UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. 50-250-OLA-2
	)	50-251-OLA-2
FLORIDA POWER & LIGHT COMPANY	)	
(Turkey Point Nuclear Generating Station, Units 3 & 4)	)	(Spent Fuel Pool Expansion)

Testimony Of Edmund E. DeMario
On Contention Number 5

Q1: Please state your name and address.

A1: My name is Edmund E. DeMario. I am employed by the Westinghouse Electric Corporation ("Westinghouse") as an advisory engineer in the Commercial Nuclear Fuel Division (CNFD). My business address is P.O. Drawer R, Columbia, SC, 29250.

Q2: Please describe your professional qualifications and experience.

A2: A summary of my professional qualifications and experience is attached hereto as Exhibit A, which is incorporated herein by reference.

Q3: What is the purpose of your testimony?

A3: The purpose of my testimony is to address Contention No. 5 as limited to the effects of seismic loads that the Turkey Point spent fuel storage racks could exert upon the fuel assemblies within the spent fuel storage racks.

The Testimony Of Harry S. Flanders, Jr. On Contention Number 5 addresses the seismic analysis of the spent fuel storage racks, and the Testimony Of Russell Gouldy On Contention Number 5 addresses the administrative controls for loading of spent fuel into the racks.

Contention No. 5 and the bases for the contention are as follows:

Contention 5

> That the main safety function of the spent fuel pool which is to maintain the spent fuel assemblies in a safe configuration through all environmental and abnormal loading, may not be met as a result of a recently brought to light unreviewed safety question involved in the current re-rack design that allows racks that overhang the support pads in the spent fuel pool. Thus, the amendment should be revoked.

Bases for Contention

> In a February 1, 1985, letter from Williams, FPL, to Varga, NRC, which describes the procedures for rack lift off under the seismic event conditions [sic]. This is clearly an unreviewed safety question which demands a safety analysis of all seismic and hurricane conditions and their potential impacts on the racks in question before the license amendments are issued. Because of the potential to increase the possibility of an accident previously evaluate [sic], or to create the possibility of a new or different kind of accident caused by loss of structural integrity. If integrity is lost, the damaged fuel rods could cause a criticality accident.

(Hurricane loads were rejected as a basis for Contention 5 in the Licensing Board's memorandum and order of September 16, 1985).

Q4: Please describe the design of the Turkey Point fuel assemblies.

A4: Each Turkey Point fuel assembly is approximately 8.4 inches square and 13 feet in length. Each assembly consists of a fifteen by fifteen array of fuel rods and guide tubes for control rods and instrumentation. Each of the 204 fuel rods in an assembly contains uranium dioxide fuel pellets clad in Zircaloy tubing, having an outside diameter of 0.422 inches and a wall thickness of 0.0243 inches. Grids, positioned at vertical intervals along the length of the fuel rods, maintain rod spacing and geometry.

The fuel assemblies and fuel rods have been designed to perform satisfactorily throughout their lifetime in the reactor. The loads, stresses, and strains resulting from the combined effects of flow induced vibrations, earthquakes, reactor pressure, fission gas pressure, fuel growth, thermal strain, and differential expansion during both steady state and transient reactor operating conditions have been considered in the design of the fuel rods and fuel assemblies. These conditions in the reactor are far more severe than those postulated for the Turkey Point spent fuel pool

during a seismic event. Thus, the stored spent fuel assemblies and fuel rods would be able to withstand a postulated seismic event at Turkey Point without loss of structural integrity.

Q5: Was any analysis performed to confirm that there would be no loss of integrity in the stored spent fuel assemblies as a result of a seismic event?

A5: Yes. Westinghouse performed a finite element analysis to confirm that there would be no loss of integrity (breaching of the fuel rod cladding) in the stored spent fuel assemblies as a result of a postulated worst case safe shutdown earthquake (SSE). I have reviewed the Westinghouse analysis of the structural capability of the fuel assemblies stored in the Turkey Point spent fuel storage racks and have verified that the methodology used in the analysis was appropriate and that the results obtained from the analysis are accurate.

Q6: Please describe this analysis.

A6: During a postulated seismic event at Turkey Point Units 3 and 4, the fuel assemblies in the spent fuel storage racks would contact the stainless steel walls of the storage rack cells due to the motion of the rack assembly relative to the motion of the fuel assemblies. Employing finite element methods of the type described in the Testimony Of Harry E. Flanders, Jr. On Contention Number 5, the maximum acceleration imposed upon a spent

fuel assembly as a result of an SSE at Turkey Point was calculated to be 1.6g (where g is the acceleration due to gravity at the earth's surface). The maximum acceleration that a fuel rod in the fuel assemblies can sustain without cladding failure was also calculated, employing finite element analysis methods, for the irradiated fuel rods and their supporting grids.

Q7: What were the results of the finite element analysis of the Turkey Point spent fuel assemblies under conditions of an SSE?

A7: The results of the finite element analysis show that the spent fuel assemblies can sustain an acceleration of 36g without localized cladding failure. Therefore, the integrity of the fuel cladding will be maintained for the worst case seismic event because the 36g acceleration required to prevent fuel cladding failure is more than an order of magnitude greater than the 1.6g acceleration that the fuel assemblies would experience in the Turkey Point spent fuel pool racks if the maximum anticipated earthquake (SSE) occurred.

EXHIBIT A

PROFESSIONAL QUALIFICATIONS AND EXPERIENCE OF
EDMUND E. DeMARIO

My name is Edmund E. DeMario and my business address is P.O. Drawer R, Columbia, S.C. 29250. I am employed by the Westinghouse Electric Corporation (Westinghouse) as an Advisory Engineer in the Commercial Nuclear Fuel Division (CNFD).

I graduated from the Stevens Institute of Technology with a Degree in Mechanical Engineering in 1960. I also completed 20 credits of graduate study in Chemical Engineering at the Stevens Institute of Technology.

In September 1961, I joined General Dynamics at the Vandenburg Air Force Base as a Test Engineer on the Atlas Missile program and in August 1963 I joined Lockheed at the Vandenburg Air Force Base as a Test Engineer on the AGENA Space Vehicle Program.

In February 1966, I joined Bell Aerosystems at Wheatfield, N.Y. as a Project Engineer in the design and development of new space engines.

In January 1969, I joined the Nuclear Fuel Division of the Westinghouse Electric Corporation as a Design Engineer where I was responsible for designing advanced fuel assemblies and performing analyses and tests to evaluate the fuel performance under the various reactor conditions.

After being promoted to the position of Fellow Engineer in 1976, I was subsequently promoted to the position of Advisory Engineer in December 1981, with the responsibility for the mechanical design of advanced fuel assemblies. In addition, I am responsible for the training of engineers in fuel assembly design.

I have been responsible for the mechanical design of advanced fuel assemblies including the 17 x 17 fuel assembly, the Vantage-5 and the Optimized Fuel Assembly.

I am a Professional Engineer in the State of Pennsylvania.