists of current Technical Specification pages marked up with the proposed change. The pages included in this exhibit are as listed below:

<u>Pages</u>

82
91
207
209

3.0 LIMITING CONDITIONS FOR OPERATION

~~Any four rod group may contain a control rod which is valved out of service provided the above requirements and Specification 3.3.A are met.~~

D. Control Rod Accumulators

Control rod accumulators shall be operable in the Startup, Run, or Refuel modes except as provided below.

1. In the Startup or Run Mode, a rod accumulator may be inoperable provided that no other control rod ~~in the nine-rod square array around this rod has a:~~

within two control rod cells in any direction has a:

   (a) Inoperable accumulator, or

   (b) Directional control valve electrically disarmed while in a non-fully inserted position.

If a control rod with an inoperable accumulator is inserted "full-in" and its directional control valves are electrically disarmed, it shall not be considered to have an inoperable accumulator.

either

or it is hydraulically isolated,

4.0 SURVEILLANCE REQUIREMENTS

Change 1

D. Control Rod Accumulators

Once per 12 hours check the status in the control room of the required Operable accumulator pressure and level alarms.

Change 2

Change 3

Change 3

Bases 3.3/4.3 (Continued):

The scram times for all control rods will be determined during each operating cycle. The weekly control rod exercise tests serves as a periodic check against deterioration of the control rod system and also verifies the ability of the control rod drive to scram since if a rod can be moved with drive pressure, it will scram because of higher pressure applied during scram. ~~Allowing for monthly exercising of one rod in any two by two array is consistent with the bases for local and overall core reactivity insertion rates assumed in the transient analyses discussed above~~. The frequency of exercising the control rods under the conditions of two or more control rods out of service provides even further assurance of the reliability of the remaining control rods.

The occurrence of scram times within the limits, but significantly longer than the average, should be viewed as an indication of a systematic problem with control rod drives especially if the number of drives exhibiting such scram times exceeds six, the allowable number of inoperable rods.

D. Control Rod Accumulators

~~The basis for this specification was not described in the FSAR and, therefore, is presented in its entirety. Requiring no more than one inoperable accumulator in any nine rod square array is based on a series of XY PDQ-4 quarter core calculations of a cold, clean core. The worst case in a nine rod withdrawal sequence resulted in a k_{eff} <1.0 — other repeating rod sequences with more rods withdrawn resulted in k_{eff} >1.0.~~ At reactor pressures in excess of 800 psig, even those control rods with inoperable accumulators will be able to meet required scram insertion times due to the action of reactor pressure. In addition, they may be normally inserted using the control-rod-drive hydraulic system. ~~Procedural control will assure that control rods with inoperable accumulators will be spaced in one-in-nine array rather than grouped together.~~

E. Reactivity Anomalies

During each fuel cycle excess operating reactivity varies as fuel depletes and as any burnable poison in supplementary control is burned. The magnitude of this excess reactivity is indicated by the integrated worth of control rods inserted into the core, referred to as the control rod inventory in the core. As fuel burnup progresses, anomalous behavior in the excess reactivity may be detected by comparison of actual rod inventory at any base equilibrium core state to predicted rod inventory at that state. Rod inventory predications can be normalized to actual initial steady state rod patterns to minimize calculational uncertainties. Experience with other operating BWR's indicates that the control rod inventory should be predictable to the equivalent of one per cent in reactivity.

Requiring no more than one inoperable accumulator within two control rod cells in any direction is in accordance with the banked position withdrawal sequence (BPWS) analysis. An equivalent way to view this arrangement is that only one rod may be inoperable within a 5x5 square control rod cell array centered on the rod with the inoperable accumulator. This spacing requirement reduces the consequences of a rod drop event while the reactor is at low power (<10%).

3.0 LIMITING CONDITIONS FOR OPERATION	4.0 SURVEILLANCE REQUIREMENTS

3.0 LIMITING CONDITIONS FOR OPERATION

B. Core Monitoring

During core alterations two SRM's shall be operable, one in and one adjacent to any core quadrant where fuel or control rods are being moved. For an SRM to be considered operable, the following conditions shall be satisfied:

1. The SRM shall be inserted to the normal operating level. (Use of special moveable, dunking type detectors during initial fuel loading and major core alterations is permissible as long as the detector is connected into the normal SRM circuit.)

2. The SRM shall have a minimum of 3 CPS with all rods fully inserted in the core except when both of the following conditions are fulfilled:

   a. No more than two fuel assemblies are present in the core quadrant associated with the SRM,

   b. While in core, these fuel assemblies are in locations adjacent to the SRM.

C. Fuel Storage Pool Water Level

Whenever irradiated fuel is stored in the fuel storage pool, the pool water level shall be maintained at a level of greater or equal to 33 feet.

D. The reactor shall be shutdown for a minimum of 24 hours prior to movement of fuel within the reactor.

4.0 SURVEILLANCE REQUIREMENTS

B. Core Monitoring

Prior to making any alterations to the core, the SRM's shall be functionally tested and checked for neutron response. Thereafter, the SRM's will be checked daily for response.

while more than two fuel assemblies are present in any reactor quadrant

C. Fuel Storage Pool Water Level

Whenever irradiated fuel is stored in the fuel storage pool the pool level shall be recorded daily.

Change 4

Bases 3.10/4.10:

A. Refueling Interlocks

During refueling operations, the reactivity potential of the core is being altered. It is necessary to require certain interlocks and restrict certain refueling procedures such that there is assurance that inadvertent criticality does not occur.

To minimize the possibility of loading fuel into a cell containing no control rod, it is required that all control rods are fully inserted when fuel is being loaded into the reactor core. This requirement assures that during refueling the refueling interlocks, as designed, will prevent inadvertent criticality. The core reactivity limitation of Specification 3.3 limits the core alterations to assure that the resulting core loading can be controlled with the reactivity control system and interlocks at any time during shutdown or the following operating cycle.

Addition of large amounts of reactivity to the core is prevented by operating procedures, which are in turn backed up by refueling interlocks on rod withdrawal and movement of the refueling platform. When the mode switch is in the "Refuel" position, interlocks prevent the refueling platform from being moved over the core if a control rod is withdrawn and fuel is on a hoist. Likewise, if the refueling platform is over the core with fuel on a hoist, control rod motion is blocked by the interlocks. With the mode switch in the refuel position only one control rod can be withdrawn.

For a new core the dropping of a fuel assembly into a vacant fuel location adjacent to a withdrawn control rod does not result in an excursion or a critical configuration, thus adequate margin is provided.

each

B. Core Monitoring

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. Requiring a minimum of 3 counts per second whenever criticality is possible provides assurance that neutron flux is being monitored. Criticality is considered to be impossible if there are no more than two assemblies in a quadrant and if these are in locations adjacent to the SRM. ~~In this case only~~, the SRM or dunking type detector count rate is permitted to be less than 3 counts per second.

and these detectors need not be demonstrated to be operable.

C. Fuel Storage Pool Water Level

To assure that there is adequate water to shield and cool the irradiated fuel assemblies stored in the pool, a minimum pool water level is established. The minimum water level of 33 feet is established because it would be a significant change from the normal level (37′9″) and well above a level to assure adequate cooling.

If it is not possible to achieve criticality, Revised Monticello Technical Specification Pages

This exhibit consists of revised Technical Specification pages that incorporate the proposed change. The pages included in this exhibit are as listed below:

<u>Pages</u>

82
91
207
209

D. Control Rod Accumulators

Control rod accumulators shall be operable in the Startup, Run, or Refuel modes except as provided below.

If a control rod with an inoperable accumulator is inserted "full-in" and either its directional control valves are electrically disarmed or it is hydraulically isolated, it shall not be considered to have an inoperable accumulator.

1. In the Startup or Run Mode, a rod accumulator may be inoperable provided that no other control rod within two control rod cells in any direction has a:

   (a) Inoperable accumulator, or

   (b) Directional control valve electrically disarmed while in a non-fully inserted position.

D. Control Rod Accumulators

Once per 12 hours check the status in the control room of the required Operable accumulator pressure and level alarms.

Bases 3.3/4.3 (Continued):

The scram times for all control rods will be determined during each operating cycle. The weekly control rod exercise tests serves as a periodic check against deterioration of the control rod system and also verifies the ability of the control rod drive to scram since if a rod can be moved with drive pressure, it will scram because of higher pressure applied during scram. The frequency of exercising the control rods under the conditions of two or more control rods out of service provides even further assurance of the reliability of the remaining control rods.

The occurrence of scram times within the limits, but significantly longer than the average, should be viewed as an indication of a systematic problem with control rod drives especially if the number of drives exhibiting such scram times exceeds six, the allowable number of inoperable rods.

D. Control Rod Accumulators

Requiring no more than one inoperable accumulator within two control rod cells in any direction is in accordance with the banked position withdrawal sequence (BPWS) analysis. An equivalent way to view this arrangement is that only one rod may be inoperable within a 5 x 5 square control rod cell array centered on the rod with the inoperable accumulator. This spacing requirement reduces the consequences of a rod drop event while the reactor is at low power (< 10%). At reactor pressures in excess of 800 psig, even those control rods with inoperable accumulators will be able to meet required scram insertion times due to the action of reactor pressure. In addition, they may be normally inserted using the control-rod-drive hydraulic system.

E. Reactivity Anomalies

During each fuel cycle excess operating reactivity varies as fuel depletes and as any burnable poison in supplementary control is burned. The magnitude of this excess reactivity is indicated by the integrated worth of control rods inserted into the core, referred to as the control rod inventory in the core. As fuel burnup progresses, anomalous behavior in the excess reactivity may be detected by comparison of actual rod inventory at any base equilibrium core state to predicted rod inventory at that state. Rod inventory predications can be normalized to actual initial steady state rod patterns to minimize calculational uncertainties. Experience with other operating BWR's indicates that the control rod inventory should be predictable to the equivalent of one per cent in reactivity.

3.0 LIMITING CONDITIONS FOR OPERATION	4.0 SURVEILLANCE REQUIREMENTS

3.0 LIMITING CONDITIONS FOR OPERATION

B. Core Monitoring

During core alterations two SRM's shall be operable, one in and one adjacent to any core quadrant where fuel or control rods are being moved. For an SRM to be considered operable, the following conditions shall be satisfied:

1. The SRM shall be inserted to the normal operating level. (Use of special moveable, dunking type detectors during initial fuel loading and major core alterations is permissible as long as the detector is connected into the normal SRM circuit.)

2. The SRM shall have a minimum of 3 CPS with all rods fully inserted in the core except when both of the following conditions are fulfilled:

    a. No more than two fuel assemblies are present in the core quadrant associated with the SRM,

    b. While in core, these fuel assemblies are in locations adjacent to the SRM.

C. Fuel Storage Pool Water Level

Whenever irradiated fuel is stored in the fuel storage pool, the pool water level shall be maintained at a level of greater or equal to 33 feet.

D. The reactor shall be shutdown for a minimum of 24 hours prior to movement of fuel within the reactor.

4.0 SURVEILLANCE REQUIREMENTS

B. Core Monitoring

Prior to making any alterations to the core while more than two fuel assemblies are present in any reactor quadrant, the SRM's shall be functionally tested and checked for neutron response. Thereafter, the SRM's will be checked daily for response.

C. Fuel Storage Pool Water Level

Whenever irradiated fuel is stored in the fuel storage pool the pool level shall be recorded daily.

Bases 3.10/4.10:

A. Refueling Interlocks

During refueling operations, the reactivity potential of the core is being altered. It is necessary to require certain interlocks and restrict certain refueling procedures such that there is assurance that inadvertent criticality does not occur.

To minimize the possibility of loading fuel into a cell containing no control rod, it is required that all control rods are fully inserted when fuel is being loaded into the reactor core. This requirement assures that during refueling the refueling interlocks, as designed, will prevent inadvertent criticality. The core reactivity limitation of Specification 3.3 limits the core alterations to assure that the resulting core loading can be controlled with the reactivity control system and interlocks at any time during shutdown or the following operating cycle.

Addition of large amounts of reactivity to the core is prevented by operating procedures, which are in turn backed up by refueling interlocks on rod withdrawal and movement of the refueling platform. When the mode switch is in the "Refuel" position, interlocks prevent the refueling platform from being moved over the core if a control rod is withdrawn and fuel is on a hoist. Likewise, if the refueling platform is over the core with fuel on a hoist, control rod motion is blocked by the interlocks. With the mode switch in the refuel position only one control rod can be withdrawn.

For a new core the dropping of a fuel assembly into a vacant fuel location adjacent to a withdrawn control rod does not result in an excursion or a critical configuration, thus adequate margin is provided.

B. Core Monitoring

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. Requiring a minimum of 3 counts per second whenever criticality is possible provides assurance that neutron flux is being monitored. Criticality is considered to be impossible if there are no more than two assemblies in each quadrant and if these are in locations adjacent to the SRM. If it is not possible to achieve criticality, the SRM or dunking type detector count rate is permitted to be less than 3 counts per second and these detectors need not be demonstrated to be operable.

C. Fuel Storage Pool Water Level

To assure that there is adequate water to shield and cool the irradiated fuel assemblies stored in the pool, a minimum pool water level is established. The minimum water level of 33 feet is established because it would be a significant change from the normal level (37′9″) and well above a level to assure adequate cooling.

Letter from General Electric to NSP,
"Monticello Technical Specification Change to Unload the Core"
September 30, 1982

EXHIBIT C

GENERAL ELECTRIC

INSTALLATION AND SERVICE ENGINEERING DIVISION

GENERAL ELECTRIC COMPANY, 5353 GAMBLE DRIVE, MINNEAPOLIS, MN. 55416
Phone (612) 542-0200

WRITER'S DIRECT DIAL NUMBER

G-EK-2-165
September 30, 1982

Mr. D.M. Musolf
Manager - Nuclear Support Services
Northern States Power Company
414 Nicollet Mall
Minneapolis, MN 55401

SUBJECT: MONTICELLO TECHNICAL SPECIFICATION CHANGE TO UNLOAD THE CORE

Dear Mr. Musolf:

In response to a telephone request from Tom Parker of your office, General Electric has prepared the following comments to assist your efforts to modify the Technical Specifications of the Monticello Nuclear Generating Plant to enable the unloading of its core.

These Technical Specification changes would modify the requirement that the Source Range Monitors (SRMs) used to monitor the core must maintain a count rate of 3 counts per second (cps) during core alterations as follows.

The count rate may drop below 3 cps when both of the following conditions are met:

1. No more than two fuel assemblies are present in the core quadrant associated with the SRM; and

2. While in the core, these fuel assemblies are in locations adjacent to the SRM.

The requirement that the SRMs maintain a minimum of 3 cps whenever criticality is possible provides assurance that the neutron flux is being monitored. Criticality is considered to be impossible if there are no more than two assemblies in a quadrant and if these assemblies are adjacent to the SRM. In this case only, the SRM or dunking type detector count rate is permitted to be less than 3 cps.

GE hopes the above input meets your needs. We will provide a separate letter proposal to formalize your request for the above support.

If you have any additional questions on this matter, please feel free to call our office.

Very truly yours,

DC Pullen

for G.H. Scott
Service Supervisor - Nuclear

GHS:DAP:jww