UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 207 TO FACILITY OPERATING LICENSE NO. NPF-3

TOLEDO EDISON COMPANY

CENTERIOR SERVICE COMPANY

AND

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1

DOCKET NO. 50-346

1.0 INTRODUCTION

By letter dated September 29, 1995, the Toledo Edison Company, Centerior Service Company, and the Cleveland Electric Illuminating Company (the licensees), submitted a request for changes to the Davis-Besse Nuclear Power Station (DBNPS), Unit No. 1 Technical Specifications (TS). The requested amendment would revise the following TS sections: 3/4.1.2.8, Reactivity Control Systems - Borated Water Sources - Shutdown; 3/4.1.2.9, Reactivity Control Systems - Operating; 3/4.5.1, Emergency Core Cooling Systems (ECCS) - Core Flooding Tanks; 3/4.5.2, Emergency Core Cooling Systems - ECCS Subsystems - $T_{avg} \geq 280^{\circ}F$; 3/4.5.4, ECCS - Borated Water Storage Tank; 3/4.9.1, Refueling Operations - Boron Concentration; Bases 3/4.1.2, Boration Systems; Bases 3/4.5.2 and 3/4.5.3, ECCS Subsystems; and Bases 3/4.9.1 Boron Concentration. The amendment increases the minimum available borated water volume requirement for the boric acid addition system, the minimum and maximum boron concentration requirements for the borated water storage tank, the minimum boron concentration requirement for the core flood tanks; increases the minimum volume of trisodium phosphate dodecahydrate (TSP); deletes the surveillance requirements for verification of the density and solubility of TSP; and modifies the refueling boron concentration and the associated Action statement.

2.0 BACKGROUND

In general, the operating cycles of nuclear power plants are being extended to 24 months by making the appropriate changes in fuel loading and consequential changes in reactivity control. Many plants have already made this change. DBNPS already has approval to use 5 weight percent enriched fuel to accommodate the longer cycle (Amendment No. 181 dated November 19, 1993). The changes that are the subject of this request relate to the compensatory adjustments that are required for additional reactivity control by increased boron concentration in selected systems and the resulting increase in the TSP

required to neutralize the acidity of the borated water mixture in the containment sump during post-LOCA recirculation.

3.0 EVALUATION

3.1 Boric Acid Addition System (BAAS)

The BAAS provides sufficient concentrated boric acid solution to increase the reactor coolant system (RCS) boron concentration from hot, full power (HFP) boron concentration to cold, shutdown (CSD) boron concentration at any time during the operating cycle. The borated water storage tank (BWST) provides an alternate capability to the BAAS. To maintain this capability with the more reactive core for achieving a 24-month operating cycle, the proposed TS changes are as follows:

TS 3/4.1.2.8, Reactivity Control Systems - Borated Water Sources - Shutdown

It is proposed to increase the minimum BAAS volume Limiting Condition for Operation (LCO) from 700 gallons to 900 gallons and increase the minimum BWST boron concentration LCO from 2100 ppm to 2600 ppm.

An administrative change to the BAAS boron concentration requirement of "Between 7875 and 13,125 ppm" to ≥ 7875 and ≤ 13,125 ppm", is also proposed.

TS 3/4.1.2.9, Reactivity Control Systems - Borated Water Sources - Operating:

It is proposed to revise Figure 3.1.1, "Boric Acid Addition System Minimum Required volume as a Function of Boric Acid Concentration Required in Modes 1-4," in order to increase the minimum required volume.

It is proposed to increase the minimum and maximum BWST boron concentrations from 2100 ppm and 2200 ppm to 2600 ppm and 2800 ppm, respectively.

It is also proposed to make administrative changes to the BAAS boron concentration requirement of "Between 7875 and 13,125 ppm" to ≥ 7875 and ≤ 13,125 ppm" and to the BWST requirement of "Between 2100 and 2200 ppm" to "≥ 2600 and ≤ 2800 ppm," using the proposed revised values.

Bases 3/4.1.2, Boration Systems:

For the maximum boration requirements from HFP to 200°F, it is proposed to increase the minimum volume requirement for the BAAS from 9,071 gallons at a minimum boric acid concentration of 7875 ppm to 12,200 gallons, and to increase the minimum volume requirement for the BWST from 75,300 gallons at a minimum boron concentration of 2100 ppm to 86,700 gallons at a minimum boron concentration of 2600 ppm. It is also proposed to add a statement explaining why the volume requirement of 12,200 gallons is a lower value than that shown in TS Figure 3.1-1.

For the boration requirements below 200°F, it is proposed to increase the

For the boration requirements below 200°F, it is proposed to increase the minimum volume requirement for the BAAS from 700 gallons to 900 gallons, and to increase the minimum BWST boron concentration from 2100 ppm to 2600 ppm.

The reload report for Cycle 11 will include the necessary reanalyses for inadvertent boron dilution as well as for any adjustment to lithium control to maintain the RCS pH. The proposed changes ensure an adequate concentration of boron is available in the BAAS to maintain a 1%"k/k shutdown margin. Based on the above considerations, the staff finds these changes appropriate and acceptable.

3.2 Core Flooding Tanks (CFTs)

The CFTs provide the immediate reflood of the reactor following a design basis large break LOCA to ensure that the fuel cladding peak temperature will remain below the 10 CFR 50.46 criteria of 2200°F prior to the refill of the reactor by the ECCS high pressure injection and low pressure injection systems.

The licensee proposes the following changes to TS 3/4.5.1, Emergency Core Cooling Systems (ECCS) - Core Flooding Tanks":

The CFTs minimum boron concentration is proposed to be increased from 2100 ppm to 2600 ppm for consistency with the BWST minimum boron concentration. This minimum boron concentration is used in the analysis for post-LOCA shutdown margin (SDM) analysis.

An administrative change to the CFT boron concentration requirement of "Between 2100 and 3500 ppm" to "$\geq$ 2600 and $\leq$ 3500 ppm", using the revised value, is also proposed.

Since these proposed changes ensure the minimum boron concentration is consistent with the assumptions used for core flooding tank injection in the Updated Safety Analysis Report, the staff finds them acceptable.

3.3 Trisodium Phosphate (TSP) Baskets

The safety function of the TSP contained in baskets in containment is to neutralize the acidity of the post-LOCA borated water mixture during containment emergency sump recirculation. The BWST water has a nominal pH value of approximately 5. Raising the borated water mixture to a pH value of 7 will ensure that chloride stress corrosion does not occur in austenitic stainless steel in the event that chloride levels increase as a result of contamination on surfaces inside containment. Also, a pH of 7 is assumed for the containment emergency sump for iodine retention and removal post-LOCA by the containment spray system. The surveillance testing ensures that there is adequate TSP to perform the required pH adjustment. The following changes are

proposed for TS 3/4.5.2, ECCS - ECCS Subsystems - $T_{avg} \geq 280°F$, and the associated Bases 3/4.5.2 and 3/4.5.3, ECCS Subsystems:

Surveillance Requirement (SR) 4.5.2.d.4, which presently requires verification of a minimum TSP volume of 72 cubic feet, is proposed to be changed to require verification of a minimum volume of 290 cubic feet.

SR 4.5.2.d.5, which presently requires verification of TSP density, is proposed to be deleted.

SR 4.5.2.d.6, which presently requires verification of TSP solubility, is proposed to be deleted.

The proposed change to SR 4.5.2.d.4 to increase the amount of TSP from 72 cubic feet to 290 cubic feet ensures the capability to buffer the post-LOCA sump mixture to a minimum pH of 7, assuming the maximum volume and maximum boron concentrations for the BWST, CFTs, and the RCS. To accommodate the additional required volume of TSP, new TSP baskets will be installed on the 565-foot elevation of containment during the upcoming tenth refueling outage (10 RFO). The new TSP baskets will have at least a 250 cubic foot capacity. The present baskets, which have a capacity of 75 cubic feet, will be retained. This provides a total capacity of 325 cubic feet.

The licensee proposes to delete SR 4.5.2.d.5 which requires verification of TSP density. The required amount of TSP is based on the mass of TSP required to achieve the desired pH. The required minimum volume verified by SR 4.5.2.d.4 is based on the manufactured density of TSP (53 pounds/cubic foot). Since TSP can have a tendency to agglomerate from high humidity in the containment, the density may increase and the volume decrease during normal plant operation, however, the required mass of TSP would remain available. Therefore, verifying the minimum volume of TSP in containment is conservative with respect to achieving a minimum required pH, and neither density nor solubility verification is required.

SR 4.5.2.d.6 is proposed for deletion since it does not serve a meaningful purpose. TSP is chemically stable and its neutralization capabilities will not change. Based on operating experience, TSP remains sufficiently soluble even if it is caked or hardened.

Deletion of SR 4.5.2.d.5 and SR 4.5.2.d.6 will remove the need to perform the associated surveillance tests. This will reduce the radiation dose incurred in collecting and analyzing the samples needed to perform the tests, and will eliminate a source of radwaste.

The staff has independently calculated the amount of TSP needed to neutralize the boric acid in the increased concentrations proposed by the TS changes. The licensee computed a value of 250 cubic feet. The required minimum volume specified in SR 4.5.2.d.4 of 290 cubic feet maintains an adequate margin and compares favorably with the staff's result of 263 cubic feet. The effects of the sump water mixture on component integrity and environmental qualification of safety-related components has been adequately considered. The effects of a

seismic event on the additional TSP baskets has been evaluated to ensure that there is no impact to safety-related systems and/or components in the vicinity. Based on the above, the proposed change to SR 4.5.2.d.4, the deletion of SR 4.5.2.d.5, and the deletion of SR 4.5.2.d.6 are acceptable.

3.4 Borated Water Storage Tank (BWST)

The safety function of the BWST is to provide a sufficient supply of borated water to the ECCS to ensure adequate inventory to maintain the reactor with a 1% $\Delta k/k$ shutdown margin in the event of a LOCA and to ensure adequate inventory for containment sump recirculation.

The proposed change to TS 3/4.5.4, ECCS - Borated Water Storage Tank, will increase the current minimum of 2100 ppm and maximum of 2200 ppm boron to 2600 ppm and 2800 ppm, respectively. The minimum boron concentration is based on the required concentration to ensure a 1% $\Delta k/k$ shutdown margin post-LOCA. The maximum boron concentration was determined based on a post-LOCA boron precipitation analysis. Additionally, an administrative change is proposed to change the wording from "Between 2100 and 2200 ppm" to "$\geq$ 2600 and $\leq$ 2800 ppm", using the proposed revised values.

Based on the fact that the volume of water available in the BWST is unchanged and the concentration of boron is increased to ensure a 1% $\Delta k/k$ shutdown margin is maintained, and the safety function of the BWST is maintained, the staff finds these changes are acceptable.

3.5 Refueling Boron Concentration

The limitations on reactivity conditions during refueling ensure that the reactor will remain subcritical during core alterations, and that a uniform boron concentration is maintained for reactivity control in the water having direct access to the reactor vessel. The licensee proposes the following changes to TS 3/4.9.1, Refueling Operations - Boron Concentration, and Bases 3/4.9.1, Boron Concentration:

> Delete LCO 3.9.1.b requirement of a minimum refueling boron concentration requirement of 1800 ppm, and make the associated changes to the Action statement and the Bases.
>
> Change the Action statement for the boration requirement from "$\geq$ 10 gpm of 8750 ppm" to "$\geq$ 12 gpm of 7875 ppm," and to add a paragraph to the Bases explaining the reason the boration flow rate requirement differs from that specified in TS 3/4.1.1.1, Reactivity Control - Shutdown Margin.

These changes will eliminate an LCO which is no longer meaningful, and make the boration rate consistent with the minimum BAAS boron concentration requirement of TS 3/4.1.2.8 and TS 3/4.1.2.9.

The proposed changes to TS 3/4.9.1 to delete the minimum boron concentration requirement of LCO 3.9.1.b, and to modify the Action statement and the Bases

accordingly, are acceptable. The minimum refueling boron concentration requirement of 1800 ppm was applicable for cycle lengths of approximately 12 months, and maintained keff $\leq$ 0.95 as assumed in the accident analysis. However, as cycle length has increased, the 1800 ppm requirement is no longer limiting, and therefore is no longer meaningful. The LCO 3.9.1.a requirement to maintain keff $\leq$ 0.95 is alone sufficient to ensure that the accident analysis assumptions are satisfied. Prior to each entry into Mode 6, the concentration of boron necessary to achieve a keff of $\leq$ 0.95 will be calculated and disseminated to Operations by memorandum. Therefore, removal of LCO 3.9.1.b and related changes to the Action statement and the Bases do not adversely affect plant safety.

Changing the TS 3/4.9.1 Action statement boration requirement from " $\geq$ 10 gpm of 8750 ppm" of boric acid solution, to "$\geq$ 12 gpm of 7875 ppm" of boric acid solution maintains an equivalent boration rate while providing consistency with the TS 3/4.1.2.8 and 3/4.1.2.9 LCO and Bases with respect to the minimum BAAS boron concentration. The addition of an explanation to the Bases discussing the reason the boration flow rate requirement differs from the boration flow rate requirement of "$\geq$ 25 gpm of 7875 ppm boron" specified in TS 3/4.1.1.1 is an administrative change. Therefore, these changes do not adversely affect plant safety.

The existing minimum boration rates associated with TS 3/4.1.1.1, Reactivity Control Systems - Boration Control - Shutdown Margin, TS 3/4.9.1, Refueling Operations - Boron Concentration, and TS 3/4.10.4, Special Test Exceptions - Shutdown Margin, were reviewed and verified to remain bounding for the proposed changes. Therefore, the staff finds these proposed changes acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Ohio State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

This amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 or changes a surveillance requirement. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluent that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding (60 FR 56371). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The staff has concluded, based on the considerations discussed above, that: (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 this amendment will not be inimical to the common defense and security or to the health and safety of the public.

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