UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the matter of	)	
	)	
DUKE POWER COMPANY	)	
	)	
(Amendment to Material License SNM-1773 for Oconee Nuclear Station Spent Fuel Transportation and Storage at McGuire Nuclear Station)	)	Docket No. 70-2623

TESTIMONY OF D. H. STERRETT

My name is Donald H. Sterrett. I am Manager of System Planning, Duke Power Company. I received a Bachelor of Science degree in Electrical Engineering from Duke University in 1944. Following graduation, until May, 1946, I served as a line officer in the U. S. Navy, in the capacity of Engineer Officer on a destroyer-escort.

In July, 1946, I was employed by the Duke Power Compan in the Relay Department. My responsibilities were primarily in power plant relaying, and included both the design of relay protection systems and field testing of installed facilities.

In December, 1949, I was transferred to the System Planning Department, where I participated in long-range planning studies which included power ant siting, transmission studies, and the economic evaluation of alternative plans. In March, 1967, I was appointed Production and Transmission Planning Engineer; in May, 1974, Manager, Projects Planning; and, in March, 1977, Manager, System Planning. In my present capacity, my responsibilities include the planning of all generation, transmission, and distribution facilities necessary to meet the future demand for electricity in the Duke service area.

Since 1969, I have been a member of the Syste Planning Committee of the Edison Electric Institute (EEI), and am currently Vice Chairman of that committee. I am a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE), and for a number of years have served on the System Planning Committee of the Power Engineering Society. At present, I am serving on the System Planning and Operations Task Force of the Electric Power Research

Institute (EPRI), and on the Technical Advisory Committee of the Southeastern Electric Reliability Council (SERC). I am a registered professional engineer in North Carolina.

My testimony will relate to several contentions of the Natural Resources Defense Council which comes within my area of responsibility within the Duke Power Company.

Contention 3: Failure to consider the following alternatives:

3a: Oconee as a last-on, first-off plant.

This contention implies that operation of the Oconee units should be changed from that of a base load plant to cyclic operation, in which the units are placed in operation as the system load increases during the daily load cycle, and removed from service as the system load decreases.

The Oconee units are not designed for this mode of operation, and are constrained by operating limits. In addition to shortening the life of the turbine rotors because of the transient thermal conditions encountered with cyclic operation, the build-up of Xenon in the reactor core under these operating conditions has been well documented. A return to full load while the Xenon level is high cannot be accomplished.

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From an operating standpoint, the physical constraints on the Oconee units are such that the units could not follow the system load, should such an attempt be made. From about 20% capacity, a minimum load level, the Oconee units can be increased in loading 744 MW in an hour and a half, 1000 MW during the next four hours, and 234 MW in three more hours. This represents an increase in loading on the Oconee units of 2008 MW in an eight and a half hour period, or an average of about 236 MW per hour. The system load will increase during the morning periods at a rate of about 500 MW per hour. The Oconee units, therefore, would be unable to change with the system load, should such operation be attempted.

It should be pointed out, in addition, that operation in a cyclical manner would be very costly in terms of system production expense. Operating the

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Oconee units in base yields the lowest total system production cost under economic dispatch, and operation in any other mode requires more energy to be produced from units burning coal, at a considerably higher fuel cost. For example, if it is assumed the Oconee units operated in base, but at a level of half their capability instead of at full capability, the additional expense in the year 1980 alone would be $111,412,000. The increase in cost resulting from cyclical operation would be even greater.

Economic dispatch of a power system is a complex procedure in which each generating unit is operated at that point on its load curve which, when combined with all the other units in operation on the system, will yield the lowest net total system production cost for that system load level. It is not a matter of fully loading one generating unit, then bringing the next unit on line, but rather of operating each unit as a function of its incremental cost curve, recognizing its relationship with the other generating units and the system load requirements. Even during valley load periods, the number of units on line, and their specific loading, are determined by incremental load curves, by the physical constraints on the units themselves, and by the need to meet specific system load requirements. The concept of "last-on, first-off" generation dispatch is a simplistic approach which simply does not exist in the real world.

3b: Cost of increased purchases of power due to Oconee shutdown is speculative.

The shutdown of Oconee becomes expensive in terms of replacement power in two ways. The energy not produced by Oconee would have to be replaced insofar as possible by energy produced from other generating units on the Duke system, which burn either coal or oil; and, that energy which could not be provided from within the Duke system, would have to be purchased from sources external to the Duke system.

The cost to produce the energy on the Duke system can be determined with a considerable degree of certainty. The average variable O&M and fuel costs for Duke's base-load units have been calculated to be the following in 1979:

Unit(s)	Cost in $/MWh	
	Variable O&M	1979 Average Fuel
Belews Ck. 1 & 2	.192	12.80
Marshall 1 & 2	.366	16.55
Marshall 3 & 4	.431	16.28
Allen 5	1.082	13.66
Oconee 1, 2, 3	.525	4.44

The cost to purchase energy is speculative in the sense that Duke has no contract at present by which such energy could be purchased. However, based on experience with short term power purchases which have been made in the past, a reasonable estimate of the cost of purchased power can be made.

The probable cost of firm capacity would be between $3.25 and $3.75 per kW-month plus the cost of energy which would be no less than 20 mills per kWh. Based on an average value of $3.50 per kW-month, the cost of a one-year contract to replace the Oconee capacity would be $108,360,000. Assuming a minimum energy cost equal to that of the Duke system fossil-fuel units, the total cost of purchased energy would be $257,514,000. The total cost of purchased power to replace Oconee for one year, therefore, would be $365,874,000.

Actually, in the light of the current status of units which have been removed from service for environmental or other regulatory reasons, and in view of the delayed start-up dates of units on neighboring systems, there is no assurance that firm power could be contracted for at any price.

Contention 5: Applicant should be bound by its full core discharge standard or demonstrate (cost/benefit) that this capability is more valuable than costs of shipment off-site of one core of spent fuel.

Applicant's response to Intervenor's Contention 3 pointed out the very considerable impact of Oconee on the Duke system operating costs. Although full core discharge capability becomes extremely important should a shutdown of the entire Oconee plant be required for generic or other reasons, Applicant

cites the cost of not operating an Oconee unit, a minimum of $165,000 per day, as a sound reason for keeping all the Oconee units in service for as much of the time as possible. The cost of transporting the fuel to maintain full core discharge capability is insignificant when compared with the alternative of shutting Oconee down.

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