PORTLAND GENERAL ELECTRIC COMPANY
EUGENE WATER & ELECTRIC BOARD
AND
PACIFIC POWER & LIGHT COMPANY

TROJAN NUCLEAR PLANT

Operating License NPF-1
Docket 50-344
License Change Application 57, Revision 2

This revision to License Change Application (LCA) 57 is submitted in support of Licensee's request to revise Limiting Conditions for Operation and Bases in the Trojan Technical Specifications (Appendix A to Operating License NPF-1) regarding borated water sources. The other amendments previously requested in LCA 57 and Revision 1 to LCA 57 regarding: (1) the method of transferring diesel fuel oil from storage to equipment; (2) change in safety system actuation terminology; and (3) the Fire Protection System remain unchanged.

PORTLAND GENERAL ELECTRIC COMPANY

By B. D. Withers

B. D. Withers
Assistant Vice President
Thermal Plant Operation and Maintenance

Subscribed and sworn to before me this 23rd day of March 1981.

Carole A. Hodgdon
Notary Public of Oregon

My Commission Expires: August 9, 1983

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LICENSE CHANGE APPLICATION 57

1. Modify the below-listed Technical Specifications as shown in Attachment A.

   a. Technical Specification 3.1.2.7 (Page 3/4 1-15);

      (1) A.1: The number "14,418" should be changed to "12,544".

      (2) B.1: The number "143,374" should be changed to "101,432".

   b. Bases B3/4.1.2 (Page B 3/4 1-3);

      (1) The second paragraph should be replaced with the following:

> "The boron inventory in the RWST or BAT is sufficient (a) to compensate for an inadvertent positive reactivity addition to the Reactor Coolant System of approximately 1 percent Δk/k while in MODE 5 at 200°F; and (b) to maintain a constant RCS reactivity while the temperature is decreased from 200°F to 80°F. In MODE 6, the BAT inventory is sufficient to increase the boron concentration to compensate for an inadvertent positive reactivity addition of approximately 1 percent Δk/k while in the refueling mode. These conditions require 8494 usable gallons of 7000-ppm borated water from the boric acid storage tanks or 23,432 usable gallons of 2000-ppm borated water from the refueling water storage tank.

      (2) The third paragraph should be revised as follows:

> "The required Boric Acid Storage Tank volume of 8494 gallons has been increased to a value greater than the minimum level indicating range (4050 gallons), to 12,544 gallons. The required RWST volume of 23,432 gallons must be increased to account for nonusable volume due to tank geometry, letdown and vortexing considerations (78,000 gallons), to 101,432 gallons.

2. Other amendments previously requested in LCA 57 regarding: (1) method of transferring diesel fuel oil from storage to equipment; (2) change in safety system actuation terminology; and (3) the Fire-Protection System remain unchanged.

REASON FOR CHANGE

Detailed calculations indicate the amount of boron required below 200°F sufficient to provide a shutdown margin of 1 percent Δk/k after xenon decay and cooldown from 200°F to below 140°F is 8494 usable gal of 7000-ppm borated water from the Boric Acid Storage Tanks or 23,432 usable gal of 2000-ppm borated water from the Refueling Water Storage Tank. The present Technical Specification 3.1.2.7, applicable to MODES 5 and 6, require 14,418 gal and 143,375 gal in the Boric Acid Storage Tank and Refueling Water Storage Tank, respectively, which are the same values for Specification 3.1.2.8, applicable in MODES 1, 2, 3, and 4. Therefore, it is felt necessary to revise the Technical Specifications to provide correct and updated values where applicable and improve flexibility in Plant operations. Approval of this LCA will do both.

SAFETY AND ENVIRONMENTAL EVALUATION

This LCR has been reviewed, evaluated, and determined to not constitute an unreviewed safety question. No new accidents are created, and the probability and consequences of accidents previously considered remain unchanged. No environmental effects or impacts result from this LCR.

Technical Specification 3.1.2.7 is applicable only when the Plant is in Operational Modes 5 and 6. The upper temperature limit of Mode 5 is 200°F; of Mode 6, $\leq$140°F. The reactor is required to be maintained at $\geq$1 percent Δk/k shutdown in both modes. The inventory of boric acid to be maintained in the Boric Acid Tanks (BATs) or Refueling Water Storage Tank (RWST) must be sufficient to compensate for an inadvertent positive reactivity addition to the Reactor Coolant System (RCS) of approximately 1 percent Δk/k and to maintain a constant RCS reactivity shutdown greater than 1 percent Δk/k while the temperature is decreased from 200°F to 80°F. The calculated volumes are 8494 gal of 7000-ppm boron from the BAT or 23,432 gal of 2000-ppm boron from the RWST with no letdown. These minimum volumes are "usable" values that must be added to tank nonusable volumes due to tank geometry, vortexing considerations, or instrumentation spans. As identified in FSAR Section 6.3.2.2.2, 78,000 gal in the RWST is considered nonusable. Use of the Boric Acid Storage Tanks (8494 gal) would not require any letdown since the water volume will decrease as the temperature decreases from 200°F to 80°F. Although the BATs are bottom draining, they have a small nonusable volume of 50 gal. However, the minimum instrument indication volume is approximately 4000 gal. Thus, the limiting value of the BAT should be 50 + 4000 + 8494, or 12,544 gal. The minimum limit of the RWST should be 23,432 + 78,000, or 101,432 gal. The present values used in Technical Specification 3.1.2.7 are those required for cooldown from normal operating temperature (556°F) to 200°F and are not applicable to this Technical Specification for Modes 5 and 6.

The minimum volumes of 8494 gal for the BAT and 23,432 gal for the RWST were calculated using the differential equations describing constant RCS charging mass flow rate with the following assumptions:

1. Begining of Life (BOL) core reactivity (1371 ppm) with the most reactive control rod bank stuck out (this is the worst case).

2. An RCS water volume of 12,500 cu ft (the larger the assumed RCS volume the more conservative the results).

3. The reactor must be maintained subcritical by at least 1 percent $\Delta k/k$.

4. The RCS temperature reduction is from 200°F to 80°F.

5. BAT boron concentration is 7000 ppm.

6. The RWST boron concentration is 2000 ppm.

7. The reactivity worth of boron is conservatively estimated at 100 ppm/percent reactivity (WCAP-9776, "Trojan Cycle 3 Nuclear Design Report", lists 78 ppm/percent reactivity).

8. The boron addition rate to maintain a constant system reactivity with a changing temperature is 0.55 ppm/°F.

9. The total refueling water volume inside Containment in Mode 6 is 56,767.7 ft^3 (424,622 gal). Only the BAT is available for boration in Mode 6 since the contents of the RWST are already in the Refueling Cavity.

10. Xenon has already decayed to steady state and is not a factor in this determination.

The evaluation was performed by determining, in sequence: (a) the amount of boron addition required during the appropriate RCS cooldown to maintain subcriticality; (b) the range of applicable initial boron concentrations in the RCS as a function of core burnup; and (c) the required BAT and RWST volumes to maintain subcriticality. As the RCS temperature decreases from 200°F to 80°F, a boron addition of approximately 66 ppm is required. Sensitivity calculations were performed for boron additions ranging from 20 to 50 ppm as the RCS temperature decreases from 200°F to 80°F. The results of these calculations indicate that the tank volumes required to borate the RCS with initial RCS boron concentration of 1371 ppm or less are all less than the minimum volumes determined above (8494 gal of usable BAT 7000-ppm borated water or 23,432 gal of usable RWST 2000-ppm borated water). Additional conservatism is achieved when these minimum usable volumes are added to the volumes considered nonusable due to tank geometry, vortexing considerations, or minimum instrument indication aspects, all of which were, in themselves, conservatively calculated.

The most limiting cases are clearly the ability to add boric acid worth an additional 1 percent Δk/k in Modes 5 or 6 with no change in RCS temperature and with no letdown flow. The necessary volume of boric acid from the BAT to accomplish this addition is 8494 gal.

This LCR involves changes in limits of boric acid concentrations for BAT and RWST volumes. The reduction in the limits of these tank volumes has no impact upon the environment. Any reduction in tank volumes, while changing from Modes 1, 2, 3, or 4 to Modes 5 or 6 that result in excess borated water will be disposed of in accordance with Environmental Technical Specifications (Appendix B to Facility Operating License NPF-1).

Therefore, the attached Technical Specification change is judged not to impact accident occurrence probability, consequences of Plant safety margins, or the environs of the Plant in a deleterious manner.

DETERMINATION OF AMENDMENT CLASS

The LCA regarding borated water sources has been determined by the NRC to result in a License Amendment Class III requiring a fee of $4,000. The license amendment resulting from this LCA involves a single safety issue and is not deemed to involve a significant hazards consideration. The fee of $4,000 was forwarded with Revision 1 to LCA 57 by letter dated June 19, 1980.

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