3.3 (cont'd)

4. Control rods shall not be withdrawn for startup or during refueling unless at least two source range channels have an observed count rate equal to or greater than three counts per second except as permitted by Specification 3.10.B.3 and 3.10.B.4.

5. During operation with limiting control rod patterns, as determined by the designated qualified personnel, either:

   a. Both RBM channels shall be operable, or

   b. Control rod withdrawal shall be blocked, or

   c. The operating power level shall be limited so the MCPR will remain above the Safety Limit assuming a single error that results in complete withdrawal of any single operable control rod.

4. Prior to control rod withdrawal for startup or during refueling, verify that at least two source range channels have an observed count rate of at least three counts per second except as permitted by Specification 3.10.B.3 and 3.10.B.4.

5. When a limiting control rod pattern exists, an instrument functional test of the RBM shall be performed prior to withdrawal of the designated rod(s).

Amendment No. ~~14~~, ~~21~~, ~~36~~, ~~45~~

3.10 LIMITING CONDITIONS FOR OPERATION

3.10 CORE ALTERATIONS

Applicability:

Applies to fuel handling and core reactivity limitations.

Objective:

To assure that core reactivity is within the capability of the control rods and to prevent criticality during refueling.

Specification:

A. Refueling Interlocks

1. The Reactor Mode Switch shall be locked in the Refuel position during core alterations and the refueling interlocks shall be operable except as permitted by Specifications 3.10.A.5, 3.10.A.6, 3.10.A.7 and 3.10.D.

2. Fuel shall not be loaded into the reactor core unless all control rods are fully inserted except as permitted by Specification 3.10.A.7.

4.10 SURVEILLANCE REQUIREMENTS

4.10 CORE ALTERATIONS

Applicability:

Applies to the periodic testing of those interlocks and instruments used during refueling and core alterations.

Objective:

To verify the operability of instrumentation and interlocks used in refueling and core alterations.

Specification:

A. Refueling Interlocks

1. Prior to any fuel handling, with the head off the reactor vessel, the refueling interlocks shall be functionally tested. They shall also be tested at weekly intervals thereafter until no longer required and following any repair work associated with the interlocks.

2. Whenever the reactor mode switch is in the Refuel position and refueling interlocks are bypassed, one licensed operator and a member of the reactor analyst department shall verify that the control cell contains no fuel before the corresponding control rod is withdrawn.

3.10 (cont'd)

3. The fuel grapple hoist load switch shall be set at less than or equal to 650 lbs.

4. If the frame-mounted auxiliary hoist, the monorail-mounted auxiliary hoist, or the service platform hoist is to be used for handling fuel with the head off the reactor vessel, the hoist load switch on the hoist to be used shall be set at less than or equal to 400 lbs.

5. Any number of control rods may be withdrawn or removed from the reactor core provided:

   a. The reactor mode switch is locked in the "Refuel" position; and

   b. The fuel assemblies situated in the control cell of the control rod to be withdrawn have been removed; and

   c. Refueling interlocks associated with all control cells containing fuel are operable. Refueling interlocks associated with a specific control rod may be bypassed after the fuel assemblies in the control cell have been removed; and

   d. Fuel on-loading operations shall be suspended until Specification 3.10.A.2 is satisfied.

3.10 (cont'd)

6. A spiral off-load may be conducted provided:

   a. Refueling interlocks are operable for any control cell which contains fuel; and

   b. Refueling interlocks are bypassed only for those control cells which contain no fuel; and

   c. Fuel is removed from a control cell before its control rod is withdrawn.

7. A spiral onload may be conducted provided:

   a. Refueling interlocks may be bypassed only for those control cells which contain no fuel; and

   b. The spiral onload may commence at either the core center around a "dunking type detector" or, around one of the source range monitors. (Placement of the "dunking type detector" in the core center does not violate the intent of the spiral onloading pattern. Fuel may be loaded into this bundle location when the dunking detector has been removed.); and

   c. Before loading fuel into an empty control cell, its control rod is fully inserted, and the refueling interlocks for that control rod are operable; and

   d. Refueling interlocks are operable for any control cell which contains fuel.

3.10 (cont'd)

B. Core Monitoring

During core alterations two SRM's shall be operable, one in the core quadrant where fuel or control rods are being moved and one in an adjacent quadrant. 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 movable, dunking type detectors during initial fuel loading and major core alterations in place of normal detectors is permissable as long as the detector is connected into normal SRM circuit).

2. The SRM shall have a minimum of 3 counts/sec with all rods fully inserted in the core except as noted in 3 and 4 below.

3. Prior to spiral unloading, the SRM's shall have an initial count rate of 3 CPS. During spiral unloading, the count rate of the SRM's may drop below 3 CPS.

4.10 (cont'd)

B. Core Monitoring

Prior to making alterations to the core the SRM's shall be functionally tested and checked for neutron response. Fuel may be on-loaded as described in Specification 3.10.B.4 prior to this functional test. Thereafter, the SRM's will be checked daily for response, except as specified in Specification 3.10.B.3 and 4.

3.10 (cont'd)

4. During Spiral reload, SRM operability will be verified by using a portable external source every 12 hours until enough fuel is loaded to maintain 3 CPS. Alternatively, a maximum of four fuel assemblies will be loaded in different cells containing control blades around each SRM to obtain the required 3 CPS. Until these assemblies have been loaded in a given quadrant, it is not necessary for the SRM in that quadrant to indicate the minimum count rate of 3 CPS. The loading of fuel near the SRM's does not violate the intent of the spiral reloading pattern.

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3.10 (cont'd)

C. Spent Fuel Storage Pool Water Level

Whenever irradiated fuel is stored in the spent fuel storage pool, the pool water level shall be maintained at a minimum level of 33 ft.

D. Control Rod and Control Rod Drive Maintenance

1. Two control rods may be withdrawn from the reactor core to perform maintenance provided:

   a. The Reactor Mode Switch is locked in the Refuel position and all refueling interlocks are operable except for those necessary to perform the demonstration and maintenance described in Specification 4.10.D.1.

   b. Control rods immediately face and diagonally adjacent to the control rods to be withdrawn are fully inserted, electrically disarmed and sufficient margin to criticality demonstrated.

   c. Control rods to be withdrawn are separated by three or more cells in any direction. (This specification does not apply to the control rods used to perform the demonstration required by Specification 3.10.D.1.b.)

4.10 (cont'd)

C. Spent Fuel Storage Pool Water Level

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

D. Control Rod and Control Rod Drive Maintenance

1. When two control rods are withdrawn from the reactor core for maintenance, the following surveillance shall be performed:

   a. If the reactor vessel head is removed, specification 4.10.A.1 shall be satisfied.

   b. Demonstrate that the reactor core can be maintained subcritical with a margin of 0.38 percent Δk at any time during the maintenance with the analytically determined strongest worth operable control rod fully withdrawn. This margin shall be demonstrated after Specification 3.10.D.1 has been satisfied.

3.10 (cont'd)

2. More than two control rods may be withdrawn from the reactor core to perform maintenance provided:

   a. Specification 3.10.A.5 is satisfied.

4.10 (cont'd)

2. When more than two control rods are withdrawn from the reactor core for maintenance, the following surveillance shall be performed:

   a. Specifications 4.10.A.1 and 4.10.A.2 shall be satisfied.

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3.10 BASES (cont'd)

Switch is in the Refuel position only one control rod can be withdrawn except as noted in Specifications 3.10.A and 3.10.D. The refueling interlocks, in combination with core nuclear design and refueling procedures limit the probability of an inadvertent criticality. The nuclear characteristics of the core assure that the reactor is subcritical even when the highest worth control rod is fully withdrawn. The combination of refueling interlocks for control rods and the refueling platform provide redundant methods of preventing inadvertent criticality even after procedural violations. The interlocks on hoists provide yet another method of avoiding inadvertent criticality.

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

A spiral off-loading pattern is one in which the fuel in the outer-most cells (four fuel bundles surrounding a control blade) is removed first. Off-loading continues by removing the remaining outermost fuel by cell so that the center cell will be removed last. A spiral on-load may start at either the core center around a dunking chamber or around one of the SRMs. Spiral on-loading and off-loading precludes the formation of flux traps (moderator-filled cavities surrounded on all sides by fuel.) It is not necessary to accomplish a full core offload or onload in order to utilize the spiral movement procedure as long as the partial unloading/reloading plan complies with the description given above.

The Spiral off-loading procedure is a special case of the method described in Specification 3.10.A.5. The spiral loading procedure is justified by the same logic used in the Bases for Specification 3.10.D. There it is noted that any control cell which contains 4 fuel bundles and a fully inserted control blade is more reactive than the same control cell after the fuel bundles and control blade have been witndrawn. Thus, during spiral onloading or offloading, the shutdown margin of the partially loaded core cannot possibly be less than the shutdown margin of the complete core which is required to comply with Specification 3.3.

B. Core Monitoring

The SRM's are provided to monitor the core during periods of plant shutdown and to guide the operator during refueling operations and plant startup. Requiring two operable SRM's in or adjacent to a core quadrant where fuel or control rods are being moved assures adequate monitoring of that quadrant during such alterations. The requirement of 3 counts/sec provides assurance that neutron flux is being monitored and insures that startup is conducted only if the source range flux level is above the minimum assumed in the control rod drop accident.

Under the special condition of spiral core unloading, it is expected that the SRM count rate 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 the SRM's to be operable prior to fuel removal assures that the SRM's are operable and can be relied on even when the count rate drops below 3 CPS.

During spiral loading of the core, SRM operability will be verified by using a portable external source every 12 hours until enough fuel has been loaded to maintain at least 3 CPS. Alternatively, a maximum of four fuel assemblies will be loaded in different cells containing control blades around each SRM to obtain the required 3 CPS. Until these assemblies have been loaded, the adjacent SRM is not required to indicate the minimum count rate of 3 CPS.

C. Spent 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 ft. is established because it would be a significant change from the normal level (37 ft.-9 in.), well above a level to assure adequate cooling (just above active fuel).

D. Control Rod and Control Rod Drive Maintenance

During certain periods, it is desirable to perform maintenance on two control rods and/or control rod drives at the same time. Specification 3.10.D.1 provides assurances that inadvertent criticality does not occur during such maintenance.

The maintenance is performed with the Mode Switch in the Refuel position to provide the refueling interlocks normally available during refueling operations as explained in Part A of these Bases. In order to withdraw a second control rod after withdrawal of the first rod, it is necessary to bypass the refueling interlock on the first control rod, which prevents more than one control rod from being withdrawn at the same time. The requirement that an adequate shutdown margin be demonstrated with the control rods remaining in-service insures that inadvertent criticality cannot occur during this maintenance. The shutdown margin is verified by demonstrating that the core is shut down even if the strongest control rod remaining in-service is fully withdrawn. Disarming the directional control valves does not inhibit control rod scram capability. Disarming a fully inserted control rod renders it incapable of being withdrawn and, therefore, excludes it from selection as the highest worth control rod for the purposes of the demonstration described in Specification 4.10.D.1.b.

The requirement for SRM operability during the maintenance is covered in Part B above.

The intent of Specification 3.10.D.2 is to permit the unloading of a significant portion of the reactor core for such purposes as in-service inspection requirements, examination of the core support plate, etc.

This Specification provides assurance that inadvertent criticality does not occur during such operation.

This operation is performed with the Mode Switch in the Refuel position to provide the refueling interlocks normally available during refueling as explained in Part A above. In order to withdraw more than one control rod, it is necessary to bypass the refueling interlock on each withdrawn control rod which prevents more than one control rod from being withdrawn at a time. The requirement that the fuel assemblies in the cell controlled by the control rod be removed from the reactor core before the interlock can be bypassed ensures that withdrawal of another control rod does not result in inadvertent criticality. Each control rod essentially provides reactivity control for the fuel assemblies in the cell associated with that control rod. Thus, removal of an entire cell (fuel assemblies plus control rod) results in a lower reactivity potential of the core.

The requirement for SRM operability during these operations is covered in Part B above.

Attachment II

NEW YORK POWER AUTHORITY
James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
DPR-59

Safety Evaluation for Technical Specification Changes Regarding Spiral Core Off-load/On-load Refueling
(JPTS-87-005)

I. DESCRIPTION OF THE PROPOSED CHANGES

This proposed amendment changes limiting conditions for operation (LCOs), surveillance requirements and one Bases section of the FitzPatrick Technical Specifications. Specifications are renumbered and relocated between pages to reflect new or deleted sections. Twelve pages in nine Sections are revised by these changes: 94, 227, 228, 229, 230, 230a, 231, 232, 233, 235, 235a and 236; pages 230b and 230c are deleted in their entirety. The following Specifications are changed:

Limiting Conditions for Operation

3.3.B - Reactivity Control, Control Rods
3.10.A - Core Alterations, Refueling Interlocks
3.10.B - Core Alterations, Monitoring
3.10.D - Core Alterations, Control Rod and Control Rod Drive Maintenance

Surveillance Requirements

4.3.B - Reactivity Control, Control Rods
4.10.A - Core Alterations, Refueling Interlocks
4.10.B - Core Alterations, Monitoring
4.10.D - Core Alterations, Control Rod and Control Rod Drive Maintenance

Bases

3.10.A - Refueling Interlocks

These technical specification changes will improve the level and extent of compliance with the NRC's requirements and guidance while improving the clarity of the specifications.

(Alphanumeric characters in square brackets, e.g. [and], are used to identify each change in this safety evaluation. These characters will be used when discussing the changes in Sections II, III and IV.)

Specification 3.3.B

[a] In Specification 3.3.B.4 (on page 94), the phrase "for startup or refueling" is changed to "for startup or during refueling." The phrase "except as permitted by Specification 3.10.B.3 and 3.10.B.4" is added at the end of the specification.

Specification 3.10.A

[b] In Specification 3.10.A.1, (on page 227), the phrase "except as specified in Specifications 3.10.A.2, 3.10.A.8, 3.10.D and 3.10.E" is changed to read "except as permitted by Specifications 3.10.A.5, 3.10.A.6, 3.10.A.7 and 3.10.D."

[c] In Specification 3.10.A.2, on page 227, the phrase "in accordance with" is changed to read "as permitted by."

[d] In Specification 3.10.A.3 (page 228), the mathematical symbol for less than or equal to is replaced with the words "less than or equal to."

[e] In Specification 3.10.A.4 (page 228), the phrase "load limit switch" is replaced with the phrase "hoist load switch." The mathematical symbol for less than or equal to is replaced with the words "less than or equal to."

[f] Specification 3.10.A.5 (including 3.10.A.5.a through 3.10.A.5.d) on pages 228 and 229 is deleted in its entirety.

[g] Specification 3.10.A.6 has been renumbered 3.10.A.5 (page 228) and the phrase "providing the following conditions are satisfied:" is replaced with the word "provided:" The last two sentences in the new Specification 3.10.A.5.a are deleted.

[h] Three new Specifications (3.10.A.5.b, 3.10.A.5.c and 3.10.A.5.d) are added on page 228. These new Specifications read as follows:

"b. The fuel assemblies situated in the control cell of the control rod to be withdrawn have been removed; and

c. Refueling interlocks associated with all control cells containing fuel are operable. Refueling interlocks associated with a specific control rod may be bypassed after the fuel assemblies in the control cell have been

removed; and

d. Fuel on-loading operations shall be suspended until Specification 3.10.A.2. is satisfied."

[i] A new Specification 3.10.A.6 (page 229) has been added. The existing Specification 3.10.A.6 is renumbered 3.10.A.5. This new specification reads as follows:

"6. A spiral off-load may be conducted provided:

a. Refueling interlocks are operable for any control cell which contains fuel; and

b. Refueling interlocks are bypassed only for those control cells which contain no fuel; and

c. Fuel is removed from a control cell before its control rod is withdrawn."

[j] Specification 3.10.A.7 (page 229) is replaced with a new specification. This new specification reads as follows:

"7. A spiral on-load may be conducted provided:

a. Refueling interlocks may be bypassed only for those control cells which contain no fuel; and

b. The spiral on-load may start at either the core center around a 'dunking type detector' or around one of the source range monitors. (Placement of the 'dunking type detector' in the core center does not violate the intent of the spiral on-loading pattern. Fuel may be loaded into this bundle location when the dunking detector has been removed.); and

c. Before loading fuel into an empty control cell, its control rod is fully inserted, and the refueling interlocks for that control rod are operable; and

d. Refueling interlocks are operable for any control cell which contains fuel."

[k] Specification 3.10.A.8 (on pages 230 and 230a) is deleted in its entirety.

Section 3.10.B

[l] Specification 3.10.B.4 (page 230a) has been moved to pages 230 and 230a. The second and third sentences of Specification 3.10.B.4 are revised to read: "Alternatively, a maximum of four fuel assemblies will be loaded in different cells containing control blades around each SRM to obtain the required 3 CPS. Until these assemblies have been loaded in a given quadrant, it is not necessary for the SRM in that quadrant to indicate the minimum count rate of 3 CPS." Pages 230b and 230c are intentionally blank.

Section 3.10.D

[m] A new Specification 3.10.D.1.c is added to Specification 3.10.D.1, "Control Rod and Control Rod Drive Maintenance," on page 231. Specification 3.10.D.1 is revised to read:

"1. Two control rods may be withdrawn from the reactor core to perform maintenance provided:

a. The Reactor Mode Switch is locked in the Refuel position and all refueling interlocks are operable except for those necessary to perform the demonstration and maintenance described in Specification 4.10.D.1; and

b. Control rods immediately face and diagonally adjacent to the control rods to be withdrawn are fully inserted, electrically disarmed and sufficient margin to criticality demonstrated; and

c. Control rods to be withdrawn are separated by three or more control cells in any direction. (This specification does not apply to the control rods used to perform the demonstration required by Specification 3.10.D.1.b.)"

[n] In Specification 3.10.D.2 (page 232), the phrase "from the reactor core" is replaced with "from the reactor core to perform maintenance."

[o] Specification 3.10.D.2.a (page 232) is replaced with a new specification. This new specification reads as follows:

"a. Specification 3.10.A.5 is satisfied."

Specification 4.3.B

[p] In Specification 4.3.B.4 (on page 94) the following phrase is added to the end of the specification: "except as permitted by Specification 3.10.B.3 and 3.10.B.4."

Specification 4.10.A

[q] Specification 4.10.A.2 on page 227 is revised to read:

"2. Whenever the reactor mode switch is in the Refuel position and refueling interlocks are bypassed, one licensed operator and a member of the reactor analyst department shall verify that the control cell contains no fuel before the corresponding control rod is withdrawn."

Specification 4.10.B

[r] In Specification 4.10.B ("Core Monitoring") on page 230b, a new sentence is added: This new sentence reads:

"Fuel may be on-loaded as described in Specification 3.10.B.4 prior to this functional test."

Specification 4.10.D

[s] Specification 4.10.D.1 (page 231) is revised to read as follows:

"1. When two control rods are withdrawn from the reactor core for maintenance, the following surveillance shall be performed:

a. If the reactor vessel head is removed, Specifications 4.10.A.1 shall be satisfied.

b. Demonstrate that the reactor core can be maintained subcritical with a margin of 0.38 percent Δk at any time during the maintenance with the analytically determined strongest worth control rod fully withdrawn. This margin shall be demonstrated after Specification 3.10.D.1 has been satisfied."

[t] Specifications 4.10.D.3 and 4.10.D.3.a (page 233) are deleted. Specification 4.10.D.2 (page 232) is replaced. This new specification read:

"2. When more than two control rods are withdrawn from the reactor core for maintenance, the following surveillance shall be performed:

a. Specifications 4.10.A.1 and 4.10.A.2 shall be satisfied."

Bases 3.10.A

[u] On page 235, a reference to Specification 3.10.E has been deleted.

[v] On page 235, the sentence "Spiral loading is the reverse of unloading." is replaced with the sentence "A spiral on-load may start at either the core center around a dunking chamber or around one of the SRMs."

[w] On page 235, the reference to Specification 3.10.A.6 is changed to Specification 3.10.A.5.

[x] In several places in Bases Section 3.10, the term "loading" is replaced with "on-loading"; "unloading" is replaced with "off-loading" (page 235).

[y] In Bases Section 4.10.B (page 235a), the last two sentences in the last paragraph are revised to read: "Alternatively a maximum of four fuel assemblies may be loaded in different cells containing control blades around each SRM to obtain the required 3 CPS. Until these assemblies have been loaded, the adjacent SRM is not required to indicate the minimum count rate of 3 CPS."

[z] One page 235a, the phrase "This Specification" is replaced with "Specification 3.10.D.1."

[aa] The following sentence is added (p. 235a) "Disarming a fully inserted control rod renders it incapable of being withdrawn and therefore excludes it from selection as the highest worth control rod for the purposes of the demonstration described in Specification 4.10.D.1.b."

[ab] On page 236, the phrase "this Specification" is replaced with "Specification 3.10.D.2."

II. PURPOSE OF THE PROPOSED CHANGES

The changes proposed in this amendment will eliminate inconsistencies in the Limiting Conditions for Operations and surveillance requirements regarding spiral core off-load/on-load refueling. Amendment 59 to the FitzPatrick Technical Specification (Reference 3) originally incorporated changes to permit spiral off-load/on-load refueling.

Inspection Report 50-333/86-23

Section 11 of NRC Inspection Report No. 86-23 (Reference 1) identified three inconsistencies in the FitzPatrick Technical Specification regarding spiral core refueling:

(i) "Amendment 59 revised Specification 3.10.B.3 to allow the count rate of the Source Range Monitors (SRMs) to drop to less than 3 CPS during spiral off-load. Specification 3.3.B.4 requires that at least two SRMs be equal to or greater than 3 CPS to withdrawal a control rod. The contradiction in the Technical Specifications resulted from a failure to change all the affected Technical Specification sections when the spiral refueling amendment was made."

(ii) "Another discrepancy noted involved Specification 3.10.A.6.a which permits bypassing the refueling interlock (the interlock prevents withdrawing more that one control rod) after the fuel assemblies for that cell have been removed. However, the Technical Specifications also states that all other refueling interlocks shall be operable meaning the interlocks associated with the refueling bridge operations. However, these interlocks must also be bypassed or the core could not be off-loaded."

(iii) "In addition, Specification 3.10.A.7 permits the bypassing of the refueling bridge operation interlocks during spiral loading except for cells which contain fuel. The use of the word "loading" does not clearly specify off-loading or on-loading but is interpreted to mean both."

Item (i) is addressed by change [b]. An exception is added to Specification 3.3.B.4 to consider the effects of spiral core on-loading/off-loading on minimum SRM readings.

Item (ii) is resolved by change [i] which completely revises Specification 3.10.A.6.

To address item (iii), the term "loading" has been replaced with "on-loading," "off-loading," or, "on-loading or off-loading," as appropriate. The terms "reload" and "unload" are also used.

Section 3.3.B

Change [a] adds an exception to Specification 3.3.B.4 to consider the effects of spiral on-loading/off-loading on minimum source range monitor (SRM) readings. This exception is incorporated by adding a reference to Specifications 3.10.B.3 and 3.10.B.4. Specifications 3.10.B.3 and 3.10.B.4 (page 230b) permit SRMs to indicate less than three CPS (counts per second),

during spiral off-loading or on-loading. The addition of this exception will resolve one of the items (i) identified in Inspection Report 50-333/86-23 (Reference 1).

The addition of the word "during" makes the wording of LCO 3.3.B.4 consistent with surveillance requirement 4.3.B.4 and clearly identifies refueling as having duration.

Section 3.10.A

Change [b] replaces inappropriate or incorrect references in 3.10.A.1. Specification 3.10.A.1 defines the conditions under which refueling interlocks must be operable. Specification 3.10.A.2 (which was referenced in 3.10.A.1) does not establish any exceptions to the LCOs in 3.10.A.1. Specification 3.10.A.2 prohibits fuel loading until all control rods are inserted unless a spiral loading pattern is used. Therefore, this reference to Specification 3.10.A.2 is inappropriate and has been deleted.

Change [b] deletes an outdated reference to Specification 3.10.A.8. Specification 3.10.A.8 was only applicable during Reload 6/Cycle 7. Specification 3.10.A.8 is deleted as change [k] of this proposed amendment.

Change [b] also eliminates a reference to a nonexistent Specification 3.10.E.

References to Specifications 3.10.A.5, 3.10.A.6, and 3.10.A.7 are added as part of change [b]. 3.10.A.5 descibes conditions for withdrawing any number of control rods; 3.10.A.6 describes conditions for spiral off-loads; and, 3.10.A.7 describes conditions for spiral on-loads.

The reference to Specification 3.10.D is correct and is retained.

Change [c] changes the terminology to clarify that the reference to Specification 3.10.A.7 constitutes an exception.

Change [d] replaces the mathematical symbol for less than or equal to with the equivalent phrase in Specification 3.10.A.3.

Change [e] clarifies Specification 3.10.A.4 by more accurately identifying the load-sensing instrument used on the three hoists used for fuel handling. The term "load limit switch" is most often used to describe a device that detects when a load exceeds the allowable limit of a crane or hoist. In other words, it represents the upper load-carrying limit of the equipment. This is not the purpose of the instrument mentioned in 3.10.A.4. This switch detects the presence of a load and is used to generate a hoist-loaded signal that is used by the refueling interlock circuitry. The 400 pound limitation

mentioned in 3.10.A.4 represents the maximum tension permissible on a hoist without generating a hoist-loaded signal and a refueling interlock. This term is consistent with Specification 3.10.A.4 which discusses the fuel grapple hoist load switch.

Change [e] also replaces the mathematical symbol for less than or equal to with the equivalent phrase. This will reduce the possibility of introducing typographical errors in future revisions of the technical specifications.

Change [f] deletes Specification 3.10.A.5 because it duplicates LCOs on control rod and control rod drive maintenance included in Specification 3.10.D.1. 3.10.A.5 identified six limiting conditions regarding control rod or control rod drive maintenance. Each of the following points are addressed by the proposed Specification 3.10.D.1:

- Maximum of two non-adjacent rods
- Mode switch in refuel
- Other interlocks operable
- Sufficient criticality margin (by other rods operable or by disarming rods and demonstration)
- Withdrawn rod separated by a minimum of two cells
- Sufficient SRMs operable

Specification 3.10.D.1 has been retained rather than 3.10.A.5 because 3.10.D.1 specifically addresses control rod and control rod drive maintenance whereas 3.10.A.5 discusses refueling interlocks.

Change [g] deletes two sentences from Specification 3.10.A.5. The first deleted sentence permitted refueling interlocks to be bypassed when all fuel had been removed from that cell. The second deleted sentence specified that "all other refueling interlocks shall be operable." Both of these limitations have been retained and more clearly stated in Specification 3.10.A.5.c.

Change [h] clarifies Specification 3.10.A.6 and 3.10.A.6.a by dividing these specifications into four discrete items. This Specification stipulates those conditions which must be satisfied before control rods can be withdrawn or removed from the reactor core. In summary, these are: mode switch in refuel; refueling interlocks may be bypassed for control rod for empty control cells; and, other refuel interlocks operable.

Specifications 3.10.A.5.a through 3.10.A.5.c restate these same requirements more clearly. Specification 3.10.A.5.a requires the mode switch to be in refuel; 3.10.A.5.b requires the fuel cell to be empty; 3.10.A.5.c permits interlocks to be bypassed for control rods with empty cells and other interlocks to be operable.

Change [h] also restates an existing restriction in Specification 3.10.A.5.d. 3.10.A.5.d requires that fuel on-loading be suspended unless the provisions of 3.10.A.2 can be met. This reinforces the concept of suspending fuel on-loading whenever all control rods are not fully inserted (except during spiral loading) as described in IE Information Notice No. 83-35 (Reference 10), and General Electric Service Information Letter 372 (Reference 11).

Change [i] revises LCOs related to refueling interlock operability during spiral on-loading and off-loading. The existing specification briefly describes the function of refueling interlocks, permits these interlocks to be bypassed for spiral on-loading or off-loading, and requires that other refueling interlocks be operable.

Change [i] adds Specifications 3.10.A.7 through 3.10.A.7.c. These specifications stipulate conditions which must be satisfied during a spiral core off-load. These Specifications more clearly state the same three limitations previously included in 3.10.A.7.

Change [j] adds Specifications 3.10.A.6 through 3.10.A.6.c. These specifications stipulate conditions which must be satisfied during a spiral core on-load. Specifications 3.10.A.7.a and 3.10.A.7.c more clearly state the limitations previously included in 3.10.A.7 as they apply to an on-load.

3.10.A.7.b includes a limiting condition not explicitly stated in the existing 3.10.A.7. Specification 3.10.A.7.b permits spiral on-loading to start at either the center of the core or around a source range monitor. This specification also explicitly states that when a dunking type detector is used, installing the dunking detector at the core center (and subsequently replacing the chamber with fuel) does not violate the intent of the spiral on-loading pattern.

The addition of Specification 3.10.A.7.b, while not specifically addressed in the safety evaluation included with Amendment 59 (Reference 3), is consistent with the intent of that amendment. A dunking chamber is, in essence, a "portable" SRM. Spiral fuel on-loading around a permanently installed SRM is not significantly different from on-loading around a dunking chamber. The primary difference arises when cells at the core periphery have been loaded with fuel. From this point on, the spiral pattern grows asymmeterically.

Similar technical specifications have been approved by the NRC for other boiling water reactor licensees (Reference 24 and 25).

Change [k] deletes the previous Specification 3.10.A.8 because it was only effective during Reload 6/Cycle 7. (Refer

to note at bottom of page 230a, Amendment 87). Amendment 87 (Reference 9) added this Specification to permit refueling with the Reactor Protection System and certain refueling interlocks and control rod blocks inoperable to facilitate the installation of analog transmitter trip components.

Section 3.10.B

Change [l] revises Specification 3.10.B.4 to permit up to four assemblies to be loaded around each SRM for use as a neutron source to verify SRM operability. Previously, the Specifications permitted only two assemblies to be used for this purpose.

There is no significant increase in the possibility of an inadvertent criticality due to this change. Four adjacent fuel assemblies are well subcritical even with no control rods inserted (about sixteen clustered and uncontrolled assemblies are required for criticality) and the groups are too far apart to interact. Subcriticality is further assured because Specifications require that control rods be inserted before fuel is on-loaded.

The increase from two to four fuel assemblies has no significant effect on a spiral on-load.

This change will increase the probability of obtaining 3 CPS using fuel assemblies as a neutron source. This will provide a continuous check of SRM operability. Use of a portable external source provides only periodic checks of operability.

Similar changes have been approved by the NRC for other boiling water reactors (References 19 and 23).

Section 3.10.D

Change [m] clarifies LCOs regarding refueling interlock operability during control rod and control rod drive maintenance. These changes reorganize the limitations currently contained in Specification 3.10.D.1, 3.10.D.1.a and 3.10.D.1.b into Specifications: 3.10.D.1 through 3.10.D.1.c.

Change [m] rewords Specification 3.10.D.1 to separate limiting conditions from any preconditions. Specifically, the minimum control rod separation criterion has been moved to Specification 3.10.D.1.c.

Three alterations to Specification 3.10.D.1.a have been incorporated. Two redundant sentences are deleted and an exception necessary to perform a criticality margin demonstration has been added. The second sentence of the existing 3.10.D.1.a, which did not limit any operating condition, is deleted. This sentence ("The refueling interlocks which prevent...") only

describes a function of the refueling interlocks. Bases Section 3.10.A already describes how refueling interlocks work.

The second sentence in Specification 3.10.D.1.a is also deleted. This sentence required that refueling interlocks be operable. This LCO has been incorporated in the revised Specification 3.10.D.1.a.

Specification 3.10.D.1.a incorporates an exception which permits the criticality margin demonstration mentioned in Specification 4.10.D.1.b to be performed. This demonstration requires that more than two control rods be bypassed. During this demonstration, three control rods must be bypassed: the highest worth rod, and the two rods under maintenance.

The limiting conditions previously in Specification 3.10.D.1.b have been more clearly stated in the revised Specification 3.10.D.1.b. Specifically, "immediately face and diagonally adjacent" replaces "a minimum of eight control rods surrounding." Control rods near the periphery of the core need not be surrounded by eight disarmed rods. Only those rods immediately facing and diagonally adjacent need to be disarmed to assure adequate margin. Interior rods withdrawn for maintenance still must be surrounded by eight disarmed rods.

The reference to Specification 3.10.A.7 also has been deleted in the revised 3.10.D.1. The limiting conditions in 3.10.D.1 duplicate those in 3.10.A.7.

Changes [n] and [o] clarify Specifications 3.10.D.2 and 3.10.D.2.a. The conditions prescribed by the revised specification are unchanged from the original. The existing Specification 3.10.D.2.a. and an introductory phrase is replaced with a reference to Specification 3.10.A.5. Specification 3.10.D.2.a required that the mode switch be in refuel and all other refueling interlocks be operable when more than two control rods are withdrawn. Each of these conditions are included in and more clearly defined by 3.10.A.5.

Section 4.3.B

Change [p] adds an exception to Specification 4.3.B.4 to consider the effects of spiral on-loading/off-loading on minimum SRM readings. This exception is incorporated by adding a reference to Specifications 3.10.B.3 and 3.10.B.4 which permit SRMs to indicate less than three CPS during a spiral core on-load or off-load. The addition of this exception will resolve the first inconsistency identified in Inspection Report 50-333/86-23 (Reference 1).

Section 4.10.A

Change [q] rephrased Specification 4.10.A.2 to clarify it. The phrase "reactor is in the refuel mode" is changed to "the reactor mode switch is in refuel" to more clearly specify the conditions under which this specification apply.

The existing Specification 4.10.A.2 erroneously refers to "rod block interlocks." Change [q] corrects this to refer to "refueling interlocks."

Change [q] also substitutes the words "control cell" for "cell" to make the terminology consistent with other portions of the FitzPatrick Technical Specifications.

Section 4.10.B

Change [r] revises surveillance requirement 4.10.B to clearly state that fuel may be used to verify the operability of SRMs before starting a spiral on-load.

Section 4.10.D

Change [s] combines the surveillance requirements of Specifications 4.10.D.1 and 4.10.D.2 into three specifications (4.10.D.1, 4.10.D.1.a and 4.10.D.1.b) to more accurately reflect their intent. As a result, 4.10.D.3 is deleted.

Combining 4.10.D.2 and 4.10.D.1 clearly illustrates that the surveillance requirement in Specification 4.10.D.2 are correctly associated with the LCOs in Specification 3.10.D.1, not 3.10.D.2. The position of Specifications 3.10.D.1 and 4.10.D.1 on page 231 is adjusted to reflect this relationship.

The two column format of FitzPatrick's Technical Specifications generally locates LCOs on the left side of each page with the corresponding surveillance requirements on the right. Using this format, the surveillance requirements for Specifications 3.10.D.1 and 3.10.D.2 should be in Specifications 4.10.D.1 and 4.10.D.2.

Specification 3.10.D.1 establishes LCOs when two control rods are withdrawn for maintenance, while 3.10.D.2 covers the case for more than two rods.

Specification 4.10.D.1 invokes the surveillance requirements of 4.10.A.1 which requires weekly interlock testing. 4.10.D.2 invokes the surveillance requirement of 4.10.A.1 and 4.10.A.2 which require additional surveillance.

The Authority interprets the existing Specifications 4.10.D.1 and 4.10.D.2 to apply when two control rods are withdrawn. The stringency of surveillance requirements should reflect the potential for an inadvertent criticality (i.e.

greater potential should be compensated for by more comprehensive surveillance.)

Change [s] revises and restructures Specification 4.10.D.1 to clarify its intent. No LCOs were added or deleted. The original requirements have been retained.

Change [s] also corrects a error identified during the preparation of this proposed change. The required subcriticality margin was incorrectly stated at 0.25 Δ k in two places in Specification 4.10.D.2. The correct value is 0.38 Δ k as stated in Specification 4.3.A.1 (page 88) and Bases Section 4.3.A (in two places on pages 98 and 99). No safety hazard has ever existed because this margin has never been used as the basis for control rod or control rod drive maintenance with two rods withdrawn. This change increases the margin to criticality required by technical specifications and clearly increases overall safety.

Change [t] renumbers Specification 4.10.D.3 to 4.10.D.2. This change clarifies the surveillance requirements previously contained in Specification 4.10.D.3

Bases 3.10.A

Change [u] deletes a reference to Specification 3.10.E. This Specification does not now exist, nor has there ever been a Specification 3.10.E in the FitzPatrick Technical Specifications.

Change [v] replaces an incorrect sentence. Because partial on-loads or off-loads are permissible, spiral on-loading is not the reverse of unloading. The replacement sentences explicitly states that an on-load may start around an SRM or a dunking chamber.

Change [w] corrects a reference to Specification 3.10.A.6 to reflect the renumbering of these specifications.

Change [x] makes the terminology associated with refueling more consistent and deletes the ambiguous term "loading."

Change [y] revises Bases Section 3.10.B to reflect the increased maximum number of fuel assemblies on-loaded around an SRM to verify SRM operability. See change [k] for further discussion.

Change [z] clarifies that Specification 3.10.D.1 is being discussed in this Bases section. This portion of the bases discusses maintenance with two control rods withdrawn. Specification 3.10.D.1 prescribes LCOs for this situation.

Change [aa] clarifies the criticality demonstration described

in Specification 4.10.D.1.b. Fully inserted and disarmed control rod are excluded from selection as the highest worth rod. If these rods were not excluded as candidates, the highest worth rod would always be face-adjacent to one of the rods withdrawn for maintenance. Since all rods surrounding a rod withdrawn for maintenance are electrically disarmed (per Specification 3.10.D.1.b), unintentional withdrawal of any of these rods is impossible.

Change [ab] clarifies that Specification 3.10.D.2 is being discussed in this portion of the Bases. Specification 3.10.D.2 prescribes LCOs for withdrawing more than two rods for maintenance.

III. IMPACT OF THE PROPOSED CHANGES

Discussion

A spiral on-load is a method for inserting fuel into the reactor core. Fuel is loaded into control cells (the four fuel bundle locations surrounding a control rod) in a spiral pattern moving outward towards the periphery. Fuel can be inserted starting at either the approximate center of the core, or around an installed SRM.

When fuel is on-loaded starting at the core center, a fuel loading chamber (or "dunking chamber") is used. The dunking chamber is later replaced with a fuel bundle. A maximum of four bundles may be inserted immediately surrounding each operable SRM (or dunking chamber if applicable) at the start of the on-load to increase the indicated count rate.

A spiral off-load is a method for removing fuel from the reactor. Fuel is removed from control cells in a spiral pattern moving in from the periphery towards the core's center.

The Authority would like to minimize the use of a dunking chamber during spiral on-loading because they suffer from signal variations due to movement and are cumbersome. Their use also increases the possibility that an object will be dropped into the vessel.

Spiral on-loading is not necessarily the reverse of spiral off-loading because of the option of either starting at the core center or at an installed SRM.

A detailed description of refueling interlocks is in Section 7.6 of the updated FitzPatrick FSAR.

Impact

These changes (except change [j]) do not require procedural changes. Change [j] will require minor revisions to plant operating procedures on spiral fuel on-loading to permit loading to start around an SRM.

None of the changes require hardware modifications to the plant. These changes do not impact the operation of the FitzPatrick plant because they are administrative in nature and merely clarify the intent of the changes approved in Amendment 59 (Reference 4).

All of the changes proposed by this amendment (except [j]) are purely administrative changes. They clarify LCOs, surveillance requirements and Bases already included in the Technical Specifications. Other nuclear power plant licensees have received operating license amendments which permit spiral on-loading to start around an SRM (Reference 24). Similarly, other plants are permitted to on-load four fuel assemblies around its SRMs to verify SRM operability (Reference 23)

Changes clearly consistent with the intent of the existing FitzPatrick Technical Specifications have already been implemented through a formal Authority procedure to document Technical Specification interpretations (References 15 and 16).

Margin to Criticality

Subcriticality in spiral off-loading and on-loading continues to be assured. The discussion of criticality in the NRC's Safety Evaluation for Amendment 59 (Section 3.1) is not affected by the proposed changes. This section states:

> "the intermediate fuel arrays...will preclude the formation of flux traps. In such a case, the neutron multiplication factor must be less than or equal to that of a fully loaded core....any control cell which contains 4 fuel bundles and a fully inserted control blade is more reactive that the same control cell after the fuel bundles and control blade have been withdrawn. Thus during spiral (on-)loading and unloading, the shutdown margin of the complete core can not possibly be less than the shutdown margin of the complete core which is assured by other specifications."

A full core off-load or on-load is not necessary to use a spiral pattern. This is consistent with a statement in Bases Section 3.10.A of the FitzPatrick Technical Specifications. Partial off-loading using a spiral pattern and subsequently on-loading does not reduce the margin of safety because the margin to criticality is not reduced at any point in the loading process. Partial on/off loading could be more efficient than a full core off-load in some maintenance scenarios. Section 2 of the NRC's safety evaluation for Amendment 59 (Reference 3)

confirms this.

IV. EVALUATION OF SIGNIFICANT HAZARDS CONSIDERATION

Operation of the FitzPatrick Plant in accordance with the proposed Amendment would not involve a significant hazards consideration as stated in 10 CFR 50.92 since it would not:

1. involve a significant increase in the probability or consequences of an accident previously evaluated. The amendment proposed involves only minor changes to plant operating procedures to permit on-loading around an SRM. No plant modifications are required to implement these changes. These changes eliminate inconsistencies relating to an activity (spiral off-load/on-load refueling) previously evaluated and approved. For example, the ambiguous term loading is replaced with either on-loading or off-loading, as appropriate. Spiral fuel on-loading around an installed SRM is similar to on-loading around a centrally installed dunking chamber.

2. create the possibility of a new or different kind of accident from any accident previously evaluated. The proposed amendment represents administrative changes and does not involve changes to the plant or operating procedures. The changes clarify and correct the Technical Specifications related to spiral off-load/on-load refueling, refueling interlocks and control rod drive maintenance. The existing refueling interlock design complies with the intent of the applicable portions of the NRC's Standard Review Plan. Spiral fuel on-loading around an SRM will not result in conditions significantly different than when a dunking chamber is used.

3. involve a significant reduction in a margin of safety. The proposed amendment does not involve changes to the plant or operating procedures. Elimination of inconsistencies related to spiral off-load/on-load refueling does not alter the intent of the changes approved in Amendment 59 to the FitzPatrick Operating License. Overall, plant safety will be improved because potentially ambiguous statements in the technical specifications will be replaced with statements that better reflect their original intent. Spiral fuel on-loading around an installed SRM does not reduce the required margin to criticality.

In the April 6, 1983 FEDERAL REGISTER (48FR14870), the NRC published examples of license Amendments that are not likely to

involve significant hazards considerations. Example number (i) of that list is applicable to these proposed changes and states:

> "A purely administrative change to technical specifications: for example, a change to achieve consistency throughout the technical specifications, correction of an error, or a change in nomenclature."

The change to permit a spiral fuel on-load around an installed SRM is similar to example (vi) except that the change does not increase the probability or consequences of a previously analyzed accident or reduce a safety margin:

> "A change which either may result in some increase to the probability or consequences of a previously analyzed accident or may reduce in some way a safety margin, but where the results of the change are clearly within all acceptable criteria with respect to the system or component specified in the Standard Review Plan."

FitzPatrick's refueling interlocks comply with the intent of applicable Standard Review Plan (SRP) criteria. Section 9.1.4, "Light Load Handling System (Related to Refueling)" is the applicable SRP section for fuel handling equipment. SRP 9.1.4 does not include detailed requirements for refueling interlocks to preclude criticality. Instead, it refers to General Design Criteria 62, Regulatory Position C.3 of Regulatory Guide 1.13 and ANS 57.1/ANSI N208 for criteria on criticality accidents and refueling interlocks.

General Design Criteria (GDC) 62 states that criticality should be prevented "by the physical systems or processes, preferably by use of geometrically safe configurations." GDC 62 does not directly relate to this technical specification change.

Regulatory Position C.3 of Regulatory Guide 1.13 (Reference 20) requires that refueling interlocks be provided "to prevent cranes from passing over stored fuel...when fuel handling is not in progress." Position C.3 further states "During fuel handling operations, the interlocks may be bypassed and administrative controls used to prevent the crane from carrying loads that are not necessary for fuel handling over the stored fuel... The facility should be designed to minimize the need for bypassing such interlocks." The refueling interlocks at FitzPatrick comply with these requirements.

Section 6.2.1 of ANSI 57.1-1980 (Reference 21) describes thirteen interlock protection features for refueling machinery. These features are designed to prevent damage, control components or provide for personnel safety. (For example: up-position or overload.) At FitzPatrick, the primary purpose of "refueling interlocks" is to prevent inadvertent criticality. While many of

the thirteen "features" described in ANSI 57.1 are installed at FitzPatrick, they are not comparable to FitzPatrick's "refueling interlocks." For example, at FitzPatrick, refueling interlocks include control rod blocks which are clearly outside the scope of ANSI 57.1; therefore, any comparison to ANSI 57.1 would be inappropriate.

V. IMPLEMENTATION OF THE PROPOSED CHANGE

These technical specification changes do not alter the plant's physical condition and require only minor changes to plant operating procedures. Therefore, their implementation will not impact the ALARA or Fire Protection Programs at FitzPatrick, nor will the changes impact the environment.

VI. CONCLUSION

The changes, as proposed, does not constitute an reviewed safety question as defined in 10 CFR 50.59, that is it:

a. will not change the probability nor the consequences of an accident or malfunction of equipment important to safety as previously evaluated in the Safety Analysis Report;

b. will not increase the possibility of an accident or malfunction of a different type than any previously evaluated in the Safety Analysis Report;

c. will not reduce the margin of safety as defined in the basis for any technical specification;

d. does not constitute an reviewed safety question; and

e. involves no significant hazards consideration, as defined in 10 CFR 50.92.

VII. REFERENCES AND NOTES

1. NRC letter, R. M. Gallo to R. J. Converse, dated March 9, 1987 transmitting NRC Inspection Report No. 50-333/86-23. Section 11 identifies inconsistencies in FitzPatrick Technical Specifications regarding spiral core unloading and reloading.

2. James A. FitzPatrick Nuclear Power Plant Updated Final Safety Analysis Report, Revised July 1982, Sections 7.6 "Refueling Interlocks"; 7.7, "Reactor Manual Control System"; 14.5, "Analysis of Abnormal Operational Transients and Reactor Vessel Overpressure"; and, 14.6, "Analysis of Design Basis Accident."

3. NRC letter, T. A. Ippolito to G. T. Berry, dated August 26, 1981 includes Amendment No. 59 to Facility Operating License. Approves PASNY December 6, 1979 amendment application.

4. PASNY letter, P. J. Early to T. A. Ippolito, dated December 6, 1979. Includes proposed changes to the FitzPatrick Technical Specifications to allow spiral core unloading and reloading.

5. NYPA letter, C. A. McNeill, Jr. to D. B. Vassallo, dated January 10, 1985 (JPN-85-001) regarding proposed changes to the Technical Specifications - refueling interlocks and control rod blocks (JPTS-84-021). Supersedes NYPA December 6, 1984 submittal (JPN-84-081) on the same subject.

6. NYPA letter, C. A. McNeill, Jr. to D. B. Vassallo dated December 6, 1984 (JPN-84-081) regarding proposed changes to the Technical Specifications, refueling interlocks and control rod blocks (JPTS-84-021).

7. NYPA letter, C. A. McNeill, Jr. to D. B. Vassallo dated February 14, 1985 (JPN-85-011) regarding proposed changes to the Technical Specifications regarding refueling interlocks and control rod blocks (JPTS-84-021).

8. NYPA letter, C. A. McNeill, Jr. to D. B. Vassallo dated February 21, 1985 (JPN-85-013) regarding proposed changes to the Technical Specifications regarding refueling interlocks and control rod blocks (JPTS-84-021).

9. NRC letter, H. I. Abelson to C. A. McNeill, Jr. dated February 22, 1985 transmits Amendment 87 to the FitzPatrick Facility Operating License. Responds to NYPA letter dated December 6, 1984 as supplemented January 10, 1985; February 8, 1985; February 14, 1985, and February 21, 1985. Permits refueling with Reactor Protection System and certain

refueling interlocks and control rod blocks inoperable to facilitate installation of Analog Trip Transmitter components.

10. NRC IE Information Notice No. 83-35, "Fuel Movement With Control Rods Withdrawn at BWRs," dated May 31, 1983.

11. General Electric Co. Service Information Letter No. 372, "Recommended Technical Specifications for Fuel Loading," dated June 18, 1982.

12. General Electric Co. letter, J. Silva to R. Converse, dated May 29, 1987 (JS-87-0529-1) regarding General Electric PRC 81-30 Refueling Interlock Bypass.

13. NYPA, James A. FitzPatrick Nuclear Power Plant, Reactor Analyst Procedure RAP-7.1.24, "Spiral Off-load/On-load Refueling."

14. James A. FitzPatrick Nuclear Power Plant Safety Evaluation Report (SER).

15. James A. FitzPatrick Nuclear Power Plant Technical Specification Interpretation No. 01 dated January 16, 1987 regarding Specifications 3.3.B.4 and 3.10.B.3.

16. James A. FitzPatrick Nuclear Power Plant Technical Specifications Interpretation No. 02 dated January 16, 1987 regarding Specifications 3.10.A.6.a and 3.10.A.7.

17. USNRC Standard Review Plan, Section 9.1.4, "Light Load Handling System (Related to Refueling)"; Section 16.0, "Technical Specifications."

18. USNRC NUREG-0123, "Standard Technical Specifications for General Electric Boiling Water Reactors," Refueling Operations (3/4 9-12), Control Rod Removal (3/4 9-14).

19. USNRC letter, G. Rivenback to C. A. McNeill, Jr. dated January 19, 1988 regarding Hope Creek Generating Station, Source Range Monitors Minimum Count Rate Technical Specifications. Issues Amendment No. 14 to FOL NPF-57.

20. Regulatory Guide 1.13, "Spent Fuel Storage Facility Design Basis," Revision 1, December 1975. Issued for comment.

21. Appendix A to 10 CFR 50, General Design Criteria 62, "Prevention of criticality in fuel storage and handling."

22. ANS 57.1/ANSI N208, "Design Requirements for LWR Fuel Handling Systems," 1980.

23. NRC letter, R. C. Clark to H. G. Parris, dated June 25, 1984 issues amendments 101, 95 and 68 to Technical Specifications for Browns Ferry Units 1, 2 and 3, respectively. Eliminates need for portable fuel loading chambers or periodic SRM source checks during a full core reload with both fresh and irradiated fuel.

24. C. V. Mangan (Niagara Mohawk Power Corp.) to USNRC regarding Nine Mile Point Unit 1 Nuclear Power Plant. Describes plans to use a spiral loading sequence with a source range monitor as the center of the spiral.

25. NRC Safety Evalutation by the Office of Nuclear Reactor Regulation Supporting Amendment No. 27 to Facility Operating Licensee No. DPE-63, Niagara Power Corp., Nine Mile Point Nuclear Power Station Unit No. 1, Docket No. 50-220. Dated March 2, 1979.