ATTACHMENT B: REVISED TECHNICAL SPECIFICATION PAGES

PNPS Table 3.1.1 REACTOR PROTECTION SYSTEM (SCRAM) INSTRUMENTATION REQUIREMENT

Operable Inst. Channels per Trip System (1) Minimum	Avail.	Trip Function	Trip Level Setting	Modes in Which Function Must Be Operable: Refuel	Startup/Hot Standby	Run	Action (1)
1	1	Mode Switch in Shutdown		X(7)	X	X	A
1	1	Manual Scram		X(7)	X	X	A
		IRM					
3	4	High Flux	≤120/125 of full scale	X(7)	X	(5)	A
3	4	Inoperative		X(7)	X	(5)	A
		APRM					
2	3	High Flux	(15)	(17)	(17)	X	A or B
2	3	Inoperative	(13)	X(7)	X(9)	X	A or B
2	3	High Flux (15%)	≤15% of Design Power	X(7)	X	(16)	A or B
2	2	High Reactor Pressure	≤1063.5 psig	X(10)	X	X	A
2	2	High Drywell Pressure	≤2.22 psig	X(8)	X(8)	X	A
2	2	Reactor Low Water Level	≥11.6 In. Indicated Level	X(10)	X	X	A
		SDIV High Water Level:	≤38 Gallons	X(2)(7)	X	X	A
2	2	East					
2	2	West					
4	4	Main Steam Line Isolation Valve Closure	≤10% Valve Closure	X(3)(6)	X(3)(6)	X(6)	A or C
2	2	Turbine Control Valve Fast Closure	≥150 psig Control Oil Pressure at Acceleration Relay	X(4)	X(4)	X(4)	A or D
4	4	Turbine Stop Valve Closure	≤10% Valve Closure	X(4)	X(4)	X(4)	A or D

NOTES FOR TABLE 3. 1.1 (Cont)

2. Permissible to bypass, with control rod block, for reactor protection system reset in refuel and shutdown positions of the reactor mode switch.
3. Permissible to bypass when reactor pressure is <576 psig.
4. Permissible to bypass when turbine first stage pressure is less than $\leq$ 112 psig.
5. IRM's are bypassed when APRM's are onscale and the reactor mode switch is in the run position.
6. The design permits closure of any two lines without a scram being initiated.
7. When the reactor mode switch is in the Refuel position, the reactor vessel head is removed, and control rods are inserted in all core cells containing one or more fuel assemblies, these scram functions are not required.
8. Not required to be operable when primary containment integrity is not required.
9. Not required while performing low power physics tests at atmospheric pressure during or after refueling at power levels not to exceed 5 MW(t).
10. Not required to be operable when the reactor pressure vessel head is not bolted to the vessel.
11. Deleted
12. Deleted
13. An APRM will be considered inoperable if there are less than 2 LPRM inputs per level or there is less than 50% of the normal complement of LPRM's to an APRM.
14. Deleted
15. The APRM high flux trip level setting shall be as specified in the CORE OPERATING LIMITS REPORT, but shall in no case exceed 120% of rated thermal power.
16. The APRM (15%) high flux scram is bypassed when in the run mode.
17. The APRM flow biased high flux scram is bypassed when in the refuel or startup/hot standby modes.
18. Deleted.

PNPS
TABLE 3.2.C.1

INSTRUMENTATION THAT INITIATES ROD BLOCKS

Trip Function	Operable Channels per Trip Function Minimum	Available	Required Operational Conditions	Notes
APRM Upscale (Flow Biased)	4	6	Run	(1)
APRM Upscale	4	6	Startup/Refuel	(1)(6)
APRM Inoperative	4	6	Run/Startup/Refuel	(1)(6)
APRM Downscale	4	6	Run	(1)
Rod Block Monitor (Power Dependent)	2	2	Run, with limiting control rod pattern, and reactor power > LPSP	(2)(5)
Rod Block Monitor Inoperative	2	2	Run, with limiting control rod pattern, and reactor power > LPSP	(2)(5)
Rod Block Monitor Downscale	2	2	Run, with limiting control rod pattern, and reactor power > LPSP	(2)(5)
IRM Downscale	6	8	Startup/Refuel, except trip is bypassed when IRM is on its lowest range	(1)(6)
IRM Detector not in Startup Position	6	8	Startup/Refuel, trip is bypassed when mode switch is placed in run	(1)(6)
IRM Upscale	6	8	Startup/Refuel	(1)(6)
IRM Inoperative	6	8	Startup/Refuel	(1)(6)

PNPS
TABLE 3.2.C.1 (Cont)

INSTRUMENTATION THAT INITIATES ROD BLOCKS

Trip Function	Operable Instrument Channels per Trip Function		Required Operational Conditions	Notes
	Minimum	Available		
SRM Detector not in Startup Position	3	4	Startup/Refuel, except trip is bypassed when SRM count rate is ≥ 100 counts/second or IRMs on Range 3 or above	(1)(4)(6)
SRM Downscale	3	4	Startup/Refuel, except trip is bypassed when IRMs on Range 3 or above	(1)(4)(6)
SRM Upscale	3	4	Startup/Refuel, except trip is by-passed when the IRM range switches are on Range 8 or above	(1)(4)(6)
SRM Inoperative	3	4	Startup/Refuel, except trip is by-passed when the IRM range switches are on Range 8 or above	(1)(4)(6)
Scram Discharge Instrument Volume Water Level - High	2	2	Run/Startup/Refuel	(3)(6)
Scram Discharge Instrument Volume-Scram Trip Bypassed	1	1	Refuel/Shutdown	(3)(6)

NOTES FOR TABLE 3.2.C-1

1. With the number of operable channels:

   a. One less than required by the minimum operable channels per trip function requirement, restore an inoperable channel to operable status within 7 days or place an inoperable channel in the tripped condition within the next hour.

   b. Two or more less than required by the minimum operable channels per trip function requirement, place at least one inoperable channel in the tripped condition within one hour.

2. a. With one RBM Channel inoperable:

      (1) restore the inoperable RBM channel to operable status within 24 hours; otherwise place one rod block monitor channel in the tripped condition within the next hour, and;

      (2) prior to control rod withdrawal, perform an instrument function test of the operable RBM channel.

   b. With both RBM channels inoperable, place at least one inoperable rod block monitor channel in the tripped condition within one hour.

3. If the number of operable channels is less than required by the minimum operable channels per trip function requirement, place the inoperable channel in the tripped condition within one hour.

4. SRM operability requirements during core alterations are given in Technical Specification 3.10.

5. RBM operability is required in the run mode in the presence of a limiting rod pattern with reactor power greater than the RBM low power setpoint (LPSP). A limiting rod pattern exists when:

   MCPR < 1.40 for reactor power ≥ 90%

   MCPR < 1.70 for reactor power < 90%

   The allowable value for the LPSP is ≤ 29% of rated core thermal power.

6. When the reactor mode switch is in the Refuel position, the reactor vessel head is removed, and control rods are inserted in all core cells containing one or more fuel assemblies, these Rod Block functions are not required.

LIMITING CONDITIONS FOR OPERATION

3.4 STANDBY LIQUID CONTROL SYSTEM

Specification:

Two SLC subsystems shall be OPERABLE.

Applicability:

Run and Startup MODES

Operation with Inoperable Equipment

A. With concentration of boron in solution not within limits but > 8%, restore concentration of boron in solution to within limits within 72 hours **AND** 10 days from discovery of failure to meet the LCO.

B. With one SLC subsystem inoperable for reasons other than Condition A, restore SLC subsystem to OPERABLE status within 7 days **AND** 10 days from discovery of failure to meet the LCO.

C. With two SLC subsystems inoperable for reasons other than Condition A, restore one SLC subsystem to OPERABLE status within 8 hours.

D. Required Action and associated Completion Time not met, be in Hot Shutdown within 12 hours.

SURVEILLANCE REQUIREMENTS

4.4 STANDBY LIQUID CONTROL SYSTEM

1. When tested as specified in 3.13 verify that each pump delivers at least 39 GPM against a system head of 1275 psig.

2. Manually initiate one of the Standby Liquid Control System loops and pump demineralized water into the reactor vessel every 24 months on a STAGGERED TEST BASIS.

3. Verify continuity of explosive charge every 31 days.

4. Verify available volume of sodium pentaborate solution is within the limits of Figure 3.4-1 or ≥ 4000 gallons every 24 hours.

5. Verify temperature of sodium pentaborate solution is > 48°F every 24 hours.

6. Verify the concentration of boron in solution is ≤ 9.22 % weight and within the limits of Figure 3.4-1 every 31 days;

   AND

   Once within 24 hours after water or boron is added to solution;

   AND

   Once within 24 hours after solution temperature is restored to > 48° F.

7. Verify sodium pentaborate enrichment is ≥ 54.5 atom percent B-10 prior to addition to SLC tank.

8 Verify all heat traced piping between storage tank and pump suction is unblocked every 24 months.

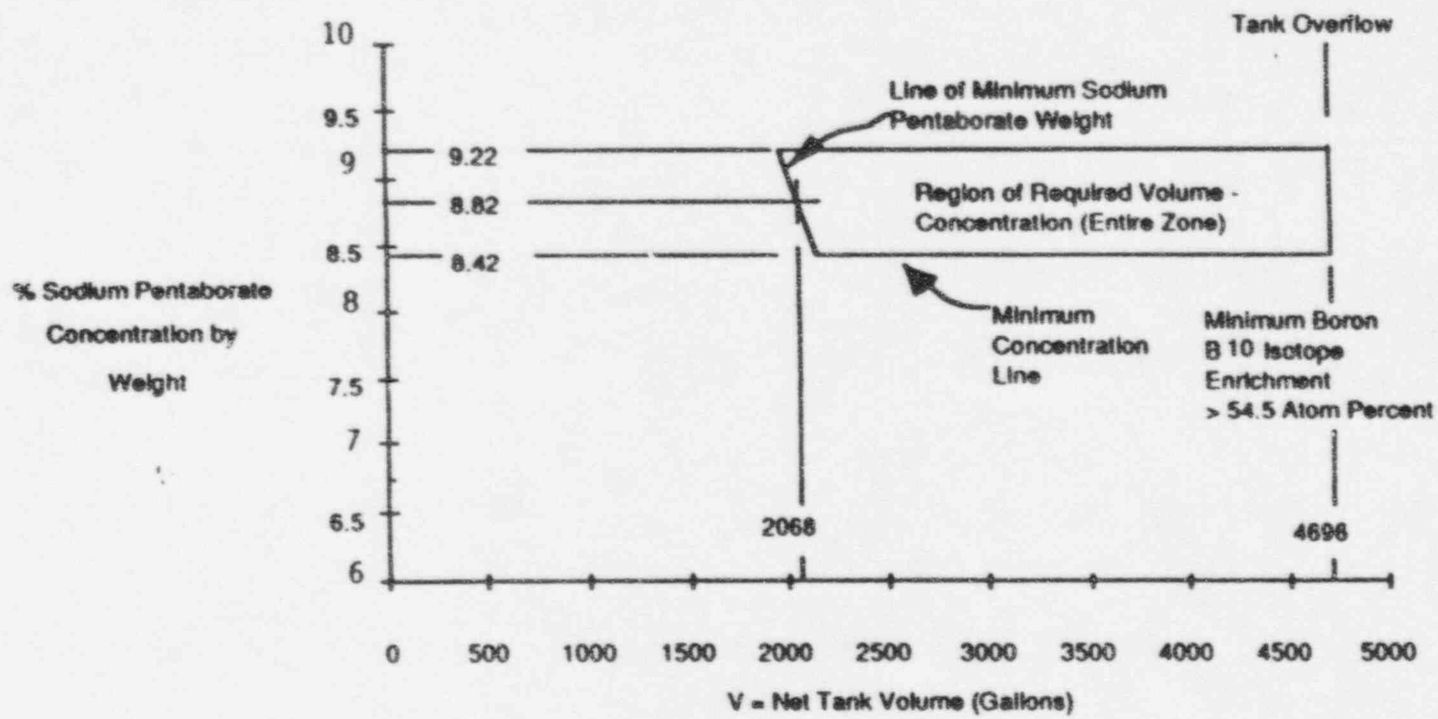
   AND

   Once within 24 hours after solution temperature is restored to > 48° F.

9. Verify temperature of pump suction piping is > 48° F every 24 hours.

PNPS
FIGURE 3.4-1

Sodium Pentaborate Solution
Volume and Concentration Requirements



3/4.4 STANDBY LIQUID CONTROL SYSTEM

Background

The design objective of the standby liquid control system is to provide the capability of bringing the reactor from full power to a cold, xenon-free shutdown condition assuming that none of the withdrawn control rods can be inserted. The Standby Liquid Control system satisfies 10 CFR 50.62, "Anticipated Transients Without Scram (ATWS)".

The SLC System consists of a boron solution storage tank, two positive displacement pumps, two explosive valves that are provided in parallel for redundancy, and associated piping and valves used to transfer borated water from the storage tank to the reactor pressure vessel (RPV). The borated solution is discharged near the bottom of the core shroud, where it then mixes with the cooling water rising through the core. A smaller tank containing demineralized water is provided for testing purposes.

Applicable Safety Analysis

The requirements for SLC capability to shutdown the reactor are identified via the station Nuclear Safety Operational Analysis (Appendix G to the FSAR, Special Event 45 - Shutdown Without Control Rods) . If no more than one operable control rod is withdrawn, the basic shutdown reactivity requirement for the core is satisfied and the Standby Liquid Control system is not required.

The SLC System is used in the event that enough control rods cannot be inserted to accomplish shutdown and cooldown in the normal manner. To meet this objective, the SLC system is designed to inject a quantity of boron that produces a minimum concentration equivalent to 675 ppm of natural boron in the reactor core. The 675 ppm equivalent concentration in the reactor core is required to bring the reactor from full power to at least a three percent Δk subcritical condition, considering the hot to cold reactivity difference, xenon poisoning, etc. The system will inject this boron solution in less than 125 minutes. The maximum time requirement for inserting the boron solution was selected to override the rate of reactivity insertion caused by cooldown of the reactor following the xenon poison peak.

The Standby Liquid Control system must have the equivalent control capacity (injection rate) of 86 gpm at 13 percent by wt. natural sodium pentaborate for a 251" diameter reactor pressure vessel in order to satisfy 10 CFR 50.62 requirements. This equivalency requirement is fulfilled by a combination of concentration, B-10 enrichment and flow rate of sodium pentaborate solution. A minimum 8.42% concentration and 54.5% enrichment of B-10 isotope at a 39 GPM pump flow rate satisfies the ATWS Rule (10 CFR 50.62) equivalency requirement.

The quantity of B-10 stored in the Standby Liquid Control System Storage Tank is sufficient to bring the concentration of B-10 in the reactor to the point where the reactor will be shutdown and to provide a minimum 25 percent margin beyond the amount needed to shutdown the reactor to allow for possible imperfect mixing of the chemical solution in the reactor water. The volume versus concentration limits in Figure 3.4-1 are calculated such that the required concentration is achieved accounting for dilution in the RPV with normal water level and including the water volume in the residual heat removal (RHR) shutdown cooling piping and in the recirculation loop piping. This quantity of borated solution is the amount that is above the pump suction shutoff level in the borated solution storage tank. No credit is taken for the portion of the tank volume that cannot be injected.

BASES:

3/4.4 STANDBY LIQUID CONTROL SYSTEM

Specification

The OPERABILITY of the SLC System provides backup capability for reactivity control independent of normal reactivity control provisions provided by the control rods. The OPERABILITY of the SLC System is based on the conditions of the borated solution in the storage tank and the availability of a flow path to the RPV, including the OPERABILITY of the pumps and valves. Two SLC subsystems are required to be OPERABLE; each contains an OPERABLE pump, an explosive valve, and associated piping, valves, and instruments and controls to ensure an OPERABLE flow path.

Applicability:

In the Run and Startup MODES, shutdown capability is required. In the Hot Shutdown and Cold Shutdown MODES, control rods are not able to be withdrawn since the reactor mode switch is in shutdown and a control rod block is applied. This provides adequate controls to ensure that the reactor remains subcritical. In the Refuel Mode, only a single control rod can be withdrawn from a core cell containing fuel assemblies. Demonstration of adequate SDM (LCO 3.3.A.1, "Reactivity Margin - core loading") ensures that the reactor will not become critical. Therefore, the SLC System is not required to be OPERABLE when only a single control rod can be withdrawn.

Operation with Inoperable Equipment

3.4.A.

If the boron solution concentration is less than the required limits for mitigation but greater than the concentration required for cold shutdown (original licensing basis), the concentration must be restored to within limits in 72 hours. It is not necessary under these conditions to declare both SLC subsystems inoperable since they are capable of performing their original design basis function. Because of the low probability of an event and the fact that the SLC System capability still exists for vessel injection under these conditions, the allowed Completion Time of 72 hours is acceptable and provides adequate time to restore concentration to within limits.

The original shutdown criteria (licensing basis) required a quantity of boron be injected into the vessel to produce a concentration equivalent to 700 ppm of natural boron in the reactor core in less than 125 minutes. To meet this criteria, at least 4770 gallons of 9.4% sodium pentaborate or equivalent was required to be available for delivery to the reactor. Since the SLC pump flowrate is unchanged and the quantity of boron in the SLC storage tank is a function of volume, concentration, and enrichment, the following formula describes the relationships necessary to ensure that sufficient B-10 is available: (BECo Calculation - N82)

$$\frac{E}{19.8} \times \frac{C}{9.4} \times \frac{V}{4770} \geq 1.0$$

Minimum Concentration (C) to achieve original shutdown criteria assuming a SLC tank usable volume (V) of 3650 gallons [4050 gallons (low level alarm) - 400 gallons (volume below suction path)], and a 54.5% enriched boron solution is:

$$C = \frac{19.8}{E} \times \frac{4770}{V} \times 9.4$$

$$C = \frac{19.8}{54.5} \times \frac{4770}{3650} \times 9.4 = 4.46\%$$

Operation with Inoperable Equipment (continued)

3.4.A (continued)

Therefore, maintaining the solution concentration > 8% will ensure original shutdown criteria is satisfied.

The second completion time establishes a limit on the maximum time allowed for any combination of concentration out of limits or inoperable SLC subsystems during any single contiguous occurrence of failing to meet the LCO. If condition 3.4.A is entered while, for instance, a SLC subsystem is inoperable (condition 3.4.B) and that subsystem is subsequently returned to OPERABLE, the LCO may already have been not met for up to 7 days. This situation could lead to a total duration of 10 days (7 days in condition 3.4.B, followed by 3 days in condition 3.4.A), since initial failure of the LCO, to restore the SLC System. Then a SLC subsystem could be found inoperable again, and concentration could be restored to within limits. This could continue indefinitely.

This completion time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock," resulting in establishing the "time zero" at the time the LCO was initially not met instead of at the time condition 3.4.A was entered. The 10 day Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely.

3.4.B

Only one of the two standby liquid control pumping loops is needed for operating the system. If one SLC subsystem is inoperable for reasons other than condition 3.4.A, the inoperable subsystem must be restored to OPERABLE status within 7 days. One inoperable pumping circuit does not immediately threaten the shutdown capability, and reactor operation can continue while the circuit is being repaired. Assurance that the remaining system will perform its intended function and that the long term average availability of the system is not reduced is obtained for a one out of two system by an allowable equipment out of service time of one third of the normal surveillance frequency. This method determines an equipment out of service time of ten days. Additional conservatism is introduced by reducing the allowable out of service time to seven days.

The second completion time establishes a limit on the maximum time allowed for any combination of concentration out of limits or inoperable SLC subsystems during any single contiguous occurrence of failing to meet the LCO. If condition 3.4.B is entered while, for instance, concentration is out of limits (condition 3.4.A), and is subsequently returned to within limits, the LCO may already have been not met for up to 3 days. This situation could lead to a total duration of 10 days (3 days in condition 3.4.A, followed by 7 days in condition 3.4.B), since initial failure of the LCO, to restore the SLC System. Then concentration could be found out of limits again, and the SLC subsystem could be restored to OPERABLE. This could continue indefinitely.

This completion time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock," resulting in establishing the "time zero" at the time the LCO was initially not met instead of at the time condition 3.4.B was entered. The 10 day Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely.

3.4.C

If both SLC subsystems are inoperable for reasons other than condition 3.4.A, at least one subsystem must be restored to OPERABLE status within 8 hours. The allowed completion time of 8 hours is considered acceptable given the low probability of a

Operation with Inoperable Equipment (continued)

3.4.C (continued)

DBA or transient occurring concurrent with the failure of the control rods to shut down the reactor.

3.4.D

If any action and associated completion time is not met, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to Hot Shutdown within 12 hours. The allowed completion time of 12 hours is reasonable, based on operating experience, to reach Hot Shutdown from full power conditions in an orderly manner and without challenging plant systems.

Surveillance Requirements

4.4.1

Demonstrating that each SLC System pump develops a flow rate of 39 gpm at a minimum system head of 1275 psig ensures that pump performance is acceptable during the fuel cycle. This minimum pump flow rate requirement ensures that, when combined with the sodium pentaborate solution concentration requirements, the rate of negative reactivity insertion from the SLC System will adequately compensate for the positive reactivity effects encountered during power reduction, cooldown of the moderator, and xenon decay. This test confirms one point on the pump design curve and is indicative of overall performance. Such inservice inspections confirm component OPERABILITY, trend performance, and detect incipient failures by indicating abnormal performance. Testing the pumps and valves in accordance with the Inservice Testing Program [ASME B&PV Code Section XI (Articles IWP and IWV, except where specific relief is granted)] adequately assesses component operational readiness.

4.4.2

This Surveillance ensures that there is a functioning flow path from the boron solution storage tank to the RPV, including the firing of an explosive valve. The replacement charge for the explosive valve shall be from the same manufactured batch as the one fired or from another batch that has been certified by having one of that batch successfully fired. The pump and explosive valve tested should be alternated such that both complete flow paths are tested every 48 months at alternating 24 month intervals. The Surveillance may be performed in separate steps to prevent injecting boron into the RPV. An acceptable method for verifying flow from the pump to the RPV is to pump demineralized water from a test tank through one SLC subsystem and into the RPV. The 24 month frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the surveillance were performed at power. Various components of the system are individually tested periodically, thus making more frequent testing of the entire system unnecessary.

4.4.3

This Surveillance verifies the continuity of the explosive charges in the injection valves to ensure that proper operation will occur if required. Other administrative controls, such as those that limit the shelf life of the explosive charges, must be followed. The 31 day frequency is based on operating experience and has demonstrated the reliability of the explosive charge continuity.

4.4.4, 4.4.5 and 4.4.9

These 24 hour Surveillances verify certain characteristics of the SLC System (e.g., the volume and temperature of the borated solution in the storage tank), thereby ensuring SLC System OPERABILITY without disturbing normal plant operation. These Surveillances ensure that the proper borated solution volume and temperature, including the temperature of the pump suction piping, are maintained. Maintaining a minimum specified borated solution temperature is important in ensuring that the boron remains in solution and does not precipitate out in the storage tank or in the pump suction piping. The solution shall be kept at least 10°F above saturation temperature to guard against boron precipitation. Minimum solution temperature is 48°F. This is 10°F above the saturation temperature for the maximum allowed sodium pentaborate concentration of 9.22 Wt. Percent.

Maintaining ≥ 4000 gallons of ≥ 8% concentration of 54.5 atom percent B–10 solution provides assurance that the original design criteria will be met which is consistent with the current license bases as revised by Amendment No. 102.

The 24 hour Frequency is based on operating experience and has shown there are relatively slow variations in the measured parameters of volume and temperature.

4.4.6

This Surveillance requires an examination of the sodium pentaborate solution by using chemical analysis to ensure that the proper concentration of boron exists in the storage tank. This Surveillance must be performed anytime boron or water is added to the storage tank solution to determine that the boron solution concentration is within the specified limits. This surveillance must also be performed anytime the temperature is restored to > 48° F, to ensure that no significant boron precipitation occurred. The 31 day fequency of this Surveillance is appropriate because of the relatively slow variation of boron concentration between surveillances.

4.4.7

Enriched sodium pentaborate solution is made by mixing granular, enriched sodium pentaborate with water. The boron enrichment (B–10 atom percent) of the solution in the tank does not vary with the addition of enriched sodium pentaborate or water provided 54.5% enriched(B–10 atom percent) material is added. The procurement process ensures that material is only purchased from a Quality Assurance approved vendor. The Quality Assurance requirements for storage of "Q" material ensures against onsite contamination/degradation of the material. Receipt inspection, isotopic tests, to verify the actual B–10 enrichment, must be performed prior to use.

Since a change in enrichment cannot occur by any process other than the addition of new chemicals to the Standby Liquid Control solution tank, verification of Boron-10 enrichment as a function of the receipt inspection of new chemicals in conjunction with the quality controls in place for onsite storage_is sufficient to satisfy the prior to addition Completion Time.

4.4.8

Demonstrating that all heat traced piping between the boron solution storage tank and the suction inlet to the injection pumps is unblocked ensures that there is a functioning flow path for injecting the sodium pentaborate solution. An acceptable method for verifying that the suction piping is unblocked is to pump from the storage tank to the test tank.

TABLE 6.9-1

REPORTS

	Area	Reference	Submittal Date
a.	Secondary Containment Leak Rate Testing (1)	4.7.C.1.c	Upon completion of each test (2)
b.	(Deleted)		
c.	(Deleted)		
d.	(Deleted)		
e.	(Deleted)		

NOTES: 1. Each integrated leak rate test of the secondary containment shall be the subject of a summary technical report. This report shall include data on the wind speed, wind direction, outside and inside temperatures during the test, concurrent reactor building pressure, and emergency ventilation flow rate. The report shall also include analyses and interpretations of those data which demonstrate compliance with the specified leak rate limits.

2. The report shall be submitted approximately 90 days after completion of each test. Test periods shall be based on the commercial service date as the starting point.

ATTACHMENT C: MARKED-UP PAGES

PNPS Table 3.1.1 REACTOR PROTECTION SYSTEM (SCRAM) INSTRUMENTATION REQUIREMENT

Operable Inst. Channels per Trip System (1)		Trip Function	Trip Level Setting	Modes in Which Function Must Be Operable			Action (1)
Minimum	Avail.			Refuel (7)	Startup/Hot Standby	Run	
1	1	Mode Switch in Shutdown		X (7)	X		A
1	1	Manual Scram		X (7)	X	X	A
		IRM					
3	4	High Flux	≤120/125 of full scale	X (7)	X	(5)	A
3	4	Inoperative		X (7)	X	(5)	A
		APRM					
2	3	High Flux	(15)	(17)	(17)	X	A or B
2	3	Inoperative	(13)	X (7)	X(9)	X	A or B
2	3	High Flux (15%)	≤15% of Design Power	X (7)	X	(16)	A or B
2	2	High Reactor Pressure	≤1063.5 psig	X(10)	X	X	A
2	2	High Drywell Pressure	≤2.22 psig	X(8)	X(8)	X	A
2	2	Reactor Low Water Level	≥11.6 In. Indicated Level	X(10)	X	X	A
		SDIV High Water Level:	≤38 Gallons	X(2)(7)	X	X	A
2	2	East					
2	2	West					
4	4	Main Steam Line Isolation Valve Closure	≤10% Valve Closure	X(3)(6)	X(3)(6)	X(6)	A or C
2	2	Turbine Control Valve Fast Closure	≥150 psig Control Oil Pressure at Acceleration Relay	X(4)	X(4)	X(4)	A or D
4	4	Turbine Stop Valve Closure	≤10% Valve Closure	X(4)	X(4)	X(4)	A or D

NOTES FOR TABLE 3.1.1 (Cont)

2. Permissible to bypass, with control rod block, for reactor protection system reset in refuel and shutdown positions of the reactor mode switch.
3. Permissible to bypass when reactor pressure is <576 psig.
4. Permissible to bypass when turbine first stage pressure is less than ≤ 112 psig.
5. IRM's are bypassed when APRM's are onscale and the reactor mode switch is in the run position.
6. The design permits closure of any two lines without a scram being initiated.
7. ~~When the reactor is subcritical, fuel is in the reactor vessel and the reactor water temperature is less than 212°F, only the following trip functions need to be operable:~~

~~A. Mode switch in shutdown~~
~~B. Manual scram~~
~~C. High flux IRM~~
~~D. Scram discharge volume high level~~
~~E. APRM (15%) high flux scram~~

8. Not required to be operable when primary containment integrity is not required.
9. Not required while performing low power physics tests at atmospheric pressure during or after refueling at power levels not to exceed 5 MW(t).
10. Not required to be operable when the reactor pressure vessel head is not bolted to the vessel.
11. Deleted
12. Deleted
13. An APRM will be considered inoperable if there are less than 2 LPRM inputs per level or there is less than 50% of the normal complement of LPRM's to an APRM.
14. Deleted
15. The APRM high flux trip level setting shall be as specified in the CORE OPERATING LIMITS REPORT, but shall in no case exceed 120% of rated thermal power.
16. The APRM (15%) high flux scram is bypassed when in the run mode.
17. The APRM flow biased high flux scram is bypassed when in the refuel or startup/hot standby modes.
18. Deleted.

L_1

7. When the reactor mode switch is in the Refuel position, the reactor vessel head is removed, and control rods are inserted in all core cells containing one or more fuel assemblies, these scram functions are not required.

PNPS

TABLE 3.2.C.1

INSTRUMENTATION THAT INITIATES ROD BLOCKS

Trip Function	Operable Channels per Trip Function Minimum	Operable Channels per Trip Function Available	Required Operational Conditions	Notes
APRM Upscale (Flow Biased)	4	6	Run	(1)
APRM Upscale	4	6	Startup/Refuel	(1)(6)
APRM Inoperative	4	6	Run/Startup/Refuel	(1)(6)
APRM Downscale	4	6	Run	(1)
Rod Block Monitor (Power Dependent)	2	2	Run, with limiting control rod pattern, and reactor power > LPSP	(2)(5)
Rod Block Monitor Inoperative	2	2	Run, with limiting control rod pattern, and reactor power > LPSP	(2)(5)
Rod Block Monitor Downscale	2	2	Run, with limiting control rod pattern, and reactor power > LPSP	(2)(5)
IRM Downscale	6	8	Startup/Refuel, except trip is bypassed when IRM is on its lowest range	(1)(6)
IRM Detector not in Startup Position	6	8	Startup/Refuel, trip is bypassed when mode switch is placed in run	(1)(6)
IRM Upscale	6	8	Startup/Refuel	(1)(6)
IRM Inoperative	6	8	Startup/Refuel	(1)(6)

PNPS

TABLE 3.2.C.1 (Cont)

INSTRUMENTATION THAT INITIATES ROD BLOCKS

Trip Function	Operable Instrument Channels per Trip Function Minimum	Operable Instrument Channels per Trip Function Available	Required Operational Conditions	Notes
SRM Detector not in Startup Position	3	4	Startup/Refuel, except trip is bypassed when SRM count rate is ≥ 100 counts/second or IRMs on Range 3 or above	(1) (4) (6)
SRM Downscale	3	4	Startup/Refuel, except trip is bypassed when IRMs on Range 3 or above	(1) (4) (6)
SRM Upscale	3	4	Startup/Refuel, except trip is by-passed when the IRM range switches are on Range 8 or above (4)	(1) (6)
SRM Inoperative	3	4	Startup/Refuel, except trip is by-passed when the IRM range switches are on Range 8 or above (4)	(1) (6)
Scram Discharge Instrument Volume Water Level - High	2	2	Run/Startup/Refuel	(3) (6)
Scram Discharge Instrument Volume-Scram Trip Bypassed	1	1	Refuel/Shutdown	(3) (6)

A1 L1

NOTES FOR TABLE 3.2.C-1

1. With the number of operable channels:

   a. One less than required by the minimum operable channels per trip function requirement, restore an inoperable channel to operable status within 7 days or place an inoperable channel in the tripped condition within the next hour.

   b. Two or more less than required by the minimum operable channels per trip function requirement, place at least one inoperable channel in the tripped condition within one hour.

2. a. With one RBM Channel inoperable:

      (1) restore the inoperable RBM channel to operable status within 24 hours; otherwise place one rod block monitor channel in the tripped condition within the next hour, and;

      (2) prior to control rod withdrawal, perform an instrument function test of the operable RBM channel.

   b. With both RBM channels inoperable, place at least one inoperable rod block monitor channel in the tripped condition within one hour.

3. If the number of operable channels is less than required by the minimum operable channels per trip function requirement, place the inoperable channel in the tripped condition within one hour.

4. SRM operability requirements during core alterations are given in Technical Specification 3.10.

5. RBM operability is required in the run mode in the presence of a limiting rod pattern with reactor power greater than the RBM low power setpoint (LPSP). A limiting rod pattern exists when:

   MCPR < 1.40 for reactor power ≥ 90%

   MCPR < 1.70 for reactor power < 90%

   The allowable value for the LPSP is ≤ 29% of rated core thermal power.

L_1

6. When the reactor mode switch is in the Refuel position, the reactor vessel head is removed, and control rods are inserted in all core cells containing one or more fuel assemblies, these Rod Block functions are not required.

LIMITING CONDITIONS FOR OPERATION

3.4 STANDBY LIQUID CONTROL SYSTEM

(A1) Applicability:

Applies to the operating status of the Standby Liquid Control System.

Objective:

To assure the availability of a system with the capability to shut down the reactor and maintain the shut down condition without the use of control rods.

Specification:

(A1) Normal System Availability

1. During periods when fuel is in the reactor and prior to startup from a Cold Condition, the Standby Liquid Control System (Two SLC subsystems) shall be OPERABLE, except as specified in 3.4.B below. This system need not be operable when the reactor is in the Cold Shutdown Condition, all operable control rods are fully inserted and Specification 3.3.A is met.

(L1) APPLICABILITY: Run and Startup MODES

SURVEILLANCE REQUIREMENTS

4.4 STANDBY LIQUID CONTROL SYSTEM

Applicability:

Applies to the surveillance requirements of the Standby Liquid Control System.

Objective:

To verify the operability of the Standby Liquid Control System.

Specification:

A. Normal System Availability

The operability of the Standby Liquid Control System shall be verified by the performance of the following tests:

1. When tested as specified in 3.13 verify that each pump delivers at least 39 GPM against a system head of 1275 psig.

(A1) 2. As required below:

(R1) a. Once every refueling interval while testing as specified in 3.13 verify the system relief valve set point of 1425 psig ± 43 psig.

LIMITING CONDITIONS FOR OPERATION

3.4 STANDBY LIQUID CONTROL SYSTEM (Cont)

B. Operation with Inoperable Components:

1. ~~From and after the date that a redundant component is made or found to be inoperable, Specification 3.4.A.1 shall be considered fulfilled and continued operation permitted provided that the component is returned to an operable condition within seven days.~~

M1

3.4.B With one SLC subsystem inoperable for reasons other than 3.4.A, restore SLC subsystem to OPERABLE status within 7 days **AND** 10 days from discovery of failure to meet the LCO

L2

3.4.C With two SLC subsystems inoperable for reasons other than 3.4.A, restore one SLC subsystem to OPERABLE status within 8 hours

SURVEILLANCE REQUIREMENTS

4.4 STANDBY LIQUID CONTROL SYSTEM (Cont)

~~A. Normal System Availability (Cont)~~

~~b. At least once during each refueling interval, while testing as specified in 3.13,~~ 2. Manually initiate one of the Standby Liquid Control System loops and pump demineralized water into the reactor vessel every 24 months on a STAGGERED TEST BASIS.

A1

R2 This test checks explosion of the charge associated with the tested loop, proper operation of the valves, and pump operability.

R3 The replacement charges to be installed will be selected from the same manufactured batch as the tested charge.

~~c. When testing to satisfy requirement 4.4.A.2.b, both systems, including both explosive valves, shall be tested in the course of two refueling intervals.~~

A1

~~B. Surveillance with Inoperable Components.~~

L3

~~1. When a component is found to be inoperable, its redundant component shall be demonstrated to be operable immediately and daily thereafter until the inoperable component is repaired.~~

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.4 STANDBY LIQUID CONTROL SYSTEM (Cont)	4.4 STANDBY LIQUID CONTROL SYSTEM (Cont)
~~C. Sodium Pentaborate Solution~~	~~C. Sodium Pentaborate Solution~~
(A1) ~~At all times when the Standby Liquid Control System is required to be operable the following conditions shall be met:~~	~~The following tests shall be performed to verify the availability of the Liquid Control Solution:~~
~~1. The net volume - concentration of the Liquid Control Solution in the liquid control tank shall be maintained as required in~~ Figure 3.4-1.	(A2) 4. ~~1.~~ Verify available Volume ~~: Check at least once per day.~~ of sodium pentaborate solution is within limits of figure 3.4-1 or ≥ 4000 gallons every 24 hours
2. The temperature of the liquid control solution shall be maintained above 48°F. (M2) If the solution temperature falls to or below 48°F, the system will be flow tested to verify a flow path. and 24 months	5. ~~2.~~ Verify Temperature ~~: Check at least once per day.~~ of sodium pentaborate solution is > 48° F every 24 hours.
3. The enrichment of the liquid control solution shall be maintained at a B^{10} isotope enrichment exceeding 54.5 atom percent.	6. ~~3.~~ Verify the Concentration ~~: Check at least once per month. Also check concentration anytime~~ of boron in solution is ≤ 9.22 % weight and within limits of Figure 3.4-1 every 31 days (M3) AND once within 24 hours after water or boron is added to the solution or the solution is at or below 48°F.
(A1) ~~D. There are two operational considerations associated with the Standby Liquid Control sodium pentaborate solution requirements. The first consideration involves sodium pentaborate concentration/volume requirements. The second consideration involves B^{10} isotopic enrichment. The related Limiting Conditions for operation are delineated below:~~	(L4) ~~4. Enrichment: Check B^{10} enrichment level by test anytime boron is added to the solution and during each refueling outage. Enrichment analyses shall be received within 30 days of test performance. If not received within 30 days, see Table 6.9.1 for reporting requirements.~~
	7. Verify sodium pentaborate enrichment is ≥ 54.5 atom percent B-10 prior to addition to SLC tank.
	(M4) 3. Verify continuity of explosive charge every 31 days
	(M2) 8. Verify all heat traced piping between storage tank and pump suction is unblocked every 24 months **AND** Once within 24 hours after solution temperature is restored to > 48° F.
	(M5) 9. Verify temperature of pump suction piping is > 48° F every 24 hours.

LIMITING CONDITIONS FOR OPERATION

3.4 STANDBY LIQUID CONTROL SYSTEM (Cont)

D. (Cont)

3.4.D L1

1. If specification 3.4.A, B, or C.1 or C.2 cannot be met, the reactor shall be placed in a Cold Shutdown Condition with all operable control rods fully inserted within 24 hours.

3.4.A M6

2. If the enrichment requirements of specification 3.4.C.3 are not met, a check shall be made to ensure that sodium pentaborate solution meets the original design criteria by comparing the enrichment, concentration and volume to established criteria. If the sodium pentaborate solution does not meet the original design criteria, the reactor shall be placed in a Cold shutdown Condition with all operable control rods fully inserted within 24 hours.

3.4.A M6

3. If the Sodium pentaborate solution meets the original design criteria, but the enrichment requirements of specification 3.4.C.3 are not met, bring the B^{10} isotopic enrichment to greater than 54.5 atom percent within seven days from the time of receipt of the enrichment report. If after this time period the enrichment requirements of specification 3.4.C.3 are still not met, submit a report to the NRC within seven days and advise them of plans to bring the solution up to a demonstratable 54.5 atom percent B^{10} isotopic enrichment.

L4

SURVEILLANCE REQUIREMENTS

4.4 STANDBY LIQUID CONTROL SYSTEM (Cont)

3.4.A With concentration of boron in solution not within limits but > 8%, restore concentration of boron in solution to within limits within 72 hours **AND** 10 days from discovery of failure to meet the LCO

L1

3.4.D. Required Action and associated Completion Time not met., be in Hot Shutdown within 12 hours

BASES:

3/4.4 STANDBY LIQUID CONTROL SYSTEM

A. (APPLICABLE SAFETY ANALYSES) The requirements for SLC capability to shutdown the reactor are identified via the station Nuclear Safety Operational Analysis (Appendix G to the FSAR, Special Event 45). If no more than one operable control rod is withdrawn, the basic shutdown reactivity requirement for the core is satisfied and the Standby Liquid Control system is not required. (A1) ~~Thus, the basic reactivity requirement for the core is the primary determinant of when the standby liquid control system is required.~~ (BACKGROUND) The design objective of the standby liquid control system is to provide the capability of bringing the reactor from full power to a cold, xenon-free shutdown condition assuming that none of the withdrawn control rods can be inserted. (APPLICABLE SAFETY ANALYSES) To meet this objective, the Standby Liquid Control system is designed to inject a quantity of boron that produces a minimum concentration equivalent to 675 ppm of natural boron in the reactor core. The 675 ppm equivalent concentration in the reactor core is required to bring the reactor from full power to at least a three percent Δk subcritical condition, considering the hot to cold reactivity difference, xenon poisoning etc. The system will inject this boron solution in less than 125 minutes. The maximum time requirement for inserting the boron solution was selected to override the rate of reactivity insertion caused by cooldown of the reactor following the xenon poison peak.

(BACKGROUND) The Standby Liquid Control system ~~is also required to meet~~ satisfies 10CFR50.62 (Requirements for Reduction of Risk from Anticipated Transients Without Scram (ATWS) Events for Light-Water-Cooled Nuclear Power Plants). (APPLICABLE SAFETY ANALYSES) The Standby Liquid Control system must have the equivalent control capacity (injection rate) of 86 gpm at 13 percent by wt. natural sodium pentaborate for a 251" diameter reactor pressure vessel in order to satisfy 10CFR50.62 requirements. This equivalency requirement is fulfilled by a combination of concentration, B^{10} enrichment and flow rate of sodium pentaborate solution. A minimum 8.42% concentration and 54.5% enrichment of B^{10} isotope at a 39 GPM pump flow rate satisfies the ATWS Rule (10CFR50.62) equivalency requirement.

(M6) ~~Because the concentration/volume curve has been revised to reflect the increased B^{10} isotopic enrichment, an additional requirement has been added to evaluate the solution's capability to meet the original design shutdown criteria whenever the B^{10} enrichment requirement is not met.~~

(4.4.1) Testing the pumps ~~and valves~~ in accordance with ASME B&PV Code Section XI (Articles IWP and IWV, except where specific relief is granted) adequately assesses component operational readiness. (A1) ~~The only practical time to fully test the liquid control system is during a refueling outage.~~ (4.4.2) Various components of the system are individually tested periodically, thus making more frequent testing of the entire system unnecessary.

BASES:

3/4.4 STANDBY LIQUID CONTROL SYSTEM (Cont)

3.4.B. Only one of the two standby liquid control pumping loops is needed for operating the system. One inoperable pumping circuit does not immediately threaten the shutdown capability, and reactor operation can continue while the circuit is being repaired. Assurance that the remaining system will perform its intended function and that the long term average availability of the system is not reduced is obtained for a one out of two system by an allowable equipment out of service time of one third of the normal surveillance frequency. This method determines an equipment out of service time of ten days. Additional conservatism is introduced by reducing the allowable out of service time to seven days ~~and by increased testing of the operable redundant component~~. (L3)

C. The quantity of B^{10} stored in the Standby Liquid Control System Storage Tank is sufficient to bring the concentration of B^{10} in the reactor to the point where the reactor will be shutdown and to provide a minimum 25 percent margin beyond the amount needed to shutdown the reactor to allow for possible imperfect mixing of the chemical solution in the reactor water. (APPLICABLE SAFETY ANALYSES)

(A1) ~~Level indication and alarm indicate whether the solution volume has changed, which might indicate a possible solution concentration change. Test intervals for level monitoring have been established in consideration of these factors. Temperature and liquid level alarms for the system are annunciated in the control room.~~

(4.4.5) The solution shall be kept at least 10°F above the maximum saturation temperature to guard against boron precipitation. Minimum solution temperature is 48°F. (4.4.6) This is 10°F above the saturation temperature for the maximum allowed sodium pentaborate concentration of 9.22 Wt. Percent.

(A1) ~~Each parameter (concentration, pump flow rate, and enrichment) is tested at an interval consistent with the potential for that parameter to vary and also to assure proper equipment performance.~~ (4.4.7) Enrichment testing is only required when material is received ~~and when chemical addition occurs~~ since change cannot occur by any process other than the addition of new chemicals to the Standby Liquid Control solution tank. (L4)

Additional information has also been added to more fully describe each subsection.

TABLE 6.9-1

REPORTS

	Area	Reference	Submittal Date
a.	Secondary Containment Leak Rate Testing (1)	4.7.C.1.c	Upon completion of each test (2)
b.	(Deleted)		
c.	(Deleted)		
d.	(Deleted)		
~~e.~~	~~Standby Liquid Control solution enrichment out of specification~~	~~3.4.C.3~~	~~Fourteen days after receipt of a non complying enrichment report or lack of receipt of such a report within the required thirty days, if enrichment compliance cannot be achieved within seven days.~~

L_4

NOTES: 1. Each integrated leak rate test of the secondary containment shall be the subject of a summary technical report. This report shall include data on the wind speed, wind direction, outside and inside temperatures during the test, concurrent reactor building pressure, and emergency ventilation flow rate. The report shall also include analyses and interpretations of those data which demonstrate compliance with the specified leak rate limits.

2. The report shall be submitted approximately 90 days after completion of each test. Test periods shall be based on the commercial service date as the starting point.