8005050268

TECHNICAL SPECIFICATION CHANGE REQUEST NO. 61 (APPENDIX A)

Page Replacement

Delete and insert the pages in Appendix A of Operating License DPR-72 as indicated below:

DELETE	INSERT
III	III
2-3	2-3
2-5	2-5
2-7	2-7
B 2-1	B 2-1
B-2-5	B 2-5
B 2-6	B 2-6
B 2-8	B 2-8
3/4 1-1	3/4 1-1
3/4 1-2a	3/4 1-2a
3/4 1-2b	
3/4 1-7	3/4 1-7
3/4 1-8	3/4 1-8
3/4 1-10	3/4 1-10
3/4 1-10a	3/4 1-10a
3/4 1-13	3/4 1-13
3/4 1-16	3/4 1-16
3/4 1-17	3/4 1-17
3/4 1-27	3/4 1-27
3/4 1-28	3/4 1-28
3/4 1-29	3/4 1-29
3/4 1-30	3/4 1-30
3/4 1-38	3/4 1-38
3/4 1-39	3/4 1-39
3/4 2-2	3/4 2-2
3/4 2-3	3/4 2-3
3/4 2-11	3/4 2-11
3/4 2-13	3/4 2-13
3/4 4-1	3/4 4-1
3/4 10-4	3/4 10-4
B3/4 1-1	B3/4 1-1
B3/4 1-2	B3/4 1-2
B3/4 1-3	B3/4 1-3

Proposed Change

A portion of these changes address the current reactor refueling for Cycle 3. These reload changes are supported in BAW-1607, Revision 1, Crystal River Unit 3 - Cycle 3 Reload Report. The remainder of the changes address increasing the Shutdown Margin in Modes 4 and 5 from $\geq 2.2\% \Delta k/k$ to $\geq 3.0 \Delta k/k$.

These changes include changing: 1) the Reactor Core Safety Limit for Reactor Thermal Power and Axial Power Imbalance and associated Bases; 2) the Limiting Safety System Settings and associated Bases; 3) the Regulating and Axial Power Shaping Rod Group insertion limits; 4) the figures that specify the power level cutoff for Xenon reactivity; 5) the Axial Power Imbalance Envelopes; 6) the Quadrant Power Tilt Limits; and 7) the DNB Margin Limits; 8) the Shutdown Margin requirements for Modes 4 and 5.

Reason for Proposed Change

Crystal River Unit 3 will operate in Cycle 3 with 52 fresh fuel assemblies. As stated in BAW-1607, Revision 1, Crystal River Unit 3 - Cycle 3 Reload Report, certain Technical Specifications require revision as a result of the Cycle 3 reload. The analyses summarized in BAW-1607, Revision 1, accounted for the Cycle 3 reload, the addition of the reactor coolant pump power monitors, and the potential increase in licensed rated thermal power from 2452 MWt to 2544 MWt. As a result of the proposed operation of Cycle 3 at the present licensed core power level, the proposed specifications which were determined for 2544 MWt will be conservative for operation at 2452 MWt.

a. Pages 2-3, 2-5, 2-7, B2-1, B2-5, B2-6, B2-8, 3/4 1-27, 3/4 1-28, 3/4 1-29, 3/4 1-30, 3/4 1-38, 3/4 1-39, 3/4 2-2, 3/4 2-3, 3/4 4-1: The flux/Δflux envelopes, flux/flow trips, regulating rod group insertion limits, axial power shaping rod group insertion limits, and axial power imbalance envelopes reflect revised nuclear parameters as a result of the Cycle 3 reload.

b. Page 3/4 2-11: Tilt limits were reduced to reflect increased detector depletion.

c. Page 3/4 2-13: Flow rates were revised to reflect the values used in the analyses.

The proposed changes to increase the Shutdown Margin requirements in Modes 4 and 5 are made to insure that a deboration incident resulting from the inadvertent injection of sodium hydroxide will not result in criticality.

d. Pages 3/4 1-1, 3/4 1-2a, 3/4 1-2b, 3/4 1-7, 3/4 1-8, 3/4 1-10, 3/4 1-10a, 3/4 1-13, 3/4 1-16, 3/4 1-17, 3/4 10-4, B3/4 1-1, B3/4 1-2, B3/4 1-3 — Shutdown Margin requirements are increased to 3.0%.

Safety Analysis of Proposed Change

The licensing considerations for operation of Crystal River Unit 3 with the Cycle 3 reload are described in BAW-1607, Revision 1, Crystal River Unit 3 - Cycle 3 Reload Report. These proposed changes will bring the Technical Specifications into agreement with the applicable portions of BAW-1607, Revision 1, as amended by the reanalysis for continuation of operation at 2452 MWt without Reactor Coolant Pump Power Monitors.

The review, of the Technical Specifications ensures that the Final Acceptance Criteria ECCS limits will not be exceeded nor will the thermal design criteria be violated.

The increase in the Shutdown Margin requirements in Modes 4 and 5 will ensure that a deboration incident resulting from the inadvertent injection of sodium hydroxide will not result in criticality.

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

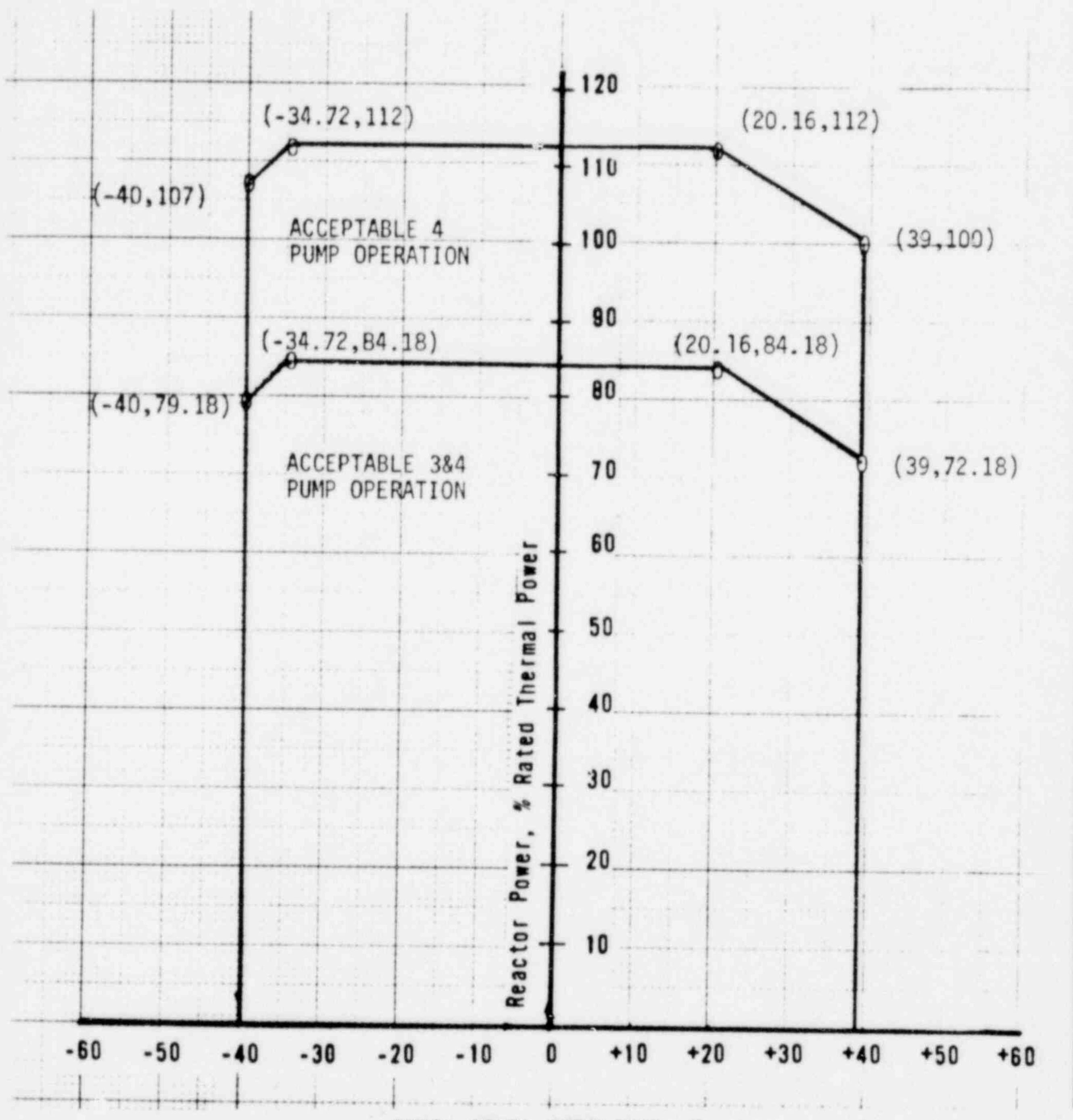


FIGURE 2.1-2

REACTOR CORE SAFETY LIMIT

TABLE 2.2-1

REACTOR PROTECTION SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
1. Manual Reactor Trip	Not Applicable	Not Applicable
2. Nuclear Overpower	≤105.5% of RATED THERMAL POWER with four pumps operating ≤77.68% of RATED THERMAL POWER with three pumps operating	<105.5% of RATED THERMAL POWER with four pumps operating ≤77.68% of RATED THERMAL POWER with three pumps operating
3. RCS Outlet Temperature-High	≤619°F	≤619°F
4. Nuclear Overpower Based on RCS Flow and AXIAL POWER IMBALANCE(1)	Trip Setpoint not to exceed the limit line of Figure 2.2-1	Allowable Values not to exceed the limit line of Figure 2.2-1.
5. RCS Pressure-Low(1)	≥1800 psig	≥1800 psig
6. RCS Pressure-High	≤2300 psig	≤2300 psig
7. RCS Pressure-Variable Low(1)	≥(11.80 T_{out} °F -5209.2) psig	≥(11.80 T_{out} °F -5209.2) psig

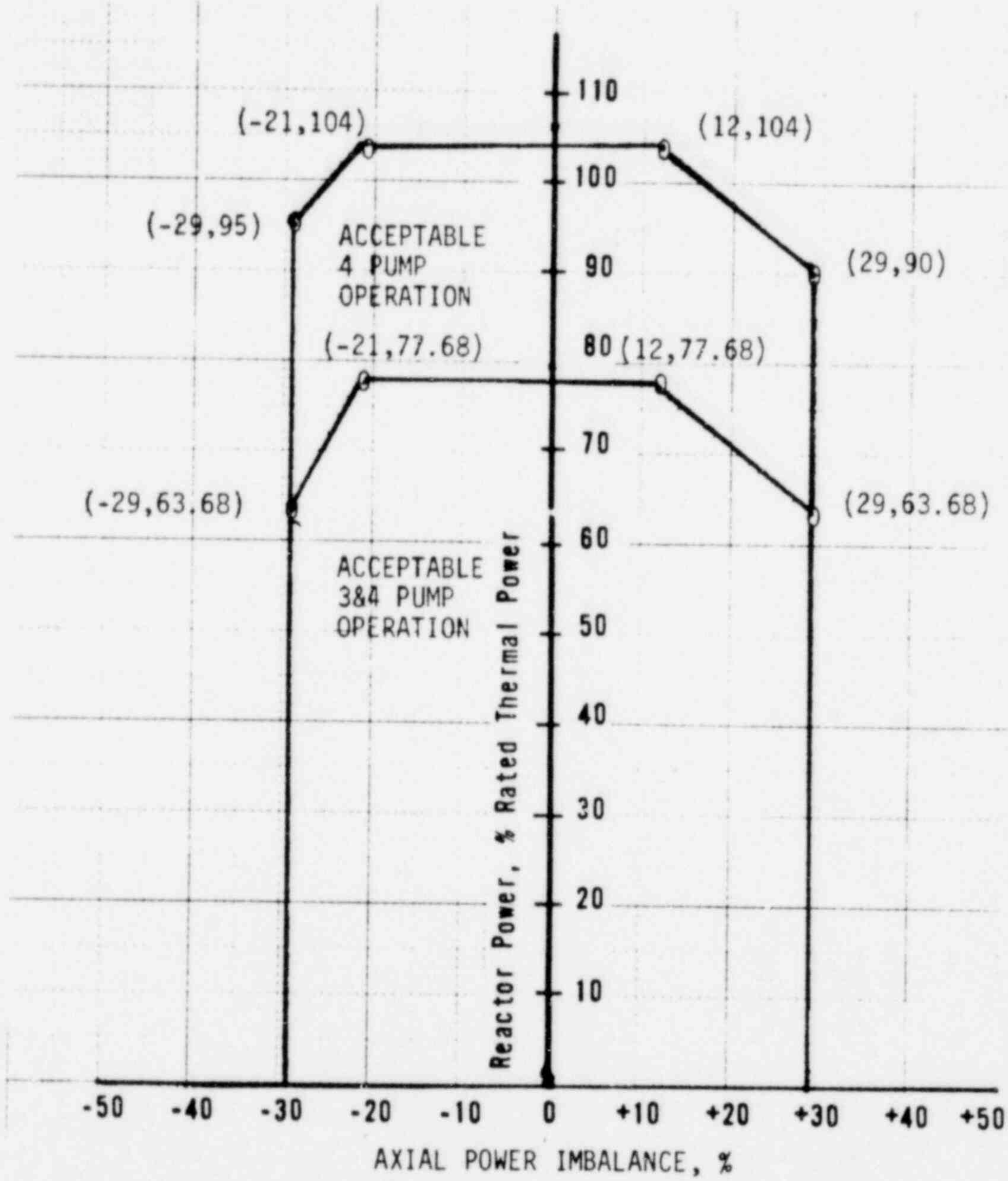


FIGURE 2.2-1

TRIP SETPOINT FOR NUCLEAR OVERPOWER BASED ON
RCS FLOW AND AXIAL POWER IMBALANCE

2.1.1 and 2.1.2 REACTOR CORE

The restrictions of this safety limit prevent overheating of the fuel cladding and possible cladding perforation which would result in the release of fission products to the reactor coolant. Overheating of the fuel cladding is prevented by restricting fuel operation to within the nucleate boiling regime where the heat transfer coefficient is large and the cladding surface temperature is slightly above the coolant saturation temperature.

Operation above the upper boundary of the nucleate boiling regime would result in excessive cladding temperatures because of the onset of departure from nucleate boiling (DNB) and the resultant sharp reduction in heat transfer coefficient. DNB is not a directly measurable parameter during operation and therefore THERMAL POWER and Reactor Coolant Temperature and Pressure have been related to DNB through the BAW-2 DNB correlation. The DNB correlation has been developed to predict the DNB flux and the location of DNB for axially uniform and non-uniform heat flux distributions. The local DNB heat flux ratio, DNBR, defined as the ratio of the heat flux that would cause DNB at a particular core location to the local heat flux, is indicative of the margin to DNB.

The minimum value of the DNBR during steady state operation, normal operational transients, and anticipated transients is limited to 1.30. This value corresponds to a 95 percent probability at a 95 percent confidence level that DNB will not occur and is chosen as an appropriate margin to DNB for all operating conditions.

The curve presented in Figure 2.1-1 represents the conditions at which a minimum DNBR of 1.30 is predicted for the maximum possible thermal power, 112%, when the reactor coolant flow is 139.7×10^6 lbs/hr, which is 106.5% of the design flow rate for four operating reactor coolant pumps. This curve is based on the following nuclear power peaking factors with potential fuel densification effects:

$$F^N_Q = 2.57; \quad F^N_H = 1.71; \quad F^N_Z = 1.50$$

The design limit power peaking factors are the most restrictive calculated at full power for the range from all control rods fully withdrawn to minimum allowable control rod withdrawal, and form the core DNBR design basis.

RCS Outlet Temperature - High

The RCS Outlet Temperature High trip $\leq$619°F prevents the reactor outlet temperature from exceeding the design limits and acts as a backup trip for all power excursion transients.

Nuclear Overpower Based on RCS Flow and AXIAL POWER IMBALANCE

The power level trip setpoint produced by the reactor coolant system flow is based on a flux-to-flow ratio which has been established to accommodate flow decreasing transients from high power.

The power level trip setpoint produced by the power-to-flow ratio provides both high power level and low flow protection in the event the reactor power level increases or the reactor coolant flow rate decreases. The power level setpoint produced by the power-to-flow ratio provides overpower DNB protection for all modes of pump operation. For every flow rate there is a maximum permissible power level, and for every power level there is a minimum permissible low flow rate. Typical power level and low flow rate combinations for the pump situations of Table 2.2-1 are as follows:

1. Trip would occur when four reactor coolant pumps are operating if power is $\geq$104.0% and reactor flow rate is 100%, or flow rate is $\leq$96.1% and power level is 100%.

2. Trip would occur when three reactor coolant pumps are operating if power is $\geq$77.68% and reactor flow rate is 74.7%, or flow rate is $\leq$72.12% and power is 75%.

For safety calculations the maximum calibratic and instrumentation errors for the power level were used.

The AXIAL POWER IMBALANCE boundaries are established in order to prevent reactor thermal limits from being exceeded. These thermal limits are either power peaking kw/ft limits or DNBR limits. The AXIAL POWER IMBALANCE reduces the power level trip produced by the flux-to-flow ratio such that the boundaries of Figure 2.2-1 are produced. The flux-to-flow ratio reduces the power level trip and associated reactor power-reactor power-imbalance boundaries by 1.04% for a 1% flow reduction.

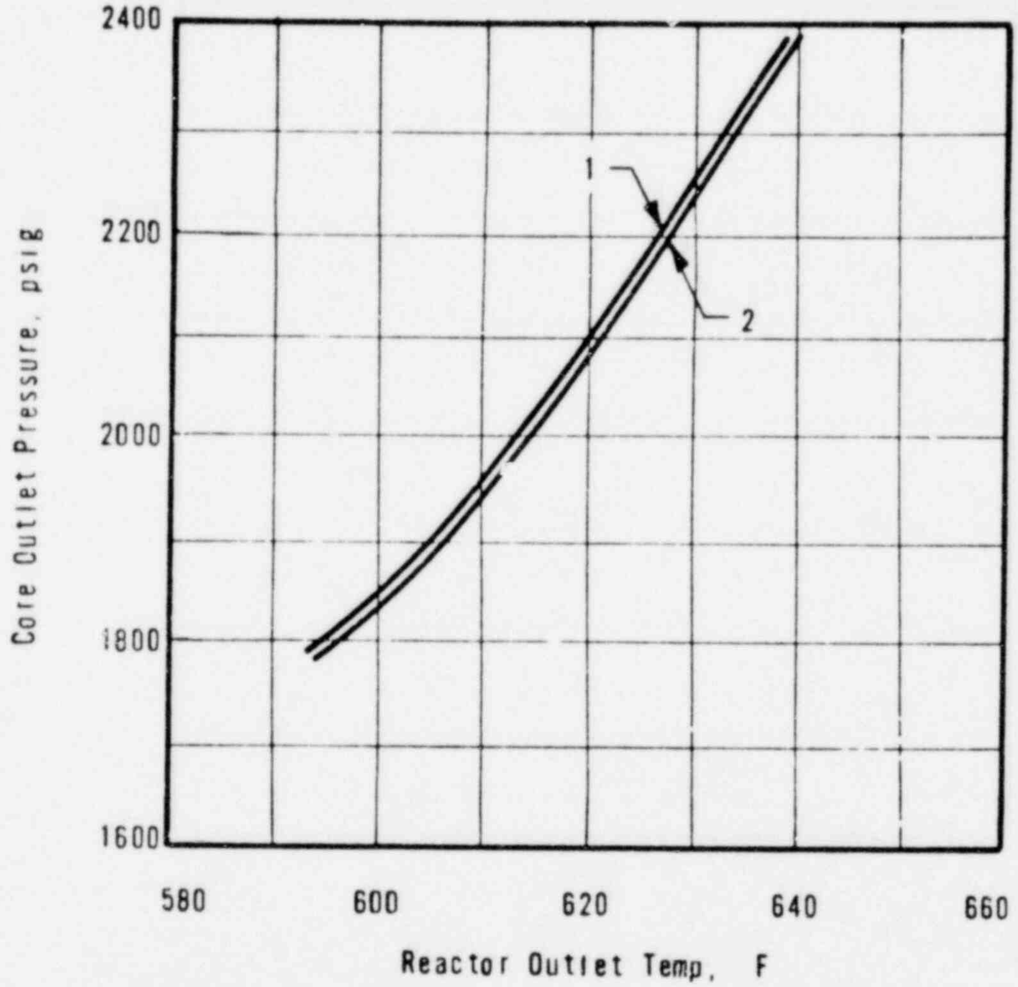
RCS Pressure - Low, High and Variable Low

The High and Low trips are provided to limit the pressure range in which reactor operation is permitted.

During a slow reactivity insertion startup accident from low power or a slow reactivity insertion from high power, the RCS Pressure-High setpoint is reached before the Nuclear Overpower Trip Setpoint. The trip setpoint for RCS Pressure-High, 2300 psig, has been established to maintain the system pressure below the safety limit, 2750 psig, for any design transient. The RCS Pressure-High trip is backed up by the pressurized code safety valves for RCS over pressure protection, and is therefore set lower than the set pressure for these valves, 2500 psig. The RCS Pressure-High trip also backs up the Nuclear Overpower trip.

The RCS Pressure-Low, 1800 psig, and RCS Presssure-Variable Low, (11.80 T_{out}°F-5209.2) psig, Trip Setpoints have been established to maintain the DNB ratio greater than or equal to 1.30 for those design accidents that result in a pressure reduction. It also prevents reactor operation at pressures below the valid range of DNB correlation limits, protecting against DNB.

Due to the calibration and instrumentation errors, the safety analysis used a RCS Pressure-Variable Low Trip Setpoint of (11.80 T_{out}°F-5249.2) psig.



REACTOR COOLANT FLOW

CURVE	FLOW (% Design)	POWER (RTP)	PUMPS OPERATING (TYPE OF LIMIT)
1	139.7×10^6 (106.5%)	117.3%	4 Pumps (DNBR)
2	104.4×10^6 (79.6%)	90.5%	3 Pumps (DNBR)

PRESSURE/TEMPERATURE LIMITS AT MAXIMUM
ALLOWABLE POWER FOR MINIMUM DNBR

BASES FIGURE 2.1

3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

SHUTDOWN MARGIN-OPERATING

LIMITING CONDITION FOR OPERATION

3.1.1.1.1 The SHUTDOWN MARGIN shall be $\geq$1% $\Delta k/k$.

APPLICABILITY: MODES 1, 2* and 3.

ACTION:

With the SHUTDOWN MARGIN <1% $\Delta k/k$, immediately initiate and continue boration with one of the OPERABLE borated water sources of Specification 3.1.2.9 until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.1.1.1 The SHUTDOWN MARGIN shall be determined to be $\geq$1% $\Delta k/k$:

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 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 12 hours, by verifying that regulating rod groups withdrawal is within the limits of Specification 3.1.3.6.

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 3.1.3.6.

d. Prior to initial operation above 5% RATED THERMAL POWER after each fuel loading by consideration of the factors of e. below, with the regulating rod groups at the maximum insertion limit of Specification 3.1.3.6.

#With $K_{eff} \geq 1.0$.
##With $K_{eff} < 1.0$.
*See Special Test Exception 3.10.4.

3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

SHUTDOWN MARGIN-SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.1.1.2 The SHUTDOWN MARGIN shall be $\geq 3.0\% \Delta k/k$.

APPLICABILITY: MODES 4 and 5.

ACTION:

MODE 4

With the SHUTDOWN MARGIN $<3.0\% \Delta k/k$, immediately initiate and continue boration with one of the OPERABLE borated water sources of Specification 3.1.2.9 until the required SHUTDOWN MARGIN is restored.

MODE 5

With the SHUTDOWN MARGIN $<3.0\% \Delta k/k$, immediately initiate and continue boration with one of the OPERABLE borated water sources of Specification 3.1.2.8 until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.1.2.1 The SHUTDOWN MARGIN shall be determined to be $\geq 3.0\% \Delta k/k$:

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 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. At least once per 24 hours by consideration of the following factors:

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

FLOW PATHS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.2 Each of the following boron injection flow paths shall be OPERABLE:

a. A flow path from the concentrated boric acid storage system via a boric acid pump and makeup or decay heat removal (DHR) pump to the Reactor Coolant System, and

b. A flow path from the borated water storage tank via makeup or DHR pump to the Reactor Coolant System.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

MODES 1, 2 and 3

a. With the flow path from the concentrated boric acid storage system inoperable, restore the inoperable flow path to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to 1% $\Delta k/k$ at 200°F within the next 6 hours; restore the flow path to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

b. With the flow path from the borated water storage tank inoperable, restore the flow path to OPERABLE status within one hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

MODE 4

a. With the flow path from the concentrated boric acid storage system inoperable, restore the inoperable flow path to OPERABLE status within 72 hours or be borated to a SHUTDOWN MARGIN equivalent to 3.0% $\Delta k/k$ at 200°F within the next 6 hours; restore the flow path to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

FLOW PATHS - OPERATING

LIMITING CONDITION FOR OPERATION

ACTION: (Continued)

b. With the flow path from the borated water storage tank inoperable, restore the flow path to OPERABLE status within one hour or be in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.2 Each of the above required flow paths shall be demonstrated OPERABLE:

a. At least once per 7 days by verifying that the pipe temperature of the heat traced portion of the flow path from the concentrated boric acid storage system is $\geq$ 105°F.

b. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

MAKEUP PUMPS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.4.1 At least two makeup pumps shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3

ACTION:

With only one makeup pump OPERABLE, restore at least two makeup pumps to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to 1% $\Delta k/k$ at 200°F within the next 6 hours; restore at least two makeup pumps to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.4.1 No additional Surveillance Requirements other than those required by Specification 4.0.5.

MAKEUP PUMPS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.4.2 At least one makeup pump shall be OPERABLE.

APPLICABILITY: MODE 4*

ACTION:

With no makeup pump OPERABLE, restore at least one makeup pump to OPERABLE status within one hour or be borated to a SHUTDOWN MARGIN equivalent to 3.0% $\Delta k/k$ at 200°F and be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.4.2 No additional Surveillance Requirements other than those required by Specification 4.0.5.

*With RCS pressure $\geq$ 150 psig.

BORIC ACID PUMPS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.7 At least one boric acid pump in the boron injection flow path required by Specification 3.1.2.2a shall be OPERABLE and capable of being powered from an OPERABLE emergency bus if the flow path through the boric acid pump in Specification 3.1.2.2a is OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

MODES 1, 2 and 3

With no boric acid pump OPERABLE, restore at least one boric acid pump to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to 1% $\Delta k/k$ at 200°F within the next 6 hours; restore at least one boric acid pump to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

MODE 4

With no boric acid pump OPERABLE, restore at least one boric acid pump to OPERABLE status within 72 hours or be borated to a SHUTDOWN MARGIN equivalent to 3.0% $\Delta k/k$ at 200°F within the next 6 hours; restore at least one boric acid pump to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.7 No additional Surveillance Requirements other than those required by Specification 4.0.5.

BORATED WATER SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.9 Each of the following borated water sources shall be OPERABLE:

a. The concentrated boric acid storage system and associated heat tracing with:

1. A minimum contained borated water volume of 6615 gallons,

2. Between 11,600 and 14,000 ppm of boron, and

3. A minimum solution temperature of 105°F.

b. The borated water storage tank (BWST) with:

1. A contained borated water volume of between 415,200 and 449,000 gallons,

2. Between 2270 and 2450 ppm of boron, and

3. A minimum solution temperature of 40°F.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

MODES 1, 2 and 3:

a. With the concentrated boric acid storage system inoperable, restore the storage system to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to 1% $\Delta k/k$ at 200°F within the next 6 hours; restore the concentrated boric acid storage system to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

b. With the borated water storage tank inoperable, restore the tank to OPERABLE status within one hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

MODE 4:

a. With the concentrated boric acid storage system inoperable, restore the storage system to OPERABLE status within 72 hours or be

BORATED WATER SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

ACTION: (Continued)

borated to a SHUTDOWN MARGIN equivalent to 3.0% $\Delta k/k$ at 200°F within the next 6 hours; restore the concentrated boric acid storage system to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

b. With the borated water storage tank inoperable, restore the tank to OPERABLE status within one hour or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.9 Each borated water source shall be demonstrated OPERABLE:

a. At least once per 7 days by:

1. Verifying the boron concentration in each water source,
2. Verifying the contained borated water volume of each water source, and
3. Verifying the concentrated boric acid storage system solution temperature.

b. At least once per 24 hours by verifying the BWST temperature when the outside air temperature is < 40°F.

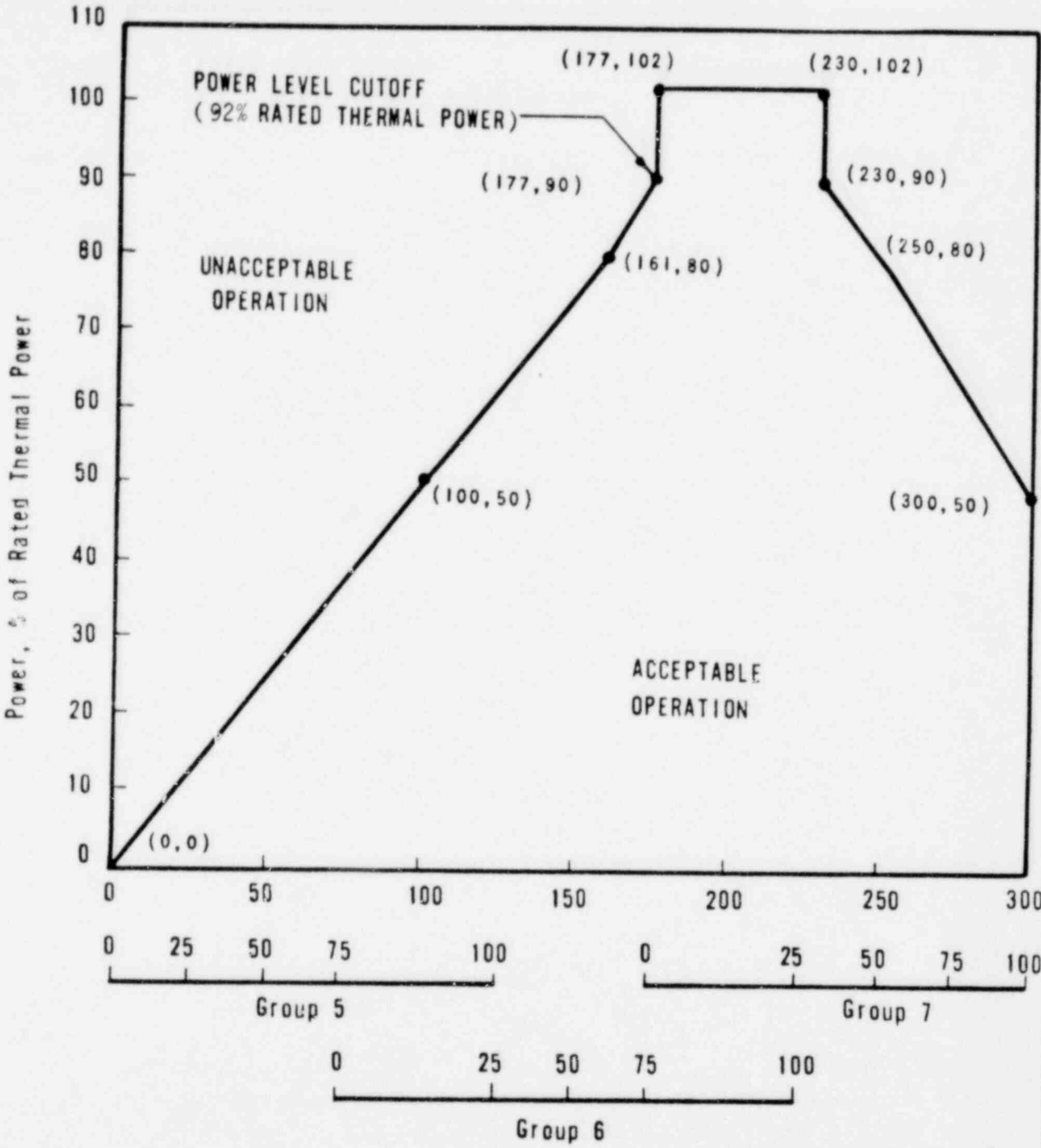


FIGURE 3.1-1

REGULATING ROD GROUP INSERTION LIMITS FOR 4 PUMP OPERATION FROM 0 EFPD TO 250 ± 10 EFPD

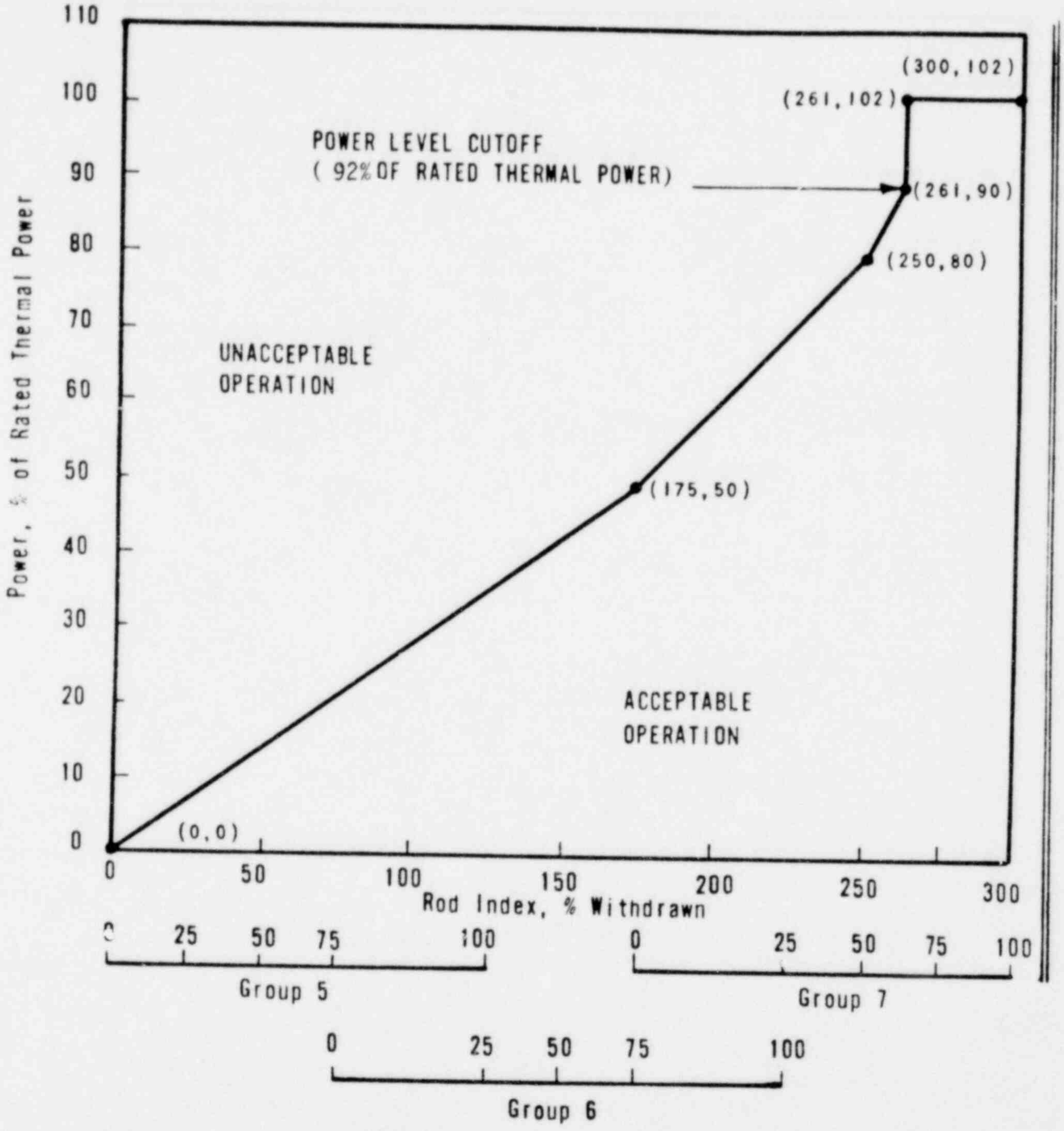


FIGURE 3.1-2

REGULATING ROD GROUP INSERTION LIMITS FOR
4 PUMP OPERATION AFTER 250 ± 10 EFPD

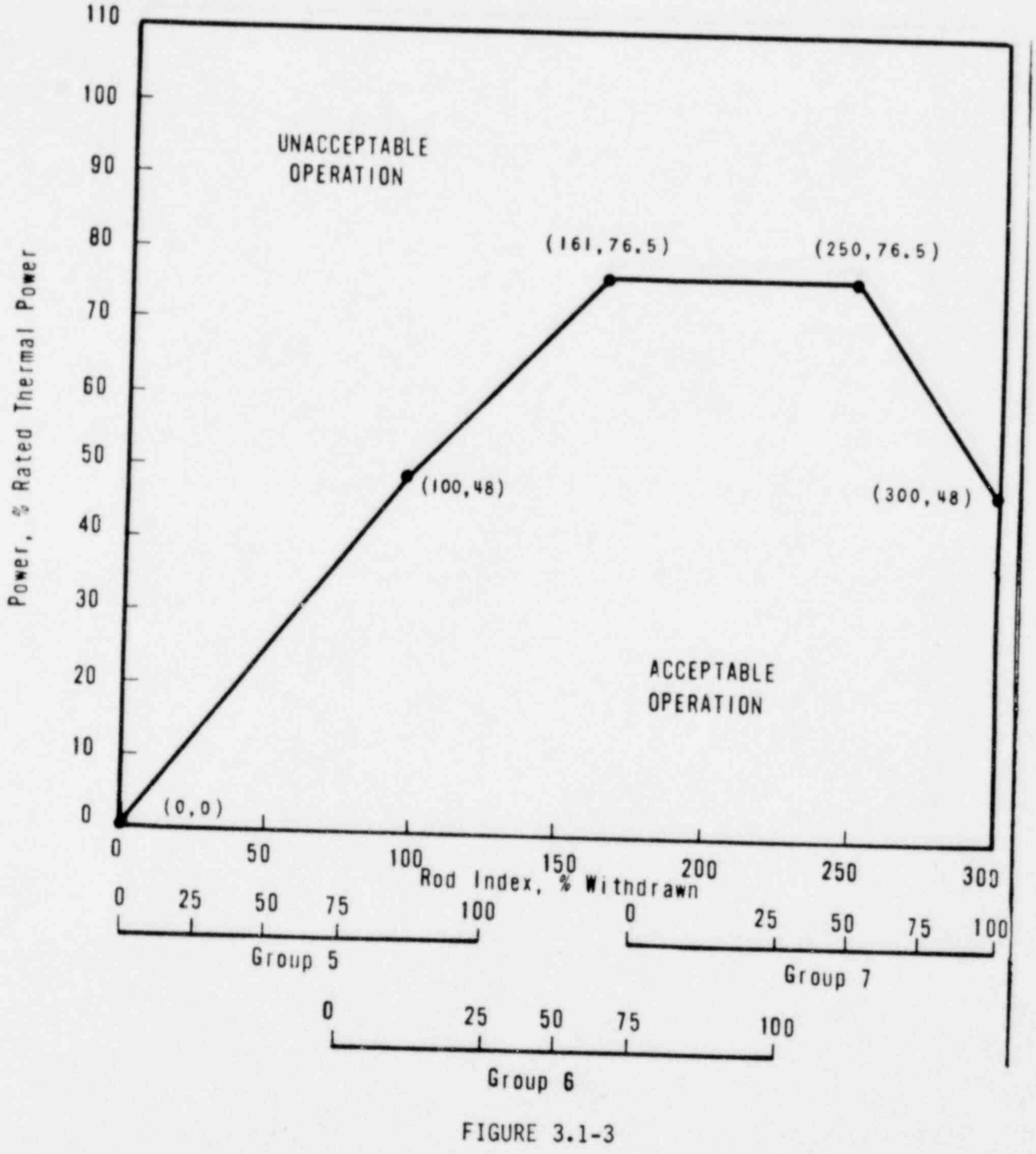


FIGURE 3.1-3

REGULATING ROD GROUP INSERTION LIMITS FOR 3 PUMP OPERATION FROM 0 EFPD TO 250 ± 10 EFPD

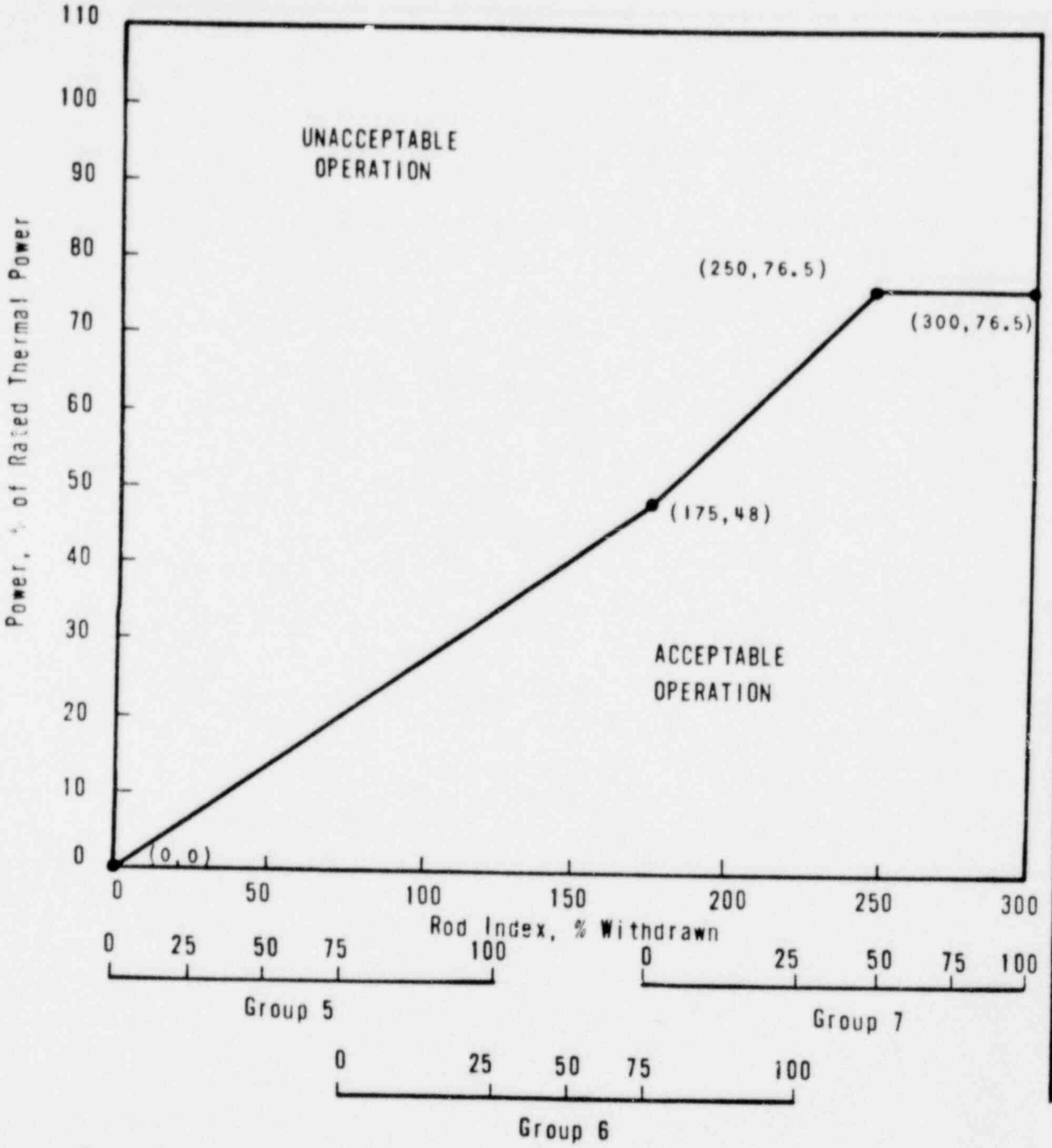


FIGURE 3.1-4

REGULATING ROD GROUP INSERTION LIMITS FOR
3 PUMP OPERATION AFTER 250 ± 10 EFPD

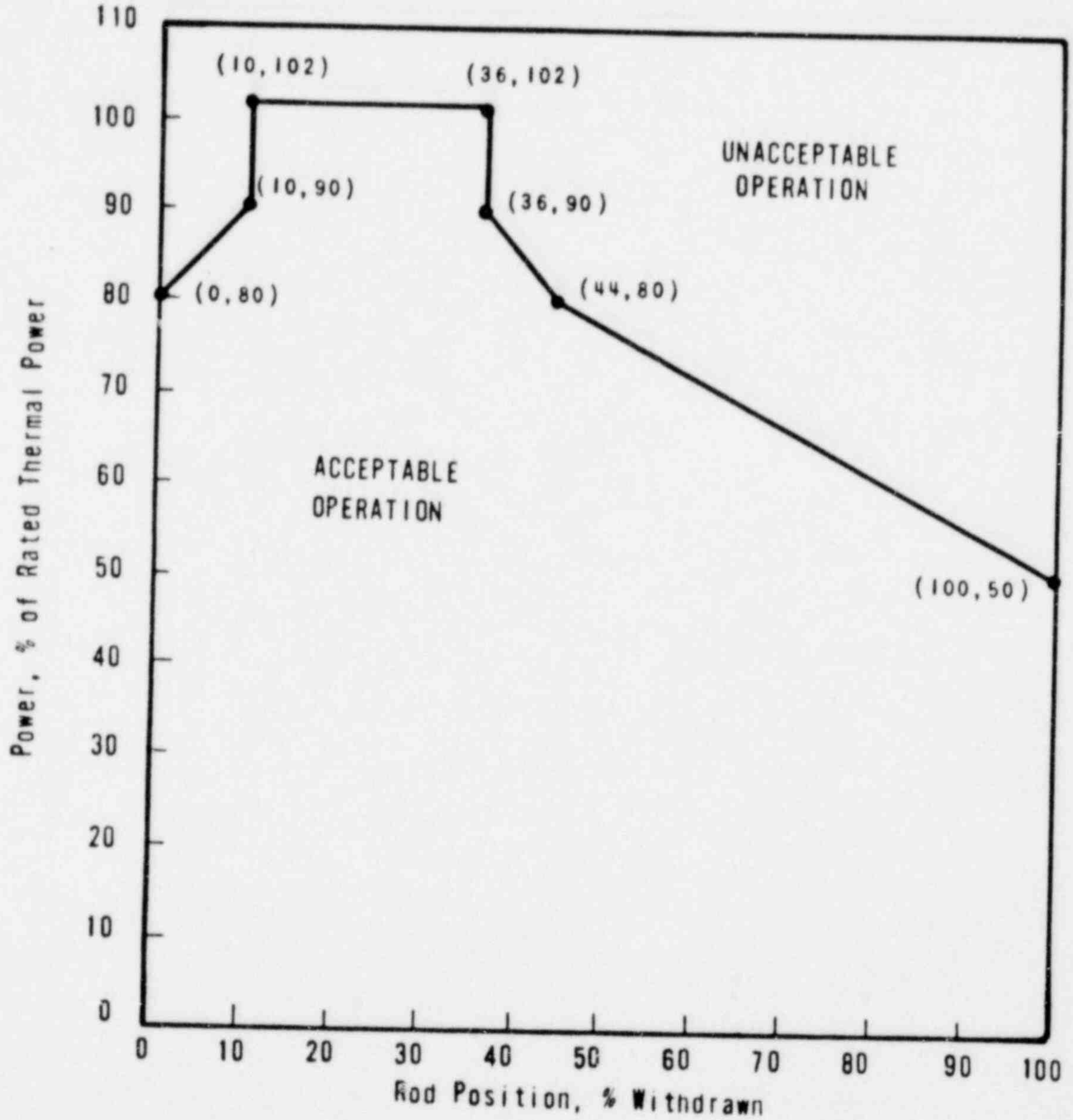


FIGURE 3.1-9

AXIAL POWER SHAPING ROD GROUP INSERTION LIMITS
FROM 0 EFPD TO 250 ± 10 EFPD

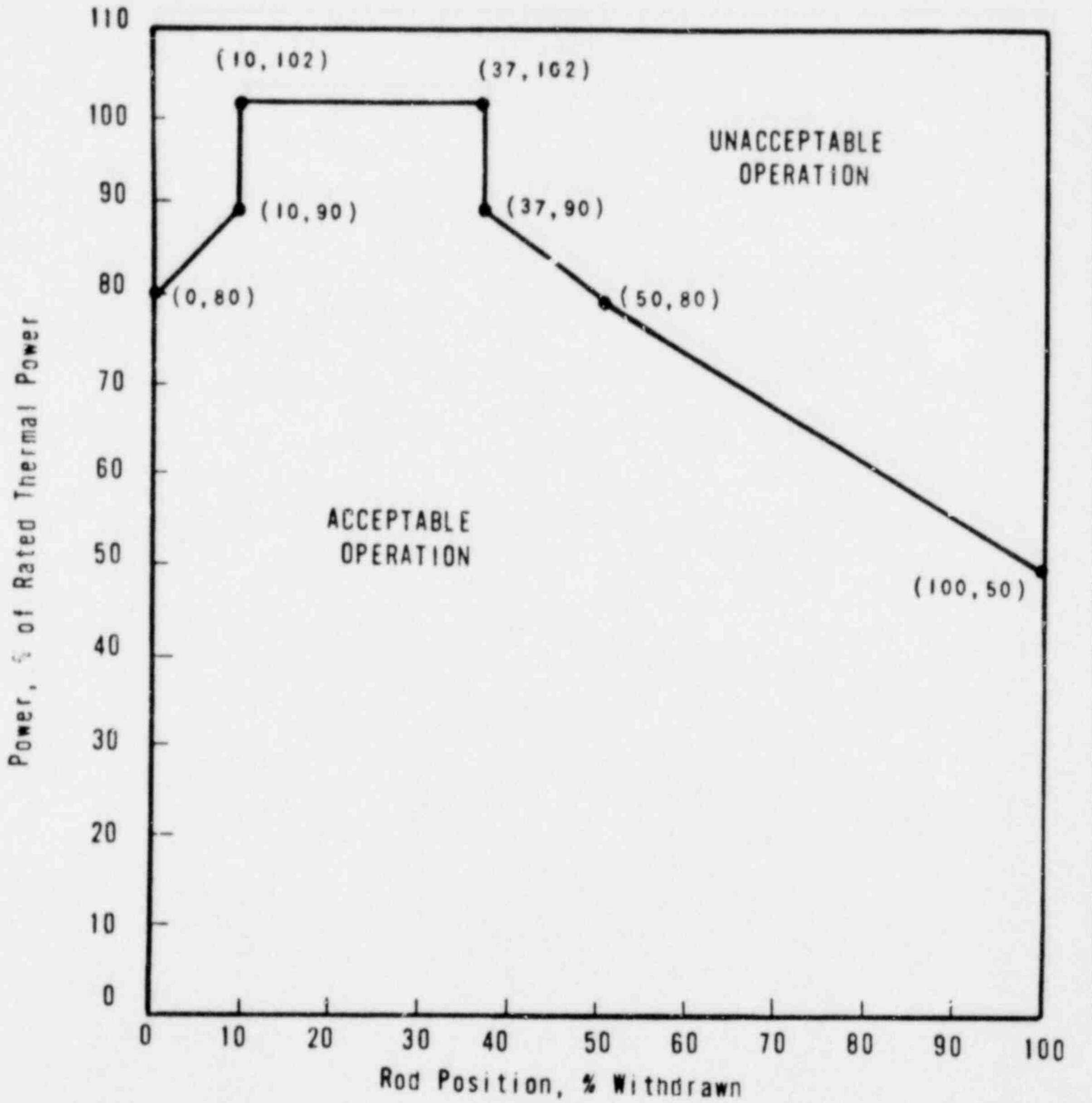


FIGURE 3.1-10

AXIAL POWER SHAPING ROD GROUP
INSERTION LIMITS AFTER 250 ± 10 EFPD

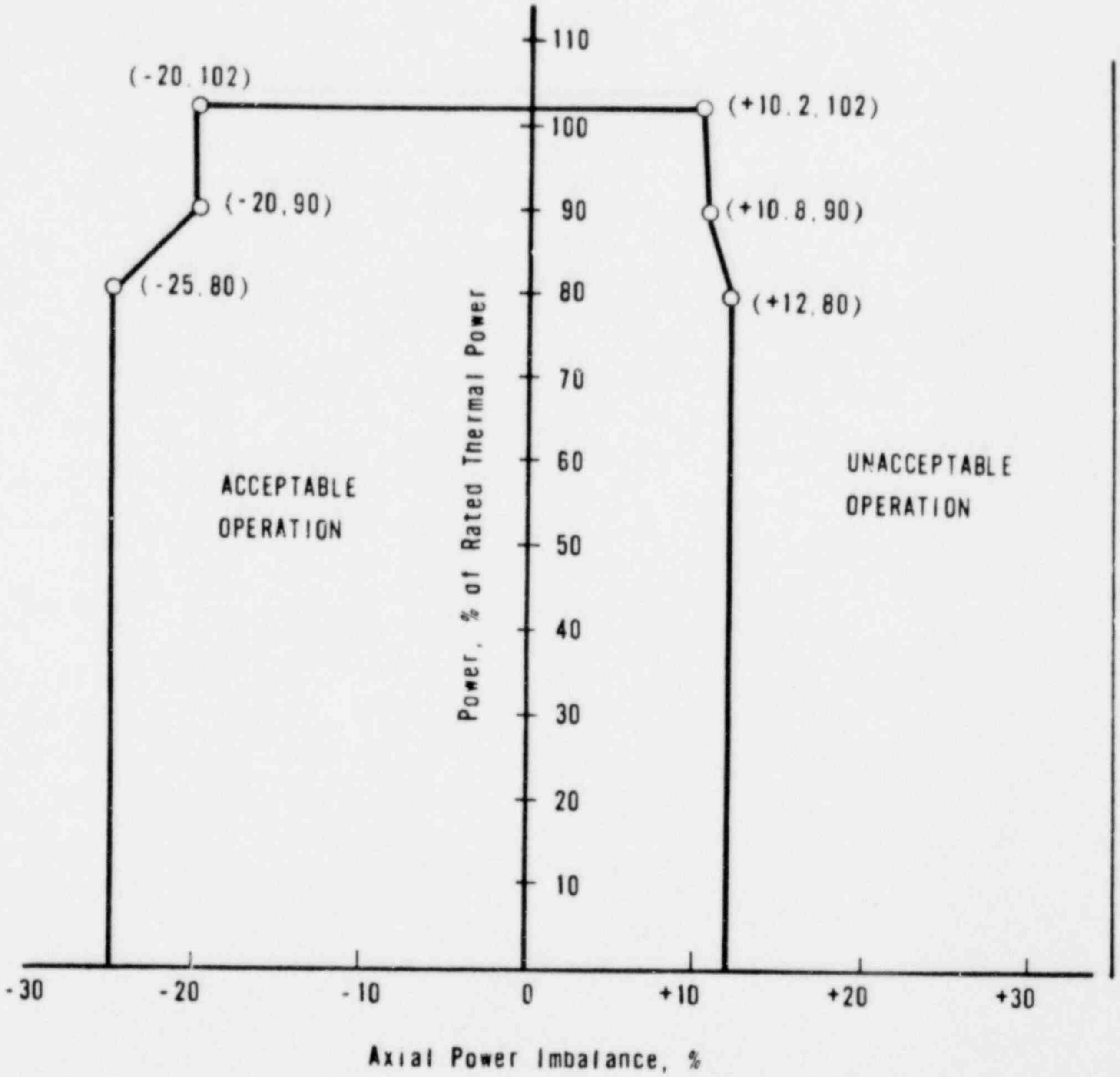


FIGURE 3.2-1

AXIAL POWER IMBALANCE ENVELOPE FOR OPERATION FROM 0 EFPD TO 250 ± 10 EFPD

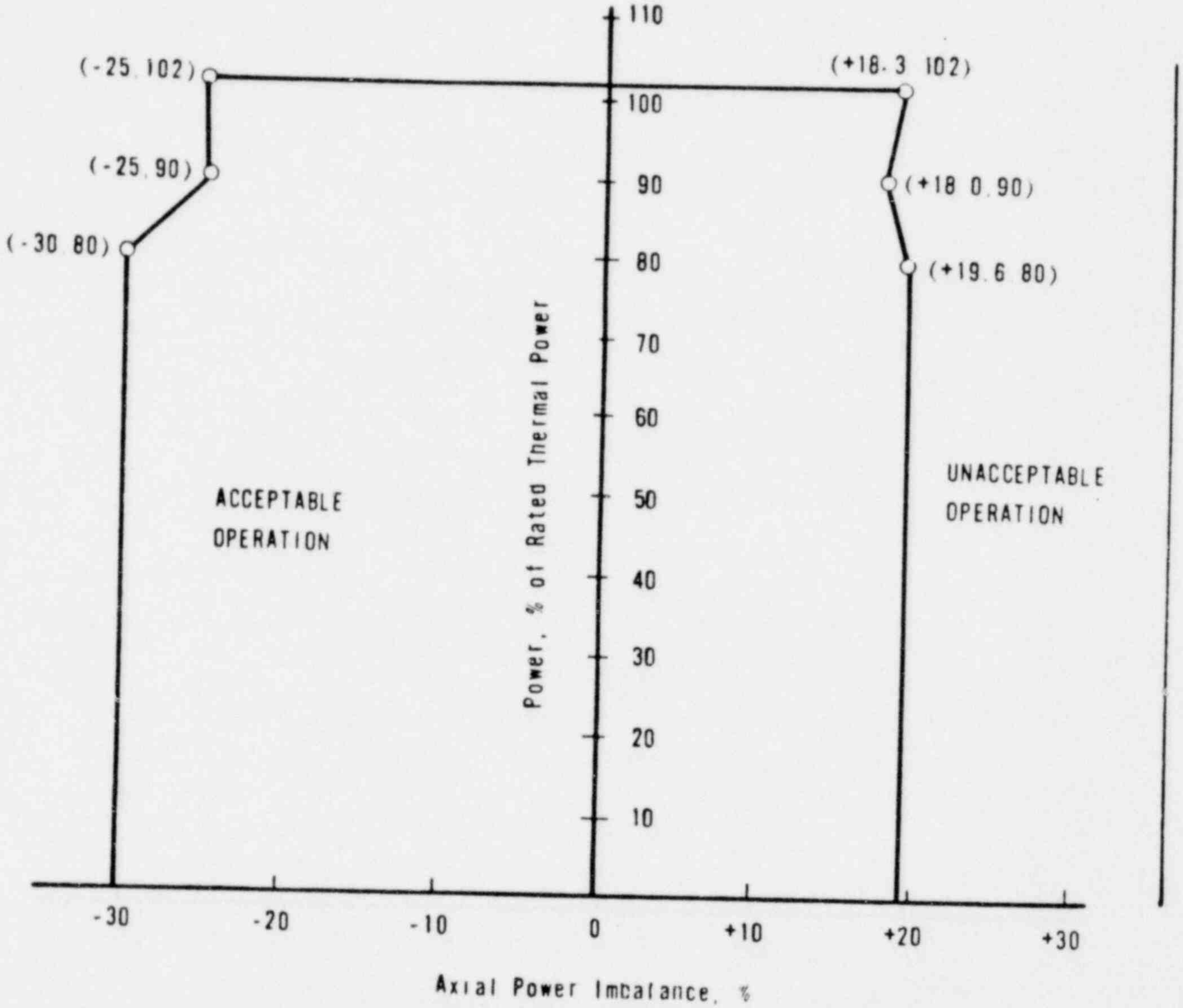


FIGURE 3.2-2

AXIAL POWER IMBALANCE ENVELOPE FOR
OPERATION AFTER 250 ± 10 EFPD

TABLE 3.2-2

QUADRANT POWER TILT LIMITS

	STEADY STATE LIMIT	TRANSIENT LIMIT	MAXIMUM LIMIT
QUADRANT POWER TILT as Measured by:			
Symmetrical Incore Detector System	3.31	8.81	20.0
Power Range Channels	1.96	6.96	20.0
Minimum Incore Detector System	1.90	4.40	20.0

TABLE 3.2-1

DNB MARGIN

Parameter	LIMITS Four Reactor Coolant Pumps Operating	 Three Reactor Coolant Pumps Operating
Reactor Coolant Hot Leg Temperature, T_H°F	≤ 604.6	≤ 604.6[1]
Reactor Coolant Pressure, psig[2]	≥ 2061.6	≥ 2057.2[1]
Reactor Coolant Flow Rate, lb/hr	≥ 139.7×10^6	≥ 104.4×10^6

(1) Applicable to the loop with 2 Reactor Coolant Pumps Operating.

(2) Limit not applicable during either a THERMAL POWER ramp increase in excess of 5% of RATED THERMAL POWER per minute or a THERMAL POWER step increase greater than 10% of RATED THERMAL POWER.

REACTOR COOLANT LOOPS

LIMITING CONDITION FOR OPERATION

3.4.1 Both reactor coolant loops and both reactor coolant pumps in each loop shall be in operation.

APPLICABILITY: As noted below, but excluding MODE 6.*

ACTION:

MODES 1 and 2:

With one reactor coolant pump not in operation, STARTUP and POWER OPERATION may be initiated and may proceed provided THERMAL POWER is restricted to less than 77.68% of RATED THERMAL POWER and within 4 hours the setpoint for the Nuclear Overpower trip has been reduced to the value specified in Specification 2.2.1 for operation with three reactor coolant pumps operating:

MODES 3, 4 and 5:

a. Operation may proceed provided at least one reactor coolant loop is in operation with an associated reactor coolant pump or decay heat removal pump.

b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.4.1 The Reactor Protective Instrumentation channels specified in the applicable ACTION statement above shall be verified to have had their trip setpoints changed to the values specified in Specification 2.2.1 for the applicable number of reactor coolant pumps operating either:

a. Within 4 hours after switching to a different pump combination if the switch is made while operating, or

b. Prior to reactor criticality if the switch is made while shut down.

* See Special Test Exception 3.10.3.

SPECIAL TEST EXCEPTION

SHUTDOWN MARGIN

LIMITING CONDITION FOR OPERATION

3.10.4 The SHUTDOWN MARGIN requirement of Specification 3.1.1.1.1 may be suspended for measurement of control rod worth and shutdown margin provided:

a. Reactivity equivalent to at least the highest estimated control rod worth is available for trip insertion from OPERABLE control rod(s), and

b. All axial power shaping rods are withdrawn to at least 35% (indicated position) and OPERABLE.

APPLICABILITY: MODE 2.

ACTION:

a. With any safety or regulating control rod not fully inserted and with less than the above reactivity equivalent available for trip insertion or the axial power shaping rods not within their withdrawal limits, immediately initiate and continue boration with one of the OPERABLE borated water sources of Specification 3.1.2.9 until the SHUTDOWN MARGIN required by Specification 3.1.1.1.1 is restored.

b. With all safety or regulating control rods fully inserted and the reactor subcritical by less than the above reactivity equivalent, immediately initiate and continue boration with one of the OPERABLE borated water sources of Specification 3.1.2.9 until the SHUTDOWN MARGIN required by Specification 3.1.1.1.1 is restored.

SURVEILLANCE REQUIREMENTS

4.10.4.1 The position of each safety, regulating, and axial power shaping rod either partially or fully withdrawn shall be determined at least once per 2 hours.

4.10.4.2 Each safety or regulating 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 Specification 3.1.1.1.1.

4.10.4.3 The axial power shaping rods shall be demonstrated OPERABLE by moving each axial power shaping rod $\geq$ 6.5% (indicated position) within 4 hours prior to reducing the SHUTDOWN MARGIN to less than the limits of Specification 3.1.1.1.1

3/4.1.1 BORATION CONTROL

SHUTDOWN MARGIN

3/4.1.1.1 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. During Modes 1 and 2 the SHUTDOWN MARGIN is known to be within limits if all control rods are OPERABLE and withdrawn to or beyond the insertion limits.

SHUTDOWN MARGIN requirements vary throughout core life as a function of fuel depletion, RCS boron concentration and RCS T_{avg}. The most restrictive condition for Modes 1, 2, and 3 occurs at EOL, with T_{avg} at no load operating temperature, and is associated with a postulated steam line break accident and resulting uncontrolled RCS cooldown. In the analysis of this accident a minimum SHUTDOWN MARGIN of 0.60% $\Delta k/k$ is initially required to control the reactivity transient. Accordingly, the SHUTDOWN MARGIN required is based upon this limiting condition and is consistent with FSAR safety analysis assumptions.

The most restrictive condition for MODES 4 and 5 occurs at BOL, and is associated with deboration due to inadvertent injection of sodium hydroxide. The higher requirement for these modes insure the accident will not result in criticality.

3/4.1.1.2 BORON DILUTION

A minimum flow rate of at least 2700 GPM provides adequate mixing, prevents stratification and ensures that reactiivity changes will be gradual through the Reactor Coolant System in the core during boron concentration reductions in the Reactor Coolant System. A flow rate of at least 2700 GPM will circulate an equivalent Reactor Coolant System volume of 12,000 cubic feet in approximately 30 minutes. The reactivity change rate associated with boron concentration reduction will be within the capability for operator recognition and control.

3/4.1.1.3 MODERATOR TEMPERATURE COEFFICIENT

The limitations on moderator temperature coefficient (MTC) are provided to ensure that the assumptions used in the accident and transit analyses remain valid through each fuel cycle. The surveillance requirement for measurment of the MTC each fuel cycle are adequate to confirm the MTC value since this coefficient changes slowly due principally to the reduction in RCS boron concentration associated with fuel burnup. The confirmation that the measured MTC value is within its limit provides assurance that the coefficient will be maintained within acceptable values throughout each fuel cycle.

3/4.1.1.4 MINIMUM TEMPFRATURE FOR CRITICALITY

This specification ensures that the reactor will not be made critical with the Reactor Coolant System average temperature less than 525°F. This limitation is required to ensure 1) the moderator temperature coefficient is within its analyzed temperature range, 2) the protective instrumentation is within its normal operating range, 3) the pressurizer is capable of being in an OPERABLE status with a steam bubble, and 4) the reactor pressure vessel is above its minimum RT_{NDT} temperature.

3/4.1.2 BORATION SYSTEMS

The boron injection system ensures that negative reactivity control is available during each mode of facility operation. The components required to perform this function include 1) borated water sources, 2) makeup or DHR pumps, 3) separate flow paths, 4) boric acid pumps, 5) associated heat tracing systems, and 6) an emergency power supply from OPERABLE emergency busses.

With the RCS average temperature above 200°F, a minimum of two separate and redundant boron injection systems are provided to ensure single functional capability in the event an assumed failure renders one of the systems inoperable. Allowable out-of-service periods ensure that minor component repair or corrective action may be completed without undue risk to overall facility safety from injection system failures during the repair period.

The boration capability of either system is sufficient to provide a SHUTDOWN MARGIN from all operating conditions of 3.0% $\Delta k/k$ after xenon decay and cooldown to 200°F. The maximum boration capability requirement occurs at EOL from full power equilibrium xenon conditions and requires either 6615 gallons of 11,600 ppm boron from the boric acid storage tanks or 45,421 gallons of 2270 ppm boron from the borated water storage tank.

The requirements for a minimum contained volume of 415,200 gallons of borated water in the borated water storage tank ensures the capability for borating the RCS to the desired level. The specified quantity of borated water is consistent with the ECCS requirements of Specification 3.5.4. Therefore, the larger volume of borated water is specified.

With the RCS temperature below 200°F, one injection system is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the additional restrictions prohibiting CORE ALTERATIONS and positive reactivity change in the event the single injection system becomes inoperable.

3/4.1.2 BORATION SYSTEMS (Continued)

The boron capability required in Modes 4 and 5 is based on a potential moderator dilution accident and is sufficient to provide a SHUTDOWN MARGIN of 3.0% Δk/k after xenon decay and and cooldown from 200°F to 140°F. This condition requires either 300 gallons of 11,600 ppm boron from the boric acid storage system or 1608 gallons of 2270 ppm boron from the borated water storage tank. To envelop future cycle BWST contained borated water volume requirements, a minimum volume of 13,500 gallons is specified.

The contained water volume limits include allowance for water not available because of discharge line location and other physical characteristics. The limits on contained water volume and boron concentration ensure a pH value of between 7.2 and 11.0 of the solution sprayed within containment after a design basis accident. The pH band minimizes the evolution of iodine and minimizes the effect of chloride and caustic stress corrosion cracking on mechanical systems and components.

The OPERABILITY of one boron injection system during REFUELING ensures that this system is available for reactivity control while in MODE 6.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

The specifications of this section (1) ensure that acceptable power distribution limits are maintained, (2) ensure that the minimum SHUTDOWN MARGIN is maintained, and (3) limit the potential effects of a rod ejection accident. OPERABILITY of the control rod position indicators is required to determine control rod positions and thereby ensure compliance with the control rod alignment and insertion limits.

The ACTION statements which permit limited variations from the basic requirements are accompanied by additional restrictions which ensure that the original criteria are met. For example, misalignment of a safety or regulating rod requires a restriction in THERMAL POWER. The reactivity worth of a misaligned rod is limited for the remainder of the fuel cycle to prevent exceeding the assumptions used in the safety analysis.

The position of a rod declared inoperable due to misalignment should not be included in computing the average group position for determining the OPERABILITY of rods with lesser misalignments.