PRIORITY 1
(ACCELERATED RIDS PROCESSING)

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9502130109 DOC.DATE: 95/01/30 NOTARIZED: NO DOCKET #
FACIL:50-269 Oconee Nuclear Station, Unit 1, Duke Power Co. 05000269
50-270 Oconee Nuclear Station, Unit 2, Duke Power Co. 05000270
50-287 Oconee Nuclear Station, Unit 3, Duke Power Co. 05000287
AUTH.NAME AUTHOR AFFILIATION
HAMPTON,J.W. Duke Power Co.
RECIP.NAME RECIPIENT AFFILIATION
Document Control Branch (Document Control Desk)

SUBJECT: Forwards addl info requested by NRC to support operation of Unit 3 full rated power during Cycle 16.

DISTRIBUTION CODE: A001D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 5+8
TITLE: OR Submittal: General Distribution

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD2-3 LA	1	1	PD2-3 PD	1	1
	WIENS,L	1	1			
INTERNAL:	ACRS	6	6	~~FILE CENTER 01~~	1	1
	NRR/DRCH/HICB	1	1	~~NRR/DSSA/SPLB~~	1	1
	NRR/DSSA/SRXB	1	1	NUDOCS-ABSTRACT	1	1
	OGC/HDS2	1	0			
EXTERNAL:	NOAC	1	1	NRC PDR	1	1

P R I O R I T Y 1 D O C U M E N T

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM P1-37 (EXT. 504-2083) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 17 ENCL 16

AA2

Duke Power Company
Oconee Nuclear Site
P.O. Box 1439
Seneca, SC 29679

J. W. HAMPTON
Vice President
(803)885-3499 Office
(803)885-3564 Fax

DUKE POWER

January 30, 1995

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, - 287
Unit 3 Cycle 16 Reload Technical Specifications
Supplement 1

By letter dated November 22, 1994, Duke Power submitted an amendment request necessary to support operation of Unit 3 at full rated power during Cycle 16. In a December 29, 1994 letter, the NRC staff requested additional information in order to complete its review of our November 22, 1994 submittal.

Attached are responses to the questions listed in your December 29, 1994 letter. This additional information does not affect the conclusions of the previously submitted No Significant Hazards Consideration Evaluation and Environmental Impact Analysis.

Please contact J. E. Burchfield at (803) 885-3292 if you have any questions.

Very truly yours,

J. W. Hampton

J. W. Hampton

xc: Mr. S. D. Ebneter, Regional Administrator
U. S. Nuclear Regulatory Commission, Region II

Mr. L. A. Wiens, Project Manager
Office of Nuclear Reactor Regulation

Mr. P. E. Harmon
Senior Resident Inspector
Oconee Nuclear Site

A001

ATTACHMENT 1

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

OCONEE PROPOSED FUEL ENRICHMENT INCREASE

Q1) Discuss the number of neutron histories accumulated in each KENO-Va calculation and why this is considered adequate to assure convergence.

A1) All of the KENO-Va calculations used to support this submittal have a nominal 90,000 neutron histories to support the final results. Plots of the average k-effective as a function of neutron generation clearly indicate that the problem is converged to an appropriate solution. Experience has shown that 90,000 histories is more than sufficient to converge most well behaved problems. In addition, although not done to support any of the Oconee criticality analyses, multiple random number sequence runs are sometimes made to confirm that KENO-Va is indeed converged to a reasonable answer.

Q2) How do KENO-Va calculations with the 27 group NDF4 cross section library compare with CASMO-3/SIMULATE-3 calculations for the same Oconee storage rack configuration?

A2) Calculated reactivities from both CASMO-3 and SIMULATE-3 were used to support this submittal as discussed in Section VI of Attachment 5. Comparisons of the calculated k-infinities between CASMO-3, SIMULATE-3 and KENO-Va were performed for the Oconee spent fuel storage rack. The CASMO and SIMULATE k-infinities were noticeably higher than the KENO-Va k-infinities. Table A2 below shows the results of this comparison.

Table A2

Spent Fuel Pool	Fuel Type	Fuel Enrichment	CASMO-3 k-inf	SIMULATE-3 k-inf	KENO-Va k-inf
Units 1 & 2	MkB11	4.3	0.95529	0.95539	0.94857
Unit 3	MkB11	4.0	0.94678	0.94689	0.93972

CASMO appears to be over predicting the reactivity of the Oconee storage racks. Modeling sensitivity studies were performed in an attempt to reveal any possible modeling errors. No trends were found to indicate any problems with the models. Also, the CASMO code vendor was contacted. Discussions with the vendor concluded that the models were accurate. Additional cases run by the vendor using different computer codes confirmed the tendency of this version of CASMO to overpredict reactivity for these geometries.

While the reactivity difference between CASMO/SIMULATE and KENO-Va are relatively large, the CASMO/SIMULATE results are conservative. Since all the burnup credit criticality analysis for the spent fuel storage racks is based on the CASMO/SIMULATE results, the proposed fuel storage requirements for the increased enrichment limit remain conservative.

Q3) The NRC staff does not agree with proposed TS 3.8.16a.3 and 3.8.16b.3, which would allow fuel storage configurations other than those reviewed by the NRC, and request that it be deleted.

A3) We understand your concern for not wanting to allow fuel storage configurations other than those reviewed by your staff. The intent of this specification is to allow for specific criticality analyses for special situations without requiring additional TS changes. An example of this would be storage of fuel assembly designs not analyzed as part of this license amendment request, as a result of either new fuel designs beyond those already anticipated or shipments of fuel from another facility. Another, more likely, example would be storage of individual fuel pins as a result of fuel assembly reconstitution. A similar specification has been approved for McGuire Nuclear Station (March 24, 1987). The specification was implemented at McGuire to accommodate storage of Oconee spent fuel shipped to McGuire for storage.

In response to your concern, we have revised TS 3.8-16 as discussed in the telephone conversation January 17, 1995. The changes include adding additional discussion in the BASES to reflect the intended use of this provision, adding a statement to each of Tables 3.8-1 through 3.8-4 indicating that specific analysis may be performed to qualify fuel assemblies for storage, and deleting proposed TS 3.8.16a.3 and 3.8.16b.3. One additional minor modification has been made to TS Tables 3.8-1 through 3.8-4. The labels for enrichment have been changed from 'Initial Enrichment' to 'Initial Nominal Enrichment' to provide further clarification. The use of nominal enrichments is discussed in the BASES for TS 3.8.

Attachment 2 contains the revisions to TS 3.8.16, TS Tables 3.8-1 through 3.8-4 and the BASES for TS 3.8..

Q4) From Table B-1, which gives the uncertainties for the spent fuel rack reactivity calculations, it appears that there was no Boraflex shrinkage assumed in the axial dimension. If this is the case please justify. If axial shrinkage was included, how much was assumed?

A4) While Table B-1 of Attachment 5 shows that no Boraflex axial shrinkage uncertainty was applied to the Oconee spent fuel storage racks, axial shrinkage was considered and determined to have no impact on reactivity.

The axial shrinkage uncertainty is based on results obtained from in situ blackness testing performed by National Nuclear Corporation in September, 1991 at the Oconee facility. The 33 panels from each spent fuel pool which were examined, had received cumulative gamma exposures of approximately equal to, or greater than, the saturation dose for shrinkage of 10^{10} rads. The axial locations of the Boraflex top and bottom ends were determined and compared to both the original as built locations and the location of the fuel stack to determine the length of the fuel stack not covered by the Boraflex. Statistical worst case results were calculated and are shown in Table A4.

Table A4

Worst Case Boraflex Axial Shrinkage

and Exposed Fuel Lengths

	Shrinkage at End	Exposed Fuel Length
Unit 1 & 2:		
Bottom	3.17"	3.11"
Top	4.23"	3.29"
Unit 3:		
Bottom	1.95"	5.61"
Top	2.49"	4.57"

The reactivity difference was calculated between the nominal boraflex length and varying amounts of exposed fuel lengths using KENO-Va. The worst case exposed fuel length was assumed for both ends. The results of the reactivity calculations showed that there was no change in reactivity for exposed fuel lengths at both ends up to 4.5" for the Unit 1 and 2 spent fuel pool, and 5.8" for the Unit 3 pool. From Table A4 above, the maximum worst case exposed fuel lengths at either end for the Unit 1 and 2 and the Unit 3 storage racks is 3.29 and 5.61 inches respectively. Therefore, no reactivity penalty is applied to either spent fuel pool because the worst case assumed exposed fuel length is always less than the minimum exposed fuel length below which no change in reactivity is predicted.

Q5) What were the maximum calculated values of k-eff for unrestricted storage of MkB11 fuel and for all other Oconee fuel at their maximum enrichment limit in each spent fuel pool?

A5) The methodology used to develop the reactivity requirements for the proposed TS is described in detail in Appendix B of the request for License Amendment for the McGuire Nuclear Station dated June 13, 1994. This methodology is referenced in Appendix B of the Oconee submittal. This methodology determines the minimum burnup requirements such that the maximum k-eff is exactly equal to 0.95 as summarized below.

The Maximum Reactivity Curves on page B-5 of the Oconee submittal are simply the maximum design k-eff of 0.95, less all the appropriate biases and uncertainties for each pool, which represents the maximum reactivity level versus burnup. Fuel specific curves are also developed which represent the calculated reactivity versus burnup for different enrichments and specific storage configurations. The intersection of the fuel specific curve and the maximum reactivity curve represents a maximum k-eff of 0.95 for the specific enrichment and storage configuration. The final reactivity requirements in the proposed TS are defined by the intersection of the maximum reactivity curve with several fuel specific curves of different enrichments for a particular storage configuration. Therefore, the reactivity requirements for spent fuel storage, defined by Tables 3.8-1 through 3.8-4 of the proposed TS, represent a maximum calculated k-eff exactly equal to 0.95 (including all biases and uncertainties).

Due to conservative rounding of numbers in the process, the final k-eff at the specified burnup limit will actually be slightly less than 0.95. Table A5 below lists maximum calculated k-eff values at beginning of life (BOL), i.e. fresh fuel, for all Oconee fuel types in both spent fuel pools. BOL values were chosen as a representative sample of maximum calculated k-effs. Similar results would be seen with higher enriched fuel at its corresponding burnup limit. The values listed in Table A5 include all appropriate biases and uncertainties. These values of k-eff are determined for an infinite array of assemblies, to reflect unrestricted storage, and are at the maximum enrichments allowed for unrestricted storage (from TS Tables 3.8-1 and 3.8-3).

Table A5

Maximum Calculated $k_{effective}$s for

Unrestricted Storage of Fresh Fuel

Fuel Assembly Design	Unit 1 and 2 Spent Fuel Pool		Unit 3 Spent Fuel Pool	
	Enrichment (w/o U-235)	k-eff	Enrichment (w/o U-235)	k-eff
MkB8 and earlier	3.93	0.94443	3.86	0.94469
MkB9 and MkB10	3.93	0.94446	3.86	0.94473
MkB10T	3.93	0.94970	3.86	0.94992
MkB11	3.73	0.94974	3.66	0.94993