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January 28, 1999 LIC-99-0005

U. S. Nuclear Regulatory Commission ATTN: Document Control Desk Mail Station P1-137 Washington, DC 20555

- References: Docket No. 50-285 1.
 - 2. Letter from OPPD (W. G. Gates) to NRC (Document Control Desk) dated December 7, 1992 (LIC-92-0340A)
 - Letter from NRC (S. D. Bloom) to OPPD (T. L. Patterson) dated August 3. 12, 1993 (TAC No. M85116)
 - Letter from OPPD (T. L. Patterson) to NRC (Document Control Desk) 4. dated March 20, 1995 (LIC-95-0065)
 - Letter from OPPD (T. L. Patterson) to NRC (Document Control Desk) 5. dated October 13, 1995 (LIC-95-0180)
 - Letter from NRC (L. R. Wharton) to OPPD (T. L. Patterson) dated April 9, 6. 1996 (TAC No. M91954)
 - 7. Letter from OPPD (S. K. Gambhir) to NRC (E. W. Merschoff) dated November 25, 1998 (LIC-98-0155)
- Correction of Spent Fuel Pool "Time-to-Boil" Information (TAC No. M85116) SUBJECT:

Omaha Public Power District (OPPD) is submitting this letter to correct spent fuel pool "time-toboil" information used by the NRC during the review which resulted in issuance of Amendment No. 155 to Facility Operation License No. DPR-40. This amendment (transmitted via Reference 3) authorized installation of new, higher density spent fuel storage racks at Fort Calhoun Station, and included a Safety Evaluation Report (SER) which described various technical aspects of the new spent fuel storage racks, based on design descriptions and evaluations submitted by OPPD (Reference 2).

On November 5, 1998, pursuant to 10 CFR 50.9(b), OPPD by conference call informed the NRC Region IV Administrator of a time-to-boil calculation error discovered by an OPPD contractor, Holtec International Company. OPPD provided a follow-up letter (Reference 7) which described the nature and significance of the error to the NRC. The error resulted in nonconservative predictions of the time-to-boil for some full core discharge cases and the corresponding maximum water boil-off rate. This erroneous information was included in the Reference 2 application for license amendment. A001'



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Holtec has also performed a reportability evaluation pursuant to 10 CFR Part 21 and determined that the program error is not reportable under the provisions of 10 CFR 21. OPPD has concluded that, even with the reduced time-to-boil, there is sufficient time to adequately address a loss of cooling event to the spent fuel pool such that there is no impact on the current design basis of the plant. Thus, the conclusions of the affected safety evaluation remain unchanged.

Attachment 1 of this letter provides details of the errors and OPPD's evaluation. Attachment 2 provides corrected pages for the Holtec Licensing Report for Spent Fuel Storage Capacity Expansion (HI-92828).

Please contact me if you have any questions.

Sincerely,

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gmbhir

S. K. Gambhir Division Manager Nuclear Operations

TCM/tcm

Attachments

c: E. J. Merschoff, NRC Regional Administrator, Region IV (w/o enclosure)
L. R. Wharton, NRC Project Manager
W. C. Walker, NRC Senior Resident Inspector (w/o enclosure)
Winston & Strawn

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Omaha Public Power District (OPPD) Fort Calhoun Station Unit No. 1

Revision to Safety Evaluation for Spent Fuel Storage Racks Time to Boil Determination

Background

Omaha Public Power District (OPPD) submitted an Application for Amendment to Operating License No. DPR-40 by letter dated December 7, 1992 (Reference 2). This application requested NRC authorization for installation of new, higher density spent fuel storage racks at Fort Calhoun Station. On August 12, 1993, the NRC issued License Amendment No. 155 (Reference 3), including a Safety Evaluation Report (SER). The SER described various technical aspects of the new spent fuel storage racks, based on design descriptions and evaluations from OPPD and its contractor, Holtec International. OPPD subsequently submitted information (Reference 5) to reflect pool to rack as-built clearances that were different from those assumed in the original design. The NRC reflected this information in a supplement to the SER dated April 9, 1996 (Reference 6).

Discussion

On November 3, 1998, Holtec International (Holtec) notified OPPD that certain errors had been discovered in the Holtec TBOIL computer program. The TBOIL program was used for modification MR-FC-91-009, "Spent Fuel Pool Rerack," which increased the storage capacity of the FCS spent fuel pool in 1994. The TBOIL program is a proprietary computer program used by Holtec to provide OPPD with time-to-boil and boil-off rate determinations in the spent fuel pool under various conditions. These determinations were included in the Reference 2 information which was used to support issuance of License Amendment No. 155 and implementation of modification MR-FC-91-009.

Holtec has stated that the program error is the result of a code logic error that causes the decay heat load in the spent fuel pool to be under-predicted for a loss of cooling scenario. This results in a corresponding non-conservative prediction of the time-to-boil for some full core discharge cases. The corresponding maximum water boil-off rate is also non-conservatively predicted for the affected cases.

On November 5, 1998, pursuant to 10 CFR 50.9(b), OPPD by conference call informed the NRC Region IV Administrator of the time-to-boil calculation error discovered by Holtec International. A follow-up letter (Reference 7) was provided by OPPD on November 25, 1998, which described the nature and significance of the error.

The revised Holtec calculation and licensing report indicates that the original limiting case timeto-boil period of 9.9 hours is reduced to approximately 7.2 hours and the corresponding boil-off rate is increased from the previously reported 33.4 gallons per minute (gpm) to 45.6 gpm. Holtec International has evaluated this error and determined that it is not reportable under the provisions of 10 CFR 21.

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Significance

The time-to-boil analysis assumes the spent fuel pool is at the end of usable pool storage life (Cycle 27) with the next cycle's core (Cycle 28) being discharged into the pool. The plant is currently in Cycle 18. The analysis assumes an initial spent fuel pool temperature of 140°F when cooling is lost. The current administrative limit for spent fuel pool temperature is 120°F. The spent fuel pool temperature is typically maintained at about 85°F. Procedure OI-SFP-1, "Spent Fuel Pool Cooling Normal Operation," states that the temperature should be maintained between 75°F and 100°F. The Holtec analysis assumes that the core is off-loaded 72 hours after plant shutdown. Historically, the core has been off-loaded approximately 10 to 14 days after plant shutdown. In addition, the calculation assumes there are 1339 spent fuel bundles in the pool. This assumes that OPPD will consolidate bundles, which is presently not being done.

	Analysis Assumption	Maximum/Minimum	Actual Value
Fuel Bundles in Spent Fuel Pool	1339 (w/consolidation)	1083 Maximum allowed (w/o consolidation)	706
Starting Fool Water Temperature	140°F	120°F Maximum allowed by admin limit	~ 85°F
Time to start unloading core	72 hrs	72 hrs Minimum allowed by TS 2.8	10 to 14 days

Analysis Assumptions vs. Actual Conditions

Historically, when pool heatup is calculated about 2 weeks after plant shutdown with the core off-loaded, the heatup rate is about 4°F/hour. Assuming an initial SFP temperature of 120°F and a 4°F/hr heatup rate, SFP heatup to only 160°F would take approximately 10 hours.

A review of the original OPPD submittal (Reference 2) and Amendment No. 155 with its Safety Evaluation Report (Reference 3) does not reveal that there is a minimum acceptable time-to-boil period. The original calculated minimum time from the loss of pool cooling to the onset of bulk boiling conditions was determined to be 9.9 hours following the loss of forced cooling, and the maximum rate of inventory loss due to boiling was calculated to be 33.4 gpm. Based on this determination, the NRC staff concluded that adequate time is available to provide makeup water to the SFP prior to the onset of bulk boiling.

The error introduced by the Holtec program affects the output of a design calculation. This error only affects the time-to-boil and associated boil-off rate and does not affect any other thermal-hydraulic calculations completed for the spent fuel pool modification. Correction of the error decreases the previously reported limiting case time-to-boil period of 9.9 hours to approximately 7.2 hours, and increases the corresponding boil-off rate from the previously reported 33.4 gpm to 45.6 gpm. The corrected time-to-boil period of 7.2 hours still provides sufficient time to adequately address a loss of cooling event for the spent fuel pool using Abnormal Operating Procedure (AOP) 36, "Loss of Spent Fuel Pool Cooling." Based on the worst-case analysis

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assumptions detailed above, OPPD also has reasonable assurance that the time-to-boil period under the current conditions would exceed 7.2 hours.

Conclusion

OPPD concludes that the discovered error has an insignificant safety impact on the current design basis of the plant. The corrected time-to-boil period of 7.2 hours still provides sufficient time to adequately address a loss of cooling event for the spent fuel pool using Abnormal Operating Procedure (AOP) 36, "Loss of Spent Fuel Pool Cooling." OPPD plans to update the erroneous information included in the Updated Safety Analysis Report and other plant documents to reflect the corrected information included in this submittal.

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Selected Page Excerpts of Revised Licensing Report (Holtec Report HI-92828) For Spent Fuel Storage Expansion

Fort Calhoun Station

Cover page of HI-92828 Review & Certification Log for Rev. 6 by Holtec Summary of Revisions Log (2 pages) thru Rev. 6 Table of Contents (partial), pages i, ii, iii, iv Section 5.8 Results, page 5-12 Table 5.8.3 Time-to-Boil Results, page 5-21 Figure 5.8.5 Water Elevation After Loss-of-Cooling – Case 1, page 5-33 Figure 5.8.6 Water Elevation After Loss-of-Cooling – Case 2, page 5-34