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 50-369 William B. McGuire Nuclear Station, Unit 1, Duke Powe 05000369
 50-370 William B. McGuire Nuclear Station, Unit 2, Duke Powe 05000370
 50-413 Catawba Nuclear Station, Unit 1, Duke Power Co. 05000413
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SUBJECT: Responds to NRC Bulletin 89-003, "Potential Loss of Required Shutdown Margin During Refueling Operations."

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DUKE POWER

January 26, 1990

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Subject: Oconee Nuclear Station, Units 1, 2, and 3; Docket Nos. 50-269,
270, and 287
McGuire Nuclear Station, Units 1 and 2; Docket Nos. 50-369 and 370
Catawba Nuclear Station, Units 1 and 2; Docket Nos. 50-413 and 414

Response to NRC Bulletin No. 89-03, Potential Loss of
Required Shutdown Margin During Refueling Operations

Gentlemen:

By your letter dated November 21, 1989, you requested holders of operating
licenses take the following actions:

- 1) Assure that any intermediate fuel assembly configuration (including
control rods) intended to be used during refueling are identified and
evaluated to maintain sufficient refueling boron concentration to result
in a shutdown margin of approximately 5 percent;
- 2) Assure that fuel loading procedures only allow those intermediate fuel
assembly configurations that do not violate the allowable shutdown
margin, and that these procedures are strictly adhered to; and,
- 3) Assure the staff responsible for refueling operations is trained in
these procedures recommended above, and understand the potential
consequences of violating these procedures (including the fundamental
aspects of criticality control with higher enriched fuel assemblies).

The attachment to this letter provides Duke Power Company's response to the
bulletin.

I declare, under penalty of perjury, that the statements set forth herein
are true and correct to the best of my knowledge.

If you have any questions, please contact S.E. LeRoy at 704-373-6233.

Very truly yours,

Hal B. Tucker

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January 26, 1990
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Attachment

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Response to NRC Bulletin 89-03
January 26, 1990

ATTACHMENT

Duke Power Company
McGuire, Oconee, and Catawba Nuclear Stations
Response to NRC Bulletin No. 89-03, Potential Loss of Required Shutdown
Margin During Refueling Operation

By letter dated November 27, 1989, the subject bulletin was issued. The following response is provided on behalf of Duke Power Company.

Item No. 1 of NRC Bulletin 89-03 requested that Duke assure that any intermediate fuel assembly configuration (including control rods) intended to be used during refueling are identified and evaluated to maintain sufficient refueling boron concentration to result in a shutdown margin of approximately 5 percent.

McGuire, Oconee, and Catawba Response:

The possibility of unanalyzed intermediate fuel assembly configurations during refueling operations was identified by Duke Reactor Engineers in April 1989. Duke Power Design Engineering (DE) performed criticality analyses on different clusters of 4.0 w/o U-235 fresh fuel assemblies in 2000 ppm Boron water. These assemblies did not contain any control rods or burnable poison assemblies. For the interior regions of the core, the analyses determined that any cluster of more than four fresh fuel assemblies should be avoided. Based on additional analyses for assemblies adjacent to the baffle areas, a cluster of more than three fresh fuel assemblies should be avoided, unless one of these assemblies has a burnable poison assembly or a control rod, then a cluster of four fresh fuel assemblies is allowed adjacent to baffle areas. These actions will assure that K-effective will be less than 0.95. In addition to this requirement, action is taken to maintain good coupling between assemblies loaded in the core, the neutron sources, and the detectors used for monitoring count rates. The combination of these requirements is sufficient to prevent inadvertent criticality. These analyses bound all fuel assemblies used at Oconee, McGuire, and Catawba Nuclear Stations.

Item No. 2 of NRC Bulletin 89-03 requested that Duke assure that fuel loading procedures only allow those intermediate fuel assembly configurations that do not violate the allowable shutdown margin, and that these procedures are strictly followed.

McGuire Response:

At McGuire Nuclear Station, following the April 1989 analyses performed by DE, prior to the Unit 2BOC6 core reloading in late July 1989, the affected plant procedure for core reloading was revised to include the implementation of the DE analyses.

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This procedure change was approved on July 12, 1989. Operations fuel handling personnel were verbally informed of the results of the criticality analyses and the acceptable intermediate fuel assembly configurations by the Reactor Engineering section. Between July 31, 1989 and August 3, 1989, the McGuire Unit 2 core was reloaded using the approved procedure. No problems occurred and procedures were strictly adhered to during the subsequent fuel reload. Procedure changes based on the additional analyses will be implemented prior to the next core reloading.

Catawba Response:

At Catawba Nuclear Station, the Unit 2 core reloading procedure also has a limit and precaution to avoid any fuel cluster of more than four fresh fuel assemblies. The Unit 1 procedure is in the process of being revised to include this same limit. This limit is also based on the DE criticality analyses previously discussed to ensure K-effective is less than 0.95. The cores are always loaded such that the main body of the reloaded core is constantly coupled with one or more operable excore detectors. Both Unit 1 and 2 core reloading procedures have a limit and precaution to avoid formation of clusters of fuel assemblies (new or previously burned) which are not physically coupled to the main body of the core. Catawba's core reloading procedures do allow for intermediate fuel assembly configurations but these configurations must first be approved by the Nuclear Engineer in the station Reactor Group that is on shift during the core reload. All members of the Reactor Group are aware of the fuel configuration concerns. Additionally, before the fuel handling personnel disengage a fuel assembly seated in the core, the Reactor Group member monitors the corresponding excore detectors to assure the count rate has stabilized following the insertion of the assembly.

Oconee Response:

The Oconee core reload sequence plan is prepared by Duke Design Engineering, and evaluated by the Oconee Reactor Engineering group to determine if unacceptable fuel loading configurations exist. All members of the Oconee Reactor Engineering group qualified to perform this evaluation are aware of the fuel configuration concerns described in the NRC Bulletin 89-03, and the results of the Design Engineering criticality analyses. The core reload sequence plan is strictly adhered to by fuel handling personnel during fuel movement. The Oconee refueling procedure will be changed to add a Limit and Precaution regarding the use of "alternate steps" (steps used when fuel or component movements different from the planned sequence must be used). The Limit and Precaution will require the Reactor Engineering Group to be contacted to confirm acceptability of any "alternate steps" which cause new fuel assemblies to be placed in core locations other than the ones evaluated in the core reload sequence. Additionally, cores are always loaded such that the main body of the reloaded core is constantly coupled with one or more operable excore detectors.

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Item No. 3 of NRC Bulletin 89-03 requested that Duke assure the staff responsible for refueling operations is trained in these procedures recommended above, and understand the potential consequences of violating these procedures (including the fundamental aspects of criticality control with higher enriched fuel assemblies).

McGuire Response:

At McGuire Nuclear Station, on August 21, 1989 formal training was provided to the plant Reactor Engineering staff on NRC Information Notice 89-51. The station Reactor Engineering staff is responsible for developing the procedures that direct the refueling activities. This training consisted of classroom discussion of NRC IN 89-51. The training was satisfactorily completed and documented with the completion of a written test. With regard to training of Operations refueling personnel, NRC Notice 89-51 and NRC Bulletin 89-03 have been placed in the required reading package for Operation re-qualification training. Senior Reactor Operators (SRO) and Reactor Operators (RO) are required to read this material in the first training segment of 1990. In addition, this information has been placed on the Operations list of items to be verbally reviewed with the personnel reloading the core prior to the start of the next reload. At this time, strict adherence to the reloading procedure will again be emphasized, in addition to explaining the concern over the inadvertent criticality due to incorrect placement of new fuel assemblies.

Catawba Response:

At Catawba Nuclear Station, prior to each refueling outage, the fuel handling shifts undergo a fuel handling briefing with the Production Support Training Department. These briefings cover the core reloading procedure limits and precautions, as well as any significant industry fuel handling incidents that are applicable to Catawba. A copy of the NRC Bulletin No. 89-03 and Duke's response will be included in these briefings.

Oconee Response:

At Oconee Nuclear Station, the Operations Projects section will prepare a training package associated with the change to the refueling procedure. The change will include a description of the reason for the change, as well as Design Engineering information relating to the fundamentals of intermediate core configurations considered in their analysis. This training package is routinely reviewed by all fuel handling personnel prior to fuel movement. This training package will include the NRC Bulletin 89-03 and Duke's response to the bulletin to increase personnel awareness of this issue. This material will also be included in appropriate 1990 modules of Operator License and requalification training.