UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

SUPPLEMENTAL TESTIMONY OF JOHN R. WEEKS
ON CONTENTIONS 7 AND 8

I, John R. Weeks, do state as follows:

I am employed by the Brookhaven National Laboratory, Department of Nuclear Energy, as Leader of the Corrosion Science Group. A statement of my professional qualifications is attached to this testimony.

This testimony addresses Contentions 7 and 8 in the Memorandum and Order of the Atomic Safety and Licensing Board of September 9, 1980, concerning the matter of corrosion in the racks.

7. The Application does not adequately assess the possibility of general corrosion and galvanic corrosion in the racks in that:

   A. The life expectancy of the Boral tubes is unsubstantial.

The life expectancy of Boral tubes in water of the quality that exists in the Dresden spent fuel pools is essentially unlimited. Unclad Boral has been exposed in the Brookhaven Medical Research Reactor spent fuel storage area for over 20 years. The coolant in this storage area is demineralized, high purity water, maintained to similar limits of conductivity and at similar temperatures to the water in the Dresden Units 2 and 3 spent fuel pools.

In July, 1978, punchings were taken of this Boral. The results showed conclusively that no boron was lost from the Boral nor was there any visible corrosion or swelling of the Boral itself other than a thin gray oxide on the outer surface of the aluminum cladding typical of other aluminum components in the reactor. This experience has been documented in my report to the NRC, BNL-NUREG-25582, "Corrosion Considerations in the Use of Boral in Spent Fuel Storage Pool Racks," dated January, 1979. In view of this experience and of the water quality at the Dresden pools, I believe that the life expectancy of the Boral tubes in the spent fuel storage racks is far greater than the design life of the pools themselves.

B. Swelling of the Boral in the tubes and its effect on removal of fuel assemblies have not been analyzed.

The Boral in the tubes itself does not swell, as evidenced by the above-cited BMRR experience. The swelling of the tubes that has been observed at certain other facilities has been caused by inadvertent entrance of water into the space containing the Boral and stainless steel, and hydrogen produced by the initial corrosion of aluminum when exposed to water. This phenonomena is also described in detail in my report BNL-NUREG-25582. The Licensee has committed to providing vent holes for the release of any gas produced by this corrosion and, therefore, I do not anticipate any swelling of the tubes. In view of the fact that the Boral itself should not swell, it is my opinion that swelling of the tubes has been eliminated by providing the vent holes for the release of any gases. Therefore, in my opinion, it is not necessary to analyze further the effect of storage rack swelling upon the removal of the fuel assemblies.

C. The corrosion surveillance program will not assure detection of corrosion in the racks because the samples to be inspected will not be representative of the actual tubes in the racks, because the sample environment will not represent pool conditions in and near the racks, and because the program does not require a dummy fuel test shortly before placement of fuel in each tube.

The Corrosion Surveillance Program for the Dresden 2 and 3 spent fuel pools has been described as being similar to or a duplicate of the Corrosion Surveillance Program proposed by the same Licensee for the Zion spent fuel pool and accepted by the NRC staff. There is little local variation of water chemistry in the spent fuel storage pool, as water is circulated through the pool by thermal convection and by pumping through the heat exchangers and water purification systems. These coupons will be exposed to the pool environment. Further, should any pitting corrosion occur where the aluminum is in contact with the stainless steel, this is most likely to occur at the point where oxygen is accessible to the interface between the two materials, in other words, around the edge of the coupons. Consequently, the use of a small coupon would give a conservative estimate of the amount of attack that might be occurring over a large cell. Further, the Licensee's plan calls for two full length vented fuel storage tubes to be suspended in the pool. These will be examined if the sample program indicates any loss of absorbent material. Therefore, the samples to be inspected will represent actual tubes in the racks. The sample environment will represent spent fuel conditions in or near the racks.

With regard to the requirement for a dummy fuel test before placement of the fuel in each tube, such a program was instituted at Monticello because

of the swelling experienced prior to venting of their storage tubes. However, since their tubes have been vented, they have found no difficulties with swelling of the racks or with removal or insertion of the dummy fuel assembly. Since the Dresden racks are to be vented, I feel that use of a dummy fuel assembly test is not a necessary requirement.

D. There is no plan for steps to be taken should corrosion be discovered in the racks. (Am. Cont. K; 2nd Am. Cont. 8.)

There is no evidence that, in water of the quality that exists in the Dresden fuel pools, any corrosion processes will develop that are sufficiently rapid to require immediate action. Any processes that remotely might be anticipated will be slow, gradual, corrosion phenomena that develop over a number of years. It is my opinion that significant corrosion is highly unlikely in the Dresden fuel pools; however, should it occur, because of the nature of the type of attack that might be anticipated, there would be adequate opportunity at that time to make plans for repairing the corrosion or replacing the corroded material without any significant risks to the fuel being stored in the pool or to the environment.

8. The Applicant should develop criteria for the racks defining when their use to store fuel would be proscribed. These criteria should be the acceptable amount of corrosion, limits on dimensional changes and strength tolerance. (Am. Cont. L; 2nd Am. Cont. 9.)

I do not believe that criteria defining the point at which racks would be proscribed for storing fuel need to be developed at this time. Experience in other spent fuel storage pools around the country has shown that little or no degradation of the spent fuel storage racks has occurred over a number of years in use. The venting of the tubes at Monticello has arrested any of

the swelling problems that developed there earlier. The performance of materials in spent fuel storage pools around the country is being followed generically for the NRC by members of the Corrosion Science Group at Brookhaven National Laboratory. The Dresden coupon inspection program will provide additional data to the information being gathered elsewhere. In my opinion, it is premature, therefore, at this time, to establish criteria for the acceptable amount of corrosion or limits on dimensional changes and strength tolerance. There is sufficient conservatism in the design of the racks to allow substantial amounts of corrosion without affecting significantly their strength or causing changes in their dimensions.

PROFESSIONAL QUALIFICATIONS
OF
JOHN R. WEEKS

I am currently a metallurgist at Brookhaven National Laboratory (BNL) where I have been employed since 1953. My present title is Leader, Corrosion Science Group, in the Department of Nuclear Energy. My current responsibilities include experimental investigations on the mechanisms of stress corrosion cracking and pitting corrosion of stainless steels and Inconel, and providing technical assistance to the U. S. Nuclear Regulatory Commission (NRC) in the area of corrosion and coolant chemistry in light water reactors. I am a participating consultant on the NRC Pipe Crack Study Group. I also am Chairman of the BNL Reactor and Critical Experiments Safety Committee, and represent the Department of Nuclear Energy on the BNL Council.

Since joining Brookhaven I have performed and supervised research on materials behavior in both liquid metal and water cooled reactors. From 1970 to 1972, I headed Brookhaven's program on liquid sodium technology. I have been materials advisor to the Reactor Division at BNL since 1959. I was keynote lecturer in 1966 at the International Atomic Energy Agency Symposium on Alkali Metal Coolants, and served in 1967-1969 as a U. S. delegate at the US-UK information exchanges on corrosion of reactor materials. I was a consultant to Aerojet General on the SNAP-8 project.

I was an adjunct associate professor of materials science at SUNY - Stony Brook in 1962-1963, and am currently an adjunct professor of Metallurgy and Nuclear Engineering at the Polytechnic Institute of New York. From 1972 to 1974, I was on assignment to the U. S. Atomic Energy Commission as a senior metallurgist in the Materials Engineering Branch, Directorate of Licensing. In 1974-1975, I served on the AEC (later NRC) Task Force investigating the causes of the stress corrosion problems in BWR piping.

My academic qualifications include a Met. E. degree from the Colorado School of Mines in 1949, an M.S. in 1950, and a Ph.D. in 1953 in Metallurgy from the University of Utah. I am a member of the American Society for Metals, for which I have been Chairman of the Long Island chapter, the Metallurgical Society of AIME, for which I have served as Chairman of the Nuclear Metallurgy Committee, and the American Nuclear Society. I am the author or co-author of approximately sixty-five publications in the areas of my research, and have prepared testimony or affidavits and testified before several Atomic Safety and Licensing Boards, and one Atomic Safety and Licensing Appeal Board, in U. S. Nuclear Regulatory Commission proceedings.