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10CFR50.90

ComEd

February 25, 2000

PSLTR: #00-0060

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

Dresden Nuclear Power Station, Units 2 and 3
Facility Operating License Nos. DPR-19 and DPR-25
NRC Docket Nos. 50-237 and 50-249

Subject: Request for Additional Information
Technical Specifications Change

Reference: 1) Letter from L.W. Rossbach (U.S.NRC) to O.D. Kingsley (ComEd), "Dresden-Request for Additional Information on Proposed MCPR Amendment," dated January 28, 2000

2) Letter from J.M. Heffley (ComEd) to U.S.NRC, "Request for Amendment to Appendix A, Minimum Critical Power Ratio," dated August 3, 1999

The purpose of this letter is to respond to a request for additional information (RAI), Reference (1). This RAI requested a written response within 30 days of the date of the letter (i.e., February 27, 2000). The RAI is related to a proposed change to the Technical Specifications, Reference (2), requested by Commonwealth Edison (ComEd) Company, for Facility License Nos. DPR-19 and DPR-25 for the Dresden Nuclear Power Station, Units 2 and 3 respectively.

The no significant hazards consideration, submitted in Reference 2, remains unaffected by the information contained in this response.

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Should you have any questions concerning this letter, please contact Mr. D. F. Ambler at (815) 942-2920, extension 3800.

Respectfully,

Preston Swafford

Preston Swafford
Site Vice President
Dresden Nuclear Power Station

Attachment

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Dresden Nuclear Power Station
Office of Nuclear Facility Safety – Illinois Department of Nuclear Safety

Question No. 1: Provide the fuel types and numbers of assemblies used in current Unit 2 cycle (D2C17) core, and identify if they are fresh or irradiated fuel (once or twice burned). Also, provide the loading patterns for the current cycle and describe the differences from the previous cycle or future cycle and impact on the safety limit for minimum critical power ration (SLMCPR) analysis.

The D2C17 core design is comprised of 76 Siemens Power Corporation (SPC) 9x9-2 fuel assemblies loaded in Cycle 14, 224 SPC 9x9-2 fuel assemblies first loaded in Cycle 15, 8 SPC ATRIUM-9B lead assemblies loaded in Cycle 15, 168 SPC ATRIUM-9B assemblies loaded in Cycle 16 and 248 SPC ATRIUM-9B assemblies loaded in Cycle 17. The loading pattern is attached to this response.

The difference between the D2C17 and D2C16 core designs, which results in the need to increase the SLMCPR, is that some assembly exposures of the fuel face-adjacent to fresh fuel in the same control cell exceeds 40 GWd/MTU near end of cycle. The NRC-approved SPC methodology utilized to determine the SLMCPR includes the impact of channel bow. The high exposure fuel in the D2C17 core design reaches this assembly exposure threshold at approximately 13, 999 MWd/MTU. Therefore, Commonwealth Edison (ComEd) Company requests to conservatively implement the SLMCPR increase at 13,800 MWd/MTU (see page 2 of the Reference 1).

Question No. 2: Identify the methodologies used for the SLMCPR analysis and the company that performed the analysis. Also, provide an explanation and justify that the increment of 0.01 to the SLMCPR is sufficient for single-loop operation. Describe the calculation procedure to derive this 0.01 increment.

The D2C17 SLMCPR was determined by SPC using the following NRC-approved methodologies: the critical power methodology described in Reference 2, the ANFB critical power correlation described in Reference 3, and the additive constant uncertainty provided in Reference 7. The SLMCPR is established to ensure that 99.9% of the fuel rods in the core are expected to avoid boiling transition during the limiting transient event. The SLMCPR is calculated based on parameters dependent on the fuel design and core design (loading pattern, control rod patterns, cycle exposure) and is determined through a statistical convolution of the uncertainties related to fuel, monitoring and plant measurements.

SPC performed the SLMCPR calculation for single loop operation (SLO) reactor conditions with the uncertainties and parameters discussed above assuming a 0.01 increase to the SLMCPR. These calculations are performed to confirm that the 0.01 increase remains supportable. The D2C17 core design with SLO reactor conditions and uncertainties yields fewer than 0.1% of rods in boiling transition for both a 1.10 SLMCPR up to 13,999 MWd/MTU and 1.13 SLMCPR beyond 13,999 MWd/MTU. ComEd then conservatively requested an increase in the SLMCPR for core exposures greater then 13,800 MWd/MTU.

Question No. 3: Provide a justification for using RODEX2X (sic) Supplements 1 and 2, in the current cycle or next cycle operation for Dresden, Units 2 and 3.

Prior to use of a fuel design in a reactor, analyses are performed that confirm the acceptability of that fuel assembly design from zero exposure to the maximum exposure for which that assembly can be acceptably irradiated. The enrichment and number of assemblies that are loaded in a core for a number of reactor cycles are predicated on knowing this maximum exposure to which the assembly will be irradiated. For ATRIUM 9B fuel, previously reviewed and approved NRC analyses (Reference 6), have demonstrated the acceptability of the design to maximum exposures of 48 GWd/MTU bundle average, 50 GWd/MTU rod average burnup, and 60 GWd/MTU peak pellet burnup. However, these ATRIUM 9B burnup limitations were based on limitations in SPC methodologies to perform calculations past those burnup levels, and not limited by physical features of the ATRIUM 9B design itself.

The NRC has approved the use of RODEX2A for licensing applications to 62 GWd/MTU rod average burnup (Reference 4). Therefore SPC has performed additional analyses under the NRC-approved generic mechanical design criteria report (Reference 5) using RODEX2A (Reference 4) and determined new conservative estimates for the ATRIUM 9B peak fuel rod and peak fuel pellet exposures that correspond to the ATRIUM 9B peak assembly exposure of 48 GWd/MTU (Reference 6). The resulting peak fuel rod exposure is 55 GWd/MTU and peak fuel pellet exposure is 66 GMWd/MTU.

The Technical Specification Amendment proposes adding the RODEX2A supplement (Reference 4) to Technical Specification Section 6.9.A.6.b (not the COLR) in recognition of the use of the ATRIUM 9B fuel to exposures of 48 GWd/MTU (assembly), 55 GWd/MTU (rod), and 66 GWd/MTU (pellet).

The ATRIUM 9B fuel operating in D2C17 is not projected to exceed these exposure limits. However, the D2C17 new fuel design utilizes the topical report to meet future design requirements. The D3C17 core design projects that fuel assemblies will exceed 60 GWd/MTU peak pellet exposure. Initial estimations for D2C18 also anticipate exceeding 60 GWd/MTU peak pellet exposure. As such, it is appropriate to incorporate the RODEX2A methodology (EMF-85-74 Supplements 1 and 2) into the Dresden Technical Specifications. Incorporation of this reference in the amendment request for D2C17 assures the appropriate references are incorporated into the Technical Specifications that were used for the design of the current cycle fuel assemblies from initial irradiation to its end of life.

References

1. ComEd letter, J. M. Heffley to USNRC, "Request for Amendment to Appendix A, Minimum Critical Power Ratio", JMHLTR:99-0076, August 3, 1999.
2. Advanced Nuclear Fuels Corporation Critical Power Methodology for Boiling Water Reactors/Advanced Nuclear Fuels Corporation Critical Power Methodology for Boiling Water Reactors, Methodology for Analysis of Assembly Channel Bowing Effects/NRC Correspondence, ANF-524(P)(A) Revision 2, Supplement 1 Revision 2, Supplement 2, Advanced Nuclear Fuels Corporation, November 1990.
3. ANF-1125(P)(A), "Critical Power Correlation- ANFB."
4. RODEX2A (BWR) Fuel Rod Thermal Mechanical Evaluation Model, EMF-85-74 (P) Revision 0, Supplement 1 (P) (A) and Supplement 2 (P) (A) dated February 1998.
5. ANF-89-98 (P) (A), Generic Mechanical Design Criteria for BWR Fuel Designs, Revision 1 and Revision 1 Supplement 1, Advanced Nuclear Fuels Corporation, May 1995.
6. ANF-89-14 (P) (A), Advanced Nuclear Fuels Corporation Generic Mechanical Design for Advanced Nuclear Fuels Corporation 9x9-IX and 9x9-9X BWR Reload Fuel, Revision 1 and Supplements 1 and 2, Advanced Nuclear Fuels Corporation, October 1991.
7. ANF-1125 (P) (A), ANFB Critical Power Correlation Determination of ATRIUM 9B Additive Constant Uncertainties, Supplement 1 Appendix E, Siemens Power Corporation, September 1998.

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3
RESPONSE TO REQUEST
FOR ADDITIONAL INFORMATION (RAI)
LOADING PATTERN DRESDEN UNIT 2 CYCLE 17

	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59
60											2	13	13	14	14	14	14	13	13	2										
58										14	2	1	2	1	2	2	1	2	1	2	14									
56							14	13	13	1	5	5	5	7	4	4	7	5	5	5	1	13	13	14						
54						14	2	5	7	7	7	1	7	6	1	1	6	7	1	7	7	7	5	2	14					
52					14	1	1	7	5	7	2	7	5	7	5	5	7	5	7	2	7	5	7	1	1	14				
50				14	1	2	7	6	7	2	7	6	7	2	6	6	2	7	6	7	2	7	6	7	2	1	14			
48			14	2	1	7	2	4	5	6	4	3	4	6	1	1	6	4	3	4	6	5	4	2	7	1	2	14		
46			13	5	7	6	4	1	6	4	2	1	6	5	1	1	5	6	1	2	4	6	1	4	6	7	5	13		
44			13	7	5	7	5	6	2	6	5	6	5	6	5	5	6	5	6	5	6	2	6	5	7	5	7	13		
42		14	1	7	7	2	6	4	6	2	6	5	6	2	6	6	2	6	5	6	2	6	4	6	2	7	7	1	14	
40	2	2	5	7	2	7	4	2	5	6	1	1	5	6	1	1	6	5	1	1	6	5	2	4	7	2	7	5	2	2
38	13	1	5	1	7	6	3	1	6	5	1	2	6	5	1	1	5	6	2	1	5	6	1	3	6	7	1	5	1	13
36	13	2	5	7	5	7	4	6	5	6	5	6	1	6	5	5	6	1	6	5	6	5	6	4	7	5	7	5	2	13
34	14	1	7	6	7	2	6	5	6	2	6	5	6	1	6	6	1	6	5	6	2	6	5	6	2	7	6	7	1	14
32	14	2	4	1	5	6	1	1	5	6	1	1	5	6	2	2	6	5	1	1	6	5	1	1	6	5	1	4	2	14
30	14	2	4	1	5	6	1	1	5	6	1	1	5	6	2	2	6	5	1	1	6	5	1	1	6	5	1	4	2	14
28	14	1	7	6	7	2	6	5	6	2	6	5	6	1	6	6	1	6	5	6	2	6	5	6	2	7	6	7	1	14
26	13	2	5	7	5	7	4	6	5	6	5	6	1	6	5	5	6	1	6	5	6	5	6	4	7	5	7	5	2	13
24	13	1	5	1	7	6	3	1	6	5	1	2	6	5	1	1	5	6	2	1	5	6	1	3	6	7	1	5	1	13
22	2	2	5	7	2	7	4	2	5	6	1	1	5	6	1	1	6	5	1	1	6	5	2	4	7	2	7	5	2	2
20		14	1	7	7	2	6	4	6	2	6	5	6	2	6	6	2	6	5	6	2	6	4	6	2	7	7	1	14	
18			13	7	5	7	5	6	2	6	5	6	5	6	5	5	6	5	6	5	6	2	6	5	7	5	7	13		
16			13	5	7	6	4	1	6	4	2	1	6	5	1	1	5	6	1	2	4	6	1	4	6	7	5	13		
14			14	2	1	7	2	4	5	6	4	3	4	6	1	1	6	4	3	4	6	5	4	2	7	1	2	14		
12				14	1	2	7	6	7	2	7	6	7	2	6	6	2	7	6	7	2	7	6	7	2	1	14			
10					14	1	1	7	5	7	2	7	5	7	5	5	7	5	7	2	7	5	7	1	1	14				
8						14	2	5	7	7	7	1	7	6	1	1	6	7	1	7	7	7	5	2	14					
6							14	13	13	1	5	5	5	7	4	4	7	5	5	5	1	13	13	14						
4										14	2	1	2	1	2	2	1	2	1	2	14									
2											2	13	13	14	14	14	14	13	13	2										
	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59

Fuel Type	Bundle Name	# of Assemblies	ID Range	Cycle Fresh
1	SPC 9x9-2B 3.13 7Gd3.5/8Gd5.0	120	A2G007-A2G126	15
2	SPC 9x9-2B 3.13 8Gd5.0	104	A2G127-A2G230	15
3	SPC ATRIUM-9B 3.48 8Gd4.0/9Gd5.0	8	A2G001-A2G006 A2G231, A2G232	15
4	SPC ATRIUM-9B 3.30 9Gd3.0/11Gd6.0/9Gd6.0	40	A2H001-A2H040	16
5	SPC ATRIUM-9B 3.48 9Gd3.0/11Gd5.0/9Gd5.0	128	A2H041-A2H168	16
6	SPC ATRIUM-9B 3.71 11Gd5.0/11Gd7.0/10Gd8.0	144	A2J001-A2J144	17
7	SPC ATRIUM-9B 3.71 11Gd5.0/11Gd6.0/10Gd6.0	104	A2J145-A2J248	17
13	SPC 9x9-2B 3.13 7Gd3.5	32	A2F129-A2F208	14
14	SPC 9x9-2B 3.13 8Gd4.0	44	A2F001-A2F128	14