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US NUCLEAR REGULATORY COMMISSION
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Ladies/Gentlemen:

DOCKETS 50-266 AND 50-301
RESPONSE TO NRC GENERIC LETTER 96-04,
BORAFLEX DEGRADATION IN SPENT FUEL POOL STORAGE RACKS,
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

This letter contains Wisconsin Electric's response and comments for Point Beach Nuclear Plant requested by NRC Generic Letter 96-04, "Boraflex Degradation in Spent Fuel Pool Storage Racks." Point Beach uses Boraflex as a neutron absorber in the spent fuel pool and is requested to assess the capability of the Boraflex to maintain a 5% subcriticality margin and submit to the NRC a plan describing proposed actions if this subcriticality margin cannot be maintained by the Boraflex panels. One new commitment is made in this response and is indicated by italics.

A general overview of the Boraflex surveillance program at Point Beach and responses to the specific requests of Generic Letter 96-04 follows.

Overview of the Boraflex Surveillance Program at Point Beach Nuclear Plant

Boraflex panels were installed as part of the spent fuel pool re-racking modification at Point Beach Nuclear Plant in 1979-1980. The designer of the Boraflex poison plate assemblies was Wachter Associates, Inc. The original Boraflex surveillance program evaluated sample coupons that were subjected to accelerated exposures along with a full-length test panel. In 1989, the coupon analysis showed significant degradation while the full-length test panel was intact. A reevaluation of the Boraflex surveillance program was conducted in 1989-1990.

In the NRC letter and safety evaluation dated February 21, 1990, addressing completion of TAC Nos. 65052 and 65063 (Point Beach Unit Nos. 1 and 2, Boraflex Surveillance Program)[1], the current Boraflex surveillance program at Point Beach was established. The program utilizes blackness testing (neutron attenuation measurements) to examine 10 full-length Boraflex panels selected from those that have been exposed to the greatest number of freshly discharged fuel assemblies at the time of the surveillance. This surveillance is completed at 5-year intervals[1].

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If significantly degraded Boraflex is found, the corrective action specified by the current surveillance program is that new fuel assemblies or spent fuel assemblies with a burnup less than 38,400 MWD/MT be stored in a designated area in the fuel storage pool in a checkerboard pattern. The surveillance program in place should detect gap formation and other degradation to the Boraflex panels that could compromise the neutron attenuation ability and provides sufficient time to perform corrective actions[1].

The initial Boraflex blackness testing in accordance with this program was completed in August 1991 and showed no measurable gap formation or significant Boraflex degradation. Eleven spent fuel pool cells and 42 Boraflex panels were tested[2,3].

The second round of Boraflex blackness testing was completed in September 1996. Six spent fuel pool cells and 22 Boraflex panels were tested. The final results for this testing campaign will not be available until November 1996.

Provide an assessment of the physical condition of the Boraflex, including any deterioration, on the basis of current accumulated gamma exposure and possible water ingress to the Boraflex and state whether a subcritical margin of 95 percent can be maintained for the racks in unborated water.

In the NRC letter and safety evaluation addressing the completion of TAC Nos. 65052 and 65053, the Boraflex surveillance program at Point Beach requires testing of 10 full-length Boraflex panels every 5 years with at least 4 panels having accelerated exposures[1].

The first blackness testing was completed in August, 1991. Eleven spent fuel pool cells and 42 Boraflex panels were tested showing no evidence of gaps or significant degradation of the Boraflex in the cells tested[2,3].

The lack of measurable gaps in the Boraflex panels is judged to be due to the lack of physical restraints; the panels are not physically fastened to or permanently glued onto any structure. Although shrinkage may occur, it is not likely that gaps will form in any significant extent during the projected life of the Boraflex assemblies[1].

Since water ingress causes surface deterioration of Boraflex, leading to washout or increased propagation of cracks, it is judged that the design of the Boraflex poison plates at Point Beach are relatively watertight. Openings on the top of the poison plates allow venting of gases but do not allow a significant flow path around the Boraflex panels. Otherwise, significant detectable deterioration from washout would have occurred over the 16 years these panels have been installed.

Relative radiation exposures of the Boraflex panels are calculated based on decay time and residence time of the spent fuel in the adjacent cells. The relative exposures are compared to determine the 20 highest exposed panels for blackness testing.

A spent fuel pool criticality analysis was recently performed by Westinghouse for the Point Beach spent fuel racks which included an assumed Boraflex shrinkage of 4% (manifested in a randomly distributed 4 inch full-width gap and end shrinkage) using approved methodologies. The 95% subcriticality margin can be maintained with Boraflex shrinkage and the fuel enrichment levels modeled in the analysis[4]. The 4% shrinkage parameter is based on experimental data as reported by the Electric Power Research Institute (EPRI)[6].

Submit a description of any proposed actions to monitor or confirm that this 5% subcriticality margin can be maintained for the lifetime of the storage racks and describe what corrective actions could be taken in the event it cannot be maintained.

The monitoring program established in the February 21, 1990, NRC letter and safety evaluation outlines the surveillance program Point Beach is committed to for monitoring the physical condition of the Boraflex panels. Confirmation of the subcriticality margin will be by analysis similar to the one recently performed by Westinghouse.

In the event that the Boraflex is determined to have deteriorated to a point beyond the bounds of the current spent fuel pool criticality analysis, we will administratively control placement of new fuel assemblies and those not meeting an established criterion to a designated area in the spent fuel pool in a checkerboard pattern. The current criterion for spent fuel is 38,400 MWD/MTU as stated in the Boraflex surveillance program safety evaluation[1].

The current Boraflex surveillance program, by testing for gap formation in the panels with accelerated exposures, provides sufficient time to perform the corrective actions needed to compensate for a spent fuel pool without Boraflex credit prior to the majority of the Boraflex panels experiencing the same degradation[1].

Describe the results from any previous post operational blackness tests and state whether blackness testing, or other in-situ tests or measurements, will be periodically performed.

As stated above, the Boraflex surveillance program at Point Beach includes in-situ blackness testing of at least 10 full-length Boraflex panels every 5 years.

The first blackness testing was completed in August of 1991. No measurable gaps or significant degradation of the Boraflex panels tested were detected[2,3].

Recently, blackness testing was completed in September 1996. *We expect the written report on the status of the Boraflex panels in November and will forward a summary of the results and actions taken if the results indicate significant Boraflex degradation or otherwise alter the conclusions contained in this response.*

Chronological trends of pool reactive silica levels, along with the timing of significant events such as refuelings, pool silica cleanups, etc., should be provided. Implications of how these pool silica levels relate to Boraflex performance should be described.

A trend of the spent fuel pool silica levels is attached to this document. Refueling activities (including full-core offloads and shuffles) and dry spent fuel cask loading and unloading events are identified on the graph. There have been no major spent fuel pool cleanup campaigns in the time frame of the silica data.

Silica in the spent fuel pool is from degradation of Boraflex. However, the silica levels in the Point Beach pool do not show significant dissolution of the Boraflex polymer or cause concern at this time based on discussions with other Boraflex users and analysis from the EPRI[5].

The silica levels in the spent fuel pool have been increasing and the rate of increase has been slightly accelerating. Silica dissolution is a direct result of irradiation and the slight acceleration in pool silica levels is attributed to greater quantity of spent fuel assemblies in the pool, not to an increase in the per-panel Boraflex degradation rate.

We believe this information is responsive to your requests in Generic Letter 96-04. Please contact us if you require additional information.

Sincerely,

for

Bob Link
Vice President,
Nuclear Power

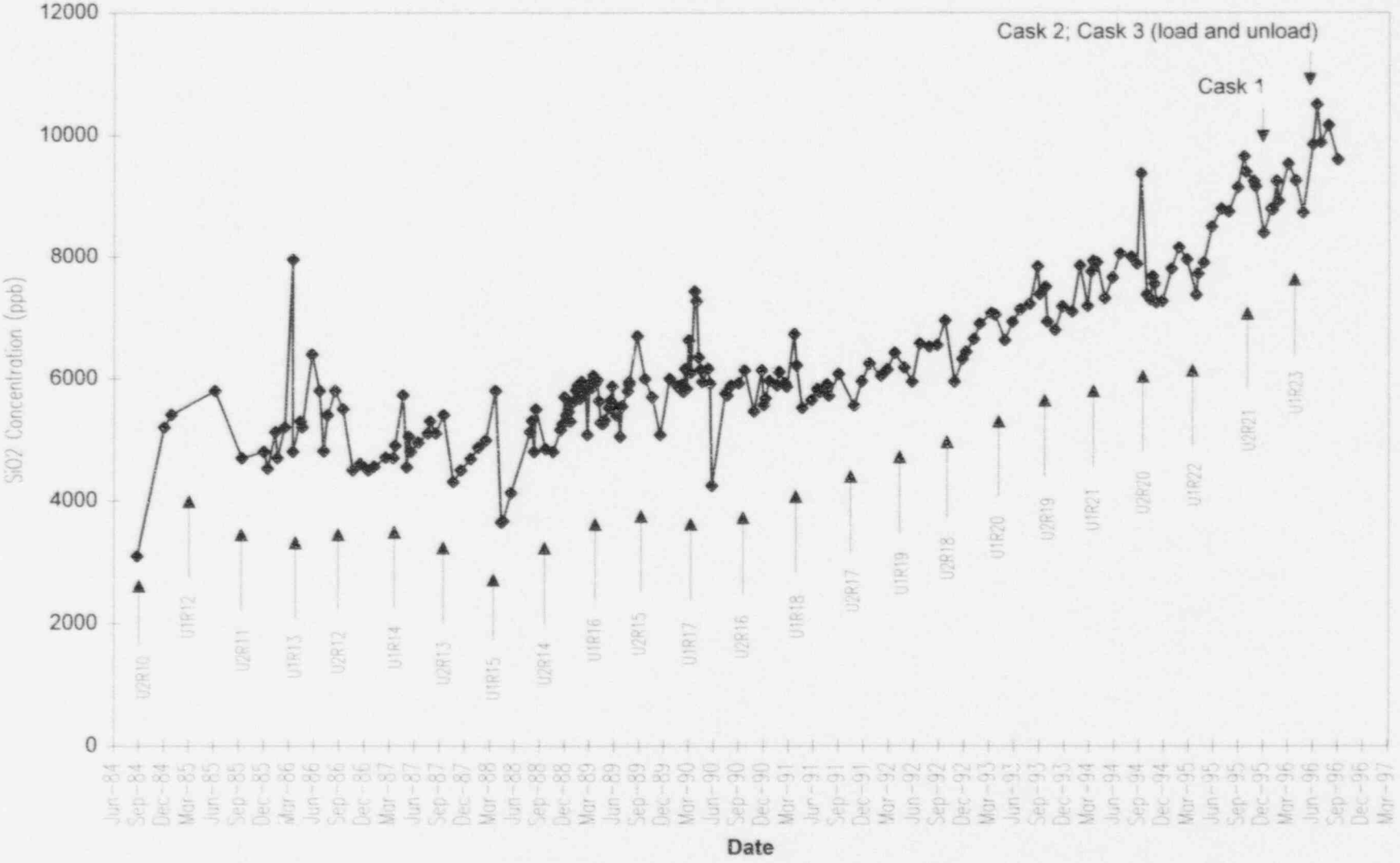
Attachments

Subscribed to and sworn before me
this 23rd day of October, 1996.

Notary Public, State of Wisconsin
My Commission expires 10/26/2000

cc Resident Inspector, Regional Administrator, Jeff Kitsembel (PSCW), Odelli Ozer (EPRI)

Point Beach Spent Fuel Pool Silica



References:

1. Letter from Warren H. Swenson, Project Manager, Project Directorate III-3, Division of Reactor Projects - III, IV, V and Special Projects, Office of Nuclear Reactor Regulation, United States Nuclear Regulatory Commission, to C. W. Fay, Vice President, Nuclear Power Department, Wisconsin Electric Power Company, February 21, 1990, Regarding "Point Beach Unit Nos. 1 and 2, Boraflex Surveillance Program (TAC Nos. 65052 and 65053)", and enclosed staff safety evaluation.
2. Letter from Stanley E. Turner, Ph.D., PE, Chief Scientist, Holtec International, to Kevin Anundson, Wisconsin Electric Power Company, August 31, 1991, Regarding "Evaluation of Blackness Testing of the Boraflex in the Pt. Beach Spent Fuel Pool".
3. Turner, Stanley E., PhD., PE, Mitchell, Walter III, PE, *Blackness Testing of Boraflex in Selected Cells of the Spent Fuel Pool Storage Racks of the Point Beach Nuclear Plant*, Holtec Report HI-91682, Holtec Project 10780, August, 1991.
4. Srinilta, S., *Criticality Analysis of the Point Beach Nuclear Plant Spent Fuel Storage Racks Considering Boraflex Gaps and Shrinkage with Credit for Integral Fuel Burnable Absorbers*, Westinghouse Commercial Nuclear Fuel Division report CAA-96-146, May 14, 1996.
5. Lindquist, K., Kline, D., Haley, T., Vonada, D., *Guidelines for Boraflex Use in Spent-Fuel Storage Racks*, EPRI Interim Report, EPRI TR-103300, Project 2813-04, December, 1993.
6. Lindquist, K., Kline, D.E., Haley, T.C., *Boraflex Test Results and Evaluation*, EPRI Interim Report, EPRI TR-101986, Project 2813-04, February, 1993.