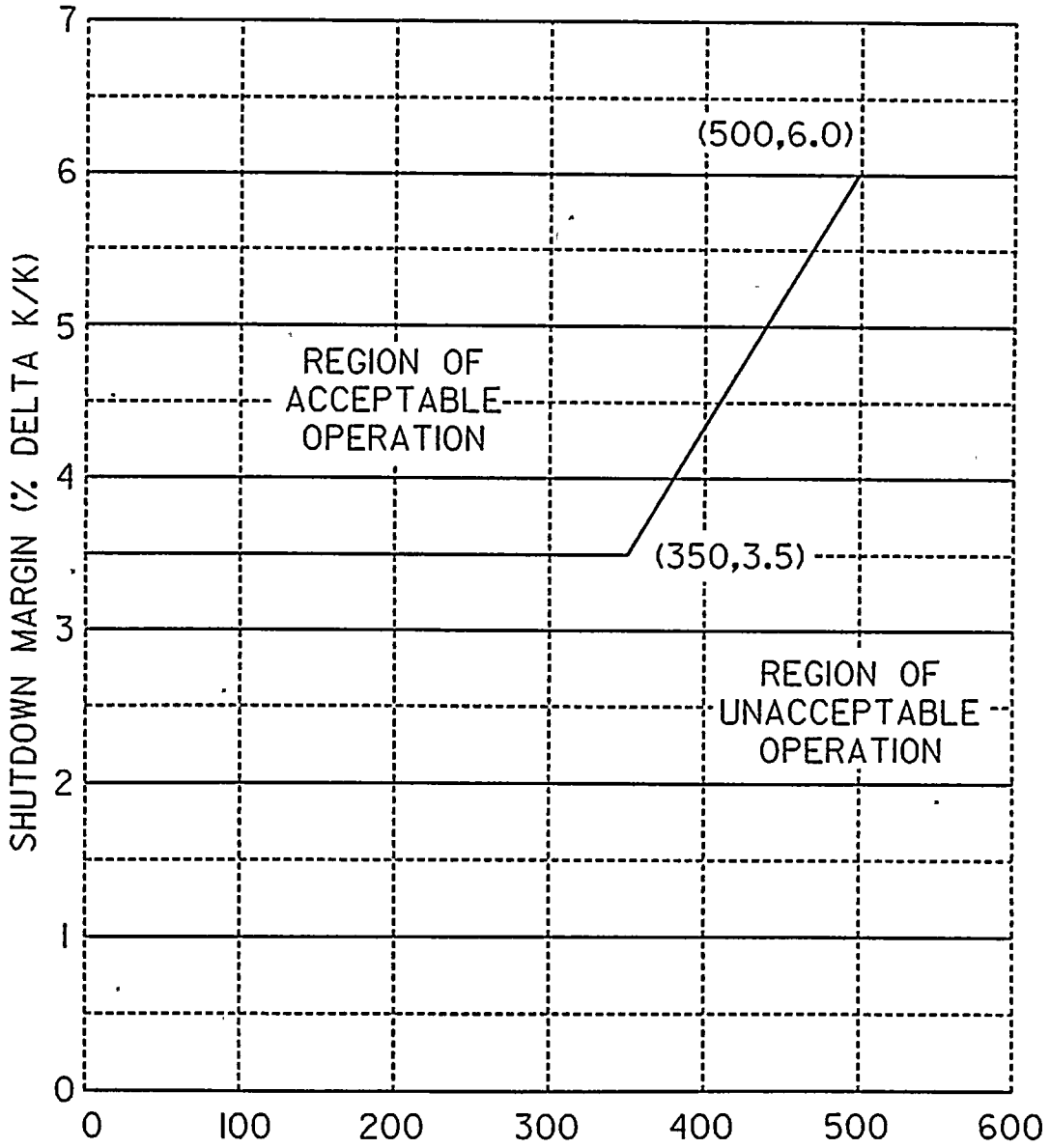

FIGURE 3.1 - 1A

SHUTDOWN MARGIN VERSUS COLD LEG TEMPERATURE

CHARGING PUMPS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.3 At least one charging pump* or one high pressure safety injection pump or one low pressure safety injection pump in the boron injection flow path required OPERABLE pursuant to Specification 3.1.2.1 shall be OPERABLE and capable of being powered from an OPERABLE emergency power source.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no charging pump or high pressure safety injection pump or low pressure safety injection pump OPERABLE or capable of being powered from an OPERABLE emergency power source, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

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

Delete

* Whenever the reactor coolant level is below the bottom of the pressurizer in MODE 5, one and only one charging pump shall be OPERABLE, by verifying at least once per every 7 days that power is removed from the remaining charging pumps.

TABLE 3.1-1

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $K_{eff} > 0.98$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	1 hour	Operation not allowed	
4 not on SCS	12 hours	1 hour	Operation not allowed	
5 ~~RCS filled~~ not on SCS	8 hours	1 hour	Operation not allowed	
4 5 ~~RCS partially drained~~ on SCS	Operation not allowed			
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: SCS = Shutdown Cooling System

TABLE 3.1-2

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $0.98 \geq K_{eff} > 0.97$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	2.5 hours	1 hour	0.5 hours
4 not on SCS	12 hours	2.5 hours	1 hour	0.5 hours
5 ~~RCS filled~~ not on SCS	8 hours	2.5 hours	1 hour	0.5 hours
4 & 5 ~~RCS partially drained~~ on SCS	8 hours	0.5 hours	Operation not allowed	
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: SCS = Shutdown Cooling System

TABLE 3.1-3

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $0.97 \geq K_{eff} > 0.96$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	3.5 hours	1.5 hours	1 hour
4 not on SCS	12 hours	3.5 hours	1.5 hours	1 hour
5 ~~RCS filled~~ not on SCS	8 hours	3.5 hours	1.5 hours	1 hour
4 4 5 ~~RCS partially drained~~ on SCS	8 hours	1 hour	0.5 hours ~~Operation not allowed~~	ONA
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: SCS = Shutdown Cooling System
ONA = Operation Not Allowed

TABLE 3.1-4

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $0.96 \geq K_{eff} > 0.95$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	5 hours	2 hours	1 hour
4 not on SCS	12 hours	5 hours	2 hours	1 hour
5 ~~RCS filled~~ not on SCS	8 hours	5 hours	2 hours	1 hour
4 & 5 ~~RCS partially drained~~ on SCS	8 hours	~~1.5 hours~~ 2.0 hours	~~Operation not allowed~~ 0.5 hours	~~2 hours~~ ONA
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: SCS = Shutdown Cooling System
ONA = Operation Not Allowed

TABLE 3.1-5

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $K_{eff} \leq 0.95$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	6 hours	3 hours	1.5 hours
4 not on SCS	12 hours	6 hours	3 hours	1.5 hours
5 ~~RCS filled~~ not on SCS	8 hours	6 hours	3 hours	1.5 hours
4 & 5 ~~RCS partially drained~~ on SCS	8 hours	2 hours	1 hour ~~Operation not allowed~~	.5 hours
6	24 hours	8 hours	4 hours	2 hours

Note: SCS = Shutdown Cooling System

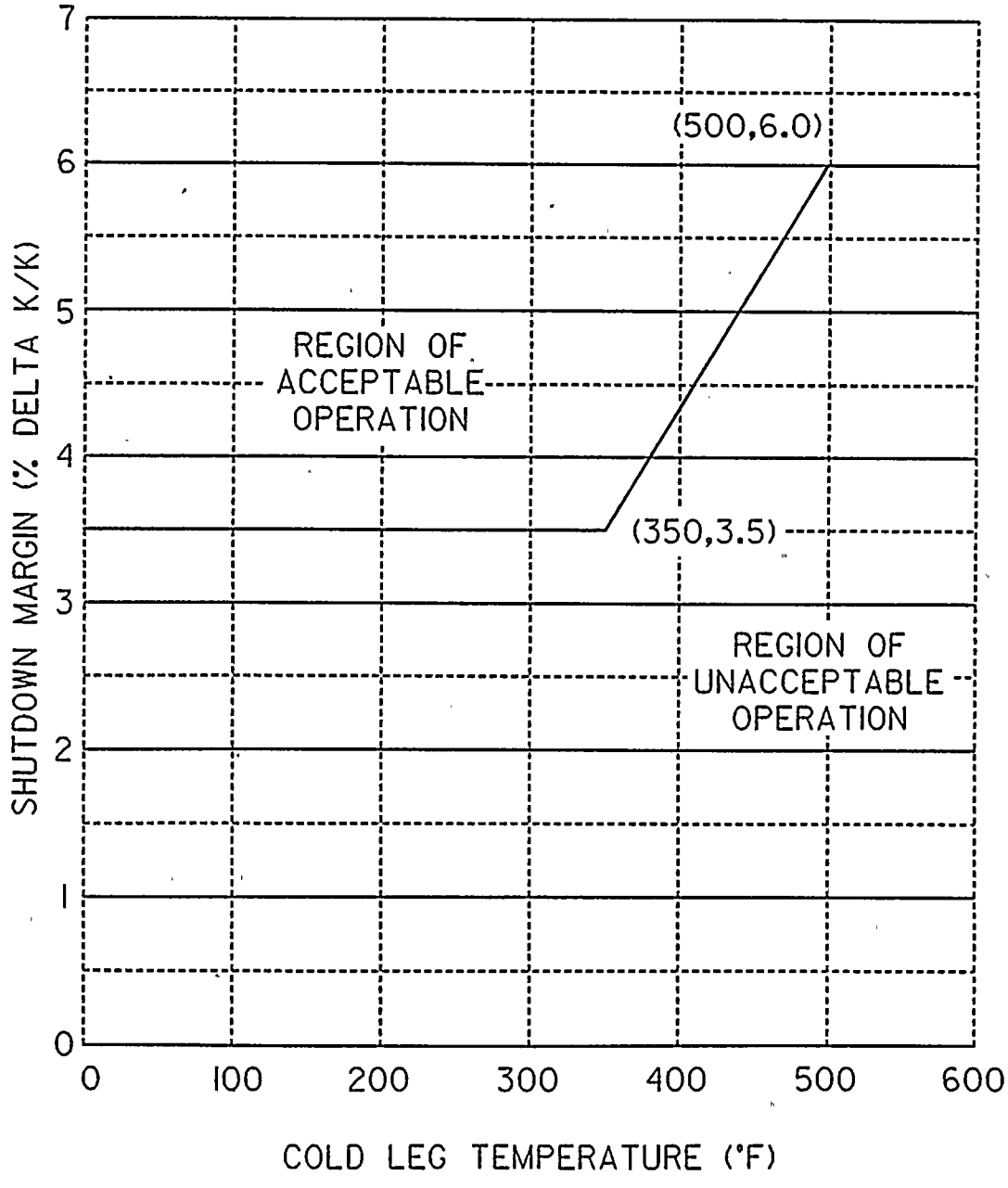

FIGURE 3.1 - 1A

SHUTDOWN MARGIN VERSUS COLD LEG TEMPERATURE

CHARGING PUMPS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.3 At least one charging pump* or one high pressure safety injection pump or one low pressure safety injection pump in the boron injection flow path required OPERABLE pursuant to Specification 3.1.2.1 shall be OPERABLE and capable of being powered from an OPERABLE emergency power source.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no charging pump or high pressure safety injection pump or low pressure safety injection pump OPERABLE or capable of being powered from an OPERABLE emergency power source, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

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

Delete

*~~Whenever the reactor coolant level is below the bottom of the pressurizer in MODE 5, one and only one charging pump shall be OPERABLE, by verifying at least once per every 7 days that power is removed from the remaining charging pumps.~~

TABLE 3.1-1

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $K_{eff} > 0.98$

OPERATIONAL MODE	NUMBER OF OPERATING CHARGING PUMPS			
	0	1	2	3
3	12 hours	1 hour	ONA	ONA
4 not on SCS	12 hours	1 hour	ONA	ONA
5 ~~RCS filled~~ not on SCS	8 hours	1 hour	ONA	ONA
5 ~~RCS partially drained~~ on SCS	ONA	ONA	ONA	ONA
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: ONA = operation not allowed
SCS = Shutdown Cooling System

TABLE 3.1-2

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $0.98 \geq K_{eff} > 0.97$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	2.5 hours	1 hour	0.5 hours
4 not on SCS	12 hours	2.5 hours	1 hour	0.5 hours
5 ~~RCS filled~~ not on SCS	8 hours	2.5 hours	1 hour	0.5 hours
4 & 5 ~~RCS partially drained~~ on SCS	8 hours	0.5 hours	Operation not allowed	
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: SCS = Shutdown Cooling System

TABLE 3.1-3

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $0.97 \geq K_{eff} > 0.96$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	3.5 hours	1.5 hours	1 hour
4 not on SCS	12 hours	3.5 hours	1.5 hours	1 hour
5 ~~RCS filled~~ not on SCS	8 hours	3.5 hours	1.5 hours	1 hour
44 5 ~~RCS partially drained~~ on SCS	8 hours	1 hour	0.5 hours ~~Operation not allowed~~	ONA
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: SCS = Shutdown Cooling System
ONA = Operation Not Allowed

TABLE 3.1-4

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $0.96 \geq K_{eff} > 0.95$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	5 hours	2 hours	1 hour
4 not on SCS	12 hours	5 hours	2 hours	1 hour
5 ~~RCS filled~~ not on SCS	8 hours	5 hours	2 hours	1 hour
4, 5 ~~RCS partially drained~~ on SCS	8 hours	~~1.5 hours~~ 2.0 hours	0.5 hours	ONA
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~ Operation not allowed	~~2 hours~~

Note: SCS = Shutdown Cooling System
ONA = Operation Not Allowed

TABLE 3.1-5

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $K_{eff} \leq 0.95$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	6 hours	3 hours	1.5 hours
4 not on SCS	12 hours	6 hours	3 hours	1.5 hours
5 ~~RCS filled~~ not on SCS	8 hours	6 hours	3 hours	1.5 hours
4& 5 ~~RCS partially drained~~ on SCS	8 hours	2 hours	1 hour ~~Operation not allowed~~	0.5 hours
6	24 hours	8 hours	4 hours	2 hours

Note: SCS = Shutdown Cooling System

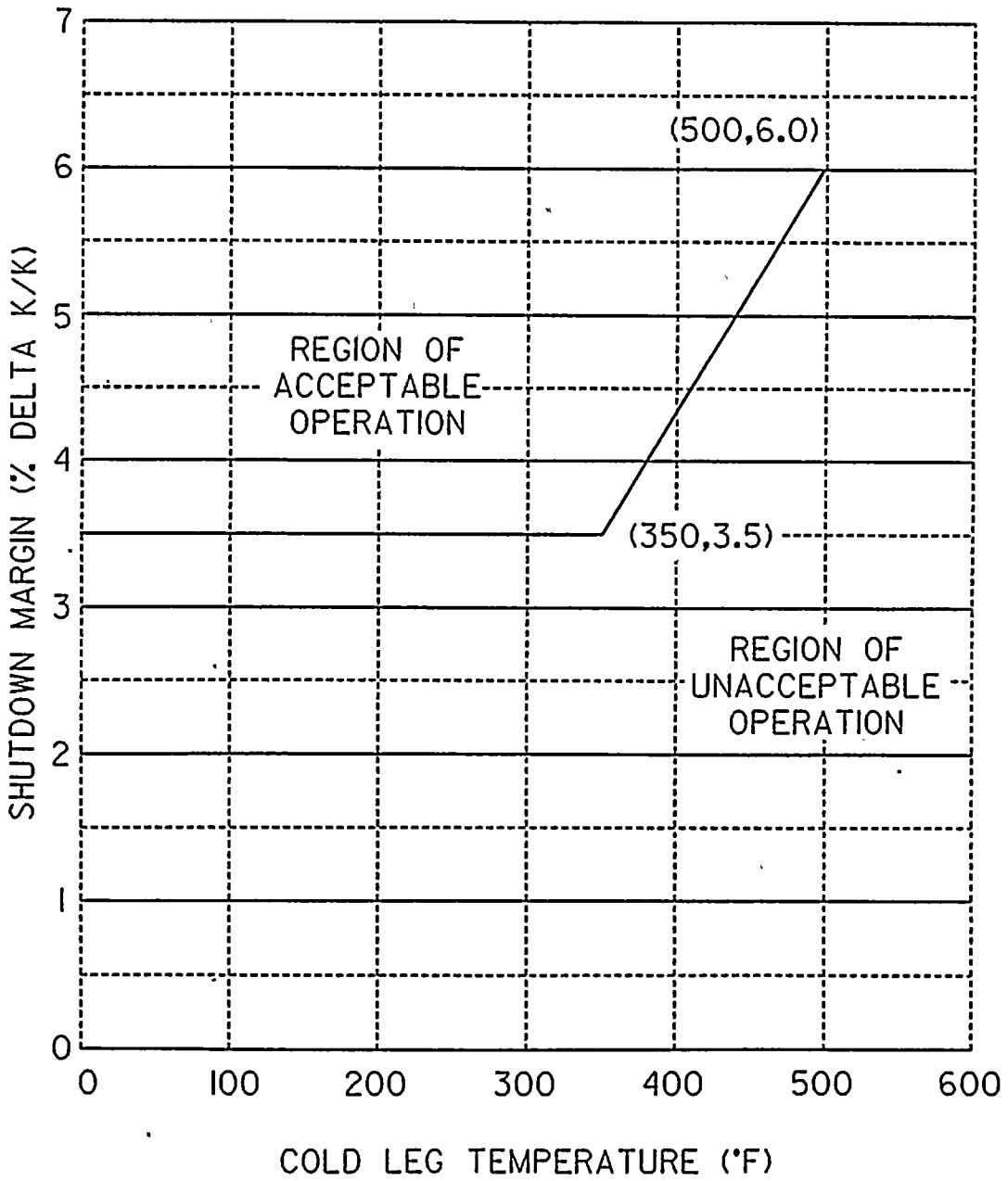

FIGURE 3.1 - 1A

SHUTDOWN MARGIN VERSUS COLD LEG TEMPERATURE

CHARGING PUMPS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.3 At least one charging pump* or one high pressure safety injection pump or one low pressure safety injection pump in the boron injection flow path required OPERABLE pursuant to Specification 3.1.2.1 shall be OPERABLE and capable of being powered from an OPERABLE emergency power source.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no charging pump or high pressure safety injection pump or low pressure safety injection pump OPERABLE or capable of being powered from an OPERABLE emergency power source, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

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

delete

*Whenever the reactor coolant level is below the bottom of the pressurizer in MODE 5, one and only one charging pump shall be OPERABLE, by verifying at least once per every 7 days that power is removed from the remaining charging pumps.

TABLE 3.1-1

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $K_{eff} > 0.98$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	1 hour	ONA	ONA
4 not on SCS	12 hours	1 hour	ONA	ONA
5 ~~RCS filled~~ not on SCS	8 hours	1 hour	ONA	ONA
4 & 5 ~~RCS partially drained~~ on SCS	ONA	ONA	ONA	ONA
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: ONA = operation not allowed
SCS = Shutdown Cooling System

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TABLE 3.1-2

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $0.98 \geq K_{eff} > 0.97$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	2.5 hours	1 hour	0.5 hours
4 not on SCS	12 hours	2.5 hours	1 hour	0.5 hours
5 not on SCS RCS filled	8 hours	2.5 hours	1 hour	0.5 hours
4, 5 on SCS RCS partially drained	8 hours	0.5 hours	Operation not allowed	
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: SCS = Shutdown Cooling System

TABLE 3.1-3

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $0.97 \geq K_{eff} > 0.96$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	3.5 hours	1.5 hours	1 hour
4 not on SCS	12 hours	3.5 hours	1.5 hours	1 hour
5 ~~RCS filled~~ not on SCS	8 hours	3.5 hours	1.5 hours	1 hour
4& 5 ~~RCS partially drained~~ on SCS	8 hours	1 hour	0.5 hours ~~Operation not allowed~~	ONA
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: SCS = Shutdown Cooling System
ONA = Operation Not allowed

TABLE 3.1-4

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $0.96 \geq K_{eff} > 0.95$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	5 hours	2 hours	1 hour
4 not on SCS	12 hours	5 hours	2 hours	1 hour
5 ~~RCS filled~~ not on SCS	8 hours	5 hours	2 hours	1 hour
4 & 5 ~~RCS partially drained~~ on SCS	8 hours	~~1.5 hours~~ 2.0 hours	~~Operation not allowed~~ 0.5 hours	~~Operation not allowed~~ ONA
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: SCS = Shutdown Cooling System
ONA = Operation Not Allowed

TABLE 3.1-5

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $K_{eff} \leq 0.95$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	6 hours	3 hours	1.5 hours
4 not on SCS	12 hours	6 hours	3 hours	1.5 hours
5 ~~RCS filled~~ not on SCS	8 hours	6 hours	3 hours	1.5 hours
4 & 5 ~~RCS partially drained~~ on SCS	8 hours	2 hours	1 hour ~~Operation not allowed~~	0.5 hours
6	24 hours	8 hours	4 hours	2 hours

Note: SCS = Shutdown Cooling System

ATTACHMENT

A. DESCRIPTION OF THE TECHNICAL SPECIFICATIONS AMENDMENT REQUEST

The proposed changes to Technical Specification sections 1.0, 2.0, 3/4.1.1, 3/4.1.2 and 3/4.10.1 reduce the boration requirements when shut down, by modification of the shutdown margin requirements as follows:

1. A new parameter, K_{N-1}, in introduced and defined as the K_{eff} calculated assuming the partially or fully inserted rod of highest inserted worth is fully withdrawn.

2. Limiting Conditions for Operation (LCOs) 3.1.1.1 and 3.1.1.2 require that for Modes 1-4, the shutdown margin be greater than or equal to 6% delta K/K, and for Mode 5, greater than or equal to 4% delta K/K. The proposed changes revise the shutdown margin requirements for Modes 1-5 according to full length Control Element Assembly (CEA) position. The revised Tech Spec 3.1.1.1 is applicable when all full length CEAs are fully inserted and requires that for Modes 3-5, the shutdown margin be greater than or equal to 2% delta K/K. The revised Tech Spec 3.1.1.2 is applicable when any full length CEA is withdrawn and requires that for Modes 1-5, the shutdown margin be greater than or equal to that given in a new Figure 3.1-1A. For reactor coolant cold leg temperature less than or equal to 500°F, K_{N-1} shall be less than 0.99. The LCO action statements are also revised to require boration when the above shutdown margin requirements are not met.

   Surveillance Requirements 4.1.1.1.1 and 4.1.1.2 require that the shutdown margin be verified at given time intervals to satisfy the LCO requirements. The proposed changes revise Tech Spec 4.1.1.1.1 and 4.1.1.2 to require the shutdown margin to be verified to the proposed new LCO requirements, as described above. In addition, the proposed change requires K_{N-1} to be determined to be less than 0.99 at least once every 24 hours.

   The associated Bases 3/4.1.1 and 3/4.1.2 are also revised to reflect the proposed changes.

3. The action statements for LCOs 3.1.2.2, 3.1.2.4, and 3.1.2.6, for Modes 1-4, require in part that when the requirements of the LCOs are not met, be in at least HOT STANDBY within the next 6 hours and borated to a shutdown margin equivalent to at least 6% delta K/K at 210 °F. The proposed changes delete the redundant reference to the shutdown margin requirement since these are covered in Tech Spec 3.1.1.1 and 3.1.1.2.

4. LCO 3.1.2.3 requires that only one charging pump may be in operation during operation in MODE 5 when the system has been drained for maintenance. This specification is made less restricitive. The proposed change removes this restriction since the revised supporting analysis bounds MODE 5 operation with the system partially drained.

5. Tables 3.1-1 through 3.1-5 specify surveillance intervals during periods when a Boron Dilution alarm is inoperable. The proposed changes make these tables more restricive. The applicability of the surveillance intervals which apply during Mode 5 drained conditions is expanded to apply during any time during Mode 4 or 5 operation when the RCS is being cooled by the shutdown cooling system. Several of the surveillance frequencies given in the table have been changed consistent with the supporting analysis. MODE 6 requirements have been deleted where the requirements conflict with the MODE definition (K_{eff}<.95).

6. LCO 3.10.1 currently requires that a reactivity equivalent to at least the highest estimated CEA worth be available for trip insertion when the shutdown margin requirement of Tech Spec 3.1.1.1 is suspended for measurement of CEA worth and shutdown margin during physics tests, and boration is required when that requirement is not met. The proposed change revises LCO 3.10.1 to state that the shutdown margin and K_N-1 requirements of Tech Spec 3.1.1.2 may be suspended for measurement of CEA worth and shutdown margin, provided reactivity equivalent to at least the highest estimated CEA worth is available for trip insertion from operable CEAs or the reactor is subcritical by at least the reactivity equivalent of the highest CEA worth.

7. The proposed change adds Special Test Exception 3.10.9 to allow the facility to suspend the requirements of Tech Spec 3.1.1.1 and 3.1.1.2 for the demonstration of the operability of the control element drive mechanism system during pre-startup tests. Basis 3/4.10.9 is also added to reflect this.

8. As a result of proposed changes 1-5 above, it is necessary to propose changes to revise setpoints to provide reactor trips to prevent the core from exceeding its safety limits in terms of departure from nucleate boiling ratio (DNBR) and local power density. These proposed changes consist of two parts:

   a. Item B.2 of Table 2.2-1 specifies a trip setpoint for "Excore Neutron Flux - Logarithmic Power Level - High" of less than or equal to 0.798% of rated thermal power, and an allowable value of less than or equal to 0.815% of rated thermal power. The proposed change revises the trip setpoint and allowable value to 0.010% and 0.011% of rated thermal power, respectively.

   b. Table notation (c) of Table 3.3-1 and Table notation (5) of Table 2.2-1 state that CPC trips may be manually bypassed below 1% of rated thermal power and the bypass shall automatically be removed when thermal power is greater than or equal to 2% of rated thermal power. The proposed changes revise the value at which the CPC trip may be manually bypassed and at which the manual bypass is automatically removed, from 1% of rated thermal power to 10^{-4}% of rated thermal power.

modification to the operating procedures and plant operation in the shutdown modes, operation of the facility in accordance with the proposed changes will not create the possibility of a new or different kind of accident from any accident previously evaluated.

Standard 3 -- Involve a significant reduction in a margin of safety.

Operation of the facility in accordance with the proposed changes may reduce in some way a safety margin, but where the results of the change are clearly within the acceptance criteria.

The PVNGS safety analysis requires that for an inadvertent boron dilution, a minimum time interval of 15 minutes for MODES 1 through 5 and 30 minutes for MODE 6 be available from the time an alarm makes the operator aware of unplanned boron dilution before a loss of shutdown margin occurs. The time to a complete loss of shutdown margin for the limiting inadvertent boron dilution is now 52 minutes compared to 95 minutes for the previously analyzed incident. However, an alarm will alert the operator of an unplanned boron dilution at least 15 minutes prior to a complete loss of shutdown margin.

Although a numerically smaller value of SHUTDOWN MARGIN may appear to result in a reduction in the safety margin, operation of the facility in accordance with the proposed changes does not involve a significant reduction in a margin of safety as a alarm is available in time to satisfy the safety analysis criterion.

The lower logarithmic power level trip setpoint and automatic removal of the CPC manual bypass at a lower power level result in an earlier reactor protective system actuation for the postulated transients, which involves no significant reduction in the margin of safety.

2. The proposed changes in parts 1, 3, 6, 7 and 9 match the guidance concerning the application of the standards for determining whether or not a significant hazards consideration exists (51 FR 7751) by the example:

   (i) A purely administrative change to Technical Specifications : for example, a change to achieve consistency throughout the Technical Specifications, correction of an error, or a change in nomenclature.

   The proposed changes in parts 2, 3, 4, and 5 match the guidance of 51 FR 7751 by the example:

   (iv) A change which either may result in some increase to the probability or consequences of a previously analyzed accident or may reduce in some way a safety margin, but where the results of the change are clearly within all acceptable criteria with respect to the system or component specified in the Standard Review Plan; for example, a change resulting from the application of a small refinement of a previously used calculation model or design method.

The proposed changes in part 4, 5 and 8 match the guidance of 51 FR 7751 by the example:

(ii) A change that constitutes an additional limitation, restriction or control not presently included in the technical specifications: for example, a more stringent surveillance requirement.

E. SAFETY EVALUATION FOR THE AMENDMENT REQUEST

The proposed Technical Specification amendment will not increase the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the FSAR. The anticipated operational occurrences (AOOs) and accidents that have potential for being impacted by the proposed changes are steam line break, CEA withdrawal, CEA ejection, inadvertent deboration and startup of an inactive reactor coolant pump (RCP). All the impacted AOOs and accidents have been reevaluated to determine the resulting consequences due to the proposed changes. The results of these evaluations show that the consequences are still within the appropriate acceptance criteria discussed below.

1. The PVNGS safety analysis requires that steam line break events be evaluated considering potential for fuel damage. If the minimum DNBR during a steam line break event falls below specified limits based on acceptable correlations, fuel damage must be assumed. The results of the limiting steam line break analysis indicate that the minimum post-trip DNBR remains well above the specified safety limit.

2. The PVNGS safety analysis requires that the consequences of an uncontrolled control element assembly (CEA) withdrawal from a subcritical or low power startup condition be evaluated on the basis that they are acceptable if the minimum DNBR remains above specified limits based on acceptable correlations. The reevaluation of the limiting CEA withdrawal analysis indicates that the minimum DNBR will remain above the plant specific safety limit of 1.231.

3. The PVNGS safety analysis requires that for a startup or an inactive RCP, fuel clad integrity should be maintained by ensuring that specified acceptable fuel design limits are not exceeded. The result of a limiting startup of an inactive RCP indicate that the reactor remains subcritical and the specified acceptable fuel design limits are not exceeded, thus maintaining fuel clad integrity.

4. The PVNGS safety analysis requires that for a CEA ejection, the reactivity excursion should not result in a radially averaged enthalpy greater than 280 cal/gm at any axial location in any fuel rod. Reevaluation of limiting CEA ejection accident concurrent with the introduction of the K_{N-1} requirement ensures that the safety analysis acceptance criterion will be met.

The proposed change to lower the setpoint of the high logarithmic power trip will provide the trip function earlier than the previous setpoint. This trip provides protection in the event of an inadvertent control element assembly (CEA) bank withdrawal from MODES 2 and 3 initial conditions with four reactor

F. ENVIRONMENTAL IMPACT CONSIDERATION DETERMINATION

The proposed change request does not involve an unreviewed environmental question because operation of PVNGS Units 1 and 2, in accordance with this change, would not:

1. Result in a significant increase in any adverse environmental impact previously evaluated in the Final environmental statement (FES) as modified by the staff's testimony to the Atomic Safety and Licensing Board, Supplements to the FES, Environmental Impact appraisals, or in any decisions of the Atomic Safety and Licensing Board; or

2. Result in a significant change in effluents or power levels; or

3. Result in matters not previously reviewed in the licensing basis for PVNGS which may have a significant environmental impact.

G. MARKED-UP TECHNICAL SPECIFICATION CHANGE PAGES:

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Definitions:

1-4, 1-5, 1-6, 1-7

Safety Limits and Safety System Settings:

2-4, 2-5

Limiting Conditions for Operation and Surveillance Requirements:

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1-10
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1-20
3-5
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10-9
10-10 (Unit 1 only)

Bases for Limiting Conditions for Operation and Surveillance Requirements

B 3/4 1-1
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1-2
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7. INADVERTENT DEBORATION

7.1 Identification of Event and Causes

The Inadvertent Deboration (ID) event is presented here with respect to time available for operator corrective action prior to the loss of minimum required shutdown margin. Fuel integrity is not challenged by this event.

The ID event may be caused by improper operator action or by a failure in the boric acid makeup flow path which reduces the flow of borated water to the charging pump suction. Either cause can produce a boron concentration of the charging flow which is below the concentration of the reactor coolant.

The ID event initiated during each of the six operational modes defined in the technical specifications was evaluated. This evaluation shows that MODE 5 (cold shutdown) with the reactor coolant system drained down results in the least time available for detection and termination of the event. This combination of lowered RCS volume and 3 charging pumps leads to a small time constant and results in the fastest dilution rate and, therefore, yields the shortest time to a complete loss of shutdown margin.

Since boron dilution is conducted under strict procedural controls which specify limits on the rate and the magnitude of any required change in boron concentration, the probability of a sustained and erroneous dilution due to operator error is very low.

The indications and/or alarms available to alert the operators that a boron dilution event is occurring in each of the operational modes are outlined below.

1. The following control indications and corresponding pre-trip alarms are available for MODES 1 and 2: a high power or, for some set of conditions, a high pressurizer pressure trip in MODE 1 or a high logarithmic power level trip in MODE 2. Furthermore, a high T_{AVG} alarm may also occur prior to trip.

2. In MODES 3 and 4 with CEAs withdrawn, the high logarithmic power level trip and pre-trip alarm, and a high neutron flux alarm will provide an indication to alert the operator of an inadvertent boron dilution.

3. In MODES 3, 4, and 5 with CEAs fully inserted except the worst rod stuck out and in MODE 6, a high neutron flux alarm on the startup flux channels will provide indication of any boron dilution event.

4. In MODE 5 with the RCS partially drained for system maintenance, the primary coolant volume available for mixing consists of only the volume of the Reactor Vessel up to the level of the coolant legs and the volume of the shutdown cooling system. Similarly, in Modes 4 or 5 when cooling the RCS with the shutdown cooling system, the active volume may consist of only the volume of the Reactor Vessel (excluding the upper head region) and the volume of the shutdown cooling system. In these conditions startup flux channel alarm will provide indication of any boron dilution event.

The operational procedure guidelines, in addition to these indications and/or alarms, will assure detection and termination of the boron dilution event before the shutdown margin is lost.

7.2 Sequence of Events and Systems Operation

The core is initially subcritical with shutdown margin at the minimum value consistent with the technical specification limit. An inadvertent deboration occurs which causes unborated water to be pumped into the RCS. The resulting decrease in RCS boron concentration adds positive reactivity to the core. Assuming dilution continues at the maximum possible rate, 52 minutes would elapse before the core becomes critical.

The success path is as follows:

Reactivity Control:

The operator is alerted to a decrease in the reactor coolant system (RCS) boron concentration either through a high neutron flux alarm on the startup flux channel, sampling, boronometer indications, or boric acid flow rate. The operator turns off the charging pump(s) and closes the letdown control valves in order to halt further dilution. Next, the operator increases the RCS boron concentration by implementing the emergency boration procedure for achieving cold shutdown boron concentration.

7.3 Analysis of Effects and Consequences

A. Mathematical Model

Assuming complete mixing of boron in the RCS, the rate of change of boron concentration during dilution is described by the following equation.

$$M\frac{dC}{dt} = -WC$$

Where: M = RCS mass
C = RCS boron concentration
W = Charging mass flow rate of unborated water

dC/dt is maximized by maximizing W and minimizing M. Assuming:

W = Constant, equal to the maximum possible value,

and choosing:

M = Constant, equal to the minimum value occurring during the boron dilution incident,

the solution of Equation (1) can be written

$$C(t) = C(o)e^{-t/\tau} \qquad (2)$$

Where: $\tau = M/W$ = Boron dilution time constant

$C(o)$ = Initial boron concentration

The time T required to dilute to criticality is given by

$$T = \tau \ln \frac{C(o)}{C_{crit}} \qquad (3)$$

Where: C_{crit} = Critical boron concentration

B. Input Parameters and Initial Conditions

It is assumed that the inadvertent deboration proceeds at the maximum possible rate. For this to occur, all charging pumps must be on, the reactor makeup water tank must be aligned with the charging pump suction, a reactor makeup water pump must be on, letdown flow must be diverted from the volume control tank, and a failure in the boric acid makeup water flow path (e.g., flow control valve FV-210Y failing in the closed position) must terminate borated water flow to the charging pump suction.

Evaluation of ID events initiated during each of the six plant operational modes (defined in the technical specifications) shows that MODE 5 (cold shutdown) in the drained down configuration results in the

shortest available time for detection and termination of the event. Therefore, the initial conditions and analysis parameters are chosen for the cold shutdown operational mode to minimize the interval from initiation of dilution to the time at which criticality is reached. The following are the analysis assumptions for the ID event:

1. Complete mixing of boron within the RCS is assumed.

2. The event was initiated at a rods out condition and used the technical specification lower limit on shutdown margin for cold shutdown. The shutdown margin as specified in the technical specifications can vary as a function of reactor coolant cold leg temperature. The minimum value of shutdown margin at temperature range of MODE 5 is 3.5% $\Delta\rho$. This condition is more limiting than the all rods in condition because when all rods are in, the core would be subcritical by the sum of the 1% $\Delta\rho$ required by specification 3.1.1.1 and the stuck rod allowance required in the definition of shutdown margin. This stuck rod allowance is larger than 4% $\Delta\rho$.

3. The primary coolant volume, including only the volumes for Mode 5 drained listed above is 4,500 ft^3. A conservatively low reactor coolant mass was assumed by using the cold RCS internal volume. Assuming the coolant temperature of 210°F, the technical specification upper limit for cold shutdown, the resulting mass is 270,400 lbm.

4. All three charging pumps are assumed to be on at their maximum rate; 44 gpm per pump, for a total of 132 gpm. The corresponding mass flow rate, assuming cold liquid flow, is 18.36 lbm/sec.

5. The critical boron concentration, with all rods in except the highest reactivity worth rod stuck out, and the inverse boron worth are 931 ppm and 66 ppm/%$\Delta\rho$, respectively, including uncertainties for the cold shutdown conditions. The initial subcritical boron concentration for the hot shutdown mode is found by adding the product of the inverse boron worth and the minimum shutdown margin (i.e., 3.5 percent) to the critical boron concentration. The resulting minimum initial boron concentration in MODE 5 is 1,162 ppm. Thus, the change in boron concentration from 3.5%$\Delta\rho$ subcritical to critical is 231 ppm.

The parameters discussed above are summarized in Table 7-1.

C. Results

Using conservative parameters as described above in Equation (3), the minimum possible time interval to dilute from 3.5%$\Delta\rho$ subcritical to criticality is 52 minutes. Given the numerous indications of improper operation and the high neutron flux alarm on the startup flux channel, sufficient time is available to assure detection of a boron dilution event at least 15 minutes prior to criticality. Boron dilution will then be terminated before loss of shutdown margin by the operator actions discussed in Section 7.2.

7.4 Conclusions

The inadvertent deboration event will result in acceptable consequences. Sufficient time is available for the operator to detect and to terminate an inadvertent deboration event if it occurs. Fuel integrity is not challenged during this event.

TABLE 7-1

ASSUMPTIONS FOR THE INADVERTENT DEBORATION ANALYSIS

Parameters	Assumed Value
Cold RCS Volume (excluding pressurizer surge line), ft^3	4,500
RCS Mass (excluding pressurizer and surge line), lbm	270,432
Volumetric Charging Rate, gpm	132
Mass Charging Rate, lbm/sec	18.36
Dilution Time Constant, τ , sec	14,700
Initial Boron Concentration - C(o), ppm	1,162
Critical Boron Concentration - C_{crit}, ppm	931

3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

ALL CEAs FULLY INSERTED

SHUTDOWN MARGIN - T_{cold} GREATER THAN 210°F

LIMITING CONDITION FOR OPERATION

3.1.1.1 The SHUTDOWN MARGIN shall be greater than or equal to 1.0% (6.0%) delta k/k.

APPLICABILITY: MODES 1, 2*, 3, and 4

3, 4*, and 5* WITH ALL FULL-LENGTH CEAs FULLY INSERTED.

ACTION:

With the SHUTDOWN MARGIN less than 1.0% (6.0%) delta k/k, immediately initiate and continue boration at greater than or equal to 26 gpm to reactor coolant system of a solution containing greater than or equal to 4000 ppm boron or equivalent until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.1.1 The SHUTDOWN MARGIN shall be determined to be greater than or equal to 1.0% (6.0%) delta k/k:

a. Within 1 hour after detection of an inoperable CEA(s) and at least once per 12 hours thereafter while the CEA(s) is inoperable. If the inoperable CEA is immovable as a result of excessive friction or mechanical interference or known to be untrippable, the above required SHUTDOWN MARGIN shall be verified acceptable with an increased allowance for the withdrawn worth of the immovable or untrippable CEA(s).

b. When in MODE 1 or MODE 2 with K_{eff} greater than or equal to 1.0, at least once per 12 hours by verifying that CEA group withdrawal is within the Transient Insertion Limits of Specification 3.1.3.6.

c. When in MODE 2 with K_{eff} less than 1.0, within 4 hours prior to achieving reactor criticality by verifying that the predicted critical CEA position is within the limits of Specification 3.1.3.6.

* See Special Test Exception ~~3.10.1.~~ 3.10.9.

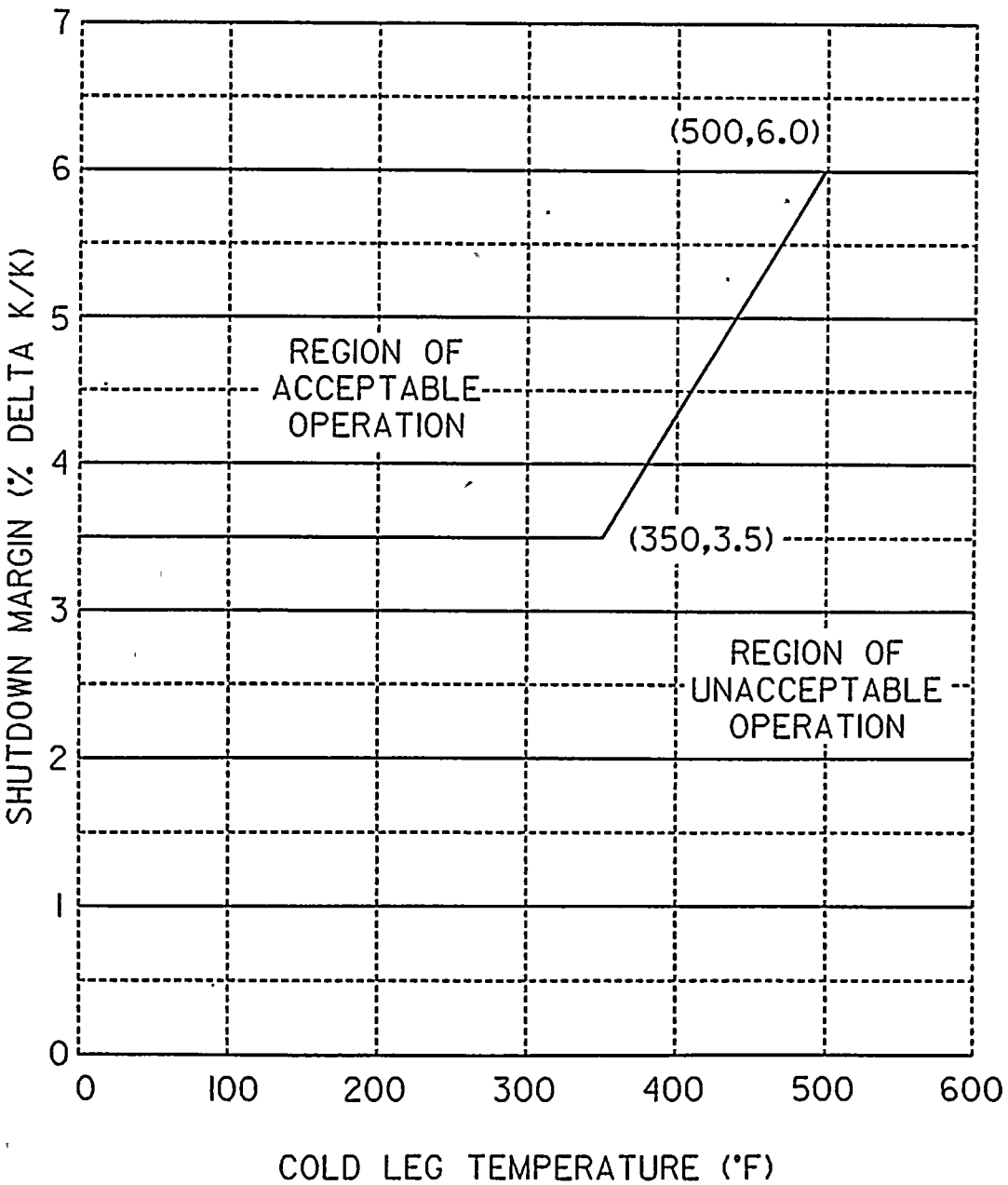

FIGURE 3.1 - 1A

SHUTDOWN MARGIN VERSUS COLD LEG TEMPERATURE

CHARGING PUMPS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.3 At least one charging pump* or one high pressure safety injection pump or one low pressure safety injection pump in the boron injection flow path required OPERABLE pursuant to Specification 3.1.2.1 shall be OPERABLE and capable of being powered from an OPERABLE emergency power source.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no charging pump or high pressure safety injection pump or low pressure safety injection pump OPERABLE or capable of being powered from an OPERABLE emergency power source, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

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

Delete

* Whenever the reactor coolant level is below the bottom of the pressurizer in MODE 5, one and only one charging pump shall be OPERABLE, by verifying at least once per every 7 days that power is removed from the remaining charging pumps.

TABLE 3.1-1

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $K_{eff} > 0.98$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	1 hour	Operation not allowed	
4 not on SCS	12 hours	1 hour	Operation not allowed	
5 ~~RCS filled~~ not on SCS	8 hours	1 hour	Operation not allowed	
4 & 5 RCS ~~partially drained~~ on SCS	Operation not allowed			
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: SCS = Shutdown Cooling System

TABLE 3.1-2

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $0.98 \geq K_{eff} > 0.97$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	2.5 hours	1 hour	0.5 hours
4 not on SCS	12 hours	2.5 hours	1 hour	0.5 hours
5 ~~RCS filled~~ not on SCS	8 hours	2.5 hours	1 hour	0.5 hours
4 & 5 ~~RCS partially drained~~ on SCS	8 hours	0.5 hours	Operation not allowed	
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: SCS = Shutdown Cooling System

TABLE 3.1-3

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $0.97 \geq K_{eff} > 0.96$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	3.5 hours	1.5 hours	1 hour
4 not on SCS	12 hours	3.5 hours	1.5 hours	1 hour
5 ~~RCS filled~~ not on SCS	8 hours	3.5 hours	1.5 hours	1 hour
5 ~~RCS partially drained~~ on SCS	8 hours	1 hour	0.5 hours ~~Operation not allowed~~	ONA
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

4 & 5

Note: SCS = Shutdown Cooling System
ONA = Operation Not Allowed

TABLE 3.1-4

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $0.96 \geq K_{eff} > 0.95$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	5 hours	2 hours	1 hour
4 not on SCS	12 hours	5 hours	2 hours	1 hour
5 ~~RCS filled~~ not on SCS	8 hours	5 hours	2 hours	1 hour
4 & 5 ~~RCS partially drained~~ on SCS	8 hours	~~1.5 hours~~ 2.0 hours	~~Operation not allowed~~ 0.5 hours	~~Operation not allowed~~ ONA
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: SCS = Shutdown Cooling System
ONA = Operation Not Allowed

TABLE 3.1-5

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $K_{eff} \leq 0.95$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	6 hours	3 hours	1.5 hours
4 not on SCS	12 hours	6 hours	3 hours	1.5 hours
5 ~~RCS filled~~ not on SCS	8 hours	6 hours	3 hours	1.5 hours
4 & 5 ~~RCS partially drained~~ on SCS	8 hours	2 hours	1 hour ~~Operation not allowed~~	.5 hours
6	24 hours	8 hours	4 hours	2 hours

Note: SCS = Shutdown Cooling System

3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

ALL CEAs FULLY INSERTED

SHUTDOWN MARGIN - ~~T_{cold}~~ GREATER THAN 210°F

LIMITING CONDITION FOR OPERATION

3.1.1.1 The SHUTDOWN MARGIN shall be greater than or equal to ~~6.0%~~ 1.0% delta k/k.

APPLICABILITY: MODES ~~1, 2*, 3, and 4.~~ 3, 4*, and 5* WITH ALL FULL-LENGTH CEAs FULLY INSERTED.

ACTION:

With the SHUTDOWN MARGIN less than ~~6.0%~~ 1.0% delta k/k, immediately initiate and continue boration at greater than or equal to 26 gpm to reactor coolant system of a solution containing greater than or equal to 4000 ppm boron or equivalent until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.1.1 The SHUTDOWN MARGIN shall be determined to be greater than or equal to ~~6.0%~~ 1.0% delta k/k:

a. Within 1 hour after detection of an inoperable CEA(s) and at least once per 12 hours thereafter while the CEA(s) is inoperable. If the inoperable CEA is immovable as a result of excessive friction or mechanical interference or known to be untrippable, the above required SHUTDOWN MARGIN shall be verified acceptable with an increased allowance for the withdrawn worth of the immovable or untrippable CEA(s).

b. When in MODE 1 or MODE 2 with K_{eff} greater than or equal to 1.0, at least once per 12 hours by verifying that CEA group withdrawal is within the Transient Insertion Limits of Specification 3.1.3.6.

c. When in MODE 2 with K_{eff} less than 1.0, within 4 hours prior to achieving reactor criticality by verifying that the predicted critical CEA position is within the limits of Specification 3.1.3.6.

* See Special Test Exception ~~3.10.1.~~ 3.10.1.

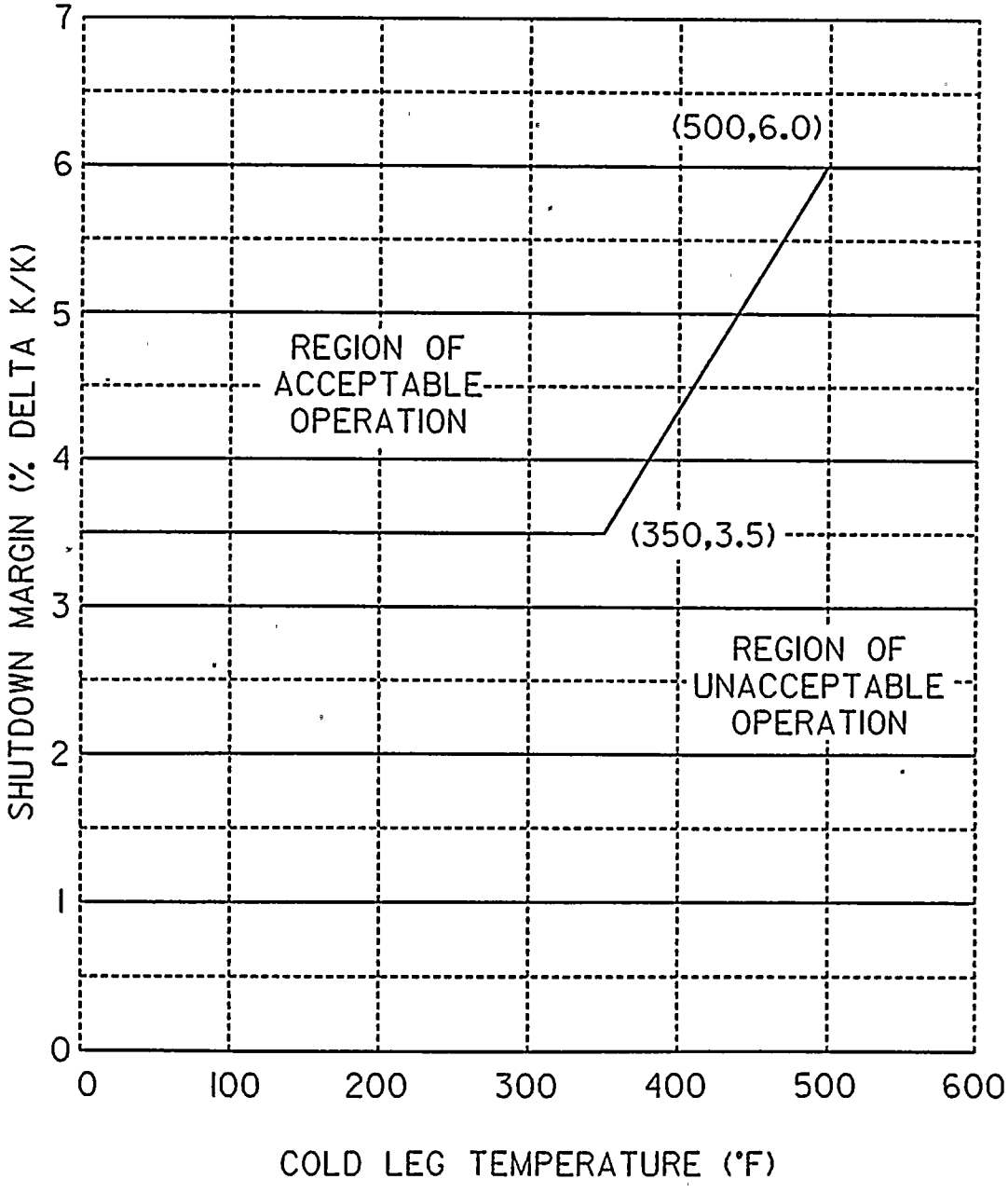

FIGURE 3.1 - 1A

SHUTDOWN MARGIN VERSUS COLD LEG TEMPERATURE

CHARGING PUMPS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.3 At least one charging pump* or one high pressure safety injection pump or one low pressure safety injection pump in the boron injection flow path required OPERABLE pursuant to Specification 3.1.2.1 shall be OPERABLE and capable of being powered from an OPERABLE emergency power source.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no charging pump or high pressure safety injection pump or low pressure safety injection pump OPERABLE or capable of being powered from an OPERABLE emergency power source, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

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

Delete

~~* Whenever the reactor coolant level is below the bottom of the pressurizer in MODE 5, one and only one charging pump shall be OPERABLE, by verifying at least once per every 7 days that power is removed from the remaining charging pumps.~~

TABLE 3.1-1

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $K_{eff} > 0.98$

OPERATIONAL MODE	NUMBER OF OPERATING CHARGING PUMPS			
	0	1	2	3
3	12 hours	1 hour	ONA	ONA
4 not on SCS	12 hours	1 hour	ONA	ONA
5 ~~RCS filled~~ not on SCS	8 hours	1 hour	ONA	ONA
5 ~~RCS partially drained~~ on SCS	ONA	ONA	ONA	ONA
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: ONA = operation not allowed
SCS = Shutdown Cooling System

TABLE 3.1-2

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $0.98 \geq K_{eff} > 0.97$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	2.5 hours	1 hour	0.5 hours
4 not on SCS	12 hours	2.5 hours	1 hour	0.5 hours
5 ~~RCS filled~~ not on SCS	8 hours	2.5 hours	1 hour	0.5 hours
4 & 5 on SCS ~~RCS partially drained~~	8 hours	0.5 hours	Operation not allowed	
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: SCS = Shutdown Cooling System

TABLE 3.1-3

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $0.97 \geq K_{eff} > 0.96$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	3.5 hours	1.5 hours	1 hour
4 not on SCS	12 hours	3.5 hours	1.5 hours	1 hour
5 not on SCS RCS ~~filled~~	8 hours	3.5 hours	1.5 hours	1 hour
4, 5 on SCS RCS ~~partially drained~~	8 hours	1 hour	0.5 hours ~~Operation not allowed~~	ONA
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: SCS = Shutdown Cooling System
ONA = Operation Not Allowed

TABLE 3.1-4

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $0.96 \geq K_{eff} > 0.95$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	5 hours	2 hours	1 hour
4 not on SCS	12 hours	5 hours	2 hours	1 hour
5 ~~RCS filled~~ not on SCS	8 hours	5 hours	2 hours	1 hour
4, 5 ~~RCS partially drained~~ on SCS	8 hours	~~1.5 hours~~ 2.0 hours	~~Operation not allowed~~ 0.5 hours	~~Operation not allowed~~ ONA
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: SCS = Shutdown Cooling System
ONA = Operation Not Allowed

TABLE 3.1-5

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $K_{eff} \leq 0.95$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	6 hours	3 hours	1.5 hours
4 not on SCS	12 hours	6 hours	3 hours	1.5 hours
5 ~~RCS filled~~ not on SCS	8 hours	6 hours	3 hours	1.5 hours
4d 5 ~~RCS partially drained~~ on SCS	8 hours	2 hours	1 hour ~~Operation not allowed~~	0.5 hours
6	24 hours	8 hours	4 hours	2 hours

Note: SCS = Shutdown Cooling System

REACTIVITY CONTROL SYSTEMS

3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

ALL CEAs FULLY INSERTED

SHUTDOWN MARGIN - ~~T_{cold}~~ GREATER THAN ~~210°F~~

LIMITING CONDITION FOR OPERATION

3.1.1.1 The SHUTDOWN MARGIN shall be greater than or equal to ~~6.0%~~ 1.0% delta k/k.

APPLICABILITY: MODES ~~1, 2*, 3, and 4.~~ 3, 4*, and 5* WITH ALL FULL-LENGTH CEAs FULLY INSERTED.

ACTION:

With the SHUTDOWN MARGIN less than ~~6.0%~~ 1.0% delta k/k, immediately initiate and continue boration at greater than or equal to 26 gpm to reactor coolant system of a solution containing greater than or equal to 4000 ppm boron or equivalent until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.1.1 The SHUTDOWN MARGIN shall be determined to be greater than or equal to ~~6.0%~~ 1.0% delta k/k:

a. Within 1 hour after detection of an inoperable CEA(s) and at least once per 12 hours thereafter while the CEA(s) is inoperable. If the inoperable CEA is immovable as a result of excessive friction or mechanical interference or known to be untrippable, the above required SHUTDOWN MARGIN shall be verified acceptable with an increased allowance for the withdrawn worth of the immovable or untrippable CEA(s).

b. When in MODE 1 or MODE 2 with K_{eff} greater than or equal to 1.0, at least once per 12 hours by verifying that CEA group withdrawal is within the Transient Insertion Limits of Specification 3.1.3.6.

c. When in MODE 2 with K_{eff} less than 1.0, within 4 hours prior to achieving reactor criticality by verifying that the predicted critical CEA position is within the limits of Specification 3.1.3.6.

*See Special Test Exception ~~3.10.1.~~ 3.10.9.

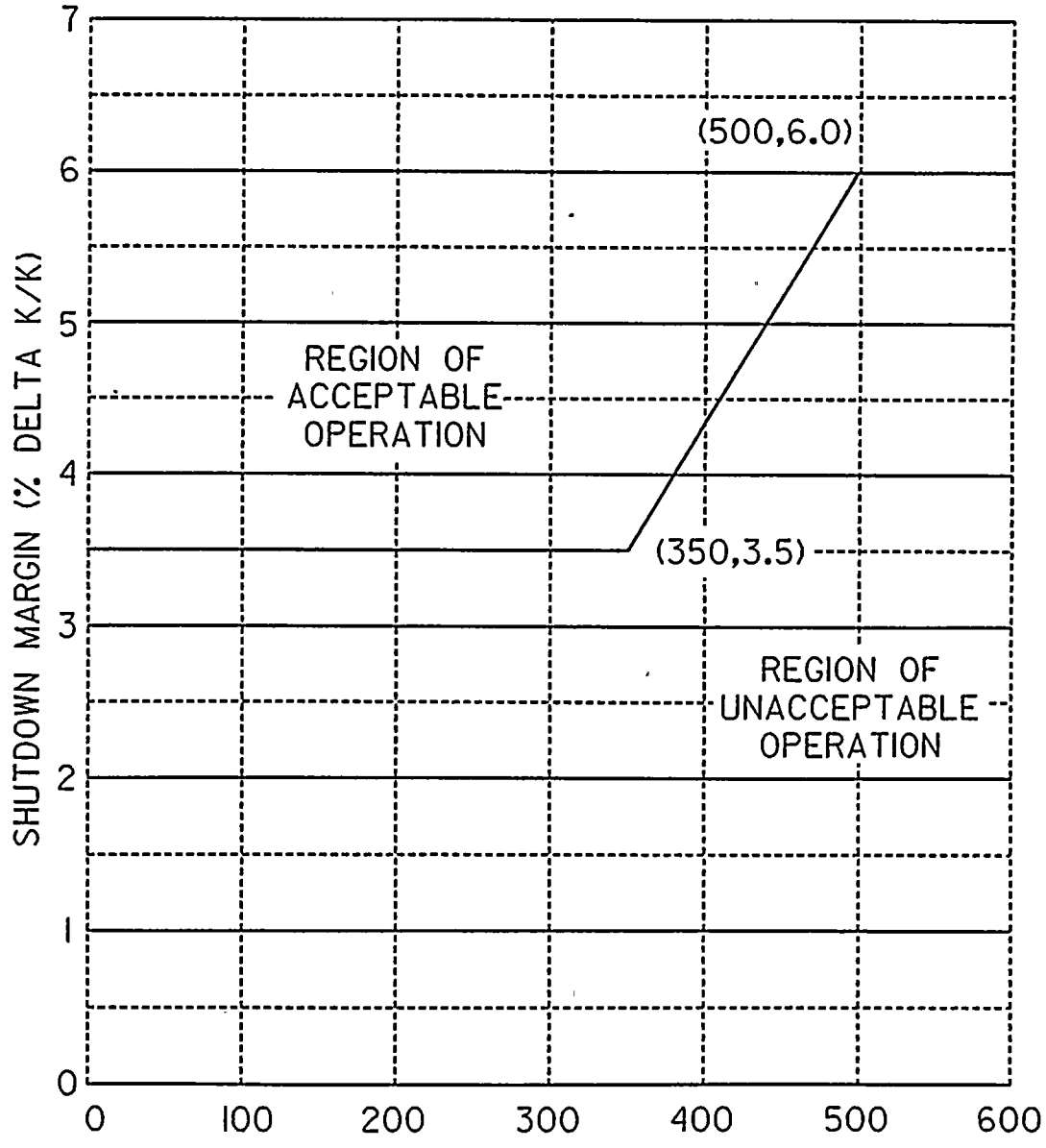

FIGURE 3.1 - 1A

SHUTDOWN MARGIN VERSUS COLD LEG TEMPERATURE

CHARGING PUMPS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.3 At least one charging pump* or one high pressure safety injection pump or one low pressure safety injection pump in the boron injection flow path required OPERABLE pursuant to Specification 3.1.2.1 shall be OPERABLE and capable of being powered from an OPERABLE emergency power source.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no charging pump or high pressure safety injection pump or low pressure safety injection pump OPERABLE or capable of being powered from an OPERABLE emergency power source, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

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

delete

~~*Whenever the reactor coolant level is below the bottom of the pressurizer in MODE 5, one and only one charging pump shall be OPERABLE, by verifying at least once per every 7 days that power is removed from the remaining charging pumps.~~

TABLE 3.1-1

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $K_{eff} > 0.98$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	1 hour	ONA	ONA
4 not on SCS	12 hours	1 hour	ONA	ONA
5 ~~RCS filled~~ not on SCS	8 hours	1 hour	ONA	ONA
4 4 5 ~~RCS partially drained~~ on SCS	ONA	ONA	ONA	ONA
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: ONA = operation not allowed
SCS = Shutdown Cooling System

TABLE 3.1-2

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $0.98 \geq K_{eff} > 0.97$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	2.5 hours	1 hour	0.5 hours
4 not on SCS	12 hours	2.5 hours	1 hour	0.5 hours
5 ~~RCS filled~~ not on SCS	8 hours	2.5 hours	1 hour	0.5 hours
4, 5 ~~RCS partially drained~~ on SCS	8 hours	0.5 hours.	Operation not allowed	
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: SCS = Shutdown Cooling System

TABLE 3.1-3

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $0.97 \geq K_{eff} > 0.96$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	3.5 hours	1.5 hours	1 hour
4 not on SCS	12 hours	3.5 hours	1.5 hours	1 hour
5 ~~RCS filled~~ not on SCS	8 hours	3.5 hours	1.5 hours	1 hour
4& 5 ~~RCS partially drained~~ on SCS	8 hours	1 hour	0.5 hours ~~Operation not allowed~~	ONA
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: SCS = Shutdown Cooling System
ONA = Operation Not allowed

TABLE 3.1-4

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $0.96 \geq K_{eff} > 0.95$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	5 hours	2 hours	1 hour
4 not on SCS	12 hours	5 hours	2 hours	1 hour
5 ~~RCS filled~~ not on SCS	8 hours	5 hours	2 hours	1 hour
4 & 5 ~~RCS partially drained~~ on SCS	8 hours	2.0 hours ~~1.5 hours~~	0.5 hours ~~Operation not allowed~~	ONA
~~6~~	~~24 hours~~	~~8 hours~~	~~4 hours~~	~~2 hours~~

Note: SCS = Shutdown Cooling System
ONA = Operation Not Allowed

TABLE 3.1-5

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR $K_{eff} \leq 0.95$

OPERATIONAL MODE	Number of Operating Charging Pumps			
	0	1	2	3
3	12 hours	6 hours	3 hours	1.5 hours
4 not on SCS	12 hours	6 hours	3 hours	1.5 hours
5 ~~RCS filled~~ not on SCS	8 hours	6 hours	3 hours	1.5 hours
4& 5 ~~RCS partially drained~~ on SCS	8 hours	2 hours	1 hour ~~Operation not allowed~~	0.5 hours
6	24 hours	8 hours	4 hours	2 hours

Note: SCS = Shutdown Cooling System