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10 CFR 50.90

January 29, 2018

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

Limerick Generating Station, Units 1 and 2
Renewed Facility Operating License Nos. NPF-39 and NPF-85
NRC Docket Nos. 50-352 and 50-353

Subject: Application to Revise Technical Specifications to Lower the Minimum Standby Liquid Control System Pump Flowrate

In accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Exelon Generation Company, LLC (Exelon) requests an amendment to the Technical Specifications (TS), Appendix A of Renewed Facility Operating License Nos. NPF-39 and NPF-85 for Limerick Generating Station (LGS), Units 1 and 2, respectively.

The proposed changes will lower the TS Standby Liquid Control System (SLCS) Surveillance Requirement (SR) pump flowrate value, raise the TS SLCS SR Boron-10 Enrichment value of the Sodium Pentaborate added to the SLCS tank and expand the operating range in the Sodium Pentaborate Solution Temperature/Concentration Requirements Figure. These changes will provide increased testing margin and operational flexibility.

The proposed amendment has been reviewed by the LGS Plant Operations Review Committee in accordance with the requirements of the Exelon Quality Assurance Program.

This amendment request contains no regulatory commitments.

Attachment 1 provides a description and assessment of the proposed changes. Attachment 2 provides the existing TS pages marked up to show the proposed changes. Attachment 3 provides the existing TS Bases pages marked up to show the proposed changes (information only).

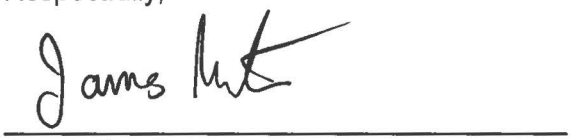
Exelon requests approval of the proposed amendment by January 29, 2019. Once approved, the amendments shall be implemented within 90 days.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), Exelon is notifying the Commonwealth of Pennsylvania of this application for license amendment by transmitting a copy of this letter and its attachments to the designated State Official.

If you have any questions or require additional information, please contact David Neff at (267) 533-1132.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 29th day of January 2018.

Respectfully,



James Barstow
Director, Licensing and Regulatory Affairs
Exelon Generation Company, LLC

Attachments:
1. Evaluation of Proposed Changes
2. Markup of Proposed Technical Specifications Pages
3. Markup of Proposed Technical Specifications Bases Pages (For Information Only)

cc:
USNRC Region I, Regional Administrator	w/ attachments
USNRC Senior Resident Inspector, LGS	"
USNRC Project Manager, LGS	"
R. R. Janati, Pennsylvania Bureau of Radiation Protection	"

ATTACHMENT 1

License Amendment Request

Limerick Generating Station, Units 1 and 2

Docket Nos. 50-352 and 50-353

EVALUATION OF PROPOSED CHANGES

Subject: Application to Revise Technical Specifications to Lower the Minimum Standby Liquid Control System Pump Flowrate

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1.0 SUMMARY DESCRIPTION

Pursuant to 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Exelon Generation Company, LLC (Exelon), proposes changes to the Technical Specifications (TS), Appendix A of Renewed Facility Operating License Nos. NPF-39 and NPF-85 for Limerick Generating Station (LGS), Units 1 and 2, respectively.

The proposed changes will lower the TS Standby Liquid Control System (SLCS) Surveillance Requirement (SR) pump flowrate value, raise the TS SLCS SR Boron-10 (B-10) Enrichment value of the Sodium Pentaborate added to the SLCS tank and expand the operating range in the Sodium Pentaborate Solution Temperature/Concentration Requirements Figure. These changes will provide greater operating flexibility:

- Standby Liquid Control System, TS SR 4.1.5.c (lower the minimum pump flowrate requirement from 41.2 to 37.0 gpm),
- Standby Liquid Control System, TS SR 4.1.5.e (raise the TS B-10 enrichment value of the Sodium Pentaborate added to the SLCS tank from 29 to 49 atom %), and
- Standby Liquid Control System, TS Figure 3.1.5-1, Sodium Pentaborate Solution Temperature/Concentration Requirements (replace the figure to provide an extended concentration range).

2.0 DETAILED DESCRIPTION

To provide increased testing margin and operational flexibility, several changes to the SLCS TS requirements are proposed in this License Amendment Request. To increase margin in the SLCS pump flowrate Inservice Testing (IST) program and TS SR testing, a lower TS SLCS pump flowrate is requested. To accommodate this change in minimum pump flowrate and to allow for increased operational flexibility when confirming the Sodium Pentaborate concentration, an increase in the B-10 enrichment value of the Sodium Pentaborate added to the SLCS tank is requested. This will help ensure the minimum amount of B-10 will remain available in the SLCS storage tank. To provide increased operational flexibility in the chemistry control of the SLCS storage tank contents, a lower Sodium Pentaborate solution concentration by weight limit and a revised TS Figure are requested.

The changes requested by this amendment application are described below.

1. TS Section 3.1.5, Standby Liquid Control System, Surveillance Requirement (SR) 4.1.5.c will be revised to lower the minimum pump flowrate requirement from 41.2 to 37.0 gpm.
2. TS Section 3.1.5, Standby Liquid Control System, Surveillance Requirement (SR) 4.1.5.e will be revised to raise the TS B-10 Enrichment value of the Sodium Pentaborate added to the SLCS tank from 29 to 49 atom %.
3. TS Section 3.1.5, Standby Liquid Control System, Figure 3.1.5-1, Sodium Pentaborate Solution Temperature/Concentration Requirements, will be revised to provide a new figure. The new figure extends the minimum operating range limit for the Sodium Pentaborate concentration from 10% to 9% while retaining the lower temperature limit of 50.5^0 F.

A change to the SLCS pump flowrate TS SR is requested to provide margin between the LGS IST Program required limits and the LGS TS SR limit. Presently, the TS SR limit of 41.2 gpm (Column E in Table 1 below) is more restrictive than the IST Program Alert Low Limit (Column C) and the Required Action Low Limit (Column D) specified by the ASME Code for Operation and Maintenance of Nuclear Power Plants, ASME OM-2004 Code (Reference 6.4) and the LGS IST Program. This forces the IST Program to be more restrictive than the ASME OM-2004 Code requirements for the SLCS pump's Alert Low Limit and Required Action Low Limit (i.e., Column C and D values are clamped at 41.2 gpm). For a Reference Value (RV) of 44.1 gpm, these limit values could be 41.1 and 39.7 gpm, respectively, as permitted by Table ISTB-5321-2 of the AMSE OM-2004 Code. This is illustrated in Table 1 below showing acceptance criteria for the Unit 1 SLCS Pump 1A, which is representative of the three SLCS pumps per unit at LGS. The current TS SR limit also reduces the margin between the IST Program low values for the Acceptable Low Limit (Column B) and the Alert Low Limit (Column C) compared to the Required Action Low Limit (Column D) where the pump must be declared inoperable. Consequently, small changes in measured flowrates can result in inoperability of the tested SLCS pump while the flowrate would still be in the Alert Range using the ASME Code requirements. Table 1 shows the new IST flowrate limits based on the proposed SLCS pump TS SR flowrate value of 37.0 gpm. This change would provide the desired margin between the Alert and the Required Action (i.e., inoperability) limits. This change could avoid the need for immediate repairs required to maintain the SLCS pump capability and could avoid unnecessary entry into TS Action 3.1.5.a which would require a plant shutdown in 7 days if two SLCS pumps are not restored to operable status.

Table 1: SLCS 1A Pump IST Program Test Acceptance Criteria vs. TS SR Limit

Column A	Column B	Column C	Column D	Column E
Reference Valve (RV)	Acceptable Low Limit (95% of RV for Comprehensive Tests)	Alert Low Limit (93% of RV for Comprehensive Tests)	Required Action Low Limit (90% of RV for Quarterly Tests)	TS SR 4.1.5.c Limit
44.1	41.9	41.2*	41.2*	41.2 (current)
44.1	41.9	41.1	39.7	37.0 (proposed)

Note *: Value is clamped at the TS SR 4.1.5.c value.

Regarding the change from 29 to 49 atom % B-10 enrichment of the Sodium Pentaborate added to the SLCS tank, this value is increased to ensure the minimum amount of B-10 remains available in the SLCS storage tank when considering the lower limit for the minimum pump flowrate and the lower limit for the Sodium Pentaborate solution concentration.

Regarding the Sodium Pentaborate solution operating limit changes, Figure 3.1.5-1 is revised to expand the lower Sodium Pentaborate solution concentration limit value from 10% to 9% by weight while retaining the lower temperature limit of 50.5^0 F. This will improve the operating flexibility when confirming the SLCS tank contents meet the limits and maintain consistency with UFSAR Figure 9.3-7 (Reference 6.1).

The marked-up pages that reflect the proposed changes are provided in Attachment 2 (Markup of Proposed Technical Specifications Pages) and Attachment 3 (Markup of Proposed Technical Specifications Bases Pages – For Information Only).

3.0 TECHNICAL EVALUATION

The proposed changes will lower the TS Standby Liquid Control System (SLCS) pump flowrate, raise the TS Boron-10 Enrichment value of the Sodium Pentaborate added to the SLCS tank and expand the operating range in the Sodium Pentaborate Solution Temperature/Concentration Requirements Figure. These changes will provide increased testing margin and operational flexibility.

The SLCS is a safety related backup system for the Nuclear Boiler System (NBS) Reactor Pressure Vessel (RPV) reactivity control. The SLCS is a back-up Reactivity Control System to comply with the requirements of 10 CFR 50.62, "Requirements for reduction of risk from anticipated transients without scram (ATWS) events for light-water-cooled nuclear power plants." The SLCS provides Sodium Pentaborate for pH control of the Suppression Pool (SP) following a Loss of Coolant Accident (LOCA) to support the implementation of Alternative Source Terms (AST) and meet the dose limits in 10 CFR 50.67, "Accident source term," as discussed in UFSAR Section 15.0.3.5.

The SLCS on each LGS Unit consists of 3-pumps, each with a design flowrate of 43 gpm, 3-explosive valves, a storage tank, a test tank, and associated instrumentation-controls, piping and valves. The SLCS injects a Sodium Pentaborate Solution using two SLCS pumps into the RPV through a Core Spray Line-Sparger. The Sodium Pentaborate Solution is then sprayed radially over the top of the reactor core. The SLCS can be manually initiated from the Control Room if the operator determines that the reactor core cannot be shut-down or kept shut-down by the Control Rod Drive System (CRDS). The SLCS may be automatically initiated upon receipt of an actuation signal from the Redundant Reactivity Control System (RRCS).

Whenever the reactor core is critical, the SLCS is capable of injecting a sufficient amount of Sodium Pentaborate into the Reactor Pressure Vessel (RPV) to ensure reactor core shutdown for anticipated transients without scram (ATWS) events. The SLCS will bring the reactor core from rated-power to a cold shutdown condition (zero power) anytime within the life of the reactor core. The SLCS is designed with the capability of injecting into the RPV a borated water solution at a flow rate, boron concentration, and boron-10 isotope enrichment that is equivalent in reactivity control to that resulting from injection of 86 gallons per minute of 13 weight percent natural Sodium Pentaborate solution to comply with 10 CFR 50.62. The boron concentration in the RPV meets the licensing design basis requirements for delivering to the RPV a boron solution such that a minimum reactor coolant average boron concentration of 660 ppm results. The design margin for boron concentration in the RPV is 165 ppm which is the difference between the SLCS boron concentration design requirements in the RPV of 825 ppm and the boron concentration in the RPV of 660 ppm which is above the concentration required to shutdown the reactor. This margin provides allowance for boron solution leakage and imperfect mixing within the RPV.

The boron injection capacity for the SLCS to meet ATWS conditions is established by the following equation:

ATWS Rule Equation:

$$\frac{C}{13\ \%\ wt.} \times \frac{E}{29\ atom\ \%} \times \frac{Q}{86\ gpm} \geq 1.0, \text{ where}$$

C = Sodium Pentaborate Solution Concentration (% By Weight)
E = Boron-10 Enrichment (% atom)
Q = Two Pump Flowrate (gpm)

The boron concentration in the RPV to meet ATWS conditions is based on the design inputs of the RPV reactivity control design analysis. Boron injection capacity is based on a combination of boron solution concentration, B-10 enrichment, and flow rate. There is no required value for any of the parameters due to the equivalent control capacity concept; however, allowable ranges for each parameter do exist and are addressed, individually, as separate controlling parameters. This concept allows flexibility in satisfying the boron injection capacity equation, in that equivalency can be obtained by changing flow rate, boron concentration, and B-10 enrichment. A combination of SLCS tank boron solution concentration, B-10 enrichment, and flow rate which results in a boron injection capacity equation result that is greater than or equal to unity (i.e., $\geq$ 1.0) will provide an associated margin in the ability of the SLCS to reduce reactor power prior to exceeding the ATWS analysis acceptance criteria. The acceptance criteria for an ATWS analysis is as follows: peak reactor pressure less than 1500 psig, peak fuel cladding temperature less than 2200° F, and peak bulk suppression pool temperature less than 190° F.

The current analysis of record for the ATWS event was performed for the implementation of Amendments 201/163 to the LGS Unit 1 and Unit 2 Renewed Facility Operating Licenses (RFOLs), respectively. These amendments approved a Measurement Uncertainty Recapture (MUR) Power Uprate and were issued on April 8, 2011. With the increase in licensed power, the ATWS analysis was re-performed. This analysis is the Current Licensing Basis (CLB) for the SLCS system relative to compliance to 10 CFR 50.62. Table 2 shows the assumptions and results of the bounding ATWS Equation analysis that supported the MUR Power Uprate amendment and forms the CLB. The CLB analysis requires a minimum of 185 lbs of B-10 be available to maintain reactivity control requirements and is specified in TS SR 4.1.5.b. The ATWS Equation calculation for the CLB analysis is less than unity (i.e., < 1.0). This ensures additional margin in the SLCS capability to meet the ATWS analysis acceptance criteria. The ATWS event analysis was performed with these limiting equivalent control capacity parameters and the analysis acceptance criteria were met. Thus, the CLB ATWS event analyses are bounding for ATWS analysis performed with equivalent control capacity parameters that result in an ATWS Equation calculation of greater than or equal to unity (i.e., $\geq$ 1.0).

Table 2: ATWS Equation Calculation Results of CLB vs Proposed Changes

Parameter	Units	Value CLB	Value LAR
Concentration	%	13.4	9.0
Enrichment	% atom	29	49
Pump Flowrate (2 pumps)	gpm	82.4	74.0
ATWS Equation Calculation Result	-	0.9876	1.0065

A comparison is also provided in Table 2 to show the combination of equivalent control capacity parameters that can satisfy the ATWS Equation in TS SR 4.1.5.b. The proposed changes to the SLCS minimum pump flowrate and the lower Sodium Pentaborate Solution concentration require an increase in the minimum B-10 Enrichment value of the Sodium Pentaborate added to the SLCS tank if the proposed flowrate and concentration values would exist simultaneously. The SLCS tank boron solution concentration, boron-10 enrichment, and flow rate that are measured during the testing for TS SR 4.1.5.b determine if an increase in Sodium Pentaborate Solution Concentration or weight of B-10 in the SLCS tank are necessary. To supplement the requirement to satisfy the ATWS Equation in TS SR 4.1.5.b with both the SLCS tank boron solution concentration and the SLCS pump flow rate at the new minimum values, the minimum B-10 Enrichment value of the Sodium Pentaborate added to the SLCS tank is increased in TS SR 4.1.5.e. This will further ensure that the B-10 enrichment is not inadvertently lowered during chemical additions to the SLCS tank.

The SLCS is also designed to be manually initiated from the Control Room within 13-hours from the onset of a large break Loss of Coolant Accident (LOCA) to meet dose limits for the control room, Exclusion Area Boundary (EAB) and Low Population Zone (LPZ) as specified in 10 CFR 50.67. Accident Source Term Dose limits for the control room, EAB and LPZ are specified in 10 CFR 50.67 for plants that have approval to use Alternative Source Terms (AST) for accident analyses. Amendments 185/146 to the LGS Unit 1 and Unit 2 RFOLs, respectively, were approved on August 23, 2006, and implemented the AST analytical methods described in Regulatory Guide 1.183 and dose limits defined in 10 CFR 50.67. These AST analytical methods and dose limits comprise the current design basis for LGS for all design basis accidents as discussed in UFSAR Section 15.0.3.5. In support of a full scope implementation of AST in accordance with Regulatory Guide 1.183, AST radiological consequence analyses were performed for the four Design Basis Accidents that result in offsite exposures. The SLCS is relied upon to inject Sodium Pentaborate into the reactor coolant that is subsequently dispersed into the Suppression Pool (SP) through the pipe break. The addition of Sodium Pentaborate is to maintain the pH of the SP at a level of 7.0 or higher following a LOCA.

The current AST analysis requires that the SP pH is maintained above 7.0 for 30 days following a LOCA to prevent the release of radioactive iodine. This is accomplished by injecting a minimum of 1400 lb of Sodium Pentaborate into the RPV using the SLCS. A minimum volume of 1600 gallons of Sodium Pentaborate solution with a minimum allowable concentration of 10%, based on TS Figure 3.1.5-1, is required to achieve the minimum weight of Sodium Pentaborate to be injected. The current TS SR 4.1.5.a.2 requires a minimum available SLCS tank volume of Sodium Pentaborate solution of at least 3160 gallons which exceeds the minimum solution volume needed for pH control. Lowering the minimum Sodium Pentaborate solution concentration in the SLCS tank from 10% to 9% increases the minimum required Sodium Pentaborate solution volume to 1786 gallons. This new minimum volume of Sodium

Pentaborate solution to meet the AST analysis remains below the minimum available SLCS tank volume of Sodium Pentaborate solution of 3160 gallons required by TS SR 4.1.5.a.2. Therefore, lowering the minimum Sodium Pentaborate solution concentration in the SLCS tank from 10% to 9% still maintains a considerable margin of available Sodium Pentaborate for pH control of the SP to meet the AST analysis.

TS Section 3.1.5, Standby Liquid Control System, Figure 3.1.5-1, Sodium Pentaborate Solution Temperature/Concentration Requirements, will be revised to provide a new figure. The new figure extends the minimum operating range limit for the Sodium Pentaborate concentration from 10% to 9% while retaining the lower temperature limit of 50.5^0 F. This will improve the operating flexibility when confirming the SLCS tank contents meet the TS limits and maintain consistency with UFSAR Figure 9.3-7 (Reference 6.1). This impact of allowing a lower Sodium Pentaborate solution concentration on ATWS analysis and on the pH control of the SP have been determined to be acceptable as discussed above in this section.

The proposed changes do not alter the physical design of any plant structure, system, or component; therefore, the proposed changes have no adverse effect on plant operation, or the availability or operation of any accident mitigation equipment. The plant response to the design basis accidents does not change. The proposed changes do not require any new or unusual operator actions. The proposed changes do not introduce any new failure modes that could result in a new accident. There is no change being made to safety analysis assumptions, safety limits or limiting safety system settings that would adversely affect plant safety as a result of the proposed changes.

The proposed changes will maintain plant operation within the bounds of the current analysis for the Anticipated Transient Without Scram (ATWS) events and for accident source term dose limits in the Loss of Coolant Accident (LOCA) analysis. The combination of the proposed equivalent control capacity parameters will satisfy the SLCS design requirements for the ATWS and AST analysis and are bounded by the CLB analysis. The above evaluation concludes there is reasonable assurance that the revisions to the SLCS TS Section 3.1.5 will not adversely impact the ability of the SLCS from performing its intended function.

TS Bases Sections B 3/4.1.5

The TS Bases for the SLCS (TS Section 3/4.1.5) will be revised to reflect the changes in the minimum SLCS pump flowrate, the Sodium Pentaborate B-10 Enrichment of the Sodium Pentaborate added to the SLCS tank and lower Sodium Pentaborate concentration limit. The marked-up TS Bases pages that reflect the proposed changes are provided in Attachment 3 for information purposes only.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

ATWS is an Abnormal Operational Occurrence (AOO) with failure of the reactor protection system to initiate a reactor scram to terminate the event. The requirements for ATWS are specified in 10 CFR 50.62, "Requirements for reduction of risk from anticipated transients without scram (ATWS) events for light-water-cooled nuclear power plants," which requires, in part, that:

(2) Each BWR have a standby liquid control (SLC) system with the capability of injecting into the reactor vessel a borated water solution with reactivity control at least equivalent to the control obtained by injecting 86 gallons per minute (gpm) of a 13 weight percent sodium pentaborate decahydrate solution at the natural boron-10 isotope abundance into a 251-inch inside diameter reactor vessel.

As discussed in Section 3 above, the proposed changes in the TS values for minimum SLCS pump flowrate, the Sodium Pentaborate B-10 Enrichment of the Sodium Pentaborate added to the SLCS tank and lower Sodium Pentaborate concentration limit have been evaluated and found to be bounded by the existing analysis of record for the ATWS events. The proposed changes will maintain compliance with the requirements of 10 CFR 50.62.

10 CFR 50.67, "Accident source term," which, in part, sets limits for the radiological consequences of a postulated design-basis accident using an AST. The AST analytical methods described in Regulatory Guide 1.183 and dose limits defined in 10 CFR 50.67 comprise the design basis for LGS for all design basis accidents as discussed in UFSAR Section 15.0.3.5. In support of a full scope implementation of AST in accordance with Regulatory Guide 1.183, AST radiological consequence analyses were performed for the four Design Basis Accidents that result in offsite exposures.

RG 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," dated July 2000 provides the dose limits and the methodology to be used to evaluate the dose consequences for design basis accidents. This RG requires that the SLCS injects boron solution into the reactor vessel following a LOCA to maintain the suppression pool pH at or above 7.0.

As discussed in Section 3 above, the proposed changes in the TS values for minimum SLCS pump flowrate, the B-10 Enrichment value of the Sodium Pentaborate added to the SLCS tank and the lower concentration limit have been evaluated and found to maintain the requirement to control SP pH above 7.0 following LOCA events in accordance with the requirements of the AST for accident analyses.

4.2 Precedence

No precedent was identified that involved revising the SLCS equivalent control capacity parameters to provide margin between the IST Program required limits and the TS SR limit. No precedent was identified that involved lowering the SLCS tank Sodium Pentaborate concentration or increasing the B-10 Enrichment value of the Sodium Pentaborate added to the SLCS tank to provide for increased operational flexibility.

4.3 No Significant Hazards Consideration

In accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Exelon Generation Company, LLC (Exelon), proposes changes to the Technical Specifications (TS), Appendix A of the Renewed Facility Operating License Nos. NPF-39 and NPF-85 for Limerick Generating Station (LGS), Units 1 and 2, respectively.

The proposed changes will lower the TS Standby Liquid Control System (SLCS) Surveillance Requirement (SR) pump flowrate value, raise the TS SLCS SR Boron-10 (B-10) Enrichment value of the Sodium Pentaborate added to the SLCS tank and expand the operating range in the Sodium Pentaborate Solution Temperature/Concentration Requirements in the TS Figure. These changes will provide greater operating flexibility. The proposed changes will maintain plant operation within the bounds of the current analysis for the Anticipated Transient Without Scram (ATWS) events and for accident source term dose limits in the Loss of Coolant Accident (LOCA) analysis. Exelon has evaluated the proposed changes, using the criteria in 10 CFR 50.92, "Issuance of amendment," and has determined that the proposed changes do not involve a significant hazards consideration. The following information is provided to support a finding of no significant hazards consideration.

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

   Response: No

   The proposed changes will lower the SLCS TS SR pump flowrate value, raise the TS SLCS SR Boron-10 (B-10) Enrichment value of the Sodium Pentaborate added to the SLCS tank and expand the operating range contained in the TS Figure for Sodium Pentaborate Solution Temperature/Concentration Requirements. These changes will provide greater operating flexibility. The proposed changes will maintain plant operation within the bounds of the current analysis for the ATWS events and for accident source term dose limits in the Loss of Coolant Accident (LOCA) analysis.

   The proposed changes do not alter the physical design of any plant structure, system, or component; therefore, the proposed changes have no adverse effect on plant operation, or the availability or operation of any accident mitigation equipment. The plant response to the design basis accidents does not change. Operation or failure of the SLCS is not assumed to be an initiator of any analyzed event in the Updated Final Safety Analysis Report (UFSAR) and cannot cause an accident. The changes to the SLCS TS SRs are bounded by current analyses for the ATWS events and LOCA and therefore the changes do not adversely affect consequences of any accident previously evaluated.

   The proposed changes conform to NRC regulatory requirements regarding ATWS events and AST dose limits.

   Therefore, the proposed changes do 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 changes will lower the TS SLCS SR pump flowrate value, raise the TS SLCS SR B-10 Enrichment value of the Sodium Pentaborate added to the SLCS tank and expand the operating range in the Sodium Pentaborate Solution

Temperature/Concentration Requirements Figure. These changes will provide greater operating flexibility. The proposed changes will maintain plant operation within the bounds of the current analysis for the ATWS events and for accident source term dose limits in the LOCA analysis.

The proposed changes do not alter the plant configuration (no new or different type of equipment is being installed) or require any new or unusual operator actions. The proposed changes do not alter the safety limits or safety analysis assumptions associated with the operation of the plant. The proposed changes do not introduce any new failure modes that could result in a new accident. The proposed changes do not reduce or adversely affect the capabilities of any plant structure, system, or component in the performance of their safety function. Also, the response of the plant and the operators following the design basis accidents is unaffected by the proposed changes.

Therefore, the proposed changes do 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 changes will lower the TS SLCS SR pump flowrate value, raise the TS SLCS SR B-10 Enrichment value of the Sodium Pentaborate added to the SLCS tank and expand the operating range in the Sodium Pentaborate Solution Temperature/Concentration Requirements Figure. These changes will provide greater operating flexibility. The proposed changes will maintain plant operation within the bounds of the current analysis for the ATWS events and for accident source term dose limits in the LOCA analysis.

The proposed changes have no adverse effect on plant operation, or the availability or operation of any accident mitigation equipment. The plant response to the design basis accidents does not change. The proposed changes do not adversely affect existing plant safety margins or the reliability of the equipment assumed to operate in the safety analyses. There is no change being made to safety analysis assumptions, safety limits or limiting safety system settings that would adversely affect plant safety as a result of the proposed changes.

Therefore, the proposed changes do not involve a significant reduction in a margin of safety.

Based on the above evaluation, Exelon concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92, paragraph (c), and accordingly, a finding of "no significant hazards consideration" is justified.

4.4 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in

the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or the health and safety of the public.

5.0 ENVIRONMENTAL CONSIDERATION

Exelon has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, "Standards for Protection Against Radiation." However, the proposed amendment does 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 amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22, "Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review," paragraph (c)(9). Therefore, pursuant to 10 CFR 51.22, paragraph (b), no environmental impact statement or environmental assessment needs to be prepared in connection with the proposed amendment.

6.0 REFERENCES

1. Limerick Generating Station, Updated Final Safety Analysis Report, Section 9.3.5, "Standby Liquid Control System."
2. Measurement Uncertainty Recapture Power Uprate Amendments 201/163 to the LGS Unit 1 and Unit 2 RFOLs, approved on April 8, 2011.
3. AST Amendments 185/146 to the LGS Unit 1 and Unit 2 RFOLs, approved on August 23, 2006
4. ASME Code for Operation and Maintenance of Nuclear Power Plants, 2004

ATTACHMENT 2

Limerick Generating Station Units 1 and 2
Docket Nos. 50-352 and 50-353

Application to Revise Technical Specifications to Lower the Minimum Standby Liquid Control System Pump Flowrate

Markup of Proposed Technical Specifications Pages

Unit 1 TS Pages

3/4 1-20
3/4 1-21

Unit 2 TS Pages

3/4 1-20
3/4 1-21

SURVEILLANCE REQUIREMENTS (Continued)

b. In accordance with the Surveillance Frequency Control Program by:

1. Verifying the continuity of the explosive charge.

2. Determining by chemical analysis and calculation* that the available weight of Boron-10 is greater than or equal to 185 lbs; the concentration of sodium pentaborate in solution is less than or equal to 13.8% and within the limits of Figure 3.1.5-1 and; the following equation is satisfied:

$$\frac{C}{13\%\ wt.} \times \frac{E}{29\ atom\ \%} \times \frac{Q}{86\ gpm} \geq 1$$

where

C = Sodium pentaborate solution (% by weight)
Q = Two pump flowrate, as determined per surveillance requirement 4.1.5.c.
E = Boron 10 enrichment (atom % Boron 10)

3. Verifying that each valve (manual, power-operated, or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

4. Verifying that no more than two pumps are aligned for automatic operation.

37.0

c. Demonstrating that, when tested pursuant to Specification 4.0.5, the minimum flow requirement of ~~41.2~~ gpm per pump at a pressure of greater than or equal to 1230 ± 25 psig is met.

d. In accordance with the Surveillance Frequency Control Program by:

1. Initiating at least one of the standby liquid control system loops, including an explosive valve, and verifying that a flow path from the pumps to the reactor pressure vessel is available by pumping demineralized water into the reactor vessel. The replacement charge for the explosive valve shall be from the same manufactured batch as the one fired or from another batch which has been certified by having one of the batch successfully fired. All injection loops shall be tested in 3 operating cycles.

2. Verify all heat-treated piping between storage tank and pump suction is unblocked.**

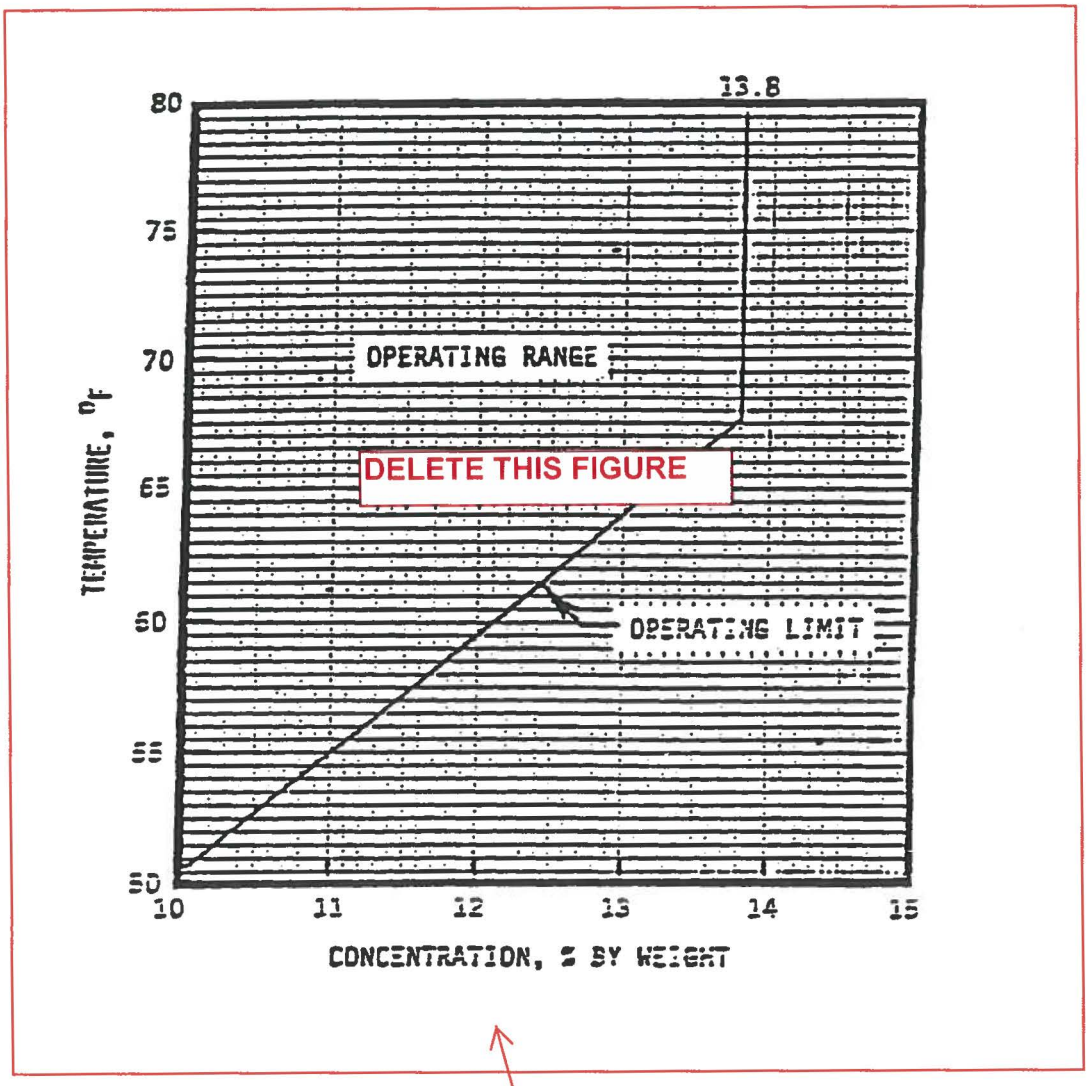
49

e. Prior to addition of Boron to storage tank verify sodium pentaborate enrichment to be added is ≥ ~~29~~ atom % Boron 10.

---

* This test shall also be performed anytime water or boron is added to the solution or when the solution temperature drops below the limits of Figure 3.1.5-1 for the most recent concentration analysis, within 24 hours after water or boron addition or solution temperature is restored.

** This test shall also be performed whenever suction piping temperature drops below the limits of Figure 3.1.5-1 for the most recent concentration analysis, within 24 hours after solution temperature is restored.



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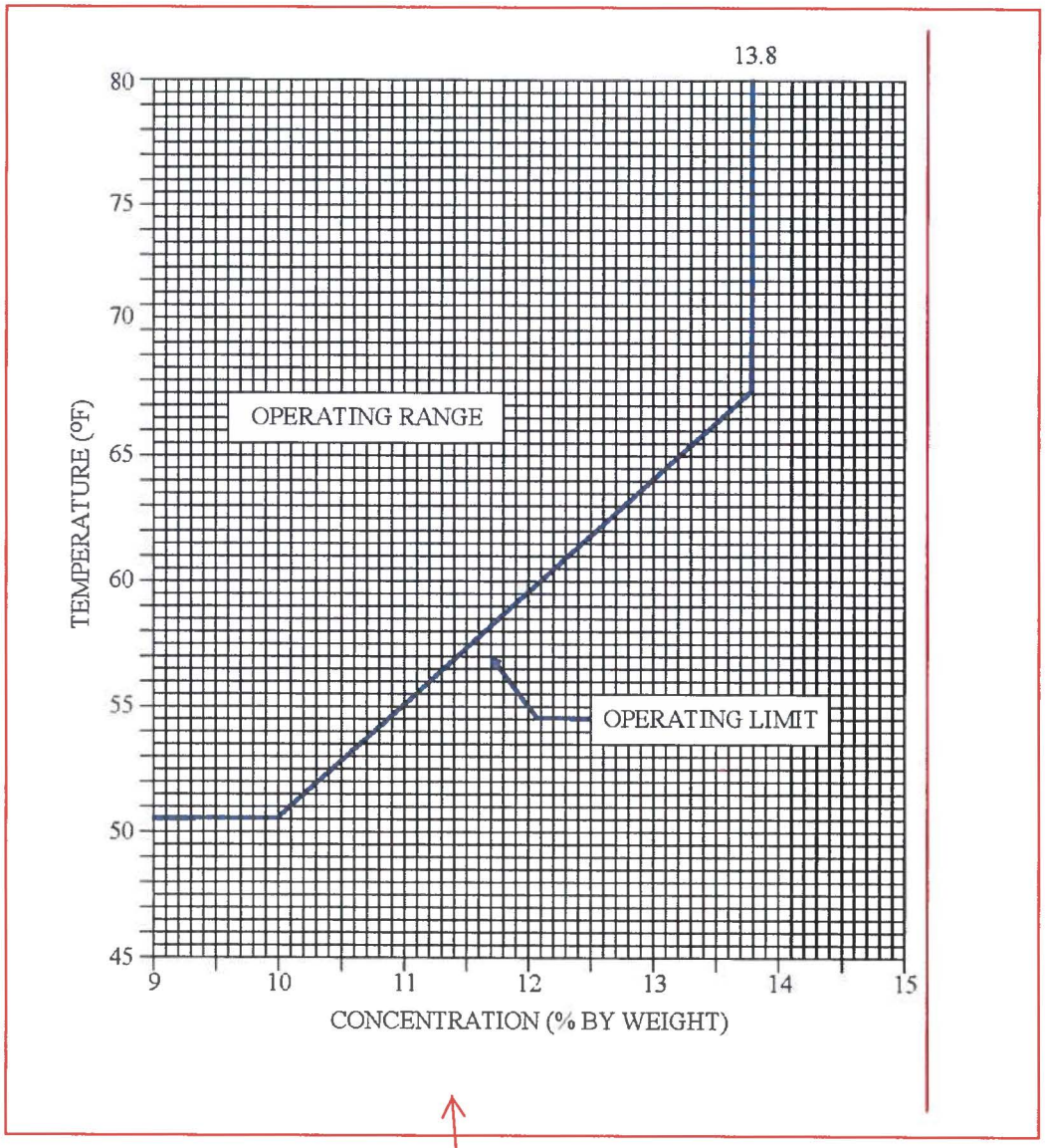
SODIUM PENTABORATE SOLUTION
TEMPERATURE/CONCENTRATION REQUIREMENTS

FIGURE 3.1.5-1



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SODIUM PENTABORATE SOLUTION
TEMPERATURE/CONCENTRATION REQUIREMENTS

FIGURE 3.1.5-1

SURVEILLANCE REQUIREMENTS (Continued)

b. In accordance with the Surveillance Frequency Control Program by:

1. Verifying the continuity of the explosive charge.

2. Determining by chemical analysis and calculation* that the available weight of Boron-10 is greater than or equal to 185 lbs; the concentration of sodium pentaborate in solution is less than or equal to 13.8% and within the limits of Figure 3.1.5-1 and; the following equation is satisfied:

$$\frac{C}{13\%\ wt.} \times \frac{E}{29\ atom\ \%} \times \frac{Q}{86\ gpm} \geq 1$$

where

C = Sodium pentaborate solution (% by weight)
Q = Two pump flowrate, as determined per surveillance requirement 4.1.5.c.
E = Boron 10 enrichment (atom % Boron 10)

3. Verifying that each valve (manual, power-operated, or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

4. Verifying that no more than two pumps are aligned for automatic operation.

c. Demonstrating that, when tested pursuant to Specification 4.0.5, the minimum flow requirement of ~~41.2~~ 37.0 gpm per pump at a pressure of greater than or equal to 1230±25 psig is met.

d. In accordance with the Surveillance Frequency Control Program by:

1. Initiating at least one of the standby liquid control system loops, including an explosive valve, and verifying that a flow path from the pumps to the reactor pressure vessel is available by pumping demineralized water into the reactor vessel. The replacement charge for the explosive valve shall be from the same manufactured batch as the one fired or from another batch which has been certified by having one of the batch successfully fired. All injection loops shall be tested in 3 operating cycles.

2. Verify all heat-treated piping between storage tank and pump suction is unblocked.**

e. Prior to addition of Boron to ~~storage tank~~ 49 verify sodium pentaborate enrichment to be added is ≥ ~~29~~ atom % Boron 10.

---

* This test shall also be performed anytime water or boron is added to the solution or when the solution temperature drops below the limits of Figure 3.1.5-1 for the most recent concentration analysis, within 24 hours after water or boron addition or solution temperature is restored.

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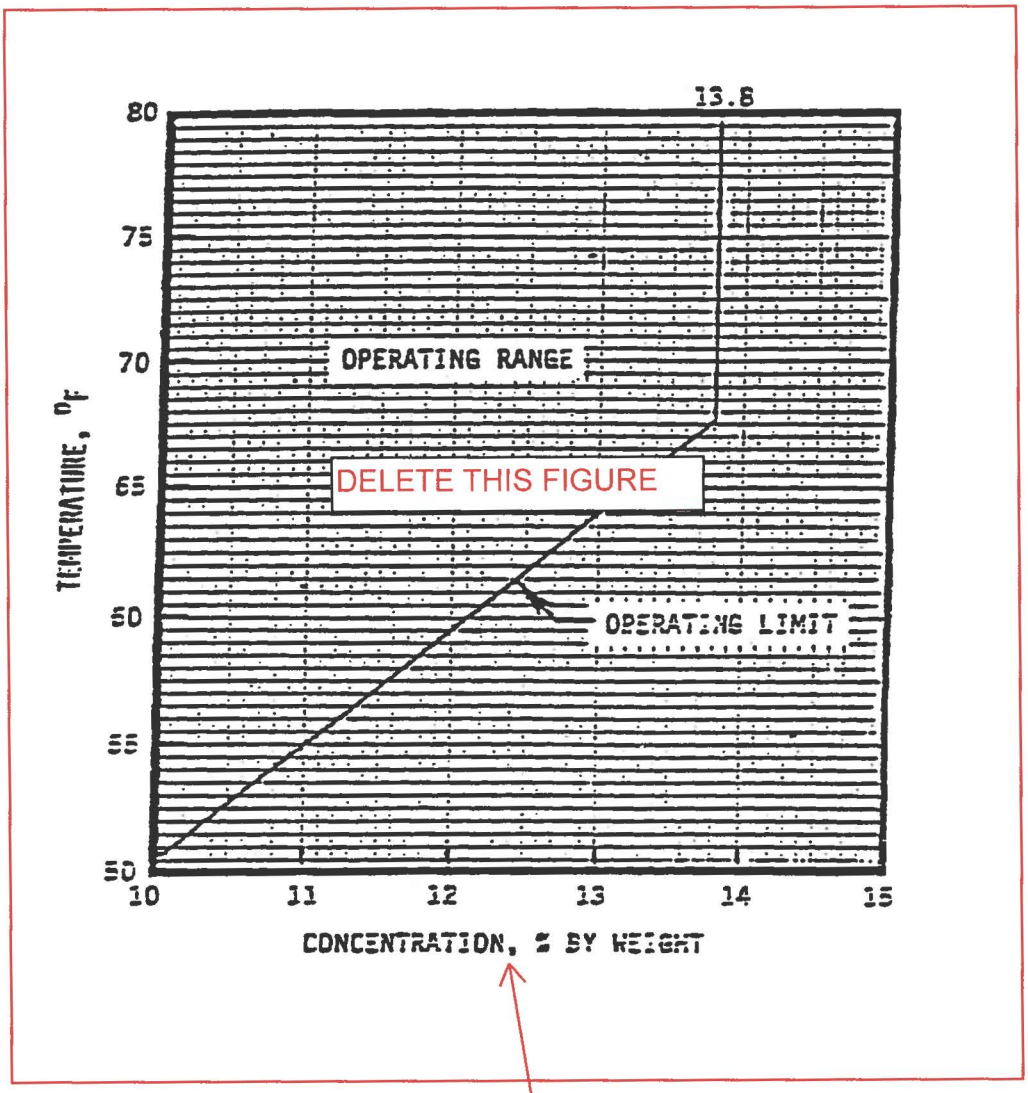
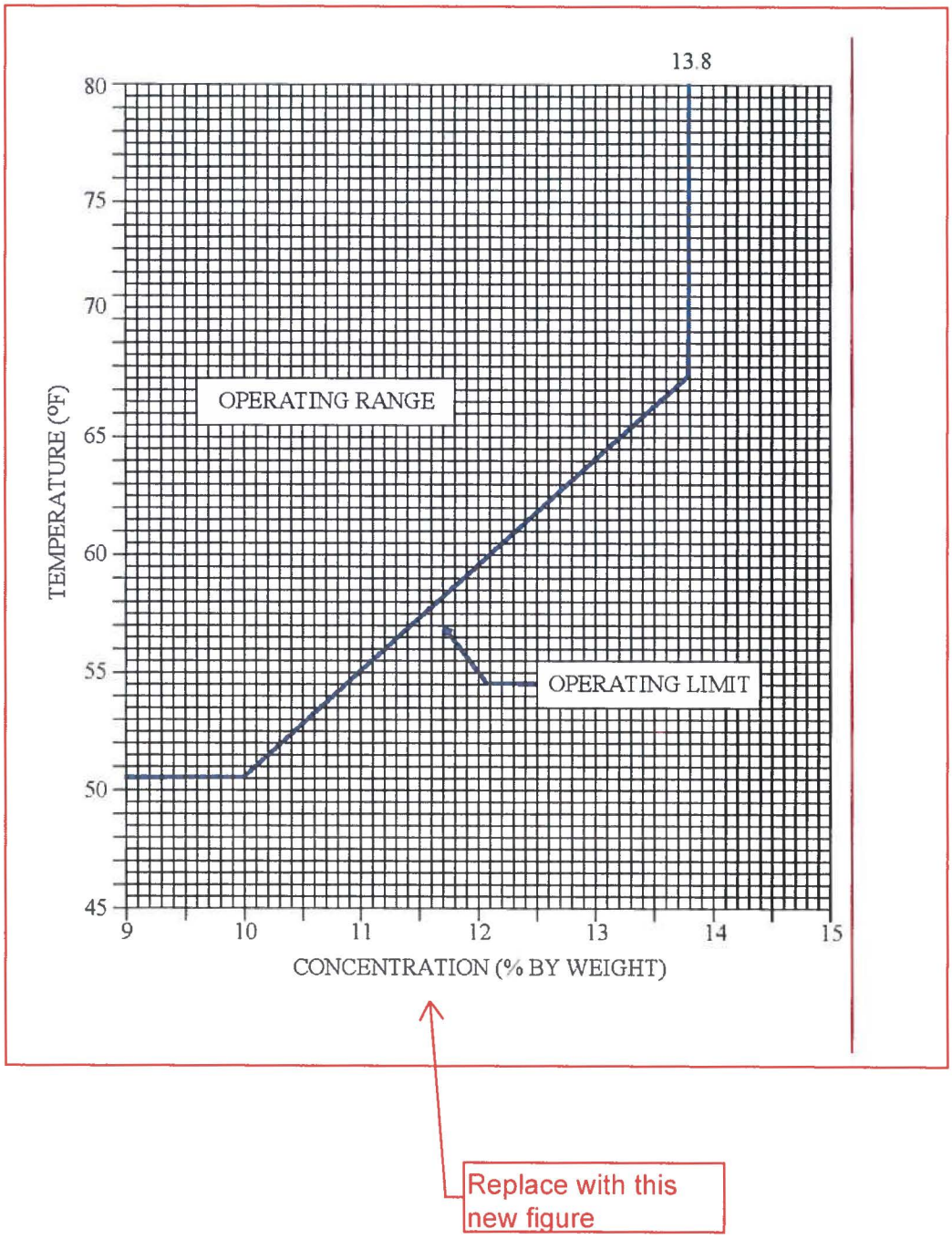


SODIUM PENTABORATE SOLUTION
TEMPERATURE/CONCENTRATION REQUIREMENTS

FIGURE 3.1.5-1



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SODIUM PENTABORATE SOLUTION
TEMPERATURE/CONCENTRATION REQUIREMENTS

FIGURE 3.1.5-1

ATTACHMENT 3

Limerick Generating Station Units 1 and 2
Docket Nos. 50-352 and 50-353

Application to Revise Technical Specifications to Lower the Minimum Standby Liquid Control System Pump Flowrate

Markup of Proposed Technical Specifications Bases Pages
(For Information Only)

Unit 1 TS Bases Page

B 3/4 1-4

Unit 2 TS Bases Page

B 3/4 1-4

3/4.1.5 STANDBY LIQUID CONTROL SYSTEM

The standby liquid control system provides a backup capability for bringing the reactor from full power to a cold, Xenon-free shutdown, assuming that the withdrawn control rods remain fixed in the rated power pattern. To meet this objective it is necessary to inject a quantity of boron which produces a concentration of 660 ppm in the reactor core and other piping systems connected to the reactor vessel. To allow for potential leakage and improper mixing, this concentration is increased by 25%. The required concentration is achieved by having available a minimum quantity of 3,160 gallons of sodium pentaborate solution containng a minimum of 3,754 lbs of sodium pentaborate having the requisite Boron-10 atom % enrichment of 29% as determined from Reference 5. This quantity of solution is a net amount which is above the pump suction shutoff level setpoint thus allowing for the portion which cannot be injected.

The above quantities calculated at 29% Boron-10 enrichment have been demonstrated by analysis to provide a Boron-10 weight equivalent of 185 lbs in the sodium pentaborate solution. Maintaining this Boron-10 weight in the net tank contents ensures a sufficient quantity of boron to bring the reactor to a cold, Xenon-free shutdown.

37.0

The pumping rate of ~~41.2~~ gpm provides a negative reactivity insertion rate over the permissible solution volume range, which adequately compensates for the positive reactivity effects due to elimination of steam voids, increased water density from hot to cold, reduced doppler effect in uranium, reduced neutron leakage from boiling to cold, decreased control rod worth as the moderator cools, and xenon decay. The temperature requirement ensures that the sodium pentaborate always remains in solution.

With redundant pumps and explosive injection valves and with a highly reliable control rod scram system, operation of the reactor is permitted to continue for short periods of time with the system inoperable or for longer periods of time with one of the redundant components inoperable.

The SLCS system consists of three separate and independent pumps and explosive valves. Two of the separate and independent pumps and explosive valves are required to meet the minimum requirements of this technical specification and, where applicable, satisfy the single failure criterion. To ensure that SLCS pump discharge pressure does not exceed the SLCS relief valve setpoint during operation following an anticipated transient without scram (ATWS) event, no more than two pumps shall be aligned for automatic operation in OPERATIONAL CONDITIONS 1, 2, and 3. This maintains the equivalent control capacity to satisfy 10 CFR 50.62 (Requirements for reduction of risk from anticipated transients without scram (ATWS). With three pumps aligned for automatic operation, the system is inoperable and ACTION statement (b) applies.

The SLCS must have an equivalent control capacity of 86 gpm of 13% weight sodium pentaborate in order to satisfy 10 CFR 50.62. As part of the ARTS/MELLL program the ATWS analysis was updated to reflect the new rod line. As a result of this it was determined that the Boron 10 enrichment was required to be increased to 29% to prevent exceeding a suppression pool temperature of 190°F. This equivalency requirement is fulfilled by having a system which satisfies the equation given in 4.1.5.b.2.

The upper limit concentration of 13.8% has been established as a reasonable limit to prevent precipitation of sodium pentaborate in the event of a loss of tank heating, which allow the solution to cool.

A SLCS Pump flowrate of 37.0 gpm (minimum) and a Sodium Pentaborate Solution concentration of 9% by weight (minimum) will require a Boron-10 enrichment of 49 atom % to be added to the tank. The decreased pump flowrate and increased solution enrichment are acceptable because the results of the ATWS Rule Equation will remain > 1.0.

3/4.1.5 STANDBY LIQUID CONTROL SYSTEM

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