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 50-249-SP
(Dresden Station, Units 2 & 3)	)	(Spent Fuel Pool Modification)

SS:
County of Santa Clara

AFFIDAVIT OF KIN W. WONG

I, Kin W. Wong, being first duly sworn, state that the attached testimony is true and correct to the best of my knowledge and belief.

SUBSCRIBED AND SWORN TO BEFORE ME
THIS 21st DAY OF January 1981

NOTARY PUBLIC - CALIFORNIA

OFFICIAL SEAL
MARGERY H. EPPERSON
NOTARY PUBLIC - CALIFORNIA
SANTA CLARA COUNTY
My Commission Expires July 22, 1984

My name is Kin W Wong. My qualifications have already been put in evidence.

I have performed criticality analysis for Exxon 8x8 fuel in the proposed Dresden spent fuel storage rack pool. The fuel assembly data used in the analysis is listed in Attachment A. The result of the analysis shows a k_{eff} under normal conditions with all uncertainties of 0.92926 (corresponding to the values 0.92406 for GE 7x7 fuel and 0.92714 for GE 8x8 fuel shown on page 3-10 of the Licensing Report, revision 5) and a total k_{eff} of 0.95190 for the assumptions listed in the third sentence of the fourth paragraph of page 3-17 of the Licensing Report, revision 5. These results are attached as Attachment B.

The acceptance criteria for k_{eff} is that "The neutron multiplication factor in spent fuel pools shall be less than or equal to 0.95, including all uncertainties, under all conditions." The above acceptance criteria is from NRC Guidance dated April 14, 1978 and is attached as Attachment C.

The NRC Staff interpretation of the acceptance criteria is that it is not necessary to include both "Condition 4" (one extra fuel assembly at side of rack) and "Condition 5" (all racks in contact with each other) at the same time. Then the total k_{eff} will be

k_{eff} +	("Condition 4" or "Condition 5") +	1 "missing" neutron absorbing plate per 32 plates	
≤ 0.92926 +	0.00743	0.01288	

$\leq 0.94957 < 0.95$

There are other methods, such as using the Monte Carlo code KENO, to come up with a less conservative k_{eff} value. We have performed a criticality analysis for the GE 7x7 fuel in the proposed Dresden spent fuel storage rack pool using KENO. The result shows a decrease in k_{eff} by .0067.

Conclusion: The proposed Dresden spent fuel storage rack design is able to satisfy the acceptance criteria of $k_{eff} < 0.95$ for Exxon 8x8 fuel in accordance with NRC Staff position.

ATTACHMENT A

Dresden Fuel Assembly Data

Fuel Assembly Design	Exxon-8x8
Number of Fuel Rods	63
Assembly Length (Max), in.	171.29 (nominal)
Active Fuel Length, in.	145.24
Fuel Rod Pitch, in.	0.641
Max. Nodal Enrichment, wt % U-235	3.02
Total Assembly Weight, lbs. (with channel)	715
Fuel Channel Outside Dimension, in.	5.438
Fuel Channel Wall Thickness, in.	0.080
Fuel Channel Material	Zr-4

Fuel Rod Data	
Outside Diameter, in.	0.484
Cladding Thickness, in.	0.035
Cladding Material	Zr-2
Pellet Density, % T.D.	94.5
Pellet Diameter	0.4055/0.4045*

Water Rod Data	
Outside Diameter, in.	0.484
Wall Thickness, in.	0.035
Material	Zr-2

* 18 of the fuel rods have the 0.4055-inch diameter pellets. The remaining 45 fuel rods have 0.4045-inch diameter pellets.

ATTACHMENT B

Additional criticality analysis for Exxon 8x8 assembly based on information supplied in Attachment A has been performed. Results are as follows:

$$k_{eff} \leq k_o + \Delta k_1 + \Delta k_2 + \Delta k_3 + \Delta k_4 + (\Delta k_5^2 + \Delta k_6^2 + \Delta k_7^2)^{1/2}$$

$$= 0.90945 + 0.005 + 0.0 + 0.00618 + 0.0 + (0.0084^2 + 0.0 + 0.002^2)^{1/2}$$

$$= 0.92926$$

k_{eff} + "Condition 4" + "Condition 5" + 1 "missing" plate per 32 plates

= 0.92926 + 0.00233 + 0.00743 + 0.01288

= 0.95190 >0.95

where:

k_o = nominal calculated k_{eff} (2-D diffusion theory)
Δk_1 = transport correction
Δk_2 = assembly location effect (Fuel in tube)
Δk_3 = rack spacing tolerance effect (Tube in rack)
Δk_4 = methods bias
Δk_5 = uncertainty in methods bias (95% confidence level)
Δk_6 = channel thickness tolerance effect
Δk_7 = fuel fabrication tolerance effect

"Condition 4" = one extra fuel assembly at side of rack

"Condition 5" = all racks in contact with each other