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

THE YANKEE ATOMIC ELECTRIC COMPANY

DOCKET NO. 50-29

YANKEE NUCLEAR POWER STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 77
License No. DPR-3

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

   A. The application for amendment by the Yankee Atomic Electric Company (the licensee) dated September 30, 1982, as supplemented October 15 and November 10, 1982, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

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

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

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

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

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 2.C(2) of Facility Operating License No. DPR-3 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 77, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Dennis M. Crutchfield

Dennis M. Crutchfield, Chief
Operating Reactors Branch #5
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: December 3, 1982

ATTACHMENT TO LICENSE AMENDMENT NO. 77

FACILITY OPERATING LICENSE NO. DPR-3

DOCKET NO. 50-29

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages as indicated. The revised pages are identified by Amendment Number and contain vertical lines indicating the area of change.

PAGES

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*Overleaf page included for completeness of records.

3/4 6-14a	3/4 6-14a
3/4 8-5	3/4 8-5*
3/4 8-6	3/4 8-6
3/4 8-7	3/4 8-7
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Add the following new pages to the Appendix A Technical Specifications.

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3/4 1-2b

*Overleaf page included for completeness of records.

INDEX

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENS

3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

SHUTDOWN MARGIN

LIMITING CONDITION FOR OPERATION

3.1.1.1.1 The SHUTDOWN MARGIN shall be $\geq$ 5.5% $\Delta k/k$.

APPLICABILITY: MODES 1 and 2*

ACTION:

With the SHUTDOWN MARGIN less than required, immediately initiate and continue boration at $\geq$ 26 gpm of 2200 ppm boron concentration or equivalent until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.1.1.1 The SHUTDOWN MARGIN shall be determined to be $\geq$ that required:

a. Within one hour after detection of an inoperable control rod(s) and at least once per 12 hours thereafter while the rod(s) is inoperable. If the inoperable control rod(s) is immovable or untrippable, the above required SHUTDOWN MARGIN shall be increased by an amount at least equal to the withdrawn worth of the immovable or untrippable control rod(s).

b. When in Modes 1 or 2#, at least once per 4 hours by verifying that control bank withdrawal is within the limits of Specification 3.1.3.5.

c. When in Mode 2##, within 4 hours prior to achieving reactor criticality, by verifying that the predicted critical control rod position is within the limits of Specification 3.1.3.5.

d. Prior to initial operation above 5% RATED THERMAL POWER after each fuel loading, by consideration of the factors of e below, with the control banks at the maximum insertion limit of Specification 3.1.3.5.

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* See Special Test Exception 3.10.1.
\# With $K_{eff} \geq 1.0$.
\#\# With $K_{eff} < 1.0$.

SURVEILLANCE REQUIREMENTS (Continued)

e. Factors to consider:

1. Main Coolant System boron concentration,
2. Control rod position,
3. Main Coolant System average temperature,
4. Fuel burnup based on gross thermal energy generation,
5. Xenon concentration, and
6. Samarium concentration.

4.1.1.1.1.2 The overall core reactivity balance shall be compared to predicted values to demonstrate agreement within $\pm$ 0.8 Δ k/k at least once per 31 Effective Full Power Days (EFPD). This comparison shall consider at least those factors stated in Specification 4.1.1.1.1.1.e, above. The predicted reactivity values shall be adjusted (normalized) to correspond to the actual core conditions prior to exceeding a fuel burnup of 60 Effective Full Power Days after each fuel loading.

3.1.1.1.2 The shutdown margin shall be determined from Figure 3.1-1 for main coolant average temperatures above 490°F. Shutdown margin for $T_{avg} \leq 450$ is 4.72% $\Delta k/k$. The shutdown margin requirement is a linear function between 450°F and 490°F.

APPLICABILITY: MODE 3*

ACTION:

With the SHUTDOWN MARGIN less than required, immediately initiate and continue boration at ≥26 gpm of 2200 ppm boron concentration or equivalent until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.1.2.1 The SHUTDOWN MARGIN shall be determined to be greater than or equal to that required:

a. When in Mode 3, at least once per 24 hours by consideration of the following factors:

1. Main Coolant System boron concentration,
2. Control rod position,
3. Main Coolant System average temperature,
4. Fuel burnup based on gross thermal energy generation,
5. Xenon concentration, and
6. Samarium concentration.

4.1.1.1.2.2 During a reactor startup in which core reactivity or control positions for criticality are not established, a plot of inverse multiplication rate (or count rate) versus reactivity shall be made.

*See Special Test Exception 3.10.1.

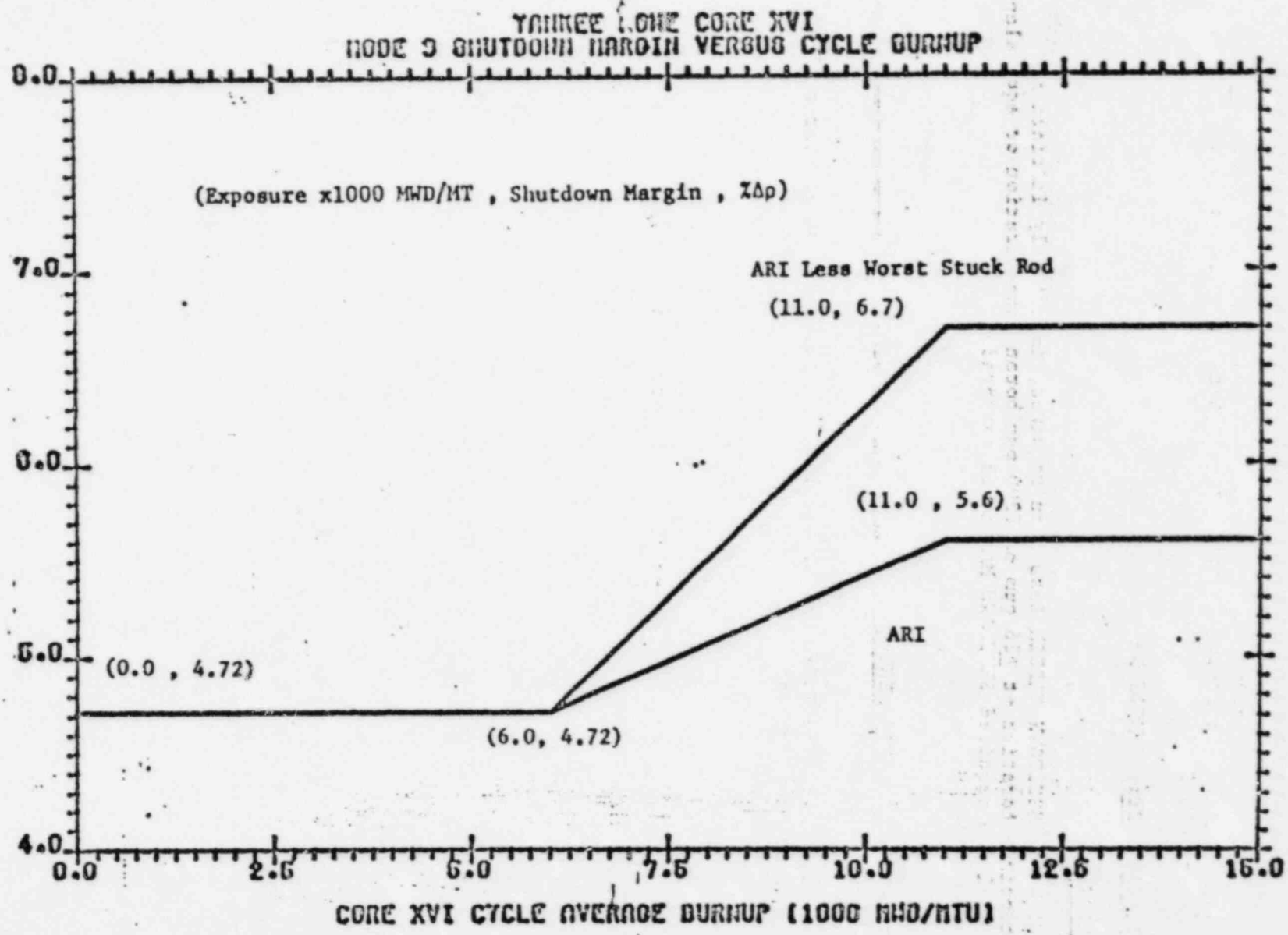

YANKEE ROWE CORE XVI
MODE 3 SHUTDOWN MARGIN VERSUS CYCLE BURNUP
(Exposure x1000 MWD/MT , Shutdown Margin , %Δρ)
ARI Less Worst Stuck Rod
(11.0, 6.7)
(11.0 , 5.6)
ARI
(0.0 , 4.72)
(6.0, 4.72)
SHUTDOWN MARGIN (PERCENT DELTA RHO)
CORE XVI CYCLE AVERAGE BURNUP (1000 MWD/MTU)
0.0
7.0
6.0
5.0
4.0
2.5
5.0
7.5
10.0
12.5
15.0

Figure 3.1-1

3/4.1.3 MOVABLE CONTROL RODS

CONTROL ROD OPERABILITY

LIMITING CONDITION FOR OPERATION

3.1.3.1 All control rods which are inserted in the core shall be OPERABLE and positioned within ± 8 inches (indicated position) of every other rod in their group.

APPLICABILITY: MODES 1* and 2*.

ACTION:

a. With one or more control rods inoperable due to being immovable as a result of excessive friction or mechanical interference or known to be untrippable, determine that the SHUTDOWN MARGIN requirement of Specification 3.1.1.1.1 is satisfied within 1 hour and be in at least HOT STANDBY within 6 hours.

b. With more than one control rod inoperable or misaligned from any other rod in its group by more than ± 8 inches (indicated position), be in at least HOT STANDBY within 6 hours.

c. With one control rod inoperable or misaligned from any other rod in its group by more than ± 8 inches (indicated position), POWER OPERATION may continue provided that within 1 hour either:

1. The rod is restored to OPERABLE status within the above alignment requirements, or

2. The rod is declared inoperable and the SHUTDOWN MARGIN requirement of Specification 3.1.1.1.1 is satisfied. POWER OPERATION may then continue provided that:

a) An analysis of the potential ejected rod worth is performed within 3 days and the rod worth is determined to be $\leq 0.93\% \Delta\rho$ at zero power and $\leq 0.5\% \Delta\rho$ at RATED THERMAL POWER for the remainder of the fuel cycle, and

*See Special Test Exceptions 3.10.2 and 3.10.4.

LIMITING CONDITION FOR OPERATION (Continued)

b. The SHUTDOWN MARGIN requirement of Specification 3.1.1.1.1 is determined at least once per 12 hours, and

c. A power distribution map is obtained from the movable incore detectors and F_Q and $F^N_{\Delta H}$ are verified to be within their limits within 72 hours.

d. The THERMAL POWER level is reduced to $\leq$ 75% of THERMAL POWER allowable for the Main Coolant Pump combination within one hour and within the next 4 hours the Power Range and Intermediate Power Range Neutron Flux high trip setpoint is reduced to $\leq$ 108% of the 75% of allowable THERMAL POWER, or

e. The remainder of the rods in the group with the inoperable rod are aligned to within $\pm$ 8 inches of the inoperable rod within one hour while maintaining the rod sequence and insertion limits of Figure 3.1-2. The THERMAL POWER level shall be restricted pursuant to Specification 3.1.3.5 during subsequent operation.

SURVEILLANCE REQUIREMENTS

4.1.3.1.1 The position of each control rod shall be determined to be within the limit by verifying the individual rod positions at least once per 4 hours.

4.1.3.1.2 Each control rod not fully inserted shall be determined to be OPERABLE by movement of at least 4 inches in any one direction at least once per 31 days.

4.1.3.1.3 The maximum reactivity insertion rate due to withdrawal of the highest worth control rod group shall be determined not to exceed 1.5×10^{-4} $\Delta k/k$ per second at least once per 18 months.

REACTIVITY CONTROL SYSTEMS

SHUTDOWN ROD INSERTION LIMIT

LIMITING CONDITION FOR OPERATION

3.1.3.4 All shutdown rods shall be withdrawn to at least 87 inches.

APPLICABILITY: MODES 1* and 2*#

ACTION:

With a maximum of one shutdown rod not withdrawn to within the limit, except for surveillance testing pursuant to Specification 4.1.3.1.2, within one hour either:

a. Withdraw the rod to within the limit, or

b. Declare the rod to be inoperable and apply Specification 3.1.3.1.

SURVEILLANCE REQUIREMENTS

4.1.3.4 Each shutdown rod shall be determined to be withdrawn to within the limit:

a. Within 15 minutes prior to withdrawal of any rods in regulating groups C and A during an approach to reactor criticality,

b. At least once per 4 hours thereafter.

*See Special Test Exceptions 3.10.2 and 3.10.4.
#With $K_{eff} \geq 1.0$.

CONTROL ROD INSERTION LIMITS

LIMITING CONDITION FOR OPERATION

3.1.3.5 The control groups shall be limited in physical insertion as shown in Figure 3.1-2.

APPLICABILITY: MODES 1* and 2*#.

ACTION:

With the control groups inserted beyond the above insertion limits, except for surveillance testing pursuant to Specification 4.1.3.1.2, either;

a. Restore the control groups to within the limits within two hours, or

b. Reduce THERMAL POWER within two hours to less than or equal to that fraction of RATED THERMAL POWER which is allowed by the group position using the above figure, or

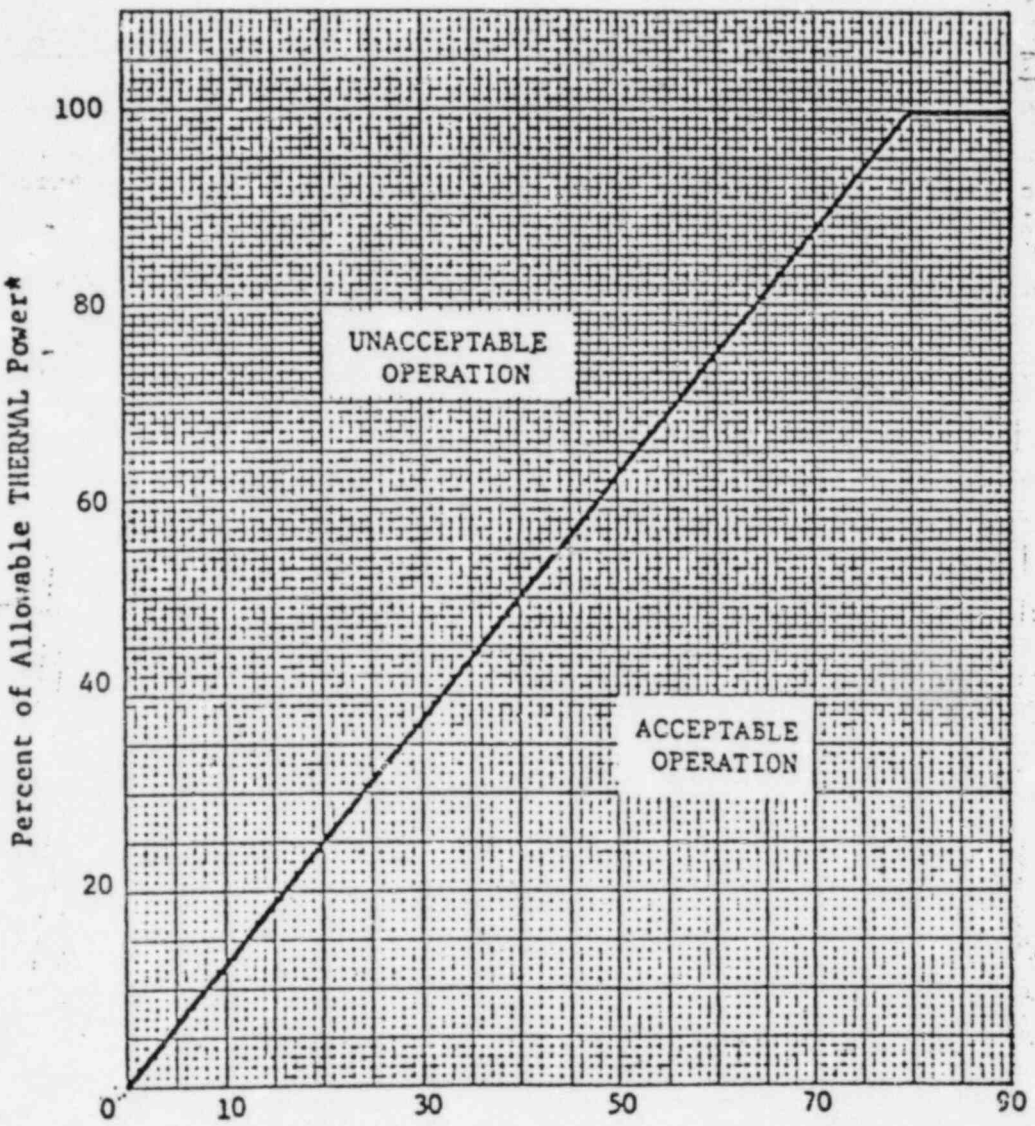
c. Be in at least HOT STANDBY within 6 hours.

SURVEILLANCE REQUIREMENTS

4.1.3.5 The position of each control group shall be determined to be within the insertion limits at least once per 4 hours.

*See Special Test Exceptions 3.10.2 and 3.10.4

#With $K_{eff.} \geq 1.0$.



* Allowable THERMAL Power based on the main coolant pump combination in operation.

FIGURE 3.1-2

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SURVEILLANCE REQUIREMENTS (Continued)

4.2.1.2 The below factors shall be included in the calculation of peak full power LHGR:

a. Heat flux power peaking factor, F_q^N, measured using incore instrumentation at a power $\geq$ 10%.

b. Effect of inserting the control group from its position at the time of measurement to its insertion limit, F_I as shown in Figure 3.2-2. The rod insertion limit is shown in Figure 3.1-2.

c. The multiplier for xenon redistribution is a function of core lifetime as given in Figure 3.2-3. In addition, if Control Rod Group C is inserted below 80 inches, allowable power may not be regained until power has been at a reduced level defined below for at least twenty-four hours with Control Rod Group C between 80 and 90 inches.

Reduced power = allowable fraction of full power times multiplier given in Figure 3.2-4.

Exceptions:

1. If the rods are inserted below 80 inches and power does not go below the reduced power calculated above, hold at the lowest attained power level for at least twenty-four hours with control Rod Group C between 80 and 90 inches before returning to allowable power.

2. If the rods are inserted below 80 inches and zero power is held for more than forty-eight hours, no reduced power level need be held on the way to the allowable fraction of full power.

d. Shortened stack height factor, 1.009.

e. Measurement uncertainty:

1. 1.05, when at least 17 incore detection system neutron detector thimbles are OPERABLE, or

2. 1.068, when less than 17 incore detection system neutron detector thimbles are OPERABLE.

SURVEILLANCE REQUIREMENTS (Continued)

f. Power level uncertainty, 1.03.

g. Heat flux engineering factor, F_q^E, 1.04.

h. Core average linear heat generation rate at full power, 4.40 kW/ft.

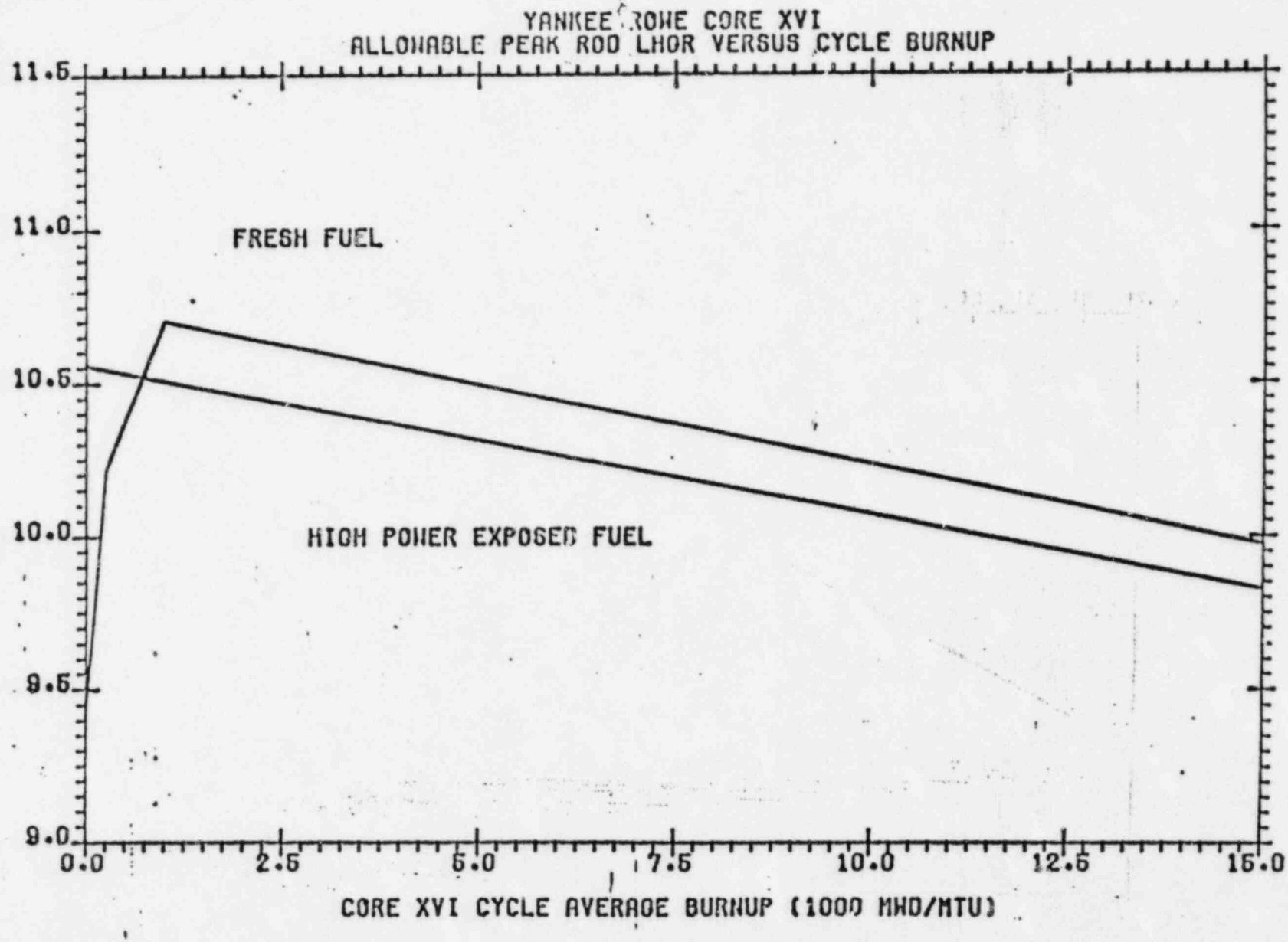
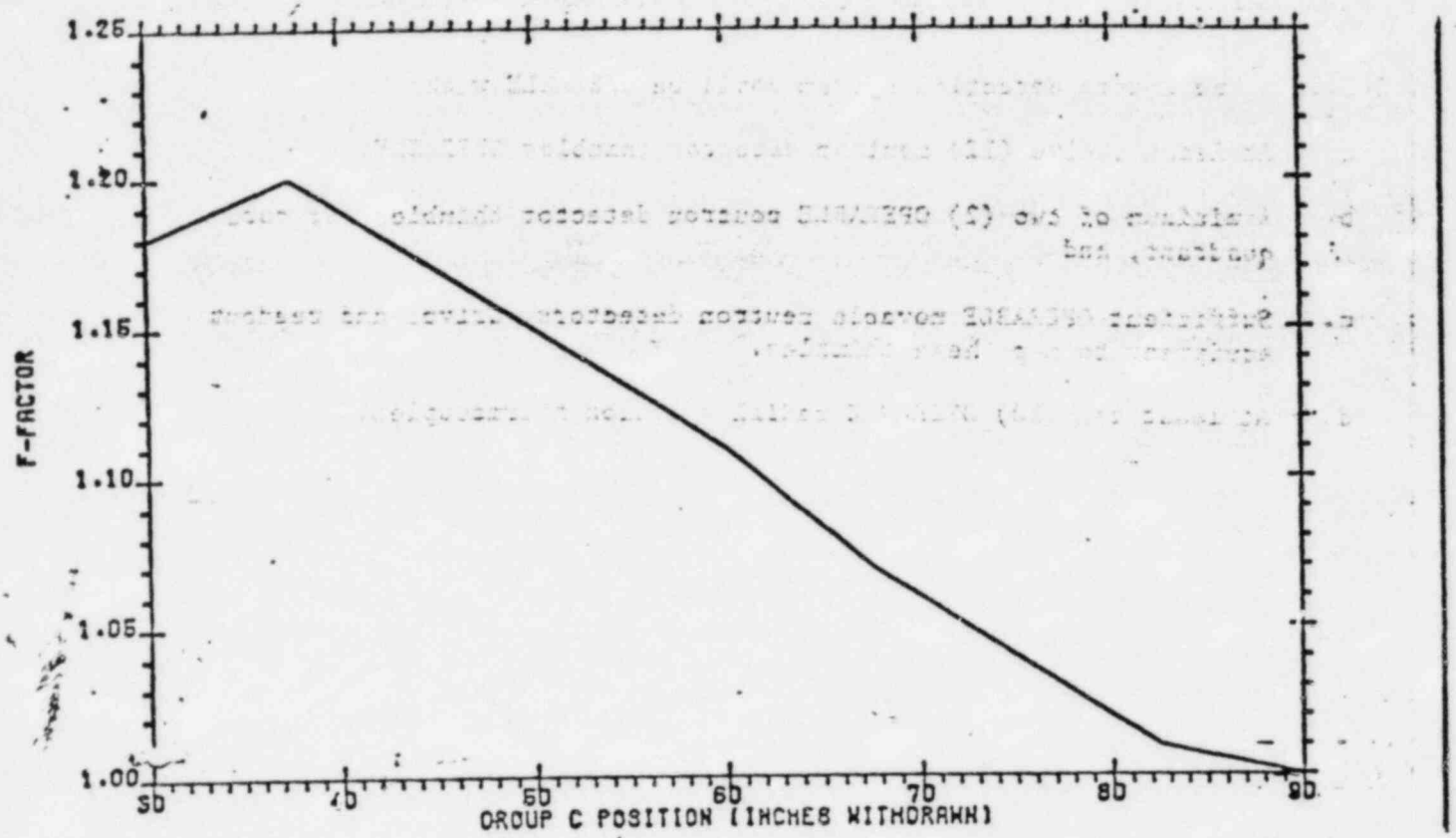

YANKEE ROWE CORE XVI
ALLOWABLE PEAK ROD LHOR VERSUS CYCLE BURNUP
FRESH FUEL
HIGH POWER EXPOSED FUEL
ALLOWABLE PEAK ROD LHGR (KW/FT)
CORE XVI CYCLE AVERAGE BURNUP (1000 MWD/MTU)
11.5
11.0
10.5
10.0
9.5
9.0
0.0
2.5
5.0
7.5
10.0
12.5
15.0

Figure 3.2-1



$$F_I = \frac{F \text{ @ Limit}}{F \text{ @ Measurement}}$$

FIGURE 3.2-2

Factor F as a Function of Rod Insertion

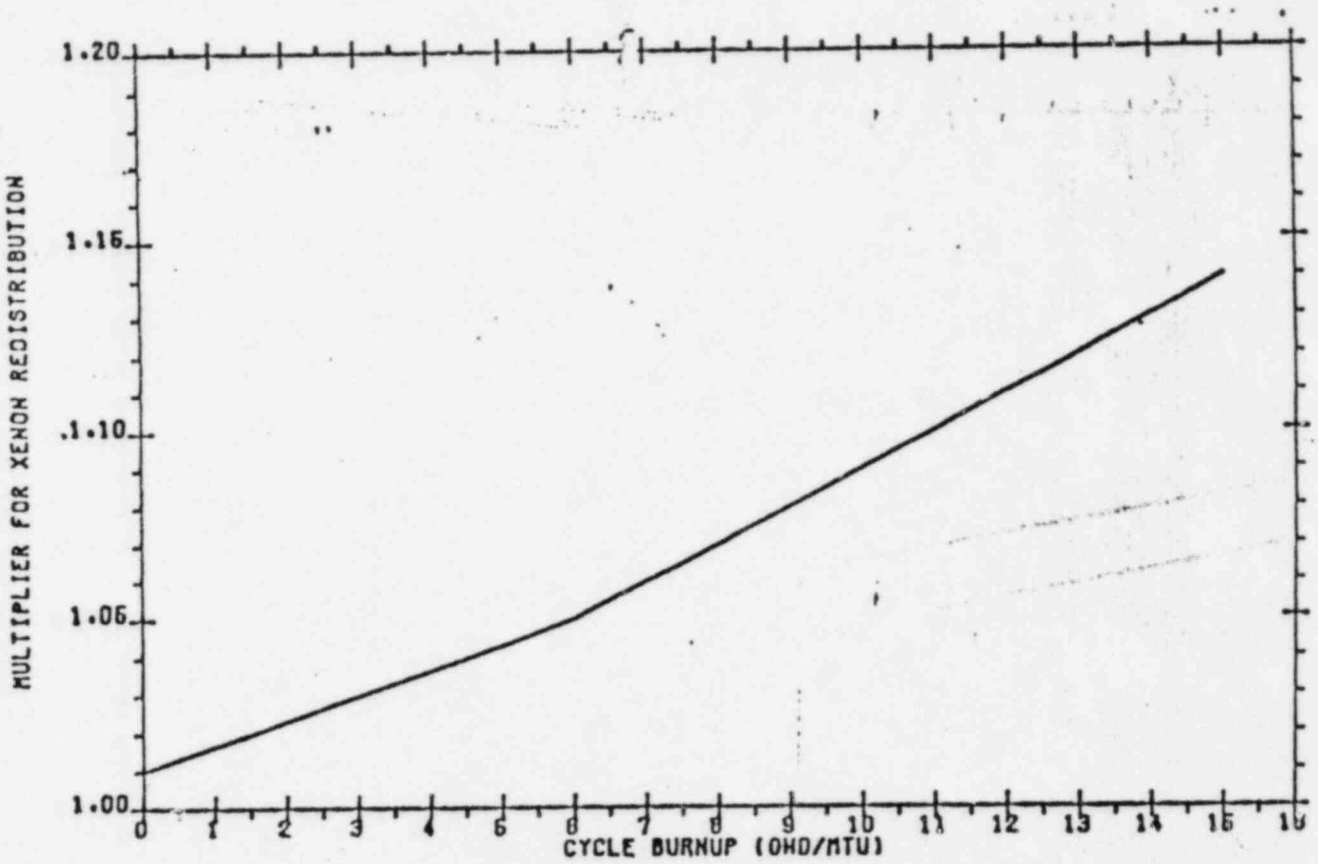


Figure 3.2-3

Multiplier for Xenon Redistribution as a Function of Exposure

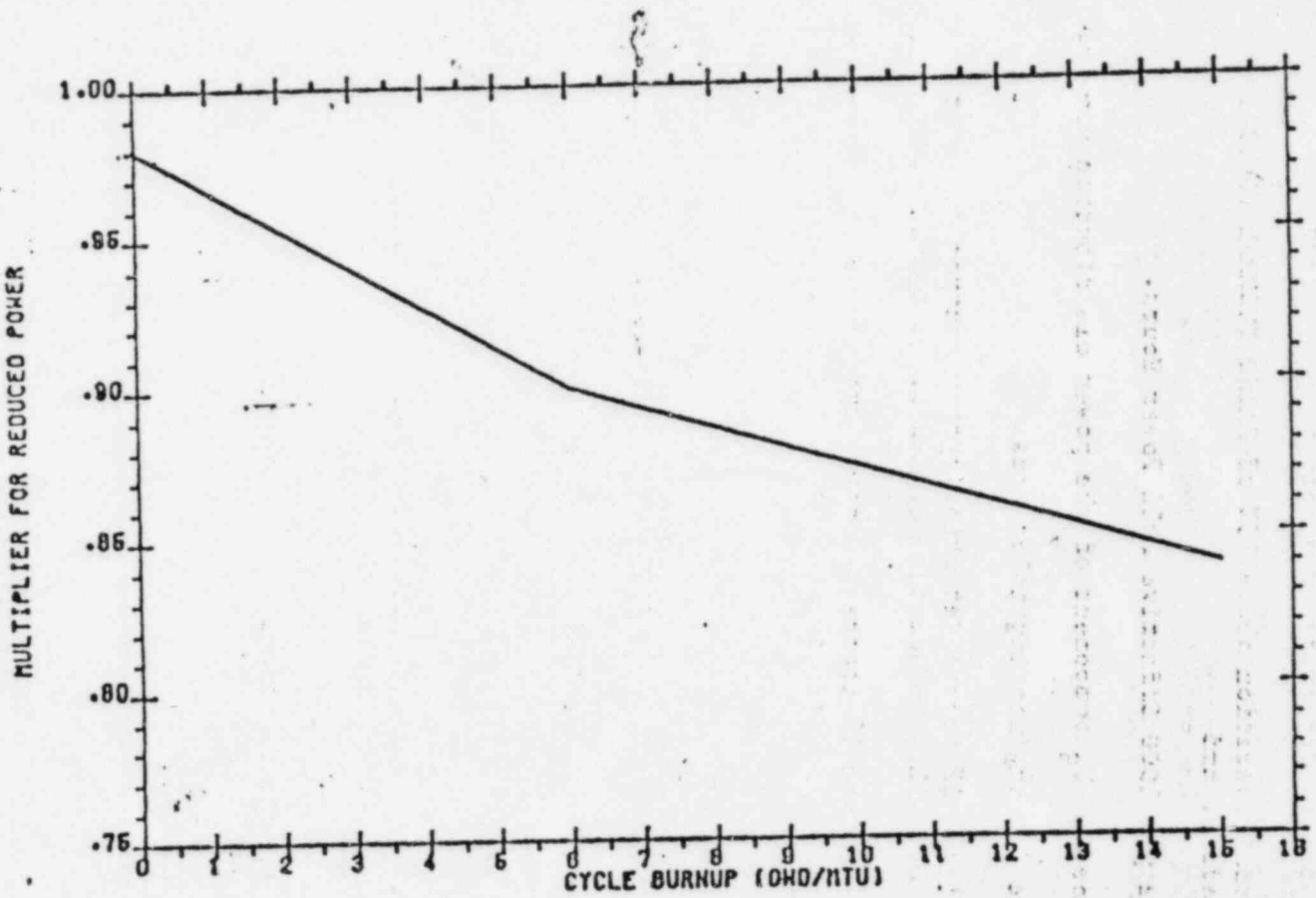


Figure 3.2-4

Multiplier for Reduced Power as a Function of Exposure

SURVEILLANCE REQUIREMENTS

4.2.2.1 F_q shall be determined to be within its limit by:

a. Using the movable incore detectors to obtain a power distribution map:

1. Prior to initial operation above 75% of RATED THERMAL POWER after each fuel loading, and

2. At least once per 1000 Effective Full Power Hours.

b. Increasing the measured F_q component of the power distribution map by:

1. 4% to account for engineering tolerances,

2. 5%, when at least 17 incore detection system neutron detector thimbles are OPERABLE, to account for measurement uncertainty,

3. 6.8%, when less than 17 incore detection system neutron detector thimbles are OPERABLE, to account for measurement uncertainty, and

4. 3% to account for fuel densification.

4.2.2.2 When F_q is measured pursuant to Specification 4.10.2.2, an overall measured F_q shall be obtained from a power distribution map and increased by:

1. 4% to account for engineering tolerances,

2. 5%, when at least 17 incore detection system neutron detector thimbles are OPERABLE, to account for measurement uncertainty,

3. 6.8%, when less than 17 incore detection system neutron detector thimbles are OPERABLE, to account for measurement uncertainty, and

4. 3% to account for fuel densification.

4.2.2.3 The provisions of Specification 4.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.2.3.1 $F^N_{\Delta H}$ shall be determined to be within its limit by using the movable incore detectors to obtain a power distribution map:

a. Prior to operation above 75% RATED THERMAL POWER after each fuel loading, and

b. At least once per 1000 Effective Full Power Hours.

c. The provisions of Specification 4.0.4 are not applicable.

4.2.3.2 The measured $F^N_{\Delta H}$ of 4.2.3.1 above shall be increased, for measurement uncertainty, by:

a. 5%, when at least 17 incore detection system neutron detector thimbles are OPERABLE; or

b. 6.8%, when less than 17 incore detection system neutron detector thimbles are OPERABLE.

TABLE 3.3-2

ENGINEERED SAFEGUARDS SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS AND SENSORS	CHANNELS AND SENSORS TO TRIP	MINIMUM CHANNELS AND SENSORS OPERABLE	APPLICABLE MODES	ACTION
1. SAFETY INJECTION					
a. Actuation Channel #1	1	1	1	1(3), 2(3), 3(2)(3)	10
1) RPS Low Main Coolant - Loop 1 Pressure Channel	1	1	1	1(3), 2(3), 3(2)(3)	10
2) High Containment Pressure Sensor	1	1	1	1(3), 2(3), 3(2)(3)	10
3) Manual Initiation	1	1	1	1, 2, 3, 4, 5(1)	10
b. Actuation Channel #2	1	1	1	1(3), 2(3), 3(2)(3)	10
1) RPS Low Main Coolant - Loop 2 Pressure Channel	1	1	1	1(3), 2(3), 3(2)(3)	10
2) High Containment Pressure Sensor	1	1	1	1(3), 2(3), 3(2)(3)	10
3) Manual Initiation	1	1	1	1, 2, 3, 4, 5(1)	10
2. CONTAINMENT ISOLATION					
a. Manual Initiation	2	1	1	1, 2, 3, 4, 5(1)	10
b. Actuation Channel A	1	1	1	1, 2, 3, 4, 5(1)	10
1) High Containment Pressure Sensor	1	1	1	1, 2, 3, 4, 5(1)	10
2) Safety Injection	(All Safety Injection Initiating Functions and Requirements)				

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TABLE 3.3-2 (continued)

TABLE NOTATION

** The provisions of Specification 3.0.4 are not applicable.

(1) Trip function may be bypassed in this MODE with main coolant pressure <300 psig.

(2) Trip function may be bypassed in this MODE with main coolant pressure <1800 psig and main coolant temperature <490°F

(3) Automatic initiation of Actuation Channel #1 may be bypassed in this MODE during functional test of the Main Coolant System Loop 1 pressure channel.

Automatic initiation of Actuation Channel #2 may be bypassed in this MODE during functional test of the Main Coolant System Loop 2 pressure channel.

(4) Trip may be manually bypassed when the reactor is not critical.

ACTION STATEMENTS

ACTION 10 - With the number of OPERABLE channels or sensors one less than the total number of channels or sensors, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours; however, one safety injection channel high containment pressure sensor may be bypassed for up to 2 hours for surveillance testing per Specification 4.3.2.1.

ACTION 6 - With the number of OPERABLE channels one less than the total number of channels, STARTUP and POWER OPERATION may proceed provided both of the following conditions are satisfied:

1. The inoperable channel is placed in the tripped condition within 1 hour.

2. The minimum channels OPERABLE requirement is met; however, one additional channel may be bypassed for up to 2 hours for surveillance testing per Specification 4.3.1.1.

TABLE 3.3-3

ENGINEERED SAFEGUARDS SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TRIP SETPOINT
1. SAFETY INJECTION	
a. Actuation Channel #1	
1) RPS Low Main Coolant - Loop 1 Pressure Channel	≥ 1700 psig
2) High Containment Pressure Sensor	≤ 5 psig
3) Manual Initiation	Not Applicable
b. Actuation Channel #2	
1) RPS Low Main Coolant - Loop 2 Pressure Channel	≥ 1700 psig
2) High Containment Pressure Sensor	≤ 5 psig
3) Manual Initiation	Not Applicable
2. CONTAINMENT ISOLATION	
a. Manual Initiation	Not Applicable
b. Actuation Channel A	
1) High Containment Pressure Sensor	≤ 5 psig
2) Safety Injection	(All Safety Injection Setpoints)
c. Actuation Channel B	
1) High Containment Pressure Sensor	≤ 5 psig
2) Safety Injection	(All Safety Injection Setpoints)
3. MAIN STEAM ISOLATION	
a. Low Steam Line Pressure	≥ 200 psig
b. Automatic Trip Logic	Not Applicable
c. Manual Initiation	Not Applicable
d. High Containment Pressure Trip-Containment Isolation	≤ 5 psig

TABLE 4.3-2

ENGINEERED SAFEGUARDS SYSTEM INSTRUMENTATION
SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
1. SAFETY INJECTION				
a. Actuation Channel #1	S	N.A.	M(1)	1, 2, 3#
1) RPS Low Main Coolant - Loop 1 Pressure Channel	S	R(3)	M	1, 2, 3,#
2) High Containment Pressure Sensor	S	R(3)	M(3)	1, 2, 3#
3) Manual Initiation	N.A.	N.A.	R	1, 2, 3, 4, 5*
b. Actuation Channel #2	S	N.A.	M(1)	1, 2, 3#
1) RPS Low Main Coolant - Loop 2 Pressure Channel	S	R(3)	M	1, 2, 3#
2) High Containment Pressure Sensor	S	R(3)	M(3)	1, 2, 3#
3) Manual Initiation	N.A.	N.A.	R	1, 2, 3, 4, 5*
2. CONTAINMENT ISOLATION				
a. Manual Initiation	N.A.	N.A.	R	1, 2, 3, 4, 5*
b. Actuation Channel A	S	N.A.	M(4)	1, 2, 3, 4, 5*
1) High Containment Pressure Sensor	S	N.A.	M(3)	1, 2, 3, 4, 5*
2) Safety Injection	(All Safety Injection Surveillance Requirements)			

INSTRUMENTATION

INCORE DETECTION SYSTEM

LIMITING CONDITIONS FOR OPERATION

3.3.3.2 The incore detection system shall be OPERABLE with:

a. At least twelve (12) neutron detector thimbles OPERABLE,

b. A minimum of two (2) OPERABLE neutron detector thimbles per core quadrant, and

c. Sufficient OPERABLE movable neutron detectors, drive, and readout equipment to map these thimbles.

d. At least ten (10) OPERABLE radial position thermcouples.

APPLICABILITY: When the incore detection system is used for core power distribution measurements.

ACTION:

With the incore detection system inoperable, do not use the system for the above applicable monitoring or calibration functions. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.3.3.2 The incore neutron detectors shall be demonstrated OPERABLE by normalizing each detector output to be used within 24 hours prior to its use for core power distribution measurements.

3/4.4 MAIN COOLANT SYSTEM

3/4.4.1 MAIN COOLANT LOOPS

COOLANT CIRCULATION - STARTUP AND POWER OPERATION

LIMITING CONDITION FOR OPERATION

3.4.1.1.1 All main coolant loops shall be in operation with all loop isolation valves open.

APPLICABILITY: MODES 1 and 2

ACTION:

a. With the requirements of the above Specification not satisfied, be in at least HOT STANDBY within 1 hour.

SURVEILLANCE REQUIREMENTS

4.4.1.1.1.1 The above required main coolant loops shall be verified to be in operation and circulating main coolant at least once per 12 hours.

MAIN COOLANT SYSTEM

COOLANT CIRCULATION - HOT STANDBY

LIMITING CONDITION FOR OPERATION

3.4.1.1.2 a. All main coolant loops shall be OPERABLE with all loop isolation valves open.

b. At least one main coolant loop shall be in operation.*

APPLICABILITY: MODE 3

ACTION:

a. With less than the above required main coolant loops OPERABLE, restore the required loops to OPERABLE status within 72 hours or be in HOT SHUTDOWN within the next 12 hours.

b. With no main coolant loop in operation, suspend all operations involving a reduction in boron concentration of the Main Coolant System and immediately initiate corrective action to return the required coolant loop to operation.

c. With the reactor vessel and connecting Pressurizer System isolated from the Heat Removal System by closing the loop isolation valve(s), leak testing may be performed provided that the coolant temperature in the reactor vessel does not increase at a rate exceeding 50° per hour, the maximum temperature increase during the test period does not exceed 100°F, and pressurizer pressure does not exceed 2485 psig.

SURVEILLANCE REQUIREMENTS

4.4.1.1.2.1 At least the above required main coolant pumps, if not in operation, shall be determined to be OPERABLE once per 7 days by verifying correct breaker alignments and indicated power availability.

4.4.1.1.2.2 At least one main coolant loop shall be verified to be in operation and circulating main coolant at least once per 12 hours.

*All main coolant pumps may be de-energized provided (1) no operations are permitted that would cause dilution of the Main Coolant System boron concentration, and (2) core outlet temperature is maintained at least 10°F below saturation temperature.

MAIN COOLANT SYSTEM

COOLANT CIRCULATION - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.4.1.1.3 a. At least two of the coolant loops listed below shall be OPERABLE:**

1. Main Coolant Loop 1 and its associated steam generator and main coolant pump,

2. Main Coolant Loop 2 and its associated steam generator and main coolant pump,

3. Main Coolant Loop 3 and its associated steam generator and main coolant pump,

4. Main Coolant Loop 4 and its associated steam generator and main coolant pump,

5. Shutdown Cooling System (Shutdown Cooling Pump and Cooler),

6. Shutdown Cooling System (Low Pressure Surge Tank Cooling Pump and Cooler).

b. At least one of the above coolant loops shall be in operation.*

APPLICABILITY: MODES 4** and 5

ACTION:

a. With less than the above required loops OPERABLE, immediately initiate corrective action to return the required loops to OPERABLE status as soon as possible; be in COLD SHUTDOWN within 20 hours.

b. With no coolant loop in operation, suspend all operations involving a reduction in boron concentration of the Main Coolant System and immediately initiate corrective action to return the required coolant loop to operation.

*All main coolant pumps and decay heat removal pumps may be de-energized provided (1) no operations are permitted that would cause dilution of the Main Coolant System boron concentration, and (2) core outlet temperature is maintained at least 10°F below saturation temperature.

**All main coolant loops shall be OPERABLE with all loop isolation valves open.

2. Verifying that the following valves are in their normally opened positions with power to the valve operators removed by removal of the circuit breaker from the motor control center:

Valve Number	Valve Function
a. SI-MOV-22	SI Header Isolation to Cold Leg
b. SI-MOV-23	SI Header Isolation to Cold Leg
c. SI-MOV-24	SI Header Isolation to Cold Leg
d. SI-MOV-25	SI Header Isolation to Cold Leg

3. Verifying that the following valves are in their normally closed position with power to the valve operator removed by disconnecting the power cables as they leave the motor starter:

Valve Number	Valve Function
b. CS-MOV-534	LPSI Pump Header Isolation Valve Bypass

4. Verifying that the following valves are in their normal position with power to the valve operator motors separated by dual contactors from the motor control center:

Valve Number	Valve Function	Normal Position
a. CS-MOV-532	LPSI Recirculation Line	Closed
b. CS-MOV-533	LPSI Pump Header Isolation	Open
c. CS-MOV-535	LPSI Pump Header Isolation	Open
d. SI-MOV-518	HPSI and LPSI Pump Header Suction Isolation	Open
e. SI-MOV-48	HPSI and LPSI Minimum Recirculation Line	Open
f. SI-MOV-49	HPSI and LPSI Minimum Recirculation Line	Open
g. SI-MOV-515	Hot Leg Injection Isolation	Closed
h. SI-MOV-514	Hot Leg Injection Isolation	Closed
i. SI-MOV-516	V.C. Sump Isolation	Closed
j. SI-MOV-517	V.C. Sump Isolation	Closed
k. SI-MOV-46	HPSI Flow Control	Open
l. SI-MOV-4	LPSI Pump Crossover to HPSI Pump	Open
m. CS-MOV-536	SI Header Isolation to Cold Leg	Open
n. CS-MOV-537	SI Header Isolation to Cold Leg	Open
o. CS-MOV-538	SI Header Isolation to Cold Leg	Open
p. CS-MOV-539	SI Header Isolation to Cold Leg	Open
q. MC-MOV-301	MCS Loop Isolation	Open
r. MC-MOV-302*	MCS Loop Isolation	Open
s. MC-MOV-309	MCS Loop Isolation	Open
t. MC-MOV-310*	MCS Loop Isolation	Open
u. MC-MOV-318*	MCS Loop Isolation	Open
v. MC-MOV-319	MCS Loop Isolation	Open
w. MC-MOV-325	MCS Loop Isolation	Open
x. MC-MOV-326*	MCS Loop Isolation	Open

Note: CS-MOV-532 may be opened for ≤ 30 minutes once per week for safety injection tank mixing or low pressure safety injection pump testing.

In Modes 2, 3, 4*, 5*, MCS loop isolation valves are required to be closed for main coolant pump(s) starting. After the pump(s) has been started, the valve(s) shall be reopened.

5. Verifying that each ECCS safety injection subsystem is aligned to receive electrical power from an OPERABLE emergency bus.

6. Verifying that each pair of ECCS recirculation subsystem redundant valves is aligned to receive electrical power from separate OPERABLE busses.

7. Verifying that each pair of ECCS long-term hot leg injection subsystem redundant valves is aligned to receive electrical power from separate OPERABLE busses.

8. Verifying that the charging header flow metering instrument is OPERABLE by observing charging flow rate at least once per 12 hours.

c. By a visual inspection which verifies that no loose debris (rags, trash, clothing, etc.) is present in the containment which could be transported to the containment sump and cause restriction of the pump suctions during LOCA conditions. This visual inspection shall be performed:

1. For all accessible areas of the containment prior to establishing containment integrity, and

2. Of the areas affected within containment at the completion of each containment entry when containment integrity is established.

d. At least once per 18 months by visual inspection of the containment sump and verifying that the subsystem suction inlets are not restricted by debris and that the sump components (trash racks, screens, etc.) show no evidence of structural distress or corrosion.

e. At least once per 18 months, during shutdown, by:

1. Cycling each power-operated (excluding automatic) valve in the flow path through at least one complete cycle of full travel.

2. Verifying that valve CS-MOV-532 actuates to its correct position on a safety injection signal.

3. Verifying that each of the following pumps start automatically upon receipt of a safety injection signal:

(a) High pressure safety injection (HPSI) pump

(b) Low pressure safety injection (LPSI) pump

4. Verifying that two low pressure safety injection pumps develop a combined flow 2180 gpm. Test every LPSI pump at least once per 36 months.

5. Verifying that each charging pump stops automatically upon receipt of a safety injection signal.

6. Verifying that the charging header flow metering instrument is OPERABLE by performing a CHANNEL CALIBRATION.

7. Verifying the proper positioning of the HPSI throttle valves SI-V-671, 672, 673, and 674 by performing an inspection to ensure that:

   (a) Each valve locking device is in place and securely welded to the valve handle and to the valve yoke.

   (b) The scribe mark on each valve body aligns with the scribe mark on the valve yoke.

8. Verifying the proper positioning of hot let injection throttle valve SI-V-645 at least once per 36 months by flow testing.

f. At least every 36 months, and/or any time either test under 4.5.e.7 is failed, by developing a backpressure of 875 psig in the high pressure safety injection header with two HPSI pumps operating as follows:

1. Pressure to the suction of the HPSI pumps to be 170 $\pm$ 10 psi.

2. LPSI flow is isolated.

3. Injection flow is to one loop with the other loops isolated by closing the appropriate injection gate valves CS-MOV-536, CS-MOV-537, CS-MOV-538, and CS-MOV-539.

4. The flow to the injection loops shall not be less than 200 gpm.

5. The above test shall be repeated to incude the operation of all HPSI pumps.

TABLE 3.6-1

CONTAINMENT ISOLATION VALVES

VALVE NUMBER	FUNCTION	TESTABLE DURING PLANT OPERATION (Yes or No)	ISOLATION TIME (Seconds)
A. AUTOMATIC ISOLATION VALVE			
TV-401A	No. 1 SG Blowdown	Yes	30
TV-401B	No. 2 SG Blowdown	Yes	30
TV-401C	No. 3 SG Blowdown	Yes	30
TV-401D	No. 4 SG Blowdown	Yes	30
TV-408	Containment Cooling Water Return	Yes	30
TV-409	Containment Heater Condensate Return	Yes	30
VD-SOV-301	Air Particulate Monitor-In	Yes	30
VD-SOV-302	Air Particulate Monitor-Out	Yes	30
HV-SOV-1	Hydrogen Vent System	Yes	30
HV-SOV-2	Hydrogen Vent System	Yes	30
TV-202	Main Coolant Drain	Yes	30
TV-203	Main Coolant Vent	Yes	30
TV-204	Valve Stem Leakoff	Yes	30
TV-205	Component Cooling Return	No	30
TV-206	Main Coolant Sample	Yes	30
TV-207	Neutren Shield Tank Sample	Yes	30
TV-209	Containment Drain	Yes	30
TV-211	Containment Pressure Sensing	Yes	30
TV-212	Containment Pressure Sensing	Yes	30
TV-213	LP Sample	Yes	30
TV-208	Component Cooling Supply	No	30

TABLE 3.6-1 (Continued)

CONTAINMENT ISOLATION VALVES

VALVE NUMBER	FUNCTION	TESTABLE DURING PLANT OPERATION (Yes or No)	ISOLATION TIME (Seconds)
A. AUTOMATIC ISOLATION VALVE (Continued)			
TV-406*	Main Steam Drain to Condenser	No	30
TV-411*	Atmospheric Steam Dump	Yes	30
TV-412	Service Water Supply	Yes	30
TV-413	VC Heat Steam supply	Yes	30
B. CHECK VALVES			
SI-V-14*	Safety Injection (HP)	NA	NA
CS-V-621*	Safety Injection (LP)	NA	NA
CH-V-611*	MC Feed to Loop #4	NA	NA
C. MANUAL VALVES			
SC-MOV-551*& 553*	Shutdown Cooling-In	No	NA
SC-MOV-552*& 554*	Shutdown Cooling-Out	No	NA
CH-MOV-522*	MC Feed to Loop Fill Header	NA	NA
CS-V-601	Shield Tank Cavity Fill	NA	NA
CA-V-746*	Containment Air Charge	NA	NA
HV-V-5*	Containment H2 Vent System	NA	NA
HV-V-6*	Containment H2 Vent System	NA	NA
CA-V-688	Containment H2 Vent System Air Supply	NA	NA
CS-MOV-500	Fuel Chute Lock Valve	No	NA

* Not subject to Type C tests.

TABLE 3.6-1 (Continued)

CONTAINMENT ISOLATION VALVES

VALVE NUMBER	FUNCTION	TESTABLE DURING PLANT OPERATION (Yes or No)	ISOLATION TIME (Seconds)

(THESE COLUMNS BLANK)

TABLE 3.6-1 (Continued)

CONTAINMENT ISOLATION VALVES

VALVE NUMBER	FUNCTION	TESTABLE DURING PLANT OPEPATION (Yes or No)	ISOLATION TIME (Seconds)
C. MANUAL VALVES (Continued)			
PR-V-610	Main Coolant Heise Pressure Gauge	NA	NA
PU-V-543	Purification System Containment Sump Suction	NA	NA
PU-V-544	Purification System Containment Sump Suction	NA	NA
SI-V-701*	SI to Alternate SG Feed	NA	NA
EBF-MOV-557*	Alternate SG Feed	NA	NA
VD-V-1157*	HSS to Alternate SG Feed	NA	NA
MS-V-627***	Main Steam Bypass	NA	NA
MS-V-628***	Main Steam Bypass	NA	NA
MS-V-629***	Main Steam Bypass	NA	NA
MS-V-630***	Main Steam Bypass	NA	NA
AS-V-719*	Emergency Feed Pump Steam Supply	NA	NA
AS-V-720*	Steam Drain	NA	NA
MS-MOV-659*	Atmospheric Steam Dump	NA	NA
MS-MOV-670*	Atmospheric Steam Dump	NA	NA
MS-MOV-681*	Atmospheric Steam Dump	NA	NA
MS-MOV-692*	Atmospheric Steam Dump	NA	NA

* Not subject to Type C tests.

*** Valve may be open for a 4-hour period during secondary plant heat-up and pressure equalization in Modes 2 and 3. Not subject to Type C tests.

ELECTRICAL POWER SYSTEMS

SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.8.1.2 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. One circuit between the offsite transmission network and the onsite Class 1E distribution system, and

b. One diesel generator with:

1. Day fuel tank containing a minimum volume of 210 gallons of fuel, equivalent to a 3/4 full tank, and

2. A fuel storage system containing a minimum volume of 4000 gallons of fuel, equivalent to a tank level of 2'2".

APPLICABILITY: MODES 5 and 6.

ACTION:

With less than the above minimum required A.C. electrical power sources OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes until the minimum required A.C. electrical power sources are restored to OPERABLE status.

SURVEILLANCE REQUIREMENTS

4.8.1.2 The above required A.C. electrical power sources shall be demonstrated OPERABLE by the performance of each of the Surveillance Requirements of 4.8.1.1.1 and 4.8.1.1.2 except for requirement 4.8.1.1.2a.4.

3/4.8.2 ON-SITE POWER DISTRIBUTION SYSTEMS

AC DISTRIBUTION - OPERATING

LIMITING CONDITION FOR OPERATION

3.8.2.1 The following ac electrical busses shall be OPERABLE and energized from sources of power other than the diesel generators with tie breakers open between redundant busses:

a. Redundant busses:

1. 2400 volt Bus #1*
2. 2400 volt Bus #2
3. 2400 volt Bus #3
4. 480 volt Bus #4-1*
5. 480 volt Bus #5-2
6. 480 volt Bus #6-3
7. 480 volt Emergency Bus #1
8. 480 volt Emergency Bus #2
9. 480 volt Emergency Bus #3
10. 480 volt Emergency MCC #3
11. 480 volt Emergency MCC #4
12. 480 volt Emergency MCC #5
13. 480 volt Emergency MCC #6

b. Non-Redundant Busses:

1. 480 volt Emergency MCC #1
2. 480 volt Emergency MCC #2
3. 120 volt Vital Bus #1
4. 120 volt Vital Bus #2

*One tie breaker may be closed $\leq$ 30 MWe.

LIMITING CONDITION FOR OPERATION (Continued)

APPLICABILITY: Modes 1, 2, 3, and 4

ACTION:

a. With less than the above complement of redundant ac busses OPERABLE, restore the inoperable bus to OPERABLE status within 8 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With any non-redundant bus inoperable, be in at least HOT STANDBY within one hour and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.8.2.1.1 Each specified ac bus, emergency bus, and emergency MCC shall be determined OPERABLE and energized from ac sources other than the diesel generators with tie breakers open between redundant busses at least once per 7 days by verifying correct breaker alignment and indicated power availability.

4.8.2.1.2 Emergency MCC #1 and #2 busses shall be determined OPERABLE by verifying:

a. At least once per 31 days that the alternate power supply is disconnected by racking out and locking out the breakers, and

b. At least once per 18 months that the interlocks preventing the normal- and alternate breakers from simultaneously being in the closed position are OPERABLE.

4.8.2.1.3 The 120 volt vital busses #1 and #2 shall be determined OPERABLE at least once per 18 months by manually transferring vital bus power from the normal source to the alternate power source.

ELECTRICAL POWER SYSTEMS

A.C. DISTRIBUTION - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.8.2.2 As a minimum, the following ac electrical busses shall be OPERABLE and energized from sources of power other than a diesel generator but aligned to an OPERABLE diesel generator.

a. 1 - 2400 volt Bus #2 or #3

b. 2 - 480 volt Busses #4-1, #5-2, or #6-3

c. 1 - 480 volt Emergency Bus #1, #2, or #3

d. 2 - 480 volt Busses, Emergency MCC #1 and Emergency MCC #2

e. 1 - 480 volt Bus, Emergency MCC #3 or Emergency MCC #4

f. 1 - 480 volt Bus, Emergency MCC #5 or Emergency MCC #6

g. 2 - 120 volt Vital Busses #1 and #2

APPLICABILITY: MODES 5 and 6

ACTION:

With less than the above complement of ac busses OPERABLE and energized, establish CONTAINMENT in accordance with Section 3.9.4 within 8 hours.

SURVEILLANCE REQUIREMENTS

4.8.2.2 The specified ac busses shall be determined OPERABLE and energized from ac sources other than the diesel generators at least once per 7 days by verifying correct breaker alignment and indicated power availability.

ELECTRICAL POWER SYSTEMS

D.C. DISTRIBUTION - OPERATING

LIMITING CONDITION FOR OPERATION

3.8.2.3 The following D.C. distribution system shall be energized and OPERABLE with tie breakers between trains open:

TRAIN "1" consisting of 125-volt D.C. distribution switchboard No. 1, 125-volt D.C. battery bank No. 1 and a full capacity charger.

TRAIN "2" consisting of 125-volt D.C. distribution switchboard No. 2, 125-volt D.C. battery bank No. 2 and a full capacity charger.

TRAIN "3" consisting of 125-volt D.C. distribution switchboards No. 3 and 3A, 125-volt D.C. battery bank No. 3 and a full capacity charger.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With one 125-volt D.C. distribution switchboard inoperable, restore the inoperable switchboard to OPERABLE status within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With one 125-volt D.C. battery and/or its charger inoperable, restore the inoperable battery and/or charger to OPERABLE status within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.8 2.3.1 Each D.C. distribution system train shall be determined OPERABLE and energized with tie breakers open at least once per 7 days by verifying correct breaker alignment and indicated power availability.

4.8.2.3.2 Each 125-volt battery bank and charger shall be demonstrated OPERABLE:

a. At least once per 7 days by verifying that:

1. The electrolyte level of each pilot cell is between the minimum and maximum level indication marks,

SURVEILLANCE REQUIREMENTS (Continued)

2. The pilot cell specific gravity, with electrolyte level within manufacturer's limits and corrected to 77°F, is ≥ 1.200,

3. The pilot cell voltage is ≥ 2.1 volts, and

4. The overall battery voltage is ≥ 125 volts.

b. At least once per 92 days by verifying that:

1. The voltage of each connected cell is ≥ 2.1 volts under float charge,

2. The specific gravity, with electrolyte level within manufacturer's limits and corrected to 77°F, of each connected cell is ≥ 1.200 and has not decreased more than 0.03 from the value observed during the previous test, and

3. The electrolyte level of each connected cell is between the minimum and maximum level indication marks.

c. At least once per 18 months by verifying that:

1. The cells, cell plates and battery racks show no visual indication of physical damage or abnormal deterioration,

2. The cell-to-cell and terminal connections are clean, tight, free of corrosion and coated with anti-corrosion material,

3. The Battery Chargers, #1 and #2 will supply at least 300 amperes at 132 volts and #3 will supply at least 75 amperes at 132 volts for at least 2 hours.

d. At least once per 18 months, during shutdown, by verifying that the battery capacity is adequate to supply and maintain in OPERABLE status all of the actual emergency loads for 2 hours when the battery is subjected to a battery service test.

e. At least once per 60 months, during shutdown, by verifying that the battery capacity is at least 80% of the manufacturer's rating when subjected to a performance discharge test. This performance discharge test may be performed in lieu of a battery service test when it is scheduled to be performed at the same time as a battery service test, but battery service tests must still be performed at 18 month intervals.

REFUELING OPERATIONS

REACTIVITY

LIMITING CONDITION FOR OPERATION

3.9.1 With the reactor vessel head unbolted or removed, the boron concentration of all filled portions of the Main Coolant System and the shield tank cavity shall be maintained uniform and sufficient to ensure a k_{eff} of 0.93 or less, which includes a 2% $\Delta k/k$ conservative allowance for uncertainties.

APPLICABILITY: MODE 6*

ACTION:

a. With the boron concentration requirements of the above specification not satisfied, immediately suspend all operations involving CORE ALTERATIONS or positive reactivity changes and initiate and continue boration at $\geq$ 26 gpm of 2200 ppm boron concentration or its equivalent until K_{eff} is reduced to $\leq$ 0.93.

b. With a significant unexpected increase in the count rate on any channel, or an unexpected increase in the count rate by a factor of two after addition of a new fuel assembly or removal of a control rod, suspend CORE ALTERATIONS until the situation is reviewed by plant technical supervisory personnel.

c. The provisions of Specification 3.0.3 are not applicable.

*The reactor shall be maintained in MODE 6 when the reactor vessel head is unbolted or removed with fuel in the vessel.

4.9.1.1 The above required reactivity condition shall be determined:

a. Prior to removing or unbolting the reactor vessel head, and*

b. Prior to withdrawal of any full-length control rod in excess of 3 feet from its fully inserted position.

c. At least after the insertion of each 5 fuel assemblies by withdrawing a single control rod using the manipulator crane to obtain a plot of control rod position versus inverse count rate multiplication. Using the inverse count rate data obtained, the SHUTDOWN MARGIN shall be calculated. If these calculations indicate that the SHUTDOWN MARGIN will be less than 5% Δ k/k (without the 2% Δ k/k conservative allowance for uncertainties) with all control rods inserted in the fully loaded core, the boron concentration will be increased to provide the required 5% Δ k/k calculated SHUTDOWN MARGIN.

4.9.1.2 Equipment which would make possible inadvertent reactivity increases shall be made inoperable and tagged out of service.

4.9.1.3 The boron concentration of the Main Coolant System and the shield tank cavity shall be determined by chemical analysis at least 3 times per 7 days with a maximum time interval between samples of 72 hours.

4.9.1.4 Before flooding the shield tank cavity with borated water, it shall be determined that the boron concentration of the water in the safety injection tank is not less than the required boron concentration of the Main Coolant System as specified above.

4.9.1.5 A record will be made of the neutron count rate before and after any change in core geometry.

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* With all four main coolant loops isolated during reactor head removal, assure that all control rods are inserted. With a control rod withdrawn, borate to compensate for the withdrawn rod.

3/4.10 SPECIAL TEST EXCEPTIONS

SHUTDOWN MARGIN

LIMITING CONDITION FOR OPERATION

3.10.1 The SHUTDOWN MARGIN requirement of Specifications 3.1.1.1.1 and 3.1.1.1.2 may be suspended for low power physics tests provided reactivity equivalent to at least the highest estimated control rod worth is available for trip insertion from OPERABLE control rod(s).

APPLICABILITY: MODES 2 and 3.

ACTION:

a. With any control rod not fully inserted and with less than the above reactivity equivalent available for trip insertion, immediately initiate and continue boration at $\geq$ 26 gpm of 2200 ppm boron concentration or its equivalent until the SHUTDOWN MARGIN required by Specifications 3.1.1.1.1 and 3.1.1.1.2 are restored.

b. With all control rods fully inserted and the reactor subcritical by less than the above reactivity equivalent, immediately initiate and continue boration at $\geq$ 26 gpm of 2200 ppm boron concentration or its equivalent until the SHUTDOWN MARGIN required by Specifications 3.1.1.1.1 and 3.1.1.1.2 are restored.

SURVEILLANCE REQUIREMENTS

4.10.1.1 The position of each control rod either partially or fully withdrawn shall be determined at least once per 2 hours.

4.10.1.2 Each control rod not fully inserted shall be demonstrated capable of full insertion when tripped from at least the 50% withdrawn position within 24 hours prior to reducing the SHUTDOWN MARGIN to less than the limits of Specifications 3.1.1.1.1 and 3.1.1.1.2.

SPECIAL TEST EXCEPTIONS

CONTROL ROD OPERABILITY AND INSERTION LIMITS

LIMITING CONDITION FOR OPERATION

3.10.2 The group height and insertion limits of Specifications 3.1.3.1, 3.1.3.4, 3.1.3.5, may be suspended during the performance of PHYSICS TESTS provided:

a. The THERMAL POWER is maintained $\leq$ 85% of RATED THERMAL POWER, and

b. The limits of Specification 3.2.1 are maintained and determined at the frequencies specified in Specification 4.10.2.2 below.

APPLICABILITY: MODE 1

ACTION:

With any of the limits of Specification 3.2.1 being exceeded while the requirements of Specification 3.1.3.1, 3.1.3.4, or 3.1.3.5 are suspended, either:

a. Reduce THERMAL POWER sufficient to satisfy the ACTION requirements of Specification 3.2.1 or

b. Be in HOT STANDBY within 6 hours.

SURVEILLANCE REQUIREMENTS

4.10.2.1 The THERMAL POWER shall be determined to be $\leq$ 85% of RATED THERMAL POWER at least once per hour during PHYSICS TESTS.

4.10.2.2 The Surveillance Requirements of Specification 4.2.2.2 shall be performed at least once per 12 hours.

3/4.1 REACTIVITY CONTROL SYSTEMS

BASES

3/4.1.1 BORATION CONTROL

3/4.1.1.1 and 3/4.1.1.2 SHUTDOWN MARGIN

A sufficient SHUTDOWN MARGIN ensures that 1) the reactor can be made subcritical from all operating conditions, 2) the reactivity transients associated with postulated accident conditions are controllable within acceptable limits, and 3) the reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

SHUTDOWN MARGIN requirements vary throughout core life as a function of fuel depletion, Main Coolant System boron concentration, and Main Coolant System T_{avg}. The most restrictive condition occurs at EOL, with T_{avg} at no load operating temperature, and is associated with a postulated steam line break accident and resulting uncontrolled Main Coolant System cooldown. The shutdown margins specified are consistent with the assumptions in the safety analysis. With $T_{avg} \leq 330^{\circ}F$, the reactivity transients resulting from a postulated steam line break cooldown are minimal. 5% $\Delta k/k$ SHUTDOWN MARGIN (with all rods inserted) provides adequate protection to preclude criticality for all postulated accidents with the reactor vessel head in place.

To eliminate possible errors in the calculations of the initial reactivity of the core and the reactivity depletion rate, the predicted relation between fuel burnup and the boron concentration, necessary to maintain adequate control characteristics, must be adjusted (normalized) to accurately reflect actual core conditions. Normally, when full power is reached after each refueling, and with the control rod groups in the desired positions, the boron concentration is measured and the predicted steady-state curve is adjusted to this point. As power operation proceeds, the measured boron concentration is compared with the predicted concentration and the slope of the curve relating burnup and reactivity is compared with that predicted. This process of normalization should be completed after about 10% of the total core burnup. Thereafter, actual boron concentration can be compared with prediction and the reactivity status of the core can be continuously evaluated, and any deviation would be thoroughly investigated and evaluated.