SECTION I
DEFINITIONS

The following frequently used terms are defined to aid in the uniform interpretation of the specifications.

1.1 OPERABLE-OPERABILITY

A system, subsystem, train, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified function(s). Implicit in this definition shall be the assumption that all necessary attendant instrumentation, controls, normal and emergency electrical power sources, cooling of seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component or device to perform its function(s) are also capable of performing their related support function(s).

A verification of operability is an administrative check, by examination of appropriate plant records (logs, surveillance test records) to determine that a system, subsystem, train, component or device is not inoperable. Such verification does not preclude the demonstration (testing) of a given system, subsystem, train, component or device to determine operability.

1.2 OPERATING

Operating means that a system or component is performing its required function.

1.3 POWER OPERATION

Power operation is any operation when the reactor is in the startup mode or run mode except when primary containment integrity is not required.

1.4 STARTUP MODE

The reactor is in the startup mode when the reactor mode switch is in the startup mode position. In this mode, the reactor protection system scram trips initiated by condenser low vacuum and main steam line isolation valve closure are bypassed when reactor pressure is less than 600 psig; the low pressure main steamline isolation valve closure is bypassed; the IRM trips for rod block and scram are operable; and the SRM trips for rod block are operable.

1.5 RUN MODE

The reactor is in the run mode when the reactor mode switch is in the run mode position. In this mode, the reactor protection system is energized with APRM protection and the control rod withdrawal interlocks are in service.

1.6 SHUTDOWN CONDITION

The reactor is in the SHUTDOWN CONDITION when there is fuel in the reactor vessel, the reactor is subcritical, all operable control rods are fully inserted, and the mode switch is in the shutdown mode position. In this position, a control rod block is initiated.

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1.7 COLD SHUTDOWN CONDITION

The reactor is in the COLD SHUTDOWN CONDITION when the reactor is in the SHUTDOWN CONDITION, and (except during reactor vessel pressure testing), the reactor coolant system is maintained at less than 212°F and vented.

1.8 PLACE IN SHUTDOWN CONDITION

Proceed with and maintain an uninterrupted normal plant shutdown operation until the shutdown condition is met.

1.9 PLACE IN COLD SHUTDOWN CONDITION

Proceed with and maintain an uninterrupted normal plant shutdown operation until the cold shutdown condition is met.

1.10 PLACE IN ISOLATED CONDITION

Proceed with and maintain an uninterrupted normal isolation of the reactor from the turbine condenser system including closure of the main steam isolation valves.

1.11 REFUEL MODE

The reactor is in the refuel mode when the reactor mode switch is in the refuel mode position and there is fuel in the reactor vessel. In this mode the refueling platform interlocks are in operation.

1.12 REFUELING OUTAGE

For the purpose of designating frequency of testing and surveillance, a refueling outage shall mean a regularly scheduled refueling outage. Following the first refueling outage, successive tests or surveillances shall be performed at least once per 24 months.

1.13 PRIMARY CONTAINMENT INTEGRITY

Primary containment integrity means that the drywell and adsorption chamber are closed and all of the following conditions are satisfied:

A. All non-automatic primary containment isolation valves which are not required to be open for plant operation are closed.

B. At least one door in the airlock is closed and sealed.

C. All automatic containment isolation valves specified in Table 3.5.2 are operable or are secured in the closed position.

D. All blind flanges and manways are closed.

1.43 CORE OPERATING LIMITS REPORT

The Oyster Creek CORE OPERATING LIMITS REPORT (COLR) is the document that provides core operating limits for the current operating reload cycle. These cycle-specific core operating limits shall be determined for each reload cycle in accordance with Specification 6.9.1.f. Plant operation within these operating limits is addressed in individual specifications.

1.44 LOCAL LINEAR HEAT GENERATION RATE

The LOCAL LINEAR HEAT GENERATION RATE (LLHGR) shall be applicable to a specific planar height and is equal to the AVERAGE PLANAR LINEAR GENERATION RATE (APLHGR) at the specified height multiplied by the local peaking factor at that height.

1.45 SHUTDOWN MARGIN (SDM)

SHUTDOWN MARGIN is the amount of reactivity by which the reactor would be subcritical when the control rod with the highest reactivity worth is fully withdrawn, all other operable control rods are fully inserted, all inoperable control rods are at their current position, reactor water temperature is 68°F, and the reactor fuel is xenon free. Determination of the control rod with the highest reactivity worth includes consideration of any inoperable control rods which are not fully inserted.

3.2 REACTIVITY CONTROL

Applicability: Applies to core reactivity and the operating status of the reactivity control systems for the reactor.

Objective: To assure reactivity control capability of the reactor.

Specification:

A. Core Reactivity

1. The SHUTDOWN MARGIN (SDM) under all operational conditions shall be equal to or greater than:

   (a) 0.38% delta k/k, with the highest worth control rod analytically determined; or

   (b) 0.28% delta k/k, with the highest worth control rod determined by test.

2. If one or more control rods are determined to be inoperable as defined in Specification 3.2.B.4 while in the STARTUP MODE or the RUN MODE, then a determination of whether Specification 3.2 A. is met must be made within 6 hours. If a determination cannot be made within the specified time period, then assume Specification 3.2 A.1 is not met.

3. If Specification 3.2.A.1 is not met while in the STARTUP Mode or the RUN MODE, meet Specification 3.2.A.1 within 6 hours or be in the SHUTDOWN CONDITION within the following 12 hours.

4. If Specification 3.2.A.1 is not met while in the SHUTDOWN CONDITION, or the COLD SHUTDOWN CONDITION, then:

   (a) Fully insert all insertable control rods within 1 hour, AND

   (b) Comply with the requirements of Specifications 3.2.C and 3.5.B.

5. If Specification 3.2.A.1 is not met while in the REFUEL MODE, then:

   (a) Immediately suspend CORE ALTERATIONS except for fuel assembly removal, AND

   (b) Immediately initiate action to fully insert all insertable control rods in control cells containing one or more fuel assemblies, AND

   (c) Comply with the requirements of Specifications 3.2.C and 3.5.B.

B. <u>Control Rod System</u>

1. The control rod drive housing support shall be in place during power operation and when the reactor coolant system is pressurized above atmospheric pressure with fuel in the reactor vessel, unless all control rods are fully inserted and Specification 3.2.A is met.

2. The Rod Worth Minimizer (RWM) shall be operable during each reactor startup until reactor power reaches 10% of rated power except as follows:

   (a) Should the RWM become inoperable after the first 12 rods have been withdrawn, the startup may continue provided that a second licensed operator verifies that the licensed operator at the reactor console is following the rod program.

   (b) Should the RWM be inoperable before a startup is commenced or before the first twelve rods are withdrawn, one startup during each calendar year may be performed without the RWM provided that the second licensed operator verifies that the licensed operator at the reactor console is following the rod program and provided that a reactor engineer from the Core Engineering Group also verifies the RWM as described in this subsection shall be reported in a special report to the Nuclear Regulatory Commission (NRC) within 30 days of the startup stating the reason for the failure of the RWM, the action taken to repair it and the schedule for completion of the repairs.

D. Reactivity Anomalies

The difference between an observed and predicted control rod inventory shall not exceed the equivalent of one percent in reactivity. If this limit is exceeded and the discrepancy cannot be explained, the reactor shall be brought to the cold shutdown condition by normal orderly shutdown procedure. Operation shall not be permitted until the cause has been evaluated and appropriate corrective action has been completed. The NRC shall be notified within 24 hours of this situation in accordance with Specification 6.6.

Bases:

Limiting conditions of operation on core reactivity and the reactivity control systems are required to assure that the excess reactivity of the reactor core is controlled at all times. The conditions specified herein assure the capability to provide reactor shutdown from steady state and transient conditions and assure the capability of limiting reactivity insertion rates under accident conditions to values which do not jeopardize the reactor coolant system integrity or operability of required safety features.

The core reactivity limitation is required to assure the reactor can be shut down at any time when fuel is in the core. It is a restriction that must be incorporated into the design of the core fuel; it must be applied to the conditions resulting from core alterations; and it must be applied in determining the required operability of the core reactivity control devices. The basic criterion is that the core at any point in its operation be capable of being made subcritical in the cold, xenon-free condition with the operable control rod of highest worth fully withdrawn and all other operable rods fully inserted. At most times in core life, more than one control rod drive could fail mechanically and this criterion would still be met.

The SDM limit specified in Section 3.2.A.1 accounts for the uncertainty in the demonstration of SDM by testing. Separate SDM limits are provided for testing where the highest worth control rod is determined analytically or by measurement (Ref. 11). This is due to the reduced uncertainty in the SDM test when the highest worth control rod is determined by measurement. When SDM is demonstrated by calculations not associated with a test, additional margin must be added to the specified SDM limit to account for uncertainties in the calculation. To ensure adequate SDM during the design process, a design margin of 1.0% delta k is included to account for uncertainties in the design calculations (Ref. 11).

Inability to meet SDM limits in the STARTUP MODE or RUN MODE is most probably due to inoperable control rods. Reduced SDM is not considered an immediate threat to nuclear safety, therefore time is allowed for analysis to insure Specification 3.2 A. is met, and for repair before requiring the plant to undergo a transient to achieve the SHUTDOWN CONDITION. The allowed times of 6 hours for analysis and an additional 6 hours for repair, if 3.2.A.1 is not met, are considered reasonable while limiting the potential for further reduction in SDM or the occurrence of a transient.

If SDM cannot be restored, shutdown is required to minimize the potential for, and consequences of, an accident or malfunction of equipment important to safety. The allowed completion time of 12 hours is considered reasonable to achieve the SHUTDOWN CONDITION from full power in an orderly manner and without challenging plant systems.

Inability to meet SDM limits in the SHUTDOWN CONDITION or COLD SHUTDOWN CONDITION could be due to inoperable control rods, discovery of errors in the SDM analysis, or discovery of errors in previous CORE ALTERATIONS. Inserting control rods maximizes SDM and, since all operable control rods are required to be fully inserted in these conditions, should be able to be completed in 1 hour. The Standby Liquid Control System is allowed to be inoperable and Secondary Containment Integrity is allowed to be relaxed in these conditions when SDM limits are met. Therefore, they may not be available when the inability to meet SDM limits is recognized. The Standby Liquid Control System is needed to provide negative reactivity if control rods are not adequate to maintain the reactor subcritical. Secondary Containment Integrity is needed to provide means for control of potential radioactive releases.

Inability to meet SDM limits in the REFUEL MODE is most probably due to CORE ALTERATION errors. CORE ALTERATIONs are suspended to prevent further reduction in SDM. Fuel assembly removal and control rod insertion reduce total reactivity and are allowed in order to recover SDM. Control rods in control cells which do not contain fuel do not affect the reactivity of the core and therefore do not have to be inserted. The Standby Liquid Control System is allowed to be inoperable in this mode when SDM limits are met and, therefore, may not be available when the inability to meet SDM limits is recognized. The Standby Liquid Control System is needed to provide negative reactivity if control rods are not adequate to maintain the reactor subcritical. Secondary Containment Integrity is needed to provide means for control of potential radioactive releases.

Fuel bundles containing gadolinia as a burnable neutron absorber results in a core reactivity characteristic which increases with exposure, goes through a maximum and then decreases. Thus, it is possible that a core could be more reactive later in the cycle than at the beginning. Satisfaction of the above criterion can be demonstrated conveniently only at the time of refueling since it requires the core to be cold and xenon-free. The demonstration is designed to be done at these times and is such that if it is successful, the criterion is

The shaded area of Figure 3.2-1 represents the acceptable values of liquid control tank volume and solution concentration which assure that, with one 30 gpm liquid control pump, the reactor can be brought to the cold shutdown condition from a full power steady state operating condition at any time in core life independent of the control rod system capabilities. The cross-hatched area of Figure 3.2-1 represents the acceptable values of liquid control tank volume and solution concentration which assure that the equivalency requirements of 10 CFR 50.62 are satisfied. The maximum volume of 4213 gal is established by the tank capacity. The tank volume requirements include consideration for 137 gal of solution which is contained below the point where the pump takes suction from the tank and, therefore, cannot be inserted into the reactor.

The solution saturation temperature varies with the concentration of sodium pentaborate. The solution will be maintained at least 5°F above the saturation temperature to guard against precipitation. The 5°F margin is included in Figure 3.2-2. Temperature and liquid level alarms for the system are annunciated in the control room.

The acceptable time out of service for a standby liquid control system pumping circuit as well as other safety features is determined to be 10 days. However, the allotted time out of service for a standby liquid control system pumping circuit is conservatively set at 7 days in the specification. Systems are designed with redundancy to increase their availability and to provide backup if one of the components is temporarily out of service.

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 with expected inventory based on appropriately corrected past data. Experience at Oyster Creek and other operating BWR's indicates that the control rod inventory should be predictable to the equivalent of one percent in reactivity. Deviations beyond this magnitude would not be expected and would require thorough evaluation. One percent reactivity limit is considered safe since an insertion of this reactivity into the core would not lead to transients exceeding design conditions of the reactor system.

<u>References</u>:

(1) FDSAR, Volume I, Section III-5.3.1
(2) FDSAR, Volume I, Section VI-3
(3) FDSAR, Volume I, Section III-5.2.1
(4) FDSAR, Volume I, Section VII-9
(5) NEDO-24195, General Electric Reload Fuel Application for Oyster Creek
(6) FDSAR, Volume I, Section III-5 and Volume II, Appendix B
(7) FDSAR, Volume I, Sections VII-4.2.2 and VII-4.3.1
(8) FDSAR, Volume I, Section VI-4
(9) FDSAR, Amendment No. 55, Section 2
(10) C. J. Paone, Banked Position Withdrawal Sequence, January 1988 (NEDO-21231)
(11) UFSAR, Volume 4, Section 4.3.2.4.1

being removed and one shall be located in an adjacent quadrant.

3. All other control rods are fully inserted with the exception of one rod which may be partially withdrawn not more than two notches to perform refueling interlock surveillance.

4. The four fuel assemblies are removed from the core cell surrounding each control rod or rod drive mechanism to be removed.

5. The SHUTDOWN MARGIN requirements of Specification 3.2.A are met.

6. An evaluation will be conducted for each refuel/reload to ensure that actual core criticality of the proposed order of defueling and refueling is bounded by previous analysis performed to support such defueling and refueling activities, otherwise a new analysis shall be performed.

   The new analysis must show that sufficient conservatism exists for the proposed order of defueling and refueling before such operation shall be allowed to proceed.

G. With any of the above requirements not met, cease core alterations or control rod removal as appropriate, and initiate action to satisfy the above requirements.

Basis: 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.

Addition of large amounts of reactivity to the core is prevented by operating procedures, which are in turn backed up by refueling interlocks (1) 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 (1,2).

The one rod withdrawal interlock may be bypassed in order to allow multiple control rod removal for repair, modifications, or core unloading. The requirements for simultaneous removal of more than one Control rod are more stringent than the requirements for removal of a single control rod, since in the latter

4.2 REACTIVITY CONTROL

Applicability: Applies to the surveillance requirements for reactivity control.

Objective: To verify the capability for controlling reactivity.

Specification:

A. SDM shall be verified:

1. Prior to each CORE ALTERATION and

2. Once within 4 hours following the first criticality following any CORE ALTERATION.

B. The control rod drive housing support system shall be inspected after reassembly.

C. 1. After each major refueling outage and prior to resuming power operation, all operable control rods shall be scram time tested from the fully withdrawn position with reactor pressure above 800 psig.

2. Following each reactor scram from rated pressure, the mean 90% insertion time shall be determined for eight selected rods. If the mean 90% insertion time of the selected control rod drives does not fall within the range of 2.4 to 3.1 seconds or the measured scram time of any one drive for 90% insertion does not fall within the range of 1.9 to 3.6 seconds, an evaluation shall be made to provide reasonable assurance that proper control rod drive performance is maintained.

3. Following any outage not initiated by a reactor scram, eight rods shall be scram tested with reactor pressure above 800 psig provided these have not been measured in six months. The same criteria of 4.2.C(2) shall apply.

D. Each partially or fully withdrawn control rod shall be exercised at least once each week. This test shall be performed at least once per 24 hours in the event of power operation is continuing with two or more inoperable control rods or in the event power operation is continuing with one fully or partially withdrawn rod which cannot be moved and for which control rod drive mechanism damage has not been ruled out. The surveillance need not be completed within 24 hours if the number of inoperable rods has been reduced to less than two and if it has been demonstrated that control rod drive mechanism collet housing failure is not the cause of an immovable control rod.

E. Surveillance of the standby liquid control system shall be as follows:

1. Pump operability	Once/month
2. Boron concentration determination	Once/month
3. Functional test	Once every 24 months
4. Solution volume and temperature check	Once/day
5. Solution Boron-10 Enrichment	Once every 24 months. Enrichment analyses shall be received no later than 30 days after sampling. If not received within 30 days, notify NRC (within 7 days) of plans to obtain test results.

F. At specific power operation conditions, the actual control rod configuration will be compared with the expected configuration based upon appropriately corrected past data. This comparison shall be made every equivalent full power month. The initial rod inventory measurement performed with equilibrium conditions are established after a refueling or major core alteration will be used as base data for reactivity monitoring during subsequent power operation throughout the fuel cycle.

G. The scram discharge volume drain and vent valves shall be verified open at least once per 31 days, except in shutdown mode*, and shall be cycled at least one complete cycle of full travel at least quarterly.

H. All withdrawn control rods shall be determined OPERABLE by demonstrating the scram discharge volume drain and vent valves OPERABLE. This will be done at least once per refueling cycle by placing the mode switch in shutdown and by verifying that:

a. The drain and vent valves close within 30 seconds after receipt of a signal for control rods to scram, and

b. The scram signal can be reset and the drain and vent valves open when the scram discharge volume trip is bypassed.

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* These valves may be closed intermittently for testing under administrative control.

BASIS:

Adequate SDM must be demonstrated to ensure that the reactor can be made subcritical from any initial operating condition. Adequate SDM is demonstrated by testing before or during the first startup after fuel movement, control rod replacement, or shuffling within the reactor pressure vessel. Control rod replacement refers to the decoupling and removal of a control rod from a core location, and subsequent replacement with a new control rod or a control rod from another core location. Since core reactivity will vary during the cycle as a function of fuel depletion and poison burnup, the beginning of cycle (BOC) test must also account for changes in core reactivity during the cycle. Therefore, to obtain the SDM, the initial measured value must be increased by an adder, "R", which is the difference between the calculated value of maximum core reactivity during the operating cycle and the calculated BOC core reactivity. If the value of R is negative (that is, BOC is the most reactive point in the cycle), no correction to the BOC measured value is required.

The SDM may be demonstrated during an in sequence control rod withdrawal, in which the highest worth control rod is analytically determined, or during local criticals. Local critical tests require the withdrawal of out of sequence control rods.

The frequency of 4 hours after reaching criticality is allowed to provide a reasonable amount of time to perform the required calculations and have appropriate verification.

During REFUEL MODE, adequate SDM is required to ensure that the reactor does not reach criticality during core alterations. An evaluation of each in vessel fuel movement during fuel loading (including shuffling fuel within the core) shall be performed to ensure adequate SDM is maintained during refueling. This evaluation can be a bounding analyses that demonstrate adequate SDM for the most reactive configurations during the refueling may be performed to demonstrate acceptability of the entire fuel movement sequence. For the SDM demonstrations that rely solely on calculation, additional margin must be added to the SDM limit of 0.38% delta k/k to account for uncertainties in the calculation.

The control rod drive housing support system[2] is not subject to deterioration during operation. However, reassembly must be assured following a partial or complete removal.

The scram insertion times for all control rods[3] will be determined at the time of each refueling outage. The scram times generated at each refueling outage when compared to scram times previously recorded gives a measurement of the functional effects of deterioration for each control rod drive. The more frequent scram insertion time measurements of eight selected rods are performed on a representative sample basis to monitor performance and give an early indication of possible deterioration and required maintenance. The times given for the eight-rod tests are based on the testing experience of control rod drives which were known to be in good condition.

The weekly control rod exercise test serves as a periodic check against deterioration of the control rod system. Experience with this control rod system has indicated that weekly tests are adequate, and that rods which move by drive pressure will scram when required as the pressure applied is much higher. The frequency of exercising the control rods has been increased under the conditions of two or more control rods which are valved out of service in order to provide even further assurance of the reliability of the remaining control rods.