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DESCRIPTION

LTR RE OUR 8-29-76 LTR...FURN INFO ON SPENT FUEL CASK DROP .....TRANS THE FOLLOWING.....

PLANT NAME: OCONEE 1-2-3

ENCLOSURE

SUPPLEMENTARY INFORMATION CONCERNING A POSTULATED SPENT FUEL CASK DROP ACCIDENT...

(1 CY OF ENCL REC)

DO NOT REMOVE

ACKNOWLEDGED

FOR ACTION/INFORMATION

SAFETY — ENVIRO 4-1-76 RB

	SAFETY			ENVIRO
	ASSIGNED AD :			ASSIGNED AD :
X	BRANCH CHIEF : (6)	PURPLE		BRANCH CHIEF :
	PROJECT MANAGER:			PROJECT MANAGER :
X	LIC. ASST. : (17)	SHEPPARD		LIC. ASST. :

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X	OELD				LAINAS		SPANGLER
	GOSSICK & STAFF		ENGINEERING		IPPOLITO		
	MIPC		MACCARY				SITE TECH
	CASE		KNIGHT		OPERATING REACTORS		GAMMILL
	HANAUER		SIHWEIL		STELLO		STEPP
	HARLESS		PAWLICKI				HULMAN
					OPERATING TECH		
	PROJECT MANAGEMENT		REACTOR SAFETY	X	EISENHUT		SITE ANALYSIS
	BOYD		ROSS	X	SHAO		VOLLMER
	P. COLLINS		NOVAK	X	BAER		BUNCH
	HOUSTON		ROSZTOCZY	X	SCHWENCER	X	J. COLLINS
	PETERSON		CHECK	X	GRIMES		KREGER
	MELTZ						
	HELTEMES		AT & I		SITE SAFETY & ENVIRO		
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✓	ACRS 16 [redacted] SENT			

DUKE POWER COMPANY
POWER BUILDING
422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28242

WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

TELEPHONE: AREA 704
373-4083

March 19, 1976

Mr. Benard 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 No. 1

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

Dear Sir:

In response to Mr. R. A. Purple's letter of August 29, 1976, my letter of November 3, 1975 provided information concerning the conclusion that the Oconee Nuclear Station Spent Fuel Cask Handling System is adequate to ensure that the consequences of the highly unlikely postulated spent fuel cask drop accident are within guidelines established in 10 CFR 100. The attached discussion provides further information concerning the possibility of the deflection of the spent fuel cask on to spent fuel stored in the pool and the resultant radiological consequences.

Very truly yours,

William O. Parker, Jr.

MST:mmb

Attachment

SUPPLEMENTARY INFORMATION CONCERNING
A POSTULATED SPENT FUEL CASK DROP ACCIDENT

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 can be postulated that the cask will 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, it is necessary to determine the maximum number of fuel assemblies which could be contacted. The cause of the accident can be either the failure of the cask crane hoist cable or the cask lifting yoke. If the lifting yoke should fail, only the cask will fall into the pool; however, if the hoist cable should fail, it would be possible for the yoke, hook and load block to fall into the pool in addition to the cask. There are numerous cask positions in which the accident could be assumed to be initiated. The worst case is considered to be a hoist cable failure when the cask is positioned over the fuel pool wall and the cask has an eccentric drop onto the wall. In this case, the cask, yoke and load block could be deflected onto spent fuel.

An analysis was performed for the above failure to determine the number of fuel assemblies which could be contacted. Only the Oconee Unit 3 spent fuel pool was considered since the higher fuel storage density will make this the worst case. The following assumptions were employed:

1. The cask, lifting yoke and load block were free to fall from elevation 844 ft., the top of the spent fuel pool, to elevation 816 ft. 5 in., the top of the fuel storage racks.

2. The drag on the cask, lifting yoke and load block from falling through 25.5 feet of water is neglected.

3. The bouyancy of the cask, lifting yoke and load block are neglected.

4. The ability of the fuel storage cells to absorb energy beyond the point of elastic buckling has been neglected.

5. The energy which is expended in deformation of the rack interconnecting members has been neglected.

6. A deformed fuel storage cell results in the total loss of integrity of one fuel assembly.

7. The projected areas of the cask, lifting yoke and load block were orientated to contact the maximum number of fuel assemblies.

Using the above assumptions, the falling cask, lifting yoke and load block will have 1.538 x 10^6 foot pounds of kinetic energy at the instant of impact with the storage racks. This energy must be absorbed by the strain energy in the storage racks. In the worst case orientation, the projected plan area of the cask, lifting yoke and load block will contact 63 storage cells. A single fuel storage cell was then analyzed as a box column to determine the energy absorbing capacity of the cell to the point of elastic buckling. The energy absorbing capacity of the 63 cells has been determined to be 1.298 x 10^6 foot pounds. Since this is less than the total kinetic energy of the falling cask, lifting yoke and load block, the storage cells will begin to buckle and deform. If this deformation does not extend beyond the periphery of the impact area, only the 63 fuel assemblies would be damaged.

For additional conservatism, it was assumed that all of the fuel storage cells on the periphery of the impact area buckled outwards toward adjacent undamaged fuel storage cells. A single fuel storage cell was then analyzed as a continuous box beam to determine the energy required to deflect it across the space between the cells. The maximum number of fuel assemblies which could be damaged was then determined by equating the kinetic energy of the falling cask, lifting yoke and lifting block to the total number of deformed fuel storage cells. This was determined to be 73 fuel assemblies.

Once the number of fuel assemblies which could be damaged was determined, an analysis was performed which is consistent with Regulatory Guide 1.25 (Safety Guide 25), which used the following 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)
73	8.02	127.7

Therefore, the radiological consequences of this postulated accident are within the established limits of 10 CFR 100.