March 25, 2008

Mr. David J. Bannister
Vice President and CNO
Omaha Public Power District
Fort Calhoun Station FC-2-4 Adm.
Post Office Box 550
Fort Calhoun, NE 68023-0550

SUBJECT: FORT CALHOUN STATION, UNIT NO. 1 - ISSUANCE OF AMENDMENT RE: PERMANENT USE OF SODIUM TETRABORATE AS THE CONTAINMENT BUILDING SUMP BUFFERING AGENT (TAC NO. MD6704)

Dear Mr. Bannister:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 253 to Renewed Facility Operating License No. DPR-40 for the Fort Calhoun Station, Unit No. 1. The amendment consists of changes to the Technical Specifications (TS) in response to your application dated September 11, 2007.

The amendment removes the footnote to TS 2.3(4), "Containment Sump Buffering Agent Specification and Volume Requirement," and TS 3.6(2)d, "Surveillance Requirements," indicating that the use of sodium tetraborate is approved for operating cycle 24 only. In addition, TS 2.3, Figure 2-3 is revised to increase the volume of sodium tetraborate due to the selection of a different chemical vendor and an increase in mass to provide additional pH margin.

A copy of the related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

/RA/

Michael T. Markley, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-285

Enclosures: 1. Amendment No. 253 to DPR-40
2. Safety Evaluation

cc w/encls: See next page

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(*) See prior concurrence

ADAMS Accession Nos.: Pkg ML080500022, Amdt. ML080500023, License/TS Pgs ML080500024 (**) SE Input Memo

OFFICE	NRR/LPL4/PE	NRR/LPL4/PM	NRR/LPL4/LA	NRR/CSGB/BC
NAME	IAnchondo (*)	MMarkley (*)	JBurkhardt	AHiser (**)
DATE	2/15/08	3/7/08	3/10/2008	2/1/08
OFFICE	NRR/DSS/SSIB/BC	NRR/DIRS/ITSB/BC	OGC	NRR/LPL4/BC
NAME	MScott (*)	GWaig (*)	SBrock, NLO w/comments	THiltz
DATE	3/4/08	3/3/08	3/19/08	02/01/08

OFFICIAL RECORD COPY

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OMAHA PUBLIC POWER DISTRICT

DOCKET NO. 50-285

FORT CALHOUN STATION, UNIT NO. 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 253
Renewed License No. DPR-40

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by the Omaha Public Power District (the licensee), dated September 11, 2007, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this license amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, Renewed Facility Operating License No. DPR-40 is amended by changes as indicated in the attachment to this license amendment, and paragraph 3.B. of Renewed Facility Operating License No. DPR-40 is hereby amended to read as follows:

   B. Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 253, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. The license amendment is effective as of its date of issuance and shall be implemented prior to plant startup from the 2008 refueling outage.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Thomas G. Hiltz, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Renewed Facility Operating License No. DPR-40 and Technical Specifications

Date of Issuance: March 25, 2008

ATTACHMENT TO LICENSE AMENDMENT NO. 253

RENEWED FACILITY OPERATING LICENSE NO. DPR-40

DOCKET NO. 50-285

Replace the following pages of the Renewed Facility Operating License No. DPR-40 and the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain vertical lines indicating the areas of change.

Renewed Operating License

REMOVE	INSERT
-3-	-3-

Technical Specifications

REMOVE	INSERT
2.3 – Page 4	2.3 – Page 4
2.3 – Page 8	2.3 – Page 8
3.6 – Page 1	3.6 – Page 1
3.6 – Page 6	3.6 – Page 6

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 253 TO RENEWED FACILITY

OPERATING LICENSE NO. DPR-40

OMAHA PUBLIC POWER DISTRICT

FORT CALHOUN STATION, UNIT NO. 1

DOCKET NO. 50-285

1.0 INTRODUCTION

By application dated September 11, 2007 (Agencywide Documents Access and Management System Accession No. ML072540536), Omaha Public Power District (OPPD) requested changes to the Technical Specifications (TS) for the Fort Calhoun Station (Fort Calhoun), Unit 1, Renewed Facility Operating License No. DPR-40. The U.S. Nuclear Regulatory Commission (NRC) issued it's proposed no significant hazards consideration determination in the *Federal Register* on October 9, 2007 (72FR57356).

The amendment removes the footnote to TS 2.3(4), "Containment Sump Buffering Agent Specification and Volume Requirement," and TS 3.6(2)d, "Surveillance Requirements," which limits the applicability of those specifications to operating cycle 24. In addition, TS 2.3, Figure 2-3 is revised to reflect an increase in the minimum required sump buffer volume. Specifically, the amendment will permanently change the containment sump buffering agent specification from trisodium phosphate (TSP) to sodium tetraborate (NaTB). The footnotes of TS 2.3(4) and TS 3.6(2)d stating, "[t]his specification is applicable only for Fuel Cycle 24" are deleted. Figure 2-3 is revised to reflect a new minimum volume required to achieve a post-loss-of-coolant accident (LOCA) sump pH of ≥7.0. The revised figure reflects a lower density of NaTB due to a change in the vendor and an increase in the mass of buffer to ensure that the resulting post-LOCA sump pH is slightly greater than 7.0.

2.0 REGULATORY EVALUATION

The NRC staff's review addresses the impact of the proposed change from TSP to NaTB on containment sump performance, especially potential chemical effects impact on sump screen blockage and head loss.

The containment sump (also known as the emergency recirculation sump) is part of the emergency core cooling system (ECCS). In accordance with the regulations in Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," every nuclear power plant is required to have an ECCS to mitigate a design-basis accident. The regulations in 10 CFR 50.46(a) state, in part, that each "pressurized light-water nuclear power reactor ... must be provided with an

[ECCS] that must be designed so that its calculated cooling performance following postulated loss-of-coolant accidents (LOCA) conforms to the criteria set forth in paragraph (b) of this section." The regulations in 10 CFR 50.46(b)(5), "Long-term cooling," state "[a]fter any calculated successful initial operation of the ECCS, the calculated core temperature shall be maintained at an acceptably low value and decay heat shall be removed for the extended period of time required by the long-lived radioactivity remaining in the core."

In addition, the NRC utilized the following regulatory guidance in performing this review:

- NUREG-0800, Section 6.5.2, "Containment Spray as a Fission Product Cleanup System," which states, in part, that long-term iodine retention may be assumed only when the equilibrium sump solution pH, after mixing and dilution with the primary coolant and ECCS injection, is above 7.

- Regulatory Guide 1.82, Revision 3, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," Section 1.1.2, which states, in part, that debris that could accumulate on the sump screen should be minimized.

3.0 TECHNICAL EVALUATION

Under LOCA conditions, buffering agents must be added to the pool of water in the containment building to increase the pH to a value greater than 7. Buffering is primarily required to reduce the release of iodine fission products from the containment pool to the containment atmosphere as iodine gas, in order to control the radiological consequences of the accident. Maintaining a pH above 7 prevents significant amounts of iodine, released from fuel failures and dissolved in the recirculation water, from converting to a volatile form and evolving into the containment atmosphere. In addition to dose considerations, raising the pH in the post-LOCA containment pool to a value greater than 7 reduces the general corrosion rate of some structural materials (e.g., steel) and inhibits the stress-corrosion cracking of austenitic stainless steel.

Prior to Amendment No. 247 that was approved and issued on November 13, 2006 (ADAMS Accession No. ML063120248), Fort Calhoun used trisodium phosphate (TSP) as a pH buffer. OPPD requested Amendment No. 247, in part, for the purpose of minimizing the potential for exacerbating sump screen blockage due to a potential adverse chemical interaction between TSP and certain calcium-containing insulation material used in containment. NRC-sponsored testing at the Argonne National Laboratory indicated that substantial head loss can occur if sufficient calcium phosphate is produced in a sump pool and transported to a pre-existing fiber bed on the containment sump screen. Consequently, the ECCS flow and containment spray system flow could be reduced by the increased head loss across the sump screen while in the post-LOCA recirculation phase. The NRC communicated these results in Information Notice 2005-26, "Results of Chemical Effects Head Loss Tests in a Simulated PWR Sump Pool Environment," and associated Supplement 1 to Information Notice 2005-26, "Additional Results of Chemical Effects Tests in a Simulated PWR Sump Pool Environment."

The NRC approved and issued Amendment No. 247 for only one cycle because, at the time, the staff was still resolving technical concerns with Westinghouse on the chemical model in WCAP-16530-NP, Rev. 0 (ADAMS Accession No. ML060890509), "Evaluation of Post-Accident Chemical Effects in Containment Sump Fluids to Support GSI-191 [Generic Safety Issue No. 191]," that served as part of the justification for Fort Calhoun's switch from TSP to NaTB. The

NRC staff found that using NaTB was an improvement over TSP at Fort Calhoun in terms of calcium phosphate chemical precipitates, however, it was unclear if NaTB was an appropriate buffer for permanent use because of other potential precipitates. The NRC staff has since issued a safety evaluation on WCAP-16530-NP and determined that NaTB is an appropriate buffer for some plants. The current amendment requests that the interim use of NaTB become permanent at Fort Calhoun as a part of a long-term solution to the potentially detrimental effect of chemical precipitates that may be formed in a postulated post-LOCA containment pool.

Given the limited duration of Amendment No. 247, the NRC staff determined that it did not need to perform a detailed review of the OPPD reference material that developed the threshold amount of dissolved calcium needed to form a precipitate in NaTB. For the current license amendment request, the NRC staff performed a more rigorous review of the previously submitted reference material. The licensee's analysis shows a significant reduction (approximately 70 percent) of chemical precipitates by switching from TSP to NaTB, based on the WCAP-16530-NP chemical model. The amount of calcium phosphate that is predicted under TSP conditions is approximately 513 kilograms, while the model predicts no calcium phosphate formation under NaTB conditions. The predicted amount of aluminum-based precipitates remains the same under both TSP and NaTB conditions.

The NRC staff performed an independent calculation and verified that the amount of NaTB required by the Fort Calhoun TS would be sufficient to raise the equilibrium pH in the post-LOCA containment pool to a value greater than 7.

This amendment request proposes to increase the minimum required volume of NaTB by approximately 30 cubic feet in order to account for a lower density NaTB that is supplied by a different vendor than previously used by the licensee. The revised volume also includes some additional sodium tetraborate to slightly increase the pH in order to provide margin. The new proposed minimum volume of NaTB, with a specified density of 48 pounds per cubic foot, is 112.9 cubic feet. The maximum volume is bounded by the size of the storage baskets. The licensee provided analysis to show that with conservative assumptions for boron concentration and maximum sodium tetraborate mass, the existing baskets cannot hold enough NaTB to raise the sump pool pH above 8.0, which is the maximum pH to which electrical components in containment are qualified.

Based on the above, the NRC staff concludes that the proposed change is acceptable in maintaining containment building sump pH using NaTB as the buffering agent.

4.0 STATE CONSULTATION

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

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents 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 published in the *Federal Register* on October 9, 2007 (72 FR 57356). 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 Commission 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 the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: M. Yoder

Date: March 25, 2008