I, Roby Bevan, being duly sworn, state that I am an employee of the U.S. Nuclear Regulatory Commission (NRC). My present position is Operating Reactors Project Manager, Operating Reactors Branch #2, Division of Licensing within the Office of Nuclear Reactor Regulation.

The purpose of my affidavit is to respond to a contention having to do with the durability and performance of Boraflex, and with corrosion of the stainless steel of the racks. An exact statement of the contention and my response to that contention follows.

Contention 4

Intervenors contend that Licensees' application to install its proposed spent fuel storage racks should be denied as

a. the durability and performance of the Boraflex in the spent fuel pool water environment is unknown and unsubstantiated, and

b. the corrosion rate of the stainless steel in the racks in unknown, and may result in their structural failure, thereby failing to provide a reasonable assurance of public health and safety.

Response to Contentions 4a. and b.

The staff has completed a review of portions of the Licensees' application, including an evaluation of the durability and performance of the Boraflex neutron absorber material and the corrosion behavior of the stainless steel in the racks. This evaluation has been officially transmitted from the Division of Engineering to the Division of Licensing for inclusion in the forthcoming Safety Evaluation Report on the Quad Cities Station augmented spent fuel storage application. The material in this evaluation addresses the concerns expressed by the Intervenors, and a copy is attached hereto in response to the stated concerns.

The attached report might be changed somewhat by editing before inclusion in the forthcoming Safety Evaluation Report. It is not anticipated, however, that any substantive or conclusory changes will be made unless unexpected new information that differs significantly from that on which the evaluation was based comes to light.

The above statements and opinions are true and correct to the best of my knowledge and belief.

Subscribed and sworn to before me
this 24th day of November, 1981.

Roby B. Bevan, Jr.

Linda M. Eyler
Notary Public

My Commission expires: July 1, 1982

SAFETY EVALUATION REPORT
QUAD CITIES STATION UNITS 1 AND 2
COMMONWEALTH EDISON CO.
DOCKET NUMBER 50-254/265

CHEMICAL ENGINEERING BRANCH
CORROSION ENGINEERING SECTION

9.1.2 Spent Fuel Storage

Nuclear reactor plants include storage facilities for the wet storage of spent fuel assemblies. The safety function of the spent fuel pool and storage racks is to maintain the spent fuel assemblies in a subcritical array during all credible storage conditions. We have reviewed the compatibility and chemical stability of the materials (except the fuel assemblies) wetted by the pool water. In addition, our review has included an evaluation of the Boraflex neutron absorber material used in the high density storage locations for environmental stability.

There will be both the old and the new types of spent fuel storage cells in the Quad Cities Station spent fuel pools during the transition time while new storage modules are being installed. The transition period is expected to last slightly over one year. The spent fuel pool is filled with demineralized high-purity, high resistivity water.

The new high-density spent fuel storage racks are of welded stainless steel construction with a "Boraflex" neutron absorber sandwiched between the stainless steel sheets. The neutron absorber is composed of boron carbide powder in a rubber-like silicone polymeric matrix.

The old low density fuel storage tubes provide for the interim storage of fuel assemblies and are constructed of aluminum without neutron absorber material. The anticipated corrosion of the aluminum alloys, 1100 or 6061, is negligible in water of spent fuel pool quality at temperatures up to the boiling point of water: at 125°C (257°F) a corrosion rate of 1.5×10^{-4} mils/day has been measured for alloy 6061 aluminum, in water pH 7, which corresponds to a total corrosion of 1.1 mils in twenty years. Since the oxidation rate will continue to decrease slightly over this period, this estimate should be conservative.

The inherent high corrosion resistance of aluminum and stainless steel makes them well suited for use in demineralized water. Aluminum and stainless steel fuel storage racks submerged in water have been in use for 10 years with no deterioration evident.

Aluminum and 300-series stainless steel are very similar insofar as their coupled potential is concerned. Because the pool water has very low conductivity, galvanic corrosion should not occur. The use of stainless steel fasteners in aluminum to avoid detrimental galvanic corrosion is a recommended practice and has been used successfully for many years by the aluminum industry.

The pool liner, rack lattice structure and the high density fuel storage tubes are stainless steel which is compatible with the storage pool environment. In this environment of oxygen-saturated high purity water, the corrosive deterioration of the type 304 stainless steel should not exceed a depth of 6.00×10^{-5} inches in 100 years, which is negligible relative to the initial thickness. Dissimilar metal contact corrosion (galvanic attack) between the stainless steel of the pool liner, rack lattice structure, fuel storage tubes, and the Inconel and the Zircaloy in the spent fuel assemblies will not be significant because all of these materials are protected by highly passivating oxide films and are therefore at similar potentials. The Boraflex poison material is composed of non-conductive materials and therefore will not develop a galvanic potential in contact with the metal components. Boraflex has undergone extensive testing to study the effects of gamma irradiation in various environments, and to verify its structural integrity and suitability as a neutron absorbing material.

The space which contains the Boraflex is vented to the pool. Venting will allow gas generated by the chemical degradation of the silicone polymer binder during heating and irradiation to escape, and will prevent bulging or swelling of the stainless steel tube.

To provide added assurance that no unexpected corrosion or degradation of the materials will compromise the integrity of the racks, the applicant has committed to conduct a long term fuel storage cell surveillance program. Surveillance samples are in the form of removable stainless steel clad Boraflex sheets, which are proto-typical of the fuel storage cell walls. These specimens will be removed and examined periodically.

From our evaluation as discussed above we conclude that the corrosion that will occur in the spent fuel storage pool environment should be of little significance during the remaining life of the plant. Components in the spent fuel storage pool are constructed of alloys which have a low differential galvanic potential between them and have a high resistance to general corrosion, localized corrosion, and galvanic corrosion. Tests under irradiation and at elevated temperatures in water indicate that the Boraflex material will not undergo significant degradation during the expected service life of 40 years.

We further conclude that the environmental compatibility and stability of the materials used in the spent fuel storage pool are adequate, based on test data and actual service experience in operating reactors.

We have reviewed the surveillance program and we conclude that the monitoring of the materials in the spent fuel storage pool, as proposed by the licensee, will provide reasonable assurance that the Boraflex material will continue to perform its function for the design life of the pool. We therefore find that the implementation of a monitoring program and the selection of appropriate materials of construction by the licensee meet the requirements of 10 CFR Part 50, Appendix A, Criterion 61, by having a capability to permit appropriate periodic inspection and testing of components, and Criterion 62, by preventing criticality by maintaining structural integrity of components and of the boron poison.