K 06/30/78

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DOCDATE: 06/26/78
DATE RCVD: 06/30/78

DOCTYPE: LETTER NOTARIZED: NO

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SUBJECT:
RESPONSE TO NRC REQUEST OF 05/17/78 FOR ADDL INFO WITH RE TO LIC PROCEDURE AND PLANT SYSTEMS FOR MOVEMENT OF HEAVY LOADS NEAR SPENT FUEL...ADVISING THIS MATTER HAS BEEN SUFFICIENTLY ADDRESSED IN THE SAFETY EVALUATION SUPPORTING AMEND NOS 32, 32 & 39...W/ATT

PLANT NAME: OCONEE - UNIT 1
OCONEE - UNIT 2
OCONEE - UNIT 3

REVIEWER INITIAL: XJM
DISTRIBUTER INITIAL: mc

********** DISTRIBUTION OF THIS MATERIAL IS AS FOLLOWS **********

NOTES:
1. M. CUNNINGHAM - ALL AMENDMENTS TO FSAR AND CHANGES TO TECH SPECS

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(DISTRIBUTION CODE A001)

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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

June 26, 1978

Mr. Edson G. Case, Acting Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

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

Dear Mr. Case:

In a letter dated May 17, 1978 from Mr. V. Stello, NRC/DOR, the staff requested additional information with regard to licensee procedures and plant systems for the movement of heavy loads near spent fuel.

Duke Power Company has previously exchanged information relating to this concern with the staff. This correspondence was documented in the Safety Evaluation supporting Amendment Nos. 32, 32, and 29 to Facility License Nos. DPR-38, -47, -55, respectively, a copy of which is attached.

Duke Power Company considers therefore that this concern has been sufficiently addressed and that no further response in this matter is required.

Very truly yours,

William O. Parker, Jr.

RLG:vr

Attachment



A001
S 1 1

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

# SAFETY EVALUATION AND ENVIRONMENTAL IMPACT APPRAISAL BY THE OFFICE OF NUCLEAR REACTOR REGULATION

## SUPPORTING AMENDMENT NO. 32 TO FACILITY LICENSE NO. DPR-38

## AMENDMENT NO. 32 TO FACILITY LICENSE NO. DPR-47

## AMENDMENT NO. 29 TO FACILITY LICENSE NO. DPR-55

## DUKE POWER COMPANY

## OCONEE NUCLEAR STATION, UNITS NOS. 1, 2 AND 3

## DOCKETS NOS. 50-269, 50-270 AND 50-287

### Introduction

By letter dated August 20, 1976, Duke Power Company (the licensee) requested a change to the Technical Specifications appended to Licenses Nos. DPR-38, DPR-47 and DPR-55 for the Oconee Nuclear Station Units Nos. 1, 2 and 3. The amendments would require that spent fuel assemblies stored in designated areas of the two Oconee spent fuel pools be decayed a minimum of 43 days prior to spent fuel cask movement.

### Discussion

By letter dated July 22, 1974, we requested that the licensee furnish, as an amendment to the Oconee FSAR, additional information on the Oconee facility design and operating procedures related to spent fuel handling that demonstrates that the objective of Section 50.34(b)(4) of 10 CFR 50 is met, or will be met by appropriate plant modifications. Section 50.34 (b)(4) requires that analysis and evaluation of the design and performance of structures, systems and components of the facility with the objective of assessing the risk to public health and safety, in particular, including determination of the adequacy of structures, systems and components provided for the prevention of accidents and mitigation of the consequences of accidents, be included in the FSAR.

Revision 35 to the Oconee FSAR, issued by the licensee on September 30, 1974, included a description of the equipment used to handle spent fuel casks at the Oconee Nuclear Station. By letter dated August 29, 1975, we advised the licensee that revision 35 did not contain sufficient analysis to support its conclusions on spent fuel cask handling system acceptability. We therefore requested that the licensee provide additional information. By letters dated November 3, 1975, March 19, 1976 and July 26, 1976, the licensee provided the additional information we requested.

The licensee was requested to specifically address the possibility of a spent fuel cask dropping onto spent fuel stored in the pool and the resultant radiological consequences. In addition, the licensee's submittal was to include the effects on the spent fuel pool liner should the spent fuel cask strike it during the postulated accident.

The licensee has conservatively estimated that up to 76 fuel assemblies could be damaged should a failure of the spent fuel cask handling crane or other cask handling equipment occur. In order to maintain the resultant whole body and thyroid doses well within the exposure guidelines of 10 CFR Part 100 it was determined that all fuel assemblies in the spent fuel pool areas which would be vulnerable to impact from a postulated spent fuel handling cask accident should have previously been decayed for a minimum of 43 days. The licensee has therefore proposed that, prior to spent fuel cask movement, spent fuel stored in the first 13 rows of the Unit Nos. 1 and 2 common spent fuel pool and in the first 20 rows of the Unit No. 3 spent fuel pool closest to the spent fuel cask handling area in each pool, shall be decayed a minimum of 43 days following its last activation in the reactor from which it was removed.

Evaluation

Our review of the Oconee spent fuel handling system involved an evaluation of the consequences of a spent fuel cask tipping and falling onto spent fuel assemblies in the spent fuel pool. The review included consideration of both the safety and environmental aspects of such a postulated accident.

Safety Considerations

As indicated by the licensee, the path of travel of the spent fuel cask handling crane does not allow the spent fuel cask to pass over stored fuel in either the pool common to Units Nos. 1 and 2 or in the Unit No. 3 pool. However, assuming a failure of the crane or handling equipment, and that the falling cask strikes the rim of the spent fuel pool or cask platform in the pool, it can be postulated that the cask would be deflected onto the stored fuel closest to the cask handling area. The licensee has considered the worst situation to be a hoist cable failure when the cask is positioned over the fuel pool wall with a resultant eccentric drop of the cask onto the wall. In such a case, the cask, as well as the yoke and load block of the cask handling system could be deflected onto spent fuel. The licensee provided an analysis of the failure postulated above to determine the number of fuel assemblies which could be contacted. The Oconee Unit No. 3 spent fuel pool was selected for the analysis since it will have a higher fuel storage density as a result of the license amendment issued by us on December 22, 1975, which authorized an increase in the fuel assembly storage capacity from 216 to 474 assemblies. The licensee described the assumptions employed and conservatisms considered in its analysis and concluded that a maximum of 76 fuel assemblies could be affected in the postulated accident.

Regarding the assumptions used by the licensee to determine the resultant radiation exposure doses from the postulated accident, we indicated to the licensee that a fuel radial peaking factor of 1.65 and a X/Q, value of $2.2X10^{-4}$ sec/$m^3$ (5% meterology at 1609 meters) would provide more conservative estimates. Using these values, exposure doses of less than 1 Rem Whole Body and 150 Rem Thyroid would be predicted if the 76 fuel assemblies assumed to be damaged have first been allowed to decay a minimum of 43 days following reactor shutdown. These conservative assumptions and others we employed in our independent analysis of the spent fuel cask tip accident and the resultant estimated doses are summarized in Table 1.

In view of the above, the licensee has agreed to place technical specification restrictions on the storage of fuel assemblies in both Oconee spent fuel pools to assure that spent fuel which might be contacted in a postulated dropped fuel cask accident has decayed for at least 43 days following its last activation in the reactor from which it was removed.

The licensee also provided an analysis of the effects on the spent fuel pool liner should the cask strike it during this postulated accident. It was indicated that the spent fuel pool concrete was originally designed for the cask drop accident. Should the cask strike the bottom liner plate on the edge, however, localized concrete crushing of the fill concrete would occur and the liner plate would be ruptured in the area of impact. The licensee therefore analyzed this possibility to determine the rate that pool water would escape. The results of this analysis show that the calculated leakage would be 21.3 gallons per day and would be well within the capacity of the pool water makeup systems. We have reviewed the licensees analysis and have concluded that the conditions assumed were appropriately conservative and agree that more than adequate makeup water would be available should damage to the spent fuel pool liner occur.

In summary, it is considered that the postulated dropped fuel cask accident evaluated herein is extremely remote. Given a dropped fuel cask, it is highly unlikely that damage would occur to a significant number of stored spent fuel assemblies in either of the two Oconee spent fuel pools due to the fact that the crane travel does not pass over stored fuel assemblies. Nevertheless, we have determined that the analysis of the postulated dropped fuel cask accident submitted by the licensee uses conservative assumptions to obtain the maximum number of fuel assemblies affected. We have concluded that the assumptions and analytical techniques utilized are acceptable and that the licensee has adequately predicted the maximum number of fuel assemblies affected.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) because the amendments do not involve a significant increase in the probability or consequences of accidents previously considered and do not involve a significant decrease in a safety margin, the amendments do not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Environmental Impact Appraisal

If, in a postulated fuel cask accident, the cask and associated handling device are assumed to tip and fall into the spent fuel pool and damage 76 fuel assemblies, the resulting thyroid and whole body doses would be well within the exposure guidelines of 10 CFR Part 100 for 5 per cent meteorology as discussed above, and would be <1 Rem to the thyroid for 50 per cent meteorology. This is not significantly greater than the expected consequences of other accidents previously evaluated in the Oconee Final Environmental Statement (FES). Radioactive effluent releases from postulated fuel handling accidents remain unchanged from those presented in the FES of March 1972. The realistic assumptions and estimated consequences for the spent fuel cask tip are summarized in Table 2.

In our Safety Evaluation supporting the license amendment issued on December 22, 1975, we indicated that the transfer of spent fuel from the Units Nos. 1 and 2 spent fuel pool to the Unit No. 3 spent fuel pool would possibly start in about 4 years. The licensee has indicated to us that such transfers may actually commence in September 1976 following completion of the design modifications to the Unit No. 3 pool. As concluded in our Environmental Impact Appraisal supporting the December 22, 1975 license amendment, a maximum of about 150 spent fuel assemblies are expected to be transferred from the Units Nos. 1 and 2 pool to the Unit No. 3 pool over the life of the plant. The dose rate for the transfer of 150 assemblies was calculated to be approximately 150 man-rem. This was considered not to involve a significant increase in the expected occupational exposures as previously reviewed. We therefore conclude that the transfer of spent fuel assemblies between the two spent fuel pools earlier than previously expected is acceptable and should be allowed to proceed as is now planned.

With regard to possible contamination due to the maximum expected spent fuel pool leakage of 21.3 gallons per day due to a ruptured liner plate, the licensee provided information indicating that the nearest water source used by the public that would become contaminated is Lake Hartwell (Keowee River). Based on permeability tests conducted at the Oconee facility, it would take a minimum of four years for any leakage to reach the oil collection pond which is ultimately discharged to Lake Hartwell.

This route is the most limiting of those examined. We agree with the licensee that four years would provide more than sufficient time to correct any damage to a spent fuel pool liner plate or to take other measures to prevent contamination of the Lake Hartwell water source.

Conclusion and Basis for Negative Declaration

On the basis of the foregoing analysis, it is concluded that there will be no significant environmental impact attributable to the proposed action. Having made this conclusion, the Commission has further concluded that no environmental impact statement for the proposed action need be prepared and that a negative declaration to this effect is appropriate.

Date: September 10, 1976

TABLE 1

CONSERVATIVE ASSUMPTIONS AND ESTIMATED CONSEQUENCES

FOR SPENT FUEL CASK TIP

AT OCONEE 3

| | |
|---|---|
| Power level | 2928 Mwt |
| Operating time | 3 years |
| Power peaking factor | 1.65 |
| Decay times | 43 days |
| Fraction in gaps: | |
| Kr-85 | 30% |
| All other noble gases | 10% |
| Iodine | 10% |
| Number of assemblies damaged | 76 |
| Number of assemblies in core | 177 |
| Iodine Decontamination Factor in pool water | 100 |
| Initial inventories at time of shutdown: | |
| I-131 | 25,080 ci/Mwt |
| Xe-131m | 259.5 ci/Mwt |
| Xe-133 | 56,220 ci/Mwt |
| Kr-85 | 410.2 ci/Mwt |
| Breathing Rate | $3.47 \times 10^{-4} m^3/sec$ |

| | 5% X/Q, $sec/m^3$ | Dose, rem (43 days) Thyroid | Whole Body |
|---|---|---|---|
| EAB (1609 m) | $2.2 \times 10^{-4}$ | 150 | <1 |
| LPZ Boundary (9656 m) | $4.0 \times 10^{-5}$ | 27 | <1 |

TABLE 2

REALISTIC ASSUMPTIONS AND ESTIMATED CONSEQUENCES

FOR SPENT FUEL CASK TIP

AT OCONEE 3

| | |
|---|---|
| Power level | 2928 Mwt |
| Operating time | 3 years |
| Power peaking factor | 1.0 |
| Decay times | 43 days |
| Fraction in gaps: | |
| Kr-85 | 20% |
| All other noble gases | 2% |
| Iodine | 2% |
| Number of assemblies damaged | 76 |
| Number of assemblies in core | 177 |
| Iodine Decontamination Factor in pool water | 500 |
| Initial inventories at time of shutdown: | |
| I-131 | 25,080 ci/Mwt |
| Xe-131m | 259.5 ci/Mwt |
| Xe-133 | 56,220 ci/Mwt |
| Kr-85 | 410.2 ci/Mwt |
| Breathing Rate | $3.47 \times 10^{-4}$ $m^3$/sec |

| | 50% X/Q, $sec/m^3$ | Dose, rem (43 days) Thyroid | Whole Body |
|---|---|---|---|
| EAB (1690 m) | $4.7 \times 10^{-5}$ | <1 | <1 |
| LPZ Boundary (9656 m) | $2.5 \times 10^{-6}$ | <1 | <1 |