CP&L
Progress Energy

John S. Keenan
Vice President
Brunswick Nuclear Plant

JUL 24 2002

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10 CFR 50.90

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Brunswick Steam Electric Plant, Unit Nos. 1 and 2
Docket Nos. 50-325 and 50-324/License Nos. DPR-71 and DPR-62
Request For License Amendments
Technical Specification 3.1.7, "Standby Liquid Control System"
Sodium Pentaborate Solution Requirements

REFERENCES: Letter from Mr. John S. Keenan to the U. S. Nuclear Regulatory Commission, "License Condition Supporting Request For License Amendments - Extended Power Uprate," dated March 25, 2002 (ML020990125)

Letter from the U. S. Nuclear Regulatory Commission to Mr. John S. Keenan, "Issuance of Amendment Re: Extended Power Uprate," dated May 31, 2002

Ladies and Gentlemen:

In accordance with the Code of Federal Regulations, Title 10, Parts 50.90 and 2.101, Carolina Power & Light (CP&L) Company is requesting a revision to the Technical Specifications (TSs) for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. The proposed license amendments revise Technical Specification Section 3.1.7, "Standby Liquid Control (SLC) System," to reflect modifications being made to the system as a result of transition to the GE14 fuel design. To support this transition, the required in-vessel boron concentration, supplied by the SLC system, is being raised from 660 ppm natural boron to a concentration equivalent to 720 ppm natural boron. This will be accomplished by use of sodium pentaborate solution enriched with the Boron-10 isotope.

This request satisfies the license conditions, included in Appendix B, "Additional Conditions," of the Operating Licenses for BSEP Units 1 and 2 with issuance of Amendments 222 and 237, which require submittal of the subject requests by August 30, 2002, for Unit 2 and August 29, 2003, for Unit 1.

CP&L has evaluated the proposed change in accordance with 10 CFR 50.91(a)(1), using the criteria in 10 CFR 50.92(c), and determined that this change involves no significant hazards considerations.

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The planned modifications to the SLC systems will be installed during the Unit 1 Cycle 15 Refueling Outage (i.e., B115R1, currently scheduled to begin in March 2004) and the Unit 2 Cycle 16 Refueling Outage (i.e., B216R1, currently scheduled to begin in March 2003). To support this schedule, CP&L requests that these amendments be issued by February 28, 2003.

CP&L requests that the amendments, once approved, be issued effective immediately, to be implemented prior to startup from the B115R1 refueling outage for Unit 1 and prior to the startup from the B216R1 refueling outage for Unit 2.

In accordance with 10 CFR 50.91(b), CP&L is providing the State of North Carolina a copy of the proposed license amendments.

Please refer any questions regarding this submittal to Mr. Edward T. O'Neil, Manager - Regulatory Affairs, at (910) 457-3512.

Sincerely,

John S. Keenan

MAT/mat

Enclosures:
1. Evaluation of Proposed License Amendment Request
2. Marked-up Technical Specification Pages - Unit 1
3. Marked-up Technical Specification Pages - Unit 2
4. Typed Technical Specification Pages - Unit 1
5. Typed Technical Specification Pages - Unit 2
6. Marked-up Technical Specification Bases Pages - Unit 1 (For Information Only)
7. List of Regulatory Commitments

John S. Keenan, having been first duly sworn, did depose and say that the information contained herein is true and correct to the best of his information, knowledge and belief; and the sources of his information are officers, employees, and agents of Carolina Power & Light Company.

Notary (Seal)

My commission expires: August 29, 2004

cc (with enclosures):

U. S. Nuclear Regulatory Commission, Region II
ATTN: Mr. Luis A. Reyes, Regional Administrator
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW, Suite 23T85
Atlanta, GA 30303-8931

U. S. Nuclear Regulatory Commission
ATTN: Mr. Theodore A. Easlick, NRC Senior Resident Inspector
8470 River Road
Southport, NC 28461-8869

U. S. Nuclear Regulatory Commission
ATTN: Ms. Brenda L. Mozafari (Mail Stop OWFN 8G9) **(Electronic Copy Only)**
11555 Rockville Pike
Rockville, MD 20852-2738

Ms. Jo A. Sanford
Chair - North Carolina Utilities Commission
P.O. Box 29510
Raleigh, NC 27626-0510

Ms. Beverly Hall
Director - Division of Radiation Protection
North Carolina Department of Environment and Natural Resources
3825 Barrett Drive
Raleigh, NC 27609-7221

Evaluation of Proposed License Amendment Request

Subject: Technical Specification 3.1.7, "Standby Liquid Control System" Sodium Pentaborate Solution Requirements

1.0 Description

This letter is a request to amend Operating Licenses DPR-71 and DPR-62 for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2.

The proposed changes revise Operating Licenses DPR-71 and DPR-62 as a result of transition to the GE14 fuel design. To support this transition, the required in-vessel boron concentration, supplied by the Standby Liquid Control (SLC) system, is being raised from 660 ppm natural boron to a concentration equivalent to 720 ppm natural boron. This will be accomplished by use of sodium pentaborate solution enriched with the Boron-10 isotope. As a result, (1) a new Surveillance Requirement (SR) 3.1.7.8, verifying sodium pentaborate enrichment, is added, (2) the Technical Specification (TS) Figure 3.1.7-1, "Sodium Pentaborate Solution Volume Versus Concentration Requirements," minimum sodium pentaborate concentration is lowered, and (3) the temperature versus concentration requirements of TS Figure 3.1.7-2, "Sodium Pentaborate Solution Temperature Versus Concentration Requirements," are revised. In a related change, SR 3.1.7.3 is also revised. Currently, the SR verifies temperature of the SLC pump suction piping. The SR is revised to verify temperature of the suction and discharge piping up to the SLC injection valves.

The planned modifications to the SLC systems will be installed during the Unit 1 Cycle 15 Refueling Outage (i.e., B115R1, currently scheduled to begin in March 2004) and the Unit 2 Cycle 16 Refueling Outage (i.e., B216R1, currently scheduled to begin in March 2003). To support this schedule, CP&L requests that these amendments be issued by February 28, 2003.

2.0 Proposed Change

To support transition to the GE14 fuel design, Carolina Power & Light (CP&L) Company is increasing the requirement for in-vessel neutron absorber from 660 ppm natural boron to a concentration equivalent to 720 ppm natural boron. This will be accomplished by use of sodium pentaborate solution enriched with the Boron-10 isotope. As a result, a new SR 3.1.7.8, verifying sodium pentaborate enrichment, is being added. The proposed SR states:

	SURVEILLANCE	FREQUENCY
SR 3.1.7.8	Verify sodium pentaborate enrichment is $\geq$ 47 atom percent B-10.	Prior to addition to SLC tank

In addition, use of sodium pentaborate solution enriched with the Boron-10 isotope allows the Figure 3.1.7-1, "Sodium Pentaborate Solution Volume Versus Concentration Requirements," minimum sodium pentaborate concentration to be lowered to 8.5 weight percent. This, in turn,

lowers the solution's saturation temperature. Accordingly, the temperature versus concentration requirements of Figure 3.1.7-2, "Sodium Pentaborate Solution Temperature Versus Concentration Requirements," are revised.

The proposed TSs are consistent with NUREG-1433, "Standard Technical Specifications General Electric Plants, BWR/4," Revision 2.1, dated March 27, 2002 (i.e., Reference 8).

In a related change, SR 3.1.7.3 is also revised. Currently, the SR verifies temperature of the SLC pump suction piping. The SR is revised to verify temperature of the suction and discharge piping up to the SLC injection valves. The proposed revision to SR 3.1.7.3 states:

SURVEILLANCE		FREQUENCY
SR 3.1.7.3	Verify the temperature of pump suction and discharge piping up to the SLC injection valves.	24 hours

The revised wording of SR 3.1.7.3 is consistent with the current wording of the TS Bases for SR 3.1.7.3.

CP&L will make supporting changes to the TS Bases in accordance with TS 5.5.10, "Technical Specifications (TS) Bases Control Program." Reference to 660 ppm in the "Applicable Safety Analyses" portion of TS Section 3.1.7 will be changed to 720 ppm equivalent. Also, a new bases for SR 3.1.7.8 will be added. Enclosure 6 provides marked-up TS Bases pages for Unit 1. These pages are being submitted for information only and do not require issuance by the NRC.

3.0 Background

The SLC system is discussed in Section 9.3.4 of the BSEP Updated Final Safety Report (UFSAR). The SLC system is designed to provide the capability of bringing the reactor, at any time in a fuel cycle, from full power and minimum control rod inventory to a subcritical condition with the reactor in the most reactive, xenon free state without taking credit for control rod movement. To meet this objective, it is currently necessary for both SLC pumps to inject a quantity of boron which produces a concentration of 660 ppm of natural boron in the reactor coolant at 70°F with normal reactor vessel water level. The SLC system also satisfies 10 CFR 50.62, "Requirements for reduction of risk from anticipated transients without scram (ATWS) events for light-water-cooled nuclear power plants."

CP&L has also implemented Alternative Source Term (AST) for BSEP Unit 1 and will be implementing AST during the next refueling outage for BSEP Unit 2 (i.e., Reference 1, Amendments 221 and 246 for BSEP Units 1 and 2 respectively, issued May 30, 2002). As a result of AST, the SLC system is also used to maintain suppression pool pH level above 7 following a loss-of-coolant-accident (LOCA) involving significant fission product releases.

This request satisfies the license conditions, included in Appendix B, "Additional Conditions," of the Operating Licenses for BSEP Units 1 and 2 with issuance of Amendments 222 and 237 (i.e.,

Reference 2), which require submittal of the subject requests by August 30, 2002, for Unit 2 and August 29, 2003, for Unit 1.

4.0 Technical Analysis

To continue to meet the shutdown objective of the SLC system during the next cycle operation with GE14 fuel (i.e., Unit 1, Cycle 15 and Unit 2, Cycle 16) it is necessary to raise the ultimate, in-vessel concentration requirement from the current 660 ppm natural boron to 720 ppm natural boron equivalent. This concentration was determined by General Electric using the approved methods described in Revision 14 of General Electric Standard Application for Reactor Fuel (GESTAR II), NEDE 24011-P-A (i.e., Reference 3). The analysis assumes BSEP operation with an equilibrium core of GE14 fuel, operating at 2923 megawatts thermal (MWt) with 24 month operating cycles. The GE analysis demonstrates that, with a minimum concentration equivalent to 720 ppm natural boron, sufficient shutdown margin is maintained (i.e., > 1.0% $\Delta k/k$) with respect to the BSEP TS 3.1.1, "Shutdown Margin (SDM)," requirement of $\geq$ 0.38% $\Delta k/k$ for both GE13 and GE14 fuel types. This analysis is bounding for the upcoming cycles and for currently planned future core designs.

The existing SLC system design requires that SLC inject a quantity of boron that includes an additional 25% above that needed for an in-vessel boron concentration of 660 ppm. This additional 25% is injected to compensate for imperfect mixing, leakage and volume in other small piping connected to the reactor. This margin will be maintained such that an additional 25% above that needed for an in-vessel boron concentration equivalent to 720 ppm natural boron will also be injected.

In order to achieve the increased neutron absorber concentration equivalent to 720 ppm natural boron, CP&L has elected to use sodium pentaborate solution enriched with the Boron-10 isotope, which is chemically and physically similar to the current solution. Accordingly, a new SR 3.1.7.8 is added to verify sodium pentaborate enrichment is $\geq$ 47 atom percent Boron-10 prior to addition to the SLC tank. The 47 atom percent Boron-10 enrichment was established to maintain compliance with 10 CFR 50.62. Paragraph (c)(4) of 10 CFR 50.62 states, in part:

> Each BWR must have a SLC system with a minimum flow capacity and boron content equivalent in control capacity to 86 gpm of 13 weight percent sodium pentaborate solution.

This requirement assumes the use of natural boron, which contains 19.8 atom percent of Boron-10. Boron-10, with its large neutron absorption capability, is the active component in sodium pentaborate. The use of sodium pentaborate enriched with the Boron-10 isotope provides a faster negative reactivity insertion rate than the same quantity of sodium pentaborate with natural boron.

In February 1987, Topical Report NEDE-31096-P-A, "Anticipated Transients Without Scram, Response to NRC ATWS Rule, 10 CFR 50.62" (i.e., Reference 4) was issued to provide guidance for equivalency determinations. This topical report includes a letter from Gus Lainas to T. A. Pickens, dated October 21, 1986, documenting NRC endorsement. Equation 1-1 of this document demonstrates 10 CFR 50.62 SLC system injection capacity equivalency as follows:

$$\frac{Q}{86} \times \frac{M251}{M} \times \frac{C}{13} \times \frac{E}{19.8} \geq 1$$

Where:

Variable	Definition	BSEP Value
Q	Design SLC system flow rate. As indicated on page 1-7 of NEDE-31096-P-A: "The use of "expected" or nominal plant-specific values in determining equivalency is consistent with the use of nominal parameter and initial conditions in the analyses of NEDE 24222. Also, in the case of SLC system flow rate, the use of the design pump flow rate (as verified by vendor test) is more reasonable for calculation purposes than using a Technical Specification minimum value that may be several gpm lower than the design value."	43 gpm
$M251$	Reference plant, with 251" diameter vessel, mass of dilution water from Table 1-1 of NEDE-31096-P-A.	628,300 lbs
M	Mass of plant specific dilution water at reference conditions.	485,500 lbs
C	Sodium pentaborate concentration.	8.5 weight percent
E	Minimum Boron-10 enrichment.	47 atom percent

Solving the Equivalency Equation, using the BSEP assumed values,

$$\frac{43}{86} \times \frac{628{,}300}{485{,}500} \times \frac{8.5}{13} \times \frac{47}{19.8} = 1.004$$

This demonstrates that the equivalency requirement of 10 CFR 50.62 is met. The SLC system volume versus concentration requirements of TS Figure 3.1.7-1 are revised based on the BSEP minimum sodium pentaborate concentration of 8.5 weight percent assumed above. This, in turn, lowers the solution's saturation temperature. Accordingly, the temperature versus concentration requirements of TS Figure 3.1.7-2 are revised. The 5°F margin to the saturation temperature, currently specified in the TS Bases, is maintained in the revised TS Figure 3.1.7-2. Data for solution saturation temperatures below 9 weight percent is not readily available. For this reason, the requirement between 8.5 weight percent and 9.0 weight percent was conservatively maintained at the value for 9.0 weight percent.

In response to 10 CFR 50.62, CP&L modified the BSEP SLC system to operate both SLC pumps simultaneously. While the two pump operation of the SLC system is not being affected by the

use of sodium pentaborate enriched with the Boron-10 isotope (i.e., two pumps will continue to be started and will inject upon manual initiation), this enhancement will allow the BSEP Probabilistic Safety Assessment (PSA) success criteria for the SLC system to be revised from the current two pump/squib valve criteria to a single pump/squib valve criteria.

CP&L has also implemented AST for BSEP Unit 1 and will be implementing AST during the next refueling outage for BSEP Unit 2. As a result of AST, the SLC system is also used to maintain suppression pool pH level above 7 following a LOCA involving significant fission product releases. This ensures that iodine will be retained in the suppression pool water post-LOCA. For the purposes of LOCA response, a SLC system injection of 2500 gallons of 9 weight percent solution within 2 hours was assumed. Injection was assumed to begin approximately 59 minutes after the event starts, or essentially within 57 minutes following the onset of fission product release. These actions result in a suppression pool pH above 7 at 2 hours.

Consistent with the AST evaluation of pH control, the revised sodium pentaborate solution requirements were evaluated using the methodology provided in NUREG-1465, "Accident Source Terms for Light-Water Nuclear Power Plants, Final Report," dated February 1, 1995 (i.e., Reference 5) and NUREG/CR-5950, "Iodine Evolution and pH Control," dated December 1992 (i.e., Reference 6). With a minimum allowed concentration of 8.5 weight percent, one SLC pump will deliver 2650 gallons in 64 minutes. The minimum sodium pentaborate solution volume, at a concentration of 8.5 weight percent, allowed by the revised Figure 3.1.7-1, is 2670 gallons. As a result, operators have 56 minutes to initiate the SLC system, versus the current assumption of 59 minutes. Using the revised assumptions (i.e., injecting 2650 gallons of 8.5 weight percent sodium pentaborate solution in 64 minutes, with injection beginning 56 minutes after the event starts), results in a suppression pool pH above 7 at 2 hours. Therefore, CP&L has concluded that the revised sodium pentaborate solution requirements provide equivalent pH control of the suppression pool. As such, the SLC system continues to meet its post-LOCA suppression pool pH design function.

The change to SR 3.1.7.3 is conservative in nature and is consistent with both the current Bases for SR 3.1.7.3 and plant operating practice. Required verification of the discharge piping up to the explosive valves as well as suction piping temperature provides additional assurance of system operability.

5.0 Regulatory Safety Analysis

5.1 No Significant Hazards Consideration

CP&L has evaluated whether or not a significant hazards consideration is involved with the proposed amendments by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

The proposed amendments do not alter the design or operation of the Standby Liquid Control (SLC) system, but rather revise Technical Specification (TS) Section 3.1.7 requirements to ensure acceptable SLC boron solution volume and concentration values to produce a minimum in-vessel boron concentration which is sufficient to bring the reactor to a subcritical condition without taking credit for control rod movement. The existing design of the SLC system is sufficient to handle enriched sodium pentaborate solution, which is chemically and physically similar to the current solution. The SLC system is not considered to be an initiator of any analyzed event. Therefore, the proposed amendments do not increase the probability of a previously evaluated accident.

The current TS Section 3.1.7 requirements ensure acceptable SLC boron solution volume and concentration values to produce a minimum in-vessel natural boron concentration of 660 ppm. The proposed change revises the boron solution requirements of TS Figures 3.1.7-1 and 3.1.7-2, to ensure a minimum in-vessel concentration equivalent to 720 ppm natural boron. A minimum concentration equivalent to 720 ppm natural boron in the reactor is sufficient to bring the reactor, at any time in a fuel cycle, from full power and minimum control rod inventory to a subcritical condition with the reactor in the most reactive, xenon free state without taking credit for control rod movement. This concentration was determined by General Electric using the approved methods described in Revision 14 of General Electric Standard Application for Reactor Fuel (GESTAR II), NEDE 24011-P-A. The analysis assumes Brunswick Steam Electric Plant (BSEP) operation with an equilibrium core of GE14 fuel, operating at 2923 megawatts thermal (MWt) with 24 month operating cycles.

As stated above, the in-vessel boron concentration is being raised from 660 ppm natural to 720 ppm equivalent. This will be accomplished by use of sodium pentaborate solution enriched with the Boron-10 isotope. As a result, a new Surveillance Requirement (SR) 3.1.7.8 is added. This SR verifies sodium pentaborate enrichment is greater than or equal to 47 atom percent Boron-10 prior to addition to the SLC tank, thereby ensuring a minimum concentration equivalent to 720 ppm natural boron in the reactor will be achieved.

Use of sodium pentaborate enriched to 47 atom percent Boron-10 allows the volume versus concentration requirements of TS Figure 3.1.7-1 to be lowered. This, in turn, lowers the solution's saturation temperature. Accordingly, the temperature versus concentration requirements of TS Figure 3.1.7-2 are revised. The existing 5°F margin to the saturation temperature specified in the bases is maintained in the revised TS Figure 3.1.7-2.

The concentration requirements of the SLC system boron solution will ensure that the SLC system continues to comply with the requirements of 10 CFR 50.62(c)(4).

The SLC system is also used to maintain suppression pool pH level above 7 following a loss-of-coolant-accident (LOCA) involving significant fission product releases. This ensures that iodine will be retained in the suppression pool water post-LOCA. The revised sodium pentaborate solution requirements were evaluated using the methodology provided in NUREG-1465, "Accident Source Terms for Light-Water Nuclear Power Plants, Final Report," dated February 1, 1995 and NUREG/CR-5950, "Iodine Evolution and pH Control," dated December 1992. This evaluation demonstrated that the SLC system continues to meet its post-LOCA suppression pool pH control design function.

The change to SR 3.1.7.3 is conservative in nature and is consistent with both the current Bases for SR 3.1.7.3 and plant operating practice. Required verification of the discharge as well as suction piping temperature provides additional assurance of system operability.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No

   The proposed amendments do not alter the design or operation of the SLC system, but rather revise TS Section 3.1.7 requirements to ensure acceptable SLC boron solution volume and concentration values to produce a minimum in-vessel boron concentration which is sufficient to bring the reactor to a subcritical condition without taking credit for control rod movement. The existing design of the SLC system is sufficient to handle enriched sodium pentaborate solution, which is chemically and physically similar to the current solution. Using the enriched solution does not change any of the key SLC system process parameters (i.e., flow rates, discharge pressure, required net positive suction head, etc.). Correct enrichment is ensured by the addition of a new SR to verify sodium pentaborate enrichment prior to addition to the SLC tank. The existing 5°F margin to the saturation temperature specified in the bases is maintained. The change to SR 3.1.7.3 is conservative in nature and is consistent with both the current Bases for SR 3.1.7.3 and plant operating practice. Required verification of the discharge as well as suction piping temperature provides additional assurance of system operability. Therefore, the proposed amendments cannot create a new or different kind of accident from any accident previously evaluated.

   Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

   Response: No

The proposed change revises the boron solution requirements of TS Figures 3.1.7-1 and 3.1.7-2, to ensure a minimum in-vessel concentration equivalent to 720 ppm natural boron. A minimum concentration equivalent to 720 ppm natural boron in the reactor is sufficient to bring the reactor, at any time in a fuel cycle, from full power and minimum control rod inventory to a subcritical condition with the reactor in the most reactive, xenon free state without taking credit for control rod movement. This concentration was determined by General Electric using the approved methods described in GESTAR II. The existing design of the SLC system is sufficient to handle enriched sodium pentaborate solution, which is chemically and physically similar to the current solution. Correct enrichment is ensured by the addition of a new SR 3.1.7.8 to verify sodium pentaborate enrichment prior to addition to the SLC tank. The existing 5°F margin to the saturation temperature specified in the bases is maintained. The existing SLC system design requires that SLC inject a quantity of boron that includes an additional 25% above that needed for an in-vessel boron concentration of 660 ppm. This additional 25% is injected to compensate for imperfect mixing, leakage, and volume in other small piping connected to the reactor. This margin will be maintained such that an additional 25% above that needed for an in-vessel boron concentration equivalent to 720 ppm natural boron will also be injected. The minimum sodium pentaborate concentration of 8.5 weight percent, proposed by this amendment request, ensures that the SLC system continues to meet its post-LOCA suppression pool pH control design function. The change to SR 3.1.7.3 is conservative in nature and is consistent with both the current Bases for SR 3.1.7.3 and plant operating practice. Required verification of the discharge as well as suction piping temperature provides additional assurance of system operability.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, CP&L concludes that the proposed amendments present no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements/Criteria

As stated in the NRC's "Safety Evaluation of the Brunswick Steam Electric Station Units 1 and 2," dated November 1973 (i.e., Reference 7), BSEP meets the intent of the General Design Criteria (GDC), published in the Federal Register on May 21, 1971, as Appendix A to 10 CFR Part 50. The proposed changes do not affect compliance with the GDCs. In particular, the intent of GDC 26, "Reactivity control system redundancy and capability," GDC 27, "Combined Reactivity control systems capability," and GDC 28, "Reactivity limits," continue to be met.

The SLC system continues to satisfy 10 CFR 50.62. Paragraph (c)(4) of 10 CFR 50.62 states, in part:

Each BWR must have a SLC system with a minimum flow capacity and boron content equivalent in control capacity to 86 gpm of 13 weight percent sodium pentaborate solution.

NEDE-31096-P-A (i.e., Reference 4) was issued to provide guidance for equivalency determinations. Using this guidance, CP&L has demonstrated that the equivalency requirement of 10 CFR 50.62 is met.

BSEP TS 3.1.1, "Shutdown Margin (SDM)," requirements continue to be met. Raising the ultimate, in-vessel concentration requirement from the current 660 ppm natural boron to 720 ppm natural boron equivalent, provided by the SLC system. This concentration was determined by General Electric using the approved methods described in Revision 14 of GESTAR II (i.e., Reference 3). The analysis assumes BSEP operation with an equilibrium core of GE14 fuel, operating at 2923 megawatts thermal (MWt) with 24 month operating cycles. The GE analysis demonstrates that, with a minimum concentration equivalent to of 720 ppm natural boron, sufficient shutdown margin is maintained (i.e., > 1.0% $\Delta k/k$) in the reactor with respect to the BSEP TS 3.1.1 requirement of $\geq$ 0.38% $\Delta k/k$ for both GE13 and GE14 fuel types. This analysis is bounding for the upcoming cycles and for currently planned future core designs.

The SLC system is also used to maintain suppression pool pH level above 7 following a LOCA involving significant fission product releases. The revised sodium pentaborate solution requirements have been evaluated and demonstrated to provide equivalent pH control capability in preventing iodine re-evolution during a postulated radiological release. The evaluation methodology is consistent with NUREG-1465 (i.e., Reference 5) and NUREG/CR-5950 (i.e., Reference 6).

Based on the above, CP&L has determined that the proposed changes do not alter compliance with any applicable regulatory requirement or criteria. Therefore, the proposed changes do not require any exemptions or relief from regulatory requirements, other than the TSs, and do not affect conformance with any GDC differently than described in the UFSAR.

6.0 Environmental Considerations

A review has determined that the proposed amendments change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20 and impose a new surveillance requirement. However, the proposed amendments do not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendments meet the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendments.

7.0 References

1. Letter from the U. S. Nuclear Regulatory Commission to Mr. John S. Keenan, "Issuance Of Amendment Re: Alternative Source Term," dated May 30, 2002.

2. Letter from the U. S. Nuclear Regulatory Commission to Mr. John S. Keenan, "Issuance Of Amendment Re: Extended Power Uprate," dated May 31, 2002.

3. Topical Report NEDE 24011-P-A, "General Electric Standard Application for Reactor Fuel (GESTAR II)," Revision 14.

4. Topical Report NEDE-31096-P-A, "Anticipated Transients Without Scram, Response to NRC ATWS Rule, 10 CFR 50.62."

5. NUREG-1465, "Accident Source Terms for Light-Water Nuclear Power Plants, Final Report," dated February 1, 1995.

6. NUREG/CR-5950, "Iodine Evolution and pH Control," dated December 1992.

7. NRC "Safety Evaluation of the Brunswick Steam Electric Station Units 1 and 2," dated November 1973.

Precedents

8. NUREG-1433, "Standard Technical Specifications General Electric Plants, BWR/4," Revision 2.1, dated March 27, 2002.

9. Letter from the U. S. Nuclear Regulatory Commission to Mr. Gary Van Middleswoth, "Duane Arnold Energy Center - Issuance of Amendment Regarding Standby Liquid Control Minimum Boron Concentration," dated January 23, 2001.

10. Letter from the U. S. Nuclear Regulatory Commission to Mr. B. Ralph Sylvia, "Amendment No. 38 to Facility Operating License No. NPF-43," dated September 1, 1989 (i.e., Fermi-2).

11. Letter from the U. S. Nuclear Regulatory Commission to Mr. S. A. White, "Standby Liquid Control System (SLCS) Technical Specification Changes," dated September 2, 1988 (i.e., Amendments 154, 150, and 125 for Browns Ferry Units 1, 2, and 3, respectively).

12. Letter from the U. S. Nuclear Regulatory Commission to Mr. James P. O'Reilly, "Issuance of Amendment No. 90 To Facility Operating License NPF-5 - Edwin I. Hatch Nuclear Plant, Unit 2," dated February 3, 1988.

The proposed TSs are consistent with NUREG-1433, "Standard Technical Specifications General Electric Plants, BWR/4," Revision 2.1, dated March 27, 2002 (i.e., Reference 8).

Reference 9 is a similar amendment, issued for Duane Arnold Energy Center, which supported raising the ultimate, in-vessel concentration supplied by the SLC system from 600 ppm natural boron to 660 ppm natural boron. This change was made primarily to support transition to the GE14 fuel type in conjunction with extended power uprate. The change, however, is not accomplished by use of sodium pentaborate solution enriched with the Boron-10 isotope.

References 10, 11, and 12 are examples of amendments which included use of sodium pentaborate solution enriched with the Boron-10 isotope in the SLC system.

Marked-up Technical Specification Pages - Unit 1

and discharge piping up to the SLC injection valves

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.1.7.2	Verify temperature of sodium pentaborate solution is within the limits of Figure 3.1.7-2.	24 hours
SR 3.1.7.3	Verify temperature of pump suction ~~piping~~ is within the limits of Figure 3.1.7-2.	24 hours
SR 3.1.7.4	Verify continuity of explosive charge.	31 days
SR 3.1.7.5	Verify the concentration of boron in solution is within the limits of Figure 3.1.7-1.	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 within the limits of Figure 3.1.7-2
SR 3.1.7.6	Verify each pump develops a flow rate $\geq$ 41.2 gpm at a discharge pressure $\geq$ 1190 psig.	In accordance with the Inservice Testing Program

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.1.7.7	Verify flow through one SLC subsystem from pump into reactor pressure vessel.	24 months on a STAGGERED TEST BASIS
SR 3.1.7.8	Verify sodium pentaborate enrichment is ≥ 47 atom percent B-10.	Prior to addition to SLC tank

Replace with Figure 3.1.7-1 on following page.

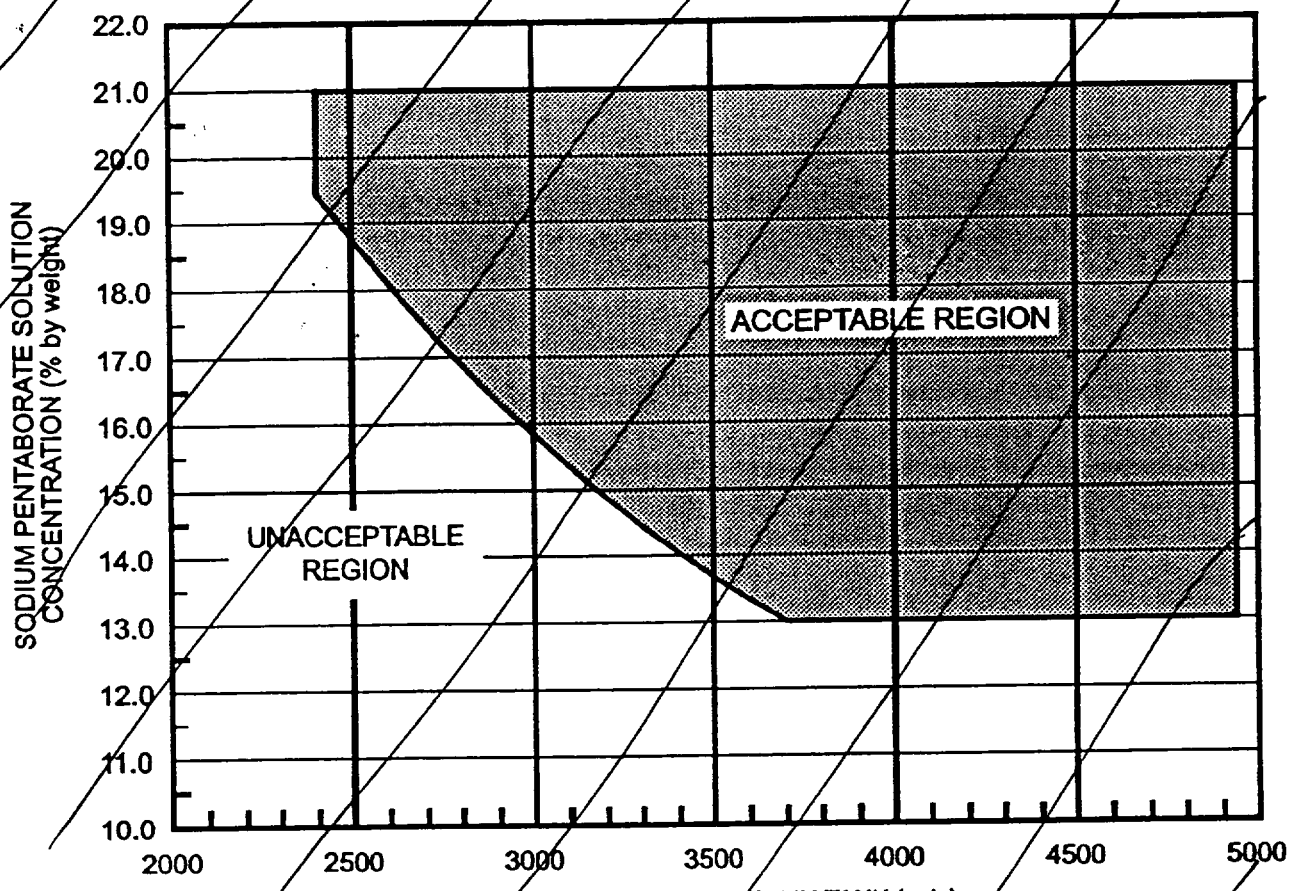

Figure 3.1.7-1 (page 1 of 1)
Sodium Pentaborate Solution Volume Versus Concentration Requirements

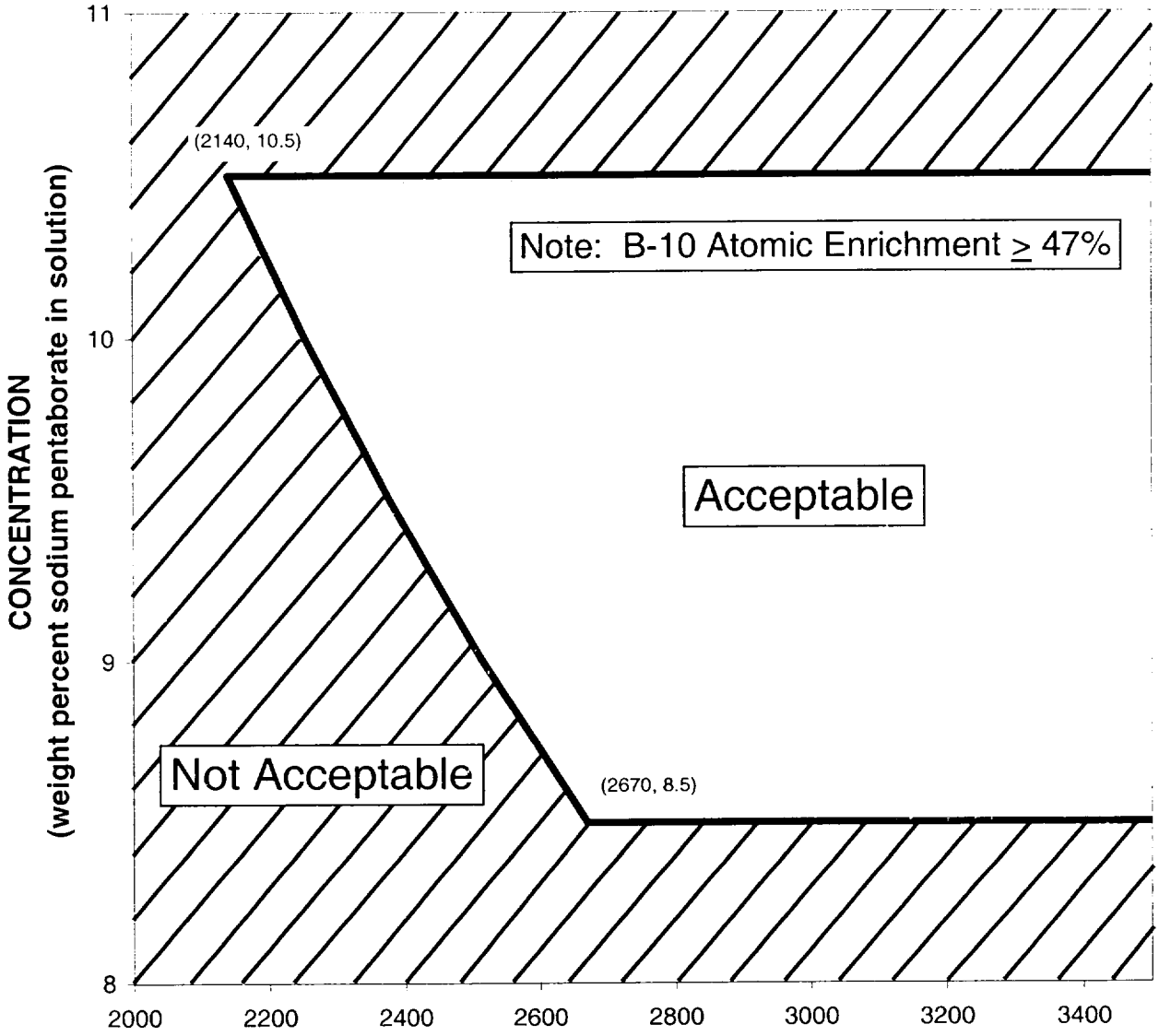

Figure 3.1.7-1 (page 1 of 1)
Sodium Pentaborate Solution Volume
Versus Concentration Requirements

Replace with Figure 3.1.7-2
on following page.

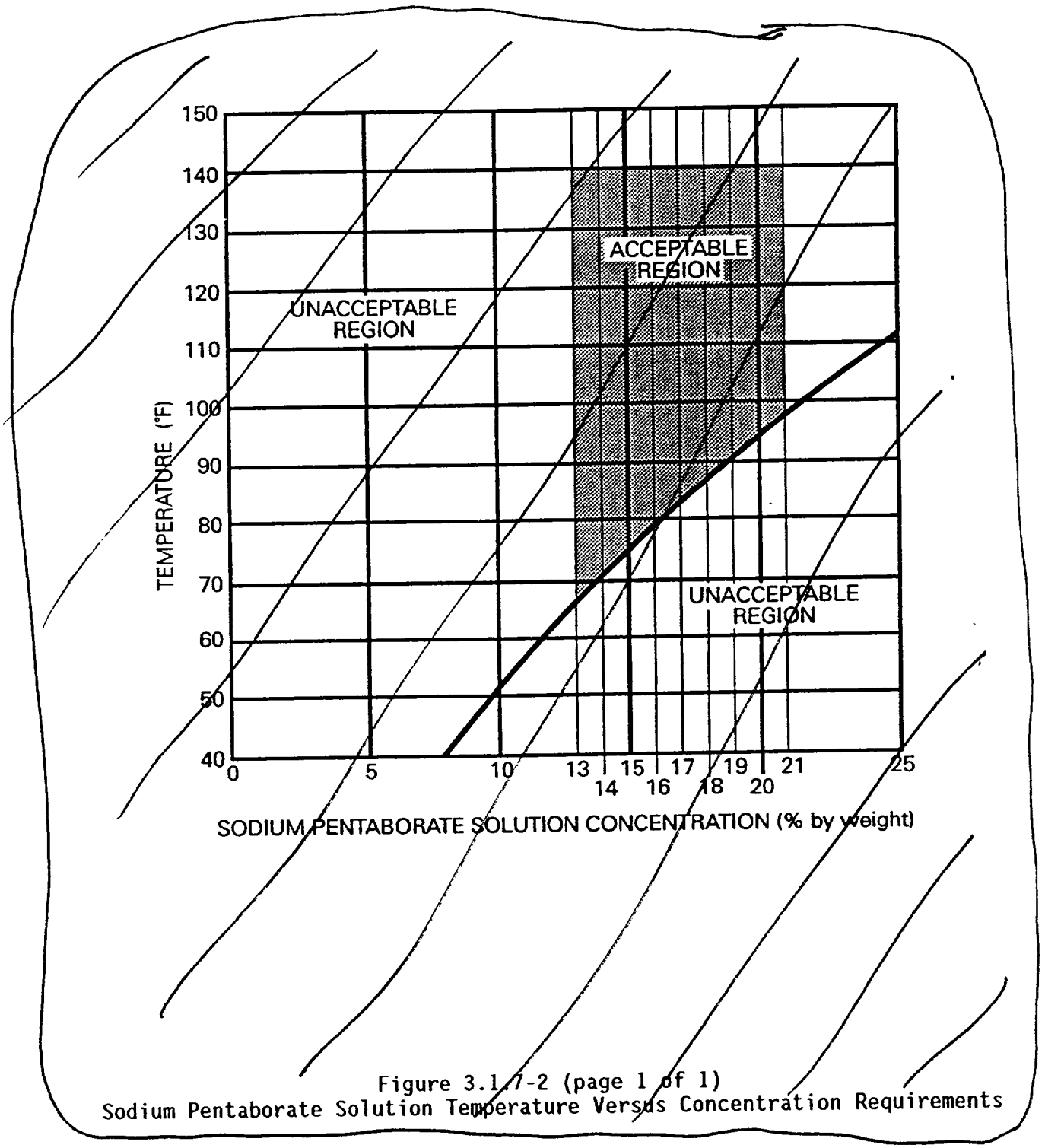

Figure 3.1.7-2 (page 1 of 1)
Sodium Pentaborate Solution Temperature Versus Concentration Requirements

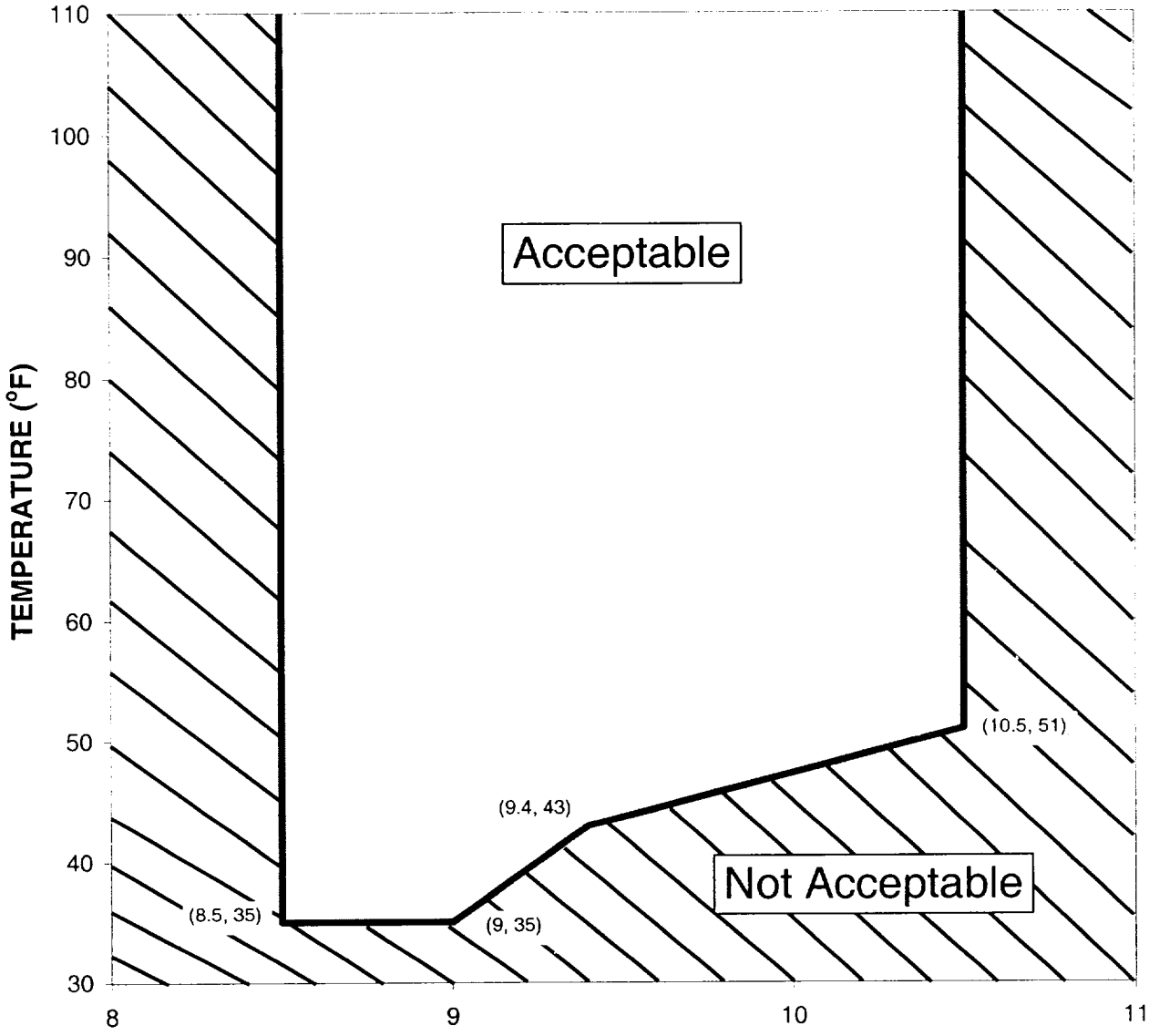

Figure 3.1.7-2 (page 1 of 1)
Sodium Pentaborate Solution Temperature
Versus Concentration Requirements

Marked-up Technical Specification Pages - Unit 2

and discharge piping up to the SLC injection valves

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.1.7.2	Verify temperature of sodium pentaborate solution is within the limits of Figure 3.1.7-2.	24 hours
SR 3.1.7.3	Verify temperature of pump suction ~~piping~~ is within the limits of Figure 3.1.7-2.	24 hours
SR 3.1.7.4	Verify continuity of explosive charge.	31 days
SR 3.1.7.5	Verify the concentration of boron in solution is within the limits of Figure 3.1.7-1.	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 within the limits of Figure 3.1.7-2
SR 3.1.7.6	Verify each pump develops a flow rate $\geq$ 41.2 gpm at a discharge pressure $\geq$ 1190 psig.	In accordance with the Inservice Testing Program

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.1.7.7	Verify flow through one SLC subsystem from pump into reactor pressure vessel.	24 months on a STAGGERED TEST BASIS
SR 3.1.7.8	Verify sodium pentaborate enrichment is ≥ 47 atom percent B-10.	Prior to addition to SLC tank

Replace with Figure 3.1.7-1
on following page

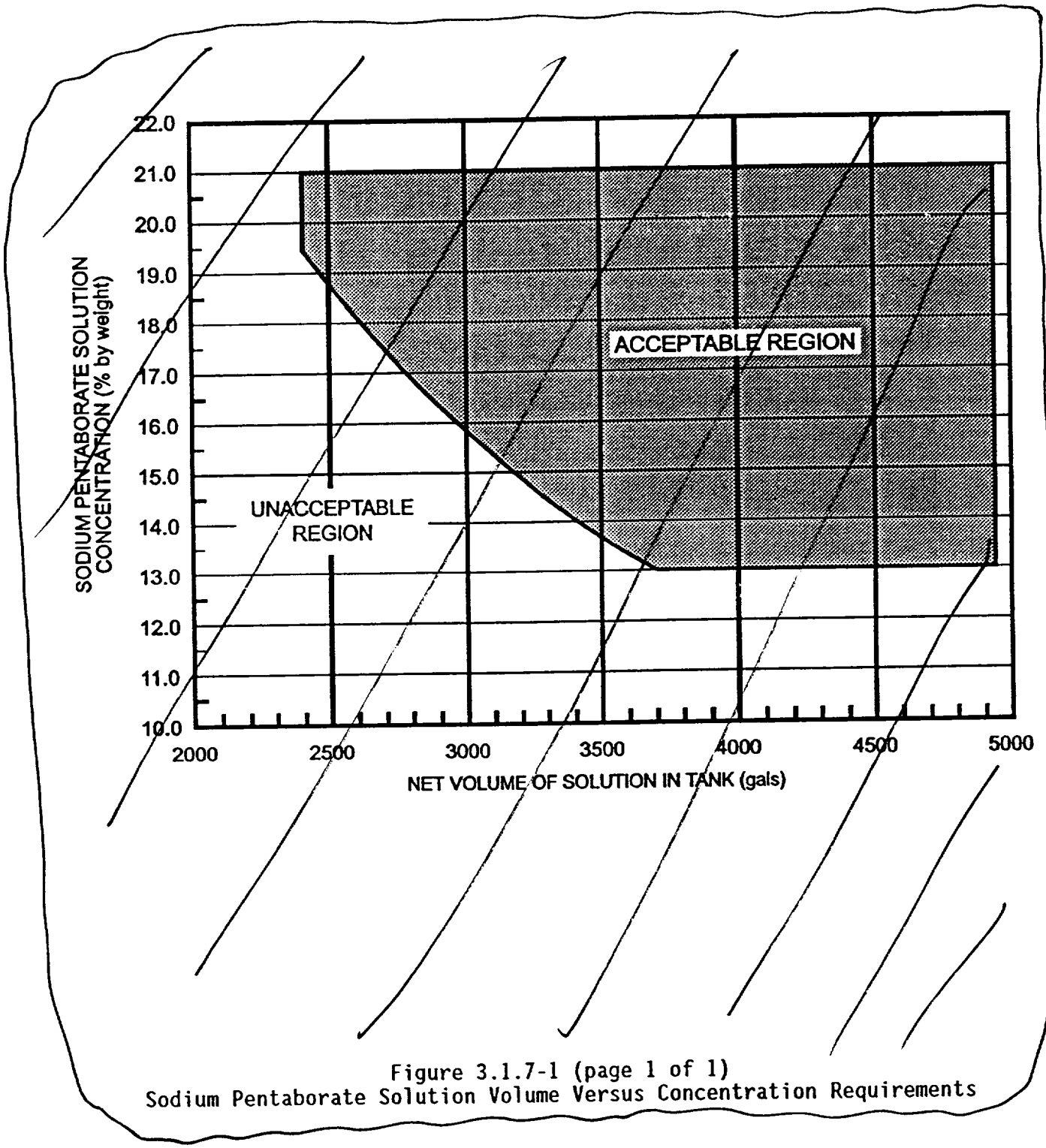

Figure 3.1.7-1 (page 1 of 1)
Sodium Pentaborate Solution Volume Versus Concentration Requirements

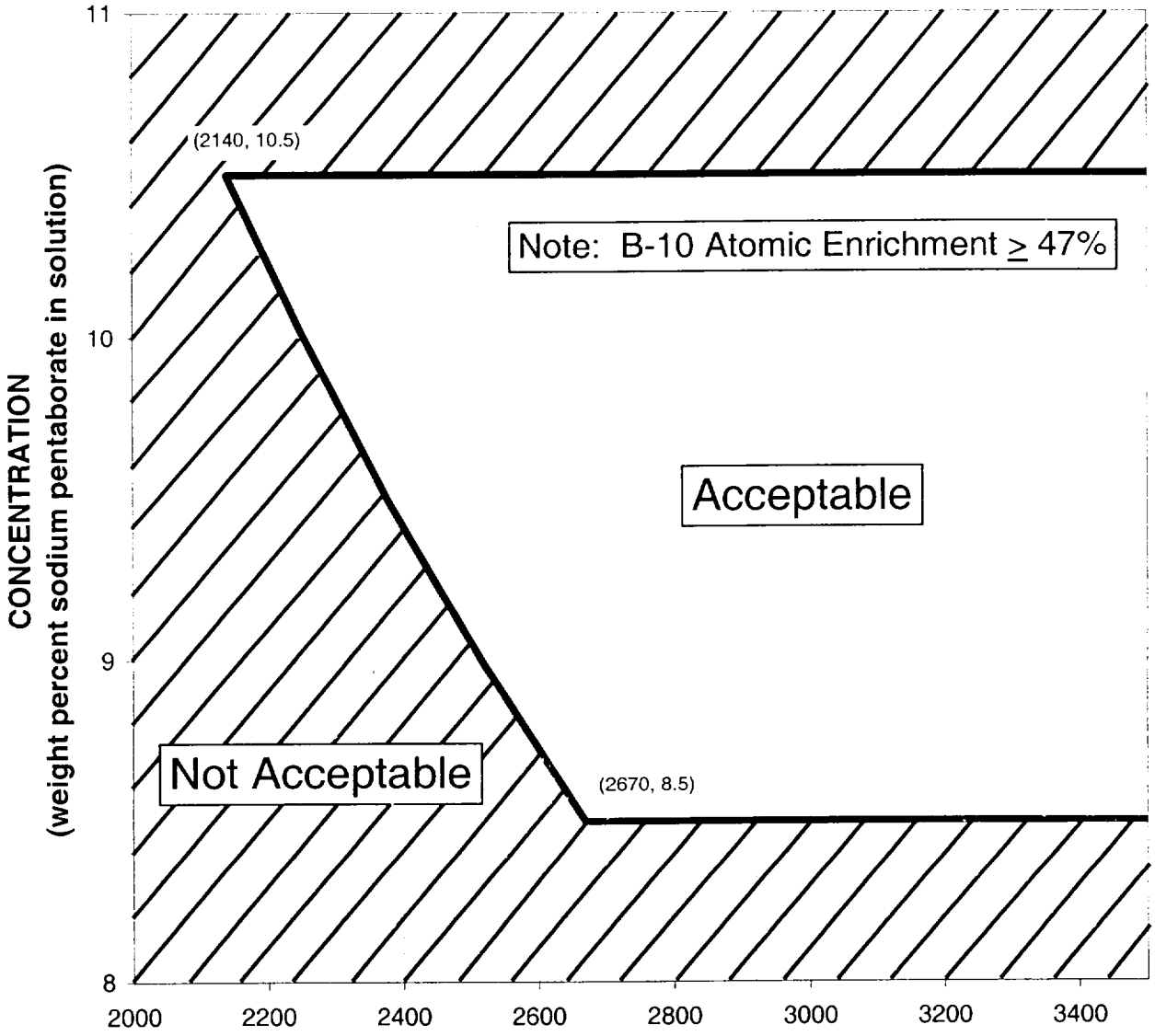

Figure 3.1.7-1 (page 1 of 1)
Sodium Pentaborate Solution Volume
Versus Concentration Requirements

Replace with Figure 3.1.7-2
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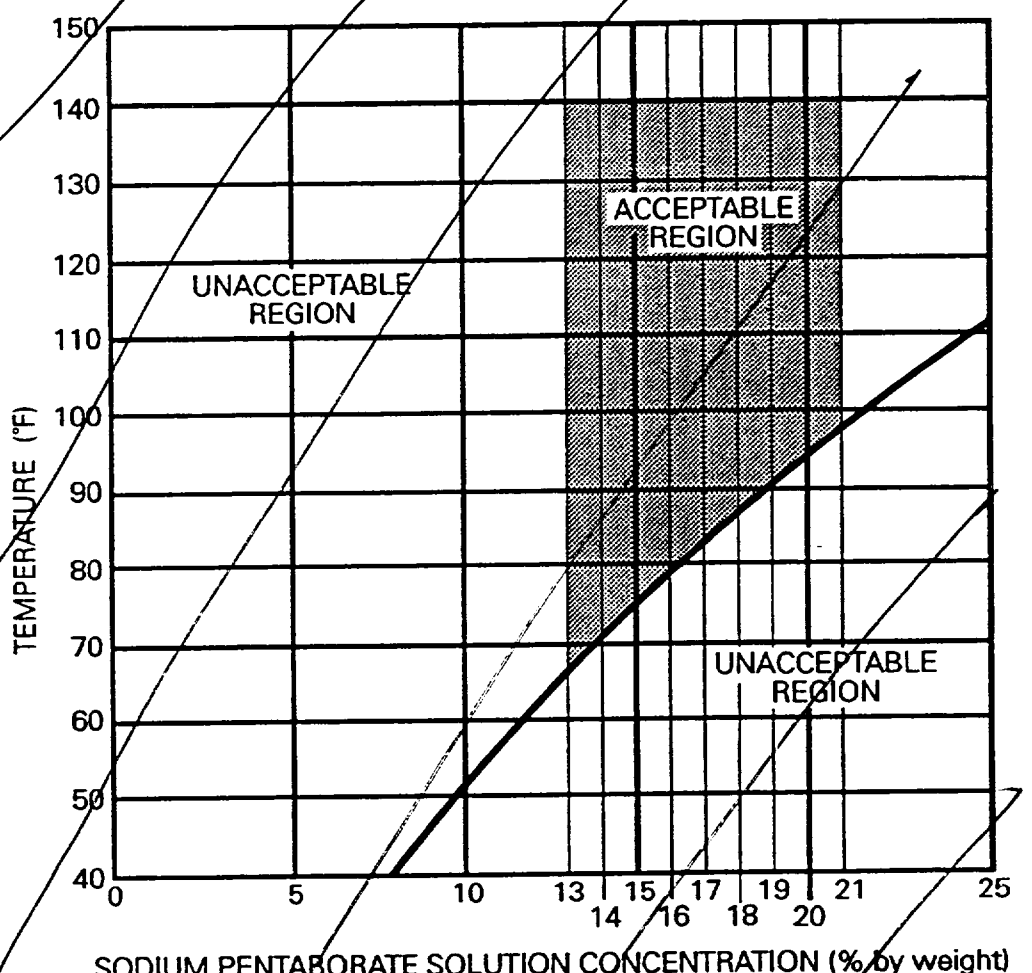

Figure 3.1.7-2 (page 1 of 1)
Sodium Pentaborate Solution Temperature Versus Concentration Requirements

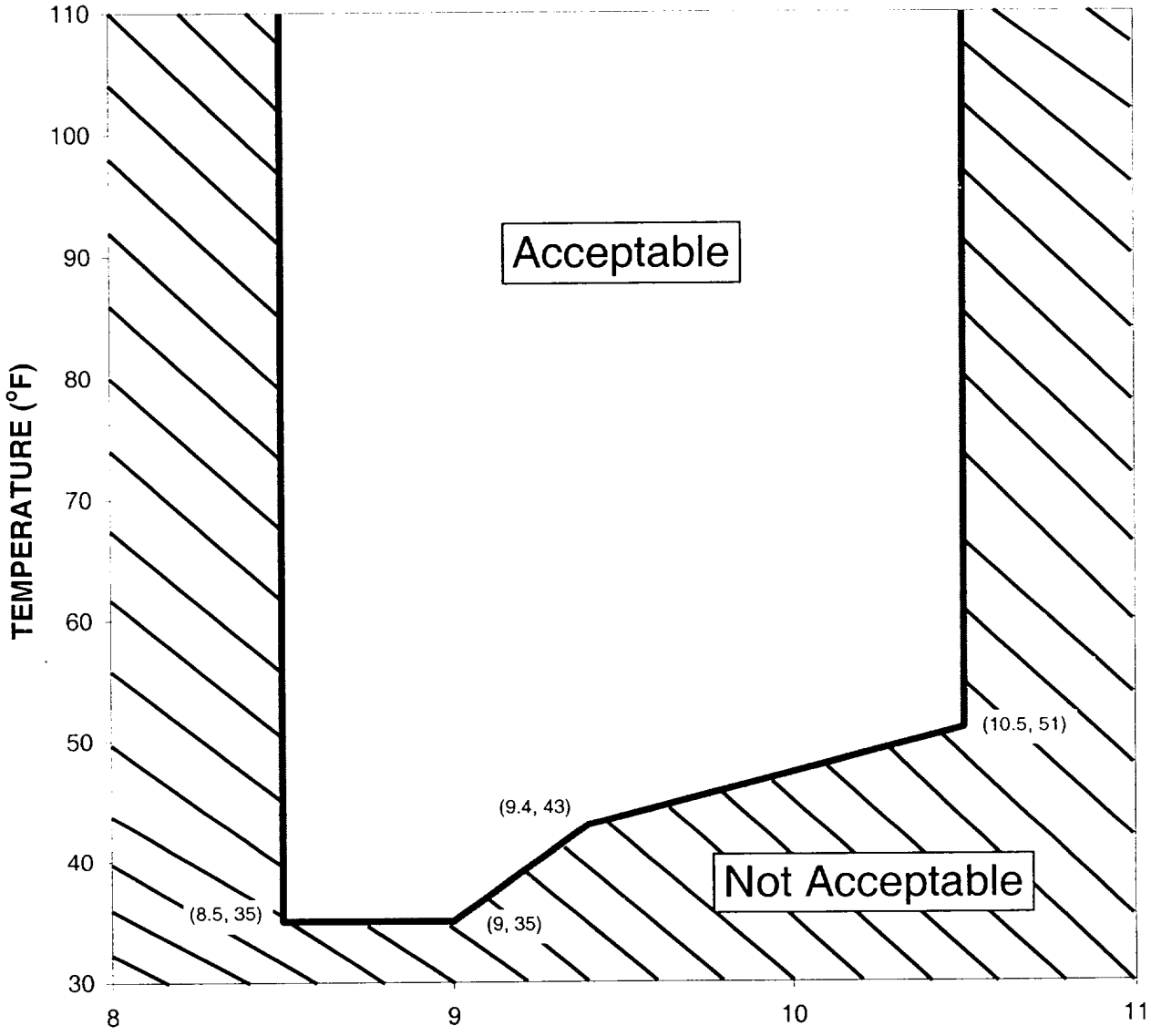

Figure 3.1.7-2 (page 1 of 1)
Sodium Pentaborate Solution Temperature
Versus Concentration Requirements

Typed Technical Specification Pages - Unit 1

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.1.7.2	Verify temperature of sodium pentaborate solution is within the limits of Figure 3.1.7-2.	24 hours
SR 3.1.7.3	Verify temperature of pump suction and discharge piping up to the SLC injection valves is within the limits of Figure 3.1.7-2.	24 hours
SR 3.1.7.4	Verify continuity of explosive charge.	31 days
SR 3.1.7.5	Verify the concentration of boron in solution is within the limits of Figure 3.1.7-1.	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 within the limits of Figure 3.1.7-2

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.1.7.6	Verify each pump develops a flow rate $\geq$ 41.2 gpm at a discharge pressure $\geq$ 1190 psig.	In accordance with the Inservice Testing Program
SR 3.1.7.7	Verify flow through one SLC subsystem from pump into reactor pressure vessel.	24 months on a STAGGERED TEST BASIS
SR 3.1.7.8	Verify sodium pentaborate enrichment is $\geq$ 47 atom percent B-10.	Prior to addition to SLC tank

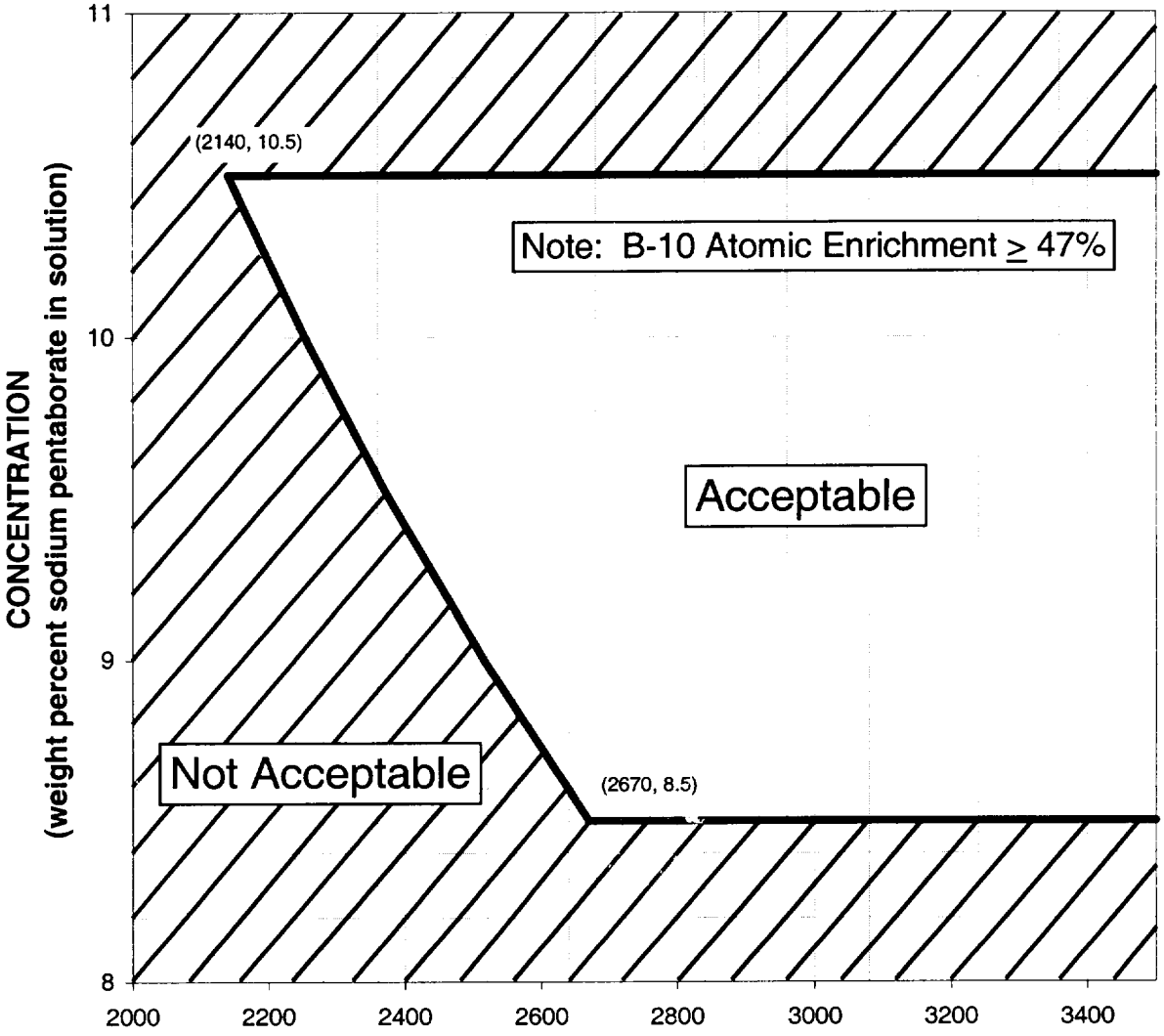

Figure 3.1.7-1 (page 1 of 1)
Sodium Pentaborate Solution Volume
Versus Concentration Requirements

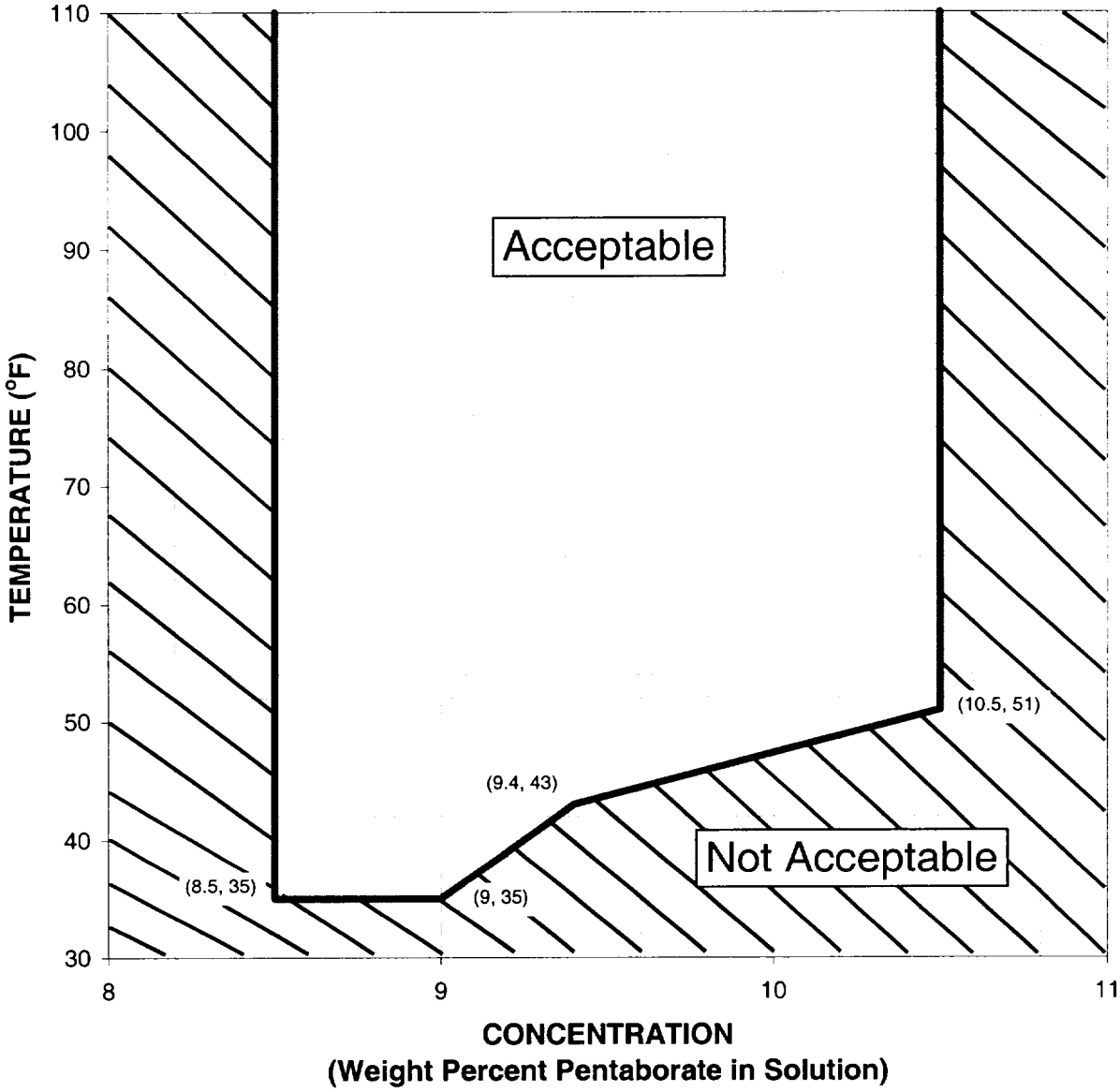

Figure 3.1.7-2 (page 1 of 1)
Sodium Pentaborate Solution Temperature
Versus Concentration Requirements

Typed Technical Specification Pages - Unit 2

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.1.7.2	Verify temperature of sodium pentaborate solution is within the limits of Figure 3.1.7-2.	24 hours
SR 3.1.7.3	Verify temperature of pump suction and discharge piping up to the SLC injection valves is within the limits of Figure 3.1.7-2.	24 hours
SR 3.1.7.4	Verify continuity of explosive charge.	31 days
SR 3.1.7.5	Verify the concentration of boron in solution is within the limits of Figure 3.1.7-1.	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 within the limits of Figure 3.1.7-2

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.1.7.6	Verify each pump develops a flow rate $\geq$ 41.2 gpm at a discharge pressure $\geq$ 1190 psig.	In accordance with the Inservice Testing Program
SR 3.1.7.7	Verify flow through one SLC subsystem from pump into reactor pressure vessel.	24 months on a STAGGERED TEST BASIS
SR 3.1.7.8	Verify sodium pentaborate enrichment is $\geq$ 47 atom percent B-10.	Prior to addition to SLC tank

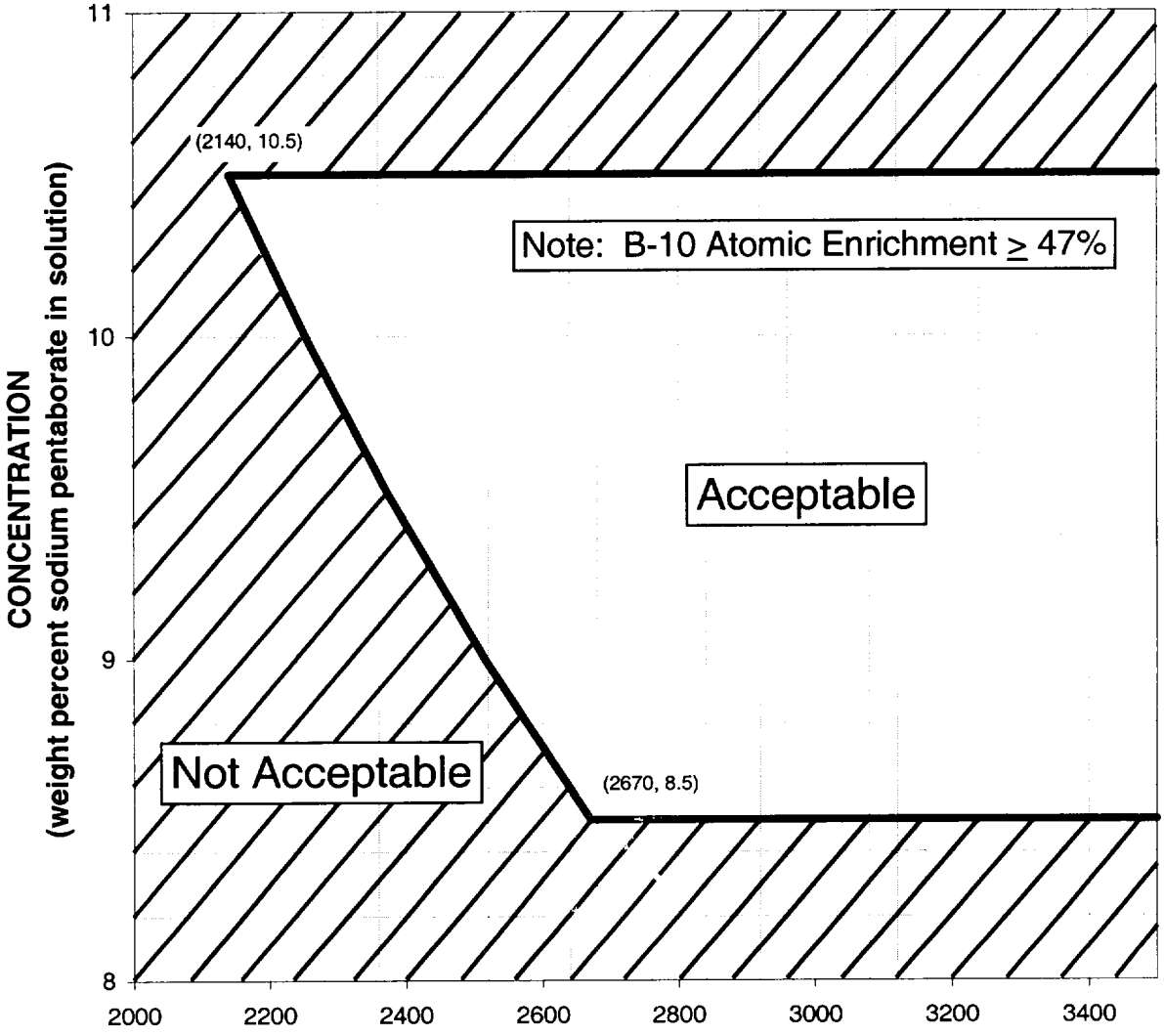

Figure 3.1.7-1 (page 1 of 1)
Sodium Pentaborate Solution Volume
Versus Concentration Requirements

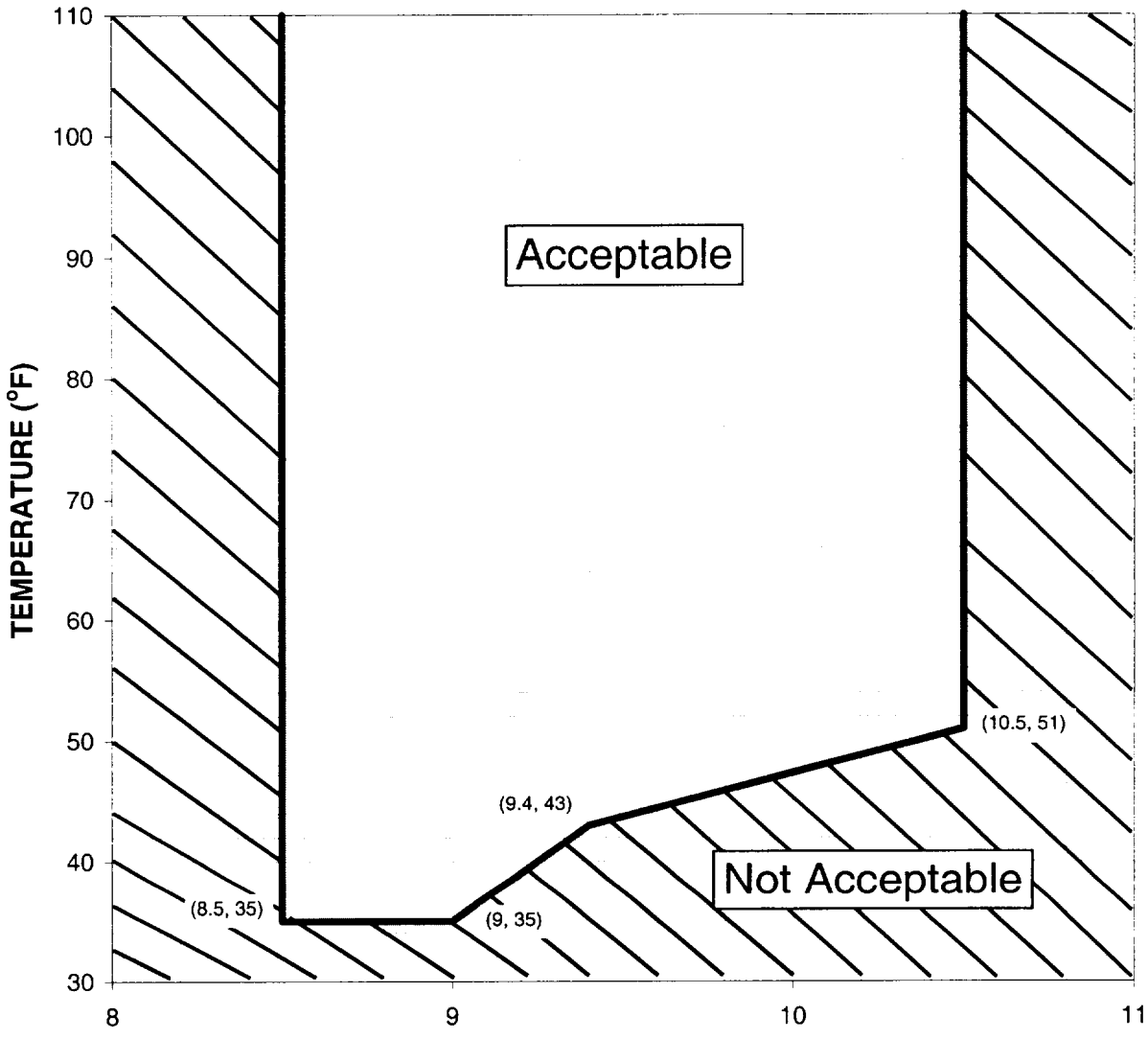

Figure 3.1.7-2 (page 1 of 1)
Sodium Pentaborate Solution Temperature
Versus Concentration Requirements

Marked-up Technical Specification Bases Pages - Unit 1
(For Information Only)

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.7 Standby Liquid Control (SLC) System

BASES

BACKGROUND

The SLC System is designed to provide the capability of bringing the reactor, at any time in a fuel cycle, from full power and minimum control rod inventory (which is at the peak of the xenon transient) to a subcritical condition with the reactor in the most reactive, xenon free state without taking credit for control rod movement. The SLC System satisfies the requirements of 10 CFR 50.62 (Ref. 1) on anticipated transient without scram.

The SLC System is also used to maintain suppression pool pH level above 7 following a loss of coolant accident (LOCA) involving significant fission product releases. Maintaining suppression pool pH levels greater than 7 following an accident ensures that iodine will be retained in the suppression pool water (Ref. 2).

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 ANALYSES

The SLC System is manually initiated from the main control room, as directed by the emergency operating procedures, if the operator believes the reactor cannot be shut down, or kept shut down, with the control rods. The SLC System is used in the event that enough control rods cannot be inserted to accomplish shutdown and cooldown in the normal manner. The SLC System injects borated water into the reactor core to add negative reactivity to compensate for all of the various reactivity effects that could occur during plant operations. To meet this objective, it is necessary for ~~both~~ SLC ~~pumps~~ to inject a quantity of boron which produces a concentration of ~~660~~ 720 ppm equivalent of natural boron in the reactor coolant at 70°F with normal reactor vessel

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.7.7 (continued)

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 with the reactor at power. Operating experience has demonstrated these components will usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

REFERENCES

1. 10 CFR 50.62.
2. NUREG-1465, Accident Source Terms for Light-Water Nuclear Power Plants, Final Report, February 1, 1995.
3. UFSAR, Section 9.3.4.
4. 10 CFR 50.67
5. 10 CFR 50.36(c)(2)(ii).

SR 3.1.7.8

Enriched sodium pentaborate solution is made by mixing granular, enriched sodium pentaborate with water. Isotopic tests on the granular sodium pentaborate to verify the actual B-10 enrichment must be performed prior to addition to the SLC tank in order to ensure that the proper B-10 atom percentage is being used.

List Of Regulatory Commitments

The following table identifies those actions committed to by Carolina Power & Light (CP&L) Company in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments. Please direct questions regarding these commitments to the Manager - Regulatory Affairs at the Brunswick Steam Electric Plant.

Commitment	Schedule
1. No commitments were made in this request.	N/A