Docket No. 50-271
BVY 99-104

Attachment 3

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 223

Spiral Core Loading Around a Source Range Monitor

Marked-up Version of the Current Technical Specifications and Bases

3.12 LIMITING CONDITIONS FOR OPERATION

3. Prior to spiral unloading, the SRMs shall be proven operable as stated in Sections 3.12.B.1 and 3.12.B.2 above, however, during spiral unloading the count rate may drop below 3 cps.

4. Prior to spiral reloading, two diagonally adjacent fuel assemblies, which have previously accumulated exposure in the reactor, shall be loaded into ~~their designated~~ core positions next to each of the 4 SRMs to obtain the required 3 cps. Until these eight bundles have been loaded, the 3 cps requirement is not necessary.

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 at least 36 feet.

4.12 SURVEILLANCE REQUIREMENTS

Prior to spiral unloading or reloading, the SRMs shall be functionally tested. Prior to spiral reloading, the SRMs shall be checked for neutron response.

C. Fuel Storage Pool Water Level

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

3.12 LIMITING CONDITIONS FOR OPERATION

b. The core may be spirally reloaded to either the original configuration or a different configuration in the reverse sequence of that used to unload, with the exception that two (2) diagonally adjacent fuel assemblies, which have previously accumulated exposure in the reactor, shall be loaded into their designated core positions next to each of the four (4) SRMs to obtain the required 3 cps. Until these eight (8) bundles have been loaded, the 3 cps requirement is not necessary. Following insertion of the initial eight (8) bundles, the reactor will be spirally reloaded from the center cell outwards, until the core is fully loaded.

around an SRM

c. At least 50% of the fuel assemblies to be reloaded into the core shall have previously accumulated a minimum exposure of 1000 Mwd/T.

4.12 SURVEILLANCE REQUIREMENTS

BASES:

3.12 & 4.12 REFUELING

A. 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.

The 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.

B. The SRMs 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 SRMs in or adjacent to any core quadrant where fuel or control rods are being moved assures adequate monitoring of that quadrant during such alterations. The requirement of 3 counts per second provides assurance that neutron flux is being monitored. Under the special condition of complete spiral core unloading, it is expected that the count rate of the SRMs will drop below 3 cps before all 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 SRMs will no longer be required. Requiring the SRMs to be operational prior to fuel removal assures that the SRMs are operable and can be relied on even when the count rate may go below 3 cps.

Prior to spiral reload, two diagonally adjacent fuel assemblies, which have previously accumulated exposure in the reactor, will be loaded into their designated core positions next to each of the 4 SRMs to obtain the required 3 cps. Exposed fuel continuously produces neutrons by spontaneous fission of certain plutonium isotopes, photo fission, and photo disintegration of deuterium in the moderator. This neutron production is normally great enough to meet the 3 cps minimum SRM requirement, thereby providing a means by which SRM response may be demonstrated before the spiral reload begins. During the spiral reload, the fuel will be loaded in the reverse sequence that it was unloaded with the exception of the initial eight (8) fuel assemblies which are loaded next to the SRMs to provide a means of SRM response.

BASES: 3.12 & 4.12 (Cont'd)

C. 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. This minimum water level of 36 feet is established because it would be a significant change from the normal level, well above a level to assure adequate cooling (just above active fuel).

D. During certain periods, it is desirable to perform maintenance on a single control rod and/or control rod drive. This specification provides assurance 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. Refueling interlocks restrict the movement of control rods and the operation of the refueling equipment to reinforce operational procedures that prevent the reactor from becoming critical during refueling operations. During refueling operations, no more than one control rod is permitted to be withdrawn from a core cell containing one or more fuel assemblies. The refueling interlocks use the "full-in" position indicators to determine the position of all control rods. If the "full-in" position signal is not present for every control rod, then the "all-rods-in" permissive for the refueling equipment interlocks is not present and fuel loading and control rod withdrawal is prevented. The refuel position one-rod-out interlock will not allow the withdrawal of a second control rod. The requirement that an adequate shutdown margin be determined with the control rods remaining in service ensures that inadvertent criticality cannot occur during this maintenance. Disarming the directional control valves does not inhibit control rod scram capability.

E. The intent of this specification is to permit the unloading of a portion of the reactor core for such purposes as inservice inspection requirements, examination of the core support plate, control rod, control rod drive maintenance, 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 the Bases for Specification 3.12.A. 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.

One method available for unloading or reloading the core is the spiral unload/reload. ~~A spiral unloading pattern is one by which the fuel in the outermost cells (four fuel bundles surrounding a control rod) is removed first. Unloading continues by unloading the remaining outermost fuel by cell spiralling inward towards the center cell which is the last cell removed. Spiral reloading is reverse of unloading, with the exception that two (2) diagonally adjacent bundles, which have previously accumulated exposure in-core, are placed next to each of the 4 SRMs before the actual spiral reloading begins. The spiral reload then begins in the center cell and spirals outward until the core is fully loaded.~~

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Insert 1, Bases 3.12.E, page 238

Spiral reloading and unloading sequences encompass reloading or unloading a cell on the edge of a continuous fueled region (the cell can be reloaded or unloaded in any sequence.) The pattern begins (for reloading) and ends (for unloading) around a single SRM. The spiral reloading pattern is the reverse of the unloading pattern, with the exception that two diagonally adjacent bundles, which have previously accumulated exposure in-core, are placed next to each of the four SRMs before the actual spiral reloading begins. The spiral reload can be to either the original configuration or a different configuration.

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Attachment 4

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4. Prior to spiral reloading, two diagonally adjacent fuel assemblies, which have previously accumulated exposure in the reactor, shall be loaded into core positions next to each of the 4 SRMs to obtain the required 3 cps. Until these eight bundles have been loaded, the 3 cps requirement is not necessary.

C. Fuel Storage Pool Water Level

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Prior to spiral unloading or reloading, the SRMs shall be functionally tested. Prior to spiral reloading, the SRMs shall be checked for neutron response.

C. Fuel Storage Pool Water Level

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

3.12 LIMITING CONDITIONS FOR OPERATION

4.12 SURVEILLANCE REQUIREMENTS

b. The core may be spirally reloaded to either the original configuration or a different configuration in the reverse sequence of that used to unload, with the exception that two (2) diagonally adjacent fuel assemblies, which have previously accumulated exposure in the reactor, shall be loaded into core positions next to each of the four (4) SRMs to obtain the required 3 cps. Until these eight (8) bundles have been loaded, the 3 cps requirement is not necessary. Following insertion of the initial eight (8) bundles, the reactor will be spirally reloaded around an SRM until the core is fully loaded.

c. At least 50% of the fuel assemblies to be reloaded into the core shall have previously accumulated a minimum exposure of 1000 Mwd/T.

BASES:

3.12 & 4.12 REFUELING

A. 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.

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BASES: 3.12 & 4.12 (Cont'd)

C. 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. This minimum water level of 36 feet is established because it would be a significant change from the normal level, well above a level to assure adequate cooling (just above active fuel).

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