DUKE POWER COMPANY

POWER BUILDING

422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28242

Regulatory File Cy.

WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

TELEPHONE: AREA 704
373-4083

November 3, 1975

NOV 6 1975

Mr. Bernard C. Rusche
Director of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. R. A. Purple, Chief
Operating Reactors Branch #1

Re: Oconee Nuclear Station
Docket Nos. 50-269,-270,-287

Dear Mr. Rusche:

With regard to Mr. R. A. Purple's letter of August 29, 1975 concerning additional information required to support our conclusion on the acceptability of the Oconee Spent Fuel Cask Handling System, the attached response is provided. The response demonstrates that the consequences of the highly unlikely postulated spent fuel cask drop accident are within guidelines established [illegible] CFR100.

Very truly yours,

William O. Parker, Jr.

MST:vr

Attachment

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Docket Clerk

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Question

Discuss the possibility of the deflection of the spent fuel cask on to spent fuel stored in the pool and the resultant radiological consequences.

RESPONSE

The path of travel of the spent fuel cask handling crane does not allow the spent fuel cask to pass over stored fuel. However, assuming a failure of the crane or handling equipment, and that the falling cask strikes the rim of the spent fuel pool or the cask platform in the pool, it is possible for the cask to be deflected on to the stored fuel closest to the cask handling area.

In order to calculate the radiological consequences of this highly unlikely accident, the cask area was projected on to the fuel storage array and the area was oriented to contact the maximum number of fuel assemblies. It was determined that a maximum of 21 assemblies could be contacted assuming all storage spaces in the existing fuel racks were occupied. Based on the high density fuel storage racks preposed to be installed in the Oconee 3 spent fuel pool (reference our September 12, 1975 submittal), and assuming all storage cavities were occupied, a maximum of 45 assemblies could be contacted. An analysis was then performed consistent with Regulatory Guide 1.25 (Safety Guide 25), with the following additional assumptions:

1. The affected fuel assemblies have decayed 30 days.
2. The affected assemblies contain core average activity, i.e., a radial peaking factor of 1.0.
3. All rods of the affected assemblies are ruptured.
4. No removal of activity prior to release to the environs by the spent fuel pool ventilation system filters.
5. Activity is released at ground level.

The results of the above analysis indicate that doses at the exclusion area boundary will be as follows:

Number of Affected Assemblies	Whole Body Dose (Rems)	Thyroid Dose (Rems)
21	2.32	36.7
45	4.95	78.7

Therefore, the radiological consequences of this postulated accident are within the established limits of 10CFR100.

Question

Provide an analysis of the effects on the spent fuel pool liner should the cask strike it during the postulated accident.

RESPONSE

An analysis has been performed of the effects of a postulated cask drop accident on the spent fuel pool liner. The spent fuel pool concrete slab was designed for the postulated cask drop accident. Fill concrete was placed from sound rock to the bottom of the fuel pool slab in the area covered by the cask to prevent the shearing of a large plug from the pool slab. If the cask strikes the bottom liner plate on the edge, localized concrete crushing would occur and the liner plate would be ruptured in the area of impact.

Since the liner plate could be ruptured, an analysis was performed to determine the rate that pool water could escape. It was postulated that the water would flow under the liner plate, around continuous embedded angles that anchor the liner plate to the concrete slab, around water seals in the concrete construction joints and an unrestricted discharge to the fuel pool exterior. A gap of 1/64 inch between embedded angles and the concrete was postulated for the perimeter of the ruptured liner plate of 308 inches. The discharge area of 4.81 square inches was modeled as an equivalent circular pipe of 42 inches in length (minimum distance from interior to exterior of spent fuel pool). The calculated leakage, based on the above postulated conditions, was 21.3 gallons per day and well within the capability of the pool water makeup systems.

Question

Provide detailed description of the spent fuel cask path of movement, detailing the elevations and direction of travel.

RESPONSE

Using the 100 ton cask crane, the cask is removed from the transport vehicle in the fuel loading area at elevation 796.5 feet. The cask is lifted vertically 51.75 feet to elevation 848.25 feet. At elevation 848.25 feet, the cask is moved horizontally a distance of 12 feet and positioned over the decontamination pit. The cask is lowered 31.5 feet into the decontamination pit at elevation 816.75 feet. After decontamination the cask is raised 31.5 feet to elevation 848.25 feet and moved horizontally a distance of 17 feet. The cask is over the fuel storage pool and the bottom elevation of the fuel storage pool is 800.0 feet. The cask is lowered 48.25 feet into the fuel storage pool to rest on the bottom slab at elevation 800.0.

When the cask is removed from the fuel storage pool, the above path of movement is reversed. The cask does not pass over equipment important to safety.

Question

Provide calculations to support any conclusion regarding the radiological consequences in the event the cask should accidentally fall from the highest point in its path of travel.

RESPONSE

The highest point in the cask path of travel is 51 feet, 9 inches above the fuel unloading area. An analysis has been performed which considers that the cask is fully ruptured following a postulated drop from this height. The assembly in the cask is assumed to have the maximum inventory from the core with an assumed radial peaking factor of 1.65. The assembly is assumed to release all activity contained in the fuel-clad gap upon loss of clad integrity. A ground level release was assumed and an analysis was performed in accordance with Regulatory Guide 1.25. The analysis has determined that the dose at the exclusion area boundary is approximately 1.7 rem for thyroid and 7.9×10^{-3} rem for whole body, assuming a conservative 90 day decay time for the fuel assembly. This value is well below the limits of 10CFR100.