Dominion Nuclear Connecticut, Inc.
Millstone Power Station
Rope Ferry Road
Waterford, CT 06385

Dominion

December 22, 2004

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

Serial No. 04-732
MPS Lic/MAE R0
Docket No. 50-336
License No. DPR-65

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 2
SELECTIVE IMPLEMENTATION OF THE ALTERNATIVE SOURCE TERM – FUEL HANDLING ACCIDENT ANALYSES

By letter dated September 20, 2004, the Nuclear Regulatory Commission (NRC) issued Amendment No. 284 for Millstone Power Station Unit 2 in response to a Dominion Nuclear Connecticut, Inc. (DNC) application dated September 26, 2002. .This application was supplemented on June 2, 2003, May 7, 2004, June 18, 2004, and August 24, 2004. The amendment approved proposed Technical Specifications (TS) changes, which are based on selective implementation of alternative source term methodology.

In the DNC letter dated August 24, 2004, which responded to an RAI and associated discussions with the staff, DNC submitted a revised extended burnup source term proposal for NRC consideration. As a separate matter, DNC agreed to support the NRC source term research with current core performance data. The core performance data requested by the NRC is provided in Attachment 1.

Attachment 1 contains information proprietary to Framatome ANP, INC., an AREVA and Siemens company. Attachment 2 contains the non-proprietary version of the information provided in Attachment 1.

Attachment 3 contains a Framatome ANP authorization letter, FAB04-1430, dated December 13, 2004, and accompanying affidavit. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.790 of the Commission's regulations. Accordingly, it is respectfully requested that the information which is proprietary to Framatome ANP be withheld from public disclosure.

Correspondence with respect to the copyright or proprietary aspects of the items listed above or the supporting Framatome ANP affidavit should reference FAB04-1430 and should be addressed to Gayle F. Elliott, Manager, Product Licensing in Regulatory Affairs, Framatome ANP, INC., 3315 Old Forest Road, P.O. Box 10935, Lynchburg, VA 24506-0935.

While this information is being transmitted on the Millstone Power Station Unit 2 docket, it is understood that it is not being submitted as part of the Millstone Power Station Unit

A4P01

2 licensing basis. Rather, this information supports a generic source term research study to evaluate the potential implications on fission gas gap fractions when the burnup and linear heat rate values exceed the R.G. 1.183 criteria.

If you have any questions or require additional information, please contact Mr. Paul R. Willoughby at (804) 273-3572.

Very truly yours,

W R Matthews

William R. Matthews
Senior Vice President – Nuclear Operations

Attachments: (3)

Commitments made in this letter: None.

cc: U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406-1415

Mr. V. Nerses
Senior Project Manager
U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Mail Stop 8C2
Rockville, MD 20852-2738

Mr. S. M. Schneider
NRC Senior Resident Inspector
Millstone Power Station

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by William R. Matthews, who is Senior Vice President - Nuclear Operations, of Dominion Nuclear Connecticut, Inc. He has affirmed before me that he is duly authorized to execute and file the foregoing document in behalf of that Company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 22nd day of December, 2004.

My Commission Expires: 3/31/2008.

Maggie McCune
Notary Public

(SEAL)

ATTACHMENT 3

SELECTIVE IMPLEMENTATION OF THE ALTERNATIVE SOURCE TERM FUEL HANDLING ACCIDENT ANALYSES

AFFIDAVIT FOR PROPRIETARY DATA

MILLSTONE POWER STATION, UNIT 2
DOMINION NUCLEAR CONNECTICUT, INC.

AREVA

December 13, 2004
FAB04-1430

Mr. H. H. Barker
Manager, Nuclear Fuel Procurement
Dominion Generation
5000 Dominion Boulevard
Glen Allen, VA 23060

Subject: Affidavit for Proprietary Data

References: 1. AREVA Letter: R. D. Kliewer to H. H. Barker, "Millstone 2 Fuel Performance Input Data for the HTP Fuel Assemblies," FAB04-1184, dated September 17, 2004.

Dear Mr. Barker:

Per your request, this letter transmits an Affidavit regarding the data communicated via reference 1. The data found in this reference are used for fuel performance analyses. Dominion originally requested these data to support your Alternate Source Term project. Reference 1 transmitted an Areva document that contained proprietary data. As numbered in this document, the data considered proprietary to Areva are items 3, 4, 5, 7, 8, 12, 13, 14, 15, 17, 19, 21, 27, 28, 29, 31, and 32. We understand that Dominion will communicate to the NRC the data found in Reference 1 to facilitate NRC review of Alternate Source Term documentation or related aspects. Our attached affidavit will be utilized as part of these communications.

If you have any questions or comments, then please contact me at (434) 832-2876.

Sincerely,

R. D. Kliewer
Project Manager

Enclosure

cc: J. R. Guerci
J. R. Harrell
L. O. Hill
M. L. VanHaltern
R. W. Sterner

FRAMATOME ANP, INC. An AREVA and Siemens company
3315 Old Forest Road, P.O. Box 10935, Lynchburg, VA 24506-0935
Tel.: 434 832 3000 - Fax: 434 832 3840 - www.areva.com

FAB04-1430: Affidavit for Proprietary Data

bcc: Contract File – LXVII-12B
Records Center – S0194 -T1.2 – cc30039
Desk/Chron

AFFIDAVIT

COMMONWEALTH OF VIRGINIA)
) ss.
CITY OF LYNCHBURG)

1. My name is Gayle F. Elliott. I am Manager, Product Licensing in Regulatory Affairs, for Framatome ANP ("FANP"), and as such I am authorized to execute this Affidavit.

2. I am familiar with the criteria applied by FANP to determine whether certain FANP information is proprietary. I am familiar with the policies established by FANP to ensure the proper application of these criteria.

3. I am familiar with Engineering Information Record 51-5050848-00, "FA and FR Design Information for the HTP Project" referenced in a letter from Mr. R.D. Kliewer (FANP) to Mr. H.H. Barker (Dominion Generation), dated September 17, 2004, and referred to herein as "Document." Information contained in this Document has been classified by FANP as proprietary in accordance with the policies established by FANP for the control and protection of proprietary and confidential information.

4. This Document contains information of a proprietary and confidential nature and is of the type customarily held in confidence by FANP and not made available to the public. Based on my experience, I am aware that other companies regard information of the kind contained in this Document as proprietary and confidential.

5. This Document has been made available to the U.S. Nuclear Regulatory Commission in confidence with the request that the information contained in this Document be withheld from public disclosure.

6. The following criteria are customarily applied by FANP to determine whether information should be classified as proprietary:

(a) The information reveals details of FANP's research and development plans and programs or their results.

(b) Use of the information by a competitor would permit the competitor to significantly reduce its expenditures, in time or resources, to design, produce, or market a similar product or service.

(c) The information includes test data or analytical techniques concerning a process, methodology, or component, the application of which results in a competitive advantage for FANP.

(d) The information reveals certain distinguishing aspects of a process, methodology, or component, the exclusive use of which provides a competitive advantage for FANP in product optimization or marketability.

(e) The information is vital to a competitive advantage held by FANP, would be helpful to competitors to FANP, and would likely cause substantial harm to the competitive position of FANP.

7. In accordance with FANP's policies governing the protection and control of information, proprietary information contained in this Document have been made available, on a limited basis, to others outside FANP only as required and under suitable agreement providing for nondisclosure and limited use of the information.

8. FANP policy requires that proprietary information be kept in a secured file or area and distributed on a need-to-know basis.

9. The foregoing statements are true and correct to the best of my knowledge, information, and belief.

SUBSCRIBED before me this 14th day of December, 2004.

Ella F. Carr-Payne
NOTARY PUBLIC, STATE OF VIRGINIA
MY COMMISSION EXPIRES: 8/31/05

ELLA F. CARR-PAYNE
Notary Public
Commonwealth of Virginia
My Commission Exps. Aug. 31, 2005

Serial No. 04-732
Docket No. 50-336

ATTACHMENT 2

(NON PROPRIETARY)

SELECTIVE IMPLEMENTATION OF THE ALTERNATIVE SOURCE TERM - FUEL HANDLING ACCIDENT ANALYSES

FUEL ASSEMBLY, FUEL ROD, AND CORE PERFORMANCE DATA

MILLSTONE POWER STATION, UNIT 2
DOMINION NUCLEAR CONNECTICUT, INC.

FUEL ASSEMBLY, FUEL ROD, AND CORE PERFORMANCE DATA

In DNC letter dated August 24, 2004, in response to an RAI and discussions with the NRC staff, DNC submitted a revised extended burnup source term proposal for NRC consideration. As a separate matter, DNC agreed to support the NRC source term research with current core performance data. Attachment 2, provides the core performance data requested by the Nuclear Regulatory Commission (NRC).

While this information is being submitted on the Millstone Power Station Unit 2 docket, it is understood that it supports a generic source term research study to evaluate the potential implications on fission gas gap fractions when the burnup and linear heat rate values exceed the R.G. 1.183 criteria. It is not part of the Millstone Power Station Unit 2 licensing basis.

Table 1 contains Fuel Assembly (FA) and Fuel Rod (FR) Design Information for the High Thermal Performance (HTP) Product. Table 1 contains non-proprietary data. Please note that proprietary Information (table entry) is omitted, i.e., designated by empty brackets.

Tables 2a, 2b, and 2c provide the pin power and burnup for all of the pins in two representative assemblies that exceed 6.3 kw/ft peak rod average power for peak average rod burnup exceeding 54,000 MWD/MTU. Tables 3a, 3b, and 3c provide the core average axial power as a function of axial height and exposure. This data was generated using NRC approved codes and methodology but it has not been independently reviewed and verified, and is considered non-QA but suitable for the intended purpose.

A Compact Disk (CD) with the neutronics data in Excel spreadsheet format is enclosed to preclude substantial manual data input.

TABLE 1: Fuel Assembly (FA) and Fuel Rod (FR) Design Information for the High Thermal Performance (HTP) Product.

#	Parameter	Value	Reference
1	Number of fuel rods per fuel assembly	176	1
2	Fuel rod pitch (in.)	0.580	1
3	Fuel cladding OD (in.)	[ ]	2
4	Fuel cladding ID (in.)	[ ]	2
5	Fuel cladding thickness (in.)	[ ]	2
6	Fuel cladding material	Zr-4	3
7	Fuel pellet diameter (in.)	[ ]	4
8	Fuel pellet length (in.)	[ ]	4
9	Fuel pellet volume reduction due to dish and chamfer	Total Dish Volume: 1.1%, 8.53 mm^3	4
19	Fuel pellet dish diameter (in.)	0.279	4
11	Fuel pellet dish depth (in.)	0.0085	4
12	Fuel rod length (in.)	[ ]	5
13	Active fuel length (in.)	[ ]	5
14	Fuel rod plenum length (in.)	[ ]	5
15	Fuel pellet initial density (%TD)	[ ]	1
16	Fuel pellet oxygen to metal ratio	Oxygen-to-Uranium ratio: ≥1.99 ≤2.01	6
17	Fuel rod internal void volume (in^3)	Free Volume: [ ] [ ]	1
18	Fuel rod plenum spring diameter (in.)	Ø0.379 Max Inactive Coils Ø0.362 ± 0.10 Active coils	7
19	Fuel rod plenum spring wire diameter (in.)	[ ]	7

Table 1 - Continued

#	Parameter	Value	Reference
20	Number of turns in plenum spring	45 (maximum active coils), 43 nominal + 2 inactive coils	7
21	Fuel rod helium fill gas pressure (psig)	[ ]	5
22	RCS pressure (psia)	2250	1
23	Reactor power (MWT)	2700	1
24	RCS coolant flow rate (lb/ft^2-hr)	2.573E6	1
25	Core inlet temperature (°F)	549	1
26	Core exit temperature (°F)	598	1
27	Channel temperature rise (°F) (for the limiting channel)	[ ] (1)	N/A
28	Temperature at which the pellets were sintered	[ ]	6
29	Limit of pellet density increase (%TD)	[ ]	6
30	Limit of pellet swelling (%)	N/A	11
31	Fuel pellet surface roughness (micro-inch.)	[ ]	6
32	Cladding ID surface roughness (micro-inch.)	[ ]	3
33	Initial crud thickness (in.)	Crud: 0 Initial oxide thickness: 0.0394 mils	10 1 & 9
34	Lattice geometry	14 X 14, square	1
35	Maximum fuel rod burnup (MWD/MTU)	62,000	1
36	Percent U-235 (fuel enrichment)	4.4% UO2 ± .05 (max. UO2 enrichment)	1

37	Hot pin and hot assembly radial peaking factors	F_R^N = 1.69 (Uncertainties non-included) F_R^T = 1.83 (Uncertainties included)	1
38	Highest allowable total peaking (F_Q)	F_Q^N = 2.16 (Uncertainties non-included) F_Q^T = 2.43 (Uncertainties included)	1
39	Core axial peaking factor	Fz = 1.48 (Max Axial Peaking factor at 100% power)	8

Note: Proprietary Information (table entry) is omitted (enclosed with brackets ([ ]).

(1) The Thermo-Hydraulic model supports an F_R^T of 1.83, a pressure of 2250 psia, an inlet temperature of 549F, an RCS core flow of 2.573E6 lb/ft2-hr, a 4% core bypass flow, and a reactor power of 2700 MWt.

The prediction made use of a representative top-peaked axial (Fz = 1.323 @ x/L = 0.85)

References:

1. E-6430-337-10, Rev 1: D.file Updates for MIB-7, MIB-6, MIB-5, MIB-4, MIB-3, ANF-2, 04/11/2003.

2. EMF-310151-00C: Cladding Drawing, 07/30/2002.

3. S36009-00D Option 1: Zircaloy Tubing for Fuel Rod Cladding, 07/09/2002.

4. EMF-310153-00A: Fuel Pellet Drawing, 07/10/2002.

5. EMF-310021-00C: Fuel Rod Assembly Drawing, 07/30/2002.

6. S36002-00C: Uranium Dioxide Pellets, 07/09/2002.

7. EMF-310154-00A: Plenum Spring Drawing, 07/10/2002.

8. E-6430-NO6-3: Neutronics Input to Safety Analysis, Milstone Unit 2 Cycle 16, 04/05/2003.

9. EMF-P45047 Rev. 8: Mechanical Analysis and Design Calculation Guide, 02/23/2003.

10. ANF-88-133(P) (A): Qualification of Advanced Nuclear Fuels PWR Design Methodology for Rod Burnups of 62 GWd/MTU, 02/04/2003.

11. EMF-92-116(P) (A): generic Mechanical Design Criteria for PWR Fuel Designs, 07/05/2002.

Table 2a

		Cycle 15 Exposure (GWD/MTU)																			
		0.15		1		3		5		7		9		11		13		15		16	
F/A ID	Pin Loc	power	burnup	power	burnup	power	burnup	power	burnup	power	burnup	power	burnup	power	burnup	power	burnup	power	burnup	power	burnup
T01	A1	1.442	0.251	1.413	1.648	1.330	4.840	1.298	6.924	1.295	9.421	1.303	12.010	1.310	14.610	1.318	17.150	1.322	19.770	1.322	21.090
	A2	1.448	0.254	1.418	1.666	1.333	4.890	1.298	6.940	1.292	9.440	1.297	12.020	1.300	14.610	1.307	17.130	1.310	19.730	1.311	21.030
	A3	1.480	0.260	1.447	1.706	1.358	5.000	1.321	7.076	1.312	9.620	1.313	12.230	1.312	14.850	1.316	17.400	1.318	20.010	1.318	21.320
	A4	1.474	0.259	1.442	1.698	1.352	4.980	1.314	7.040	1.305	9.574	1.304	12.170	1.300	14.770	1.303	17.300	1.306	19.890	1.307	21.190
	A5	1.423	0.250	1.393	1.638	1.309	4.810	1.274	6.809	1.266	9.269	1.266	11.790	1.262	14.320	1.266	16.770	1.270	19.290	1.272	20.550
	B1	1.438	0.251	1.406	1.642	1.317	4.808	1.281	6.862	1.274	9.331	1.278	11.870	1.282	14.420	1.290	16.910	1.295	19.480	1.297	20.760
	B2	1.503	0.264	1.466	1.725	1.367	5.041	1.324	7.140	1.313	9.690	1.312	12.300	1.309	14.910	1.313	17.440	1.316	20.050	1.316	21.350
	B3	1.486	0.263	1.451	1.718	1.356	5.015	1.313	7.082	1.299	9.614	1.296	12.210	1.289	14.780	1.289	17.260	1.290	19.810	1.290	21.090
	B4	1.481	0.262	1.446	1.713	1.352	5.001	1.308	7.056	1.294	9.579	1.288	12.160	1.280	14.720	1.279	17.180	1.281	19.710	1.281	20.980
	B5	1.481	0.261	1.443	1.705	1.346	4.977	1.302	7.026	1.288	9.538	1.282	12.100	1.274	14.650	1.275	17.110	1.278	19.640	1.279	20.910
	C1	1.455	0.252	1.420	1.648	1.324	4.817	1.284	6.904	1.275	9.385	1.276	11.920	1.275	14.460	1.282	16.950	1.288	19.490	1.290	20.770
	C2	1.472	0.258	1.435	1.685	1.338	4.909	1.294	6.989	1.280	9.490	1.277	12.040	1.271	14.580	1.273	17.030	1.276	19.550	1.276	20.820
	D1	1.432	0.244	1.396	1.600	1.298	4.668	1.256	6.759	1.246	9.196	1.246	11.680	1.244	14.160	1.251	16.590	1.259	19.080	1.262	20.330
	D2	1.449	0.251	1.412	1.639	1.313	4.768	1.268	6.854	1.254	9.313	1.249	11.810	1.243	14.300	1.245	16.700	1.250	19.170	1.251	20.410
	E2	1.427	0.242	1.387	1.581	1.284	4.596	1.238	6.700	1.224	9.110	1.220	11.550	1.215	13.980	1.194	15.800	1.205	18.180	1.210	19.380
T25	A1	1.403	0.228	1.417	1.508	1.458	4.279	1.473	7.201	1.475	10.090	1.482	13.040	1.472	15.960	1.454	18.860	1.434	21.760	1.424	23.200
	A2	1.347	0.219	1.372	1.452	1.443	4.163	1.472	7.073	1.476	9.960	1.481	12.900	1.469	15.810	1.450	18.710	1.430	21.590	1.421	23.010
	A3	1.446	0.232	1.454	1.535	1.482	4.378	1.492	7.342	1.493	10.260	1.495	13.250	1.480	16.180	1.458	19.080	1.437	21.990	1.427	23.420
	A4	1.482	0.236	1.479	1.559	1.483	4.435	1.482	7.387	1.484	10.280	1.486	13.260	1.469	16.180	1.446	19.050	1.426	21.930	1.416	23.350
	A5	1.452	0.230	1.445	1.522	1.439	4.326	1.437	7.185	1.442	9.990	1.445	12.900	1.430	15.730	1.409	18.530	1.392	21.340	1.384	22.730
	A10	1.451	0.231	1.443	1.519	1.434	4.317	1.432	7.166	1.436	9.970	1.438	12.860	1.421	15.680	1.396	18.460	1.379	21.240	1.371	22.620
	A11	1.480	0.236	1.476	1.555	1.475	4.421	1.474	7.354	1.476	10.240	1.476	13.200	1.457	16.100	1.428	18.940	1.408	21.780	1.399	23.190
	A12	1.442	0.232	1.448	1.528	1.471	4.356	1.480	7.293	1.482	10.190	1.483	13.150	1.465	16.070	1.435	18.930	1.414	21.790	1.405	23.200
	A13	1.342	0.219	1.364	1.441	1.426	4.132	1.454	7.002	1.460	9.860	1.465	12.760	1.451	15.640	1.422	18.500	1.403	21.330	1.395	22.720
	B1	1.343	0.218	1.367	1.442	1.434	4.142	1.463	7.031	1.468	9.900	1.473	12.820	1.462	15.720	1.443	18.600	1.425	21.470	1.416	22.890
	B3	1.415	0.230	1.431	1.517	1.481	4.334	1.498	7.309	1.498	10.240	1.492	13.220	1.469	16.120	1.442	19.010	1.419	21.860	1.408	23.260
	B4	1.488	0.239	1.485	1.577	1.489	4.465	1.488	7.432	1.486	10.340	1.481	13.310	1.458	16.200	1.431	19.040	1.408	21.870	1.398	23.270

B5	1.500	0.240	1.490	1.582	1.480	4.467	1.477	7.412	1.481	10.300	1.478	13.270	1.457	16.160	1.432	19.000	1.413	21.850	1.403	23.250
B10	1.493	0.237	1.482	1.567	1.470	4.440	1.468	7.364	1.472	10.240	1.469	13.190	1.446	16.060	1.418	18.870	1.398	21.690	1.390	23.080
C1	1.436	0.229	1.442	1.512	1.464	4.333	1.473	7.255	1.475	10.140	1.478	13.090	1.464	16.000	1.444	18.870	1.426	21.740	1.417	23.160
C14	1.411	0.222	1.415	1.461	1.432	4.242	1.442	7.095	1.446	9.930	1.447	12.820	1.429	15.670	1.400	18.470	1.383	21.240	1.376	22.620
D1	1.465	0.230	1.459	1.512	1.454	4.364	1.452	7.251	1.456	10.100	1.458	13.020	1.443	15.890	1.424	18.720	1.408	21.550	1.400	22.960
E1	1.428	0.222	1.418	1.470	1.401	4.228	1.397	7.002	1.403	9.750	1.407	12.570	1.393	15.350	1.378	18.080	1.366	20.830	1.360	22.200
E2	1.480	0.233	1.467	1.538	1.449	4.385	1.445	7.260	1.450	10.100	1.448	13.010	1.428	15.850	1.407	18.640	1.391	21.440	1.384	22.820
E3	1.433	0.229	1.427	1.507	1.424	4.286	1.432	7.128	1.449	9.950	1.444	12.850	1.420	15.670	1.396	18.460	1.378	21.230	1.369	22.590
E5	1.409	0.227	1.405	1.456	1.411	4.228	1.438	7.063	1.475	9.910	1.472	12.850	1.448	15.730	1.425	18.600	1.407	21.420	1.399	22.810
E10	1.385	0.219	1.381	1.439	1.387	4.148	1.414	6.932	1.453	9.740	1.452	12.640	1.428	15.490	1.402	18.310	1.385	21.090	1.378	22.460
E13	1.431	0.219	1.420	1.440	1.405	4.233	1.404	7.014	1.410	9.790	1.408	12.610	1.386	15.400	1.360	18.110	1.345	20.810	1.340	22.150
K6	1.397	0.213	1.384	1.400	1.368	4.126	1.376	6.838	1.400	9.580	1.399	12.370	1.374	15.120	1.352	17.820	1.341	20.490	1.337	21.810
L2	1.417	0.213	1.401	1.409	1.371	4.157	1.364	6.855	1.371	9.560	1.369	12.290	1.347	15.010	1.330	17.640	1.322	20.270	1.319	21.580
L5	1.327	0.200	1.320	1.319	1.315	3.936	1.337	6.554	1.375	9.240	1.380	11.970	1.356	14.700	1.338	17.380	1.329	20.030	1.326	21.340
M1	1.388	0.206	1.376	1.364	1.350	4.075	1.345	6.730	1.349	9.400	1.349	12.090	1.331	14.790	1.317	17.400	1.312	20.000	1.310	21.310
N1	1.339	0.198	1.335	1.312	1.326	3.960	1.331	6.557	1.336	9.230	1.336	11.890	1.317	14.560	1.304	17.160	1.300	19.740	1.299	21.040

Table 2b

		Cycle 16 Exposure (GWD/MTU)																		
		0.15		1		3		5		8		9		11		13		15		
F/A ID	Pin Loc	power	burnup	power	burnup	power	burnup	power	burnup	power	burnup	power	burnup	power	burnup	power	burnup	power	burnup	
T01	A1	1.273	21.380	1.269	22.460	1.253	24.980	1.241	27.470	1.217	31.160	1.212	32.380	1.212	34.800	1.209	37.230	1.194	39.640	
	A2	1.277	21.320	1.272	22.400	1.254	24.920	1.240	27.420	1.215	31.100	1.211	32.310	1.211	34.730	1.208	37.140	1.194	39.530	
	A3	1.298	21.610	1.292	22.710	1.271	25.270	1.254	27.800	1.226	31.510	1.221	32.730	1.220	35.170	1.215	37.600	1.201	40.010	
	A4	1.300	21.470	1.293	22.580	1.272	25.140	1.254	27.660	1.226	31.380	1.221	32.600	1.220	35.030	1.216	37.460	1.201	39.870	
	A5	1.277	20.840	1.271	21.920	1.251	24.440	1.235	26.920	1.209	30.580	1.205	31.790	1.205	34.190	1.203	36.600	1.190	38.980	
	B1	1.268	21.040	1.266	22.120	1.252	24.630	1.239	27.120	1.216	30.800	1.212	32.020	1.213	34.440	1.210	36.870	1.195	39.280	
	B2	1.300	21.630	1.296	22.730	1.278	25.290	1.262	27.820	1.234	31.550	1.229	32.780	1.228	35.220	1.223	37.670	1.207	40.090	
	B3	1.285	21.370	1.280	22.450	1.260	24.980	1.242	27.470	1.213	31.130	1.207	32.330	1.205	34.720	1.199	37.110	1.185	39.480	
	B4	1.287	21.260	1.282	22.340	1.261	24.870	1.244	27.360	1.214	31.030	1.208	32.230	1.205	34.620	1.200	37.010	1.186	39.390	
	B5	1.298	21.190	1.294	22.280	1.275	24.840	1.259	27.360	1.232	31.080	1.227	32.300	1.226	34.740	1.222	37.170	1.208	39.590	
	C1	1.280	21.060	1.277	22.140	1.262	24.670	1.247	27.180	1.222	30.880	1.217	32.100	1.217	34.530	1.213	36.970	1.198	39.390	

	C2	1.275	21.100	1.271	22.170	1.253	24.680	1.236	27.160	1.208	30.800	1.202	32.000	1.200	34.380	1.195	36.770	1.181	39.140
	D1	1.272	20.620	1.270	21.690	1.255	24.210	1.240	26.700	1.215	30.380	1.212	31.600	1.213	34.020	1.209	36.450	1.194	38.860
	D2	1.269	20.690	1.266	21.760	1.248	24.260	1.231	26.730	1.203	30.350	1.198	31.550	1.196	33.920	1.191	36.290	1.177	38.650
	E2	1.274	20.280	1.271	21.350	1.256	23.870	1.241	26.360	1.216	30.030	1.212	31.230	1.213	33.640	1.209	36.050	1.195	38.450
T25	A1	1.110	23.480	1.099	24.420	1.083	26.620	1.069	28.780	1.051	31.980	1.041	33.030	1.020	35.110	1.013	37.160	1.020	39.200
	A2	1.131	23.300	1.120	24.250	1.105	26.480	1.091	28.680	1.073	31.940	1.063	33.010	1.041	35.120	1.033	37.200	1.038	39.270
	A3	1.156	23.700	1.145	24.680	1.130	26.960	1.116	29.200	1.097	32.530	1.086	33.630	1.062	35.780	1.053	37.900	1.057	40.010
	A4	1.167	23.640	1.156	24.630	1.141	26.930	1.128	29.180	1.108	32.540	1.096	33.650	1.072	35.830	1.062	37.970	1.066	40.090
	A5	1.157	23.020	1.147	24.000	1.134	26.280	1.123	28.520	1.105	31.870	1.093	32.970	1.070	35.140	1.061	37.280	1.064	39.400
	A10	1.189	22.910	1.180	23.920	1.167	26.260	1.158	28.570	1.137	32.020	1.125	33.160	1.102	35.390	1.091	37.580	1.092	39.760
	A11	1.212	23.480	1.203	24.510	1.189	26.900	1.178	29.250	1.155	32.760	1.142	33.910	1.118	36.180	1.106	38.400	1.105	40.610
	A12	1.214	23.490	1.205	24.520	1.192	26.920	1.182	29.280	1.159	32.800	1.146	33.950	1.122	36.220	1.111	38.450	1.109	40.670
	A13	1.199	23.010	1.192	24.030	1.181	26.400	1.173	28.750	1.152	32.240	1.140	33.390	1.118	35.650	1.107	37.870	1.105	40.080
	B1	1.138	23.170	1.125	24.140	1.105	26.370	1.085	28.570	1.062	31.800	1.052	32.860	1.030	34.950	1.023	37.010	1.030	39.060
	B3	1.160	23.540	1.149	24.520	1.131	26.790	1.114	29.020	1.091	32.320	1.081	33.410	1.059	35.560	1.051	37.660	1.056	39.760
	B4	1.164	23.550	1.154	24.530	1.138	26.810	1.121	29.050	1.100	32.370	1.089	33.470	1.067	35.630	1.059	37.750	1.064	39.860
	B5	1.182	23.530	1.173	24.520	1.160	26.840	1.147	29.130	1.126	32.520	1.115	33.640	1.092	35.840	1.082	38.010	1.085	40.160
	B10	1.207	23.360	1.199	24.380	1.187	26.750	1.176	29.090	1.155	32.570	1.143	33.720	1.120	35.980	1.109	38.200	1.109	40.400
	C1	1.169	23.450	1.154	24.440	1.129	26.730	1.104	28.960	1.076	32.240	1.065	33.310	1.043	35.430	1.036	37.510	1.042	39.590
	C14	1.195	22.910	1.190	23.920	1.180	26.290	1.170	28.630	1.148	32.110	1.138	33.260	1.119	35.530	1.110	37.760	1.108	39.990
	D1	1.183	23.250	1.167	24.250	1.139	26.560	1.111	28.810	1.079	32.100	1.069	33.180	1.047	35.300	1.039	37.390	1.046	39.480
	E1	1.175	22.490	1.159	23.480	1.131	25.780	1.102	28.010	1.070	31.260	1.060	32.340	1.040	34.450	1.034	36.530	1.041	38.600
	E2	1.197	23.110	1.183	24.120	1.159	26.450	1.133	28.730	1.102	32.060	1.092	33.160	1.071	35.320	1.064	37.450	1.069	39.580
	E3	1.181	22.870	1.169	23.860	1.146	26.160	1.122	28.420	1.094	31.730	1.084	32.820	1.064	34.960	1.058	37.070	1.064	39.180
	E5	1.208	23.090	1.199	24.110	1.181	26.470	1.166	28.800	1.134	32.220	1.124	33.340	1.102	35.550	1.094	37.720	1.098	39.890
	E10	1.211	22.740	1.204	23.760	1.190	26.140	1.175	28.490	1.149	31.960	1.139	33.100	1.119	35.340	1.111	37.550	1.112	39.750
	E13	1.188	22.420	1.182	23.430	1.170	25.770	1.158	28.090	1.135	31.510	1.125	32.640	1.109	34.870	1.102	37.070	1.103	39.270
	K6	1.236	22.100	1.224	23.140	1.202	25.550	1.177	27.910	1.146	31.370	1.136	32.510	1.117	34.750	1.110	36.950	1.113	39.160
	L2	1.257	21.870	1.240	22.930	1.207	25.280	1.173	27.740	1.136	31.180	1.126	32.310	1.105	34.540	1.098	36.730	1.103	38.930
	L5	1.252	21.630	1.240	22.680	1.215	25.120	1.187	27.510	1.154	31.000	1.144	32.140	1.124	34.400	1.117	36.610	1.120	38.830
	M1	1.279	21.630	1.257	22.700	1.216	25.190	1.176	27.580	1.133	31.030	1.123	32.160	1.102	34.390	1.094	36.590	1.099	38.780
	N1	1.292	21.350	1.270	22.440	1.229	24.950	1.187	27.370	1.145	30.860	1.136	32.000	1.114	34.260	1.105	36.480	1.110	38.690

Cycle 17 Exposure (GWD/MTU)

Table 2c

		0.15		1		2		5		7		9		11		13		15.1	
F/A ID	Pin Loc	power	burnup	power	burnup	power	burnup	power	burnup	power	burnup	power	burnup	power	burnup	power	burnup	power	burnup
T01	A1	1.037	39.790	1.037	40.680	1.044	41.720	1.051	44.870	1.048	46.970	1.049	49.060	1.047	51.140	1.042	53.220	1.038	55.380
	A2	1.040	39.690	1.039	40.570	1.044	41.610	1.047	44.740	1.044	46.830	1.046	48.910	1.045	50.980	1.040	53.050	1.035	55.210
	A3	1.042	40.160	1.040	41.040	1.043	42.080	1.043	45.200	1.041	47.270	1.042	49.340	1.041	51.410	1.037	53.470	1.033	55.620
	A4	1.036	40.020	1.033	40.900	1.034	41.920	1.032	45.010	1.030	47.060	1.032	49.110	1.032	51.160	1.029	53.200	1.026	55.340
	A5	1.021	39.130	1.017	39.990	1.018	41.010	1.015	44.040	1.015	46.060	1.018	48.080	1.019	50.100	1.017	52.120	1.015	54.230
	B1	1.033	39.440	1.033	40.320	1.038	41.360	1.043	44.490	1.041	46.580	1.044	48.670	1.042	50.760	1.037	52.840	1.032	55.000
	B2	1.040	40.240	1.039	41.120	1.044	42.160	1.048	45.290	1.047	47.380	1.050	49.470	1.049	51.560	1.044	53.650	1.039	55.830
	B3	1.011	39.640	1.011	40.490	1.014	41.490	1.019	44.520	1.020	46.540	1.025	48.570	1.027	50.620	1.026	52.680	1.024	54.820
	B4	1.002	39.540	1.001	40.380	1.004	41.380	1.008	44.370	1.009	46.370	1.014	48.370	1.017	50.400	1.017	52.430	1.017	54.560
	B5	1.012	39.740	1.011	40.590	1.013	41.590	1.014	44.610	1.015	46.630	1.019	48.650	1.021	50.670	1.020	52.700	1.018	54.830
	C1	1.034	39.550	1.033	40.430	1.036	41.470	1.041	44.600	1.040	46.690	1.043	48.780	1.042	50.870	1.037	52.950	1.032	55.120
	C2	1.009	39.290	1.009	40.140	1.014	41.150	1.021	44.190	1.023	46.220	1.028	48.260	1.030	50.320	1.028	52.380	1.026	54.540
	D1	1.029	39.010	1.027	39.890	1.030	40.920	1.035	44.040	1.035	46.120	1.039	48.200	1.039	50.280	1.034	52.360	1.029	54.530
	D2	1.001	38.810	1.001	39.650	1.006	40.650	1.014	43.670	1.017	45.690	1.023	47.720	1.026	49.770	1.024	51.820	1.022	53.970
	E2	1.013	38.600	1.014	39.460	1.018	40.470	1.027	43.530	1.031	45.580	1.037	47.640	1.038	49.710	1.034	51.780	1.030	53.940
T25	A1	0.999	39.350	1.003	40.210	1.008	41.220	1.035	44.290	1.047	46.380	1.052	48.480	1.051	50.580	1.042	52.670	1.034	54.840
	A2	1.002	39.420	1.006	40.280	1.011	41.290	1.034	44.350	1.045	46.440	1.051	48.530	1.051	50.640	1.041	52.730	1.033	54.900
	A3	1.003	40.160	1.007	41.010	1.012	42.020	1.033	45.080	1.043	47.150	1.050	49.240	1.051	51.330	1.041	53.420	1.032	55.580
	A4	0.996	40.240	0.999	41.090	1.004	42.090	1.025	45.120	1.034	47.180	1.044	49.250	1.045	51.330	1.036	53.400	1.028	55.550
	A5	0.980	39.550	0.984	40.380	0.989	41.360	1.011	44.360	1.021	46.380	1.033	48.430	1.036	50.490	1.029	52.550	1.022	54.690
	A10	0.961	39.910	0.965	40.720	0.972	41.680	0.994	44.620	1.005	46.610	1.020	48.610	1.026	50.650	1.020	52.680	1.015	54.800
	A11	0.968	40.750	0.972	41.570	0.980	42.540	1.001	45.500	1.010	47.500	1.025	49.510	1.030	51.550	1.023	53.590	1.017	55.710
	A12	0.969	40.810	0.973	41.630	0.981	42.600	1.003	45.570	1.011	47.570	1.026	49.590	1.031	51.640	1.024	53.680	1.017	55.800
	A13	0.961	40.220	0.966	41.040	0.975	42.000	0.999	44.960	1.007	46.960	1.021	48.980	1.026	51.030	1.020	53.070	1.014	55.200
	B1	1.007	39.210	1.010	40.070	1.013	41.090	1.037	44.160	1.049	46.250	1.054	48.350	1.052	50.460	1.042	52.550	1.034	54.730
	B3	0.985	39.900	0.990	40.740	0.996	41.720	1.022	44.710	1.034	46.750	1.043	48.790	1.043	50.850	1.035	52.900	1.027	55.030
	B4	0.974	40.000	0.979	40.830	0.986	41.800	1.012	44.760	1.024	46.770	1.035	48.800	1.037	50.840	1.029	52.880	1.022	54.990
	B5	0.979	40.310	0.984	41.140	0.991	42.120	1.016	45.100	1.028	47.140	1.040	49.190	1.042	51.260	1.034	53.320	1.026	55.470
	B10	0.961	40.550	0.967	41.360	0.975	42.320	1.001	45.260	1.013	47.250	1.028	49.270	1.033	51.320	1.027	53.360	1.020	55.490
	C1	1.014	39.750	1.016	40.610	1.018	41.630	1.040	44.700	1.052	46.790	1.055	48.890	1.053	51.000	1.043	53.080	1.034	55.250

C14	0.967	40.140	0.971	40.970	0.979	41.950	1.000	44.930	1.008	46.940	1.021	48.980	1.026	51.030	1.019	53.080	1.013	55.210
D1	1.012	39.630	1.013	40.500	1.015	41.510	1.036	44.570	1.049	46.660	1.051	48.750	1.048	50.840	1.039	52.920	1.031	55.080
E1	1.002	38.750	1.003	39.610	1.004	40.610	1.026	43.640	1.041	45.710	1.042	47.790	1.040	49.870	1.032	52.880	1.025	54.080
E2	0.995	39.730	0.999	40.570	1.003	41.570	1.029	44.590	1.044	46.650	1.047	48.730	1.045	50.090	1.037	52.110	1.029	55.040
E3	0.965	39.320	0.971	40.140	0.976	41.100	1.005	44.030	1.021	46.040	1.027	48.060	1.028	50.060	1.021	52.070	1.015	54.220
E5	0.963	40.030	0.969	40.850	0.976	41.810	1.005	44.750	1.020	46.770	1.028	48.800	1.030	50.850	1.023	51.440	1.017	55.040
E10	0.952	39.890	0.959	40.700	0.967	41.650	0.996	44.570	1.010	46.560	1.022	48.570	1.026	50.670	1.021	52.650	1.015	54.780
E13	0.967	39.420	0.972	40.240	0.980	41.210	1.005	44.180	1.017	46.190	1.030	48.230	1.035	40.290	1.028	52.350	1.022	54.490
K6	0.961	39.300	0.967	40.120	0.973	41.080	1.003	44.010	1.020	46.020	1.025	48.050	1.026	50.090	1.020	52.130	1.015	54.250
L2	1.004	39.080	1.007	39.930	1.010	40.930	1.038	43.970	1.054	46.050	1.053	48.140	1.049	50.230	1.040	51.980	1.033	54.460
L5	0.977	38.980	0.983	39.800	0.988	40.780	1.018	43.750	1.035	45.790	1.037	47.850	1.036	49.920	1.030	51.980	1.023	54.130
M1	1.021	38.930	1.021	39.800	1.022	40.820	1.046	43.900	1.061	46.000	1.057	48.110	1.051	50.210	1.042	52.280	1.035	54.450
N1	1.024	38.840	1.024	39.710	1.025	40.740	1.051	43.830	1.067	45.940	1.062	48.070	1.055	50.170	1.046	52.260	1.038	54.430

Table 3a Cycle 15 Axial Core Average Power

		HFP ARO					
Node	Height (IN)	150	2000	5000	9000	13000	16641
24	133.85	0.413	0.408	0.406	0.431	0.499	0.606
23	128.16	0.797	0.773	0.751	0.759	0.824	0.906
22	122.46	0.940	0.922	0.909	0.918	0.985	1.043
21	116.76	1.009	1.000	0.994	0.998	1.058	1.083
20	111.07	1.056	1.052	1.046	1.041	1.084	1.080
19	105.37	1.088	1.088	1.079	1.066	1.088	1.065
18	99.68	1.112	1.116	1.101	1.080	1.082	1.047
17	93.98	1.131	1.137	1.117	1.089	1.072	1.031
16	88.29	1.146	1.153	1.128	1.096	1.061	1.018
15	82.59	1.157	1.165	1.136	1.101	1.052	1.009
14	76.89	1.162	1.171	1.141	1.105	1.044	1.003
13	71.20	1.163	1.172	1.143	1.109	1.040	1.000
12	65.50	1.161	1.169	1.145	1.113	1.040	1.001
11	59.81	1.152	1.161	1.143	1.116	1.043	1.004
10	54.11	1.140	1.148	1.139	1.119	1.050	1.011
9	48.41	1.123	1.130	1.133	1.121	1.061	1.021
8	42.72	1.101	1.108	1.123	1.121	1.075	1.036
7	37.02	1.075	1.080	1.108	1.118	1.090	1.054
6	31.33	1.044	1.048	1.086	1.109	1.104	1.077
5	25.63	1.009	1.009	1.055	1.090	1.112	1.100
4	19.94	0.962	0.958	1.006	1.051	1.098	1.112
3	14.24	0.899	0.888	0.926	0.975	1.036	1.086
2	8.54	0.769	0.752	0.772	0.814	0.876	0.961
1	2.85	0.391	0.390	0.411	0.458	0.527	0.646

Table 3b Cycle 16 Axial Core Average Power

Node	Height (IN)	HFP ARO 150	2000	5000	9000	13000	15705
24	133.85	0.344	0.353	0.362	0.391	0.460	0.534
23	128.16	0.757	0.755	0.743	0.758	0.821	0.880
22	122.46	0.953	0.944	0.926	0.938	0.993	1.032
21	116.76	1.061	1.046	1.023	1.026	1.063	1.079
20	111.07	1.124	1.103	1.076	1.066	1.081	1.079
19	105.37	1.160	1.134	1.105	1.083	1.079	1.065
18	99.68	1.179	1.149	1.119	1.089	1.071	1.050
17	93.98	1.187	1.156	1.126	1.090	1.061	1.037
16	88.29	1.188	1.157	1.129	1.090	1.054	1.028
15	82.59	1.185	1.155	1.131	1.090	1.049	1.023
14	76.89	1.178	1.151	1.131	1.091	1.046	1.020
13	71.20	1.169	1.146	1.130	1.092	1.046	1.019
12	65.50	1.158	1.140	1.130	1.096	1.048	1.022
11	59.81	1.146	1.133	1.128	1.100	1.052	1.025
10	54.11	1.131	1.126	1.127	1.105	1.058	1.030
9	48.41	1.115	1.117	1.125	1.111	1.068	1.039
8	42.72	1.096	1.106	1.121	1.118	1.080	1.051
7	37.02	1.073	1.092	1.113	1.122	1.094	1.067
6	31.33	1.043	1.071	1.099	1.123	1.109	1.087
5	25.63	1.002	1.039	1.074	1.113	1.121	1.109
4	19.94	0.939	0.985	1.026	1.080	1.114	1.120
3	14.24	0.844	0.893	0.936	0.998	1.056	1.088
2	8.54	0.672	0.719	0.758	0.814	0.885	0.945
1	2.85	0.297	0.328	0.362	0.414	0.492	0.573

Table 3c Cycle 17 Axial Core Average Power

Node	Height (IN)	HFP ARO 150	2000	5000	9000	13000	15100
24	133.85	0.327	0.326	0.328	0.363	0.451	0.501
23	128.16	0.758	0.738	0.719	0.749	0.843	0.877
22	122.46	0.951	0.931	0.915	0.940	1.019	1.034
21	116.76	1.053	1.035	1.018	1.033	1.081	1.081
20	111.07	1.111	1.095	1.074	1.072	1.090	1.080
19	105.37	1.144	1.130	1.104	1.088	1.082	1.066
18	99.68	1.163	1.151	1.121	1.093	1.068	1.051
17	93.98	1.173	1.163	1.130	1.092	1.056	1.039
16	88.29	1.178	1.170	1.136	1.092	1.046	1.030
15	82.59	1.179	1.173	1.140	1.091	1.040	1.025
14	76.89	1.176	1.173	1.142	1.091	1.037	1.023
13	71.20	1.171	1.169	1.143	1.092	1.035	1.022
12	65.50	1.163	1.164	1.143	1.096	1.038	1.025
11	59.81	1.151	1.155	1.143	1.100	1.041	1.028
10	54.11	1.137	1.144	1.140	1.106	1.047	1.034
9	48.41	1.121	1.130	1.137	1.113	1.057	1.043
8	42.72	1.101	1.113	1.132	1.121	1.070	1.055
7	37.02	1.078	1.092	1.123	1.127	1.086	1.071
6	31.33	1.049	1.065	1.107	1.130	1.105	1.092
5	25.63	1.012	1.028	1.080	1.122	1.122	1.114
4	19.94	0.955	0.971	1.028	1.090	1.124	1.126
3	14.24	0.865	0.878	0.930	1.003	1.075	1.095
2	8.54	0.692	0.701	0.738	0.807	0.904	0.948
1	2.85	0.292	0.303	0.330	0.386	0.482	0.542