

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

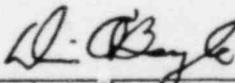
THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of )  
COMMONWEALTH EDISON COMPANY ) Docket Nos. 50-237-SP  
(Dresden Station, Units 2 & 3)) 50-249-SP  
(Spent Fuel Pool  
Modification)

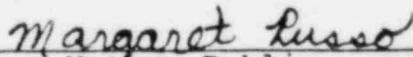
AFFIDAVIT OF DENNIS O'BOYLE

State of Illinois )  
County of C o o k ) SS.

I, Dennis O'Boyle, being first duly sworn, state that the attached testimony is true and correct to the best of my knowledge and belief.

  
\_\_\_\_\_  
Dennis O'Boyle

SUBSCRIBED AND SWORN TO  
before me this 23rd day  
of February, 1982.

  
\_\_\_\_\_  
Notary Public

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Testimony Updating Previous Information  
On Channel Deformation

My name is Dennis O'Boyle and I presented both written and oral testimony in the Dresden Nuclear Station Spent Fuel Pool Modification hearings conducted before the Atomic Safety and Licensing Board ("Licensing Board"). The testimony I presented primarily concerned the dimensional changes BWR fuel channels undergo as a result of irradiation in the reactor core. The testimony I presented was based on dimensional measurements of fuel channels located at the Quad Cities Nuclear Station. Since my testimony was presented, Commonwealth Edison has continued a measurement program on irradiated channels and now has completed measurements on approximately 1,900 channels located in the spent fuel storage pools at both the Quad Cities and Dresden Nuclear Stations. The purpose of this testimony is to inform the Licensing Board as to the results of these recent measurements and changes in our current understanding concerning the causes of channel deformation by bowing.

A total of 300 irradiated channels have been measured at Dresden Nuclear Station since my earlier testimony and the maximum amount of bow plus bulge which has been observed is 0.292 inches. This value is much smaller than the maximum amount of bow plus bulge of 0.420 inches which I reported as having been measured at the Quad Cities Nuclear Station in my written testimony dated January 30, 1981. The worst-case analysis set forth in the written and oral testimony of Mr. J. D. Gilcrest assumed a maximum bow plus bulge deformation of 0.500 inches. See, Testimony of James D. Gilcrest Related To Fuel Channel Bowing at p. 9, following Tr. 1013. Thus, the recent measurements of fuel channels at the Dresden Nuclear Station do not suggest any problems.

Since my earlier testimony, the dimensions of 724 additional irradiated fuel channels have been measured at the Quad Cities Nuclear Station. One of the fuel channels measured had a maximum bow plus bulge deformation of 0.462 inches. All of the other fuel channels measured had a maximum bow plus bulge deformation of less than 0.400 inches. Thus, only one channel of the 724 additional fuel channels measured exceeded the largest bow plus bulge deformation reported in my earlier testimony. A bow plus bulge deformation of 0.462 inches is well within the limits of the analysis presented by Mr. Gilcrest in his testimony at the Dresden hearing. See, Testimony of James D. Gilcrest Related To Fuel Channel Bowing at p. 9, following Tr. 1013.

Pursuant to Commonwealth Edison's fuel channel management program, measured fuel channels with a bow plus bulge deformation greater than 0.300 inches are not reinserted into reactor cores and are not subject to additional irradiation. Accordingly, deformation of fuel channels during future irradiation at the Dresden Nuclear Station should not exceed the amount of deformation observed in the recent measurements conducted at the Dresden Nuclear Station. Based on the results of the additional measurements referred to above, my conclusions with respect to the storage of irradiated fuel channels presented in the previous testimony remain valid.

As a result of further analysis of the channel deformation measurements, I have modified my opinion concerning the major cause of large bowing of fuel channels. Previously, the industry's (and my) understanding was that channel bowing was caused mainly by the fast neutron flux gradient near the edge of the reactor core. At the time I testified before this Licensing Board, time constraints limited the breadth of my analysis of the channel measurements. With respect to the fifteen channels having the largest bow deformation, the majority had been loaded into the peripheral core region where the neutron flux gradient was the largest for at least one fuel cycle. See, O'Boyle Testimony On Dimensional Changes of BWR Fuel Channels as a Result of Irradiation and Non-GE Fuel Bundles and Channels

and p. 10, following Tr. 1013. Indeed, the channel which exhibited the largest amount of bow had been loaded into peripheral core locations for four fuel cycles. (Tr. 752.)

Further investigation showed that a fuel channel that had been intentionally located in peripheral core locations for four fuel cycles had only bowed approximately 0.130 inches. This led me to question the earlier belief as to the main cause of large channel bowing and I reexamined the fifteen channels having the largest in-core deformation. The results of this analysis did not support my earlier testimony that the largest channel bowing was caused mainly by the neutron flux gradient in the peripheral region of the reactor core. Although the majority of the fifteen channels had indeed been located in peripheral core locations for at least one cycle, it became apparent that the majority had spent more of their time in the reactor core in non-peripheral locations than in peripheral locations. Thus, the correlation between core location and large bow plus bulge seemed questionable and I began to look for other explanations of large bow plus bulge.

I now believe that, while flux gradients contribute to fuel channel bow, the major cause of large channel bowing is related to the fabrication history of the individual fuel channel. See, Attachment No. 1. Fabrication processes used in the early 1970's to manufacture the fuel channels utilized at the Quad Cities and Dresden Nuclear

Stations resulted in a small percentage of these channels having slightly non-uniform metallurgical properties. Fuel channels currently being purchased by Commonwealth Edison no longer use this fabrication process.

Thus, as a result of the modified fabrication process and the above noted fuel management program, the major source of fuel channel deformation due to bowing should be eliminated in future irradiation cycles. This new understanding of channel deformation suggests that future channel deformation will be smaller than had been predicted previously, and the potential for interference between irradiated channels and the fuel storage racks is less than previously thought.