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10 CFR 50.90

RS-02-114

June 18, 2002

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Quad Cities Nuclear Power Station, Unit 1
Facility Operating License No. DPR-29
NRC Docket No. 50-254

Subject: Supplemental Information Supporting the Request for Technical Specification Changes for Minimum Critical Power Ratio Safety Limit

Reference: Letter from Keith R. Jury (Exelon Generation Company, LLC) to U. S. NRC, "Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit," dated April 8, 2002

In the referenced letter, Exelon Generation Company (EGC), LLC, requested approval for a Technical Specifications (TS) change for the Minimum Critical Power Ratio Safety Limit for Quad Cities Nuclear Power Station (QCNPS), Unit 1. In that request, EGC proposed to revise the values of the Safety Limit for the Minimum Critical Power Ratio (SLMCP) in TS Section 2.1.1, "Reactor Core SLs," for Unit 1 Cycle 17A for both two loop operation (TLO) and single loop operation (SLO).

During conversations with the NRC on June 5, 2002, Mr. Fred Lyon requested additional clarifying information for the SLMCP TS. It was requested that QCNPS provide additional information relative to core loading patterns, calculations of SLMCP for QC1C17A, and additional clarifying information concerning the original submittal. Attached is the requested information.

Should you have any questions concerning his letter, please contact Mr. Don Cecchett at (630) 657-2826.

Respectfully,



P. R. Simpson
Manager - Licensing
Mid-West Regional Operating Group

Attachment: Requested Supplemental Information

A001

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

REQUEST FOR ADDITIONAL INFORMATION
RELATING TO REQUEST DATED 4/8/02 FOR CHANGE TO
SLMCPR EXELON GENERATION COMPANY, LLC QUAD CITIES NUCLEAR
POWER STATION, UNIT 1 DOCKET NO. 50-254

Question 1:

Please provide the core loading patterns for both before and after the mid-cycle fuel shuffle, including quantity, fuel type and when the bundles were loaded into the core, and identify the fuel type and quantity of the leaking fuel assembly.

Response:

Figures 1 and 2 respectively contain the Quad Cities 1 Cycle 17 and Quad Cities 1 Cycle 17A core loading maps. The table at the bottom of each figure identifies each fuel type in the core (GE10 – General Electric fuel type GE10, SPCA9 – Siemens Power Corporation fuel type ATRIUM-9B), the quantity of each fuel type contained in the core, and when each fuel type was first loaded in the core.

The leaking fuel assembly in Quad Cities 1 Cycle 17 was one (1) ATRIUM-9B assembly with 3.82 weight percent bundle enrichment and 12 gadolinium rods. This assembly is type 19 as identified in the tables and was first loaded in Cycle 17. It was replaced by one (1) GE10 assembly with 3.12 weight percent bundle enrichment and 7 gadolinium rods. This assembly is type 2 as identified in the tables and was first loaded in Cycle 14. This assembly had been discharged at the end of cycle 16.

Question 2:

It appears that the Cycle 17A is a mixed core operation. Please provide in detail the calculation procedures for Safety Limit Minimum Critical Power Ratio (SLMCPR) for QC1C17A including: (1) the approved methodologies used; (2) the interface data from different fuel vendors (for GE10 and ATRIUM-9B), and (3) the main cause of the 0.04 increase of the SLMCPR for both two loop operation and single loop operation beyond 4,140 MWD/MTU.

Response:

The fuel types (GE10 and ATRIUM-9B) in Q1C17A are identical to the fuel types in Quad Cities 1 Cycle 17 (Q1C17). The procedure used to determine the SLMCPR for the two core loadings is identical.

The safety limit analysis for Quad Cities Unit 1 Cycle 17A (Q1C17A) was performed using the NRC approved methodology described in Reference 1. This analysis evaluated the Safety Limit MCPR (SLMCPR) using the Reference 2 NRC approved correlation. The ATRIUM-9B additive constant uncertainties from Reference 3 were used in the analysis. The process of developing additive constants and additive constant uncertainties for application of the ANFB correlation to co-resident fuel is described in Reference 4. This process was used for the co-resident GE10 fuel. The increase in the SLMCPR for Cycle 17A beyond 4,140 MWd/MTU is primarily due to the location of the GE10 fuel in the Cycle 17A core design and the subsequent impact of channel bow (through local peaking and f-effective changes in neighboring bundles) on the SLMCPR. The mid-cycle core shuffle resulted in a larger number of high exposed GE10 assemblies being located near high powered ATRIUM-9B assemblies. The high powered ATRIUM-9B assemblies are the assemblies that contribute rods in boiling transition for the SLMCPR calculation. Consequently, the GE10 mean channel bow and

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Question 2 Response (continued)

channel bow uncertainty has a significant impact on the SLMCPR calculation for Q1C17A. There is a large change in the mean channel bow and channel bow uncertainty for the GE10 fuel at 40,000 MWd/MTU channel exposure. At 4,140 MWd/MTU cycle exposure, a significant number of GE10 channels reach or exceed exposures of 40,000 MWd/MTU (all bundle exposures remain within the limits specified in the QCNPS operating license). Therefore, the increased GE10 mean channel bow and channel bow uncertainty, through local peaking and f-effective changes in neighboring bundles, influences the calculated SLMCPR for exposures beyond 4,140 MWd/MTU. The Q1C17A SLMCPR increases by 0.04 due to the change in mean channel bow and channel bow uncertainties.

References:

1. ANF-524 (P)(A) Revision 2 and Supplements 1 and 2, "ANF Critical Power Methodology for Boiling Water Reactors," November 1990.
2. ANF-1125 (P)(A) and Supplements 1 and 2, "ANFB Critical Power Correlation," April 1990.
3. ANF-1125 (P)(A) Supplement 1 Appendix E, "ANFB Critical Power Correlation Determination of ATRIUM-9B Additive Constant Uncertainties," September 1998.
4. EMF-1125 (P)(A) Supplement 1 Appendix C, "ANFB Critical Power Correlation Application for Co-Resident Fuel," August 1997.

Question 3:

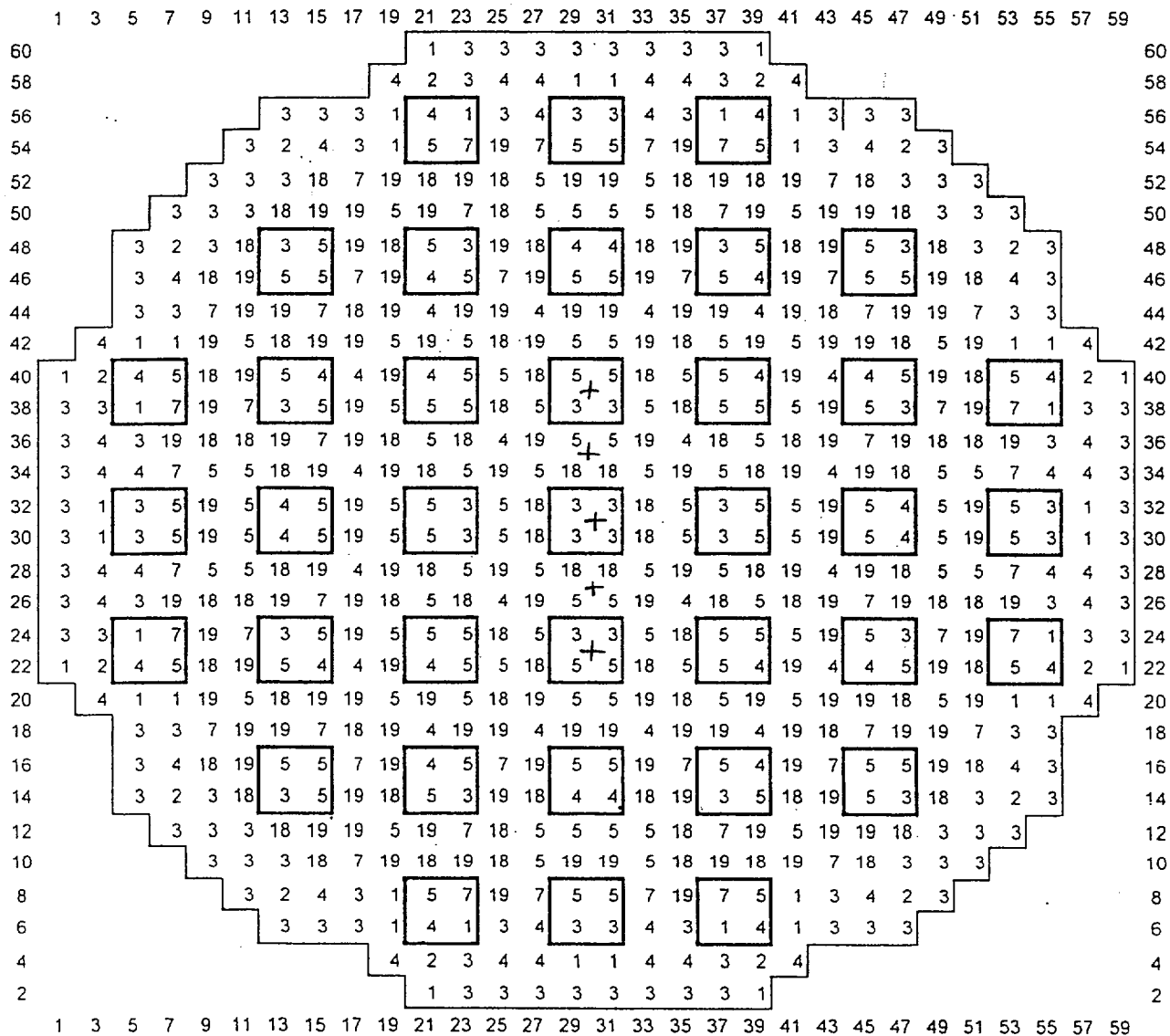
Section E of Attachment A of your 4/8/02 submittal appears to be missing. Please provide Section E if it exists.

Response:

The Attachment A section's were inadvertently mis-sequenced, Section E of Attachment A does not exist.

Figure 1

Quad Cities Unit 1 Cycle 17 Bundle Type Loading Plan



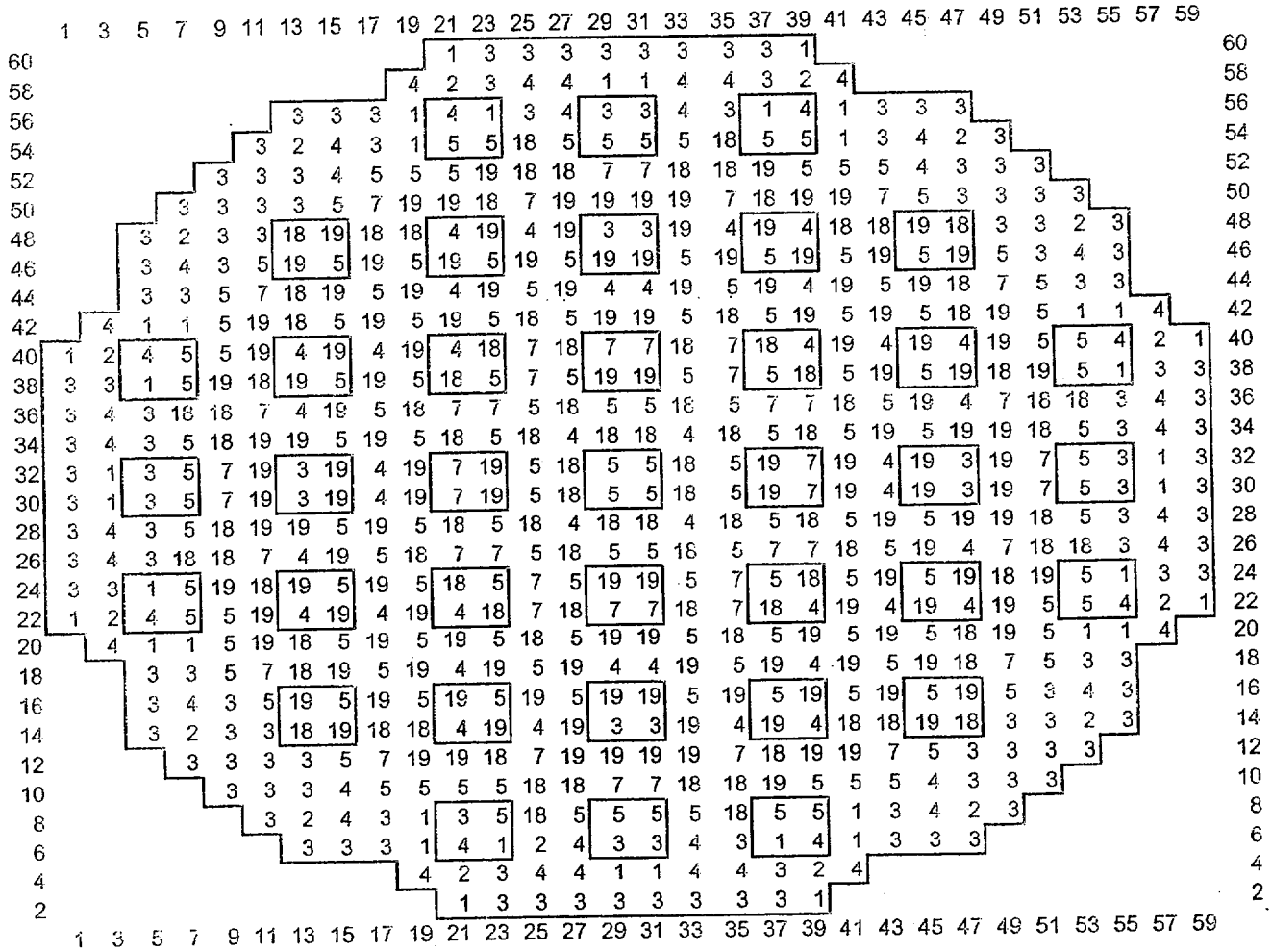
BT	Bundle Name	# Bundles	ID Range	Cycle First Loaded
1	GE10-P8HXB311-8GZ-100M-145-CECO	40	YJ8175 - YJ8254	14
2	GE10-P8HXB312-7GZ-100M-145-CECO	16	YJ8263 - YJ8317	14
3	GE10-P8HXB332-8G5.0-100M-145-CECO	144	YJD285 - YJD428	15
4	GE10-P8HXB333-4G5.0/6G4.0-100M-145-CECO	88	YJD429 - YJD516	15
5	SPCA9-3.48B-11G6.5-ADV	152	Q6A001 - Q6A152	16
7	SPCA9-3.60B-11G6.5-ADV	48	Q6B153 - Q6B200	16
18	SPCA9-383B-11GZH-ADV	92	Q7C001 - Q7C092	17
19	SPCA9-382B-12GZL-ADV	144	Q7D093 - Q7D236	17

author: CT 7/24/00

reviewer PAW
7/27/00

Figure 2

Quad Cities 1 Cycle 17A Bundle Type Loading Plan



BT	Bundle Name	# Bundles	ID Range	Cycle	
				First Loaded	
1	GE10-P8HXB311-8GZ-100M-145-CECO	40	YJ8175-YJ8254	14	
2	GE10-P8HXB312-7GZ-100M-145-CECO	17	YJ8262-YJ8317	14	
3	GE10-P8HXB332-8G5.0-100M-145-CECO	144	YJD285-YJD428	15	
4	GE10-P8HXB333-4G5.0/6G4.0-100M-145-CECO	88	YJD429-YJD516	15	
5	SPCA9-3.48B-11G6.5-ADV	152	Q6A001-Q6A152	16	
7	SPCA9-3.60B-11G6.5-ADV	48	Q6B153-Q6B200	16	
18	SPCA9-383B-11GZH-ADV	92	Q7C001-Q7C092	17	
19	SPCA9-382B-12GZL-ADV	143	Q7D093-Q7D236	17	

Preparer: *[Signature]*

Reviewer: *[Signature]* 1/14/2002