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RS-01-193

September 17, 2001

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

Dresden Nuclear Power Station, Unit 2
Facility Operating License No. DPR–19
NRC Docket No. 50–237

Subject: Additional Information Supporting the Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit

References: 1) Letter from R. M. Krich (Exelon Generation Company, LLC) to U. S. NRC, "Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit," dated June 6, 2001

2) Letter from L. W. Rossbach (U. S. NRC) to O. D. Kingsley (Exelon Generation Company, LLC), "Request for Additional Information, 'Request for Technical Specification Changes for Minimum Critical Power Ratio Safety Limit,'" dated August 30, 2001

In Reference 1, in accordance with 10 CFR 50.90, "Application for amendment of license or construction permit," Exelon Generation Company (EGC), LLC, requested a change to the Technical Specifications (TS) of Facility Operating License Number DPR–19 for the Dresden Nuclear Power Station (DNPS), Unit 2. In an August 22, 2001, telephone conference call between representatives of EGC and members of the NRC, the NRC requested additional information regarding this proposed change. The questions were formally transmitted in Reference 2. In a September 14, 2001, teleconference between Mr. J. Stang of the NRC and Mr. A. R. Haeger of EGC, it was agreed that EGC would provide the requested information by September 17, 2001. Attachment A to this letter provides the requested information.

A001

Some of the information in Attachment A is proprietary information to the Global Nuclear Fuels (GNF) Company, and EGC requests that it be withheld from public disclosure in accordance with 10 CFR 2.790(a)(4), "Public Inspections, Exemptions, Requests for Withholding." This information is indicated with sidebars. Attachment B provides the affidavit supporting the request for withholding the proprietary information in Attachment A from public disclosure, as required by 10 CFR 2.790(b)(1). Attachment C contains a non-proprietary version of Attachment A.

Should you have any questions concerning his letter, please contact Mr. Allan R. Haeger at (630) 657–2807.

Respectfully,

T. W. Simpkin
Manager – Licensing
Mid-West Regional Operating Group

Attachments:

Affidavit
Attachment A: Additional Information Supporting the Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit (Proprietary)
Attachment B: Affidavit for Withholding Portions of Attachment A from Public Disclosure
Attachment C: Additional Information Supporting the Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit (Non-Proprietary)

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

STATE OF ILLINOIS)
COUNTY OF DUPAGE)
IN THE MATTER OF)

EXELON GENERATION COMPANY, LLC) **Docket Number**

DRESDEN NUCLEAR POWER STATION, UNIT 2) **50–237**

SUBJECT: Additional Information Supporting the Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit

AFFIDAVIT

I affirm that the content of this transmittal is true and correct to the best of my knowledge, information and belief.

T. W. Simpkin
Manager – Licensing
Mid-West Regional Operating Group

Subscribed and sworn to before me, a Notary Public in and for the State above named, this 17th day of September, 2001.

"OFFICIAL SEAL"
Timothy A. Byam
Notary Public, State of Illinois
My Commission Expires 11/24/2001

Notary Public

Attachment B
Additional Information Supporting the Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit (Proprietary)
Dresden Nuclear Power Station, Unit 2

Affidavit for Withholding Portions of Attachment A from Public Disclosure

Affidavit

I, Charles M. Vaughan, being duly sworn, depose and state as follows:

(1) I am Manager, Facility Licensing, Global Nuclear Fuel – Americas, L.L.C. ("GNF-A") and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

1. The information sought to be withheld is contained in the attachment, "Additional Information Supporting the Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit".

(2) In making this application for withholding of proprietary information of which it is the owner or licensee, GNF-A relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4) and 2.790(a)(4) for "trade secrets and commercial or financial information obtained from a person and privileged or confidential" (Exemption 4). The material for which exemption from disclosure is here sought is all "confidential commercial information," and some portions also qualify under the narrower definition of "trade secret," within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(3) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GNF-A's competitors without license from GNF-A constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information which reveals cost or price information, production capacities, budget levels, or commercial strategies of GNF-A, its customers, or its suppliers;

d. Information which reveals aspects of past, present, or future GNF-A customer–funded development plans and programs, of potential commercial value to GNF-A;

e. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b., above.

(5) The information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GNF-A, and is in fact so held. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in (6) and (7) following. The information sought to be withheld has, to the best of

my knowledge and belief, consistently been held in confidence by GNF-A, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or subject to the terms under which it was licensed to GNF-A. Access to such documents within GNF-A is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GNF-A are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2) is classified as proprietary because it contains details of GNF-A's fuel design and licensing methodology.

The development of the methods used in these analyses, along with the testing, development and approval of the supporting methodology was achieved at a significant cost, on the order of several million dollars, to GNF-A or its licensor.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GNF-A's competitive position and foreclose or reduce the availability of profit–making opportunities. The fuel design and licensing methodology is part of GNF-A's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC–approved methods.

The research, development, engineering, analytical, and NRC review costs comprise a substantial investment of time and money by GNF-A or its licensor.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GNF-A's competitive advantage will be lost if its competitors are able to use the results of the GNF-A experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GNF-A would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GNF-A of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

Affidavit

State of North Carolina)
County of New Hanover) SS:

Charles M. Vaughan, being duly sworn, deposes and says:

That he has read the foregoing affidavit and the matters stated therein are true and correct to the best of his knowledge, information, and belief.

Executed at Wilmington, North Carolina, this 14 day of September, 2001

Charles M. Vaughan
Global Nuclear Fuel – Americas, LLC

Subscribed and sworn before me this 14th day of September, 2001

Notary Public, State of North Carolina

My Commission Expires Feb. 6, 2006

Attachment C
Additional Information Supporting the Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit (Non-Proprietary)
Dresden Nuclear Power Station, Unit 2

Question 1

Provide the fuel types and numbers of assemblies used in Dresden Cycle 17 and Cycle 18 operation and identify if they are fresh or irradiated fuel (once or twice burned, etc.). Also, describe the impact on the Safety Limit for the Minimum Critical Power Ratio (SLMCPR) calculation based on the fuel loading patterns for Cycle 17 and Cycle 18 mixed core.

Response

The fuel types, number of assemblies, cycles burned, and identification of cycle loaded are included as Figures 1 and 2 for Dresden Nuclear Power Station (DNPS), Unit 2, Cycles 17 and 18 (D2C17 and D2C18), respectively. The two loading patterns are identical to those provided in Attachment F of Reference 1. The legend is expanded to add the number of cycles burned and the cycle loaded.

In Figure 1 (D2C17), fuel types A, B, H, and J are the Framatome Advanced Nuclear Products (FANP) two water rod 9x9 design (300 assemblies total). The remaining fuel types C, D, E, F, and G are the FANP ATRIUM 9B design (424 assemblies total).

In Figure 2 (D2C18), fuel type A is the FANP two water rod 9x9 design (28 assemblies total, which are all located on the core periphery). Fuel types B, C, D, and E are the FANP ATRIUM 9B design (416 assemblies total), while fuel types F and G are the new General Electric (GE) Company GE14 assemblies to be loaded (280 assemblies total).

The impact of the fuel loading patterns is discussed in the response to Question 2 below. The SLMCPR is also affected by the uncertainties used for each fuel type as noted in the following. GE's GESTAR methodology was used to analyze the SLMCPR for the D2C18 mixed core. GESTAR used the GEXL14 correlation to calculate the onset of transition boiling for GE14 fuel, and the GEXL96 correlation to calculate the onset of transition boiling for ATRIUM-9B fuel. As indicated in Reference 1, a Critical Power Correlation (CPR) correlation uncertainty of [[ ]][(1)] was applied to the GE14 fuel in the D2C18 mixed core (i.e. for the GEXL14 correlation which is applicable for GE14 fuel) and a CPR correlation uncertainty of [[ ]] was applied to the ATRIUM 9B fuel in the D2C18 mixed core (i.e. for the GEXL96 correlation which is applicable to the FANP ATRIUM 9B fuel). D2C17 was analyzed using FANP NRC-approved methods, for a reactor core with ATRIUM-9B and 9x9-2 fuel, with the FANP uncertainties for those fuel types.

Question 2

Please identify the major contributor to the large reduction of the SLMCPR value (i.e., about 0.05). Clarify that the ATRIUM-9B is not dominant in Cycle 18 operation and justify that the proposed straight SLMCPR values instead of the cycle exposure dependent SLMCPR values for two recirculation loop and single loop operation bound the Cycle 18 operation. Identify which total uncertainty in the GEXL96 correlation predictions for ATRIUM-9B fuel is used in the SLMCPR calculation.

(1) See the section titled "Additional Information"

Response

The difference in SLMCPR values between D2C18 and D2C17 is attributed to the following effects.

1. The FANP ATRIUM 9B/9x9-2 fuel in D2C17 and the FANP ATRIUM 9B/GNF GE14 fuel in D2C18 have different applicable CPR correlations and correlation uncertainties.
2. D2C17 and D2C18 have different core radial and axial power distributions.
3. D2C17 FANP SLMCPR calculations include the effects of channel bow in the uncertainties used, [[

]]

4. Different computer code packages are used for analysis methodology. FANP analysis methodology is used for D2C17 and GNF analysis methodology is used for D2C18. Both methodologies are NRC-approved.

For D2C18, a 1.07 SLMCPR is supportable throughout the cycle, although DNPS is requesting a limit of 1.08 to potentially accommodate the following DNPS Unit 2 operating cycle. In contrast to the D2C17 results, a difference of only 0.02 exists between the limiting D2C17 SLMCPR of 1.09 from beginning of cycle (BOC) to 13,800 megawatt-days per metric ton (MWD/MT) compared to the limiting D2C18 calculated SLMCPR of 1.07 over that same exposure range. The combination of the four effects quoted above easily explains the small difference of 0.02 for this portion of the cycle. Beyond 13,800 MWD/MT, a 0.05 difference is seen between the D2C17 and D2C18 results. Due to the differences in fuel vendors, fuel designs, and vendor methodology between the D2C17 and D2C18 results, no specific analyses can be performed to quantitatively determine how much of this 0.05 difference is separately due to each of the four effects identified above. However, from past FANP analyses and sensitivities, engineering judgement would indicate that the FANP determined channel bow effects relative to the D2C17 SLMCPR would account for approximately 0.03 of this difference and the remainder of the difference would be attributable to the other three effects. This is supported by the observation that the SLMCPR for D2C17 increases at the latter part of the cycle, which is when channel bow becomes much more pronounced. This is consistent with the irradiated fuel's channel bow effects on the new fuel's pin powers becoming much more pronounced once the old fuel assemblies become highly exposed.

The contribution of ATRIUM 9B fuel to the number of rods in boiling transition for the calculated SLMCPR is shown on the table below as a function of D2C18 incremental cycle exposure, expressed in gigawatt days (GWD)/MT.

[[

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The percent contribution corresponds to the number of pins in transition boiling attributable to a given fuel type. For example, at 0 GWD/MT exposure, [[ ]] of the pins in transition boiling are in ATRIUM 9B fuel while [[ ]] of the pins in transition boiling reside in GE14 fuel assemblies. This results in the ATRIUM 9B fuel having a [[ ]] contribution to the number to rods in transition boiling early in the cycle. As cycle exposure increases, the contribution of ATRIUM 9B fuel to the number of rods in boiling transition [[ ]], such that at 6 GWD/MT, [[ ]], there are approximately [[ ]] to the number of rods in boiling transition from the ATRIUM and GE14 fuel. From this table, it can be concluded that [[ ]]. However, as indicated in the table below, the SLMCPR is not necessarily the largest at BOC due to the impact of the core power distribution, which is varying throughout the cycle.

A summary of the exposure dependent SLMCPR computed throughout the cycle is shown in the table below. The proposed dual loop SLMCPR straight value of 1.08 is conservative with respect to the SLMCPR calculated for various exposures throughout the cycle. For single loop operation (SLO), [[ ]]. Thus, the proposed straight MCPR value of 1.09 for SLO bounds D2C18 operation throughout the cycle.

[[

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As indicated in Reference 1, a CPR correlation uncertainty of [[ ]] (1) was applied to the GE14 fuel in the D2C18 mixed core SLMCPR calculations (i.e. [[ ]] (1) for the GEXL14 correlation which is applicable for GE14 fuel). A CPR correlation uncertainty of [[ ]] was applied to the ATRIUM 9B fuel in the D2C18 mixed core (i.e. [[ ]] for the GEXL96 correlation which is applicable to the FANP ATRIUM 9B fuel).

Question 3

Describe the POWERPLEX bundle power distribution uncertainty in relation to the uncertainty values specified in Table 1 and Table 2 of Attachment F and explain the meaning of "Specific" for power distribution uncertainty in Table 1. Also, describe the difference between the uncertainty values obtained from NEDC-32601P-A and from Dresden-2 Specific, respectively, and their impact on the Safety Limit MCPR calculation.

(1) See the section titled "Additional Information"

Response

The bundle power uncertainty value in Reference 1 is identified as specific. The bundle power distribution uncertainty value that has been used throughout the D2C18 SLMCPR calculations is 5.0%. This value is specific in that it is a bounding bundle power distribution uncertainty value as determined for the POWERPLEX on-line core monitoring system. It is not a generic GE GETAB model value or a GE reduced uncertainty model value. This value of 5.0% is conservative relative to the GETAB model uncertainty value of [[ ]].

The difference between the DNPS Unit 2 specific values and the other uncertainty values obtained from NEDC-32601P-A (Reference 2) is that the numbers obtained from NEDC-32601P-A are generic values and the DNPS specific values represent actual plant system configuration uncertainties for Unit 2. For example, the generic NEDC-32601P-A uncertainty value for feedwater flow rate is [[ ]]. However, due to the specific measurement equipment installed at DNPS Unit 2, a higher feedwater flow rate uncertainty of 2.7% has been determined. Whenever plant specific uncertainties are determined to be higher than the generic uncertainties of NEDC-32601P-A, the plant specific uncertainties are used. The calculated SLMCPR value becomes a higher number (i.e. more conservative) due to the use of the higher plant specific uncertainties.

Additional Information

The response to Question 1 of Reference 3 [[

]] GNF has re-evaluated this uncertainty in the GEXL14 correlation and will soon be providing the appropriate documentation to the NRC. [[

]] The requested D2C18 SLMCPR of 1.08 is still appropriate even in consideration of this slight increase in the GEXL correlation uncertainty for GE14 fuel.

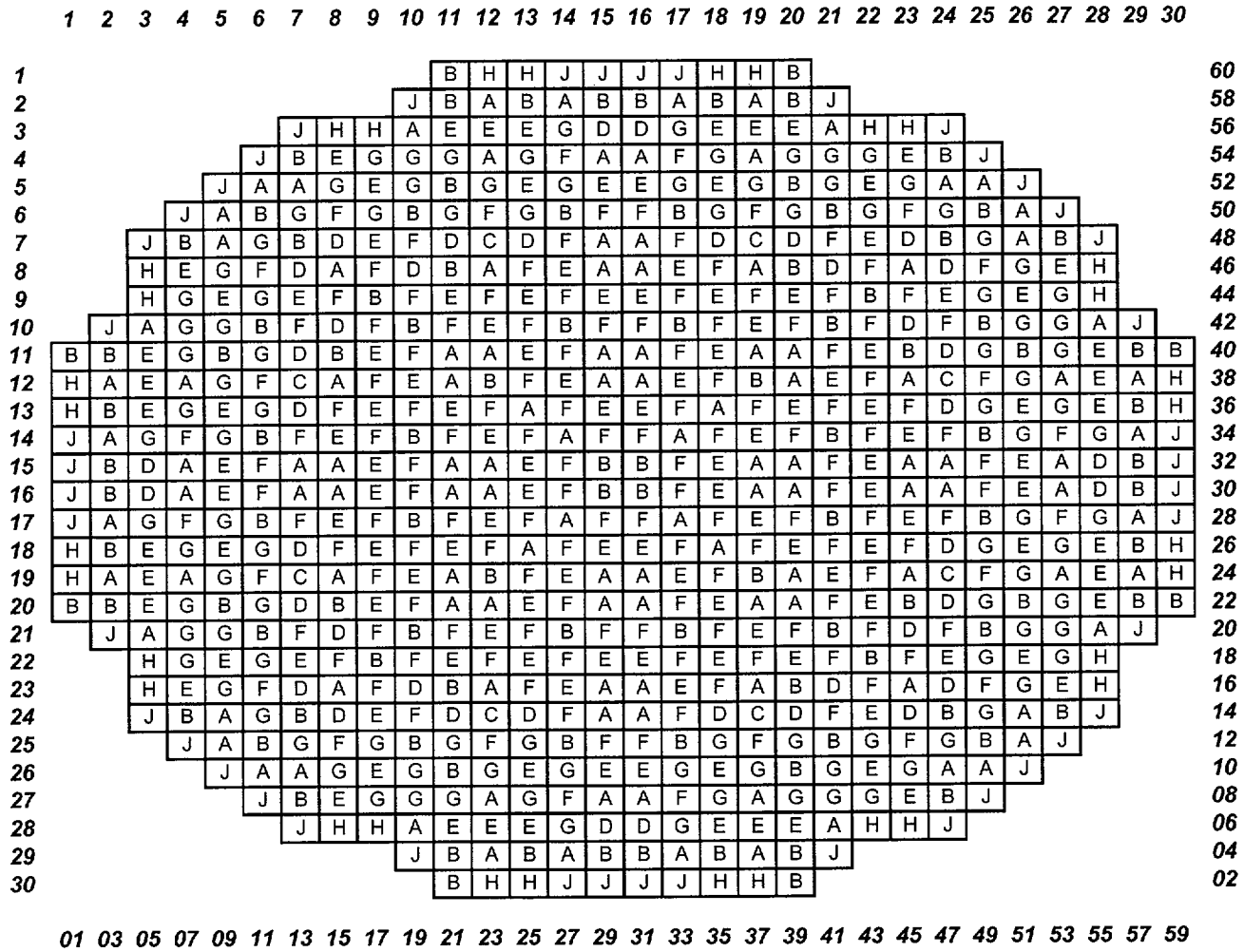
References

1. Letter from R. M. Krich (Exelon Generation Company, LLC) to U. S. NRC, "Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit," dated June 6, 2001.

2. NEDC-32601P-A, "Methodology and Uncertainties for Safety Limit MCPR Evaluations," August 1999

3. Letter from K. A. Ainger (Exelon Generation Company, LLC) to U. S. NRC, "Additional Reactor Systems Information Supporting the License Amendment Request to Permit Uprated Power Operation at Dresden Nuclear Power Station and Quad Cities Nuclear Power Station," dated August 9, 2001

Attachment C
Additional Information Supporting the Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit (Non-Proprietary)
Dresden Nuclear Power Station, Unit 2

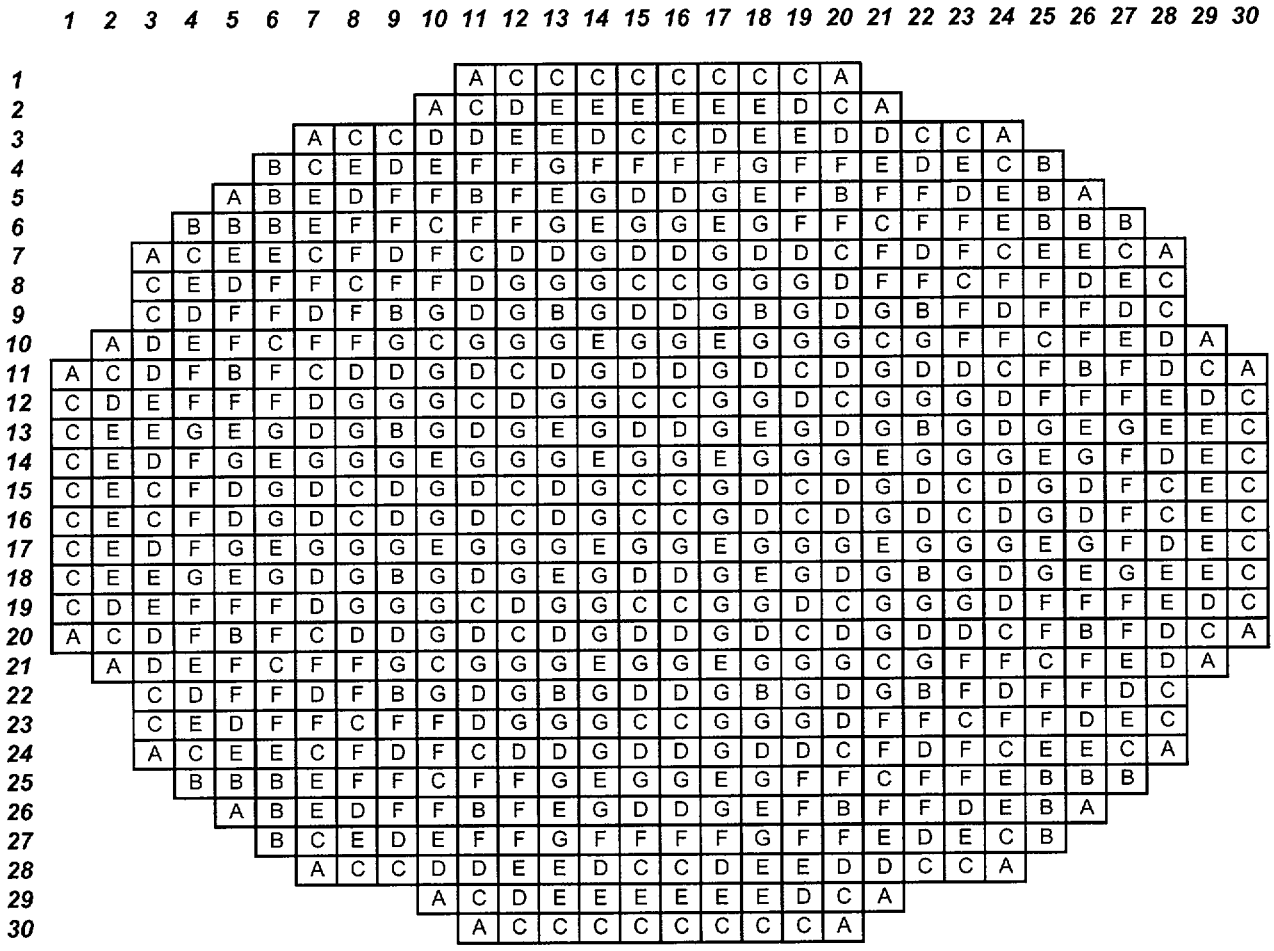


	FUEL TYPE	CYCLE FRESH	# OF BUNDLES	
A	ANF9X9-2-P9DANB314-9GZ-SPC80M-145-T6-3909	15	120	Twice Burned
B	ANF9X9-2-P9DANB314-8G5.0-SPC80M-145-T6-3910	15	104	Twice Burned
C	ATRM9-P9DATB349-9GZ-SPC80M-9WR-145-T6-3911	15	8	Twice Burned
D	ATRM9-P9DATB330-11GZ-SPC80M-9WR-144-T6-3915	16	40	Once Burned
E	ATRM9-P9DATB348-11GZ-SPC80M-9WR-144-T6-3913	16	128	Once Burned
F	ATRM9-P9HATB371-13GZ-SPC100T-9WR-144-T6-3914	17	144	Fresh
G	ATRM9-P9HATB371-13GZ-SPC100T-9WR-144-T6-3912	17	104	Fresh
H	ANF9X9-2-P9DANB313-7G3.5-SPC80M-145-T6-3907	14	32	Thrice Burned
J	ANF9X9-2-P9DANB313-8G4.0-SPC80M-145-T6-3908	14	44	Thrice Burned

Figure 1

Dresden Unit 2 Cycle 17 Reference Core Loading Pattern

Attachment C
Additional Information Supporting the Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit (Non-Proprietary)
Dresden Nuclear Power Station, Unit 2



	FUEL TYPE	CYCLE FRESH	# OF BUNDLES	
A	ANF9X9-2-P9DANB314-9GZ-SPC80M-145-T6-3909	15	28	Thrice Burned
B	ATRM9-P9DATB330-11GZ-SPC80M-9WR-144-T6-3915	16	40	Twice Burned
C	ATRM9-P9DATB348-11GZ-SPC80M-9WR-144-T6-3913	16	128	Twice Burned
D	ATRM9-P9HATB371-13GZ-SPC100T-9WR-144-T6-3914	17	144	Once Burned
E	ATRM9-P9HATB371-13GZ-SPC100T-9WR-144-T6-3912	17	104	Once Burned
F	GE14-P10HNAB411-4G7.0/9G6.0-100T-145-T6-2484	18	160	Fresh
G	GE14-P10HNAB408-16GZ-100T-145-T6-2483	18	120	Fresh

Figure 2

Dresden Unit 2 Cycle 18 Reference Core Loading Pattern