High Flux Isotope Reactor Low-Enriched Uranium Low Density Silicide Fuel Design Parameters



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March 22, 2021



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ORNL/TM-2020/1798

Nuclear Energy and Fuel Cycle Division

HIGH FLUX ISOTOPE REACTOR LOW-ENRICHED URANIUM LOW DENSITY SILICIDE FUEL DESIGN PARAMETERS

Benjamin R. Betzler David Chandler Jin Whan Bae Germina Ilas Jennifer L. Meszaros

March 22, 2021

Prepared by OAK RIDGE NATIONAL LABORATORY Oak Ridge, TN 37831-6283 managed by UT-Battelle, LLC for the US DEPARTMENT OF ENERGY under contract DE-AC05-00OR22725

CONTENTS

LIS	ST OF	FIGUR	ESi	х
LIS	ST OF	F TABLI	ΞS	i
AC	RON	YMS .	xi	i
AC	KNO	WLEDO	GMENTS	i
AB	STR	ACT		1
1.	INTE	RODUC	ΤΙΟΝ	2
2.	FUE	L ELEN	IENT GEOMETRY	3
3.	SILI	CIDE D	ISPERSION FUEL	4
4.	COM	IPUTAT	IONAL METHODS	8
	4.1	Neutro	nics Mesh	8
	4.2	Depleti	on Modeling	9
	4.3	Therma	ll-hydraulics mesh	9
	4.4	Design	parameter calculation methods	3
		4.4.1	Fission rate density	3
		4.4.2	Cumulative fission density	3
		4.4.3	Power density	3
		4.4.4	Heat flux 1	3
5.	CAN	IDIDAT	E FUEL DESIGN PARAMETERS	5
6	OVE	RVIEW	OF METRICS	9
0.	61	DESCE	RIPTION OF METRICS	9
	0.1	611	Cf Production Rate 19	9
		612	Cycle Length 20	Ó
		613	Cold Source Flux and Ratio	0
		614	Flux Tran Fast Flux and Ratio	n
		615	Minimum Burnout Margin	1
		616	Paflector Fast Flux and Patio	1 1
		617	$\frac{235}{11} \text{ L ording and Utilization} $	1 1
7	DEC	IGN SD		1 7
7.	7 1		$\frac{1}{7} = \frac{1}{7} = \frac{1}$	2
	/.1	7 1 1	Fuel Most Shape 2	י ג
		7.1.1	Fuel Meat Shape	+
		7.1.2	Power Density	0 7
		7.1.5	Power Density	/ 0
		715	Cumulative Erection Density	0
	7 2		Cumulative Fission Density	9 1
	1.2		INALE I DESIGN 3 Evel Meet Shame 2'	1 2
		7.2.1	Fuel Meat Shape	2 1
		7.2.2	Pression Rate Density	+
		7.2.3	Power Density	5
		7.2.4		5
	7.2	1.2.5	Cumulative Fission Density	1
	1.3	ALTER	$\begin{array}{llllllllllllllllllllllllllllllllllll$	9
		/.3.1	Fuel Meat Shape 40 Fi D	U 1
		7.3.2	Fission Rate Density 4	1
		7.3.3	Power Density	3

		7.3.4	Heat Flux	4
		7.3.5	Cumulative Fission Density	5
	7.4	ALTEF	ANATE 3 DESIGN	7
		7.4.1	Fuel Meat Shape 48	8
		7.4.2	Fission Rate Density	9
		7.4.3	Power Density	1
		7.4.4	Heat Flux	2
		7.4.5	Cumulative Fission Density	3
8.	DIS	CUSSIO	N	5
9.	REF	ERENC	ES	7
AF	PEN	DIX A. I	DISTRIBUTIONS FOR OPTIMIZED DESIGN	1
	APP	ENDIX	A-1. FISSION RATE DENSITY DISTRIBUTIONS FOR OPTIMIZED DESIGN A - 1	1
	APP	ENDIX	A-2. CUMULATIVE FISSION DENSITY DISTRIBUTIONS FOR OPTIMIZED	
		DESIG	δΝΑ-10	0
	APP	ENDIX	A-3. POWER DENSITY DISTRIBUTIONS FOR OPTIMIZED DESIGN A - 16	6
	APP	ENDIX	A-4. HEAT FLUX DISTRIBUTIONS FOR OPTIMIZED DESIGN	5
AF	PEN	DIX B. I	DISTRIBUTIONS FOR ALTERNATE 1 DESIGN	1
	APP	ENDIX	B-1. FISSION RATE DENSITY DISTRIBUTIONS FOR ALTERNATE 1 DESIGN B - 1	1
	APP	ENDIX	B-2. CUMULATIVE FISSION DENSITY DISTRIBUTIONS FOR	
		ALTEF	RNATE 1 DESIGN	0
	APP	ENDIX	B-3. POWER DENSITY DISTRIBUTIONS FOR ALTERNATE 1 DESIGN B - 16	6
	APP	ENDIX	B-4. HEAT FLUX DISTRIBUTIONS FOR ALTERNATE 1 DESIGN B - 25	5
AF	PEN	DIX C. I	DISTRIBUTIONS FOR ALTERNATE 2 DESIGN	1
	APP	ENDIX	C-1. FISSION RATE DENSITY DISTRIBUTIONS FOR ALTERNATE 2 DESIGN C - 1	1
	APP	ENDIX	C-2. CUMULATIVE FISSION DENSITY DISTRIBUTIONS FOR	
		ALTER	RNATE 2 DESIGN	9
	APP	ENDIX	C-3. POWER DENSITY DISTRIBUTIONS FOR ALTERNATE 2 DESIGN C - 15	5
	APP	ENDIX	C-4. HEAT FLUX DISTRIBUTIONS FOR ALTERNATE 2 DESIGN C - 23	3
AF	PEN	DIX D. I	DISTRIBUTIONS FOR ALTERNATE 3 DESIGN	1
	APP	ENDIX	D-1. FISSION RATE DENSITY DISTRIBUTIONS FOR ALTERNATE 3 DESIGN D - 1	1
	APP	ENDIX	D-2. CUMULATIVE FISSION DENSITY DISTRIBUTIONS FOR	
		ALTER	RNATE 3 DESIGN	0
	APP	ENDIX	D-3. POWER DENSITY DISTRIBUTIONS FOR ALTERNATE 3 DESIGN D - 16	6
	APP	ENDIX	D-4. HEAT FLUX DISTRIBUTIONS FOR ALTERNATE 3 DESIGN D - 25	5

LIST OF FIGURES

1	High Flux Isotope Reactor (HFIR) inner and outer fuel elements. 3
2	Fuel element HFIR Steady State Heat Transfer Code (HSSHTC) nodes (black circles)
	superimposed on neutronics mesh (black lines)
3	Python HFIR Analysis and Measurement Engine (PHAME)-generated MCNP file
	geometry
4	The top image shows the center and symmetric fuel, where the layers are
	clad-filler-fuel-filler-clad. The middle image shows the off-center and asymmetric fuel,
	where the layers are clad-fuel-filler-clad. The bottom images shows the axial contour of
	the center and symmetric fuel, where the fuel thickness is reduced to $200 \mu\text{m}$. These
	images are for illustration only
5	Interpretation of fuel plate plots with Alternate Design 1 IFE illustrated
6	Fuel meat shape for the optimized design. 24
7	Fuel bottom meat shape for the optimized design. The axial gradient increases the
_	minimum safety margin, which usually occurs at the bottom of the core
8	Optimized design maximum fission density during operation
9	Optimized design maximum power density during operation
10	Optimized design maximum heat flux during operation
11	Optimized design maximum cumulative fission density during operation
12	Optimized design fission rate density variation with cumulative fission density during
	operation
13	Fuel meat shape for the alternate 1 design. 32
14	Fuel bottom meat shape for the alternate 1 design. The axial gradient increases the
	minimum safety margin, which usually occurs at the bottom of the core
15	Alternate 1 design maximum fission density during operation
16	Alternate 1 design maximum power density during operation. 35
17	Alternate 1 design maximum heat flux during operation. 36
18	Alternate 1 design maximum cumulative fission density during operation
19	Alternate 1 design fission rate density variation with cumulative fission density during
•	operation
20	Fuel meat shape for the alternate 2 design. 40
21	Alternate 2 design maximum fission density during operation
22	Alternate 2 design maximum power density during operation
23	Alternate 2 design maximum heat flux during operation
24	Alternate 2 design maximum cumulative fission density during operation
25	Alternate 2 design fission rate density variation with cumulative fission density during
•	operation
26	Fuel meat shape for the alternate 3 design. 48
27	Alternate 3 design maximum fission density during operation
28	Alternate 3 design maximum power density during operation
29	Alternate 3 design maximum heat flux during operation. 52
30	Alternate 3 design maximum cumulative fission density during operation. 53
31	Alternate 3 design fission rate density variation with cumulative fission density during
	operation

32	Fission rate density distribution for optimized design IFE region on day 0 (see Section $7.1.2$).	A - 1
33	Fission rate density distribution for optimized design IFE region on day 1 (see Section 7.1.2)	A _ 2
34	Fission rate density distribution for optimized design IFE region on day 15 (see Section 7.1.2)	Λ 3
35	Fission rate density distribution for optimized design IFE region on day 27 (see Section 7.1.2)	A - J
36	Fission rate density distribution for optimized design OFE region on day 0 (see Section 7.1.2)	A - 4
37	Fission rate density distribution for optimized design OFE region on day 1 (see Section 7.1.2)	A - 5
38	Fission rate density distribution for optimized design OFE region on day 2 (see Section	A - 0
39	Fission rate density distribution for optimized design OFE region on day 15 (see Section	A - /
40	Fission rate density distribution for optimized design OFE region on day 27 (see Section	A - 8
41	7.1.2)	A - 9
42	Section 7.1.5)	A - 10
43	Section 7.1.5)	A - 11
44	Section 7.1.5)	A - 12
45	Section 7.1.5)	A - 13
46	Section 7.1.5)	A - 14
47	Section 7.1.5)	A - 15 A - 16
48	Power density distribution for optimized design IFE region on day 1 (see Section 7.1.3).	A - 17
49	Power density distribution for optimized design IFE region on day 15 (see Section 7.1.3).	A - 18
50	Power density distribution for optimized design IFE region on day 27 (see Section 7.1.3).	A - 19
51	Power density distribution for optimized design OFE region on day 0 (see Section 7.1.3).	A - 20
52	Power density distribution for optimized design OFE region on day 1 (see Section 7.1.3).	A - 21
53	Power density distribution for optimized design OFE region on day 2 (see Section 7.1.3).	A - 22
54	Power density distribution for optimized design OFE region on day 15 (see Section 7.1.3).	A - 23
55	Power density distribution for optimized design OFE region on day 27 (see Section 7.1.3).	A - 24
56	Heat flux distribution for optimized design IFE region on day 0 (see Section 7.1.4). \ldots	A - 25
57	Heat flux distribution for optimized design IFE region on day 1 (see Section 7.1.4).	A - 26
58 50	Heat flux distribution for optimized design IFE region on day 15 (see Section 7.1.4).	A - 27
59 60	Heat flux distribution for optimized design IFE region on day 27 (see Section 7.1.4).	A - 28
60	Heat flux distribution for optimized design OFE region on day 0 (see Section 7.1.4). \therefore	A - 29
01	Heat flux distribution for optimized design OFE region on day 1 (see Section 7.1.4).	A - 30

62	Heat flux distribution for optimized design OFE region on day 2 (see Section 7.1.4).	A - 31
63	Heat flux distribution for optimized design OFE region on day 15 (see Section 7.1.4)	A - 32
64	Heat flux distribution for optimized design OFE region on day 27 (see Section 7.1.4)	A - 33
65	Fission rate density distribution for alternate 1 design IFE region on day 0 (see Section	
	7.2.2).	B - 1
66	Fission rate density distribution for alternate 1 design IFE region on day 1 (see Section	
	7.2.2)	B - 2
67	Fission rate density distribution for alternate 1 design IFE region on day 15 (see Section	
	7.2.2)	B - 3
68	Fission rate density distribution for alternate 1 design IFE region on day 27 (see Section	
	7.2.2)	B - 4
69	Fission rate density distribution for alternate 1 design OFE region on day 0 (see Section	
	7.2.2)	В-5
70	Fission rate density distribution for alternate 1 design OFE region on day 1 (see Section	
	7.2.2)	B - 6
71	Fission rate density distribution for alternate 1 design OFE region on day 2 (see Section	
	7.2.2)	B - 7
72	Fission rate density distribution for alternate 1 design OFE region on day 15 (see Section	
	7.2.2)	B - 8
73	Fission rate density distribution for alternate 1 design OFE region on day 27 (see Section	
	7.2.2)	B - 9
74	Cumulative fission density distribution for alternate 1 design IFE region on day 1 (see	
	Section 7.2.5)	B - 10
75	Cumulative fission density distribution for alternate 1 design IFE region on day 15 (see	
	Section 7.2.5)	B - 11
76	Cumulative fission density distribution for alternate 1 design IFE region on day 27 (see	
	Section 7.2.5).	В - 12
11	Cumulative fission density distribution for alternate 1 design OFE region on day 1 (see	D 12
70	Section 7.2.5).	В - 13
/8	Cumulative fission density distribution for alternate 1 design OFE region on day 15 (see	D 14
70		В - 14
/9	Cumulative fission density distribution for alternate 1 design OFE region on day 27 (see	D 15
00	Section 7.2.5).	B - 15
80	Power density distribution for alternate 1 design IFE region on day 0 (see Section 7.2.3).	B - 10
81	Power density distribution for alternate 1 design IFE region on day 1 (see Section 7.2.3).	B - 1/
82	Power density distribution for alternate I design IFE region on day 15 (see Section 7.2.3).	B - 18
83	Power density distribution for alternate 1 design IFE region on day 27 (see Section 7.2.3).	B - 19
84	Power density distribution for alternate I design OFE region on day 0 (see Section 7.2.3).	B - 20
85	Power density distribution for alternate 1 design OFE region on day 1 (see Section 7.2.3).	B - 21
86	Power density distribution for alternate 1 design OFE region on day 2 (see Section 7.2.3).	B - 22
87	Power density distribution for alternate 1 design OFE region on day 15 (see Section 7.2.3).	В - 23
88	Power density distribution for alternate 1 design OFE region on day 27 (see Section 7.2.3).	В - 24
89	Heat flux distribution for alternate 1 design IFE region on day 0 (see Section 7.2.4). \therefore	В - 25
90	Heat flux distribution for alternate 1 design IFE region on day 1 (see Section 7.2.4).	В - 26
91	Heat flux distribution for alternate 1 design IFE region on day 15 (see Section 7.2.4).	В - 27

92	Heat flux distribution for alternate 1 design IFE region on day 27 (see Section 7.2.4).	B - 28
93	Heat flux distribution for alternate 1 design OFE region on day 0 (see Section 7.2.4).	B - 29
94	Heat flux distribution for alternate 1 design OFE region on day 1 (see Section 7.2.4).	B - 30
95	Heat flux distribution for alternate 1 design OFE region on day 2 (see Section 7.2.4)	B - 31
96	Heat flux distribution for alternate 1 design OFE region on day 15 (see Section 7.2.4).	B - 32
97	Heat flux distribution for alternate 1 design OFE region on day 27 (see Section 7.2.4).	B - 33
98	Fission rate density distribution for alternate 2 design IFE region on day 0 (see Section	
	7.3.2)	C - 1
99	Fission rate density distribution for alternate 2 design IFE region on day 1 (see Section	
	7.3.2)	C - 2
100	Fission rate density distribution for alternate 2 design IFE region on day 15 (see Section	
	7.3.2).	C - 3
101	Fission rate density distribution for alternate 2 design IFE region on day 27 (see Section	~ .
	7.3.2).	C - 4
102	Fission rate density distribution for alternate 2 design OFE region on day 0 (see Section	a -
102	7.3.2)	C - 5
103	Fission rate density distribution for alternate 2 design OFE region on day 1 (see Section	0 (
104	7.3.2).	C - 6
104	Fission rate density distribution for alternate 2 design OFE region on day 15 (see Section	C 7
105	7.3.2)	C - /
105	Fission rate density distribution for alternate 2 design OFE region on day 27 (see Section 7.3.2)	C
106	Cumulative fission density distribution for alternate 2 design IEE region on day 1 (see	C - 0
100	Section 7 3 5)	C - 9
107	Cumulative fission density distribution for alternate 2 design IFE region on day 15 (see	0)
107	Section 7.3.5).	C - 10
108	Cumulative fission density distribution for alternate 2 design IFE region on day 27 (see	
	Section 7.3.5)	C - 11
109	Cumulative fission density distribution for alternate 2 design OFE region on day 1 (see	
	Section 7.3.5)	C - 12
110	Cumulative fission density distribution for alternate 2 design OFE region on day 15 (see	
	Section 7.3.5)	C - 13
111	Cumulative fission density distribution for alternate 2 design OFE region on day 27 (see	
	Section 7.3.5)	C - 14
112	Power density distribution for alternate 2 design IFE region on day 0 (see Section 7.3.3).	C - 15
113	Power density distribution for alternate 2 design IFE region on day 1 (see Section 7.3.3).	C - 16
114	Power density distribution for alternate 2 design IFE region on day 15 (see Section 7.3.3).	C - 17
115	Power density distribution for alternate 2 design IFE region on day 27 (see Section 7.3.3).	C - 18
116	Power density distribution for alternate 2 design OFE region on day 0 (see Section 7.3.3).	C - 19
117	Power density distribution for alternate 2 design OFE region on day 1 (see Section 7.3.3).	C - 20
118	Power density distribution for alternate 2 design OFE region on day 15 (see Section 7.3.3).	C - 21
119	Power density distribution for alternate 2 design OFE region on day 27 (see Section 7.3.3).	C - 22
120	Heat flux distribution for alternate 2 design IFE region on day 0 (see Section 7.3.4).	C - 23
121	Heat flux distribution for alternate 2 design IFE region on day 1 (see Section 7.3.4).	C - 24
122	Heat flux distribution for alternate 2 design IFE region on day 15 (see Section 7.3.4).	C - 25

123	Heat flux distribution for alternate 2 design IFE region on day 27 (see Section 7.3.4).	C - 26
124	Heat flux distribution for alternate 2 design OFE region on day 0 (see Section 7.3.4).	C - 27
125	Heat flux distribution for alternate 2 design OFE region on day 1 (see Section 7.3.4).	C - 28
126	Heat flux distribution for alternate 2 design OFE region on day 15 (see Section 7.3.4).	C - 29
127	Heat flux distribution for alternate 2 design OFE region on day 27 (see Section 7.3.4).	C - 30
128	Fission rate density distribution for alternate 3 design IFE region on day 0 (see Section	
	7.4.2)	D - 1
129	Fission rate density distribution for alternate 3 design IFE region on day 1 (see Section	
	7.4.2)	D - 2
130	Fission rate density distribution for alternate 3 design IFE region on day 15 (see Section	
	7.4.2)	D - 3
131	Fission rate density distribution for alternate 3 design IFE region on day 27 (see Section	
	7.4.2).	D - 4
132	Fission rate density distribution for alternate 3 design OFE region on day 0 (see Section	
	7.4.2)	D - 5
133	Fission rate density distribution for alternate 3 design OFE region on day 1 (see Section	
	7.4.2)	D - 6
134	Fission rate density distribution for alternate 3 design OFE region on day 2 (see Section	
	7.4.2)	D - 7
135	Fission rate density distribution for alternate 3 design OFE region on day 15 (see Section	
	7.4.2).	D - 8
136	Fission rate density distribution for alternate 3 design OFE region on day 27 (see Section	
	7.4.2).	D - 9
137	Cumulative fission density distribution for alternate 3 design IFE region on day 1 (see	D 10
100	Section 7.4.5).	D - 10
138	Cumulative fission density distribution for alternate 3 design IFE region on day 15 (see	D 11
120		D - 11
139	Cumulative fission density distribution for alternate 3 design IFE region on day 27 (see	D 12
140	Section 7.4.5).	D - 12
140	Cumulative lission density distribution for alternate 3 design OFE region on day 1 (see	D 12
1/1	Section 7.4.5).	D - 13
141	Section 7.4.5)	D 14
142	Section 7.4.5).	D - 14
142	Section 7.4.5)	D 15
1/2	Section 7.4.5)	D - 15
143	Power density distribution for alternate 3 design IFE region on day 1 (see Section 7.4.3).	D - 10
144	Power density distribution for alternate 3 design IFE region on day 15 (see Section 7.4.3).	D 19
145	Power density distribution for alternate 3 design IFE region on day 15 (see Section 7.4.3).	D - 10
140	Power density distribution for alternate 3 design OEE region on day 2/ (see Section 7.4.3).	D - 19
14/	Power density distribution for alternate 3 design OFE region on day 0 (see Section 7.4.3).	D - 20
140	Power density distribution for alternate 2 design OFE region on day 1 (see Section 7.4.2).	D - 21
149	rower density distribution for alternate 2 design OFE region on day 2 (see Section 7.4.3).	D - 22
150	Power density distribution for alternate 3 design OFE region on day 15 (see Section 7.4.3).	D - 23
151	Power density distribution for alternate 3 design OFE region on day $2/$ (see Section 7.4.3).	D - 24
152	Heat flux distribution for alternate 3 design IFE region on day 0 (see Section 7.4.4).	D - 25

Heat flux distribution for alternate 3 design IFE region on day 1 (see Section 7.4.4).
D - 26
Heat flux distribution for alternate 3 design IFE region on day 15 (see Section 7.4.4).
D - 27
Heat flux distribution for alternate 3 design IFE region on day 27 (see Section 7.4.4).
D - 28
Heat flux distribution for alternate 3 design OFE region on day 0 (see Section 7.4.4).
D - 29
Heat flux distribution for alternate 3 design OFE region on day 1 (see Section 7.4.4).
D - 30
Heat flux distribution for alternate 3 design OFE region on day 2 (see Section 7.4.4).
D - 31
Heat flux distribution for alternate 3 design OFE region on day 15 (see Section 7.4.4).
D - 31
Heat flux distribution for alternate 3 design OFE region on day 15 (see Section 7.4.4).
D - 32
Heat flux distribution for alternate 3 design OFE region on day 27 (see Section 7.4.4).
D - 32

LIST OF TABLES

1	Key HFIR highly enriched uranium (HEU) geometry and operational parameters	5
2	U ₃ Si ₂ -Al material composition data.	6
3	U_3Si_2 -Al material atom fraction data.	6
4	Analysis codes used for this work.	8
5	Radii of the inner fuel element (IFE) fuel regions in the neutronics model	9
6	Radii of the outer fuel element (OFE) fuel regions in the neutronics model	10
7	Axial mesh for fuel regions in the neutronics model.	10
8	Radii of the fuel nodes in the HSSHTC model	11
9	Axial mesh for fuel nodes in the HSSHTC model.	11
10	Key HFIR low-enriched uranium (LEU) geometry and operational parameters common	
	to all presented designs.	16
11	Complex fuel design features and benefits.	17
12	Currently analyzed silicide designs that meet the performance and safety metrics. Case	
	numbers denote different fuel shapes	17
13	Metrics used to measure the performance and safety of the LEU core	19
14	The performance and safety metrics for the new low density LEU designs need to meet or	
	exceed HEU metrics. All the designs in this study meet or exceed HEU metrics minus the	
	cold source cold flux ratio, minimum burnout margin, and uranium utilization	20
15	Key optimized design geometry and operational parameters	23
16	Fuel shape polynomial coefficients for optimized design.	25
17	Minimum and maximum fission rate densities in the optimized design	26
18	Minimum and maximum power densities in the optimized design	27
19	Minimum and maximum heat fluxes in the optimized design	28
20	Minimum and maximum cumulative fission density values in the optimized design	29
21	Key alternate 1 design geometry and operational parameters	31
22	Fuel shape polynomial coefficients for alternate 1 design.	33
23	Minimum and maximum fission rate densities in the alternate 1 design	34
24	Minimum and maximum power densities in the alternate 1 design	35
25	Minimum and maximum heat fluxes in the alternate 1 design	36
26	Minimum and maximum cumulative fission density values in the alternate 1 design	37
27	Key alternate 2 design geometry and operational parameters	39
28	Fuel shape polynomial coefficients for alternate 2 design.	41
29	Minimum and maximum fission rate densities in the alternate 2 design	42
30	Minimum and maximum power densities in the alternate 2 design	43
31	Minimum and maximum heat fluxes in the alternate 2 design	44
32	Minimum and maximum cumulative fission density values in the alternate 2 design	45
33	Key alternate 3 design geometry and operational parameters	47
34	Fuel shape polynomial coefficients for alternate 3 design.	49
35	Minimum and maximum fission rate densities in the alternate 3 design	50
36	Minimum and maximum power densities in the alternate 3 design	51
37	Minimum and maximum heat fluxes in the alternate 3 design	52
38	Minimum and maximum cumulative fission density values in the alternate 3 design	53
39	Summary of maximum parameters for each low density U_3Si_2 -Al design	56

ACRONYMS

BOC beginning-of-cycle
CE control element
DOE Department of Energy
EOC end-of-cycle
HEU highly enriched uranium
HFIR High Flux Isotope Reactor
HPC high-performance computing
HSSHTC HFIR Steady State Heat Transfer Code
IAEA International Atomic Energy Agency IFE inner fuel element
LEU low-enriched uranium
MCNP Monte Carlo N-Particle code
MOC middle-of-cycle
NNSA National Nuclear Security Administration
OFE outer fuel element
ORNL Oak Ridge National Laboratory
PHAME Python HFIR Analysis and Measurement Engine

USHPRR US High Performance Research Reactor

ACKNOWLEDGEMENTS

This work is supported by the National Nuclear Security Administration Office of Material Management and Minimization, US Department of Energy. Reviews of the manuscript by Emilian Popov and Kara Godsey at Oak Ridge National Laboratory are appreciated.

ABSTRACT

High Flux Isotope Reactor (HFIR) highly enriched uranium (HEU) to low-enriched uranium (LEU) conversion activities are ongoing as part of the Department of Energy (DOE) National Nuclear Security Administration (NNSA)'s nuclear nonproliferation mission. Design activities studying the conversion of HFIR from HEU to LEU fuel explored different fuel design features and shapes with a low density uranium-silicide dispersion (U₃Si₂-Al) fuel, which has a uranium density of 4.8 gU/cm³. The goal of these studies is to generate several HFIR LEU fuel designs of varying fuel fabrication complexity that meet the current HEU performance metrics and safety requirements. The documented designs will serve as references for fuel fabrication and qualification activities.

Recent advancements in modeling and simulation tools enable quick prototyping of fuel designs. Shift, a Monte Carlo neutron transport and depletion tool optimized for high-performance computing (HPC) architectures, is used for efficient fuel cycle and performance metrics calculations. The HFIR Steady State Heat Transfer Code (HSSHTC) is used to vet the thermal safety margin. Also, a new automation tool that connects all fuel design analysis steps, named Python HFIR Analysis and Measurement Engine (PHAME), has been developed to expedite the design study in an efficient and reproducible manner. Leveraging these tools, several candidate fuel designs were selected for varying fabrication complexity.

This report provides design feature details for four selected HFIR LEU low density U_3Si_2 -Al fuel designs and their corresponding performance and safety metrics. Nominal, best-estimate design parameters and irradiation conditions, including fission rate densities, power densities, heat fluxes, and cumulative fission densities are provided for candidate fuel designs relevant to framing irradiation experiments to support fuel qualification efforts. Simulations show that the low density U_3Si_2 -Al, with design features to enhance safety, can meet HEU core performance metrics and safety requirements if the reactor power is increased from 85 MW (HEU) to 95 MW (LEU) and if the active fuel length is increased from 50.80 cm (HEU) to 55.88 cm (LEU).

1. INTRODUCTION

The HFIR is a US Department of Energy (DOE) Office of Science User Facility that is operated at the Oak Ridge National Laboratory (ORNL). HFIR is a versatile research reactor that provides one of the highest steady-state neutron fluxes of any reactor in the world for neutron scattering experiments focused on fundamental and applied research on the structure and dynamics of matter, as well as materials irradiation studies and production of medical, industrial, and research isotopes.

ORNL is funded by the US DOE National Nuclear Security Administration (NNSA)'s Office of Material Management and Minimization (M³) to perform HFIR conversion activities such as design studies presented herein. US High Performance Research Reactor (USHPRR)s, including HFIR, the Advanced Test Reactor, the National Institute of Standards and Technology Research Reactor, the Massachusetts Institute of Technology Research Reactor, and the University of Missouri Research Reactor, are providing research on potential LEU alternatives in support of NNSA's nonproliferation mission.

Initial studies to convert HFIR from its current HEU dispersion fuel to LEU fuel explored uranium-molybdenum (U-10Mo) monolithic alloy fuel because of its high uranium density [7, 23]. HFIR's proposed U-10Mo fuel design [7] consisted of radial and axial contoured fuel profiles. HFIR initiated fuel design studies with LEU uranium-silicide dispersion (U_3Si_2 -Al) fuel in 2017 and officially rebaselined to U_3Si_2 -Al in 2019.

Current studies are focused on U_3Si_2 -Al dispersion fuels with different uranium metal densities [9, 10, 11, 13]. The goal of the HFIR conversion efforts is to design, qualify, fabricate, and deploy LEU HFIR fuel that will maintain or exceed current reactor performance metrics and safety requirements at an affordable cost [22]. Following the conversion of HFIR from HEU to LEU fuel, (1) the ability of HFIR to perform its scientific missions must be maintained or enhanced, (2) all safety requirements must be met, and (3) annual operating costs must not increase.

This report presents design characteristics and performance parameters for candidate low-density U_3Si_2 -Al fuel (4.8 $\frac{gU}{cm^3}$) designs [9]. A similar design report details the performance of the high-density U_3Si_2 -Al [1] fuel design. An optimization approach leveraging reactor physics and steady-state thermal hydraulics simulations yield optimal designs using this U_3Si_2 -Al fuel [3, 4, 5, 6, 8] and predefined conversion assumptions [22]. Multiple fuel designs are presented herein, as they represent designs with varying fabrication complexity; this provides fuel fabrication and fuel qualification options to be investigated. Designs presented in this report meet or exceed most HFIR HEU core performance metrics and safety requirements [19]. A quantitative, multivariate design down-selection will be performed after additional fabrication and irradiation testing are performed. At a minimum, the down-selection process must consider performance, safety, fabrication cost, and uranium utilization.

The set of design parameters highlighted in this report are:

- 1. fuel element and fuel plate geometry and features,
- 2. temporal fission rate density distributions,
- 3. temporal power density distributions,
- 4. temporal heat flux distributions, and
- 5. discharge cumulative fission density distributions.

2. FUEL ELEMENT GEOMETRY

The HFIR core consists of concentric annular regions: a central flux trap containing vertical experimental targets; two fuel elements — inner fuel element (IFE) and outer fuel element (OFE) — separated by a thin water labyrinth region; a region containing two control elements (CEs); a beryllium reflector; and a water region up to the edge of the pressure vessel, which is located in a pool of water [14].

The fuel assembly consists of an integral two-element configuration; the IFE is designed to be seated within the OFE. The IFE and OFE are composed of numerous 1.27 mm thick involute-shaped fuel plates separated by 1.27 mm thick coolant channels (Figure 1). The fuel plate elements are composed of a fuel region (also known as *fuel meat*) and a filler region enclosed by an aluminum cladding. In the current HEU design, the fuel meat is a mixture of aluminum powder and U_3O_8 with 93 wt% ²³⁵U. The fuel meat is contoured along the arc of the involute plate to reduce edge power peaking. The IFE fuel also contains B₄C for reactivity hold-down and to control power distribution during operation. The fuel plates are inserted into slots located in the cylindrical aluminum side plates, and they extend into machine grooves where they are attached to the side plates via circumferential welds. Key geometry and operational parameters are provided in Table 1. More details of the fuel element geometry can be found in the work by Ilas et al. [20].



Figure 1. HFIR inner and outer fuel elements.

3. SILICIDE DISPERSION FUEL

The study described in this report considered the 4.8 gU/cm³ U₃Si₂-Al dispersion fuel with an enrichment of 19.75 wt.% 235 U/U. According to the International Atomic Energy Agency (IAEA) [18], the U₃Si₂ density is 12.2 g/cm³ and the corresponding silicon and uranium weight fractions are 0.075 and 0.925, respectively. A typical aluminum density [18] of 2.7 g/cm³ is also used. A summary of the U₃Si₂-Al material composition assumed for this study is provided in Table 2. This table provides the assumed Al, U, Si, and porosity volume fractions and densities. With an assumed enrichment of 19.75 wt.% 235 U, the 235 U density in the U₃Si₂-Al fuel meat is 0.948 g/cm³.

An enrichment of 19.75 wt.% 235 U/U is assumed for these studies because this is the enrichment that has been utilized for LEU conversion studies. The assumed weight percent for 234 U, 236 U, and 238 U in U are 0.18, 0.09, and 79.78, respectively. The isotopic composition used in the neutron transport calculations is listed in Table 3.

Parameter	Units	Va	lue
Power	MW	8	35
Cycle length	days	24	-26
Coolant	-	light	water
Inlet coolant temperature	°C	48	.89
Inlet coolant pressure	MPa	3.	33
Primary flow rate	m ³ /s	1.	01
Number of fuel elements	-		2
Fuel plate clad	-	ŀ	Al
Clad thickness	μm	2.	54
Fuel meat	-	U ₃ C	D ₈ -Al
Fuel plate filler	-	Al $(+B_4)$	C in IFE)
Fuel meat + filler thickness	μm	7	62
Fuel plate thickness	μm	12	270
Coolant channel thickness	μm	12	270
Plate-to-water ratio	-		1
²³⁵ U enrichment	wt.% ²³⁵ U /U	ç	03
²³⁵ U loading	kg	9.	40
U loading	kg	10	.11
U ₃ O ₈ density	g/cm ³	8.	22
²³⁵ U density	$\frac{g^{235}U/cm^3 U_3O_8}{g^{235}U/cm^3 U_3O_8}$	6.	47
Active fuel meat length	cm	50	.80
Fuel plate length	cm	60	.96
Active fuel zone volume	L	50	0.03
Average power density	MW/L	1.	70
Fuel meat heat transfer area	m ²	39	.84
		IFE	OFE
Number of fuel plates	-	171	369
²³⁵ U loading	kg	2.60	6.80
²³⁵ U loading	g/plate	15.18	18.44
U ₃ O ₈ -to-Al mass split	wt.% U ₃ O ₈	30	40
Burnable poison in the filler	-	10 B in B ₄ C	-
¹⁰ B loading	g	2.70	-
¹⁰ B density in filler	mg/cm ³	1.752	-
Involute radius *	cm	6.91261	14.91742
Fuel plate arc length*	cm	9.21004	8.09752
Distance from inner plate edge to involute	cm	0.29718	0.29464
origin*			
Distance along involute to fuel meat start	cm	0.23241	0.21336
Distance along involute to fuel meat end	cm	8.02259	7.22884
Fuel meat arc length	cm	7.79018	7.01548
Fuel meat heat transfer area	m ²	13.53435	26.30132
Inner radius of fuel meat	cm	7.11950	15.11586
Outer radius of fuel meat	cm	12.53239	20.87073
Active fuel zone volume	L	16.97643	33.05139
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Table 1. Key HFIR HEU geometry and operational parameters.

* Visual depiction of fuel plate geometry in Figure 5

Parameter	Unit	Symbol	Value	Source
Al density	g/cm ³	$ ho_{Al}$	2.7	[18]
U density in U ₃ Si ₂ -Al	g/cm ³	$ ho_{U,M}$	4.8	assumed based on [24]
U ₃ Si ₂ density	g/cm ³	ρ_{U3Si2}	12.2	[18]
U weight fraction in U_3Si_2	-	W_U	0.925	[18]
U density in U ₃ Si ₂	g/cm ³	$ ho_{U,S}$	11.285	$ ho_{U_3Si_2}\cdot(W_U)$
Si weight fraction in U ₃ Si ₂	-	W_{Si}	0.075	[18]
Si density in U ₃ Si ₂	g/cm ³	$\rho_{Si,S}$	0.915	$\rho_{U_3Si_2} \cdot (W_{Si})$
parameter "a"	cm ³ /g	a	0.3118	[18]; $\frac{1}{W_U}(\frac{1}{\rho_{Al}} - \frac{1}{\rho_{U_3Si_2}})$
U_3Si_2 volume fraction in	-	$V_{f,M}$	0.4253	[18]; $\frac{\rho_{U,M}(\frac{1}{\rho_{Al}} - aW_U)}{W_U}$
U ₃ Si ₂ -Al				
U_3Si_2 density in U_3Si_2 -Al	g/cm ³	$ ho_{U3Si2,M}$	5.1892	$V_{f,M} \cdot (\rho_{U_3Si_2})$
Porosity volume fraction	-	$V_{P,M}$	0.0824	[18], $0.072V_{f,M}$ –
				$0.275(V_{f,m})^2 + 1.32(V_{f,M})^3$
Al matrix volume fraction	-	$V_{Al,M}$	0.4922	$1 - V_{f,M} - V_{P,M}$
Al density in U ₃ Si ₂ -Al	g/cm ³	$\rho_{Al,M}$	1.3290	$\rho_{Al}(V_{Al,M})$
U ₃ Si ₂ -Al density	g/cm ³	$ ho_M$	6.5181	$\rho_{U3Si2,M} + \rho_{Al,M}$
²³⁵ U enrichment	g ²³⁵ U/gU	е	0.1975	assumed based on LEU
				enrichment
235 U density in U ₃ Si ₂	g/cm ³	$ ho_{U5,S}$	2.2288	$\rho_{U,S}(e)$
235 U density in U ₃ Si ₂ -Al	g/cm ³	$ ho_{U5,M}$	0.9480	$\rho_{U,M}(e)$

Table 2. U₃Si₂-Al material composition data.

Table 3. $U_{3}Si_{2}\mbox{-}Al$ material atom fraction data.

Isotope	Atom fraction
$^{27}Al^{13}$	5.91103E-01
²⁸ Si ¹⁴	1.53948E-01
²⁹ Si ¹⁴	7.55088E-03
³⁰ Si ¹⁴	4.81762E-03
$^{234}U^{92}$	4.33147E-04
$^{235}\mathrm{U}^{92}$	4.83986E-02
$^{236}U^{92}$	2.22055E-04
²³⁸ U ⁹²	1.93527E-01

As described in Section 3.3.1 of the US Nuclear Regulatory Commission's report [24], "the fuel particles in the core swell as a function of burnup to accommodate fission products, both solid and gaseous, that occupy a greater volume than the fissioning uranium." Fuel meat swelling causes plate thickness to increase, resulting in a reduced in-core coolant-to-moderator volume. The reduction in the volume of water adjacent to the fuel plates degrades reactor performance by introducing negative reactivity and therefore reducing cycle length. It also adversely affects the thermal safety margin by thinning the coolant channel.

The swelling rate of U_3Si_2 is 6.2% percent per 10^{21} fissions/cm³- U_3Si_2 [24]. Thus, fuel particle swelling increases linearly as a function of burnup. As shown above, the volume fraction of U_3Si_2 in the fuel meat (i.e., U_3Si_2 -Al) is 0.4253, so the swelling rate can also be described as 2.637% per 10^{21} fissions/cm³ - fuel meat. The impact of fuel swelling on cycle length was shown to be small in a preliminary study, so fuel swelling is not specifically modeled in the depletion simulations. However, fuel swelling is considered in the HSSHTC calculations to decrease the coolant channel thickness.

4. COMPUTATIONAL METHODS

The computational design and analysis methods have been modernized to (1) decrease time of analysis, (2) decrease inconsistencies in the analysis, and (3) increase reproducibility [2, 25]. Tools used in this work are shown in Table 4.

Name	Description	Reference
Shift	Monte Carlo radiation transport code. Sim-	[21]
	ulates neutron transport in HFIR and deple-	
	tion of fuel and target isotopes.	
HSSHTC	Reads processed output from Shift to calcu-	[10, 15]
	late steady-state thermal hydraulic metrics	
	such as burnout margins steady-state tem-	
	perature.	
PHAME	Driver for the entire analysis process. Orga-	[2, 3]
	nizes and passes data between tools. Also	
	contains a visualization suite.	

Table 4. Analysis codes used for this work.

The analysis process is as follows:

- 1. Determine fuel design features (Table 11) and fuel shape (radial thickness profile)
- 2. Generate Monte Carlo N-Particle code (MCNP) geometry from analyst input (Figure 3)
- 3. Generate corresponding Shift input file
- 4. Run Shift with critical CE position search to determine critical CE position.
- 5. Parse Shift output to produce reactor physics performance metrics (h5 database)
- 6. Create HSSHTC input file from the produced database
- 7. Run HSSHTC
- 8. Parse HSSHTC output file to store thermal hydraulics metrics (h5 database)
- 9. Use visualization suite to produce plots and tables of analysis results

Except for the initial step, the entire analysis process is automated, which increases reproducibility and decreases probability of human error. A full HFIR Monte Carlo N-Particle code (MCNP) model with a representative loading is used to generate these metrics [12].

4.1 Neutronics Mesh

The involute fuel plates within the fuel elements are explicitly modeled using a set of hexahedra to approximately define the fuel meat, filler, and Al cladding of the fuel plates and the water coolant between the plates. The radial mesh used to define the hexahedra approximating the fuel meat shape is listed in Tables 5 and 6, respectively. A total of 21 radial mesh cells are used to define the IFE, primarily because it has a smaller involute radius and therefore more curvature than the OFE. The IFE and OFE axial meshes

consist of 21 cells as described in Table 7. Nonuniform radial and axial mesh cells are defined to accurately capture the fuel shape and the flux gradients that occur at the axial and radial extremes of the fuel meat.

No.	$r_i(\text{cm})^*$	$r_o(\text{cm})$	$\Delta r(cm)$
1	7.124378	7.20	0.08
2	7.20	7.35	0.15
3	7.35	7.50	0.15
4	7.50	7.75	0.25
5	7.75	8.00	0.25
6	8.00	8.25	0.25
7	8.25	8.50	0.25
8	8.50	8.85	0.35
9	8.85	9.20	0.35
10	9.20	9.50	0.30
11	9.50	9.85	0.35
12	9.85	10.20	0.35
13	10.20	10.50	0.30
14	10.50	10.85	0.35
15	10.85	11.20	0.35
16	11.20	11.50	0.30
17	11.50	11.75	0.25
18	11.75	12.00	0.25
19	12.00	12.20	0.20
20	12.20	12.40	0.20
21	12.40	12.54696	0.15

Table 5. Radii of the IFE fuel regions in the neutronics model.

* r_i and r_o are inner and outer radii; $\Delta r = r_o - r_i$

4.2 Depletion Modeling

For depletion modeling, the fully explicit transport-depletion coupling method is used, where a single transport calculation is done at the beginning of the time, and that result is used for all the depletion substeps. For this work, a timestep of a day is used, with 10 depletion substeps. [16] explains depletion modeling in Shift in detail.

4.3 Thermal-hydraulics mesh

The HSSHTC is a 2-D r-z steady-state heat transfer code represented as (i,j) nodes. The IFE and OFE radial mesh defining the fuel meat consists of 11 nodes each as shown in Table 8. The IFE and OFE axial mesh consists of 23 nodes as shown in Table 9. The HSSHTC node locations were selected based on the following guidelines: (1) ~0.4 cm Δs (distance along arc length) at radial edges, (2) 0.5 cm Δz at axial edges, (3) internal fuel meat nodes approximately at neutronic s midpoints, (4) internal fuel nodes approximately at neutronic z midpoints, and (5) nodes at location optimized for energy conservation based on the power distribution. Very fine axial and radial meshes at the radial and axial extremes were not desired because HSSHTC does not conduct heat into the unfueled regions and a very fine mesh around the

No.	$r_i(\text{cm})^*$	$r_o(\text{cm})$	$\Delta r(\text{cm})$
1	15.13905	15.30	0.16
2	15.30	15.50	0.20
3	15.50	16.00	0.50
4	16.00	16.50	0.50
5	16.50	17.00	0.50
6	17.00	17.50	0.50
7	17.50	18.00	0.50
8	18.00	18.50	0.50
9	18.50	19.00	0.50
10	19.00	19.50	0.50
11	19.50	20.00	0.50
12	20.00	20.50	0.50
13	20.50	20.75	0.25
14	20.75	20.95536	0.21

Table 6. Radii of the OFE fuel regions in the neutronics model.

* r_i and r_o are inner and outer radii; $\Delta r = r_o - r_i$

Tabl	e 7.	Axial	mesh	for	fuel	regions	in	the	neutronics	model.

No.	z _{upper} (cm) *	z _{lower} (cm)	$\Delta z (cm)$
1	27.94	27.44	0.50
2	27.44	26.94	0.50
3	26.94	25.94	1.00
4	25.94	24.94	1.00
5	24.94	23.00	1.94
6	23.00	18.00	5.00
7	18.00	13.00	5.00
8	13.00	8.00	5.00
9	8.00	3.00	5.00
10	3.00	1.00	2.00
11	1.00	-1.00	2.00
12	-1.00	-3.00	2.00
13	-3.00	-8.00	5.00
14	-8.00	-13.00	5.00
15	-13.00	-18.00	5.00
16	-18.00	-23.00	5.00
17	-23.00	-24.94	1.94
18	-24.94	-25.94	1.00
19	-25.94	-26.94	1.00
20	-26.94	-27.44	0.50
21	-27.44	-27.94	0.50

* Location is with respect to the core midplane (at axial location 0.0cm).

frame of the fuel meat would result in additional conservatism. Figure 2 illustrates the HSSHTC nodes superimposed onto the neutronics mesh.

i	IFE r (cm)	OFE r (cm)
3	7.124	15.139
4	7.493	15.521
5	7.820	15.837
6	8.254	16.252
7	9.014	17.007
8	10.012	18.007
9	11.011	19.007
10	11.753	19.752
11	12.119	20.279
12	12.326	20.67
13	12.547	20.955

Table 8. Radii of the fuel nodes in the HSSHTC model.

Table 9. Axial mesh for fuel nodes in the HSSHTC model.

	7 (cm) *	i	7 (cm)
	Z (CIII)	1	Z (CIII)
3	27.94	15	-2.00
4	27.44	16	-5.50
5	26.94	17	-10.50
6	26.32	18	-15.50
7	25.44	19	-20.50
8	23.97	20	-23.97
9	20.50	21	-25.44
10	15.50	22	-26.32
11	10.50	23	-26.94
12	5.50	24	-27.44
13	2.00	25	-27.94
14	0.00		

*Location is with respect to the core midplane at axial location 0.0 cm.



Figure 2. Fuel element HSSHTC nodes (black circles) superimposed on neutronics mesh (black lines).

4.4 Design parameter calculation methods

4.4.1 Fission rate density

The fission rate density f_d in a given fuel region is

$$f_d = \frac{1}{V_{\text{fuel}}} \sum_{i}^{M} \int_0^\infty dE \int_{\partial V \in V_{\text{fuel}}} dV N_i(\mathbf{r}) \sigma_{i,f}(\mathbf{r}, E) \phi(\mathbf{r}, E)$$
(1)

where V_{fuel} is the volume of the given fuel region, N_i is the number density of isotope *i*, $\sigma_{i,f}$ is the fission cross section of isotope *i*, ϕ is the scalar flux, and the sum is over the *M* fissionable isotopes within the fuel region. The unit of f_d is fissions per second per cubic cm of fuel particle.

4.4.2 Cumulative fission density

Cumulative fission density is calculated by taking the time integral of the fission rate density values.

$$F_d(t_f) = \frac{1}{V_{\text{fuel}}} \sum_{i}^{M} \sum_{t}^{T} \int_0^\infty dE \int_{\partial V \in V_{\text{fuel}}} dV N_{i,t}(\mathbf{r}) \sigma_{i,f}(\mathbf{r}, E) \phi_t(\mathbf{r}, E) \Delta t$$
(2)

The unit of F_d is fissions per cubic cm of fuel particle. The maximum cumulative fission density in this report is an interpolated value between the last full cycle day and the next day. For example, if the cycle length is 26.7 days, then maximum cumulative fission density is at:

$$F_d(26.7) = F_d(26) + (F_d(27) - F_d(26)) * 0.7$$
(3)

4.4.3 Power density

Power density is calculated by multiplying the fission rate density by the average energy generated per fission (200.7 MeV *). A conservative assumption is made that all energy generated by fission is deposited locally in the fuel meat.

$$P_d = f_d * 200.7 \frac{MeV}{fission} * \frac{1.60218 * 10^{-16} \,\text{kJ}}{1\,\text{MeV}}$$
(4)

The unit of P_d is kW per cubic cm of fuel particle.

4.4.4 Heat flux

Nominal heat fluxes are estimated using the following expression:

$$q_{(r,z)}^{\prime\prime}(\frac{W}{cm^2}) = \overline{q^{\prime\prime}}(\frac{W}{cm^2})\phi_{(r,z)} = \frac{P_{tot}(W)f_{FE}}{A(cm^2)}\phi_{(r,z)}$$
(5)

^{*}This Q value of 200.7 Mev/fission is a 'typical' Q value used in HFIR analyses close to the approximate cycle-averaged value that was recently calculated for the optimized silicide design. The BOC and EOC Q values were estimated to be 200.49 and 201.46 MeV/fission, respectively, givin the average Q value of 200.98 MeV/fission [9].

where $q''_{(r,z)}$ is the nominal heat flux at r, z, and $\overline{q''}$ is the core average heat flux, $\phi_{(r,z)}$ is the relative fission density at r,z, P_{tot} is the total reactor power, f_{FE} is the fraction of total heat deposited in the fuel element, and A is the heat transfer area. A f_{FE} value of 0.965 is assumed, and a heat transfer area of $4.3820e^5cm^2$ is assumed for 22-inch fuel (Eq. 6). Symmetric heat transport through both sides of the fuel plates is assumed irrespective of the location of the fuel meat inside the plates (i.e., centered symmetric vs. off-centered asymmetric). The location of the fuel is taken into account by adjusting the uncertainty factors in the HSSHTC calculation.

$$A_{FE} = (\Delta s_{IFE} * N_{IFE} + \Delta s_{OFE} * N_{OFE}) * (H * 2)$$
(6)

- Δs = Length of fuel meat along involute
- N = Number of fuel plates in region
- H = Height of fuel plate

5. CANDIDATE FUEL DESIGN PARAMETERS

All four low density U_3Si_2 fuel designs share some key geometric and operational characteristics (Table 10). The fuel designs have different design features that impact manufacturing processes (Table 11). Table 12 shows the design features selected for the fuel design options explored in this effort. The fuel axial length had to be extended from 50.8 cm (20 inches) to 55.88 cm (22 inches) in order to meet cycle length standards.

The input generation script is set up so that the user can specify different combinations of design features. Figure 4 shows the MCNP geometry representations of these design features.



Figure 3. PHAME-generated MCNP file geometry.

Parameter	Units	Va	alue	
Power	MW		95	
Coolant	-	light	water	
Inlet coolant temperature	°C	48	3.89	
Inlet coolant pressure	MPa	3	.33	
Primary flow rate	m ³ /s	1	.01	
Number of fuel elements	-		2	
Clad thickness	μm	2	254	
Fuel meat + filler thickness	μm	7	/62	
Fuel plate thickness	μm	12	270	
Coolant channel thickness	μm	12	270	
Plate-to-water ratio	-		1	
Active fuel meat length	cm	55	5.88	
Fuel plate length	cm	60).96	
Active fuel zone volume	L	55	5.58	
Average power density	MW/L	1.71		
Fuel meat heat transfer area	m ²	44.13		
		IFE	OFE	
Number of fuel plates	-	171	369	
Involute radius*	cm	6.91261	14.91742	
Fuel plate arc length*	cm	9.21004	8.09752	
Distance from inner plate edge to invo- lute origin*	cm	0.29718	0.29464	
Distance along involute to fuel meat start	cm	0.23114	0.23439	
Distance along involute to fuel meat end	cm	8.02706	7.32267	
Fuel meat arc length	cm	7.79592	7.08828	
Fuel meat heat transfer area	m^2	14.89875	29.23167	
Inner radius of fuel meat	cm	7.12438	15.13905	
Outer radius of fuel meat	cm	12.54696	20.95536	
Active fuel zone volume	L	18.72606	36.85477	

Table 10. Key HFIR LEU geometry and operational parameters common to all presented designs.

* Visual depiction of fuel plate geometry in Figure 5

Design option	Description	Benefit
Axial contour (i.e., toe)	The lowest 1 cm of the fuel is linearly interpolated from the top shape to a radially flat fuel profile with reduced thickness.	Because the coolant flows from top to bottom in HFIR, the location of limiting thermal margin is at the bot- tom (i.e., the outlet). By reducing fuel mass on the bottom, outlet power peaking is reduced.
Center and symmetric fuel zone	The fuel meat is centered and sym- metric within the fuel plate thick- ness and is surrounded by an equal amount of filler material on each side (plates consist of cladding, filler, fuel, filler, and cladding instead of cladding, fuel, filler, and cladding).	Enhances heat transfer path from fuel meat to coolant. The amount of heat dissipated from the convex and con- cave sides of the involute are equal.
Gd ₂ O ₃ in IFE filler	Gadolinium is added in addition to boron to suppress IFE power peaking in the first few day(s) of operation.	Provides for an increase in the total fuel amount while maintaining safety margins in the first few cycle days when margins are typically smallest for silicide designs.
Boron strip underneath	The lowest unfueled region (i.e., clad) of the fuel contains a 0.5-inch boron strip in the form of borated aluminum powder.	Because the coolant flows from top to bottom in HFIR, the location of lim- iting thermal margin is at the bottom (i.e., the outlet). By placing boron on the bottom, outlet power peaking is suppressed.

Table 11. Complex fuel design features and benefits.

Table 12. Currently analyzed silicide designs that meet the performance and safety metrics. Case numbers denote different fuel shapes.

Name	Center-symmetric fuel	Axial contour	Gd in filler	Boron strip
Optimized	Y	Y	-	-
Alternate 1	-	Y	Y	-
Alternate 2	Y	-	Y	-
Alternate 3	-	-	-	Y



Figure 4. The top image shows the center and symmetric fuel, where the layers are clad-filler-fuelfiller-clad. The middle image shows the off-center and asymmetric fuel, where the layers are cladfuel-filler-clad. The bottom images shows the axial contour of the center and symmetric fuel, where the fuel thickness is reduced to 200 μ m. These images are for illustration only.

6. OVERVIEW OF METRICS

The metrics used to measure the LEU core performance and safety are shown in Table 13. The list of metrics used in this report is expanded from the list in Ilas et al. [19], to provide a more comprehensive set of metrics related to safety, performance, and resource utilization.

All the designs meet or exceed HEU metrics (Table 14) minus the cold source cold flux ratio, minimum burnout margin, and uranium utilization. The detailed explanations for these metrics are below. The most variation in performance between designs is seen in cycle length and Cf production rate.

6.1 DESCRIPTION OF METRICS

This section presents a brief description and the calculation method for each metric. All flux metrics are spatially and temporally averaged, so the single value denotes the average value across all radial, axial, and temporal (day) meshes.

6.1.1 Cf Production Rate

One of the primary missions of HFIR is isotope production, including the production of 252 Cf, which is created within the curium-oxide targets inside the flux trap region through a complex absorption and decay

Metric	Туре	Units	Description
Cf production rate	Performance	mg/day	Time-averaged mass of cal-
			ifornium produced from the
			curium targets
Cm target thermal flux	Performance	$\frac{n}{cm^2 \cdot s}$	Thermal flux ($E < 0.625 \text{ eV}$) in
			the curium target
Cold source moderator vessel	Performance	-	Ratio of cold flux ($E < 0.103978$
cold flux ratio			eV) in cold source
Cold source moderator vessel	Performance	$\frac{\text{neutrons}}{\text{cm}^2 \cdot \text{s}}$	Cold flux ($E < 0.103978 \text{ eV}$) in
cold flux			the moderator vessel
Cycle length	Performance	days	Number of days the LEU core
			can maintain criticality
Flux trap fast flux	Performance	$\frac{n}{cm^2 \cdot s}$	Fast flux $(E > 0.1 \text{ MeV})$ in flux
			trap
Flux trap fast flux ratio	Performance	-	Ratio of fast flux ($E > 0.1 \text{ MeV}$)
			in flux trap
Minimum burnout margin	Safety	-	Thermal safety margin
Reflector fast flux	Performance	$\frac{\text{neutrons}}{\text{cm}^2 \cdot \text{s}}$	Fast flux $(E > 0.1 \text{ MeV})$ in re-
			flector
Reflector fast flux ratio	Performance	-	Ratio of fast flux ($E > 0.1 \text{ MeV}$)
			in reflector
²³⁵ U loading	Design	kg	Mass of 235 U in the fuel
²³⁵ U utilization	Performance	day/kg	Cycle length divided by loaded ²³⁵ U

Table 13. Metrics used to measure the performance and safety of the LEU core.

chain. This metric is calculated by obtaining the mass of 252 Cf at the end of the cycle and dividing by the cycle length.

6.1.2 Cycle Length

Cycle length denotes the number of days the core can maintain criticality. The critical element position search module determines positions throughout operation, ending when the core is subcritical, with the control elements fully withdrawn. From the control element position curve, an interpolation is made to estimate the cycle length. For example, if a core is subcritical with fully withdrawn control elements starting on day 27, then the cycle length would be 26.N days, where N is interpolated from the control element position curve.

6.1.3 Cold Source Flux and Ratio

The cold source flux magnitude and cold-to-total flux ratio are measures of the quality of the flux for cold neutron science. Increased brightness (i.e., greater magnitude) and reduced noise (i.e., higher cold-to-total flux ratio) are desired. Due to a hardened spectrum with LEU fuel relative to HEU, the cold-to-total flux ratio of these designs do not meet HEU metrics.

As the cold source neutron source region is radially external to the control elements, the cold source region flux is highly affected by the control element location. Therefore, designs with longer cycle lengths and associated slower control element withdrawals have a relatively lower average cold source flux.

6.1.4 Flux Trap Fast Flux and Ratio

The flux trap is the center region in HFIR that experiences the highest flux (~ $10^{15} \frac{neutrons}{cm^2 \cdot s}$). The flux trap region is used for isotope production and materials irradiation testing. Fast flux in the flux trap is used for materials irradiation studies to accelerate damage testing. The fast flux and fast-to-total flux ratio metrics

Table 14. The performance and safety metrics for the new low density LEU designs need to meet or
exceed HEU metrics. All the designs in this study meet or exceed HEU metrics minus the cold source
cold flux ratio, minimum burnout margin, and uranium utilization.

Metrics	HEU	Optimized	Alternate1	Alternate2	Alternate3
Cf production rate	1.388	1.406	1.398	1.396	1.38
Cm target flux	>1.00E+15	1.64E+15	1.64E+15	1.63E+15	1.63E+15
Cold source cold flux ratio	0.736	0.723	0.723	0.724	0.724
Cold source flux	4.48E+14	4.63E+14	4.64E+14	4.65E+14	4.65E+14
Cycle length	26.2	27.464	27.452	27.117	27.121
Flux trap fast flux	1.07E+15	1.15E+15	1.15E+15	1.14E+15	1.14E+15
Flux trap fast flux ratio	0.29	0.308	0.308	0.307	0.306
Minimum burnout	1.61	1.617	1.538	1.507	1.512
Reflector fast flux	2.89E+14	3.22E+14	3.22E+14	3.23E+14	3.23E+14
Reflector fast flux ratio	0.192	0.198	0.198	0.197	0.197
²³⁵ U loading	9.4	13.95	13.95	13.933	13.951
²³⁵ U utilization	2.78	1.969	1.968	1.946	1.944
are calculated by spatially averaging the fast fluxes in the material irradiation targets located in the flux trap. This results in a time-resolved quantity that is then averaged over the cycle.

6.1.5 Minimum Burnout Margin

Safety limit (SL) calculations must show that for cases in which a given process variable is at its SL, all other variables are at their limiting control settings (LCSs), and all uncertainties in the technical knowledge of the process have resolved unfavorably, then no hot spot burnout can occur. At each time step, HSSHTC determines the average temperatures and heat fluxes at the given power and then calculates the effects of uncertainties in reactor process conditions, tolerances and uncertainties in fuel manufacturing, and analysis/correlation uncertainties. At the last time step specified in the input, the reactor power is increased until the hot spot surface heat flux is equal to the surface heat flux predicted by the Gambill burnout heat flux correlation [17]. The burnout margin is defined as the burnout-to-nominal power ratio and the minimum burnout margin is the smallest ratio calculated over the cycle. Refer to [11] for more details regarding the safety limit calculation methods and the employed uncertainty factors for silicide fuel.

For the 95 MW LEU core, a minimum burnout power of 129.2 MW is required to meet the current 1.36 flux-to-flow safety limit; however, a greater margin is required to render an LEU design option feasible because the minimum predicted HEU margin is 1.61 and the assumptions made for the LEU fuel uncertainty factors associated with manufacturing tolerances and physics correlations may need to be refined, making it prudent to favor a more conservative calculation in this analysis stage. It is desired to maintain the HEU-calculated margin (1.61), but a margin of 1.51 has been defined by the HFIR conversion team as the minimum margin to declare a LEU design feasible. This margin has been somewhat arbitrarily selected based on a previous safety limit and the difference between the safety limit and the calculated limit being ≈ 0.15 . The difference of 0.15 is then added to the current safety limit of 1.36 to get 1.51.

A design that meets the HEU calculated 1.61 is preferred, but given the tight restraints on the design space, the 1.51 margin is adequate, as long as it notably pass the TSR SL of 1.36 and the reduced margin is offset by performance and fabrication improvements.

6.1.6 Reflector Fast Flux and Ratio

The removable beryllium reflector has eight large aluminum-lined irradiation positions, and one of these facilities is often used for materials irradiation purposes when large targets are to be irradiated. For the flux trap, these metrics are calculated by spatially averaging the fluxes in the 8 irradiation facilities (1A,1B, 3A,3B, 5A, 5B, 7A, 7B) within the removable beryllium reflector region. This results in a time-resolved quantity that is then averaged over the cycle.

6.1.7 ²³⁵U Loading and Utilization

The 235 U loading metric denotes the total mass of 235 U in the fuel elements. The mass of fissile material is roughly proportional to the cycle length. The utilization metric is the cycle length divided by the initial 235 U mass loading. The HEU core has a lower 235 U loading and a higher utilization because it has a substantially lower amount of 238 U, so it is impacted less by fuel parasitic neutron absorption.

7. DESIGN SPECIFICATIONS AND PARAMETERS

This section presents the four candidate designs and their time-dependent, nominal maximum detailed design parameters (i.e., fission rate density, power density, heat flux, and cumulative fission density). The larger plots that show the spatially dependent values are provided in the appendix for readability. The reference numbers in each section are links to the plots in the document. Also, for these plots, only the beginning-of-cycle (BOC), first day, middle-of-cycle (MOC), and end-of-cycle (EOC) values are shown. The BOC and EOC state points are provided because they bound the cycle operations. Results at the first day into the cycle are provided because fission product poisons have approximately reached their equilibrium conditions, the control elements have rapidly withdrawn with respect to BOC, and the peak parameters at the outer radial edge of the OFE on the core midplane are observed. MOC conditions are provided because they approximately represent cycle average results.

The fuel plate geometry for each design is discussed in the following subsections for the four designs. Interpretation of the Alternate 1 design's IFE fuel plate is illustrated in Figure 5, with nominal dimensions shown. The fuel meat thickness (t) profiles are defined as polynomial curves, f(x), where x is the arc distance from the origin of the involute generating radius. Thus, x=0 is the origin of the involute generating radius, which is 2.7215 inches (6.91261 cm) from the reactor core centerline for the IFE. The distance from the inner edge of the IFE plate to the origin of the involute is 0.117 inches (0.29718 cm). The distances from the origin of the involute to the fuel meat start and stop edges are taken as 0.091 inches (0.23114 cm) and 3.16026 inches (8.02706 cm). The nominal fuel plate arc length is 3.626 inches (9.21004 cm).



Figure 5. Interpretation of fuel plate plots with Alternate Design 1 IFE illustrated.

7.1 OPTIMIZED DESIGN

The optimized design was generated by including center-symmetric fuel zones to promote heat transfer to the coolant and axial contours at the bottom of the fuel zones to reduce axial power peaking. Combining these two complex design features is advantageous, resulting in a design with a desirable thermal safety margin. The cycle length of this design is 27.46 days. The optimized fuel design specifications are presented in Table 15.

Parameter	Units		Value	
Center-symmetric fuel zone	-		yes	
Axial contour	-		yes	
Gd_2O_3 in IFE filler	-		no	
Boron strip below fuel	-		no	
U loading	kg		70.6332	
²³⁵ U loading	kg		13.9501	
		IFE	OFE	
²³⁵ U loading	kg	4.0748	9.8753	
²³⁵ U loading per plate	g/plate	23.82924	26.76233	
Filler	-	$Al + B_4C$	Al	
10 B loading in IFE filler	g	2.2025	-	
¹⁰ B density in IFE filler	mg/cm ³	1.752	-	
Gd loading in IFE filler	mg	0.0	0.0	
Gd density in IFE filler	mg/cm ³	0.0	0.0	

Table 15. Key optimized design geometry and operational parameters.

7.1.1 Fuel Meat Shape

The fuel meat thickness profile of the optimized design is described in Table 16, where t (μ m) is the fuel meat thickness and s (cm) is the distance from the origin of the involute generating radius. Illustrations of the IFE and OFE fuel meat shapes are shown in Figures 6 and 7.



Figure 6. Fuel meat shape for the optimized design.



Figure 7. Fuel bottom meat shape for the optimized design. The axial gradient increases the minimum safety margin, which usually occurs at the bottom of the core.

					Order		
	s_i (cm)	s_f (cm)	4	3	2	1	0
IFE	ALL		-2.23E-01	2.88E+00	-2.82E+01	1.84E+02	2.57E+02
	0.2343	1.696	-	-	-5.60E+01	2.60E+02	4.82E+02
OFE	1.696	6.005	-	-	-	-	7.62E+02
	6.005	7.3226	-	-	-7.14E+01	7.90E+02	-1.41E+03

Table 16. Fuel shape polynomial coefficients for optimized design.

7.1.2 Fission Rate Density

Figure 8 shows the maximum fission rate density during operation for each fuel element. Table 17 lists the peak fission rate results and references to the figures in the appendix that illustrate the spatial fission rate density values for the four selected state points for each fuel element.



Figure 8. Optimized design maximum fission density during operation.

Table 1	7. M	inimum	and	maximum	fission	rate	densities	s in	the	optimized	design.

Day	Region	Minimum	Maximum	Unit	Ref.
0	IFE	3.2	18.65		Fig. 32
1	IFE	3.02	17.52		Fig. 33
15	IFE	3.02	13.47		Fig. 34
27	IFE	3.17	9.72	10 ¹⁴ <u>fissions</u>	Fig. 35
0	OFE	1.33	9.93	s·cm ³ _{fuelparticle}	Fig. 36
1	OFE	1.34	11.81		Fig. 37
2	OFE	1.37	11.85		Fig. 38
15	OFE	1.82	10.13		Fig. 39
27	OFE	2.16	8.35		Fig. 40

7.1.3 Power Density

The power density values are the fission rate density values multiplied by the average energy generated per fission. It is conservatively assumed that all energy generated by fission is deposited locally in the fuel meat. Therefore, the power density and fission rate density results have identical trends, and only the magnitudes of the results are different. Figure 9 shows the maximum local power density during operation for each fuel element. Table 18 lists the maximum power density results and references the figures in the appendix. Each plot in the appendix shows the spatial power density values for each of the four selected state points for each fuel element.



Figure 9. Optimized design maximum power density during operation.

Day	Region	Minimum	Maximum	Unit	Ref.
0	IFE	4.37	25.5		Fig. 47
1	IFE	4.13	23.96		Fig. 48
15	IFE	4.12	18.42		Fig. 49
27	IFE	4.34	13.3	kW	Fig. 50
0	OFE	1.81	13.58	cm ³ _{fuelparticle}	Fig. 51
1	OFE	1.84	16.15		Fig. 52
2	OFE	1.87	16.2		Fig. 53
15	OFE	2.48	13.86		Fig. 54
27	OFE	2.95	11.42		Fig. 55

Table 18. Minimum and maximum power densities in the optimized design.

7.1.4 Heat Flux

Figure 10 shows the maximum heat flux during operation for each fuel element. Table 19 lists the maximum heat flux results and references to the figures in the appendix. Each plot in the appendix shows the spatial heat flux values for the four selected state points for each fuel element.



Figure 10. Optimized design maximum heat flux during operation.

Day	Region	Minimum	Maximum	Unit	Ref.
0	IFE	117.9	370.06		Fig. 56
1	IFE	114.0	350.02		Fig. 57
15	IFE	111.09	302.86		Fig. 58
27	IFE	109.2	270.01	w	Fig. 59
0	OFE	32.79	363.14	cm ²	Fig. 60
1	OFE	33.43	452.33		Fig. 61
2	OFE	33.91	454.31		Fig. 62
15	OFE	42.28	390.07		Fig. 63
27	OFE	71.77	326.38		Fig. 64

Table 19. Minimum and maximum heat fluxes in the optimized design.

7.1.5 Cumulative Fission Density

Figure 11 shows the maximum local cumulative fission density during operation for each fuel element, and Figure 12 illustrates the fission rate density variation with cumulative fission density for every spatial cell in the neutronics model. Table 20 lists the maximum cumulative fission density results and references to the figures in the appendix.



Figure 11. Optimized design maximum cumulative fission density during operation.

Table 20. Minimum	and maximum	cumulative	fission (density	values in	the o	ntimized	design.
	and maximum	cumulative	11551011	uchisty	values m	une o	pumizeu	ucoigni

Day	Region	Minimum	Maximum	Unit	Ref.
1	IFE	0.27	1.57		Fig. 41
15	IFE	3.95	20.4		Fig. 42
27	IFE	7.17	32.32	10 ²⁰ <u>fissions</u>	Fig. 43
1	OFE	0.12	0.9	cm ³ _{fuelparticle}	Fig. 44
15	OFE	2.06	14.35		Fig. 45
27	OFE	4.21	24.02		Fig. 46



Figure 12. Optimized design fission rate density variation with cumulative fission density during operation.

7.2 ALTERNATE 1 DESIGN

The alternate 1 design was generated by including axial contours at the bottom of the fuel zones to reduce axial power peaking and gadolinium oxide in the IFE filler to suppress power peaking in the IFE for the first few days. The cycle length of this design is 27.45 days. The alternate 1 fuel design specifications are presented in Table 21.

Parameter	Units		Value	
Center-symmetric fuel zone	-		no	
Axial contour	-		yes	
Gd ₂ O ₃ in IFE filler	-		yes	
Boron strip below fuel	-		no	
U loading	kg		70.6332	
²³⁵ U loading	kg	13.9501		
		IFE	OFE	
²³⁵ U loading	kg	4.0748	9.8753	
²³⁵ U loading per plate	g/plate	23.82924	26.76233	
Filler	-	$Al + B_4C$	Al	
¹⁰ B loading in IFE filler	g	2.2022	-	
¹⁰ B density in IFE filler	mg/cm ³	1.752	-	
Gd loading in IFE filler	mg	1.009	0.0	
Gd density in IFE filler	mg/cm ³	0.80231	0.0	

Table 21. Key alternate 1 design geometry and operational parameters.

7.2.1 Fuel Meat Shape

The fuel meat thickness profile of the alternate 1 design is described in Table 22, where t (μ m) is the fuel meat thickness and s (cm) is the distance from the origin of the involute generating radius. Illustrations of the IFE and OFE fuel meat shapes are shown in Figures 13 and 14.



Figure 13. Fuel meat shape for the alternate 1 design.



Figure 14. Fuel bottom meat shape for the alternate 1 design. The axial gradient increases the minimum safety margin, which usually occurs at the bottom of the core.

					Order		
	s_i (cm)	s_f (cm)	4	3	2	1	0
IFE	ALL		-2.23E-01	2.88E+00	-2.82E+01	1.84E+02	2.57E+02
	0.2343	1.696	-	-	-5.60E+01	2.60E+02	4.82E+02
OFE	1.696	6.005	-	-	-	-	7.62E+02
	6.005	7.3226	-	-	-7.14E+01	7.90E+02	-1.41E+03

 Table 22. Fuel shape polynomial coefficients for alternate 1 design.

7.2.2 Fission Rate Density

Figure 15 shows the maximum fission rate density during operation for each fuel element. Table 23 lists the peak fission rate results and references to the figures in the appendix that illustrate the spatial fission rate density values for the four selected state points for each fuel element.



Figure 15. Alternate 1 design maximum fission density during operation.

Table 23.]	Minimum and	l maximum	fission rat	e densities	in the	alternate	1 design.
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Day	Region	Minimum	Maximum	Unit	Ref.
0	IFE	3.1	18.15		Fig. 65
1	IFE	2.97	17.54		Fig. 66
15	IFE	3.08	13.47		Fig. 67
27	IFE	3.17	9.68	10 ¹⁴ <u>fissions</u>	Fig. 68
0	OFE	1.31	10.01	s·cm ³ _{fuelparticle}	Fig. 69
1	OFE	1.36	11.82		Fig. 70
2	OFE	1.38	11.82		Fig. 71
15	OFE	1.8	10.18		Fig. 72
27	OFE	2.15	8.35		Fig. 73

7.2.3 Power Density

The power density values are the fission rate density values multiplied by the average energy generated per fission. It is conservatively assumed that all energy generated by fission is deposited locally in the fuel meat. Therefore, the power density and fission rate density results have identical trends, and only the magnitudes of the results are different. Figure 16 shows the maximum local power density during operation for each fuel element. Table 24 lists the maximum power density results and references the figures in the appendix. Each plot in the appendix shows the spatial power density values for each of the four selected state points for each fuel element.



Figure 16. Alternate 1 design maximum power density during operation.

Day	Region	Minimum	Maximum	Unit	Ref.
0	IFE	4.24	24.82		Fig. 80
1	IFE	4.06	23.99		Fig. 81
15	IFE	4.21	18.42		Fig. 82
27	IFE	4.33	13.24	kW	Fig. 83
0	OFE	1.79	13.7	cm ³ _{fuelparticle}	Fig. 84
1	OFE	1.86	16.16		Fig. 85
2	OFE	1.89	16.16		Fig. 86
15	OFE	2.46	13.92		Fig. 87
27	OFE	2.94	11.41		Fig. 88

Table 24. Minimum and maximum power densities in the alternate 1 design.

7.2.4 Heat Flux

Figure 17 shows the maximum heat flux during operation for each fuel element. Table 25 lists the maximum heat flux results and references to the figures in the appendix. Each plot in the appendix shows the spatial heat flux values for the four selected state points for each fuel element.



Figure 17. Alternate 1 design maximum heat flux during operation.

Day	Region	Minimum	Maximum	Unit	Ref.
0	IFE	113.11	358.43		Fig. 89
1	IFE	112.19	347.6		Fig. 90
15	IFE	112.31	301.36		Fig. 91
27	IFE	107.26	268.94	w	Fig. 92
0	OFE	32.9	374.24	cm ²	Fig. 93
1	OFE	32.82	452.49		Fig. 94
2	OFE	32.86	452.78		Fig. 95
15	OFE	42.05	391.41		Fig. 96
27	OFE	70.87	325.96		Fig. 97

Table 25. Minimum and maximum heat fluxes in the alternate 1 design.

7.2.5 Cumulative Fission Density

Figure 18 shows the maximum local cumulative fission density during operation for each fuel element, and Figure 19 illustrates the fission rate density variation with cumulative fission density for every spatial cell in the neutronics model. Table 26 lists the maximum cumulative fission density results and references to the figures in the appendix.



Figure 18. Alternate 1 design maximum cumulative fission density during operation.

Table 26. Minimum and maximum cumulative fission density values in the alternate 1 design.

Day	Region	Minimum	Maximum	Unit	Ref.
1	IFE	0.26	1.54		Fig. 74
15	IFE	3.94	20.37		Fig. 75
27	IFE	7.18	32.32	10 ²⁰ <u>fissions</u>	Fig. 76
1	OFE	0.12	0.94	cm ³ _{fuelparticle}	Fig. 77
15	OFE	2.06	14.38		Fig. 78
27	OFE	4.2	24.03		Fig. 79



Figure 19. Alternate 1 design fission rate density variation with cumulative fission density during operation.

7.3 ALTERNATE 2 DESIGN

The alternate 2 design was generated by including center-symmetric fuel zones to promote heat transfer to the coolant and gadolinium oxide in the IFE filler to suppress power peaking in the IFE for the first few days. The cycle length of this design is 27.12 days. The alternate 2 fuel design specifications are presented in Table 27.

Parameter	Units		Value		
Center-symmetric fuel zone	-		Ves		
Axial contour	-		no		
Gd_2O_3 in IFE filler	-		yes		
Boron strip below fuel	-		no		
U loading	kg		70.5474		
²³⁵ U loading	kg		13.9331		
		IFE	OFE		
²³⁵ U loading	kg	3.9458	9.9873		
²³⁵ U loading per plate	g/plate	23.07485	27.06585		
Filler	-	$Al + B_4C$	Al		
¹⁰ B loading in IFE filler	g	2.4406	-		
¹⁰ B density in IFE filler	mg/cm ³	1.752	-		
Gd loading in IFE filler	mg	1.1182	0.0		
Gd density in IFE filler	mg/cm ³	0.80231	0.0		

Table 27. Key alternate 2 design geometry and operational parameters.

7.3.1 Fuel Meat Shape

The fuel meat thickness profile of the alternate 2 design is described in Table 28, where t (μ m) is the fuel meat thickness and s (cm) is the distance from the origin of the involute generating radius. Illustrations of the IFE and OFE fuel meat shapes are shown in Figure 20.



Figure 20. Fuel meat shape for the alternate 2 design.

						Order			
	s_i (cm)	s_f (cm)	6	5	4	3	2	1	0
IFE	A	LL	-3.06E-03	8.76E-02	-1.09E+00	6.55E+00	-3.32E+01	1.77E+02	2.53E+02
	0.2343	1.696	-	-	-	-	-9.92E+01	3.61E+02	4.36E+02
OFE	1.696	6.005	-	-	-	-	-	-	7.62E+02
	6.005	7.3226	-	-	-	-	-7.82E+01	8.78E+02	1.69E+03

Table 28. Fuel shape polynomial coefficients for alternate 2 design.

7.3.2 Fission Rate Density

Figure 21 shows the maximum fission rate density during operation for each fuel element. Table 29 lists the peak fission rate results and references to the figures in the appendix that illustrate the spatial fission rate density values for the four selected state points for each fuel element.



Figure 21. Alternate 2 design maximum fission density during operation.

Day	Region	Minimum	Maximum	Unit	Ref.
0	IFE	3.16	18.05		Fig. 98
1	IFE	3.03	17.27		Fig. 99
15	IFE	3.12	13.5		Fig. 100
27	IFE	3.23	9.76	10 ¹⁴ <u>fissions</u>	Fig. 101
0	OFE	1.27	10.34	s·cm ³ _{fuelparticle}	Fig. 102
1	OFE	1.34	11.97		Fig. 103
15	OFE	1.75	10.2		Fig. 104
27	OFE	2.16	8.29		Fig. 105

Table 29. Minimum and maximum fission rate densities in the alternate 2 design.

7.3.3 Power Density

The power density values are the fission rate density values multiplied by the average energy generated per fission. It is conservatively assumed that all energy generated by fission is deposited locally in the fuel meat. Therefore, the power density and fission rate density results have identical trends, and only the magnitudes of the results are different. Figure 22 shows the maximum local power density during operation for each fuel element. Table 30 lists the maximum power density results and references the figures in the appendix. Each plot in the appendix shows the spatial power density values for each of the four selected state points for each fuel element.



Figure 22. Alternate 2 design maximum power density during operation.

Day	Region	Minimum	Maximum	Unit	Ref.
0	IFE	4.32	24.69		Fig. 112
1	IFE	4.14	23.61		Fig. 113
15	IFE	4.26	18.46		Fig. 114
27	IFE	4.42	13.35	kW	Fig. 115
0	OFE	1.74	14.14	$cm_{fuelparticle}^{3}$	Fig. 116
1	OFE	1.83	16.37		Fig. 117
15	OFE	2.39	13.95		Fig. 118
27	OFE	2.95	11.34		Fig. 119

Table 30. Minimum and maximum power densities in the alternate 2 design.

7.3.4 Heat Flux

Figure 23 shows the maximum heat flux during operation for each fuel element. Table 31 lists the maximum heat flux results and references to the figures in the appendix. Each plot in the appendix shows the spatial heat flux values for the four selected state points for each fuel element.



Figure 23. Alternate 2 design maximum heat flux during operation.

Day	Region	Minimum	Maximum	Unit	Ref.
0	IFE	135.21	349.69		Fig. 120
1	IFE	129.56	338.16		Fig. 121
15	IFE	136.08	294.98		Fig. 122
27	IFE	143.61	273.18	w	Fig. 123
0	OFE	47.82	391.81	cm ²	Fig. 124
1	OFE	50.34	455.5		Fig. 125
15	OFE	87.76	389.62		Fig. 126
27	OFE	110.09	323.43		Fig. 127

Table 31. Minimum and maximum heat fluxes in the alternate 2 design.

7.3.5 Cumulative Fission Density

Figure 24 shows the maximum local cumulative fission density during operation for each fuel element, and Figure 25 illustrates the fission rate density variation with cumulative fission density for every spatial cell in the neutronics model. Table 32 lists the maximum cumulative fission density results and references to the figures in the appendix.



Figure 24. Alternate 2 design maximum cumulative fission density during operation.

Table 32. Minimum and maximum cumulative fission density values in the alternate 2 design.

Day	Region	Minimum	Maximum	Unit	Ref.
1	IFE	0.27	1.53		Fig. 106
15	IFE	4.0	20.46		Fig. 107
27	IFE	7.33	32.47	10 ²⁰ <u>fissions</u>	Fig. 108
1	OFE	0.11	0.97	cm ³ _{fuelparticle}	Fig. 109
15	OFE	2.03	14.45		Fig. 110
27	OFE	4.07	24.08		Fig. 111



Figure 25. Alternate 2 design fission rate density variation with cumulative fission density during operation.

7.4 ALTERNATE 3 DESIGN

The alternate 3 design was generated by including a 0.5-inch boron strip in the form of a borated powder at the lowest unfueled region to increase thermal margins at the bottom of the fuel.

The cycle length of this design is 27.12 days. The alternate 3 fuel design specifications are presented in Table 33.

Parameter	Units		Value
Center-symmetric fuel zone	-		no
Axial contour	-		no
Gd_2O_3 in IFE filler	-		no
Boron strip below fuel	-		yes
U loading	kg		70.6401
²³⁵ U loading	kg		13.9514
		IFE	OFE
²³⁵ U loading	kg	4.0136	9.9378
²³⁵ U loading per plate	g/plate	23.47135	26.93171
Filler	-	$Al + B_4C$	Al
10 B loading in IFE filler	g	2.3157	-
¹⁰ B density in IFE filler	mg/cm ³	1.752	-
Gd loading in IFE filler	mg	0.0	0.0
Gd density in IFE filler	mg/cm ³	0.0	0.0

Table 33. Key alternate 3 design geometry and operational parameters.

7.4.1 Fuel Meat Shape

The fuel meat thickness profile of the alternate 3 design is described in Table 34, where t (μ m) is the fuel meat thickness and s (cm) is the distance from the origin of the involute generating radius. Illustrations of the IFE and OFE fuel meat shapes are shown in Figure 26.



Figure 26. Fuel meat shape for the alternate 3 design.

						Order			
	s_i (cm)	s_f (cm)	6	5	4	3	2	1	0
IFE	A	LL	-1.93E-02	4.96E-01	-5.08E+00	2.50E+01	-7.30E+01	2.22E+02	2.15E+02
	0.2343	1.696	-	-	-	-	-5.60E+01	2.53E+02	4.89E+02
OFE	1.696	6.005	-	-	-	-	-	-	7.57E+02
	6.005	7.3226	-	-	-	-	-8.52E+01	9.75E+02	-2.02E+03

Table 34. Fuel shape polynomial coefficients for alternate 3 design.

7.4.2 Fission Rate Density

Figure 27 shows the maximum fission rate density during operation for each fuel element. Table 35 lists the peak fission rate results and references to the figures in the appendix that illustrate the spatial fission rate density values for the four selected state points for each fuel element.



Figure 27. Alternate 3 design maximum fission density during operation.

Day	Region	Minimum	Maximum	Unit	Ref.
0	IFE	3.05	19.01		Fig. 128
1	IFE	2.89	17.79		Fig. 129
15	IFE	3.05	13.79		Fig. 130
27	IFE	3.18	9.89	10 ¹⁴ fissions	Fig. 131
0	OFE	1.25	10.0	s·cm ³ _{fuelparticle}	Fig. 132
1	OFE	1.29	11.95		Fig. 133
2	OFE	1.31	12.01		Fig. 134
15	OFE	1.76	10.15		Fig. 135
27	OFE	2.18	8.3		Fig. 136

 Table 35. Minimum and maximum fission rate densities in the alternate 3 design.

7.4.3 Power Density

The power density values are the fission rate density values multiplied by the average energy generated per fission. It is conservatively assumed that all energy generated by fission is deposited locally in the fuel meat. Therefore, the power density and fission rate density results have identical trends, and only the magnitudes of the results are different. Figure 28 shows the maximum local power density during operation for each fuel element. Table 36 lists the maximum power density results and references the figures in the appendix. Each plot in the appendix shows the spatial power density values for each of the four selected state points for each fuel element.



Figure 28. Alternate 3 design maximum power density during operation.

Day	Region	Minimum	Maximum	Unit	Ref.
0	IFE	4.17	26.0		Fig. 143
1	IFE	3.96	24.34		Fig. 144
15	IFE	4.17	18.86		Fig. 145
27	IFE	4.35	13.53	kW	Fig. 146
0	OFE	1.71	13.67	$cm_{fuelparticle}^{3}$	Fig. 147
1	OFE	1.76	16.34		Fig. 148
2	OFE	1.79	16.42		Fig. 149
15	OFE	2.4	13.88		Fig. 150
27	OFE	2.98	11.34		Fig. 151

Table 36. Minimum and maximum power densities in the alternate 3 design.

7.4.4 Heat Flux

Figure 29 shows the maximum heat flux during operation for each fuel element. Table 37 lists the maximum heat flux results and references to the figures in the appendix. Each plot in the appendix shows the spatial heat flux values for the four selected state points for each fuel element.



Figure 29. Alternate 3 design maximum heat flux during operation.

Day	Region	Minimum	Maximum	Unit	Ref.
0	IFE	134.86	350.68		Fig. 152
1	IFE	127.33	337.73		Fig. 153
15	IFE	138.27	300.87		Fig. 154
27	IFE	145.45	285.53	w	Fig. 155
0	OFE	46.73	368.11	cm ²	Fig. 156
1	OFE	48.26	455.05		Fig. 157
2	OFE	49.89	457.81		Fig. 158
15	OFE	86.63	388.06		Fig. 159
27	OFE	109.87	323.9		Fig. 160

Table 37. Minimum and maximum heat fluxes in the alternate 3 design.

7.4.5 Cumulative Fission Density

Figure 30 shows the maximum local cumulative fission density during operation for each fuel element, and Figure 31 illustrates the fission rate density variation with cumulative fission density for every spatial cell in the neutronics model. Table 38 lists the maximum cumulative fission density results and references to the figures in the appendix.



Figure 30. Alternate 3 design maximum cumulative fission density during operation.

Table 38. Minimum and maximum cumulative fission density values in the alternate 3 design.

Day	Region	Minimum	Maximum	Unit	Ref.
1	IFE	0.26	1.6		Fig. 137
15	IFE	3.85	20.81		Fig. 138
27	IFE	7.14	32.93	10 ²⁰ <u>fissions</u>	Fig. 139
1	OFE	0.11	0.93	cm ³ _{fuelparticle}	Fig. 140
15	OFE	1.98	14.46		Fig. 141
27	OFE	4.04	24.09		Fig. 142



Figure 31. Alternate 3 design fission rate density variation with cumulative fission density during operation.

8. DISCUSSION

Core design studies performed by Chandler et al. [9] resulted in four HFIR LEU U₃Si₂-Al fuel designs with various design features that require additional fabrication R&D to determine their feasibility of fabrication. The design approach was initiated by first generating an optimized design with features known to result in excellent performance and safety. Alternate fuel designs were then generated by substituting a single design feature anticipated to be difficult to fabricate with one that would perform an analogous function [9]. With regards to the HEU core design, the LEU fuel designs require additional fabrication features primarily to reduce power peaking and increase thermal safety margin. Introduction of substantial amounts of ²³⁸U into the core results in increased self-shielding due to the parasitic absorptions in the ²³⁸U isotope. The reactor power must therefore be uprated from 85 MW for the HEU core to 95 MW for the LEU core to maintain performance. Consequently, additional power peaking mitigation features must be introduced to meet thermal safety requirements of the compact, high power density core.

This report provides detailed descriptions of these four fuel designs along with their performance and safety metrics and design parameters. All four fuel designs are presented herein, and all designs meet HEU key performance metrics. However the cold source cold-to-total flux ratio is slightly degraded due to the harder LEU fuel spectrum. The slightly increased fast flux down the beamlines, which acts as noise to the neutron scattering instruments, is not anticipated to adversely affect the neutron scattering mission. None of the designs have a greater thermal safety margin than the HEU core; however, they meet the minimum safety limit requirements. Some additional observations from this study are presented below.

- For the low density U₃Si₂-Al designs, having only center-symmetric fuel or an axial gradient feature requires Gd burnable poisons in the IFE filler in addition to boron burnable poison.
- The axial gradient design feature is more beneficial than the center and symmetric fuel design feature.
- A design feature to suppress power at the bottom of the fuel zone is required.
- The active fuel length must be increased relative to the HEU core design.

These four designs are presented to show (1) relevant operating conditions such as fission densities, power densities, and heat fluxes and (2) design flexibility for fuel fabrication in order to frame irradiation qualification needs and prioritize design feature R&D efforts. The maximum parameters for each fuel element, for each of the four presented designs, are provided in Table 39. Given feedback from the fuel conversion pillars, a final design feature set will be chosen, and the selected fuel design will be further analyzed to assess additional performance and safety metrics with the fuel design.

		Fis. rate density	Power density	Heat Flux	Cumulative fission density
		$\left(\frac{fis}{s \cdot cm_{fuelparticle}^3}\right)$	$\left(\frac{kW}{cm_{fuelparticle}^3}\right)$	$\left(\frac{W}{cm^2}\right)$	$\left(\frac{fis}{cm_{fuelparticle}^3}\right)$
Optimized	IFE	1.86E+15	2.55E+01	3.70E+02	3.27E+21
	OFE	1.18E+15	1.62E+01	4.54E+02	2.43E+21
Alternate1	IFE	1.82E+15	2.48E+01	3.58E+02	3.27E+21
	OFE	1.18E+15	1.62E+01	4.53E+02	2.44E+21
Alternate2	IFE	1.81E+15	2.47E+01	3.50E+02	3.26E+21
	OFE	1.20E+15	1.64E+01	4.55E+02	2.42E+21
Alternate3	IFE	1.90E+15	2.60E+01	3.51E+02	3.30E+21
	OFE	1.20E+15	1.64E+01	4.58E+02	2.42E+21

Table 39. Summary of maximum parameters for each low density $U_3Si_2\mbox{-}Al$ design.
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APPENDIX A. DISTRIBUTIONS FOR OPTIMIZED DESIGN

APPENDIX A-1. FISSION RATE DENSITY DISTRIBUTIONS FOR OPTIMIZED DESIGN



Figure 32. Fission rate density distribution for optimized design IFE region on day 0 (see Section 7.1.2).



Figure 33. Fission rate density distribution for optimized design IFE region on day 1 (see Section 7.1.2).



Figure 34. Fission rate density distribution for optimized design IFE region on day 15 (see Section 7.1.2).



Figure 35. Fission rate density distribution for optimized design IFE region on day 27 (see Section 7.1.2).



Figure 36. Fission rate density distribution for optimized design OFE region on day 0 (see Section 7.1.2).



Figure 37. Fission rate density distribution for optimized design OFE region on day 1 (see Section 7.1.2).



Figure 38. Fission rate density distribution for optimized design OFE region on day 2 (see Section 7.1.2).



Figure 39. Fission rate density distribution for optimized design OFE region on day 15 (see Section 7.1.2).



Figure 40. Fission rate density distribution for optimized design OFE region on day 27 (see Section 7.1.2).

APPENDIX A-2. CUMULATIVE FISSION DENSITY DISTRIBUTIONS FOR OPTIMIZED DESIGN



Figure 41. Cumulative fission density distribution for optimized design IFE region on day 1 (see Section 7.1.5).



Figure 42. Cumulative fission density distribution for optimized design IFE region on day 15 (see Section 7.1.5).



Figure 43. Cumulative fission density distribution for optimized design IFE region on day 27 (see Section 7.1.5).

- 69	0.63	0.56	0.50	0.43	0.39	0.37	0.34	0.32	0.30	0.28	0.26	0.25	0.24	0.25		
7.19 27	0.54	0.47	0.39	0.32	0.28	0.26	0.24	0.23	0.21	0.20	0.19	0.19	0.20	0.21		
6.44 2 ⁷	0.47	0.41	0.33	0.26	0.23	0.21	0.19	0.18	0.17	0.16	0.16	0.16	0.17	0.19		
5.44 2	0.44	0.38	0.31	0.24	0.21	0.19	0.17	0.16	0.16	0.15	0.15	0.15	0.17	0.18		- 0 75
3.97 2	0.44	0.38	0.31	0.25	0.22	0.20	0.18	0.17	0.16	0.16	0.16	0.16	0.18	0.19		0.75
20.5 2	0.51	0.45	0.37	0.30	0.26	0.24	0.22	0.21	0.21	0.20	0.21	0.22	0.24	0.27		
15.5	0.64	0.56	0.47	0.39	0.34	0.31	0.29	0.28	0.28	0.28	0.29	0.32	0.37	0.42		
10.5	0.75	0.66	0.55	0.46	0.40	0.37	0.35	0.34	0.34	0.35	0.38	0.45	0.54	0.63		- 0.60 "โร
5.5	0.82	0.72	0.61	0.50	0.44	0.41	0.39	0.39	0.39	0.41	0.46	0.55	0.68	0.81		20 <u>fission:</u> cm ³ uelpart
- 2.0	0.84	0.75	0.62	0.52	0.46	0.43	0.41	0.40	0.41	0.43	0.49	0.59	0.74	0.89		sity [10
esh 0.0	0.85	0.75	0.63	0.52	0.46	0.43	0.41	0.40	0.41	0.44	0.49	0.60	0.75	0.90		on dens
-2.0 -2.0	0.84	0.75	0.62	0.52	0.46	0.42	0.40	0.40	0.41	0.43	0.48	0.59	0.73	0.87		- 0 45 -
-5.5	0.81	0.71	0.60	0.49	0.44	0.40	0.38	0.38	0.38	0.40	0.44	0.54	0.66	0.79		umulati
-10.5	0.72	0.64	0.53	0.44	0.39	0.36	0.34	0.33	0.33	0.33	0.36	0.42	0.50	0.57		Ō
-15.5	0.61	0.53	0.45	0.37	0.32	0.29	0.27	0.26	0.25	0.25	0.26	0.28	0.31	0.35		
-20.5	0.48	0.42	0.35	0.28	0.24	0.22	0.20	0.19	0.18	0.18	0.17	0.17	0.18	0.19		- 0 30
3.97	0.42	0.37	0.30	0.24	0.20	0.18	0.16	0.15	0.14	0.13	0.13	0.12	0.12	0.12		0.50
5.44 -2	0.44	0.38	0.30	0.24	0.20	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.12	0.12		
6.44 -2 -	0.50	0.43	0.36	0.30	0.26	0.23	0.21	0.19	0.18	0.16	0.15	0.14	0.13	0.13		
:7.19 -2	0.63	0.57	0.50	0.44	0.39	0.36	0.33	0.30	0.27	0.25	0.22	0.20	0.18	0.17		0.15
7.69 -2	0.73	0.69	0.63	0.58	0.52	0.48	0.44	0.41	0.37	0.33	0.29	0.25	0.22	0.20		- 0.15
- 7	15.22	15.4	15.75	16.25	16.75	17.25 F	17.ٰ75 ۲ mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		

Figure 44. Cumulative fission density distribution for optimized design OFE region on day 1 (see Section 7.1.5).

<u></u> б.	8.63	7.85	6.95	6.11	5.59	5.21	4.90	4.61	4.35	4.09	3.86	3.73	3.71	3.83		
27.6																
27.19	7.47	6.58	5.52	4.61	4.07	3.74	3.49	3.30	3.13	2.98	2.89	2.90	3.06	3.32		
6.44	6.64	5.78	4.72	3.79	3.29	2.98	2.77	2.62	2.51	2.44	2.43	2.54	2.78	3.09		
5.44 2	6.20	5.41	4.40	3.51	3.01	2.72	2.52	2.40	2.32	2.29	2.34	2.51	2.82	3.16		- 12.5
3.97 2	6.19	5.43	4.48	3.62	3.14	2.84	2.66	2.54	2.48	2.48	2.56	2.81	3.19	3.59		
20.5 2	7.16	6.34	5.29	4.36	3.82	3.50	3.31	3.20	3.16	3.20	3.38	3.81	4.42	5.05		
15.5	8.87	7.88	6.63	5.51	4.86	4.49	4.28	4.17	4.17	4.30	4.63	5.36	6.36	7.34		
10.5	10.32	9.20	7.78	6.50	5.77	5.36	5.16	5.09	5.19	5.49	6.14	7.45	9.16	10.78		- 10.0 .[[ະ
5.5	11.30	10.08	8.56	7.18	6.39	5.97	5.77	5.76	5.93	6.39	7.31	9.10	11.36	13.47		0 <u>fissions</u> cm ³ uelparti
cm]	11.64	10.41	8.84	7.42	6.61	6.19	5.99	5.98	6.19	6.69	7.68	9.59	12.02	14.24		ity [10 ²
esh [0.0	11.68	10.45	8.88	7.44	6.64	6.21	6.02	6.02	6.22	6.73	7.74	9.67	12.09	14.35		in dens
Z -2.0	11.62	10.38	8.81	7.39	6.60	6.17	5.98	5.97	6.17	6.67	7.68	9.59	12.01	14.25		ve fissio
-5.5	11.21	10.01	8.50	7.12	6.34	5.92	5.73	5.71	5.89	6.35	7.28	9.07	11.35	13.47		ımulativ
10.5	10.18	9.07	7.66	6.39	5.67	5.26	5.05	4.98	5.06	5.35	5.97	7.24	8.88	10.44		Ŭ
15.5 -	8.65	7.68	6.46	5.35	4.70	4.33	4.11	3.99	3.96	4.04	4.30	4.89	5.69	6.48		
20.5 -	6.94	6.13	5.11	4.19	3.65	3.33	3.13	3.01	2.94	2.95	3.07	3.39	3.86	4.34		- 5 0
3.97 -	6.11	5.34	4.37	3.51	3.01	2.71	2.51	2.38	2.28	2.22	2.23	2.35	2.57	2.80		5.0
5.44 -2	6.34	5.51	4.48	3.56	3.04	2.72	2.50	2.34	2.22	2.12	2.06	2.08	2.18	2.31		
6.44 -2	7.19	6.33	5.28	4.36	3.80	3.43	3.16	2.94	2.74	2.55	2.40	2.29	2.26	2.31		
7.19 -2	8.87	8.18	7.25	6.38	5.73	5.26	4.86	4.48	4.13	3.78	3.45	3.11	2.87	2.76		
7.69 -2	10.28	9.74	9.02	8.22	7.56	7.01	6.49	6.00	5.51	5.00	4.47	3.92	3.50	3.25		- 2.5
-2	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		

Figure 45. Cumulative fission density distribution for optimized design OFE region on day 15 (see Section 7.1.5).

_	15.01	12.00	10.00	10.05	10.07	0.44	0.00	0.50	0.11	7 75	7 40	7 20	7.50	7.00		- 24
27.69	- 15.01	13.80	12.33	10.95	10.07	9.44	8.96	8.50	8.11	/./5	7.46	/.38	7.56	7.96		
7.19	- 13.12	11.68	9.92	8.36	7.44	6.87	6.48	6.15	5.89	5.71	5.66	5.86	6.38	7.03		
6.44 2	- 11.76	10.32	8.53	6.92	6.02	5.48	5.14	4.90	4.74	4.69	4.77	5.18	5.86	6.62		
5.44 2	- 10.99	9.66	7.93	6.38	5.50	5.00	4.67	4.47	4.37	4.40	4.59	5.12	5.91	6.72		
3.97 25	- 10.97	9.69	8.05	6.56	5.71	5.19	4.89	4.71	4.65	4.72	4.99	5.63	6.56	7.51		- 20
0.5 23	- 12.56	11.18	9.43	7.83	6.90	6.35	6.04	5.88	5.87	6.05	6.53	7.57	8.96	10.34		
5.5 2	- 15.35	13.73	11.69	9.80	8.70	8.08	7.75	7.64	7.74	8.13	8.99	10.72	12.94	15.03		
0.5 1	- 17.62	15.83	13.56	11.45	10.21	9.53	9.20	9.15	9.41	10.08	11.43	13.95	17.06	19.86		_
5.5 1	- 19.08	17.18	14.77	12.51	11.19	10.49	10.17	10.18	10.54	11.41	13.08	16.14	19.77	22.98		fissions m ³ fuelparticle
 د ع	- 19.59	17.67	15.20	12.89	11.54	10.83	10.52	10.53	10.92	11.84	13.61	16.80	20.58	23.88		, [10 ²⁰
sh [c	- 19.66	17.72	15.26	12.94	11.59	10.88	10.56	10.58	10.98	11.91	13.69	16.90	20.69	24.02		density
e ne	- 19.57	17.64	15.18	12.86	11.53	10.80	10.50	10.52	10.91	11.84	13.61	16.80	20.58	23.89		fission
Ņ Ņ																ative 1
-5.5	- 19.01	17.12	14.71	12.46	11.15	10.44	10.12	10.13	10.49	11.37	13.05	16.11	19.76	22.98		- 12 m
10.5	- 17.50	15.72	13.45	11.34	10.11	9.43	9.10	9.04	9.28	9.94	11.26	13.77	16.83	19.60		0
15.5 -	- 15.13	13.53	11.52	9.64	8.53	7.90	7.56	7.42	7.49	7.83	8.62	10.20	12.24	14.17		
20.5	- 12.35	10.98	9.23	7.63	6.69	6.13	5.80	5.63	5.58	5.70	6.07	6.92	8.10	9.26		
2- 76.1	- 11.01	9.69	7.99	6.47	5.58	5.05	4.71	4.50	4.38	4.36	4.50	4.94	5.59	6.26		
.44 -23	- 11.46	10.02	8.22	6.61	5.67	5.11	4.73	4.48	4.31	4.21	4.23	4.50	4.96	5.47		- 8
.44 -25	- 12.94	11.47	9.70	8.09	7.11	6.46	6.00	5.64	5.34	5.09	4.94	4.97	5.21	5.56		
.19 -26	- 15.70	14.60	13.11	11.63	10.57	9.78	9.13	8.53	7.99	7.49	7.04	6.67	6.50	6.53		
69 -27.	- 17.95	17.10	15.98	14.71	13.67	12.80	11.99	11.24	10.49	9.74	8.99	8.25	7.73	7.48		
-27.	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		

Figure 46. Cumulative fission density distribution for optimized design OFE region on day 27 (see Section 7.1.5).



Figure 47. Power density distribution for optimized design IFE region on day 0 (see Section 7.1.3).



Figure 48. Power density distribution for optimized design IFE region on day 1 (see Section 7.1.3).



Figure 49. Power density distribution for optimized design IFE region on day 15 (see Section 7.1.3).



Figure 50. Power density distribution for optimized design IFE region on day 27 (see Section 7.1.3).

:7.69	10.22	9.27	8.14	7.03	6.44	6.00	5.58	5.22	4.94	4.54	4.27	4.06	3.94	3.98		
7.19 2	8.88	7.80	6.44	5.28	4.68	4.29	3.94	3.71	3.47	3.30	3.10	3.07	3.18	3.36		
6.44 2 [.]	7.73	6.72	5.45	4.35	3.74	3.37	3.13	2.90	2.74	2.66	2.59	2.63	2.79	2.99		- 12
5.44 2	7.18	6.23	5.08	3.99	3.39	3.07	2.84	2.65	2.51	2.47	2.43	2.49	2.66	2.89		
3.97 25	7.27	6.28	5.15	4.15	3.56	3.20	2.96	2.78	2.65	2.56	2.54	2.58	2.74	2.96		
20.5 23	8.31	7.31	6.07	4.96	4.31	3.90	3.62	3.43	3.27	3.16	3.11	3.18	3.37	3.61		
5.5	10.33	9.12	7.61	6.26	5.45	4.99	4.66	4.44	4.29	4.23	4.26	4.49	4.91	5.39		- 10
0.5 1	12.06	10.72	8.94	7.36	6.49	5.95	5.63	5.45	5.42	5.53	5.89	6.78	8.04	9.32		
5.5 1	13.23	11.68	9.77	8.08	7.12	6.58	6.25	6.10	6.10	6.33	6.87	8.08	9.76	11.44		_
- 5.0	13.56	12.08	10.06	8.34	7.34	6.76	6.48	6.32	6.32	6.59	7.18	8.49	10.33	12.19		kW kW ³
esh [6	13.58	11.98	10.10	8.30	7.37	6.79	6.48	6.29	6.32	6.55	7.17	8.53	10.33	12.16		α nsity [_
, Z	13.46	11.97	9.97	8.25	7.25	6.67	6.36	6.23	6.25	6.46	6.98	8.24	9.94	11.49		wer de
.5.5 -	12.91	11.41	9.57	7.91	6.97	6.41	6.08	5.92	5.90	6.07	6.58	7.65	9.14	10.63		PG
0.5	11.63	10.26	8.55	7.03	6.17	5.68	5.35	5.16	5.08	5.17	5.51	6.33	7.46	8.57		- 6
5.5 -1	9.74	8.56	7.14	5.81	5.03	4.55	4.24	3.99	3.79	3.63	3.52	3.50	3.61	3.74		
0.5 -1	7.68	6.72	5.54	4.48	3.87	3.47	3.18	2.97	2.77	2.60	2.45	2.33	2.27	2.28		
.97 -2	6.71	5.84	4.75	3.77	3.23	2.87	2.62	2.41	2.25	2.09	1.97	1.88	1.85	1.87		
.44 -23	6.96	6.03	4.91	3.89	3.31	2.92	2.65	2.43	2.25	2.10	1.94	1.84	1.81	1.82		- 4
.44 -25	8.03	6.99	5.75	4.75	4.15	3.73	3.42	3.13	2.87	2.59	2.39	2.19	2.08	2.06		
.19 -26	10.13	9.06	8.02	6.94	6.28	5.74	5.32	4.78	4.38	3.95	3.55	3.12	2.81	2.64		
.69 -27	11.65	11.02	10.18	9.28	8.38	7.73	7.11	6.52	5.90	5.28	4.66	3.99	3.55	3.18		- 2
-27	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		

Figure 51. Power density distribution for optimized design OFE region on day 0 (see Section 7.1.3).

.69	9.50	8.55	7.50	6.53	6.00	5.56	5.25	4.92	4.60	4.32	3.98	3.84	3.77	3.83		
.19 27	8.02	7.02	5.89	4.85	4.30	3.96	3.64	3.49	3.25	3.12	3.00	2.95	3.06	3.24		- 15.0
6.44 27	7.19	6.26	5.03	3.99	3.42	3.12	2.91	2.78	2.60	2.51	2.47	2.49	2.72	2.97		
.44 26	6.74	5.81	4.70	3.69	3.16	2.84	2.63	2.50	2.39	2.33	2.32	2.39	2.58	2.84		
3.97 25	6.66	5.86	4.76	3.86	3.31	2.98	2.78	2.64	2.55	2.47	2.45	2.57	2.80	3.07		
:0.5 23	- 7.77	6.84	5.66	4.63	4.04	3.69	3.47	3.34	3.26	3.26	3.37	3.73	4.26	4.80		- 12.5
5.5	9.78	8.59	7.16	5.91	5.20	4.81	4.55	4.45	4.42	4.53	4.89	5.68	6.79	7.93		
.0.5	11.46	10.11	8.47	7.02	6.17	5.70	5.44	5.33	5.39	5.61	6.13	7.26	8.86	10.44		
5.5	- 12.62	11.17	9.35	7.76	6.89	6.41	6.16	6.10	6.24	6.64	7.55	9.38	11.83	14.25		_
- 2.0	- 12.97	11.46	9.63	8.05	7.13	6.66	6.48	6.45	6.63	7.11	8.17	10.26	13.14	15.87		KW [10.0 - 10.0
esh [6	- 13.13	11.66	9.73	8.08	7.17	6.68	6.47	6.46	6.67	7.20	8.22	10.41	13.31	16.15		nsity [<mark>_</mark>
, -2.0 T	- 13.12	11.58	9.68	8.02	7.13	6.65	6.41	6.41	6.60	7.08	8.13	10.27	13.22	16.01		wer de
-5.5	12.53	11.07	9.28	7.69	6.81	6.31	6.07	6.03	6.17	6.58	7.46	9.28	11.75	14.20		- 7.5
10.5	11.20	9.95	8.29	6.86	6.03	5.57	5.31	5.17	5.18	5.38	5.83	6.83	8.19	9.54		
-5.5 -1	9.43	8.30	6.93	5.72	5.00	4.60	4.34	4.22	4.17	4.26	4.58	5.27	6.27	7.24		
:0.5 -1	- 7.47	6.57	5.41	4.42	3.82	3.47	3.25	3.09	2.97	2.93	2.96	3.17	3.50	3.85		
2- <u>-</u> 2	6.52	5.67	4.59	3.67	3.11	2.79	2.57	2.37	2.22	2.09	2.01	1.95	1.94	1.98		- 5.0
.44 -23	6.83	5.85	4.68	3.69	3.15	2.78	2.55	2.35	2.19	2.06	1.93	1.85	1.84	1.89		
.44 -25	7.73	6.73	5.54	4.57	3.97	3.55	3.26	3.02	2.77	2.57	2.34	2.17	2.09	2.11		
.19 -26	9.61	8.87	7.78	6.81	5.97	5.51	5.12	4.63	4.21	3.85	3.47	3.07	2.81	2.67		
.69 -27	11.23	10.75	9.83	8.90	8.12	7.57	6.88	6.35	5.86	5.21	4.61	3.98	3.53	3.24		- 2.5
-27	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 8 mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		I

Figure 52. Power density distribution for optimized design OFE region on day 1 (see Section 7.1.3).

7 60	- 07	9.40	8.54	7.44	6.51	5.85	5.56	5.18	4.86	4.54	4.28	4.04	3.83	3.81	3.88		
с 0Г	ד ק ד.	8.13	7.10	5.86	4.84	4.29	3.94	3.64	3.47	3.29	3.07	2.97	2.96	3.09	3.31		- 15.0
- C V V	- ++ -	7.17	6.22	4.97	3.98	3.42	3.11	2.87	2.71	2.57	2.47	2.44	2.51	2.73	2.97		
90 44	- + +	6.63	5.73	4.65	3.70	3.17	2.82	2.61	2.47	2.38	2.33	2.31	2.40	2.67	2.93		
30 20	2 1 2	6.63	5.80	4.72	3.80	3.29	2.97	2.76	2.63	2.55	2.52	2.54	2.66	2.94	3.22		
сс з 0	cz	7.71	6.81	5.63	4.61	4.03	3.66	3.46	3.33	3.28	3.32	3.48	3.91	4.52	5.17		- 12.5
ר ע ע	n -	9.65	8.51	7.08	5.84	5.15	4.74	4.51	4.38	4.38	4.51	4.83	5.60	6.70	7.77		
- - -	 0	11.29	9.99	8.36	6.94	6.11	5.66	5.42	5.33	5.39	5.61	6.18	7.38	9.03	10.62		
- - 		12.50	11.06	9.28	7.73	6.83	6.37	6.15	6.12	6.27	6.72	7.65	9.57	12.17	14.68		
[u]	n -	12.89	11.43	9.58	8.00	7.12	6.67	6.45	6.42	6.61	7.11	8.18	10.36	13.25	16.03		kw 0.01 - n ³ kw
ssh [o	 0	12.89	11.47	9.63	8.02	7.14	6.65	6.47	6.46	6.63	7.15	8.23	10.42	13.36	16.20		nsity [
Z me	 -	12.85	11.37	9.59	7.98	7.06	6.61	6.39	6.35	6.54	7.09	8.19	10.37	13.27	16.12		wer dei
u u	- n -	12.38	10.98	9.20	7.60	6.77	6.31	6.09	6.05	6.21	6.69	7.64	9.60	12.18	14.74		දි - 7.5
ц С	- 	11.11	9.87	8.23	6.81	5.98	5.55	5.28	5.17	5.20	5.40	5.90	6.95	8.41	9.83		
- - -	T	9.38	8.28	6.92	5.67	4.98	4.57	4.33	4.21	4.17	4.27	4.54	5.21	6.17	7.07		
г ц	T	7.46	6.55	5.44	4.41	3.81	3.48	3.25	3.11	3.04	3.03	3.14	3.46	3.93	4.43		
c 20	7- 16.	6.53	5.66	4.59	3.66	3.11	2.81	2.59	2.41	2.26	2.15	2.07	2.02	2.05	2.13		- 5.0
CC VV	CZ- 1 4.	6.72	5.76	4.68	3.71	3.15	2.84	2.58	2.36	2.22	2.10	1.97	1.87	1.89	1.90		
3C VV	CZ- ++.	7.62	6.68	5.53	4.53	3.95	3.55	3.21	2.98	2.78	2.54	2.37	2.22	2.12	2.12		
90 01	07- 6T.	9.61	8.78	7.69	6.65	6.07	5.48	5.12	4.68	4.33	3.89	3.51	3.14	2.86	2.69		
20 27	17- 60-	11.32	10.60	9.70	8.74	8.13	7.50	6.85	6.32	5.78	5.19	4.64	3.98	3.50	3.26		- 2.5
<u>г</u> с	17-	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 8 mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		1
							•			-							

Figure 53. Power density distribution for optimized design OFE region on day 2 (see Section 7.1.3).

7.69	8.61	7.89	7.13	6.32	5.76	5.38	5.15	4.91	4.64	4.41	4.18	4.20	4.27	4.49		
7.19 2	7.58	6.70	5.75	4.85	4.31	3.94	3.75	3.56	3.38	3.27	3.24	3.40	3.71	4.03		
6.44 27	6.76	6.01	4.95	3.99	3.49	3.19	2.99	2.84	2.75	2.71	2.80	3.05	3.46	3.91		
5.44 2	6.37	5.61	4.59	3.68	3.20	2.93	2.73	2.59	2.56	2.58	2.70	3.05	3.53	4.02		- 12
.97 2!	6.36	5.60	4.65	3.80	3.30	3.01	2.83	2.72	2.71	2.75	2.91	3.28	3.87	4.41		
20.5 23	7.30	6.51	5.46	4.54	4.00	3.70	3.51	3.39	3.38	3.46	3.69	4.21	4.94	5.64		
5.5	8.90	7.97	6.80	5.72	5.05	4.68	4.51	4.42	4.50	4.71	5.18	6.15	7.42	8.63		
0.5	10.17	9.19	7.90	6.66	5.97	5.57	5.38	5.36	5.55	5.98	6.86	8.44	10.44	12.18		- 10
5.5	- 10.98	9.93	8.57	7.29	6.54	6.13	5.95	5.97	6.19	6.72	7.72	9.51	11.64	13.46		
cm]	11.31	10.17	8.82	7.51	6.72	6.33	6.17	6.14	6.37	6.93	7.97	9.86	12.03	13.84		kW ³ fuelparticle
esh [. 0.0	- 11.31	10.19	8.87	7.54	6.73	6.34	6.16	6.19	6.42	6.98	8.05	9.90	12.02	13.84		e susity [
-2.0 D	11.29	10.21	8.83	7.50	6.73	6.31	6.11	6.13	6.38	6.95	8.01	9.85	12.01	13.86		ower de
-5.5 ·	10.92	9.88	8.54	7.25	6.50	6.11	5.92	5.94	6.15	6.67	7.71	9.51	11.65	13.47		đ
10.5	10.11	9.12	7.83	6.61	5.92	5.52	5.33	5.34	5.51	5.92	6.80	8.47	10.49	12.31		
	8.74	7.84	6.69	5.59	4.95	4.58	4.38	4.30	4.33	4.49	4.90	5.75	6.87	7.93		- 6
:0.5	7.14	6.35	5.34	4.42	3.88	3.54	3.34	3.23	3.20	3.22	3.37	3.77	4.30	4.85		
2- <u>7</u> 6.	6.38	5.60	4.62	3.73	3.23	2.94	2.73	2.61	2.56	2.57	2.65	2.98	3.41	3.85		
.44 -23	6.66	5.80	4.77	3.86	3.29	3.00	2.76	2.62	2.53	2.48	2.55	2.77	3.14	3.52		
.44 -25	7.40	6.63	5.58	4.67	4.11	3.76	3.52	3.26	3.09	2.94	2.88	2.95	3.15	3.43		- 4
.19 -26	8.94	8.40	7.55	6.66	6.16	5.65	5.22	4.90	4.59	4.28	4.02	3.81	3.70	3.70		
.69 -27	10.23	9.87	9.13	8.39	7.84	7.33	6.90	6.37	5.94	5.56	5.07	4.55	4.23	4.07		
-27.	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853	I	

Figure 54. Power density distribution for optimized design OFE region on day 15 (see Section 7.1.3).

69.7	8.31	7.81	7.14	6.47	6.12	5.84	5.64	5.51	5.41	5.32	5.37	5.62	6.03	6.60		
7.19 2	7.50	6.78	5.95	5.13	4.67	4.31	4.21	4.10	4.02	3.99	4.15	4.69	5.39	6.00		
5.44 2	6.71	6.05	5.16	4.28	3.78	3.50	3.36	3.28	3.26	3.33	3.60	4.25	5.12	5.92		- 10.5
5.44 2(6.35	5.67	4.75	3.92	3.45	3.17	3.02	2.95	3.02	3.19	3.53	4.29	5.29	6.28		
3.97 2!	6.32	5.62	4.78	3.97	3.47	3.24	3.11	3.09	3.20	3.42	3.92	4.87	6.09	7.27		
20.5 23	6.96	6.31	5.44	4.62	4.15	3.87	3.76	3.77	3.93	4.28	4.96	6.22	7.82	9.29		
15.5	8.12	7.42	6.47	5.58	5.04	4.72	4.60	4.64	4.85	5.29	6.13	7.63	9.35	10.83		- 9.0
10.5	8.92	8.23	7.22	6.28	5.64	5.33	5.20	5.26	5.49	6.00	6.90	8.42	10.04	11.33		
5.5	9.40	8.67	7.68	6.67	6.04	5.71	5.57	5.64	5.89	6.41	7.36	8.84	10.27	11.33		_
cm]	9.58	8.81	7.85	6.85	6.19	5.85	5.71	5.74	6.00	6.55	7.50	8.98	10.38	11.39		m ³ kW ^{KW} m ³ 5.7 -
esh [_ 0.0	9.64	8.88	7.88	6.84	6.19	5.85	5.71	5.74	6.02	6.58	7.53	8.98	10.40	11.40		ensity $[\frac{1}{c}]$
, Z - ^{2.0}	9.56	8.79	7.82	6.81	6.18	5.85	5.67	5.76	5.99	6.56	7.55	9.02	10.43	11.37		ower de
-5.5	9.46	8.69	7.68	6.66	6.05	5.73	5.58	5.63	5.90	6.44	7.40	8.86	10.30	11.37		ď
10.5	9.09	8.28	7.30	6.33	5.70	5.37	5.23	5.27	5.51	6.02	6.95	8.48	10.10	11.42		- 6.0
15.5 -:	8.25	7.48	6.56	5.63	5.07	4.75	4.63	4.65	4.87	5.33	6.17	7.70	9.48	11.07		
20.5 -1	7.13	6.43	5.54	4.68	4.19	3.90	3.78	3.78	3.92	4.26	4.98	6.31	7.96	9.53		
3.97 -2	6.60	5.84	4.96	4.13	3.60	3.33	3.18	3.13	3.21	3.42	3.87	4.83	6.05	7.25		
5.44 -23	6.86	6.02	5.13	4.25	3.69	3.41	3.22	3.17	3.12	3.24	3.54	4.15	5.05	5.90		- 4.5
5.44 -25	7.70	7.02	6.10	5.22	4.70	4.34	4.10	3.94	3.83	3.86	4.00	4.35	4.91	5.57		
7.19 -26	9.14	8.48	7.92	7.26	6.79	6.29	6.10	5.83	5.64	5.54	5.50	5.62	5.89	6.14		
7.69 -2 <u>7</u>	10.03	9.69	9.25	8.72	8.32	7.99	7.70	7.43	7.13	7.03	6.87	6.80	6.71	6.85		- 3 0
-27	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		. 5.0

Figure 55. Power density distribution for optimized design OFE region on day 27 (see Section 7.1.3).

APPENDIX A-4. HEAT FLUX DISTRIBUTIONS FOR OPTIMIZED DESIGN

	27.94 -	302.0	300.7	308.2	316.4	317.6	320.4	323.5	313.8	305.0	297.4	287.6		
	27.44 -	277.8	269.6	264.9	259.6	253.5	252.8	255.6	256.6	255.1	256.8	255.0		- 350
	26.94 -	254.6	239.0	225.1	208.4	194.8	189.9	193.6	204.0	209.8	217.6	221.4		
	26.315 -	244.3	224.9	210.5	191.8	173.5	165.5	171.3	184.3	193.9	199.5	202.2		
	25.44 -	237.8	219.6	201.2	181.4	160.4	150.4	155.8	170.8	181.3	188.1	191.1		
	23.97 -	248.0	228.0	207.7	186.9	165.1	153.7	159.2	173.2	181.9	187.8	191.1		
	20.5 -	290.0	268.3	244.5	221.5	197.3	185.0	191.7	204.6	213.0	216.8	220.5		- 300
	15.5 -	336.1	314.9	289.6	265.7	240.1	228.8	237.9	253.3	263.2	269.8	273.1		
	10.5 -	348.3	329.4	311.3	289.6	269.1	263.6	275.9	297.2	309.2	314.8	318.8		
	5.5 -	362.9	344.9	326.7	308.8	291.0	284.7	300.6	322.7	334.7	340.6	346.9		
cm]	2.0 -	370.1	352.9	333.9	315.7	298.1	293.2	309.9	332.1	345.2	353.2	356.8		/cm2]
esh [0.0 -	369.2	351.6	333.7	315.6	298.9	292.9	309.9	333.7	346.0	351.4	356.0		Iux [W
Ĕ N	-2.0 -	366.7	349.6	332.1	313.2	295.4	290.7	306.6	331.5	343.3	349.5	355.3		Heat f
	-5.5 -	356.5	338.4	321.5	304.6	284.9	280.2	294.8	315.9	328.7	335.6	340.0		
	-10.5 -	337.0	319.4	300.7	282.8	263.3	255.4	266.3	284.8	296.6	302.5	305.8		
	-15.5 -	301.0	284.2	265.3	246.1	225.9	216.5	224.8	240.9	248.0	253.0	256.1		- 200
	-20.5 -	243.4	228.2	213.6	197.5	180.2	172.6	178.7	191.1	197.3	201.9	205.6		
	-23.97 -	204.2	190.7	178.7	163.4	148.2	142.2	148.2	162.8	170.2	175.8	179.4		
	-25.44 -	201.3	187.7	174.2	163.3	149.6	145.3	150.7	164.7	174.6	179.8	185.0		
	-26.315 -	214.5	206.5	200.2	193.9	183.9	184.7	194.0	205.4	211.6	212.8	219.0		150
	-26.94 -	177.2	164.5	155.7	146.9	136.3	134.4	138.9	145.1	151.2	153.9	161.7		- 150
	-27.44 -	162.6	150.4	141.5	133.0	126.6	124.6	125.0	127.2	131.4	133.6	138.5		
	-27.94 -	168.4	156.2	145.5	134.2	125.7	119.8	117.9	120.9	126.2	129.9	134.6		
		7.124	7.493	7.82	8.254	9.014 R m	10.012 esh [11.011 cm]	11.753	12.119	12.326	12.547		

Figure 56. Heat flux distribution for optimized design IFE region on day 0 (see Section 7.1.4).

	27.94 -	279.7	277.3	281.0	285.7	291.2	297.1	297.7	284.8	278.8	272.2	267.7		
	27.44 -	256.0	248.6	242.5	237.0	233.1	231.4	233.3	233.0	232.7	234.2	234.2		
	26.94 -	233.7	220.0	206.4	191.2	178.1	170.6	173.6	185.2	191.0	198.0	203.5		- 320
	26.315 -	224.3	207.4	192.8	173.8	156.0	148.4	151.9	167.1	176.7	182.2	191.4		- 320
	25.44 -	218.9	205.0	186.6	166.4	146.0	136.6	142.0	155.8	166.0	171.9	179.5		
	23.97 -	228.9	208.9	190.4	170.5	149.3	139.4	145.6	158.9	167.3	172.3	177.2		
	20.5 -	266.7	247.3	226.4	203.2	179.3	168.2	174.4	188.4	196.6	201.7	205.2		- 280
	15.5 -	311.1	290.6	268.9	246.5	221.6	210.5	219.9	235.3	245.9	251.8	255.9		200
	10.5 -	324.2	307.7	290.0	271.2	250.1	243.4	256.3	275.7	287.7	294.7	301.3		
	5.5 -	339.0	325.3	308.5	289.4	270.8	266.3	281.3	305.1	319.2	326.0	332.8		
cm]	2.0 -	348.1	333.4	314.4	296.4	278.5	273.8	289.7	315.2	331.0	337.5	343.6		7] 240 - 240
sh [0.0 -	350.0	334.3	317.0	298.6	280.5	275.3	290.9	314.0	329.0	337.7	345.3		ux [W/
Z	-2.0 -	346.3	329.5	315.1	296.2	277.6	273.8	288.7	313.2	327.3	335.3	340.2		Heat fl
	-5.5 -	338.1	321.6	306.4	288.9	270.0	263.9	278.8	302.8	315.9	323.3	328.4		
	-10.5 -	321.7	304.5	287.6	267.3	248.1	241.2	253.0	272.5	284.9	289.8	293.8		- 200
	-15.5 -	286.6	268.7	253.1	233.4	212.4	204.8	213.8	230.2	241.4	245.2	250.0		
	-20.5 -	230.5	216.2	203.4	186.7	169.7	163.1	169.9	182.4	191.1	196.1	199.9		
	-23.97 -	195.1	181.6	170.1	155.3	141.4	134.3	141.0	154.1	163.3	168.4	172.9		
	-25.44 -	188.4	176.7	165.5	153.0	140.3	135.5	143.9	160.3	169.4	175.6	180.6		- 160
	-26.315 -	206.3	195.9	189.6	180.2	174.5	175.0	184.0	196.8	204.3	206.4	209.4		
	-26.94 -	172.0	158.9	149.3	139.4	130.7	128.9	134.2	140.6	147.9	152.9	158.6		
	-27.44 -	158.7	145.7	137.2	130.0	121.9	120.5	121.7	122.9	127.1	129.6	134.0		
	-27.94 -	165.0	150.5	141.1	132.3	120.8	115.9	114.0	115.5	120.2	122.0	126.5		- 120
		7.124	7.493	7.82	8.254	9.014 R m	10.012 esh [11.011 cm]	11.753	12.119	12.326	12.547		

Figure 57. Heat flux distribution for optimized design IFE region on day 1 (see Section 7.1.4).

27.94 -	227.6	237.8	249.5	262.0	272.7	276.0	275.9	266.1	257.1	245.5	236.7			
27.44 -	214.4	221.1	226.5	229.2	228.0	223.8	223.0	224.3	224.7	220.0	217.9			
26.94 -	202.0	204.7	203.4	197.2	184.0	173.6	174.1	183.8	191.1	194.2	196.4			- 280
26.315 -	197.1	197.1	191.4	181.2	162.7	151.7	155.4	165.5	172.6	179.2	180.7			
25.44 -	194.9	193.3	185.4	170.4	151.7	140.4	143.7	156.1	164.6	167.9	172.5			
23.97 -	201.5	196.8	190.6	177.0	155.0	142.1	147.0	158.4	165.8	168.3	171.2			
20.5 -	227.2	227.2	221.3	207.8	184.0	169.0	172.6	184.6	190.4	193.0	193.6			
15.5 -	255.6	260.1	258.5	246.4	224.6	209.5	215.0	228.4	234.6	235.1	236.0			- 240
10.5 -	263.4	271.4	273.8	267.0	250.2	239.5	247.8	263.0	268.8	270.0	269.1			
5.5 -	272.0	280.1	284.8	281.6	268.3	258.2	268.4	285.0	291.2	290.6	289.8			
2.0 -	276.9	286.5	292.1	288.0	274.7	265.7	277.2	294.5	298.9	298.2	297.9			cm2]
0.0 -	278.3	286.7	293.0	288.2	275.6	267.7	278.9	297.3	302.9	302.4	300.1			//M] xn
-2.0 -	274.8	285.3	291.5	288.7	274.3	267.0	275.9	294.5	299.5	296.7	295.7			Heat II
-5.5 -	271.7	281.3	284.1	281.8	267.6	258.1	266.9	284.7	290.2	291.2	290.0			
-10.5 -	262.3	270.2	271.7	265.5	248.8	238.2	246.7	261.6	266.9	267.7	267.3			
-15.5 -	242.5	247.4	245.8	236.7	218.0	206.4	212.4	225.2	231.4	232.5	231.7			
-20.5 -	208.2	207.5	203.3	193.1	176.8	166.4	171.6	182.4	188.0	190.9	192.0			
-23.97 -	181.5	181.0	175.8	164.5	149.4	140.6	146.4	157.9	166.2	170.6	171.9			- 160
-25.44 -	179.9	179.1	174.9	165.0	151.0	145.9	151.6	166.1	172.3	175.8	178.2			
-26.315 -	193.3	197.2	198.8	196.6	190.7	188.8	197.0	206.5	209.2	209.9	210.2			
-26.94 -	160.8	156.1	154.2	149.3	144.5	140.6	142.7	149.6	150.3	154.5	154.5			
-27.44 -	142.8	136.9	133.5	129.4	125.0	121.9	122.0	123.9	124.8	124.9	126.9			
-27.94 -	143.0	138.1	132.3	126.7	117.7	111.5	111.1	111.9	116.1	114.5	120.0			- 120
	7.124	7.493	7.82	8.254	9.014 R m	10.012 esh [11.011 cm]	11.753	12.119	12.326	12.547	l		
	27.94 - 27.44 - 26.94 - 26.315 - 25.44 - 23.97 - 20.5 - 10.5 - 10.5 - 2.0 - 0.0 - -2.0 - -2.0 - -2.0 - -10.5 - -10.5 - -20.5 - -23.97 - -25.44 - -26.315 - -26.94 - -27.94 -	27.94 227.6 27.44 214.4 26.94 202.0 26.315 29 25.44 2194.9 23.97 201.5 20.5 227.2 20.5 227.2 20.5 227.2 20.5 227.2 20.5 227.2 20.5 227.2 20.6 227.3 20.6 227.3 20.6 227.4 20.6 227.4 20.6 20 20.6	27.94227.6237.827.44214.4221.126.94202.0204.726.315197.1197.125.44194.9193.323.97201.5196.820.5227.2227.215.5255.6260.110.5273.0280.120.6273.0280.120.7274.8285.320.6274.8285.320.7274.8285.320.6274.8285.320.7274.8285.320.6274.8285.320.7274.8285.320.6274.8285.320.5271.7281.320.6242.5247.420.5208.2207.523.97181.5181.023.97181.5197.224.53197.226.31525.44193.3197.226.315143.0136.127.94143.8136.127.94143.0138.1	27.94227.6237.8249.527.44214.4221.1226.526.94202.0204.7203.426.315197.1197.1191.425.44194.9193.3185.423.97201.5196.8190.620.527.2227.2221.315.5263.4201.5263.4213.815.5255.6260.125.4410.5263.4271.4284.820.6276.9286.7293.110.7276.9286.7293.120.6276.9286.7293.120.7271.4281.3291.520.6202.5247.4281.320.5203.2207.5203.221.5203.2207.5203.222.5208.2207.5203.323.97181.5181.0175.824.94179.9179.1174.925.44136.3197.2138.122.744143.8136.1132.324.94143.8136.1133.1	27.94227.6237.8249.5262.027.44214.4221.1226.5229.226.94202.0204.7203.4197.226.315197.1197.1191.4181.225.44194.9193.3185.4170.423.97201.5196.8190.6177.020.5227.2221.3207.8207.815.5255.6260.1258.5246.410.5255.6260.1258.5267.05.5272.0286.7283.6283.76.01278.8286.7284.8283.86.02274.8286.7291.5288.76.15.5271.7281.3291.5283.76.15.6202.1201.5201.5203.77.12203.1217.7265.77.12203.1217.7265.77.12203.1214.1214.17.12174.1214.5214.17.12174.1174.9174.17.127.49.1174.9124.1	27.94 227.6 237.8 249.5 262.0 27.44 27.44 214.4 221.1 226.3 289.0 289.0 26.94 202.0 204.7 203.4 197.2 184.0 26.315 197.1 197.1 191.4 181.2 162.7 25.44 194.9 193.3 185.4 170.4 155.0 20.54 201.5 196.8 190.6 177.0 155.0 20.55 207.2 221.3 207.8 284.0 244.6 15.5 255.6 260.1 258.5 246.4 244.6 10.5 255.6 260.1 258.5 246.4 244.6 10.5 255.6 260.1 258.5 246.4 244.6 10.5 263.4 271.4 273.8 261.6 263.1 2.0 274.8 286.7 289.7 288.7 274.7 2.0 274.8 281.8 267.6 274.8 264.6 274.7 1.0.5 274.8 281.7 288.7 214.7 265.5	27.94 227.6 237.8 249.5 26.92 27.84 21.44 22.11 22.63 22.83 22.83 26.94 - 20.00 20.47 20.31 197.2 197.4 <td< td=""><td>27.94 227.64 237.84 249.54 262.00 27.44 214.44 221.14 226.24 228.04 223.04 26.94 202.00 204.74 203.44 197.24 197.44 <</td><td>27.94 27.40 23.70 24.91 262.00 27.270 27.40 21.44 22.11 22.65 22.80 <</td><td>27.94 27.74 <td< td=""><td>27.9427.4</td><td>27.94 27.76 27.77 27.77 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 <td< td=""><td>27.9427.627.727.627.627.626.626.7</td><td>27.9427.627.727.627.627.627.627.627.627.627.627.627.727.627.727.627.727.627.727.627.727.627.727.627.7</td></td<></td></td<></td></td<>	27.94 227.64 237.84 249.54 262.00 27.44 214.44 221.14 226.24 228.04 223.04 26.94 202.00 204.74 203.44 197.24 197.44 <	27.94 27.40 23.70 24.91 262.00 27.270 27.40 21.44 22.11 22.65 22.80 <	27.94 27.74 <td< td=""><td>27.9427.4</td><td>27.94 27.76 27.77 27.77 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 <td< td=""><td>27.9427.627.727.627.627.626.626.7</td><td>27.9427.627.727.627.627.627.627.627.627.627.627.627.727.627.727.627.727.627.727.627.727.627.727.627.7</td></td<></td></td<>	27.9427.4	27.94 27.76 27.77 27.77 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 27.76 <td< td=""><td>27.9427.627.727.627.627.626.626.7</td><td>27.9427.627.727.627.627.627.627.627.627.627.627.627.727.627.727.627.727.627.727.627.727.627.727.627.7</td></td<>	27.9427.627.727.627.627.626.626.7	27.9427.627.727.627.627.627.627.627.627.627.627.627.727.627.727.627.727.627.727.627.727.627.727.627.7

Figure 58. Heat flux distribution for optimized design IFE region on day 15 (see Section 7.1.4).

		7.124	7.493	7.82	8.254	9.014 R m	10.012 esh [11.011 cm]	11.753	12.119	12.326	12.547		
	-27.94 -	119.7	119.6	118.6	115.5	111.0	109.8	109.3	109.2	112.2	111.8	115.1		
	-27.44 -	122.4	122.7	123.2	122.2	122.1	123.7	124.5	124.2	123.0	122.7	123.0		- 120
	-26.94 -	143.8	147.2	149.3	150.3	151.0	150.8	153.6	157.9	155.4	156.6	154.3		
	-26.315 -	177.7	189.5	196.2	202.1	203.9	204.0	211.4	220.4	220.7	218.8	214.1		
	-25.44 -	166.5	173.3	174.8	171.3	162.9	156.7	163.6	177.4	182.4	184.3	183.8		
	-23.97 -	167.3	172.5	174.3	169.5	156.5	148.8	154.3	167.6	172.8	175.0	175.5		- 150
	-20.5 -	180.3	189.8	193.2	192.0	180.0	171.3	175.6	187.5	190.3	190.5	190.2		
	-15.5 -	196.1	209.7	219.5	222.6	213.3	204.1	210.2	219.8	222.7	220.6	218.9		
	-10.5 -	202.2	218.8	234.0	241.5	237.2	229.9	235.7	246.1	246.3	242.6	239.6		
	-5.5 -	204.1	221.3	238.6	248.2	246.1	241.3	250.1	260.4	259.0	254.7	248.8		- 180 -
Z me	-2.0 -	202.8	220.3	238.8	249.3	249.2	245.5	254.7	264.7	261.9	256.9	253.1		b Heat flu
sh [c	0.0 -	202.7	220.5	238.7	251.4	251.0	246.4	254.9	263.2	260.8	255.9	251.0		ux [W/c
Ē	2.0 -	204.7	222.2	240.1	250.8	249.4	245.1	253.4	262.6	260.4	255.9	251.0		:m2]
	5.5 -	202.8	219.9	236.9	247.5	246.1	240.5	247.8	258.1	256.7	252.7	247.7		
	10.5 -	199.4	215.8	231.3	237.9	233.2	225.9	233.6	243.1	243.5	240.0	236.7		- 210
	15.5 -	196.8	212.3	223.9	227.1	216.4	204.0	208.7	217.6	220.6	217.7	215.2		
	20.5 -	185.0	196.0	202.5	199.7	184.1	171.0	173.4	183.7	187.0	186.3	185.3		
	23.97 -	173.1	179.6	180.6	176.4	159.0	147.5	149.8	160.9	166.2	167.4	167.9		
	25.44 -	169.6	179.5	179.9	176.2	159.6	146.2	150.2	161.3	168.1	168.1	169.5		- 240
	26.315 -	172.3	178.8	182.9	181.8	170.4	159.1	162.8	171.8	176.7	177.7	176.4		
	26.94 -	173.9	186.3	192.5	196.3	189.6	183.2	185.1	191.3	192.1	190.6	191.7		
	27.44 -	177.4	195.8	208.1	217.7	222.4	225.7	227.6	226.2	217.6	213.1	209.8		
	27.94 -	181.5	203.0	222.4	236.9	253.9	266.9	270.0	260.3	241.7	235.3	224.3		- 270

Figure 59. Heat flux distribution for optimized design IFE region on day 27 (see Section 7.1.4).

	27.94 -	284.5	277.2	274.5	264.3	243.8	212.4	186.3	167.3	147.2	125.4	114.2		- 360
	27.44 -	254.7	239.1	227.7	213.6	191.9	165.3	145.5	131.8	119.7	107.2	100.5		
	26.94 -	222.8	201.4	184.1	167.0	143.9	122.2	108.4	100.8	95.4	90.2	87.3		
	26.315 -	202.2	182.9	167.3	150.0	126.3	107.3	96.2	92.7	88.8	84.2	81.8		
	25.44 -	191.0	172.6	158.5	140.1	117.3	99.7	90.3	88.2	84.8	81.4	79.9		- 300
	23.97 -	193.1	173.8	161.3	145.7	122.6	104.3	94.7	92.0	88.0	83.8	81.9		
	20.5 -	221.7	203.8	190.4	174.4	149.2	128.3	116.8	112.7	108.6	102.9	99.5		
	15.5 -	276.1	255.1	238.9	220.1	189.8	165.5	155.1	154.7	153.9	151.2	149.7		
[cm]	10.5 -	322.8	300.2	280.4	258.7	226.3	201.7	199.4	213.9	233.7	250.2	259.6		- 240
	5.5 -	353.6	327.0	306.8	284.1	249.3	224.9	226.4	249.9	279.0	304.8	319.3		
	2.0 -	363.1	338.1	315.7	293.4	256.7	233.0	235.1	261.3	293.4	322.8	340.3		(cm2]
esh [0.0 -	362.8	336.2	317.9	292.2	257.6	232.5	234.4	260.9	294.6	322.7	339.4		lux [W/
Ĕ N	-2.0 -	360.2	335.2	313.1	290.0	253.3	229.2	231.5	253.9	284.6	309.4	320.5		Heat f Heat f
	-5.5 -	344.9	319.6	300.8	278.0	243.4	218.3	218.1	239.1	264.2	284.9	296.8		
	-10.5 -	310.8	286.9	268.8	247.3	215.7	191.3	186.7	200.3	217.9	231.6	238.3		
	-15.5 -	259.5	238.9	223.7	203.9	173.8	149.5	134.8	127.8	119.5	110.0	103.6		
	-20.5 -	205.4	187.4	174.0	157.9	133.8	112.2	97.9	89.1	78.9	68.3	62.3		- 120
	-23.97 -	178.2	161.4	147.6	132.2	110.5	91.1	78.6	71.1	63.7	55.6	51.1		120
	-25.44 -	185.6	167.2	153.4	137.1	113.4	92.5	79.0	70.5	62.5	54.7	50.0		
	-26.315 -	226.8	205.8	190.7	176.2	150.1	124.7	104.0	90.7	77.7	65.3	58.9		
	-26.94 -	163.7	146.6	137.5	126.0	109.9	91.9	75.9	65.6	55.7	46.7	42.5		
	-27.44 -	132.0	123.2	118.4	111.2	98.2	82.7	67.9	57.0	47.5	39.9	35.4		- 60
	-27.94 -	121.2	114.5	108.4	101.9	88.4	74.8	61.2	50.7	42.7	37.0	32.8		
		15.139	15.521	15.837	16.252	17.007 R m	18.007 esh [19.006 cm]	19.752	20.279	20.67	20.955		

Figure 60. Heat flux distribution for optimized design OFE region on day 0 (see Section 7.1.4).

	27.94 -	266.1	256.2	253.3	246.4	227.1	200.8	175.5	154.4	138.8	120.0	109.7		
	27.44 -	232.6	217.6	209.8	197.6	177.7	154.8	137.0	125.1	114.1	102.8	96.6		
	26.94 -	201.7	182.9	169.1	153.0	132.2	113.9	102.3	97.8	91.4	87.4	85.1		- 400
	26.315 -	189.6	170.9	153.8	137.5	116.2	101.4	91.2	88.0	83.9	82.5	81.5		
	25.44 -	179.1	160.2	146.1	129.4	108.9	93.1	85.7	84.1	81.5	79.0	78.4		
	23.97 -	177.7	162.5	148.3	135.5	114.2	98.3	90.9	88.9	87.8	85.8	84.7		
	20.5 -	207.4	190.8	177.1	162.7	140.5	123.8	118.5	122.3	128.1	131.8	133.4		
	15.5 -	261.1	239.9	224.9	207.6	181.9	163.7	162.8	177.6	195.8	211.3	221.0		- 320
	10.5 -	306.4	283.2	266.4	246.9	216.1	196.2	200.4	223.0	251.3	277.1	292.1		
	5.5 -	337.6	313.0	294.0	273.1	242.1	223.4	234.8	274.5	325.1	371.5	398.5		
c IJ	2.0 -	347.0	321.4	303.5	283.4	251.2	235.6	250.5	297.2	356.6	413.4	444.6		cm2]
ssh [0.0 -	351.6	326.7	305.5	284.2	252.2	235.6	252.9	299.4	361.5	418.8	452.3		<u>کر</u> ۲ 240 -
Ш Ш	-2.0 -	351.0	324.3	304.3	282.1	250.7	233.5	249.4	295.8	356.8	416.2	448.5		Heat fl
	-5.5 -	334.9	310.1	292.0	270.6	238.8	220.4	232.4	271.4	321.7	369.1	397.2		
	-10.5 -	300.0	278.8	260.3	241.3	211.2	191.0	192.5	212.3	236.2	255.7	266.9		
	-15.5 -	251.4	231.6	217.4	200.9	174.3	155.6	153.0	166.0	181.5	194.7	201.4		
	-20.5 -	199.9	183.4	169.9	155.9	133.1	115.7	107.6	107.7	108.8	108.0	107.0		- 160
	-23.97 -	173.3	156.5	142.8	128.6	106.8	89.3	78.0	72.5	66.0	58.4	54.1		
	-25.44 -	181.6	161.0	145.7	130.0	107.8	89.0	77.2	69.9	62.6	55.5	51.8		
	-26.315 -	218.7	197.6	183.2	168.8	143.5	119.6	101.9	89.1	76.9	65.8	60.4		
	-26.94 -	156.2	143.0	132.9	123.3	104.4	88.3	73.4	63.8	54.6	46.9	42.9		- 80
	-27.44 -	126.8	120.7	114.1	107.8	94.7	80.1	66.4	56.0	47.0	39.8	35.8		
	-27.94 -	117.4	111.4	104.1	97.2	86.4	72.6	60.8	50.3	42.5	36.7	33.4		
		15.139	15.521	15.837	16.252	17.007	18.007	19.006	19.752	20.279	20.67	20.955		•
						Rm	iesh [cm]						

Figure 61. Heat flux distribution for optimized design OFE region on day 1 (see Section 7.1.4).

	27.04	262.7		250.0	245.0	224.1	107.0	172.2	150.0	120.0	101 5	111 2		
	27.94 -	202.7	255.0	250.8	245.0	224.1	197.8	1/3.2	158.0	138.8	121.5	111.3		
	27.44 -	233.8	218.4	208.0	197.2	176.3	153.8	136.3	125.6	114.5	104.1	98.8		
	26.94 -	204.7	183.5	167.7	152.8	132.2	113.4	102.0	96.3	92.1	88.1	86.6		- 400
	26.315 -	188.2	168.9	152.2	137.4	116.4	99.3	89.8	87.3	84.6	82.9	81.5		400
	25.44 -	176.5	158.4	145.2	129.9	109.0	92.4	85.5	83.9	82.2	81.9	81.0		
	23.97 -	177.0	160.9	147.4	133.4	113.9	98.0	92.2	92.0	91.1	90.4	89.2		
	20.5 -	206.3	190.1	176.4	162.0	140.0	123.6	120.3	126.7	134.5	140.2	144.0		
	15.5 -	258.2	238.1	222.7	205.7	180.1	162.1	161.9	175.8	193.4	209.0	216.8		- 320
	10.5 -	302.3	280.2	263.2	244.3	214.4	196.1	200.8	225.3	255.8	282.7	297.3		
	5.5 -	334.8	310.4	292.7	272.1	240.6	223.6	237.0	278.8	332.5	382.7	411.3		
сш	2.0 -	345.4	320.9	301.8	281.8	251.4	235.0	250.5	298.0	360.1	417.5	449.6		(cm2]
esh [0.0 -	345.7	322.5	303.5	282.4	251.3	235.8	251.4	299.8	362.2	420.8	454.3		<u>کر</u> 240 <u>۲</u>
Ĕ	-2.0 -	344.2	319.6	302.6	281.1	249.1	232.5	248.8	298.6	360.7	418.3	452.1		Heat f
	-5.5 -	331.6	308.3	289.7	267.7	238.3	221.2	235.3	278.1	333.2	383.2	412.9		
	-10.5 -	298.0	277.1	258.8	239.7	210.2	190.6	193.5	215.0	240.6	263.2	275.1		
	-15.5 -	250.6	231.7	217.3	199.3	173.6	155.2	153.6	165.0	179.5	191.7	197.0		
	-20.5 -	200.0	183.5	171.2	155.6	133.1	116.2	110.7	114.3	118.9	121.8	123.4		- 160
	-23.97 -	173.7	156.3	142.9	128.4	107.2	90.5	79.9	74.9	68.6	62.1	58.4		
	-25.44 -	179.0	159.5	146.6	130.6	109.1	90.0	78.7	71.6	63.7	57.2	52.1		
	-26.315 -	215.9	197.1	183.4	167.9	143.2	117.7	101.4	90.4	78.8	66.7	60.8		
	-26.94 -	155.3	142.2	131.9	121.0	104.9	88.2	74.7	64.7	56.3	47.8	43.3		- 80
	-27.44 -	127.2	119.0	112.8	105.7	95.0	80.3	66.9	56.6	47.5	40.0	36.2		
	-27.94 -	118.0	109.5	103.2	95.8	86.0	72.3	60.0	50.6	42.4	36.3	33.9		
		15.139	15.521	15.837	16.252	17.007 R m	18.007 esh [19.006 cm]	19.752	20.279	20.67	20.955		

Figure 62. Heat flux distribution for optimized design OFE region on day 2 (see Section 7.1.4).

	27.94 -	241.5	239.7	242.8	238.6	219.1	198.8	178.6	162.7	151.8	135.7	128.7		
	27.44 -	217.9	208.2	205.0	196.1	175.7	157.2	142.1	134.3	129.5	122.3	118.0		260
	26.94 -	193.8	179.1	169.0	155.7	135.2	118.8	109.0	108.8	109.6	110.1	109.4		- 360
	26.315 -	180.0	167.4	153.4	138.7	120.0	104.7	98.6	101.3	104.8	107.4	109.6		
	25.44 -	171.5	157.3	144.5	130.3	112.4	97.3	94.1	98.6	105.7	110.2	112.6		
	23.97 -	171.1	157.5	146.8	134.4	115.5	101.5	100.1	106.5	113.9	120.9	123.5		- 300
	20.5 -	197.0	184.1	173.1	160.8	141.1	126.5	125.5	135.3	146.2	154.6	158.4		
	15.5 -	240.7	226.9	216.4	202.7	178.6	164.0	169.1	190.1	214.4	233.3	242.8		
	10.5 -	275.4	262.7	251.7	236.2	211.9	197.4	212.1	251.6	295.0	328.7	343.0		
	5.5 -	297.4	284.2	273.7	258.7	232.7	219.0	237.3	283.3	332.4	366.4	379.2		
Ē	2.0 -	306.0	291.1	282.0	266.6	239.7	226.0	244.7	292.4	344.2	378.0	389.5		- 240 [7 5
sh [0.0 -	306.2	292.2	283.7	267.7	240.1	226.9	246.5	295.5	345.4	377.8	389.6		- 180
Zme	-2.0 -	305.8	292.4	281.9	266.3	239.4	224.9	245.2	294.2	343.9	377.5	390.1		
	-5.5 -	295.8	283.0	272.6	257.3	231.5	217.8	235.8	283.2	332.3	366.7	379.5		
	-10.5 -	273.9	260.7	249.7	234.7	210.1	196.1	210.1	249.4	295.8	330.7	346.7		
	-15.5 -	236.1	223.1	212.6	197.9	174.6	159.0	161.9	179.4	200.1	215.6	223.0		
	-20.5 -	193.2	180.2	170.0	157.3	136.5	120.8	118.1	123.7	130.8	134.4	136.2		
	-23.97 -	171.4	157.0	145.4	131.9	112.6	97.5	93.7	96.9	103.0	106.2	107.8		120
	-25.44 -	179.2	162.8	151.0	137.0	115.5	98.8	92.0	93.3	96.0	97.8	98.7		- 120
	-26.315 -	212.9	199.4	187.0	174.6	151.3	130.4	116.3	111.2	107.4	103.0	101.7		
	-26.94 -	149.4	141.5	133.6	124.8	110.7	94.6	83.4	77.2	72.3	67.4	65.4		
	-27.44 -	117.6	113.8	109.1	103.9	94.9	82.1	71.4	63.5	56.1	50.4	47.5		60
	-27.94 -	107.7	102.9	97.0	91.8	83.3	73.1	63.2	55.4	48.6	44.3	42.3		- טט
		15.139	15.521	15.837	16.252	17.007 R m	18.007 esh [19.006 cm]	19.752	20.279	20.67	20.955		I

Figure 63. Heat flux distribution for optimized design OFE region on day 15 (see Section 7.1.4).

	27.94 -	234.4	239.3	242.8	243.9	236.1	220.6	212.4	210.9	204.0	193.6	190.7		
	27.44 -	215.7	211.9	210.5	205.2	191.0	177.7	170.9	173.6	178.2	177.8	176.4		
	26.94 -	194.7	184.9	178.5	167.4	148.6	137.0	132.8	140.4	154.6	163.7	165.5		- 300
	26.315 -	180.0	171.1	162.0	149.5	131.5	119.7	119.7	131.5	147.8	161.5	168.1		
	25.44 -	172.5	161.5	151.3	139.6	122.0	110.1	114.5	130.2	150.4	168.0	177.8		
	23.97 -	171.4	160.5	152.7	141.4	123.9	114.3	122.2	144.4	171.1	193.6	206.2		
	20.5 -	189.6	181.6	174.6	164.8	147.9	139.0	151.7	183.1	218.8	248.5	263.4		250
	15.5 -	221.6	214.4	208.1	199.1	180.2	170.7	187.6	226.4	268.0	295.9	306.7		- 250
	10.5 -	244.0	238.7	232.6	224.0	202.6	193.4	212.6	254.7	295.3	316.1	320.3		
	5.5 -	257.2	252.3	247.9	238.0	217.1	207.3	227.5	271.7	309.4	322.2	319.7		
[L	2.0 -	261.9	256.6	253.7	244.4	222.3	211.7	232.2	277.1	314.4	325.3	321.3		cm2]
sh [o	0.0 -	263.7	258.4	254.6	244.3	222.3	211.8	233.2	278.2	314.3	325.9	321.5		- 200 ×
Z	-2.0 -	261.4	256.0	252.7	243.2	222.2	211.3	232.3	278.9	315.7	326.4	320.6		Heat fl
	-5.5 -	258.4	252.6	247.8	237.8	217.5	207.2	228.1	273.1	310.3	323.1	320.9		
	-10.5 -	248.1	240.2	235.7	225.9	204.5	194.1	213.3	256.7	297.3	318.2	322.8		
	-15.5 -	224.4	216.0	211.1	200.5	181.0	171.2	188.2	227.5	270.2	300.2	313.3		
	-20.5 -	194.6	185.6	178.4	167.6	149.8	140.1	151.7	184.1	222.3	253.6	270.9		- 150
	-23.97 -	178.7	166.3	158.5	147.0	127.4	116.1	122.1	142.3	169.4	192.3	205.3		
	-25.44 -	185.9	171.8	164.7	151.9	131.2	118.1	117.6	130.9	145.7	160.1	167.2		
	-26.315 -	223.7	215.6	207.4	196.0	175.1	155.5	149.2	156.0	159.9	163.0	166.8		
	-26.94 -	156.1	149.0	146.2	140.0	126.3	113.5	107.1	107.5	107.9	108.3	108.5		- 100
	-27.44 -	118.0	114.3	113.9	111.0	103.8	95.7	89.6	87.1	84.8	82.0	80.9		
	-27.94 -	105.5	102.4	99.3	95.5	90.0	83.7	78.3	75.8	74.0	71.8	72.7		
		15.139	15.521	15.837	16.252	17.007	18.007	19.006	19.752	20.279	20.67	20.955		•
						Rm	nesh [cm]						

Figure 64. Heat flux distribution for optimized design OFE region on day 27 (see Section 7.1.4).

APPENDIX B. DISTRIBUTIONS FOR ALTERNATE 1 DESIGN

APPENDIX B-1. FISSION RATE DENSITY DISTRIBUTIONS FOR ALTERNATE 1 DESIGN



Figure 65. Fission rate density distribution for alternate 1 design IFE region on day 0 (see Section 7.2.2).


Figure 66. Fission rate density distribution for alternate 1 design IFE region on day 1 (see Section 7.2.2).



Figure 67. Fission rate density distribution for alternate 1 design IFE region on day 15 (see Section 7.2.2).



Figure 68. Fission rate density distribution for alternate 1 design IFE region on day 27 (see Section 7.2.2).



Figure 69. Fission rate density distribution for alternate 1 design OFE region on day 0 (see Section 7.2.2).



Figure 70. Fission rate density distribution for alternate 1 design OFE region on day 1 (see Section 7.2.2).



Figure 71. Fission rate density distribution for alternate 1 design OFE region on day 2 (see Section 7.2.2).



Figure 72. Fission rate density distribution for alternate 1 design OFE region on day 15 (see Section 7.2.2).



Figure 73. Fission rate density distribution for alternate 1 design OFE region on day 27 (see Section 7.2.2).

APPENDIX B-2. CUMULATIVE FISSION DENSITY DISTRIBUTIONS FOR ALTERNATE 1 DESIGN



Figure 74. Cumulative fission density distribution for alternate 1 design IFE region on day 1 (see Section 7.2.5).



Figure 75. Cumulative fission density distribution for alternate 1 design IFE region on day 15 (see Section 7.2.5).



Figure 76. Cumulative fission density distribution for alternate 1 design IFE region on day 27 (see Section 7.2.5).

-69	0.62	0.56	0.49	0.43	0.39	0.36	0.34	0.32	0.30	0.28	0.26	0.25	0.24	0.25		
7.19 27	0.54	0.47	0.39	0.32	0.28	0.26	0.24	0.23	0.21	0.20	0.19	0.19	0.20	0.21		- 0.90
5.44 2 ⁷	0.47	0.41	0.33	0.26	0.23	0.21	0.19	0.18	0.17	0.16	0.16	0.16	0.17	0.19		
5.44 20	0.44	0.38	0.31	0.24	0.21	0.19	0.17	0.16	0.15	0.15	0.15	0.15	0.17	0.18		
3.97 2	0.44	0.38	0.31	0.25	0.21	0.19	0.18	0.17	0.16	0.16	0.16	0.16	0.18	0.19		- 0.75
20.5 2	0.51	0.45	0.37	0.30	0.26	0.24	0.23	0.21	0.21	0.20	0.21	0.22	0.24	0.27		
15.5	0.64	0.56	0.47	0.38	0.34	0.31	0.29	0.28	0.28	0.28	0.29	0.33	0.38	0.44		
10.5	0.75	0.66	0.55	0.46	0.40	0.37	0.35	0.35	0.35	0.36	0.39	0.45	0.55	0.64		– *
5.5	0.82	0.72	0.61	0.50	0.45	0.41	0.40	0.39	0.40	0.42	0.46	0.56	0.70	0.83		- 0.90 - <i>fissions</i>
- 5.0	0.85	0.75	0.63	0.52	0.46	0.43	0.41	0.41	0.42	0.44	0.50	0.61	0.77	0.92		ity [10 ²
esh [0.0	0.85	0.75	0.63	0.52	0.46	0.43	0.41	0.41	0.42	0.44	0.50	0.62	0.78	0.94		n densi
	0.84	0.75	0.62	0.52	0.46	0.43	0.41	0.41	0.41	0.44	0.49	0.60	0.76	0.90		/e fissic
-5.5	0.81	0.71	0.60	0.50	0.44	0.41	0.39	0.38	0.39	0.41	0.45	0.55	0.68	0.80		- 0.45 mulativ
10.5	0.73	0.64	0.53	0.44	0.39	0.36	0.34	0.33	0.33	0.34	0.37	0.43	0.51	0.59		Ū
15.5 -	0.61	0.54	0.44	0.37	0.32	0.29	0.27	0.26	0.26	0.26	0.26	0.29	0.33	0.37		
20.5 -	0.48	0.42	0.35	0.28	0.24	0.22	0.20	0.19	0.18	0.18	0.17	0.18	0.18	0.20		
3.97 -	0.42	0.36	0.30	0.23	0.20	0.18	0.16	0.15	0.14	0.13	0.13	0.12	0.12	0.12		- 0.30
5.44 -2	0.43	0.37	0.30	0.24	0.20	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.12	0.12		
6.44 -2 '	0.50	0.43	0.36	0.29	0.25	0.23	0.21	0.19	0.18	0.16	0.15	0.14	0.13	0.13		
7.19 -2	0.61	0.57	0.50	0.43	0.39	0.35	0.33	0.30	0.27	0.24	0.22	0.20	0.18	0.17		
7.69 -2	0.72	0.69	0.63	0.57	0.52	0.48	0.44	0.40	0.37	0.33	0.29	0.25	0.22	0.20		- 0.15
-2	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 8 mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		

Figure 77. Cumulative fission density distribution for alternate 1 design OFE region on day 1 (see Section 7.2.5).

.7.69	8.58	7.80	6.93	6.10	5.59	5.21	4.90	4.62	4.34	4.10	3.86	3.71	3.71	3.82		
7.19 2	7.42	6.56	5.50	4.58	4.06	3.73	3.50	3.31	3.13	3.00	2.88	2.90	3.05	3.31		
6.44 2	6.63	5.76	4.71	3.80	3.28	2.97	2.77	2.61	2.50	2.43	2.42	2.54	2.79	3.09		
5.44 2	6.19	5.39	4.39	3.52	3.01	2.72	2.53	2.41	2.33	2.30	2.33	2.52	2.82	3.16		- 12.5
3.97 2	6.19	5.43	4.47	3.62	3.13	2.84	2.66	2.54	2.48	2.48	2.56	2.81	3.19	3.59		
20.5 2	7.15	6.32	5.29	4.36	3.82	3.50	3.31	3.20	3.15	3.20	3.38	3.81	4.43	5.06		
15.5	8.85	7.87	6.63	5.50	4.86	4.49	4.28	4.17	4.17	4.30	4.64	5.37	6.37	7.36		
10.5	10.32	9.20	7.78	6.50	5.77	5.37	5.15	5.10	5.19	5.49	6.15	7.46	9.17	10.80		- 10.0
5.5	11.30	10.09	8.56	7.18	6.39	5.97	5.78	5.76	5.94	6.40	7.33	9.12	11.39	13.50) <u>fissions</u> cm ³ tuelpartic
cm]	11.64	10.39	8.83	7.41	6.61	6.18	5.99	5.99	6.20	6.70	7.70	9.63	12.05	14.29		ty [10 ²⁰
esh [_ 	11.70	10.42	8.86	7.44	6.64	6.20	6.02	6.02	6.22	6.74	7.75	9.69	12.15	14.38		n densi
- ^{2.0} D	11.61	10.37	8.81	7.39	6.59	6.18	5.99	5.99	6.18	6.68	7.68	9.62	12.04	14.29		e fissio
-5.5	11.22	10.01	8.50	7.12	6.34	5.93	5.73	5.72	5.90	6.36	7.29	9.09	11.37	13.50		mulativ
10.5	10.17	9.07	7.66	6.40	5.67	5.27	5.06	4.98	5.07	5.36	5.99	7.26	8.91	10.47		Cu
15.5	8.65	7.68	6.46	5.35	4.71	4.34	4.11	3.99	3.96	4.05	4.31	4.90	5.71	6.50		
20.5	6.94	6.14	5.11	4.19	3.65	3.33	3.13	3.00	2.94	2.95	3.07	3.39	3.87	4.35		5.0
3.97	6.14	5.35	4.38	3.51	3.01	2.71	2.51	2.37	2.28	2.23	2.23	2.36	2.57	2.81		- 5.0
5.44 -2	6.34	5.52	4.48	3.57	3.05	2.72	2.50	2.35	2.22	2.12	2.06	2.08	2.18	2.31		
5.44 -25	7.20	6.34	5.28	4.36	3.80	3.43	3.17	2.94	2.74	2.55	2.38	2.28	2.26	2.31		
7.19 -2(8.87	8.17	7.27	6.35	5.73	5.26	4.86	4.49	4.15	3.78	3.44	3.11	2.88	2.77		
7.69 -2 <u>7</u>	10.30	9.77	9.01	8.20	7.56	7.00	6.50	6.01	5.53	5.01	4.48	3.94	3.50	3.25		- 2.5
-27	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		-

Figure 78. Cumulative fission density distribution for alternate 1 design OFE region on day 15 (see Section 7.2.5).

69	14.96	13.73	12.30	10.93	10.07	9.44	8.96	8.52	8.11	7.76	7.46	7.37	7.56	7.95		- 24
.19 27	13.09	11.66	9.89	8.32	7.43	6.86	6.47	6.16	5.90	5.72	5.65	5.86	6.36	7.01		
5.44 27	11.74	10.31	8.53	6.94	6.02	5.49	5.13	4.89	4.73	4.68	4.77	5.18	5.87	6.62		
5.44 26	10.99	9.64	7.93	6.39	5.50	5.00	4.68	4.48	4.39	4.40	4.58	5.12	5.92	6.74		
3.97 25	11.00	9.70	8.05	6.56	5.69	5.19	4.89	4.72	4.65	4.72	4.98	5.64	6.57	7.51		- 20
20.5 2.	12.56	11.18	9.43	7.84	6.90	6.36	6.04	5.89	5.88	6.06	6.54	7.58	8.98	10.36		
15.5	15.32	13.73	11.69	9.81	8.71	8.09	7.76	7.64	7.74	8.13	9.00	10.73	12.96	15.05		
10.5	17.62	15.84	13.57	11.45	10.21	9.53	9.20	9.16	9.41	10.08	11.43	13.96	17.07	19.87		_ ا
5.5	19.08	17.19	14.78	12.51	11.19	10.49	10.18	10.19	10.55	11.42	13.10	16.16	19.80	23.00		0 fissions ^{Cm3telpartic}
cm]	19.60	17.66	15.20	12.88	11.54	10.83	10.51	10.54	10.93	11.86	13.62	16.83	20.61	23.92		ity [10 ²
esh [19.67	17.70	15.25	12.93	11.58	10.86	10.55	10.58	10.98	11.92	13.70	16.93	20.72	24.03		on dens
ч ^{-2.0} Ч	19.55	17.63	15.16	12.85	11.52	10.81	10.50	10.52	10.92	11.84	13.61	16.83	20.60	23.92		ve fissio
-5.5	19.01	17.11	14.71	12.45	11.14	10.44	10.12	10.13	10.51	11.38	13.07	16.13	19.78	23.01		ımulati [.] 12 -
10.5	17.47	15.70	13.44	11.32	10.09	9.42	9.10	9.04	9.29	9.95	11.28	13.78	16.85	19.62		Ŭ
.15.5	15.13	13.53	11.52	9.64	8.54	7.91	7.56	7.42	7.50	7.84	8.63	10.21	12.27	14.19		
20.5	12.35	10.98	9.23	7.63	6.69	6.14	5.81	5.63	5.58	5.70	6.08	6.94	8.11	9.27		
3.97 -	11.03	9.69	8.01	6.48	5.58	5.04	4.71	4.49	4.38	4.37	4.51	4.95	5.60	6.28		- 8
5.44 -2	11.43	10.01	8.21	6.61	5.68	5.11	4.74	4.49	4.32	4.20	4.24	4.51	4.97	5.47		U
6.44 -2	12.93	11.48	9.68	8.09	7.10	6.47	6.02	5.66	5.34	5.09	4.93	4.96	5.21	5.56		
7.19 -2	15.70	14.57	13.10	11.61	10.54	9.78	9.13	8.55	8.01	7.48	7.01	6.66	6.51	6.53		
7.69 -2	17.94	17.11	15.96	14.70	13.68	12.79	12.00	11.25	10.51	9.75	8.98	8.25	7.75	7.47		
-2	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		

Figure 79. Cumulative fission density distribution for alternate 1 design OFE region on day 27 (see Section 7.2.5).



Figure 80. Power density distribution for alternate 1 design IFE region on day 0 (see Section 7.2.3).



Figure 81. Power density distribution for alternate 1 design IFE region on day 1 (see Section 7.2.3).



Figure 82. Power density distribution for alternate 1 design IFE region on day 15 (see Section 7.2.3).



Figure 83. Power density distribution for alternate 1 design IFE region on day 27 (see Section 7.2.3).

69.7	10.05	9.08	7.99	7.02	6.37	5.82	5.54	5.15	4.84	4.51	4.17	3.92	3.88	4.01		
.19 2	8.57	7.54	6.29	5.18	4.60	4.19	3.92	3.69	3.43	3.28	3.07	3.03	3.09	3.36		
5.44 27	7.61	6.58	5.38	4.28	3.73	3.36	3.10	2.89	2.77	2.63	2.58	2.59	2.73	2.98		
.44 26	7.06	6.04	4.97	3.94	3.38	3.04	2.82	2.63	2.50	2.40	2.37	2.45	2.61	2.83		- 12
.97 25	7.05	6.17	5.04	4.05	3.49	3.12	2.92	2.76	2.62	2.53	2.51	2.57	2.74	2.97		
0.5 23	8.18	7.21	6.00	4.90	4.27	3.88	3.60	3.40	3.26	3.14	3.11	3.19	3.40	3.65		
5.5 2	10.32	9.13	7.56	6.21	5.44	4.97	4.66	4.47	4.34	4.31	4.40	4.75	5.30	5.89		- 10
0.5 1	12.06	10.68	8.93	7.38	6.49	5.99	5.67	5.54	5.49	5.64	6.09	7.06	8.40	9.79		
5.5 1(13.22	11.70	9.81	8.13	7.16	6.62	6.32	6.20	6.24	6.49	7.07	8.36	10.16	11.90		
چ ع	13.70	12.07	10.08	8.36	7.40	6.86	6.57	6.47	6.51	6.79	7.51	9.01	11.05	13.11		<u>kW</u> Juelparticle
sh [c	13.60	11.98	10.13	8.42	7.42	6.88	6.56	6.47	6.52	6.83	7.57	9.16	11.31	13.41		sity [
Z De	13.49	12.03	10.02	8.35	7.38	6.81	6.52	6.35	6.40	6.72	7.37	8.75	10.69	12.53		ver den
- نہ اب	12.97	11.48	9.61	7.96	7.02	6.48	6.18	6.04	6.04	6.20	6.77	7.96	9.54	11.08		Pov
- نہ ت	11.64	10.31	8.58	7.10	6.21	5.70	5.40	5.24	5.21	5.33	5.73	6.63	7.89	9.12		- 6
5 -10	9.70	8.56	7.11	5.84	5.09	4.61	4.29	4.07	3.89	3.78	3.75	3.84	4.10	4.39		-
5 -15.	7 63	6 7 3	5 5 3	4 4 9	3 89	3 48	3 20	2 96	2 78	2 61	2 48	2 37	2 31	2 32		
-20.		5.01	4.70	0.75	2.01	2.07	0.00	2.00	2.70	2.102	1.07	1.00	1.02	1.01		
-23.97	6.72	5.81	4.73	3.75	3.21	2.87	2.60	2.40	2.24	2.10	1.97	1.86	1.83	1.81		- 4
25.44	6.88	6.00	4.81	3.84	3.26	2.89	2.63	2.43	2.26	2.10	1.93	1.85	1.82	1.79		
.6.44 -2	7.94	6.89	5.72	4.67	4.10	3.68	3.35	3.08	2.82	2.60	2.38	2.17	2.09	2.02		
7.19 -2	9.75	8.99	7.95	6.89	6.25	5.69	5.19	4.77	4.33	3.92	3.54	3.11	2.85	2.70		
7.69 -2	11.55	10.99	10.03	9.12	8.32	7.61	6.98	6.47	5.93	5.24	4.60	4.05	3.51	3.20		- 2
-27	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		

Figure 84. Power density distribution for alternate 1 design OFE region on day 0 (see Section 7.2.3).

.69	9.55	8.63	7.50	6.60	6.05	5.60	5.25	4.92	4.59	4.28	4.05	3.85	3.80	3.87		
.19 27	8.32	7.17	5.94	4.91	4.28	3.94	3.68	3.47	3.24	3.08	2.94	2.97	3.07	3.31		- 15.0
6.44 27	7.29	6.20	5.05	4.05	3.45	3.13	2.90	2.74	2.59	2.50	2.45	2.53	2.74	2.97		
.44 26	6.69	5.79	4.66	3.70	3.19	2.86	2.65	2.47	2.39	2.33	2.30	2.42	2.61	2.89		
3.97 25	6.72	5.80	4.76	3.81	3.29	2.97	2.78	2.62	2.50	2.46	2.47	2.59	2.82	3.09		
20.5 23	7.80	6.84	5.68	4.65	4.07	3.72	3.50	3.36	3.27	3.27	3.39	3.75	4.29	4.86		- 12.5
5.5	9.78	8.64	7.20	5.92	5.20	4.80	4.56	4.44	4.42	4.53	4.89	5.68	6.80	7.92		
.0.5 1	11.48	10.16	8.48	7.01	6.19	5.72	5.46	5.35	5.39	5.62	6.15	7.30	8.89	10.49		
5.5 1	12.64	11.17	9.39	7.77	6.89	6.42	6.17	6.13	6.24	6.69	7.58	9.41	11.90	14.36		
	13.12	11.60	9.66	8.04	7.14	6.69	6.48	6.45	6.62	7.11	8.16	10.28	13.19	15.97		$\frac{\eta_{13}^{3}}{\eta_{1elparticle}^{3}}$ 0.01 -
o.0 .0	13.18	11.59	9.76	8.09	7.19	6.72	6.49	6.48	6.67	7.16	8.24	10.43	13.34	16.16		nsity [
, z.º	13.05	11.54	9.66	8.02	7.15	6.69	6.46	6.46	6.62	7.10	8.13	10.25	13.18	16.02		wer de
-5.5	12.53	11.06	9.28	7.71	6.82	6.35	6.11	6.04	6.20	6.60	7.49	9.33	11.80	14.23		- 7.5
10.5	11.27	9.93	8.26	6.83	6.01	5.55	5.30	5.15	5.16	5.34	5.81	6.84	8.23	9.53		
- 2.5 -1	9.47	8.34	6.93	5.72	4.99	4.60	4.35	4.22	4.18	4.28	4.58	5.26	6.26	7.25		
:0.5 -1	7.43	6.55	5.39	4.38	3.79	3.45	3.22	3.08	2.99	2.93	2.96	3.17	3.51	3.89		
	6.49	5.66	4.58	3.64	3.09	2.77	2.54	2.38	2.24	2.12	2.01	1.95	1.94	2.00		- 5.0
.44 -23	6.70	5.80	4.65	3.66	3.13	2.78	2.57	2.35	2.20	2.05	1.94	1.86	1.86	1.89		
.44 -25	7.71	6.73	5.52	4.52	3.95	3.55	3.25	2.97	2.75	2.53	2.35	2.18	2.12	2.13		
.19 -26	9.58	8.88	7.76	6.64	5.99	5.51	5.09	4.61	4.25	3.79	3.47	3.10	2.80	2.67		
.69 -27	11.31	10.71	9.73	8.77	8.11	7.40	6.88	6.28	5.73	5.11	4.52	3.96	3.48	3.18		- 2.5
-27	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		

Figure 85. Power density distribution for alternate 1 design OFE region on day 1 (see Section 7.2.3).

7.69	9.43	8.54	7.56	6.55	5.95	5.50	5.24	4.91	4.51	4.25	3.98	3.85	3.82	3.90		
7.19 2	8.13	7.08	5.90	4.89	4.30	3.89	3.68	3.43	3.25	3.11	2.91	2.91	3.05	3.33		- 15.0
6.44 2	7.07	6.13	4.97	3.98	3.43	3.11	2.89	2.71	2.60	2.48	2.43	2.54	2.74	2.96		
5.44 2	6.66	5.74	4.69	3.72	3.17	2.85	2.63	2.51	2.39	2.32	2.31	2.46	2.68	2.95		
3.97 2	6.64	5.79	4.68	3.79	3.28	2.97	2.79	2.63	2.57	2.52	2.53	2.67	2.95	3.25		
20.5 2.	7.70	6.78	5.64	4.62	4.03	3.71	3.49	3.37	3.32	3.34	3.51	3.95	4.59	5.23		- 12.5
15.5	9.64	8.54	7.09	5.86	5.15	4.77	4.52	4.40	4.39	4.50	4.86	5.64	6.74	7.83		
10.5	11.34	10.01	8.37	6.94	6.14	5.69	5.44	5.35	5.38	5.64	6.21	7.42	9.08	10.74		
5.5	12.53	11.11	9.28	7.72	6.87	6.40	6.20	6.14	6.30	6.75	7.69	9.61	12.22	14.76		_
cm]	12.85	11.37	9.59	7.96	7.08	6.64	6.41	6.39	6.68	7.17	8.19	10.37	13.19	16.04		^{m3} ^{m3} telparticle 0.01 –
esh [0.0	12.98	11.49	9.60	8.04	7.14	6.62	6.46	6.44	6.64	7.20	8.27	10.43	13.34	16.16		ensity [
, Z	12.80	11.44	9.57	7.92	7.07	6.63	6.35	6.38	6.59	7.07	8.16	10.34	13.21	16.06		ower de
-5.5	12.34	10.92	9.19	7.61	6.76	6.30	6.07	6.04	6.21	6.67	7.63	9.57	12.17	14.75		م - 7.5
10.5	11.16	9.85	8.24	6.80	6.00	5.55	5.30	5.19	5.21	5.39	5.91	6.98	8.45	9.90		
15.5	9.39	8.28	6.87	5.64	4.96	4.57	4.32	4.21	4.17	4.25	4.54	5.19	6.13	7.04		
20.5	7.43	6.50	5.38	4.39	3.82	3.48	3.27	3.11	3.04	3.04	3.16	3.48	3.97	4.46		
3.97	6.43	5.58	4.58	3.69	3.14	2.80	2.57	2.43	2.29	2.18	2.08	2.05	2.08	2.14		- 5.0
5.44 -2	6.63	5.76	4.67	3.70	3.14	2.78	2.54	2.37	2.22	2.08	1.96	1.91	1.89	1.91		
5.44 -2! -	7.65	6.67	5.50	4.51	3.90	3.52	3.27	3.02	2.78	2.52	2.36	2.20	2.11	2.13		
7.19 -2(9.67	8.74	7.58	6.69	6.00	5.50	5.06	4.69	4.29	3.88	3.49	3.13	2.85	2.73		
7.69 -2	11.26	10.58	9.73	8.80	8.09	7.44	6.83	6.29	5.83	5.19	4.65	4.00	3.52	3.20		- 2.5
-2	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		-

Figure 86. Power density distribution for alternate 1 design OFE region on day 2 (see Section 7.2.3).

7.69	8.53	7.91	7.08	6.31	5.75	5.44	5.15	4.90	4.63	4.43	4.25	4.17	4.29	4.47		
7.19 2	7.52	6.62	5.69	4.80	4.24	3.92	3.71	3.53	3.38	3.29	3.23	3.33	3.60	4.02		
6.44 2	6.72	5.92	4.91	4.00	3.47	3.16	2.96	2.82	2.75	2.72	2.77	3.02	3.44	3.91		
5.44 21	6.45	5.66	4.61	3.73	3.17	2.88	2.73	2.60	2.56	2.57	2.68	3.03	3.52	4.05		- 12
3.97 2 ¹	6.34	5.62	4.66	3.80	3.33	3.02	2.84	2.75	2.70	2.73	2.91	3.31	3.87	4.42		
20.5 23	7.28	6.48	5.46	4.56	4.00	3.68	3.50	3.40	3.37	3.45	3.68	4.23	4.92	5.65		
5.5	8.88	7.98	6.81	5.72	5.08	4.71	4.51	4.43	4.47	4.69	5.16	6.15	7.41	8.58		
-0.5 1	- 10.17	9.17	7.91	6.68	5.96	5.58	5.39	5.39	5.54	6.00	6.87	8.44	10.42	12.17		- 10
5.5	- 11.00	9.95	8.57	7.28	6.51	6.13	5.96	5.96	6.18	6.70	7.72	9.54	11.66	13.46		_
	- 11.29	10.26	8.83	7.47	6.72	6.33	6.14	6.17	6.39	6.92	7.91	9.85	11.99	13.79		kW ³ fuelparticle
o.0 .0	11.31	10.22	8.88	7.52	6.73	6.30	6.17	6.18	6.42	7.00	8.04	9.96	12.08	13.92		8 nsity [<u>-</u>
, -2.0 M	11.29	10.13	8.78	7.51	6.75	6.29	6.16	6.13	6.42	6.95	8.00	9.89	12.04	13.92		wer de
-5.5	- 10.96	9.91	8.54	7.26	6.50	6.10	5.91	5.92	6.15	6.69	7.71	9.56	11.66	13.47		Pc
10.5	10.09	9.09	7.80	6.61	5.91	5.53	5.32	5.31	5.49	5.95	6.83	8.45	10.47	12.29		
.5.5	8.74	7.86	6.70	5.62	4.97	4.61	4.37	4.29	4.33	4.52	4.92	5.79	6.89	7.95		- 6
20.5 -1	7.12	6.35	5.34	4.41	3.87	3.55	3.35	3.24	3.18	3.22	3.37	3.75	4.29	4.87		
.97 -2	6.39	5.60	4.59	3.73	3.22	2.93	2.74	2.61	2.55	2.57	2.68	2.96	3.37	3.87		
.44 -23	6.63	5.75	4.71	3.83	3.27	2.96	2.76	2.61	2.53	2.46	2.56	2.79	3.15	3.55		
.44 -25	7.42	6.66	5.59	4.68	4.08	3.74	3.49	3.26	3.10	2.96	2.87	2.95	3.15	3.40		- 4
.19 -26	8.93	8.33	7.47	6.74	6.04	5.67	5.25	4.93	4.58	4.25	4.05	3.76	3.74	3.74		
.69 -27	10.16	9.84	9.12	8.43	7.84	7.35	6.88	6.43	5.96	5.49	5.09	4.61	4.21	4.06		
-27	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853	I	

Figure 87. Power density distribution for alternate 1 design OFE region on day 15 (see Section 7.2.3).

69.7	8.34	7.86	7.11	6.49	6.09	5.83	5.72	5.47	5.40	5.32	5.36	5.57	6.04	6.59		
7.19 2	7.49	6.82	5.96	5.13	4.64	4.42	4.23	4.05	4.05	4.07	4.25	4.61	5.30	6.04		
6.44 2	6.79	6.14	5.19	4.29	3.79	3.50	3.31	3.23	3.23	3.36	3.63	4.23	5.06	5.95		- 10.5
5.44 2	6.44	5.71	4.80	3.95	3.45	3.15	3.01	2.94	3.01	3.16	3.56	4.30	5.29	6.28		
3.97 2	6.29	5.67	4.80	3.98	3.49	3.22	3.11	3.09	3.19	3.41	3.90	4.87	6.13	7.28		
20.5 2	6.98	6.31	5.46	4.63	4.13	3.88	3.74	3.78	3.93	4.27	4.96	6.25	7.85	9.29		- 0.0
15.5	8.14	7.43	6.52	5.60	5.03	4.74	4.61	4.64	4.85	5.30	6.15	7.63	9.37	10.88		- 9.0
10.5	8.96	8.20	7.25	6.28	5.69	5.36	5.22	5.25	5.50	6.01	6.93	8.48	10.10	11.36		
5.5	9.45	8.67	7.71	6.67	6.05	5.71	5.57	5.64	5.88	6.42	7.39	8.86	10.32	11.39		_
- 5.0	9.63	8.84	7.86	6.85	6.16	5.84	5.68	5.78	6.01	6.58	7.52	8.96	10.38	11.35		- 7.5 - 7.5 -
esh [9.61	8.86	7.89	6.84	6.18	5.85	5.73	5.80	6.05	6.57	7.53	9.00	10.34	11.36		ensity [-
- ^{-2.0}	9.60	8.85	7.83	6.82	6.19	5.81	5.69	5.73	6.01	6.55	7.50	9.00	10.40	11.39		ower de
-5.5	9.47	8.70	7.69	6.70	6.05	5.70	5.57	5.62	5.89	6.44	7.39	8.86	10.32	11.39		۵.
10.5	9.02	8.29	7.32	6.32	5.69	5.35	5.22	5.26	5.51	6.04	6.95	8.47	10.12	11.41		- 6.0
15.5 -	8.22	7.50	6.55	5.61	5.07	4.76	4.62	4.64	4.84	5.30	6.14	7.68	9.49	11.13		
20.5 -	7.11	6.36	5.52	4.68	4.16	3.90	3.79	3.78	3.94	4.27	4.97	6.29	7.96	9.52		
3.97 -	6.55	5.87	4.97	4.09	3.57	3.30	3.16	3.12	3.20	3.42	3.87	4.81	6.04	7.24		
5.44 -2	6.87	6.08	5.12	4.24	3.70	3.39	3.20	3.12	3.12	3.25	3.51	4.14	4.98	5.85		- 4.5
6.44 -2 '	7.71	7.01	6.07	5.20	4.67	4.31	4.07	3.90	3.86	3.83	3.95	4.34	4.88	5.51		
7.19 -2	9.10	8.53	7.87	7.15	6.74	6.37	6.09	5.81	5.62	5.53	5.48	5.57	5.88	6.15		
7.69 -2	10.02	9.68	9.23	8.70	8.26	8.08	7.73	7.43	7.20	6.96	6.83	6.72	6.72	6.73		- 3.0
-2	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		

Figure 88. Power density distribution for alternate 1 design OFE region on day 27 (see Section 7.2.3).

APPENDIX B-4. HEAT FLUX DISTRIBUTIONS FOR ALTERNATE 1 DESIGN

	27.94 -	293.2	292.1	292.2	294.3	305.5	312.9	311.0	305.8	293.8	289.9	282.9		- 350
	27.44 -	267.1	256.7	252.1	245.1	244.8	244.5	246.2	249.5	246.3	250.0	248.8		
	26.94 -	242.1	224.2	214.3	199.4	187.7	181.6	186.4	197.0	202.5	211.1	217.2		
	26.315 -	232.2	213.2	199.0	182.3	164.6	159.1	164.7	176.6	186.9	192.7	202.3		
	25.44 -	228.9	209.1	190.4	173.6	152.3	146.0	152.7	165.6	177.0	182.0	185.0		
	23.97 -	235.7	216.0	197.4	178.0	158.2	150.0	154.6	168.8	177.3	181.5	185.6		- 300
	20.5 -	278.1	255.8	234.0	211.8	189.0	179.8	186.8	200.9	208.9	213.1	215.9		
	15.5 -	324.6	300.1	277.9	255.4	231.8	223.5	234.0	251.1	259.7	265.7	270.0		
	10.5 -	334.0	316.5	298.7	280.3	262.5	258.0	273.2	293.9	303.2	308.9	314.0		
	5.5 -	351.1	332.6	315.1	299.0	282.5	281.0	296.6	319.3	332.2	339.5	345.0		
cm]	2.0 -	358.4	339.6	321.1	304.2	290.4	288.3	307.0	328.2	341.8	349.7	355.5		- 250 - /cm2]
esh [0.0 -	356.3	340.7	322.2	304.9	291.0	287.7	307.0	329.8	340.8	347.6	354.2		lux [W
Ĕ N	-2.0 -	357.4	338.0	320.0	304.5	290.2	286.6	305.6	326.1	337.9	344.5	352.0		Heat f
	-5.5 -	346.4	327.7	312.3	295.3	279.7	277.8	293.3	314.5	327.0	333.8	339.2		
	-10.5 -	326.9	308.5	291.1	273.0	256.0	252.2	264.9	283.4	293.5	298.9	304.3		- 200
	-15.5 -	290.2	271.2	254.7	237.4	219.3	213.3	223.2	238.3	246.5	251.7	256.0		
	-20.5 -	234.0	219.1	203.5	188.6	173.8	168.3	175.4	187.8	195.8	200.5	203.7		
	-23.97 -	196.0	183.0	170.7	156.5	143.3	138.4	145.1	157.6	166.8	171.7	175.8		
	-25.44 -	187.3	177.4	165.6	154.1	143.4	139.7	147.7	162.1	170.7	178.6	186.0		
	-26.315 -	203.8	195.8	187.7	182.2	175.8	176.9	185.6	196.1	204.7	209.6	213.5		- 150
	-26.94 -	169.5	155.4	143.1	135.9	130.5	126.7	131.7	139.7	145.8	151.9	156.0		
	-27.44 -	156.8	143.5	133.0	125.1	120.2	117.5	119.3	122.3	124.4	129.0	133.8		
	-27.94 -	163.6	150.8	140.4	128.7	118.6	113.8	113.1	115.1	118.2	123.2	130.3		
		7.124	7.493	7.82	8.254	9.014 R m	10.012 esh [11.011 cm]	11.753	12.119	12.326	12.547		

Figure 89. Heat flux distribution for alternate 1 design IFE region on day 0 (see Section 7.2.4).

	27.94 -	274.3	281.7	281.2	287.5	288.4	296.8	294.2	285.5	276.8	274.5	270.2		
	27.44 -	252.4	249.1	243.6	236.8	230.9	230.6	232.7	234.1	233.2	234.3	236.2		
	26.94 -	230.9	219.7	206.4	190.4	177.7	170.1	175.8	186.0	193.3	197.1	204.3		- 320
	26.315 -	221.5	210.0	189.2	173.9	157.4	148.4	154.3	167.5	178.2	182.9	190.4		
	25.44 -	219.1	203.4	184.1	163.6	144.3	135.4	141.8	157.0	165.8	172.3	177.6		
	23.97 -	228.8	210.2	190.8	169.8	148.2	139.3	144.6	158.2	166.4	170.9	176.5		
	20.5 -	265.3	246.0	225.9	203.6	178.8	167.5	173.7	187.8	196.1	200.8	204.8		- 280
	15.5 -	312.3	291.8	269.0	245.5	219.9	209.2	219.1	236.1	245.8	251.9	255.5		
	10.5 -	323.7	307.5	289.1	269.4	249.2	243.0	257.0	277.0	290.0	296.2	301.2		
	5.5 -	339.3	324.5	308.0	288.7	270.9	267.5	281.6	305.5	318.4	325.9	329.5		
cm]	2.0 -	347.6	332.3	317.0	297.8	279.4	275.5	291.3	315.2	329.8	336.7	341.3		- 240 [Zuj
esh [0.0 -	346.8	332.3	316.6	300.4	280.1	275.4	290.2	314.3	329.3	336.6	344.1		lux [W/
ŭ N	-2.0 -	343.1	329.5	313.8	296.1	276.7	272.1	289.9	314.8	327.8	334.8	340.8		Heat f
	-5.5 -	336.3	321.1	306.0	287.3	268.6	263.4	278.6	300.6	313.6	322.7	327.6		
	-10.5 -	319.7	303.1	285.9	265.6	245.8	239.1	252.5	273.2	284.3	291.5	296.9		- 200
	-15.5 -	283.5	267.1	249.2	230.6	211.6	204.2	212.6	228.9	240.2	245.7	249.6		
	-20.5 -	230.5	216.1	200.8	185.7	168.3	160.7	168.0	181.1	190.0	194.0	197.1		
	-23.97 -	193.9	182.3	167.8	154.5	138.8	132.2	140.6	153.2	160.4	168.5	171.1		
	-25.44 -	188.4	175.2	163.2	150.7	140.1	134.3	141.7	156.0	165.8	173.2	177.5		- 160
	-26.315 -	209.1	198.3	188.2	179.5	172.7	173.4	181.8	192.9	199.1	207.1	209.7		
	-26.94 -	172.0	158.3	148.6	137.8	129.9	127.4	131.3	138.8	143.0	149.6	158.4		
	-27.44 -	157.7	144.8	136.7	128.6	121.4	118.3	119.1	121.9	124.8	127.7	133.1		
	-27.94 -	164.9	151.3	140.6	131.7	120.0	113.4	112.2	114.6	119.8	123.1	125.8		- 120
		7.124	7.493	7.82	8.254	9.014 R m	10.012 esh [11.011 cm]	11.753	12.119	12.326	12.547		-

Figure 90. Heat flux distribution for alternate 1 design IFE region on day 1 (see Section 7.2.4).

	27.94 -	225.7	238.3	253.7	266.9	273.9	280.6	279.0	269.9	260.5	248.6	241.1		
	27.44 -	215.8	222.4	227.1	230.8	227.9	225.2	227.5	226.1	224.2	220.8	216.2		
	26.94 -	205.5	206.8	202.4	197.2	184.2	173.6	178.5	184.8	190.0	193.5	193.2		- 280
	26.315 -	199.3	198.1	191.9	183.1	164.4	153.2	157.0	167.6	175.2	179.3	182.8		
	25.44 -	195.7	190.4	183.8	171.6	150.1	139.4	143.3	156.8	164.2	168.3	171.1		
	23.97 -	200.6	199.1	190.9	176.8	155.2	142.6	146.6	158.3	163.9	167.0	169.0		
	20.5 -	226.9	226.6	220.8	207.4	184.2	169.0	172.7	185.4	190.6	193.9	195.1		
	15.5 -	254.6	259.5	258.1	246.1	224.9	209.4	214.1	227.4	234.0	235.5	235.5		- 240
	10.5 -	262.4	269.7	271.6	264.6	250.1	239.2	248.9	263.8	270.2	270.8	270.4		
	5.5 -	272.5	282.0	285.6	281.1	267.7	258.7	269.8	285.8	290.9	292.3	290.4		
cm]	2.0 -	278.9	286.1	290.7	288.5	275.1	264.8	276.8	294.2	298.9	299.4	296.1		cm2]
ssh [0.0 -	277.5	288.9	293.9	288.8	276.1	265.5	277.1	294.6	300.8	301.4	299.2		lux [W/
Ĕ	-2.0 -	275.3	285.8	291.1	288.4	273.5	265.9	278.7	293.2	300.5	300.8	299.3		Heat f
	-5.5 -	273.5	281.5	286.3	281.3	267.9	259.3	268.5	285.2	291.6	291.3	291.0		
	-10.5 -	261.7	268.6	272.0	265.4	248.4	238.2	247.8	263.1	269.3	269.8	268.4		
	-15.5 -	242.8	245.8	244.4	235.2	216.7	205.0	213.1	226.0	231.1	233.6	233.1		
	-20.5 -	208.2	208.3	204.8	194.3	176.4	165.2	171.9	183.5	189.4	191.2	191.8		
	-23.97 -	182.4	180.4	174.9	164.8	148.1	139.8	144.9	158.0	164.9	168.6	171.4		- 160
	-25.44 -	180.0	176.2	174.2	165.8	153.3	145.4	151.0	165.0	171.1	175.5	178.9		
	-26.315 -	194.0	199.7	199.6	197.2	191.3	189.2	196.2	205.5	209.6	208.4	209.0		
	-26.94 -	160.1	157.3	155.2	148.6	143.5	140.9	143.4	148.9	151.5	153.5	154.8		
	-27.44 -	141.8	136.6	133.5	128.3	124.5	122.5	123.5	124.6	124.9	125.8	126.9		100
	-27.94 -	142.5	137.9	131.4	125.8	117.8	112.3	112.3	113.3	115.4	116.3	119.0		- 120
		7.124	7.493	7.82	8.254	9.014 R m	10.012 esh [11.011 cm]	11.753	12.119	12.326	12.547	_	

Figure 91. Heat flux distribution for alternate 1 design IFE region on day 15 (see Section 7.2.4).

								_						
	27.94 -	180.4	197.1	216.1	233.8	253.8	266.9	268.9	261.8	243.6	231.8	222.0		
	27.44 -	176.7	190.1	203.5	212.8	220.8	225.0	227.1	226.8	220.7	213.2	208.1		
	26.94 -	173.3	183.2	191.0	191.9	187.5	182.7	185.0	191.3	196.0	192.7	190.4		
	26.315 -	171.2	179.3	183.6	180.6	169.2	159.9	162.5	172.0	178.0	177.3	175.5		
	25.44 -	168.5	176.1	176.4	172.1	157.4	145.8	149.0	160.4	163.7	165.5	170.2		- 240
	23.97 -	172.2	178.2	180.9	174.8	158.3	145.0	150.2	160.6	166.5	168.2	167.9		
	20.5 -	186.9	197.2	203.8	200.4	184.0	170.7	174.2	184.2	186.5	186.4	186.1		
	15.5 -	197.3	213.7	225.8	228.6	216.6	204.5	208.5	219.1	220.7	217.5	215.4		
	10.5 -	201.1	217.3	231.8	239.8	234.8	226.2	233.1	243.1	244.3	241.2	236.7		- 210
	5.5 -	202.5	220.6	237.5	247.1	246.0	240.6	248.7	259.2	258.2	253.7	249.1		
cm]	2.0 -	204.2	221.5	239.5	250.7	251.0	245.8	255.4	266.4	265.0	258.2	252.5		cm2]
sh [0.0 -	204.4	221.0	238.5	250.2	250.6	247.2	256.7	266.4	264.7	260.1	253.7		/M] xu
Z	-2.0 -	203.2	221.9	240.2	251.3	250.5	246.4	253.9	263.6	262.3	255.9	251.4		Heat fl Heat fl
	-5.5 -	203.6	222.4	238.5	249.0	247.4	241.0	248.8	258.3	256.8	252.9	249.3		
	-10.5 -	202.2	218.7	234.0	242.0	236.4	229.1	235.7	245.6	245.1	242.0	237.9		
	-15.5 -	196.1	209.0	220.3	223.0	214.1	204.7	209.9	220.0	221.9	220.5	217.9		
	-20.5 -	179.6	188.8	193.2	191.5	179.1	169.9	175.3	186.1	189.9	189.7	188.4		
	-23.97 -	166.1	170.9	173.0	168.7	155.2	148.7	153.9	166.5	172.3	173.2	174.4		- 150
	-25.44 -	163.0	170.2	172.5	170.2	161.4	155.5	162.1	174.5	180.4	182.7	182.5		
	-26.315 -	178.5	190.3	197.6	199.8	201.9	205.1	211.2	219.3	218.3	215.6	213.8		
	-26.94 -	143.3	146.8	149.6	150.1	148.3	149.6	153.7	155.7	156.1	156.8	154.4		
	-27.44 -	122.9	120.8	122.2	122.0	121.3	121.6	123.1	122.8	122.9	121.5	119.8		- 120
	-27.94 -	122.5	117.6	117.5	114.3	111.8	108.4	107.3	108.9	110.6	108.4	109.7		
		7.124	7.493	7.82	8.254	9.014 R m	10.012 esh [11.011 cm]	11.753	12.119	12.326	12.547		I

Figure 92. Heat flux distribution for alternate 1 design IFE region on day 27 (see Section 7.2.4).

	27.94 -	280.6	271.4	269.8	264.6	238.9	210.0	183.5	162.6	141.4	124.2	115.2			- 360
	27.44 -	247.5	232.3	223.2	211.2	187.9	163.8	143.7	129.4	116.7	104.9	101.0			500
	26.94 -	215.4	195.4	180.7	163.4	141.7	121.4	107.9	100.4	94.3	87.8	87.4			
	26.315 -	199.6	179.3	165.9	148.0	126.1	106.4	96.2	92.1	87.2	82.8	81.2			
	25.44 -	187.3	167.0	155.6	138.2	116.4	98.8	88.9	85.6	83.3	79.7	78.0			200
	23.97 -	187.7	171.0	157.3	142.2	120.0	103.0	93.4	90.9	87.5	83.7	82.0			- 300
	20.5 -	218.3	201.3	188.1	172.0	147.9	127.1	116.2	112.7	108.9	103.8	100.7			
	15.5 -	275.7	254.4	236.8	218.2	189.2	165.9	157.2	159.8	162.8	163.5	163.5			
	10.5 -	322.2	298.6	280.4	259.4	226.8	203.9	202.6	221.0	243.0	261.6	272.5			246
esh [cm]	5.5 -	353.3	327.5	308.4	285.5	250.6	227.8	231.7	257.0	288.7	317.3	331.9			- 240
	2.0 -	365.8	337.2	317.0	293.8	259.3	237.2	242.0	273.1	311.4	345.8	365.7			(cm2]
	0.0 -	363.2	335.7	319.3	295.9	260.0	237.0	243.0	275.2	316.7	353.9	374.2			lux [W/
Ĕ N	-2.0 -	361.1	336.5	314.2	293.3	258.1	234.2	238.8	267.7	302.3	333.9	349.2			Heat
	-5.5 -	346.6	321.2	301.9	279.6	245.4	222.2	222.9	245.9	274.5	297.5	308.8		- 180	- 180
	-10.5 -	311.3	287.8	269.5	249.4	216.7	193.5	191.7	207.9	228.4	245.2	253.5			
	-15.5 -	258.5	238.4	222.3	204.7	176.0	151.5	139.2	135.8	131.2	125.6	121.4			
	-20.5 -	204.3	187.6	173.6	158.2	134.3	112.2	98.1	90.2	80.3	69.5	63.2			
	-23.97 -	178.3	160.2	147.3	131.4	109.9	90.5	78.5	71.1	62.9	54.7	49.3			- 120
	-25.44 -	183.7	165.5	149.8	134.8	111.9	92.0	79.2	70.1	62.7	54.7	48.8			
	-26.315 -	224.4	202.7	189.8	172.8	147.9	122.3	103.3	90.5	77.1	65.1	57.3			
	-26.94 -	159.0	145.6	136.7	124.8	108.9	90.3	75.1	65.5	55.1	47.4	42.8			
	-27.44 -	129.1	122.6	116.4	109.7	97.2	81.6	67.5	56.4	47.8	39.9	35.9			- 60
	-27.94 -	121.1	113.6	106.0	99.7	87.2	73.8	61.1	49.9	43.2	36.2	32.9			
15.139 15.521 15.837 16.252 17.007 18.007 19.006 19.752 20.279 20.67 20.955 R mesh [cm]												20.955			-

Figure 93. Heat flux distribution for alternate 1 design OFE region on day 0 (see Section 7.2.4).

	27.94 -	266.1	257.4	252.5	249.0	229.6	200.8	174.4	158.5	139.2	121.0	110.6		
		220.0	220.2	2105	1007	170.0	155.0	1001	105.1	1140	102.0	00.4		
	27.44 -	238.0	220.2	210.5	199.7	178.0	155.2	136.1	125.1	114.6	103.6	98.4		
	26.94 -	208.5	184.1	171.4	155.1	131.7	114.0	101.6	95.6	92.3	87.9	86.5		- 400
	26.315 -	190.2	168.1	155.8	139.8	117.4	100.5	90.9	87.5	85.5	83.1	81.3		
	25.44 -	178.0	159.6	145.1	130.1	109.7	93.0	85.6	83.5	82.7	80.2	79.8		
	23.97 -	178.8	160.7	149.0	133.9	113.7	98.1	90.0	89.6	88.4	86.5	85.4		- 320
	20.5 -	208.3	190.6	178.3	163.3	141.6	124.9	119.0	123.1	128.8	133.0	135.3		
	15.5 -	261.5	241.6	226.3	208.3	181.9	163.8	163.1	177.9	195.8	212.2	220.8		
	10.5 -	307.4	284.3	266.8	246.6	216.7	197.0	200.7	223.9	252.5	278.7	293.4		
sh [cm]	5.5 -	338.2	313.2	295.7	273.6	242.5	224.2	235.7	275.9	326.3	374.2	401.6		
	2.0 -	351.3	324.4	304.0	282.9	251.9	235.8	250.5	297.0	357.2	415.5	447.3		cm2]
	0.0 -	352.5	324.9	308.0	284.7	253.4	236.6	252.3	300.1	362.1	420.4	452.5		<u>آم</u> - 240 ۲
Z	-2.0 -	349.4	323.2	304.4	282.4	252.2	235.5	250.2	296.2	356.3	415.8	449.0		Heat fl
	-5.5 -	335.3	309.8	292.3	271.4	239.9	221.5	233.3	272.7	323.2	371.1	397.8		
	-10.5 -	301.6	277.6	260.0	240.5	210.7	190.5	191.6	211.6	236.6	257.2	266.5		
	-15.5 -	252.8	232.5	217.4	200.7	174.2	155.8	153.8	166.2	181.1	194.7	201.6		
	-20.5 -	199.3	182.9	169.2	154.7	132.2	115.0	107.9	107.9	108.9	108.6	108.2		- 160
	-23.97 -	172.7	156.1	142.4	127.5	106.2	89.2	78.8	72.5	65.8	58.5	54.6		
	-25.44 -	178.8	160.1	145.0	129.0	107.6	89.6	77.2	70.4	63.2	56.3	51.8		
	-26.315 -	218.5	197.4	182.5	167.3	142.9	118.4	100.7	89.4	77.4	66.9	61.0		
	-26.94 -	156.2	143.6	132.4	120.7	104.7	87.7	73.3	64.3	55.2	47.2	43.4		- 80
	-27.44 -	126.9	120.4	113.2	105.8	94.3	79.7	65.6	55.4	47.0	39.3	35.4		
	-27.94 -	118.4	110.4	102.8	96.0	85.2	72.2	59.3	49.1	42.1	36.1	32.8		
		15.139	15.521	15.837	16.252	17.007 B m	18.007	19.006	19.752	20.279	20.67	20.955		-
						17.11	icon [CIII						

Figure 94. Heat flux distribution for alternate 1 design OFE region on day 1 (see Section 7.2.4).

	27.94 -	263.2	257.0	256.5	246.8	225.1	200.5	171.9	155.8	140.0	122.2	111.8		
	27.44 -	234.1	219.0	211.4	199.0	176.2	154.6	135.9	123.3	113.6	103.7	99.5		
	26.94 -	203.4	182.6	168.8	154.1	131.6	113.1	102.5	94.7	90.8	87.4	86.9		400
	26.315 -	185.3	167.0	152.7	137.3	116.6	99.9	90.6	87.1	86.1	83.5	81.1		- 400
	25.44 -	177.1	158.9	146.6	130.8	109.4	93.4	85.6	83.9	84.1	82.4	81.8		
	23.97 -	177.1	160.2	146.2	133.0	113.8	98.4	92.5	91.9	91.3	90.8	90.1		
	20.5 -	205.8	189.3	177.1	162.5	140.7	124.9	121.3	127.7	135.7	142.4	145.5		
	15.5 -	258.2	238.8	222.9	206.3	180.6	162.6	162.0	176.9	194.6	210.3	218.4		- 320
	10.5 -	303.6	280.6	263.6	244.6	215.4	196.8	201.1	226.3	256.8	284.7	300.5		
	5.5 -	335.8	311.4	292.2	271.8	241.8	225.0	238.2	280.2	333.6	384.8	413.1		
sh [cm]	2.0 -	344.2	319.4	302.5	280.6	250.1	233.5	252.7	298.4	360.2	416.1	449.7		cm2]
	0.0 -	347.8	321.8	302.5	283.1	250.8	235.4	252.6	301.4	362.4	420.5	452.8		<u>آ (</u> ۲ 240 -
ш Д	-2.0 -	343.7	321.4	301.2	278.9	249.6	232.4	249.3	297.5	359.2	416.9	450.3		Heat fl
	-5.5 -	330.5	306.6	289.7	268.0	237.9	220.8	235.0	277.7	332.0	383.2	412.9		
	-10.5 -	298.9	276.1	259.5	239.5	210.6	191.3	193.5	215.3	241.6	264.7	277.0		
	-15.5 -	251.0	231.1	215.4	198.1	173.3	155.0	153.1	165.1	178.8	190.8	195.9		
	-20.5 -	199.0	181.6	169.5	155.0	133.4	116.6	111.0	115.1	119.7	123.1	124.1		- 160
	-23.97 -	171.0	154.5	143.2	129.3	107.6	90.6	81.0	75.3	69.5	63.0	58.8		
	-25.44 -	177.2	159.7	146.1	130.3	107.9	89.6	78.2	71.3	65.0	57.0	52.4		
	-26.315 -	216.4	196.5	183.1	167.2	141.4	119.8	101.2	89.9	78.2	66.6	61.1		
	-26.94 -	156.5	140.5	130.1	121.3	104.4	88.7	74.1	64.3	55.7	47.7	44.3		- 80
	-27.44 -	127.0	118.2	112.3	106.5	94.6	79.8	66.9	56.5	47.6	40.1	36.1		
	-27.94 -	117.5	109.8	103.9	96.4	85.4	72.0	60.4	50.8	42.7	36.5	32.9		
		15.139	15.521	15.837	16.252	17.007 R m	18.007 esh [19.006 cm]	19.752	20.279	20.67	20.955		

Figure 95. Heat flux distribution for alternate 1 design OFE region on day 2 (see Section 7.2.4).

	27.94 -	240.2	240.6	240.5	238.8	221.0	198.9	178.6	166.2	151.7	137.7	127.7		
	27.44 -	216.3	206.8	202.9	194.8	175.0	156.3	142.3	135.3	127.7	120.6	117.7		
	26.94 -	191.8	175.7	167.3	154.1	133.3	117.3	109.3	107.8	107.3	107.3	109.4		- 360
	26.315 -	178.8	164.8	152.7	139.4	119.2	103.7	98.6	100.2	104.0	107.7	109.5		
	25.44 -	173.6	158.1	144.9	131.9	110.9	97.5	94.0	98.1	104.9	110.0	113.5		- 300
	23.97 -	170.9	158.1	146.8	134.5	116.2	102.3	99.4	106.3	114.6	120.9	123.9		
	20.5 -	196.4	183.3	173.5	161.6	140.8	126.5	125.0	134.9	146.5	154.2	158.4		
	15.5 -	240.2	227.1	216.5	202.8	179.6	164.1	168.2	189.3	214.1	233.0	241.3		
	10.5 -	275.4	261.9	252.3	236.9	211.7	198.0	212.0	252.1	294.7	328.4	342.4		
	5.5 -	298.1	284.5	273.4	258.2	232.0	219.0	236.8	283.3	332.9	366.9	378.8		
Ē	2.0 -	306.3	293.5	281.6	265.2	239.7	226.3	244.7	290.3	343.7	377.0	387.7		- 240 נק
Z mesh [c	0.0 -	306.3	293.0	283.8	266.9	239.2	226.9	246.8	295.3	347.4	379.8	391.4		- 180
	-2.0 -	305.4	289.6	281.2	266.3	239.3	225.8	245.7	293.7	345.2	378.8	391.4		
	-5.5 -	296.8	283.0	272.6	257.6	231.3	217.2	236.1	283.0	333.5	367.1	379.1		
	-10.5 -	273.3	259.6	249.0	234.6	210.0	195.2	210.4	250.5	295.1	330.2	345.9		
	-15.5 -	236.0	223.3	212.7	198.8	175.4	158.6	162.3	180.4	201.2	216.4	223.6		
	-20.5 -	192.8	180.3	170.0	156.7	136.5	121.2	117.7	123.7	130.1	134.2	136.5		
	-23.97 -	171.5	156.5	144.5	131.7	112.2	97.6	93.5	98.0	102.0	105.2	108.2		
	-25.44 -	178.4	160.7	148.9	135.8	114.4	98.5	91.6	93.7	96.5	98.2	99.5		- 120
	-26.315 -	213.7	200.2	187.4	174.4	150.5	129.8	116.7	110.7	107.6	102.7	100.6		
	-26.94 -	149.7	140.5	132.9	125.9	109.6	94.8	83.2	77.3	71.6	68.0	65.5		
	-27.44 -	116.9	112.8	108.4	104.9	94.5	82.4	71.0	63.9	56.2	50.6	47.6		60
	-27.94 -	107.1	103.0	97.0	92.2	83.6	73.3	62.9	55.6	49.3	43.8	42.1		- 00
		15.139	15.521	15.837	16.252	17.007	18.007	19.006	19.752	20.279	20.67	20.955		I
						Кm	esh [cm]						

Figure 96. Heat flux distribution for alternate 1 design OFE region on day 15 (see Section 7.2.4).

	27.94 -	235.6	239.6	241.2	244.9	234.7	221.5	211.5	209.2	202.7	194.6	189.6		
	27.44 -	215.9	212.4	209.8	205.4	191.6	177.7	172.2	175.5	175.5	176.5	177.0		
	26.94 -	195.3	186.2	178.6	167.3	150.1	135.8	134.6	143.6	151.8	161.2	167.1		- 300
	26.315 -	182.9	173.4	162.7	150.1	131.4	117.7	119.1	132.0	147.4	160.3	169.0		
	25.44 -	174.5	162.3	152.9	140.6	121.6	109.6	113.9	130.9	150.7	167.9	177.9		
	23.97 -	171.1	162.0	153.2	141.8	123.7	114.2	121.9	143.7	171.0	195.0	206.1		
	20.5 -	190.1	181.4	175.1	164.9	147.6	138.8	151.5	182.9	219.5	249.4	263.3		- 250
	15.5 -	222.1	215.1	209.8	199.8	180.3	170.9	187.5	226.9	267.9	296.8	308.0		
	10.5 -	244.7	237.9	233.9	224.1	203.9	193.5	212.9	255.7	297.2	318.0	320.6		
	5.5 -	258.2	252.3	249.2	238.1	217.1	207.1	227.6	272.7	310.1	323.8	321.2		
cm]	2.0 -	263.2	257.2	254.3	244.5	221.6	211.9	232.9	277.8	313.6	325.2	319.7		/cm2]
esh [0.0 -	262.7	258.1	255.1	244.1	222.3	213.2	233.3	278.0	314.6	324.1	320.0		- 200 ^N] <u>×n</u> l
Ĕ N	-2.0 -	262.6	257.4	252.8	243.3	221.6	211.2	232.4	276.8	315.0	326.0	321.0		Heat f
	-5.5 -	258.7	252.6	248.3	238.9	216.9	206.8	228.0	272.6	310.0	323.9	321.1		
	-10.5 -	246.7	240.9	236.4	225.7	204.0	193.7	213.8	256.5	297.0	318.9	322.4		
	-15.5 -	223.9	216.3	210.3	199.8	181.1	170.8	187.2	226.3	269.6	300.9	315.1		- 150
	-20.5 -	193.8	183.5	178.1	167.6	149.3	140.3	152.1	183.7	221.7	253.8	270.4		
	-23.97 -	177.7	167.2	158.3	145.4	126.5	115.5	122.0	142.6	168.8	192.1	205.0		
	-25.44 -	186.7	173.1	164.0	151.6	131.1	117.0	117.9	129.6	145.1	158.1	165.8		
	-26.315 -	223.9	214.5	206.8	195.7	173.7	154.2	149.2	153.8	159.8	161.8	164.5		
	-26.94 -	155.9	149.1	145.0	138.0	126.0	112.9	106.8	106.7	107.4	108.1	108.5		- 100
	-27.44 -	117.7	114.6	113.2	109.9	104.1	95.7	89.4	86.7	84.0	82.0	80.0		
	-27.94 -	105.6	102.1	99.1	95.5	90.1	83.8	78.3	75.2	73.2	71.8	70.9		
		15.139	15.521	15.837	16.252	17.007 R m	18.007 esh [19.006 cm]	19.752	20.279	20.67	20.955		

Figure 97. Heat flux distribution for alternate 1 design OFE region on day 27 (see Section 7.2.4).

APPENDIX C. DISTRIBUTIONS FOR ALTERNATE 2 DESIGN

APPENDIX C-1. FISSION RATE DENSITY DISTRIBUTIONS FOR ALTERNATE 2 DESIGN



Figure 98. Fission rate density distribution for alternate 2 design IFE region on day 0 (see Section 7.3.2).



Figure 99. Fission rate density distribution for alternate 2 design IFE region on day 1 (see Section 7.3.2).



Figure 100. Fission rate density distribution for alternate 2 design IFE region on day 15 (see Section 7.3.2).



Figure 101. Fission rate density distribution for alternate 2 design IFE region on day 27 (see Section 7.3.2).


Figure 102. Fission rate density distribution for alternate 2 design OFE region on day 0 (see Section 7.3.2).



Figure 103. Fission rate density distribution for alternate 2 design OFE region on day 1 (see Section 7.3.2).



Figure 104. Fission rate density distribution for alternate 2 design OFE region on day 15 (see Section 7.3.2).



Figure 105. Fission rate density distribution for alternate 2 design OFE region on day 27 (see Section 7.3.2).

APPENDIX C-2. CUMULATIVE FISSION DENSITY DISTRIBUTIONS FOR ALTERNATE 2 DESIGN



Figure 106. Cumulative fission density distribution for alternate 2 design IFE region on day 1 (see Section 7.3.5).



Figure 107. Cumulative fission density distribution for alternate 2 design IFE region on day 15 (see Section 7.3.5).



Figure 108. Cumulative fission density distribution for alternate 2 design IFE region on day 27 (see Section 7.3.5).

69.7	0.61	0.55	0.48	0.42	0.38	0.36	0.34	0.32	0.29	0.28	0.26	0.24	0.24	0.25		
.19 27	0.53	0.46	0.38	0.31	0.28	0.25	0.24	0.22	0.21	0.20	0.19	0.19	0.20	0.21		- 0.90
.44 27	0.47	0.40	0.32	0.26	0.23	0.20	0.19	0.18	0.17	0.16	0.16	0.16	0.17	0.19		
.44 26	0.43	0.37	0.30	0.24	0.20	0.18	0.17	0.16	0.15	0.15	0.15	0.15	0.17	0.18		
.97 25	0.43	0.38	0.31	0.25	0.21	0.19	0.18	0.17	0.16	0.16	0.16	0.16	0.18	0.19		
20.5 23	0.50	0.44	0.37	0.30	0.26	0.24	0.22	0.21	0.21	0.20	0.21	0.22	0.25	0.28		- 0.75
-5.5	0.63	0.56	0.46	0.38	0.33	0.31	0.29	0.28	0.28	0.28	0.30	0.34	0.39	0.45		
10.5	0.74	0.66	0.55	0.45	0.40	0.37	0.35	0.34	0.34	0.36	0.39	0.46	0.56	0.66		Ξ.
5.5 1	0.82	0.73	0.61	0.50	0.44	0.41	0.40	0.39	0.40	0.42	0.47	0.57	0.71	0.85		fissions cm ³ _{tuelpartich}
cm]	0.85	0.75	0.63	0.52	0.46	0.43	0.41	0.41	0.42	0.44	0.50	0.62	0.79	0.95		- 0.60 ⁻ .7 [10 ²⁰
esh [o 0.0	0.85	0.75	0.63	0.52	0.46	0.43	0.41	0.41	0.42	0.45	0.51	0.63	0.80	0.97		n densit
, 2 - ^{2.0}	0.85	0.74	0.62	0.52	0.46	0.43	0.41	0.41	0.42	0.44	0.50	0.62	0.78	0.94		e fissio
-5.5	0.81	0.72	0.60	0.50	0.44	0.41	0.39	0.38	0.39	0.41	0.46	0.56	0.70	0.83		mulativ Mulativ
-0.5	0.73	0.65	0.54	0.44	0.39	0.36	0.34	0.33	0.33	0.35	0.37	0.44	0.53	0.61		Cu
15.5 -1 -	0.62	0.54	0.45	0.37	0.32	0.30	0.28	0.27	0.26	0.26	0.27	0.30	0.35	0.40		
20.5 -1	0.49	0.43	0.35	0.29	0.25	0.22	0.21	0.20	0.19	0.18	0.18	0.19	0.20	0.21		
.97 -2	0.42	0.36	0.30	0.24	0.20	0.18	0.16	0.15	0.14	0.14	0.13	0.12	0.12	0.12		- 0.30
.44 -23	0.43	0.37	0.29	0.23	0.20	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.12		
5.44 -25 -	0.46	0.40	0.32	0.25	0.21	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.12		
'.19 -26 '	0.52	0.46	0.37	0.31	0.27	0.24	0.22	0.20	0.18	0.17	0.15	0.14	0.14	0.13		
.69 -27	0.61	0.55	0.49	0.42	0.37	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.17	0.16		- 0.15
-27	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		•

Figure 109. Cumulative fission density distribution for alternate 2 design OFE region on day 1 (see Section 7.3.5).

7.69	8.52	7.78	6.87	6.05	5.52	5.15	4.85	4.59	4.32	4.07	3.85	3.71	3.72	3.84		
7.19 2	7.39	6.52	5.46	4.55	4.03	3.71	3.46	3.27	3.10	2.97	2.88	2.91	3.09	3.34		
6.44 2	6.62	5.74	4.66	3.76	3.26	2.95	2.75	2.60	2.49	2.43	2.42	2.56	2.82	3.13		
5.44 2	6.17	5.37	4.35	3.48	2.99	2.70	2.52	2.39	2.32	2.29	2.34	2.54	2.86	3.21		- 12.5
3.97 2	6.18	5.41	4.44	3.58	3.11	2.82	2.64	2.53	2.48	2.48	2.57	2.84	3.25	3.67		
20.5 2.	7.14	6.31	5.25	4.32	3.79	3.48	3.29	3.18	3.15	3.20	3.39	3.84	4.48	5.13		
15.5	8.86	7.86	6.60	5.47	4.83	4.46	4.26	4.16	4.17	4.30	4.66	5.42	6.46	7.48		
10.5	10.32	9.19	7.75	6.46	5.74	5.34	5.14	5.09	5.20	5.52	6.20	7.57	9.34	11.02		- 10.0
5.5	11.31	10.09	8.53	7.14	6.36	5.95	5.76	5.75	5.94	6.40	7.34	9.15	11.46	13.59		fissions cm ³ _{tielpartici}
cm]	11.67	10.42	8.82	7.39	6.59	6.17	5.97	5.98	6.19	6.69	7.71	9.64	12.09	14.33		ty [10 ²⁰
esh [. 	11.71	10.45	8.86	7.42	6.62	6.20	6.01	6.01	6.22	6.73	7.76	9.72	12.18	14.45		n densi
- ^{2.0}	11.66	10.40	8.80	7.38	6.58	6.16	5.97	5.97	6.18	6.69	7.71	9.65	12.09	14.38		e fissio - 7.5 -
-5.5	11.28	10.06	8.50	7.11	6.34	5.93	5.74	5.73	5.91	6.38	7.34	9.17	11.48	13.64		mulativ
10.5	10.27	9.15	7.70	6.41	5.68	5.29	5.08	5.03	5.13	5.44	6.11	7.44	9.17	10.81		Cu
L5.5 -:	8.76	7.78	6.52	5.39	4.75	4.37	4.16	4.04	4.02	4.11	4.40	5.02	5.88	6.71		
20.5	7.05	6.22	5.17	4.23	3.70	3.38	3.18	3.05	3.00	3.01	3.14	3.49	4.00	4.50		5.0
3.97	6.13	5.34	4.37	3.51	3.03	2.73	2.54	2.40	2.31	2.27	2.30	2.45	2.70	2.98		- 5.0
5.44 -23	6.19	5.36	4.32	3.42	2.91	2.60	2.39	2.25	2.14	2.06	2.03	2.08	2.21	2.38		
5.44 -25	6.68	5.79	4.68	3.72	3.18	2.84	2.61	2.43	2.27	2.15	2.05	2.03	2.08	2.18		
7.19 -26	7.53	6.62	5.49	4.50	3.94	3.56	3.28	3.04	2.82	2.61	2.41	2.27	2.23	2.27		
7.69 -27	8.78	7.94	6.96	6.04	5.43	4.99	4.60	4.25	3.91	3.56	3.22	2.90	2.70	2.63		- 2.5
-27	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		-

Figure 110. Cumulative fission density distribution for alternate 2 design OFE region on day 15 (see Section 7.3.5).

													7.60			- 24
27.69	- 14.89	13.69	12.22	10.87	10.00	9.39	8.90	8.49	8.08	1.13	7.45	7.41	7.62	8.01		
7.19	13.06	11.62	9.84	8.29	7.38	6.85	6.43	6.12	5.88	5.71	5.66	5.90	6.43	7.10		
6.44 2	11.75	10.29	8.45	6.87	5.98	5.45	5.11	4.87	4.73	4.68	4.79	5.23	5.93	6.73		
5.44 2	10.98	9.62	7.88	6.35	5.48	4.96	4.65	4.46	4.37	4.40	4.60	5.16	5.98	6.84		
97 25	10.97	9.66	8.00	6.51	5.66	5.17	4.86	4.69	4.65	4.72	5.01	5.70	6.67	7.65		- 20
0.5 23	12.57	11.17	9.39	7.78	6.86	6.32	6.01	5.87	5.87	6.06	6.56	7.65	9.09	10.51		
5.5	15.36	13.74	11.65	9.75	8.65	8.05	7.72	7.62	7.73	8.14	9.04	10.82	13.10	15.24		
.5	17.62	15.83	13.50	11.37	10.15	9.48	9.17	9.14	9.40	10.10	11.47	14.05	17.21	20.07		
.5 10	- 19.12	17.19	14.72	12.44	11.14	10.44	10.13	10.15	10.52	11.40	13.09	16.16	19.84	23.05		- 19 - 1 <u>3 issions</u>
ء 10	- 19.66	17.69	15.17	12.84	11.50	10.79	10.47	10.50	10.90	11.83	13.61	16.82	20.62	23.92		[10 ^{20 _ f}
י כר י ה [כר	- 19 71	17 75	15 23	12.88	11 54	10.83	10 52	10 56	10.95	11 89	13.69	16.93	20.75	24.08		ensity
nes 		11.15	13.23	12.00	11.51		10.52	10.50	10.55			10.00	20.75	21.00		ion d
-2.0 -2.0	- 19.64	17.68	15.16	12.83	11.49	10.77	10.47	10.50	10.91	11.83	13.62	16.84	20.63	23.98		/e fiss
-5.5	- 19.11	17.18	14.71	12.43	11.13	10.44	10.13	10.14	10.51	11.40	13.10	16.20	19.88	23.13		mulati [,] 12 -
10.5	17.62	15.82	13.50	11.35	10.12	9.45	9.13	9.09	9.36	10.04	11.41	13.98	17.13	19.95		Cn
5.5	15.32	13.70	11.60	9.69	8.59	7.97	7.63	7.50	7.58	7.95	8.79	10.44	12.56	14.56		
0.5 -1	12.53	11.12	9.33	7.71	6.77	6.22	5.89	5.71	5.68	5.82	6.23	7.14	8.39	9.60		
.97 -2	11.03	9.68	7.98	6.47	5.59	5.06	4.74	4.53	4.42	4.43	4.60	5.08	5.80	6.53		
44 -23	11.13	9.71	7.93	6.33	5.41	4.86	4.51	4.28	4.13	4.07	4.14	4.46	4.97	5.53		- 8
44 -25	12.01	10.49	8.59	6.89	5.93	5.34	4.94	4.65	4.43	4.28	4.24	4.43	4.81	5.26		
19 -26.	13.47	11.93	10.04	8.33	7.35	6.70	6.22	5.82	5.49	5.19	4.97	4.95	5.15	5.47		
9 -27.	15.47	14_12_	12.52	11.00	9.99	9.25_	8.63_	8.06_	7.52	7.01	6.55	6.21_	6.09_	6.20_		
-27.6	15.00	15 4	15 75	16.05	16,75	17.05	17'75	10,25	10 75	10.25	10 75	20/25		20.052		
•	15.22	15.4	15./5	16.25	10.75	17.25 F	17.75 R mes	18.25 h [cm	18.75	19.25	19.75	20.25	20.625	20.853		

Figure 111. Cumulative fission density distribution for alternate 2 design OFE region on day 27 (see Section 7.3.5).



Figure 112. Power density distribution for alternate 2 design IFE region on day 0 (see Section 7.3.3).



Figure 113. Power density distribution for alternate 2 design IFE region on day 1 (see Section 7.3.3).



Figure 114. Power density distribution for alternate 2 design IFE region on day 15 (see Section 7.3.3).



Figure 115. Power density distribution for alternate 2 design IFE region on day 27 (see Section 7.3.3).

_	0.04	0.05	7.05	c. 0.c	6.20	F 00	F 42	E 10	A 7 A	4.40	4 1 7	2.04	2.00	2.01		
27.69	9.94	9.05	7.85	6.86	6.20	5.80	5.42	5.13	4.74	4.49	4.17	3.94	3.86	3.91		
7.19	8.57	7.54	6.22	5.14	4.59	4.15	3.87	3.61	3.39	3.23	3.07	3.02	3.14	3.38		
6.44 2	7.63	6.52	5.27	4.25	3.69	3.29	3.03	2.86	2.70	2.58	2.52	2.59	2.76	3.00		- 12.5
5.44 2	7.01	6.10	4.88	3.94	3.35	3.02	2.79	2.61	2.48	2.40	2.36	2.45	2.61	2.87		
3.97 25	7.02	6.11	5.01	4.04	3.47	3.10	2.89	2.72	2.58	2.50	2.48	2.54	2.76	2.97		
20.5 2	8.18	7.17	5.94	4.85	4.20	3.82	3.56	3.38	3.23	3.12	3.10	3.19	3.42	3.65		
5.5	10.23	9.04	7.50	6.17	5.40	4.93	4.65	4.47	4.37	4.34	4.47	4.92	5.56	6.23		
10.5	12.00	10.62	8.85	7.28	6.44	5.94	5.65	5.50	5.50	5.64	6.13	7.16	8.59	10.03		- 10.0
5.5	13.24	11.70	9.80	8.11	7.16	6.62	6.34	6.20	6.26	6.51	7.12	8.49	10.38	12.23		
cm]	13.65	12.11	10.11	8.37	7.42	6.91	6.60	6.48	6.57	6.89	7.69	9.35	11.62	13.74		kW ³ tuelparticle
esh [. 	13.65	12.06	10.12	8.38	7.44	6.89	6.59	6.51	6.60	6.96	7.80	9.51	11.86	14.14		insity [_
, Z -2.0	13.56	11.97	10.03	8.34	7.37	6.82	6.53	6.42	6.50	6.84	7.58	9.12	11.20	13.32		- 7.5 ⁻ əp
-5.5	13.00	11.53	9.62	7.95	7.02	6.50	6.19	6.05	6.09	6.32	6.89	8.12	9.80	11.42		ď
10.5	11.64	10.33	8.60	7.12	6.26	5.76	5.45	5.29	5.29	5.45	5.85	6.81	8.12	9.40		
15.5	9.80	8.67	7.18	5.87	5.12	4.66	4.36	4.15	4.00	3.93	3.96	4.19	4.57	5.01		
20.5	7.78	6.84	5.64	4.56	3.94	3.54	3.26	3.04	2.86	2.69	2.53	2.42	2.37	2.40		- 5.0
3.97	6.77	5.85	4.74	3.78	3.20	2.85	2.61	2.42	2.24	2.11	1.98	1.90	1.88	1.87		
5.44 -2	6.98	5.93	4.71	3.71	3.14	2.76	2.52	2.32	2.16	2.00	1.87	1.80	1.74	1.78		
5.44 -25	7.38	6.35	5.11	4.06	3.44	3.05	2.75	2.53	2.33	2.17	2.01	1.89	1.81	1.84		
7.19 -2(8.36	7.35	6.04	4.96	4.29	3.89	3.50	3.22	2.94	2.70	2.47	2.25	2.12	2.11		- 2.5
7.69 -2 <u>7</u>	9.85	8.89	7.80	6.64	5.96	5.44	4.98	4.53	4.13	3.72	3.33	2.95	2.68	2.61		
-27	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		-

Figure 116. Power density distribution for alternate 2 design OFE region on day 0 (see Section 7.3.3).

.69	9.29	8.35	7.41	6.48	5.92	5.49	5.18	4.87	4.50	4.23	3.96	3.78	3.76	3.89		
7.19 2	8.04	7.00	5.81	4.75	4.27	3.89	3.64	3.39	3.21	3.01	2.90	2.91	3.04	3.24		- 15 0
6.44 2	- 7.20	6.18	4.93	3.93	3.42	3.12	2.86	2.68	2.54	2.46	2.41	2.50	2.68	2.94		- 15.0
5.44 2	6.59	5.69	4.56	3.66	3.11	2.81	2.61	2.47	2.36	2.29	2.29	2.41	2.62	2.89		
3.97 2	6.66	5.79	4.68	3.79	3.27	2.96	2.75	2.59	2.50	2.47	2.45	2.60	2.84	3.14		
20.5 23	7.74	6.80	5.60	4.56	4.00	3.66	3.46	3.32	3.26	3.29	3.44	3.85	4.43	5.05		- 12.5
15.5	9.73	8.56	7.15	5.85	5.14	4.74	4.51	4.41	4.40	4.52	4.89	5.70	6.85	7.98		
10.5	11.39	10.07	8.40	6.94	6.13	5.69	5.43	5.34	5.36	5.62	6.22	7.43	9.09	10.73		
5.5	12.69	11.20	9.30	7.73	6.84	6.39	6.16	6.14	6.25	6.70	7.63	9.53	12.11	14.61		_
cm]	13.11	11.52	9.63	7.99	7.09	6.65	6.43	6.43	6.64	7.14	8.18	10.34	13.33	16.18		$\frac{kW}{m_{tuelparticle}^3}$ 0.01 -
esh [_ 0.0	- 13.20	11.64	9.70	8.02	7.13	6.68	6.48	6.44	6.68	7.21	8.31	10.46	13.42	16.37		insity [_
й - ^{5.0} Д	13.15	11.53	9.63	7.97	7.12	6.65	6.44	6.43	6.64	7.16	8.24	10.42	13.35	16.25		ower de
-5.5	12.58	11.12	9.27	7.68	6.81	6.37	6.13	6.09	6.24	6.68	7.63	9.56	12.14	14.71		- 7.5
	11.40	10.05	8.36	6.91	6.07	5.63	5.36	5.26	5.27	5.47	5.98	7.06	8.51	9.95		
L5.5 -:	9.63	8.47	7.01	5.78	5.08	4.65	4.42	4.28	4.25	4.36	4.68	5.41	6.43	7.46		
20.5	7.61	6.67	5.50	4.47	3.88	3.55	3.31	3.15	3.06	3.05	3.13	3.42	3.85	4.32		
3.97 -2	6.55	5.65	4.60	3.66	3.16	2.81	2.59	2.41	2.28	2.15	2.06	2.01	2.00	2.07		- 5.0
5.44 -23	6.62	5.62	4.55	3.59	3.02	2.69	2.44	2.28	2.12	1.99	1.91	1.85	1.83	1.87		
.44 -25	7.14	6.15	4.91	3.90	3.32	2.90	2.65	2.46	2.26	2.13	1.96	1.86	1.87	1.91		
'.19 -26	8.14	7.01	5.73	4.71	4.19	3.71	3.39	3.12	2.89	2.65	2.39	2.19	2.15	2.11		
.69 -27	9.51	8.61	7.52	6.47	5.82	5.29	4.85	4.45	4.07	3.63	3.29	2.90	2.62	2.55		- 2.5
-27	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		•
						•										

Figure 117. Power density distribution for alternate 2 design OFE region on day 1 (see Section 7.3.3).

7.69	8.58	7.84	7.10	6.24	5.78	5.42	5.15	4.89	4.63	4.40	4.24	4.23	4.34	4.52		
7.19 2	7.64	6.76	5.69	4.79	4.29	3.94	3.67	3.51	3.39	3.28	3.25	3.40	3.72	4.14		
6.44 27	6.84	5.96	4.91	3.96	3.49	3.12	2.99	2.80	2.74	2.71	2.80	3.07	3.50	3.97		
5.44 20	6.31	5.54	4.56	3.67	3.17	2.86	2.69	2.57	2.56	2.58	2.71	3.04	3.55	4.07		- 12
3.97 25	6.34	5.60	4.64	3.78	3.29	3.01	2.83	2.71	2.69	2.73	2.91	3.29	3.84	4.42		
20.5 23	7.27	6.48	5.43	4.50	3.97	3.67	3.48	3.39	3.36	3.43	3.69	4.22	4.93	5.66		
5.5	8.87	7.95	6.78	5.68	5.05	4.68	4.49	4.42	4.48	4.71	5.20	6.20	7.50	8.80		
0.5 1	10.14	9.10	7.83	6.63	5.93	5.53	5.37	5.38	5.55	5.97	6.85	8.48	10.47	12.22		- 10
5.5 1	11.05	9.97	8.57	7.26	6.51	6.09	5.91	5.93	6.17	6.70	7.72	9.52	11.65	13.46		
	11.39	10.32	8.86	7.50	6.75	6.32	6.07	6.11	6.36	6.93	8.00	9.85	11.99	13.79		kW ¹³ ndelparticle
o.0	11.35	10.25	8.81	7.51	6.73	6.31	6.14	6.17	6.38	6.99	8.05	9.92	12.08	13.95		8 nsity [<u>-</u>
, 5.0 2.0	11.26	10.19	8.81	7.48	6.69	6.30	6.12	6.12	6.37	6.93	7.95	9.85	12.02	13.88		wer de
5.5 -	11.00	9.95	8.56	7.25	6.49	6.08	5.95	5.95	6.18	6.71	7.74	9.57	11.69	13.51		Pc
0.5	10.12	9.12	7.86	6.64	5.93	5.53	5.37	5.35	5.53	6.00	6.88	8.53	10.57	12.40		
5.5 -1	8.83	7.93	6.73	5.64	4.98	4.63	4.43	4.34	4.39	4.59	5.04	5.94	7.16	8.31		- 6
0.5 -1	7.26	6.46	5.43	4.46	3.93	3.59	3.38	3.28	3.22	3.26	3.44	3.86	4.41	4.94		
.97 -2	6.38	5.60	4.62	3.77	3.25	2.93	2.73	2.62	2.59	2.60	2.71	3.01	3.46	3.94		
.44 -23	6.45	5.65	4.63	3.74	3.17	2.81	2.61	2.48	2.43	2.39	2.48	2.75	3.12	3.51		
.44 -25	6.97	6.05	4.99	3.99	3.43	3.09	2.88	2.69	2.59	2.50	2.55	2.67	3.02	3.36		- 4
.19 -26	7.77	6.85	5.77	4.90	4.27	3.87	3.59	3.37	3.16	2.96	2.87	2.89	3.04	3.26		
.69 -27	8.84	7.91	7.17	6.37	5.78	5.33	4.98	4.65	4.28	4.00	3.72	3.46	3.40	3.47		
-27	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 8 mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853	I	

Figure 118. Power density distribution for alternate 2 design OFE region on day 15 (see Section 7.3.3).

·.69	8.27	7.80	7.13	6.49	6.04	5.78	5.64	5.46	5.38	5.33	5.38	5.67	6.16	6.71		
7.19 27	7.48	6.84	5.99	5.08	4.64	4.34	4.16	4.08	3.97	4.07	4.21	4.69	5.37	6.19		
6.44 2	6.81	6.11	5.15	4.32	3.79	3.52	3.36	3.26	3.24	3.36	3.65	4.28	5.18	6.10		- 10.5
5.44 2	6.43	5.67	4.77	3.93	3.44	3.17	3.03	2.95	3.00	3.20	3.58	4.40	5.50	6.49		
3.97 2	6.30	5.62	4.78	3.98	3.51	3.26	3.14	3.11	3.20	3.41	3.95	4.92	6.21	7.47		
20.5 2	7.04	6.35	5.43	4.62	4.13	3.87	3.75	3.76	3.92	4.28	4.97	6.26	7.85	9.29		- 9.0
15.5	8.18	7.41	6.49	5.55	4.99	4.71	4.58	4.61	4.83	5.28	6.10	7.59	9.30	10.82		
10.5	8.98	8.24	7.21	6.23	5.61	5.30	5.18	5.21	5.43	5.94	6.85	8.37	9.95	11.19		
5.5	9.42	8.60	7.61	6.62	6.02	5.66	5.55	5.60	5.87	6.39	7.33	8.79	10.22	11.24		_
cm]	9.62	8.80	7.79	6.75	6.13	5.77	5.65	5.70	5.96	6.50	7.48	8.93	10.32	11.32		- 7.5 - 7.5 -
esh [0.0	9.66	8.84	7.82	6.81	6.15	5.81	5.66	5.72	5.99	6.53	7.51	9.00	10.36	11.32		ensity [-
Z - ^{-2.0}	9.57	8.86	7.82	6.83	6.16	5.81	5.66	5.73	5.97	6.54	7.48	8.96	10.36	11.34		ower de
-5.5	9.49	8.68	7.71	6.70	6.05	5.70	5.56	5.61	5.88	6.42	7.35	8.83	10.28	11.34		<u>a</u> .
10.5	9.10	8.34	7.31	6.30	5.68	5.35	5.24	5.29	5.52	6.02	6.95	8.48	10.08	11.31		- 6.0
15.5 -	8.39	7.57	6.61	5.66	5.08	4.78	4.65	4.69	4.89	5.35	6.21	7.75	9.53	11.10		
20.5 -	7.25	6.52	5.59	4.73	4.21	3.95	3.84	3.84	3.99	4.35	5.05	6.39	8.09	9.69		
3.97 -	6.57	5.86	4.93	4.08	3.60	3.32	3.17	3.16	3.22	3.47	3.99	5.00	6.33	7.62		
5.44 -2 '	6.75	5.90	4.97	4.04	3.52	3.22	3.08	3.00	3.01	3.18	3.52	4.26	5.18	6.22		- 4.5
6.44 -2	7.21	6.45	5.41	4.45	3.89	3.59	3.37	3.27	3.21	3.31	3.54	4.02	4.79	5.45		
7.19 -2	7.98	7.14	6.33	5.33	4.82	4.47	4.27	4.05	3.98	3.91	3.98	4.29	4.82	5.45		
7.69 -2	8.83	8.33	7.64	6.83	6.36	6.03	5.76	5.46	5.37	5.19	5.10	5.18	5.45	5.91		- 3.0
-2	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 8 mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		

Figure 119. Power density distribution for alternate 2 design OFE region on day 27 (see Section 7.3.3).

	27.94 -	280.6	282.0	282.1	286.7	290.3	301.1	299.4	291.5	278.9	275.2	270.7		
	27.44 -	255.7	246.0	241.9	236.6	233.7	234.8	237.0	238.1	237.9	237.2	240.1		
	26.94 -	233.2	214.5	203.3	190.5	179.9	174.6	180.0	189.2	198.0	201.5	208.9		
	26.315 -	226.2	206.6	187.9	174.5	157.9	154.0	159.7	170.9	179.0	186.2	191.6		- 320
	25.44 -	221.8	201.7	183.4	166.2	148.1	141.8	146.8	158.1	167.8	175.0	181.6		
	23.97 -	224.8	205.9	188.5	170.0	150.9	143.8	148.9	161.0	169.1	176.6	181.6		
	20.5 -	266.6	244.3	223.2	201.9	181.4	173.3	180.8	192.2	199.9	205.1	209.1		
	15.5 -	313.1	289.2	267.4	245.6	223.8	217.0	226.8	241.0	251.3	255.4	261.9		- 280
	10.5 -	325.2	305.4	286.6	270.4	253.6	250.9	263.4	281.7	294.4	301.4	306.5		
	5.5 -	339.0	321.7	304.3	287.2	273.0	272.3	288.7	308.4	321.5	328.9	335.8		
cm]	2.0 -	346.0	328.5	311.5	294.3	280.7	280.3	296.4	318.5	331.5	339.3	349.7		/cm2]
esh [0.0 -	348.1	330.6	314.0	297.7	282.1	281.5	296.9	318.9	331.6	341.6	349.0		<u>ک</u> 1 240 -
Ĕ N	-2.0 -	347.5	329.2	310.8	294.5	279.2	280.2	294.5	316.2	328.6	337.0	346.1		Heat f
	-5.5 -	336.8	318.8	302.6	285.4	270.7	270.1	285.3	307.3	319.8	327.0	333.2		
	-10.5 -	321.1	301.6	284.5	265.1	249.0	246.1	258.5	275.5	286.1	293.0	299.9		
	-15.5 -	284.9	266.7	249.2	231.2	215.0	210.2	219.3	232.4	241.2	247.6	253.3		200
	-20.5 -	232.4	216.3	201.6	187.5	173.2	167.6	173.8	184.8	192.1	197.7	201.8		- 200
	-23.97 -	196.7	182.3	167.7	156.9	142.9	138.7	143.7	155.3	163.6	169.4	173.2		
	-25.44 -	189.6	177.0	164.0	150.7	137.4	135.2	141.7	155.7	162.8	167.1	173.0		
	-26.315 -	193.7	183.7	173.0	160.6	150.4	148.6	154.5	166.7	175.2	182.4	189.0		
	-26.94 -	202.5	190.9	186.1	177.5	170.1	170.7	175.6	184.7	191.9	198.4	206.7		- 160
	-27.44 -	222.4	217.5	219.7	219.7	221.8	228.6	232.8	234.1	233.6	238.0	241.4		
	-27.94 -	243.0	248.1	255.9	264.7	277.9	291.1	294.8	287.5	278.5	281.3	277.3		
		7.124	7.493	7.82	8.254	9.014 R m	10.012 1esh [11.011 cm]	11.753	12.119	12.326	12.547		

Figure 120. Heat flux distribution for alternate 2 design IFE region on day 0 (see Section 7.3.4).

	27.94 -	264.2	266.8	264.3	272.8	278.9	282.3	283.3	275.8	264.1	262.3	261.1		
	27.44 -	243.7	234.3	230.0	227.1	224.4	222.8	224.3	224.0	223.2	225.3	227.2		
	26.94 -	223.7	206.1	196.6	184.3	172.6	166.9	169.8	176.3	185.3	191.0	196.5		- 320
	26.315 -	214.2	198.7	181.5	167.8	150.9	144.1	149.0	158.8	170.0	177.1	184.7		
	25.44 -	209.8	192.7	175.4	159.4	139.7	131.0	135.5	148.7	158.1	166.1	172.2		
	23.97 -	218.3	202.0	184.5	163.6	143.1	134.3	140.2	151.0	160.0	165.8	170.4		
	20.5 -	256.8	237.9	218.1	195.1	172.1	162.6	168.3	180.3	188.8	194.0	199.0		- 280
	15.5 -	301.7	281.2	260.1	236.8	213.7	205.3	212.1	228.5	239.3	245.2	249.7		
	10.5 -	314.6	298.4	280.4	262.3	242.7	236.7	248.7	268.3	278.8	285.7	292.7		
	55-	329.9	314.2	297.7	280.9	262.8	259.4	274.0	294.8	308.3	317.0	322.5		
Ē	2.0 -	335.6	323.5	306.8	288.4	269.9	266.2	283.5	303.7	317.0	327.6	333.3		[2ר
h [cr	2.0	337.0	321.8	306.5	288.3	270.3	266.9	283.8	305.7	319.6	328.2	338.2		- 240 ^{LD} /M
mes	-2.0 -	336.8	321.8	306.2	287.6	268.6	267.7	282.6	303.8	316.4	324.9	332.5		eat flux
Ν	-2.0	330.1	31/1 6	207.1	207.0	260.0	250.0	274.0	20/ 1	307.4	316.8	372.0		₩
	-5.5 -	214.1	206.4	297.1	275.7	202.5	225.5	2/4.0	254.1		204.0	201.2		
	-10.5 -	201.2	290.4	200.0	200.9	241.0	255.5	247.0	205.7	277.7	204.0	291.5		- 200
	-15.5 -	281.3	203.9	247.3	229.0	210.0	202.2	210.5	225.2	230.4	242.1	247.3		
	-20.5 -	228.3	214.1	199.6	183.9	166.7	160.3	166.9	1/9.1	187.5	191.7	196.0		
	-23.97 -	193.7	178.6	165.9	153.0	137.9	131.5	139.0	151.4	160.6	165.9	171.8		
	-25.44 -	188.3	175.8	163.6	148.0	134.6	129.6	136.5	151.4	158.3	166.4	171.8		
	-26.315 -	190.7	178.6	170.7	158.1	147.4	145.0	148.5	161.1	172.5	181.7	187.1		- 160
	-26.94 -	198.5	190.5	180.9	173.6	166.4	165.1	170.0	178.7	189.6	194.9	201.3		
	-27.44 -	218.5	215.7	214.2	213.6	215.3	222.0	225.5	227.5	229.8	228.8	232.1		
	-27.94 -	239.4	240.8	251.5	256.7	268.3	284.9	284.9	280.3	272.9	266.5	265.2		
		7.124	7.493	7.82	8.254	9.014 R m	10.012 esh [11.011 cm]	11.753	12.119	12.326	12.547		

Figure 121. Heat flux distribution for alternate 2 design IFE region on day 1 (see Section 7.3.4).

	27.94 -	214.3	229.4	242.1	251.3	262.3	267.1	266.2	253.5	247.5	239.5	239.2		
	27.44 -	208.6	215.3	218.9	220.5	220.3	219.0	217.9	217.3	217.7	215.2	211.4		
	26.94 -	201.1	200.0	196.3	191.1	179.9	172.0	171.8	181.0	187.4	189.1	186.2		
	26.315 -	194.1	190.4	186.3	177.8	161.0	149.6	151.8	161.8	171.2	172.4	176.4		- 270
	25.44 -	191.8	187.2	181.9	168.0	149.1	137.4	140.6	150.8	161.4	163.5	166.6		
	23.97 -	196.8	193.9	185.8	172.9	152.1	139.2	142.5	153.5	159.2	165.3	168.4		
	20.5 -	222.1	221.3	215.8	203.0	180.5	166.4	170.7	180.1	185.5	188.0	190.5		
	15.5 -	248.9	253.4	250.6	240.4	219.8	206.1	210.8	222.5	228.6	231.3	231.4		240
	10.5 -	258.3	264.5	266.1	259.9	245.4	235.7	243.3	257.3	263.1	265.7	265.9		- 240
	5.5 -	266.6	274.4	277.8	274.9	263.0	254.9	264.2	279.2	284.8	286.5	286.5		
cm]	2.0 -	271.5	279.6	286.4	281.6	271.0	261.8	271.3	288.3	293.0	292.9	294.4		(cm2]
esh [0.0 -	271.4	280.4	286.0	282.2	271.0	263.4	273.5	288.3	294.1	295.0	293.9		lux [W/
ŭ N	-2.0 -	271.5	280.4	285.5	282.7	269.1	262.5	272.6	287.4	293.7	294.7	293.9		Heat [
	-5.5 -	267.2	275.0	279.5	275.9	264.3	256.0	264.7	280.2	285.8	287.1	287.3		
	-10.5 -	259.9	265.8	266.9	262.1	247.3	237.1	243.7	257.1	262.1	263.4	265.3		
	-15.5 -	240.6	244.2	242.5	233.4	218.0	206.9	211.1	222.1	228.3	230.0	230.9		
	-20.5 -	205.1	205.8	201.1	191.2	175.9	165.4	169.7	179.8	184.9	187.6	189.5		- 180
	-23.97 -	182.3	177.7	172.3	160.9	146.8	138.4	144.2	154.8	161.6	165.7	168.2		
	-25.44 -	176.3	171.3	166.4	157.9	143.5	136.1	142.5	154.1	163.4	165.8	169.2		
	-26.315 -	179.5	176.5	173.9	166.6	155.1	148.5	153.7	164.2	172.5	178.3	180.0		
	-26.94 -	185.8	186.6	184.3	180.4	174.5	172.7	176.8	183.5	189.8	193.6	193.0		- 150
	-27.44 -	195.8	202.4	206.4	210.2	215.7	221.2	224.3	225.8	224.9	222.7	219.0		100
	-27.94 -	205.3	217.4	229.3	241.0	258.3	270.1	272.3	269.3	260.2	252.4	245.7		
		7.124	7.493	7.82	8.254	9.014 R m	10.012 esh [11.011 cm]	11.753	12.119	12.326	12.547		

Figure 122. Heat flux distribution for alternate 2 design IFE region on day 15 (see Section 7.3.4).

	27.94 -	182.0	194.9	215.1	231.1	246.0	255.7	258.7	249.4	238.6	225.1	216.8		
	27.44 -	174.4	188.2	202.6	208.4	216.6	219.8	221.4	219.5	213.0	207.3	204.9		
	26.94 -	168.0	180.2	189.2	186.7	185.6	181.7	182.6	187.8	188.2	188.7	190.1		
	26.315 -	166.9	173.8	180.0	176.7	166.3	157.7	159.3	168.0	175.1	175.3	176.2		
	25.44 -	166.6	171.4	173.7	169.1	155.1	143.6	146.2	157.0	162.5	162.9	165.7		- 250
	23.97 -	169.2	174.8	177.2	172.1	157.1	145.4	147.5	157.4	162.1	163.0	163.9		
	20.5 -	182.0	191.8	198.4	195.7	181.1	168.4	171.1	180.0	183.2	182.8	182.7		
	15.5 -	193.6	206.7	218.8	221.4	212.8	202.5	204.9	212.4	215.6	213.3	211.7		
	10.5 -	196.7	212.8	227.3	234.3	229.8	223.8	229.3	237.7	238.1	235.2	233.3		- 225
	5.5 -	199.3	216.8	231.7	242.1	241.1	237.7	244.4	252.3	250.4	247.1	243.3		
cm]	2.0 -	201.3	218.3	235.3	245.8	245.9	242.3	248.7	256.8	255.2	251.2	246.9		cm2]
sh [0.0 -	200.9	217.6	235.4	245.8	246.6	243.2	250.8	257.9	255.7	252.8	248.6		/M] xu
Z D	-2.0 -	199.6	216.5	233.9	245.5	246.3	243.3	249.9	258.3	256.4	251.8	247.5		Heat fl
	-5.5 -	199.5	216.2	233.1	243.9	243.5	240.0	246.1	252.6	251.0	247.3	243.6		- 200
	-10.5 -	199.1	215.3	230.4	236.9	234.0	228.2	233.0	241.1	241.4	237.8	235.3		
	-15.5 -	194.6	207.1	216.6	219.6	213.2	205.1	210.0	217.7	220.3	218.4	217.8		
	-20.5 -	178.3	186.0	191.7	189.6	178.2	170.5	175.9	185.4	188.2	188.9	189.3		
	-23.97 -	163.8	169.2	171.7	166.7	155.4	146.7	153.0	164.2	168.9	171.1	171.7		- 175
	-25.44 -	160.9	165.9	167.9	164.1	154.8	147.9	154.0	164.8	172.3	175.3	175.5		
	-26.315 -	162.4	170.5	175.8	174.1	167.8	163.7	168.7	179.2	182.5	186.0	186.1		
	-26.94 -	168.1	178.8	184.4	189.8	186.3	186.8	192.3	199.2	199.7	201.1	198.0		
	-27.44 -	173.8	187.2	198.6	209.2	217.7	226.8	233.3	233.4	228.7	222.6	216.8		150
	-27.94 -	177.7	193.7	212.9	225.8	248.4	266.0	273.2	267.0	256.5	242.3	235.2		- 120
		7.124	7.493	7.82	8.254	9.014 R m	10.012 esh [11.011 cm]	11.753	12.119	12.326	12.547		

Figure 123. Heat flux distribution for alternate 2 design IFE region on day 27 (see Section 7.3.4).

	27.94 -	269.8	269.0	266.1	259.4	234.2	206.8	180.3	161.8	141.6	121.5	110.1		
	27.44 -	239.5	231.1	221.4	209.4	185.5	160.8	141.4	129.0	116.1	104.5	98.8		
	26.94 -	209.6	193.6	179.6	163.6	140.2	118.5	105.6	99.1	93.2	88.7	87.0		- 360
	26.315 -	193.7	175.7	163.0	147.4	123.3	103.9	93.3	89.2	86.3	82.5	80.6		
	25.44 -	181.2	167.1	153.0	138.5	114.8	97.2	87.8	84.9	82.6	79.0	78.0		
	23.97 -	181.4	168.7	157.6	142.4	118.4	101.0	91.5	88.9	86.1	83.5	80.6		
	20.5 -	211.8	199.2	187.8	171.2	145.0	125.2	114.8	111.7	108.4	103.7	99.7		- 300
	15.5 -	265.6	251.7	237.1	217.9	187.0	165.1	157.6	161.8	168.3	171.0	171.6		
	10.5 -	311.9	296.4	280.3	257.6	224.5	202.1	202.0	221.7	246.0	266.0	276.5		
	5.5 -	344.0	327.1	310.7	286.8	250.1	227.5	231.7	258.2	293.1	323.4	339.0		
Ē	2.0 -	355.2	338.6	320.7	296.1	260.1	237.3	244.5	279.0	323.0	361.9	380.4		- 240 [] נו
sh [c	0.0 -	354.7	337.3	321.3	296.5	260.1	237.7	246.1	282.7	328.5	370.1	391.8		9/M] xr
Z me	-2.0 -	352.3	334.6	318.5	294.9	257.3	235.0	242.2	274.9	314.5	349.2	368.9		Heat flu
	-5.5 -	338.1	322.0	304.9	281.3	245.2	222.1	225.4	250.2	280.4	305.0	316.7		
	-10.5 -	302.6	288.2	272.3	251.5	217.9	194.6	194.5	211.5	233.4	250.7	258.5		- 180
	-15.5 -	254.6	241.4	226.8	207.3	177.1	154.0	143.6	143.1	143.0	140.1	138.0		
	-20.5 -	201.3	189.7	177.8	160.9	135.1	113.7	99.9	90.8	81.5	70.9	64.9		
	-23.97 -	174.7	160.9	148.7	133.1	109.0	90.4	78.2	70.9	63.6	55.4	50.2		
	-25.44 -	179.5	161.4	147.4	130.7	106.3	86.9	74.6	67.0	59.9	51.5	47.8		- 120
	-26.315 -	187.9	171.4	157.7	140.3	114.5	93.0	79.2	70.6	62.2	53.0	48.9		
	-26.94 -	203.4	188.3	173.4	156.9	130.5	106.4	89.7	79.3	68.3	57.7	52.6		
	-27.44 -	235.4	226.4	217.7	202.3	174.8	144.6	120.0	103.1	86.0	70.4	62.9		
	-27.94 -	267.7	266.0	266.2	251.4	222.8	186.1	153.0	128.8	105.3	84.0	73.9		- 60
		15.139	15.521	15.837	16.252	17.007 R m	18.007 esh [19.006 cm]	19.752	20.279	20.67	20.955		•

Figure 124. Heat flux distribution for alternate 2 design OFE region on day 0 (see Section 7.3.4).

	27.94 -	251.5	250.0	253.9	246.8	223.8	197.9	171.0	154.3	136.3	119.5	111.2		
	27.44 -	224.0	214.7	209.1	196.2	175.0	152.5	133.5	122.3	112.2	102.0	96.5		
	26.94 -	197.4	181.3	167.7	150.8	130.7	111.3	99.5	93.8	90.4	86.0	83.4		
	26.315 -	183.4	166.7	152.3	136.7	115.8	98.1	88.6	85.8	83.8	80.9	79.8		- 400
	25.44 -	170.4	156.1	143.3	129.2	107.2	91.8	83.8	82.6	81.6	79.6	78.9		
	23.97 -	172.4	159.6	147.3	133.6	112.7	96.4	89.7	88.5	88.4	86.6	86.0		
	20.5 -	201.1	189.3	177.1	161.3	138.9	122.8	118.8	124.5	131.9	136.6	139.0		
	15.5 -	252.6	239.0	226.6	206.9	179.2	161.8	162.0	177.3	196.3	212.4	220.5		- 320
	10.5 -	296.7	281.7	266.9	245.9	214.8	195.9	199.8	226.1	257.1	283.8	298.3		
	5.5 -	330.2	312.4	295.3	273.7	240.4	223.5	235.5	277.1	330.1	379.0	405.2		
cm]	2.0 -	341.0	322.2	306.3	283.2	249.8	233.8	250.9	297.3	359.2	418.6	450.0		cm2]
nesh [0.0 -	343.5	325.2	308.1	284.3	251.2	235.1	252.8	302.1	363.1	421.6	455.5		/w] xn
Ĕ	-2.0 -	341.9	322.2	306.2	282.7	250.4	234.1	251.3	299.7	361.7	419.5	452.3		Heat fl
	-5.5 -	327.7	310.8	294.3	272.0	239.6	222.1	234.8	277.0	330.7	379.8	407.7		
	-10.5 -	296.5	280.6	265.2	244.7	212.5	193.0	195.3	217.4	244.3	265.8	277.1		
	-15.5 -	250.2	235.7	222.0	204.5	176.5	157.7	156.3	169.6	185.9	198.8	205.7		
	-20.5 -	197.5	185.3	173.8	158.0	134.6	117.0	110.5	113.2	116.8	118.0	118.7		- 160
	-23.97 -	169.3	155.6	144.7	129.2	107.9	90.3	79.9	74.3	67.7	60.1	56.0		
	-25.44 -	170.4	154.2	143.4	126.7	103.2	85.2	74.0	68.5	62.1	54.5	50.3		
	-26.315 -	181.8	166.5	152.2	135.5	110.1	90.3	77.4	69.5	62.0	55.4	51.2		
	-26.94 -	197.9	179.4	164.8	149.3	125.7	103.0	88.2	76.6	67.0	59.5	53.5		
	-27.44 -	228.2	216.9	208.5	195.2	170.1	141.2	118.2	101.1	84.7	70.4	62.3		- 80
	-27.94 -	258.7	259.0	257.8	246.7	218.3	183.0	150.4	128.0	104.1	81.8	72.3		
		15.139	15.521	15.837	16.252	17.007 R m	18.007 esh [19.006 cm1	19.752	20.279	20.67	20.955		_

Figure 125. Heat flux distribution for alternate 2 design OFE region on day 1 (see Section 7.3.4).



Figure 126. Heat flux distribution for alternate 2 design OFE region on day 15 (see Section 7.3.4).

27.94 -	227.0	238.0	245.3	247.6	232.9	219.7	211.4	210.5	206.4	198.1	191.5			- 320	
27.44 -	209.3	212.8	213.1	206.0	190.0	176.3	171.0	174.8	178.7	178.9	179.9				
26.94 -	190.3	186.9	180.6	167.6	149.2	135.7	133.3	142.5	154.0	163.2	170.4				
26.315 -	178.0	171.5	163.4	152.6	131.9	119.4	119.3	132.9	149.3	164.1	172.0				
25.44 -	169.5	160.9	153.6	141.2	121.7	110.1	114.1	131.6	154.4	173.9	182.4			- 280	
23.97 -	166.4	160.4	154.2	142.9	124.7	115.0	121.8	145.2	172.8	197.0	210.1				
20.5 -	186.2	181.7	175.7	165.9	147.5	138.4	151.1	183.1	219.7	248.4	261.4				
15.5 -	216.8	214.0	211.1	199.6	178.8	169.5	186.6	225.0	266.4	293.7	304.1				
10.5 -	238.7	238.4	234.6	224.1	201.3	191.8	210.3	252.7	293.1	312.2	314.0				
5.5 -	250.2	249.8	248.3	238.1	215.5	205.7	226.3	270.4	307.4	319.5	314.9			- 240	
2.0 -	255.7	255.5	254.1	242.9	219.8	209.6	230.4	276.0	312.4	322.5	316.9			cm2]	
0.0 -	256.8	256.5	255.1	244.9	220.6	210.1	231.5	277.1	314.4	323.4	316.7			ux [W/u	
-2.0 -	255.1	257.3	254.8	245.7	220.8	210.2	231.1	276.1	313.4	323.4	317.5			Heat fl	
-5.5 -	252.2	252.3	251.6	241.1	216.8	206.1	227.2	271.2	309.0	321.4	317.5			- 200	
-10.5 -	241.9	241.4	238.1	226.8	203.6	194.3	213.2	256.5	297.3	316.4	317.3				
-15.5 -	222.2	218.3	214.9	203.6	181.7	172.4	189.1	229.0	271.8	301.0	311.9				
-20.5 -	191.9	187.0	181.0	169.9	150.4	141.5	153.9	186.1	224.6	256.9	272.7				
-23.97 -	173.7	166.6	158.8	146.5	127.3	116.6	123.1	146.7	175.6	200.8	214.5			- 160	
-25.44 -	177.6	167.4	160.1	145.1	124.0	111.9	114.0	129.6	148.8	164.2	174.9				
26.315 -	188.3	181.1	170.9	156.7	134.6	119.6	118.1	129.3	140.9	151.2	154.2				
-26.94 -	201.8	194.9	191.0	175.0	153.3	136.6	130.8	135.5	141.7	147.2	149.6				
-27.44 -	222.8	224.7	227.3	216.8	197.7	178.2	168.1	165.4	162.7	158.8	158.1				
-27.94 -	242.8	256.5	262.7	260.6	244.7	222.0	208.5	199.8	188.0	174.6	168.6			- 120	
	15.139	15.521	15.837	16.252	17.007 R m	18.007 esh [19.006 cm]	19.752	20.279	20.67	20.955			I	
	27.94 - 27.44 - 26.94 - 26.315 - 25.44 - 23.97 - 20.5 - 10.5 - 10.5 - 2.0 - 0.0 - -2.0 - -2.0 - -10.5 - -10.5 - -20.5 - -20.5 - -23.97 - -25.44 - -25.44 - -26.94 - -27.94 -	27.94 227.0 27.44 200.3 26.94 200.3 26.315 200 25.44 200.5 23.97 200 23.97 200 20.5 200 20.5 200 20.5 200 20.6 200 20.6 200 20.7 200	27.94227.0238.027.44209.3212.826.94190.3186.926.315178.0171.525.44169.4160.420.5166.4160.420.5216.3214.015.5216.3214.010.5255.7255.720.6255.7255.50.0256.8255.50.0255.7255.30.0255.7255.30.0255.7255.30.0255.7255.30.0255.7255.30.0255.7255.310.5255.7255.3255.7255.7255.7255.7255.7255.7255.7255.7255.7255.7 <td>27.94227.0238.0245.327.44209.3212.8213.126.94190.3186.9180.626.315178.0171.5163.425.44169.3160.9153.623.97166.4160.4154.220.5186.2181.7175.715.5216.8214.0211.110.5238.7238.4238.65.5250.2249.8248.30.0255.7255.5254.10.0255.7255.5254.10.0255.8255.5254.10.0255.7255.5254.110.5252.2257.3251.610.5252.2218.3251.6-20.5241.9241.4238.1-20.5191.9187.0181.0-20.5191.9166.6158.8-23.97173.7166.6158.8-26.94201.8214.1217.1-27.94242.8224.7227.3</td> <td>27.94227.0238.0245.3247.427.44209.3212.8213.1206.026.94190.3186.9180.4157.626.315178.0171.5163.4152.625.44169.5160.4153.6141.223.97166.4160.4154.2142.920.5186.2181.7175.7165.910.5238.7238.4234.6234.110.5250.7255.5254.1242.910.6255.8255.5254.1242.910.7255.8255.5254.1242.910.8255.7255.2254.2243.910.9255.8255.3254.3243.910.9255.9254.3243.9243.910.9255.1254.3245.7245.910.9255.2254.3245.9245.910.9255.3254.3245.9245.910.9255.3254.3245.9245.910.9255.3254.3245.9245.910.9241.9245.9245.9245.925.94173.7166.6158.8146.526.94241.9167.9161.9165.726.94201.8164.9160.1175.926.94201.8164.9161.9175.926.94201.8264.7262.7263.627.94242.8264.7262.7263.6<!--</td--><td>27.94 - 227.00 238.00 245.30 247.00 239.00 27.44 - 209.30 212.80 213.10 206.00 149.02 26.94 - 190.30 186.90 180.60 167.00 131.90 26.315 - 178.00 171.50 163.40 152.00 131.90 25.44 - 169.50 160.00 153.60 141.20 121.70 23.97 - 166.40 160.40 154.20 141.20 121.70 20.5 - 166.20 181.70 175.70 165.90 124.70 15.5 - 166.20 181.70 175.70 165.90 124.70 10.5 - 236.70 238.70 241.80 241.90 215.70 10.5 - 255.70 255.70 255.70 254.90 244.90 210.80 10.0 - 255.70 255.70 255.70 255.70 241.90 216.80 10.0 - 255.70 255.70 255.70 255.70 241.90 216.80 10.1 - 255.70 255.70 255.70 255.70 261.60 <t< td=""><td>27.94 - 27.00 238.00 245.30 247.60 238.00 247.60 238.00 247.60 100.00 176.30 26.94 - 190.00 160.00 160.00 167.00 167.00 131.00 131.00 26.315 - 178.00 171.00 163.00 167.00 131.00 110.01 26.315 - 176.00 160.00 153.00 141.00 121.01 110.01 26.316 - 166.00 160.00 155.00 166.00 167.00 167.00 131.00 20.05 - 166.00 160.00 175.00 161.00 178.00 138.00 10.5 - 166.00 161.00 175.00 161.00 178.00 169.00 10.5 - 150.00 241.00 241.00 178.00 169.00 169.00 169.00 10.0 - 255.00 255.00 255.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00<</td><td>27.94 27.94 28.00 24.50 24.70 23.90 21.90 <td< td=""><td>27.9427.0028.0024.5024.7021.70<th< td=""><td>17.9427.9428.94<th< td=""><td>27.9427.9428.9428.4428.45<th< td=""><td>27.9427.0028.0024.5024.70<th< td=""><td>27.3427.428.4028.4028.4028.4021.40</td><td>27.427.028.028.028.028.021.121.020.610.119.127.420.320.421.320.610.016.717.017.017.017.017.017.020.410.010.010.010.010.010.010.010.010.017.017.017.017.020.410.010.010.010.010.010.010.010.010.010.017.017.017.020.410.010.010.010.010.010.010.010.010.017.017.017.017.020.510.010.010.010.010.010.010.010.017.017.017.017.017.010.510.010.010.010.010.010.010.010.017.017.017.017.017.010.520.010.010.010.010.010.010.010.010.017.017.017.017.010.520.020.020.020.020.020.020.020.020.020.020.020.020.010.620.020.020.020.020.020.020.020.020.020.020.020.020.010.620.020.020.020.020.020.020.020.020.020.020.020.0<</td></th<></td></th<></td></th<></td></th<></td></td<></td></t<></td></td>	27.94227.0238.0245.327.44209.3212.8213.126.94190.3186.9180.626.315178.0171.5163.425.44169.3160.9153.623.97166.4160.4154.220.5186.2181.7175.715.5216.8214.0211.110.5238.7238.4238.65.5250.2249.8248.30.0255.7255.5254.10.0255.7255.5254.10.0255.8255.5254.10.0255.7255.5254.110.5252.2257.3251.610.5252.2218.3251.6-20.5241.9241.4238.1-20.5191.9187.0181.0-20.5191.9166.6158.8-23.97173.7166.6158.8-26.94201.8214.1217.1-27.94242.8224.7227.3	27.94227.0238.0245.3247.427.44209.3212.8213.1206.026.94190.3186.9180.4157.626.315178.0171.5163.4152.625.44169.5160.4153.6141.223.97166.4160.4154.2142.920.5186.2181.7175.7165.910.5238.7238.4234.6234.110.5250.7255.5254.1242.910.6255.8255.5254.1242.910.7255.8255.5254.1242.910.8255.7255.2254.2243.910.9255.8255.3254.3243.910.9255.9254.3243.9243.910.9255.1254.3245.7245.910.9255.2254.3245.9245.910.9255.3254.3245.9245.910.9255.3254.3245.9245.910.9255.3254.3245.9245.910.9241.9245.9245.9245.925.94173.7166.6158.8146.526.94241.9167.9161.9165.726.94201.8164.9160.1175.926.94201.8164.9161.9175.926.94201.8264.7262.7263.627.94242.8264.7262.7263.6 </td <td>27.94 - 227.00 238.00 245.30 247.00 239.00 27.44 - 209.30 212.80 213.10 206.00 149.02 26.94 - 190.30 186.90 180.60 167.00 131.90 26.315 - 178.00 171.50 163.40 152.00 131.90 25.44 - 169.50 160.00 153.60 141.20 121.70 23.97 - 166.40 160.40 154.20 141.20 121.70 20.5 - 166.20 181.70 175.70 165.90 124.70 15.5 - 166.20 181.70 175.70 165.90 124.70 10.5 - 236.70 238.70 241.80 241.90 215.70 10.5 - 255.70 255.70 255.70 254.90 244.90 210.80 10.0 - 255.70 255.70 255.70 255.70 241.90 216.80 10.0 - 255.70 255.70 255.70 255.70 241.90 216.80 10.1 - 255.70 255.70 255.70 255.70 261.60 <t< td=""><td>27.94 - 27.00 238.00 245.30 247.60 238.00 247.60 238.00 247.60 100.00 176.30 26.94 - 190.00 160.00 160.00 167.00 167.00 131.00 131.00 26.315 - 178.00 171.00 163.00 167.00 131.00 110.01 26.315 - 176.00 160.00 153.00 141.00 121.01 110.01 26.316 - 166.00 160.00 155.00 166.00 167.00 167.00 131.00 20.05 - 166.00 160.00 175.00 161.00 178.00 138.00 10.5 - 166.00 161.00 175.00 161.00 178.00 169.00 10.5 - 150.00 241.00 241.00 178.00 169.00 169.00 169.00 10.0 - 255.00 255.00 255.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00<</td><td>27.94 27.94 28.00 24.50 24.70 23.90 21.90 <td< td=""><td>27.9427.0028.0024.5024.7021.70<th< td=""><td>17.9427.9428.94<th< td=""><td>27.9427.9428.9428.4428.45<th< td=""><td>27.9427.0028.0024.5024.70<th< td=""><td>27.3427.428.4028.4028.4028.4021.40</td><td>27.427.028.028.028.028.021.121.020.610.119.127.420.320.421.320.610.016.717.017.017.017.017.017.020.410.010.010.010.010.010.010.010.010.017.017.017.017.020.410.010.010.010.010.010.010.010.010.010.017.017.017.020.410.010.010.010.010.010.010.010.010.017.017.017.017.020.510.010.010.010.010.010.010.010.017.017.017.017.017.010.510.010.010.010.010.010.010.010.017.017.017.017.017.010.520.010.010.010.010.010.010.010.010.017.017.017.017.010.520.020.020.020.020.020.020.020.020.020.020.020.020.010.620.020.020.020.020.020.020.020.020.020.020.020.020.010.620.020.020.020.020.020.020.020.020.020.020.020.0<</td></th<></td></th<></td></th<></td></th<></td></td<></td></t<></td>	27.94 - 227.00 238.00 245.30 247.00 239.00 27.44 - 209.30 212.80 213.10 206.00 149.02 26.94 - 190.30 186.90 180.60 167.00 131.90 26.315 - 178.00 171.50 163.40 152.00 131.90 25.44 - 169.50 160.00 153.60 141.20 121.70 23.97 - 166.40 160.40 154.20 141.20 121.70 20.5 - 166.20 181.70 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131.00 26.315 - 178.00 171.00 163.00 167.00 131.00 110.01 26.315 - 176.00 160.00 153.00 141.00 121.01 110.01 26.316 - 166.00 160.00 155.00 166.00 167.00 167.00 131.00 20.05 - 166.00 160.00 175.00 161.00 178.00 138.00 10.5 - 166.00 161.00 175.00 161.00 178.00 169.00 10.5 - 150.00 241.00 241.00 178.00 169.00 169.00 169.00 10.0 - 255.00 255.00 255.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00 261.00<	27.94 27.94 28.00 24.50 24.70 23.90 21.90 <td< td=""><td>27.9427.0028.0024.5024.7021.70<th< td=""><td>17.9427.9428.94<th< td=""><td>27.9427.9428.9428.4428.45<th< td=""><td>27.9427.0028.0024.5024.70<th< 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td=""><td>27.3427.428.4028.4028.4028.4021.40</td><td>27.427.028.028.028.028.021.121.020.610.119.127.420.320.421.320.610.016.717.017.017.017.017.017.020.410.010.010.010.010.010.010.010.010.017.017.017.017.020.410.010.010.010.010.010.010.010.010.010.017.017.017.020.410.010.010.010.010.010.010.010.010.017.017.017.017.020.510.010.010.010.010.010.010.010.017.017.017.017.017.010.510.010.010.010.010.010.010.010.017.017.017.017.017.010.520.010.010.010.010.010.010.010.010.017.017.017.017.010.520.020.020.020.020.020.020.020.020.020.020.020.020.010.620.020.020.020.020.020.020.020.020.020.020.020.020.010.620.020.020.020.020.020.020.020.020.020.020.020.0<</td></th<>	27.3427.428.4028.4028.4028.4021.40	27.427.028.028.028.028.021.121.020.610.119.127.420.320.421.320.610.016.717.017.017.017.017.017.020.410.010.010.010.010.010.010.010.010.017.017.017.017.020.410.010.010.010.010.010.010.010.010.010.017.017.017.020.410.010.010.010.010.010.010.010.010.017.017.017.017.020.510.010.010.010.010.010.010.010.017.017.017.017.017.010.510.010.010.010.010.010.010.010.017.017.017.017.017.010.520.010.010.010.010.010.010.010.010.017.017.017.017.010.520.020.020.020.020.020.020.020.020.020.020.020.020.010.620.020.020.020.020.020.020.020.020.020.020.020.020.010.620.020.020.020.020.020.020.020.020.020.020.020.0<	

Figure 127. Heat flux distribution for alternate 2 design OFE region on day 27 (see Section 7.3.4).

APPENDIX D. DISTRIBUTIONS FOR ALTERNATE 3 DESIGN

APPENDIX D-1. FISSION RATE DENSITY DISTRIBUTIONS FOR ALTERNATE 3 DESIGN



Figure 128. Fission rate density distribution for alternate 3 design IFE region on day 0 (see Section 7.4.2).



Figure 129. Fission rate density distribution for alternate 3 design IFE region on day 1 (see Section 7.4.2).



Figure 130. Fission rate density distribution for alternate 3 design IFE region on day 15 (see Section 7.4.2).



Figure 131. Fission rate density distribution for alternate 3 design IFE region on day 27 (see Section 7.4.2).



Figure 132. Fission rate density distribution for alternate 3 design OFE region on day 0 (see Section 7.4.2).



Figure 133. Fission rate density distribution for alternate 3 design OFE region on day 1 (see Section 7.4.2).

	27.69 -	6.81	6.22	5.39	4.79	4.34	4.04	3.78	3.57	3.32	3.10	2.93	2.80	2.79	2.88
	27.19 -	5.77	5.04	4.20	3.53	3.13	2.87	2.66	2.52	2.36	2.22	2.14	2.15	2.25	2.43
	26.44 -	5.21	4.47	3.65	2.92	2.51	2.27	2.10	2.00	1.87	1.84	1.80	1.84	2.00	2.22
	25.44 -	4.84	4.18	3.37	2.69	2.30	2.09	1.94	1.82	1.75	1.70	1.69	1.80	1.98	2.16
	23.97 -	4.82	4.19	3.44	2.78	2.40	2.16	2.03	1.94	1.87	1.84	1.88	1.99	2.21	2.46
	20.5 -	5.62	4.93	4.10	3.36	2.95	2.70	2.56	2.47	2.43	2.46	2.60	2.93	3.41	3.93
	15.5 -	7.02	6.19	5.18	4.28	3.76	3.48	3.32	3.24	3.24	3.32	3.59	4.17	4.97	5.76
	10.5 -	8.23	7.26	6.08	5.07	4.49	4.18	4.00	3.94	3.98	4.19	4.64	5.56	6.83	8.07
_	5.5 -	9.13	8.05	6.76	5.62	5.00	4.68	4.51	4.49	4.63	4.97	5.69	7.14	9.06	10.98
[Cm	2.0 -	9.41	8.29	6.96	5.85	5.20	4.88	4.74	4.72	4.89	5.28	6.07	7.63	9.79	11.91
esh	0.0 -	9.44	8.37	7.02	5.85	5.22	4.88	4.73	4.73	4.90	5.30	6.11	7.72	9.89	12.01
ž ně	-2.0 -	9.40	8.32	6.97	5.83	5.21	4.87	4.70	4.69	4.88	5.23	6.05	7.65	9.80	11.83
	-5.5 -	9.05	8.02	6.73	5.60	4.99	4.66	4.51	4.47	4.60	4.95	5.67	7.12	9.08	11.00
	-10.5 -	8.12	7.19	6.03	5.00	4.42	4.10	3.92	3.85	3.88	4.04	4.45	5.28	6.43	7.54
	-15.5 -	6.86	6.04	5.04	4.15	3.67	3.36	3.21	3.11	3.09	3.15	3.37	3.87	4.56	5.24
	-20.5 -	5.40	4.77	3.96	3.22	2.83	2.59	2.42	2.33	2.29	2.30	2.39	2.66	3.06	3.47
	23.97 -	4.64	4.01	3.28	2.64	2.27	2.04	1.89	1.77	1.68	1.60	1.55	1.54	1.57	1.63
	25.44 -	4.65	4.00	3.19	2.53	2.15	1.92	1.77	1.63	1.53	1.43	1.37	1.32	1.33	1.35
	26.44 -	4.97	4.23	3.41	2.70	2.31	2.04	1.86	1.74	1.62	1.51	1.40	1.34	1.31	1.36
	27.19 -	5.50	4.86	3.94	3.22	2.77	2.51	2.28	2.11	1.96	1.82	1.65	1.52	1.46	1.48
	27.69 -	6.41	5.69	4.94	4.22	3.71	3.40	3.11	2.90	2.65	2.41	2.14	1.93	1.79	1.77
		15.22	15.4	15.75	16.25	16.75	17.25	17.75 R mes	18.25 h [cm]	18.75	19.25	19.75	20.25	20.625	20.853

Figure 134. Fission rate density distribution for alternate 3 design OFE region on day 2 (see Section 7.4.2).



Figure 135. Fission rate density distribution for alternate 3 design OFE region on day 15 (see Section 7.4.2).



Figure 136. Fission rate density distribution for alternate 3 design OFE region on day 27 (see Section 7.4.2).

APPENDIX D-2. CUMULATIVE FISSION DENSITY DISTRIBUTIONS FOR ALTERNATE 3 DESIGN



Figure 137. Cumulative fission density distribution for alternate 3 design IFE region on day 1 (see Section 7.4.5).


Figure 138. Cumulative fission density distribution for alternate 3 design IFE region on day 15 (see Section 7.4.5).



Figure 139. Cumulative fission density distribution for alternate 3 design IFE region on day 27 (see Section 7.4.5).

69.7	0.62	0.56	0.49	0.43	0.39	0.37	0.34	0.32	0.30	0.28	0.26	0.25	0.25	0.25		- 0.90
19 27	0.53	0.46	0.38	0.32	0.28	0.26	0.25	0.23	0.22	0.20	0.19	0.19	0.20	0.21		0.50
5.44 27	0.47	0.41	0.33	0.27	0.23	0.21	0.19	0.18	0.17	0.16	0.16	0.16	0.18	0.19		
5.44 2(0.44	0.38	0.31	0.24	0.21	0.19	0.18	0.17	0.16	0.15	0.15	0.15	0.17	0.18		
3.97 2!	0.44	0.38	0.31	0.25	0.22	0.20	0.18	0.17	0.16	0.16	0.16	0.17	0.18	0.19		- 0.75
20.5 23	0.51	0.45	0.37	0.30	0.27	0.24	0.23	0.21	0.21	0.21	0.21	0.22	0.25	0.28		
L5.5	0.63	0.56	0.47	0.39	0.34	0.31	0.29	0.28	0.28	0.28	0.29	0.33	0.38	0.44		
10.5	0.74	0.66	0.55	0.46	0.40	0.37	0.36	0.35	0.35	0.36	0.39	0.46	0.55	0.65		Γ.
5.5	0.82	0.72	0.61	0.50	0.45	0.42	0.40	0.39	0.40	0.42	0.47	0.57	0.70	0.84		- fissions cm ³ departic
- 2.0	0.85	0.75	0.63	0.52	0.46	0.43	0.41	0.41	0.42	0.44	0.50	0.61	0.77	0.92		ty [10 ²⁰
esh [_ 0.0	0.85	0.75	0.63	0.52	0.46	0.43	0.41	0.41	0.42	0.45	0.50	0.62	0.78	0.93		n densi
й - ^{5.0} Д	0.84	0.74	0.62	0.52	0.46	0.43	0.41	0.41	0.41	0.44	0.49	0.60	0.75	0.90		e fissio
-5.5	0.81	0.71	0.60	0.50	0.44	0.41	0.39	0.38	0.39	0.41	0.46	0.55	0.68	0.81		nulativ mulativ
10.5	0.72	0.64	0.53	0.44	0.39	0.36	0.34	0.33	0.33	0.34	0.37	0.43	0.52	0.60		C
15.5 -1 -	0.61	0.54	0.45	0.37	0.32	0.29	0.28	0.26	0.26	0.26	0.27	0.29	0.33	0.37		
20.5 -1	0.48	0.42	0.35	0.28	0.25	0.22	0.21	0.20	0.19	0.18	0.18	0.18	0.19	0.21		
3.97 -2	0.41	0.35	0.29	0.23	0.20	0.18	0.16	0.15	0.14	0.13	0.13	0.12	0.12	0.12		- 0.30
5.44 -23 -	0.41	0.35	0.28	0.22	0.19	0.17	0.15	0.14	0.13	0.12	0.12	0.11	0.11	0.11		
5.44 -25 -	0.43	0.37	0.30	0.24	0.20	0.18	0.17	0.15	0.14	0.13	0.12	0.11	0.11	0.11		
7.19 -26	0.49	0.42	0.35	0.28	0.24	0.22	0.20	0.18	0.17	0.16	0.14	0.13	0.13	0.12		
.69 -27	0.56	0.51	0.43	0.37	0.33	0.30	0.27	0.25	0.23	0.21	0.19	0.17	0.16	0.15		- 0.15
-27	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		•

Figure 140. Cumulative fission density distribution for alternate 3 design OFE region on day 1 (see Section 7.4.5).

																_
7.69	8.54	7.79	6.89	6.09	5.57	5.19	4.90	4.61	4.35	4.10	3.88	3.74	3.75	3.87		
7.19 2	7.38	6.51	5.48	4.58	4.06	3.73	3.51	3.31	3.15	3.00	2.90	2.94	3.10	3.36		
6.44 2	6.59	5.73	4.69	3.79	3.28	2.98	2.77	2.63	2.52	2.45	2.45	2.58	2.85	3.17		
5.44 2	6.16	5.37	4.36	3.51	3.02	2.73	2.54	2.42	2.34	2.32	2.36	2.56	2.87	3.24		- 12.5
3.97 2	6.15	5.39	4.46	3.61	3.13	2.84	2.67	2.56	2.50	2.50	2.60	2.86	3.27	3.70		
20.5 23	7.11	6.29	5.27	4.34	3.81	3.50	3.32	3.21	3.18	3.23	3.42	3.86	4.50	5.14		
[5.5 ·	8.82	7.84	6.61	5.50	4.87	4.50	4.29	4.19	4.20	4.33	4.68	5.44	6.47	7.49		
10.5	10.27	9.16	7.76	6.49	5.78	5.39	5.18	5.13	5.23	5.56	6.24	7.59	9.36	11.04		- 10.0
5.5	- 11.26	10.05	8.54	7.17	6.40	5.99	5.80	5.79	5.97	6.44	7.38	9.19	11.48	13.61		fissions cm ³ _{uelparticl}
2.0	- 11.60	10.36	8.81	7.42	6.63	6.21	6.02	6.01	6.23	6.74	7.75	9.68	12.10	14.34		.y [10 ²⁰
esh [6	- 11.65	10.41	8.85	7.45	6.65	6.23	6.04	6.05	6.26	6.77	7.79	9.74	12.19	14.46		ר densit
, n 7 n	11.59	10.34	8.80	7.41	6.62	6.20	6.01	6.01	6.22	6.72	7.74	9.66	12.10	14.35		o و fissio
-5.5	- 11.20	10.01	8.50	7.14	6.38	5.96	5.78	5.76	5.95	6.42	7.36	9.17	11.48	13.63		mulativ
10.5	10.19	9.07	7.68	6.42	5.71	5.31	5.10	5.05	5.14	5.45	6.11	7.44	9.17	10.81		Cui
- 5.5	8.68	7.71	6.49	5.39	4.75	4.38	4.16	4.05	4.03	4.12	4.39	5.01	5.85	6.68		
20.5 -1	6.96	6.15	5.13	4.22	3.69	3.38	3.18	3.06	3.00	3.01	3.14	3.49	3.98	4.49		- 5 0
.97 -2	6.01	5.25	4.32	3.49	3.00	2.70	2.52	2.39	2.31	2.26	2.29	2.43	2.68	2.95		- 5.0
.44 -23	6.00	5.20	4.23	3.36	2.86	2.56	2.37	2.21	2.10	2.03	1.99	2.06	2.19	2.35		
.44 -25	6.43	5.55	4.52	3.60	3.08	2.76	2.53	2.35	2.21	2.09	2.00	1.98	2.02	2.13		
.19 -26	7.19	6.30	5.24	4.30	3.75	3.38	3.10	2.88	2.66	2.47	2.29	2.16	2.14	2.17		
.69 -27	8.30	7.51	6.56	5.64	5.04	4.61	4.23	3.90	3.60	3.28	2.97	2.70	2.53	2.48		- 2.5
-27	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 8 mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		•

Figure 141. Cumulative fission density distribution for alternate 3 design OFE region on day 15 (see Section 7.4.5).

<u>6</u> .	14.91	13.70	12.25	10.91	10.04	9.43	8.96	8.52	8.12	7.76	7.50	7.44	7.65	8.05		- 24
27.6									5.00		E 60	5.00				
27.19	13.02	11.58	9.86	8.34	/.44	6.87	6.48	6.17	5.93	5.74	5.69	5.93	6.45	/.12		
6.44	11.69	10.26	8.49	6.92	6.03	5.50	5.16	4.91	4.76	4.71	4.81	5.26	5.96	6.74		
5.44 2	10.94	9.60	7.88	6.38	5.52	5.01	4.69	4.50	4.41	4.43	4.63	5.19	6.00	6.86		
3.97 2	10.91	9.63	8.01	6.54	5.69	5.19	4.90	4.73	4.68	4.75	5.05	5.73	6.70	7.69		- 20
20.5 2	12.49	11.12	9.39	7.81	6.89	6.36	6.05	5.91	5.92	6.11	6.61	7.68	9.12	10.54		
15.5	15.26	13.67	11.65	9.79	8.70	8.09	7.77	7.66	7.78	8.19	9.09	10.86	13.12	15.25		
10.5	17.53	15.76	13.50	11.42	10.21	9.55	9.24	9.20	9.46	10.16	11.54	14.09	17.25	20.09		Ξ.
5.5	19.00	17.12	14.73	12.49	11.20	10.51	10.20	10.22	10.59	11.47	13.15	16.22	19.87	23.09		- 19 - 16 - cm ³ cons
cm]	19.53	17.60	15.16	12.88	11.55	10.84	10.54	10.56	10.97	11.91	13.69	16.88	20.65	23.96		ty [10 ²⁽
esh [0.0	19.60	17.67	15.21	12.93	11.59	10.88	10.58	10.62	11.03	11.96	13.75	16.97	20.76	24.09		n densi
Z -2.0	19.53	17.57	15.14	12.87	11.54	10.83	10.53	10.56	10.97	11.90	13.67	16.87	20.66	23.97		ve fissio
-5.5	18.98	17.10	14.71	12.48	11.19	10.49	10.19	10.20	10.57	11.45	13.15	16.22	19.89	23.12		mulativ 12 -
10.5	17.50	15.71	13.46	11.37	10.16	9.49	9.16	9.13	9.39	10.07	11.43	14.00	17.13	19.96		С
15.5 -	15.18	13.59	11.57	9.71	8.61	7.99	7.65	7.53	7.61	7.98	8.79	10.43	12.54	14.54		
20.5 -	12.41	11.03	9.29	7.70	6.78	6.23	5.90	5.73	5.69	5.83	6.23	7.14	8.38	9.58		
3.97	10.84	9.54	7.91	6.43	5.56	5.04	4.72	4.53	4.42	4.43	4.60	5.08	5.77	6.49		- 8
5.44 -2	10.90	9.51	7.80	6.26	5.36	4.81	4.47	4.24	4.10	4.04	4.11	4.43	4.95	5.49		
5.44 -2 ¹	11.68	10.19	8.39	6.76	5.81	5.24	4.84	4.56	4.34	4.20	4.17	4.36	4.73	5.19		
7.19 -2(13.03	11.54	9.73	8.09	7.12	6.47	5.99	5.62	5.28	5.00	4.80	4.79	5.02	5.34		
7.69 -2	14.91	13.65	12.07	10.53	9.52	8.78	8.15	7.61	7.11	6.63	6.22	5.92	5.84	5.96		
-2	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75	19.25	19.75	20.25	20.625	20.853		_

Figure 142. Cumulative fission density distribution for alternate 3 design OFE region on day 27 (see Section 7.4.5).



Figure 143. Power density distribution for alternate 3 design IFE region on day 0 (see Section 7.4.3).



Figure 144. Power density distribution for alternate 3 design IFE region on day 1 (see Section 7.4.3).



Figure 145. Power density distribution for alternate 3 design IFE region on day 15 (see Section 7.4.3).



Figure 146. Power density distribution for alternate 3 design IFE region on day 27 (see Section 7.4.3).

7.69	10.13	9.18	7.99	7.06	6.43	5.96	5.60	5.23	4.94	4.63	4.25	4.00	3.98	4.04		
7.19 2	8.64	7.53	6.26	5.24	4.63	4.23	4.00	3.74	3.53	3.31	3.17	3.07	3.13	3.35		
6.44 27 -	7.71	6.64	5.42	4.36	3.75	3.36	3.15	2.96	2.80	2.69	2.59	2.62	2.77	3.04		- 12
5.44 2 -	7.19	6.17	4.99	3.97	3.43	3.07	2.85	2.70	2.53	2.46	2.39	2.46	2.63	2.87		12
.97 25	7.13	6.23	5.12	4.14	3.54	3.20	2.94	2.77	2.64	2.55	2.51	2.60	2.75	2.98		
0.5 23	8.24	7.24	6.02	4.94	4.30	3.90	3.62	3.40	3.25	3.15	3.12	3.18	3.36	3.62		
5.5 2	10.27	9.05	7.57	6.26	5.46	4.97	4.67	4.45	4.33	4.28	4.37	4.68	5.18	5.75		- 10
0.5 1	12.05	10.63	8.94	7.37	6.49	5.98	5.69	5.49	5.47	5.62	6.05	6.98	8.33	9.68		
5.5 1(13.19	11.68	9.77	8.11	7.17	6.64	6.32	6.21	6.20	6.45	7.03	8.29	10.04	11.79		
چ ع	13.67	12.07	10.11	8.36	7.40	6.85	6.56	6.45	6.50	6.79	7.47	8.90	10.93	12.85		kW 3 Intelparticle
sh [c	13.59	11.97	10.06	8.37	7.39	6.86	6.55	6.43	6.48	6.77	7.50	9.02	11.10	13.14		sity [
n ne N ne	13.43	11.93	10.02	8.29	7.35	6.79	6.51	6.36	6.39	6.63	7.26	8.57	10.38	12.19		/er den
. تە كە يە يا	12.92	11.42	9.56	7.95	6.99	6.48	6.16	6.00	5.99	6.18	6.74	7.90	9.48	11.05		Pow
ις Γ	11.56	10.22	8.53	7.08	6.23	5.73	5 41	5.24	5.20	5.30	5.70	6.58	7.82	8.97		- 6
-10.	11.50	10.22	0.55		0.20	5.75	5.11	5.21	5.20	5.50	5.70	0.50	7.02	0.57		Ū
-15.5	9.74	8.57	7.15	5.88	5.10	4.63	4.29	4.08	3.91	3.78	3.71	3.78	3.99	4.22		
20.5	7.65	6.73	5.57	4.51	3.90	3.53	3.24	3.01	2.81	2.65	2.50	2.37	2.31	2.32		
3.97	6.51	5.68	4.66	3.73	3.20	2.84	2.59	2.41	2.25	2.11	1.98	1.87	1.80	1.81		
5.44 -2.	6.54	5.63	4.56	3.57	3.03	2.68	2.45	2.24	2.10	1.99	1.82	1.72	1.71	1.72		- 4
6.44 -25	6.90	6.00	4.85	3.87	3.24	2.90	2.65	2.41	2.22	2.05	1.92	1.81	1.74	1.78		
.19 -26	7.81	6.72	5.54	4.53	3.96	3.53	3.19	2.95	2.72	2.48	2.27	2.06	2.00	1.95		
69 -27	8.96	8.10	6.96	5.90	5.29	4.72	4.32	4.01	3.64	3.28	2.93	2.64	2.45	2.34		- 2
-27.	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		•

Figure 147. Power density distribution for alternate 3 design OFE region on day 0 (see Section 7.4.3).

7.69	9.42	8.59	7.54	6.53	5.98	5.56	5.20	4.87	4.60	4.33	4.02	3.86	3.78	3.91		
7.19 2	8.06	7.06	5.82	4.89	4.30	3.97	3.73	3.46	3.31	3.09	2.97	2.97	3.11	3.29		- 15 0
6.44 2	7.20	6.18	4.99	4.05	3.46	3.16	2.91	2.73	2.60	2.50	2.46	2.53	2.77	3.01		15.0
5.44 2	6.73	5.77	4.67	3.74	3.18	2.87	2.69	2.53	2.43	2.33	2.34	2.42	2.59	2.89		
3.97 2	6.67	5.86	4.80	3.84	3.34	2.99	2.78	2.65	2.53	2.48	2.51	2.63	2.89	3.16		
20.5 2	7.77	6.84	5.67	4.65	4.07	3.72	3.51	3.37	3.30	3.34	3.49	3.86	4.45	5.06		- 12.5
15.5	9.72	8.56	7.15	5.92	5.19	4.82	4.57	4.45	4.44	4.55	4.91	5.75	6.89	8.05		
10.5	11.42	10.09	8.46	7.02	6.21	5.78	5.52	5.43	5.46	5.67	6.24	7.44	9.10	10.72		
5.5	12.61	11.13	9.34	7.79	6.93	6.47	6.23	6.19	6.32	6.77	7.69	9.57	12.13	14.65		_
cm]	13.05	11.56	9.71	8.07	7.16	6.72	6.47	6.46	6.67	7.20	8.27	10.40	13.32	16.22		- 10.0 - <i>KW</i> 0.01 -
esh [0.0	13.17	11.64	9.76	8.11	7.23	6.76	6.54	6.52	6.72	7.28	8.38	10.54	13.47	16.34		ensity [<mark>-</mark>
Z -2.0	13.01	11.51	9.61	8.02	7.16	6.65	6.49	6.50	6.68	7.22	8.28	10.46	13.36	16.30		ower de
-5.5	12.56	11.05	9.27	7.71	6.86	6.40	6.18	6.13	6.30	6.72	7.64	9.53	12.11	14.66		_ - 7.5
10.5	11.23	9.88	8.27	6.86	6.06	5.62	5.37	5.25	5.27	5.47	5.95	7.01	8.48	9.91		
15.5 -	9.48	8.37	6.96	5.74	5.03	4.63	4.40	4.26	4.24	4.34	4.67	5.38	6.40	7.41		
20.5 -	7.49	6.56	5.42	4.43	3.86	3.52	3.30	3.16	3.07	3.02	3.08	3.35	3.75	4.18		
3.97	6.34	5.52	4.52	3.62	3.09	2.78	2.59	2.40	2.25	2.10	2.02	1.97	1.96	2.01		- 5.0
5.44 -2	6.31	5.49	4.36	3.46	2.92	2.60	2.40	2.23	2.06	1.94	1.85	1.80	1.76	1.79		
6.44 -2	6.75	5.80	4.69	3.68	3.10	2.76	2.56	2.34	2.16	2.02	1.87	1.81	1.78	1.80		
7.19 -2	7.66	6.55	5.43	4.33	3.75	3.44	3.12	2.84	2.59	2.41	2.21	2.03	2.00	1.97		- 2 5
7.69 -2	8.78	7.86	6.72	5.75	5.08	4.62	4.24	3.88	3.56	3.23	2.94	2.63	2.48	2.32		2.5
-2	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		

Figure 148. Power density distribution for alternate 3 design OFE region on day 1 (see Section 7.4.3).

6	- 9.31	8.51	7.37	6.54	5.93	5.53	5.16	4.89	4.55	4.25	4.01	3.82	3.82	3.94		
27.6																
27.19	- 7.90	6.90	5.74	4.82	4.28	3.92	3.64	3.45	3.23	3.03	2.93	2.94	3.07	3.33		- 15 0
6.44 2	- 7.12	6.11	4.99	3.99	3.44	3.10	2.87	2.73	2.56	2.52	2.47	2.52	2.73	3.04		15.0
5.44 2	- 6.63	5.72	4.60	3.67	3.15	2.86	2.66	2.49	2.40	2.33	2.31	2.46	2.71	2.96		
3.97 2	- 6.59	5.74	4.70	3.80	3.28	2.96	2.78	2.66	2.55	2.52	2.57	2.73	3.02	3.37		
0.5 23	- 7.69	6.74	5.60	4.60	4.03	3.70	3.51	3.38	3.33	3.36	3.55	4.01	4.67	5.37		- 12.5
5.5	- 9.60	8.47	7.09	5.85	5.14	4.75	4.54	4.43	4.44	4.54	4.91	5.70	6.79	7.88		
.0.5 1	- 11.25	9.93	8.32	6.93	6.14	5.71	5.47	5.39	5.44	5.73	6.34	7.60	9.34	11.03		
5.5 1	- 12.48	11.01	9.25	7.69	6.83	6.40	6.17	6.15	6.34	6.80	7.78	9.77	12.39	15.02		
2.0 J	- 12.87	11.34	9.52	8.00	7.12	6.67	6.49	6.45	6.69	7.23	8.30	10.43	13.39	16.29		$\frac{kW}{m_{tuelparticle}^3}$ 0.01 -
esh [o 0.0	- 12.91	11.45	9.61	8.00	7.14	6.67	6.47	6.47	6.70	7.24	8.36	10.55	13.52	16.42		nsity [_
Z ne -2.0	- 12.86	11.38	9.53	7.97	7.12	6.66	6.43	6.42	6.67	7.16	8.27	10.46	13.40	16.18		ower de
-5.5	- 12.38	10.97	9.20	7.66	6.82	6.38	6.17	6.12	6.29	6.77	7.76	9.73	12.42	15.04		بة - 7.5
10.5	- 11.10	9.83	8.25	6.83	6.04	5.60	5.36	5.27	5.31	5.53	6.09	7.22	8.80	10.32		
[5.5 -]	- 9.38	8.26	6.90	5.67	5.02	4.60	4.38	4.26	4.23	4.31	4.60	5.29	6.24	7.17		
20.5 -1	- 7.39	6.52	5.41	4.41	3.87	3.54	3.31	3.18	3.13	3.15	3.26	3.64	4.19	4.75		
3.97 -2	- 6.35	5.48	4.48	3.61	3.11	2.78	2.58	2.42	2.30	2.19	2.12	2.11	2.15	2.23		- 5.0
5.44 -23	- 6.36	5.47	4.37	3.45	2.93	2.62	2.42	2.22	2.09	1.96	1.88	1.80	1.82	1.84		
6.44 -25	- 6.79	5.78	4.66	3.70	3.16	2.79	2.54	2.38	2.22	2.06	1.91	1.83	1.79	1.86		
.19 -26	- 7.53	6.65	5.39	4.41	3.79	3.43	3.12	2.88	2.68	2.49	2.26	2.08	2.00	2.02		
.69 -27	- 8.76	7.78	6.75	5.78	5.08	4.66	4.25	3.96	3.63	3.29	2.93	2.64	2.45	2.42		- 2.5
-27	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		•

Figure 149. Power density distribution for alternate 3 design OFE region on day 2 (see Section 7.4.3).

69.7	- 8.60	7.85	7.08	6.23	5.68	5.41	5.13	4.88	4.65	4.48	4.29	4.26	4.42	4.63		
7.19 2	- 7.48	6.68	5.71	4.86	4.28	3.94	3.76	3.58	3.41	3.31	3.24	3.45	3.71	4.08		
5.44 27	- 6.71	5.85	4.89	4.02	3.50	3.20	2.99	2.82	2.76	2.75	2.82	3.09	3.50	3.97		
5.44 26	- 6.29	5.58	4.54	3.70	3.21	2.92	2.73	2.60	2.54	2.59	2.73	3.07	3.53	4.03		- 12
3.97 25	- 6.32	5.58	4.65	3.78	3.31	3.03	2.84	2.75	2.73	2.75	2.95	3.32	3.91	4.40		
0.5 23	- 7.21	6.40	5.43	4.52	3.97	3.68	3.49	3.41	3.38	3.46	3.69	4.23	4.94	5.68		
5.5	- 8.85	7.90	6.75	5.67	5.05	4.70	4.50	4.42	4.49	4.72	5.22	6.23	7.53	8.77		
0.5 1	- 10.13	9.16	7.84	6.63	5.94	5.58	5.38	5.40	5.57	6.00	6.87	8.47	10.44	12.17		- 10
5.5 1	- 11.01	9.91	8.54	7.26	6.52	6.13	5.96	5.96	6.19	6.71	7.74	9.54	11.65	13.48		
5.0]	- 11.27	10.18	8.81	7.49	6.72	6.36	6.14	6.14	6.37	6.94	8.01	9.89	12.01	13.78		kW] ³ ³ ¹ ¹ ¹ ¹
sh [c 0.0	- 11.33	10.23	8.85	7.52	6.75	6.33	6.16	6.18	6.44	7.01	8.07	9.93	12.06	13.88		sity [
Z me	- 11.22	10.13	8.78	7.48	6.70	6.31	6.13	6.16	6.40	6.94	8.00	9.85	11.96	13.85		ver der
5.5	- 10.96	9.94	8.54	7.26	6.52	6.14	5.95	5.97	6.23	6.77	7.77	9.58	11.70	13.51		Po
).5 -	- 10.14	9.11	7.84	6.63	5.93	5.56	5.39	5.37	5.56	6.01	6.89	8.55	10.53	12.38		
5.5 -1(- 8.78	7.91	6.72	5.65	5.02	4.65	4.45	4.36	4.41	4.60	5.03	5.93	7.13	8.26		- 6
.5 -15	- 7.19	6.41	5.41	4.48	3.94	3.61	3.42	3.29	3.23	3.28	3.45	3.84	4.40	4.96		
97 -20	- 6.28	5.51	4.61	3.73	3.23	2.94	2.75	2.63	2.59	2.60	2.70	2.97	3.42	3.87		
44 -23.	- 6.35	5.55	4.58	3.66	3.13	2.80	2.61	2.47	2.42	2.40	2.49	2.73	3.07	3.49		
14 -25.4	- 6.80	5.90	4.86	3.93	3.41	3.05	2.83	2.69	2.55	2.48	2.50	2.61	2.90	3.24		- 4
.9 -26.4	- 7.56	6.74	5.68	4.71	4.14	3.78	3.50	3.26	3.10	2.90	2.80	2.80	2.94	3.15		
9 -27.1	- 8.71	7. <u>95</u>	6. <u>99</u>	6. <u>08</u>	5.46	5.11	4. <u>68</u>	4. <u>38</u>	4.07	3. <u>80</u>	3.54	3. <u>33</u>	3.28	3. <u>33</u>		
-27.6	15.22	15.4	15.75	16.25	16.75	17.25	17.75 8 mes	18.25 h [cm	18.75 1	19.25	19.75	20.25	20.625	20.853		l
							, mes	n Lein	1							

Figure 150. Power density distribution for alternate 3 design OFE region on day 15 (see Section 7.4.3).

.69	8.36	7.75	7.14	6.50	6.14	5.84	5.69	5.49	5.36	5.28	5.38	5.67	6.12	6.67		
7.19 2	7.47	6.76	5.87	5.09	4.63	4.41	4.19	4.10	4.02	4.08	4.26	4.70	5.44	6.15		
6.44 2	6.79	6.09	5.13	4.30	3.77	3.55	3.35	3.27	3.28	3.41	3.70	4.35	5.22	6.04		- 10.5
5.44 2(6.35	5.60	4.76	3.93	3.44	3.19	3.02	2.98	3.03	3.22	3.59	4.41	5.47	6.51		
3.97 2	6.29	5.59	4.74	3.99	3.50	3.26	3.12	3.10	3.21	3.43	3.94	5.00	6.31	7.51		
20.5 23	6.93	6.30	5.44	4.64	4.15	3.87	3.75	3.78	3.94	4.30	4.98	6.26	7.85	9.31		- 9 0
15.5	8.10	7.40	6.47	5.56	5.00	4.71	4.60	4.63	4.83	5.30	6.13	7.62	9.37	10.85		5.0
10.5	8.92	8.15	7.21	6.22	5.64	5.29	5.18	5.23	5.49	5.98	6.90	8.40	9.99	11.24		
5.5	9.35	8.59	7.63	6.65	6.02	5.68	5.53	5.60	5.85	6.40	7.31	8.79	10.22	11.28		_
cm]	9.57	8.82	7.80	6.79	6.17	5.82	5.71	5.72	5.97	6.53	7.47	8.93	10.34	11.32		- 7.5 - 7.5 -
esh [_ 0.0	9.55	8.76	7.79	6.83	6.20	5.87	5.72	5.78	6.03	6.56	7.49	8.97	10.35	11.33		ensity [_
- ^{2.0} D	9.54	8.79	7.82	6.78	6.19	5.82	5.70	5.76	6.02	6.57	7.50	8.96	10.32	11.30		ower de
-5.5	9.43	8.71	7.69	6.69	6.04	5.72	5.59	5.65	5.90	6.45	7.40	8.85	10.27	11.34		ď
10.5	9.00	8.22	7.29	6.31	5.71	5.38	5.24	5.29	5.54	6.02	6.94	8.45	10.02	11.28		- 6.0
15.5	8.27	7.56	6.60	5.67	5.11	4.81	4.67	4.71	4.90	5.37	6.22	7.75	9.54	11.13		
20.5	7.16	6.47	5.59	4.74	4.24	3.97	3.84	3.85	4.01	4.36	5.08	6.41	8.08	9.70		
3.97	6.48	5.86	4.90	4.06	3.58	3.32	3.18	3.15	3.23	3.47	3.98	5.00	6.33	7.61		
5.44 -2	6.63	5.85	4.95	4.09	3.54	3.21	3.08	3.00	3.00	3.19	3.54	4.25	5.24	6.14		- 4.5
5.44 -2!	7.13	6.34	5.35	4.45	3.91	3.58	3.36	3.30	3.22	3.27	3.48	4.01	4.73	5.50		
7.19 -2(7.85	7.11	6.26	5.38	4.81	4.47	4.20	4.05	3.90	3.87	3.98	4.24	4.88	5.44		
7.69 -2	8.80	8.33	7.51	6.77	6.26	5.96	5.69	5.47	5.24	5.08	5.04	5.19	5.46	5.78		- 2 0
-2	15.22	15.4	15.75	16.25	16.75	17.25 F	17.75 R mes	18.25 h [cm	18.75]	19.25	19.75	20.25	20.625	20.853		- 3.0

Figure 151. Power density distribution for alternate 3 design OFE region on day 27 (see Section 7.4.3).

APPENDIX D-4. HEAT FLUX DISTRIBUTIONS FOR ALTERNATE 3 DESIGN

	27.94 -	275.6	275.8	281.8	290.5	304.6	317.4	317.8	309.8	297.6	286.1	278.3		
	27.44 -	248.2	246.1	246.0	243.9	244.7	248.9	251.2	251.5	251.5	249.4	247.9		
	26.94 -	223.7	218.4	210.4	200.8	189.5	185.8	189.4	198.9	207.2	212.4	217.0		
	26.315 -	217.1	207.8	193.5	184.4	168.6	162.5	166.8	181.3	188.4	193.3	199.3		- 320
	25.44 -	214.5	201.5	187.9	172.6	154.9	149.2	155.2	168.9	179.2	183.8	186.8		
	23.97 -	220.6	206.7	194.1	176.2	158.7	151.0	158.3	171.5	179.2	182.6	185.5		
	20.5 -	261.4	248.2	231.0	211.6	190.4	182.6	189.7	203.0	209.7	213.0	214.3		
	15.5 -	305.1	291.0	273.3	253.3	232.4	226.4	237.2	254.0	263.4	266.6	267.3		- 280
	10.5 -	316.5	305.8	293.1	276.5	262.0	260.7	275.7	295.1	306.5	310.7	312.1		
	5.5 -	329.2	319.9	307.9	294.1	281.3	282.1	300.5	322.8	335.3	340.3	340.5		
cm]	2.0 -	337.7	328.3	317.6	303.0	289.3	291.5	309.3	332.2	346.1	350.7	350.2		/cm2]
esh [0.0 -	339.0	329.0	318.5	303.7	289.8	291.5	310.0	333.1	344.2	348.6	349.9		≥ <u>×</u> 240 _
В И	-2.0 -	336.4	326.6	314.3	300.2	287.7	290.4	307.8	328.9	342.5	346.4	348.5		Heat 1
	-5.5 -	326.4	319.5	307.3	292.0	278.2	279.5	296.5	317.7	328.7	332.9	334.1		
	-10.5 -	309.1	298.7	287.1	270.3	254.6	252.5	267.6	286.4	297.1	301.5	301.0		
	-15.5 -	273.8	264.6	252.6	235.8	219.8	216.6	226.7	242.2	249.9	252.6	253.6		200
	-20.5 -	221.2	213.0	201.4	187.4	175.0	171.5	178.3	189.6	197.3	200.3	201.1		- 200
	-23.97 -	183.9	177.0	167.4	155.4	143.6	140.0	148.0	160.4	167.0	170.7	171.8		
	-25.44 -	174.0	165.2	159.9	149.9	139.2	134.9	141.7	155.1	163.4	168.8	172.5		
	-26.315 -	178.2	172.0	166.0	155.9	145.7	143.7	150.5	162.8	172.5	178.8	181.0		
	-26.94 -	186.8	178.2	174.4	165.8	160.9	162.0	168.1	178.4	187.3	192.2	196.4		- 160
	-27.44 -	199.6	196.7	197.5	194.9	199.1	207.6	214.8	219.4	222.5	222.2	221.8		
	-27.94 -	211.5	217.9	222.9	227.0	239.3	256.0	264.9	263.4	259.7	254.0	245.8		
		7.124	7.493	7.82	8.254	9.014 R m	10.012 esh [11.011 cm]	11.753	12.119	12.326	12.547		

Figure 152. Heat flux distribution for alternate 3 design IFE region on day 0 (see Section 7.4.4).

	27.94 -	249.7	252.9	262.7	267.5	277.4	288.8	293.3	290.6	277.5	269.5	265.5		
	27131													
	27.44 -	227.7	227.0	226.2	225.4	223.3	225.9	230.3	234.1	232.3	231.5	228.4		- 320
	26.94 -	207.6	200.5	193.0	184.8	172.7	168.3	173.5	183.4	190.5	195.4	195.9		
	26.315 -	200.2	188.0	181.3	167.1	152.5	147.4	154.5	167.4	175.2	180.0	185.6		
	25.44 -	195.6	187.0	173.6	158.5	140.1	134.7	141.0	156.8	165.6	170.3	173.5		
	23.97 -	206.2	195.5	180.8	164.1	145.0	136.8	144.1	156.8	166.4	172.3	174.3		
	20.5 -	242.7	229.6	214.1	194.6	173.8	166.6	174.6	188.7	196.2	200.0	200.5		- 280
	15.5 -	284.2	271.8	256.2	236.3	215.3	209.2	220.0	237.1	246.4	250.7	251.9		
	10.5 -	297.4	288.4	276.3	259.9	243.7	242.1	257.3	278.8	287.9	293.8	296.2		
	5.5 -	309.1	303.0	291.0	276.2	263.7	264.1	281.6	304.1	316.7	322.3	323.6		
cm]	2.0 -	317.7	312.0	299.3	284.1	270.3	272.5	291.3	313.8	329.1	334.7	335.3		- 240 IJ
ssh [0.0 -	318.5	311.9	300.5	285.9	271.3	271.5	290.4	315.5	330.6	335.2	337.7		//M] xn
Z D	-2.0 -	315.6	308.9	297.6	284.2	270.4	270.0	289.2	314.5	327.6	332.7	333.1		Heat fl
	-5.5 -	308.4	301.8	290.4	276.0	261.8	263.1	278.7	301.9	315.3	320.6	323.1		
	-10.5 -	291.8	283.7	270.8	255.9	241.2	238.6	252.9	272.5	284.7	288.8	289.3		
	-15.5 -	260.5	251.9	238.7	224.5	207.7	203.9	214.7	232.1	240.8	244.7	246.8		- 200
	-20.5 -	211.9	203.4	192.6	179.2	165.0	161.2	169.5	183.1	190.5	194.0	195.3		
	-23.97 -	177.0	168.6	158.3	147.6	136.0	131.7	140.1	152.5	161.2	164.9	167.1		
	-25.44 -	169.2	161.5	151.7	141.0	130.3	127.3	134.5	148.4	156.7	162.7	165.6		
	-26.315 -	170.8	165.9	157.1	146.4	138.3	135.9	141.7	155.6	165.8	172.9	173.9		- 160
	-26.94 -	173.7	170.3	166.3	158.8	151.7	153.3	161.7	171.1	180.4	186.0	189.8		
	-27.44 -	187.2	188.6	188.9	188.3	190.6	198.9	208.0	212.6	215.3	216.3	216.8		
	-27.94 -	203.1	210.1	213.1	219.0	233.3	247.7	255.9	257.1	252.4	248.6	242.7		
		7.124	7.493	7.82	8.254	9.014 R m	10.012 esh [11.011 cm]	11.753	12.119	12.326	12.547		I

Figure 153. Heat flux distribution for alternate 3 design IFE region on day 1 (see Section 7.4.4).

			207.7	221 7	221.0	253.0	271.8	277.6	275.8	267.3	248.9	242.3		
	-27.44 -	181.0	192.3	198.1	204.9	212.5	221.8	226.3	232.0	228.4	222.0	218.2		- 150
	-26.94 -	171.0	177.3	176.3	177.8	172.4	173.1	177.8	189.3	191.6	194.7	193.8		
	-26.315 -	167.0	169.9	168.6	163.8	153.0	150.5	157.3	169.2	175.3	178.5	179.3		
	-25.44 -	164.7	165.1	164.9	156.7	144.1	138.3	143.6	157.4	163.8	165.5	167.4		
	-23.97 -	168.1	171.3	169.4	161.0	147.5	139.7	145.0	157.1	164.2	165.3	165.1		- 180
	-20.5 -	192.0	197.5	195.8	188.5	175.3	167.9	174.2	185.8	190.8	191.2	190.1		
	-15.5 -	225.3	233.8	237.0	231.0	216.9	208.1	215.4	228.6	233.4	233.1	230.5		
	-10.5 -	242.6	254.3	259.9	257.3	246.0	239.0	248.8	263.8	269.9	268.9	264.8		
N	-5.5 -	250.5	264.7	273.5	273.4	263.2	259.6	270.7	287.0	292.1	290.6	287.1		- 210 -
me	-2.0 -	252.9	268.1	278.0	279.0	269.8	265.2	278.0	295.3	299.9	296.7	293.0		leat flu
sh [c	0.0 -	256.0	269.2	278.2	278.4	270.5	266.6	279.4	294.6	300.9	298.5	294.5		z/W] xi
Ē	2.0 -	253.3	266.9	277.6	279.0	268.5	265.1	278.8	295.5	300.7	295.8	292.1		m2]
	5.5 -	249.2	263.1	271.0	270.6	262.6	258.8	271.3	287.9	291.7	290.7	286.9		2.0
	10.5 -	241.5	253.2	259.6	257.2	244.5	238.2	248.7	263.4	268.8	268.4	264.4		- 240
	15.5 -	233.7	244.2	245.3	237.1	219.8	209.0	215.4	227.7	233.6	233.7	230.9		
	20.5 -	207.2	213.8	211.3	200.0	180.5	168.9	174.2	184.7	189.5	190.5	188.8		
	23.97 -	182.5	184.9	181.0	171.2	151.8	141.5	146.1	157.7	165.4	166.3	165.4		
	25.44 -	179.3	182.1	176.5	165.5	150.3	140.2	142.7	155.6	164.8	166.0	164.8		- 270
	26.315 -	182.7	185.8	182.8	173.3	161.0	152.4	155.9	165.8	174.0	176.1	177.0		
	26.94 -	186.5	192.3	194.1	189.6	181.7	174.3	178.0	183.7	187.8	190.0	193.9		
	27.44 -	195.8	205.5	213.4	220.0	220.7	222.1	226.6	223.7	221.6	216.3	212.5		
	27.94 -	205.9	219.0	232.0	249.8	259.4	271.3	277.0	265.1	257.6	242.9	227.9		- 300

Figure 154. Heat flux distribution for alternate 3 design IFE region on day 15 (see Section 7.4.4).

	27.94 -	166.2	187.9	204.9	222.2	244.0	263.3	270.3	260.0	247.0	234.0	220.4		
	27.44 -	161.9	180.7	195.3	206.5	215.6	222.2	229.6	225.9	220.2	213.4	203.0		- 275
	26.94 -	157.8	173.2	185.0	188.8	185.7	181.0	188.1	192.5	193.2	191.9	186.0		
	26.315 -	156.1	168.3	177.1	175.7	167.2	158.7	164.6	175.1	177.9	178.0	176.2		
	25.44 -	155.6	165.1	170.1	168.6	156.3	145.5	150.3	161.5	166.5	167.6	165.5		
	23.97 -	157.4	167.9	174.5	171.1	157.2	148.5	151.6	161.3	165.4	166.8	164.0		- 250
	20.5 -	169.2	183.3	193.1	193.1	181.5	171.0	174.6	184.1	186.6	186.0	182.3		230
	15.5 -	179.8	198.1	211.9	218.5	212.9	204.4	209.8	218.8	219.6	216.8	212.3		
	10.5 -	181.3	201.1	218.5	229.2	229.4	227.2	234.7	244.1	242.9	238.4	230.9		
	5.5 -	182.8	203.0	223.1	235.3	240.5	240.0	249.1	258.5	257.2	251.6	243.0		
E	2.0 -	182.8	205.1	224.8	239.2	245.6	246.5	254.6	264.6	260.8	254.6	246.0		- 225 7 2
sh [c	0.0 -	184.7	207.3	226.8	240.3	246.3	246.7	255.1	265.5	264.3	257.7	249.0		9/M] xr
Z De	-2.0 -	186.7	207.1	228.5	240.1	247.1	246.8	256.2	263.6	261.9	254.8	249.3		Heat fl
	-5.5 -	186.2	205.9	226.0	238.5	242.9	242.9	250.6	260.0	257.3	251.2	243.7		
	-10.5 -	184.5	204.0	221.8	232.5	233.2	229.7	238.5	248.1	247.5	241.7	235.1		- 200
	-15.5 -	180.2	198.1	211.0	217.3	213.2	207.3	213.9	224.1	225.4	221.1	215.2		
	-20.5 -	166.1	178.4	186.9	187.1	179.4	173.0	178.3	189.0	191.9	190.8	188.9		
	-23.97 -	153.7	163.0	168.0	165.0	156.2	150.5	156.3	168.0	173.0	173.8	173.5		
	-25.44 -	151.6	158.0	164.6	161.7	153.7	149.9	156.9	168.4	175.6	175.7	175.3		- 175
	-26.315 -	152.6	163.1	168.8	170.2	163.0	163.3	169.5	182.3	187.3	188.4	186.6		
	-26.94 -	156.4	170.4	178.4	183.3	184.6	187.5	194.6	205.1	206.5	202.0	198.6		
	-27.44 -	161.7	178.6	192.4	204.7	219.1	232.3	240.5	241.1	236.4	225.9	219.3		
	-27.94 -	166.2	185.5	205.1	225.4	251.1	276.6	285.5	275.0	264.3	250.1	240.2		- 150
		7.124	7.493	7.82	8.254	9.014 R m	10.012 esh [/	11.011 cm]	11.753	12.119	12.326	12.547		I

Figure 155. Heat flux distribution for alternate 3 design IFE region on day 27 (see Section 7.4.4).

	27.94 -	285.4	275.9	269.7	265.1	241.9	211.5	186.8	164.4	144.6	127.6	115.8		- 360
	27.44 -	251.3	233.7	222.6	212.3	189.2	165.5	146.0	132.3	118.5	106.9	100.5		
	26.94 -	218.7	195.5	180.8	165.3	141.6	123.1	109.3	102.7	95.2	88.9	87.1		
	26.315 -	203.7	181.9	167.5	150.2	125.9	108.0	97.3	91.8	88.0	84.2	83.0		
	25.44 -	192.3	170.7	155.7	138.9	117.3	100.1	90.1	86.1	83.6	80.6	79.0		- 300
	23.97 -	191.3	173.6	160.2	144.9	121.6	103.1	93.7	90.3	88.5	84.1	81.8		
	20.5 -	221.5	202.7	189.0	172.9	147.9	126.8	115.8	112.4	108.2	102.7	99.4		
	15.5 -	276.4	254.1	238.0	219.0	188.5	165.0	155.8	157.9	160.2	159.8	158.8		
	10.5 -	324.2	299.0	281.2	258.1	225.5	202.2	200.6	218.4	240.2	259.3	268.3		
	5.5 -	355.4	328.3	307.4	284.1	249.7	226.8	229.0	254.2	286.0	313.5	327.5		- 240
cm]	2.0 -	368.1	339.2	317.9	293.0	257.6	235.5	240.6	270.0	307.4	341.3	356.9		/cm2]
esh [0.0 -	365.7	336.6	317.0	293.2	257.6	234.9	239.8	271.1	311.3	347.0	365.1		lux [W
Ĕ	-2.0 -	361.9	335.9	315.0	290.5	255.6	232.9	235.6	262.4	295.6	324.1	338.5		Heat f
	-5.5 -	347.8	320.8	300.7	278.3	243.5	220.0	220.4	243.6	272.2	295.5	306.7		- 180
	-10.5 -	311.3	286.9	268.1	247.9	216.3	192.6	189.8	205.8	226.4	242.6	248.1		
	-15.5 -	261.9	240.4	224.7	205.6	175.8	151.2	139.0	133.9	129.0	122.0	116.5		
	-20.5 -	205.7	188.2	174.4	158.0	134.0	112.9	98.5	89.9	80.0	69.3	63.0		
	-23.97 -	174.6	158.3	145.7	130.4	108.9	90.2	78.7	71.1	63.1	54.1	49.2		- 120
	-25.44 -	175.0	155.9	142.1	125.0	102.9	84.5	73.6	65.4	58.3	51.4	46.7		
	-26.315 -	182.5	164.6	149.3	133.4	108.7	89.8	75.6	68.0	60.5	51.9	48.3		
	-26.94 -	197.4	174.6	160.4	144.9	121.5	99.4	84.2	74.4	64.4	55.8	50.2		
	-27.44 -	224.5	206.4	194.6	180.4	156.0	128.9	108.1	92.6	78.4	66.1	57.8		
	-27.94 -	251.0	242.2	232.5	220.0	193.3	161.8	133.6	112.3	94.4	76.6	66.7		- 60
15.139 15.521 15.837 16.252 17.007 18.007 19.006 19.752 20.279 20.67 20.955 R mesh [cm]														

Figure 156. Heat flux distribution for alternate 3 design OFE region on day 0 (see Section 7.4.4).

	27.94 -	265.4	259.6	255.1	244.4	224.9	196.3	173.8	155.4	138.7	119.6	111.6		
	27.44 -	234.1	219.2	208.3	197.0	176.2	153.5	136.1	124.0	114.2	103.4	97.6		
	26.94 -	204 1	182.0	166 3	153.8	131 7	113.6	101.6	95 5	92.1	88.9	85.3		
	20.94	100.1	102.0	150.5	100.0	131.7			06.0	04.0	00.5	01.0		- 400
	26.315 -	190.1	168.1	153.4	138.9	116.7	99.2	89.9	86.8	84.9	83.6	81.8		
	25.44 -	179.6	159.2	145.6	130.4	108.8	93.7	85.4	83.7	81.9	79.1	79.2		
	23.97 -	178.9	163.0	149.3	134.0	113.8	97.6	89.9	90.0	89.3	88.1	86.7		
	20.5 -	208.6	191.4	177.5	162.3	140.4	123.9	119.5	125.4	132.2	137.5	139.7		
	15.5 -	261.2	239.9	224.3	206.9	180.6	162.9	162.1	176.9	197.4	214.0	222.6		- 320
	10.5 -	307.4	283.4	265.9	245.6	216.4	197.7	201.2	225.5	257.1	284.7	298.4		
	5.5 -	339.3	312.7	293.8	272.5	242.0	224.3	236.6	277.5	330.7	380.2	406.8		
esh [cm]	2.0 -	351.5	325.2	305.6	282.6	250.8	233.8	250.9	298.8	360.2	419.1	451.7		/cm2]
	0.0 -	354.6	327.1	306.9	284.0	252.7	236.0	253.3	302.7	364.8	423.4	455.1		lux [W/
й И	-2.0 -	350.4	323.1	302.0	280.8	249.6	234.6	251.5	299.5	362.1	420.6	454.2		Heat 1 042 -
	-5.5 -	337.5	310.1	291.2	269.8	239.3	222.3	235.3	275.6	329.1	379.1	406.8		
	-10.5 -	302.1	277.2	260.1	240.1	210.8	191.8	194.2	215.2	242.2	265.3	276.3		
	-15.5 -	254.8	234.2	218.0	200.6	174.2	156.2	154.7	167.9	184.5	198.2	204.4		
	-20.5 -	200.9	183.0	169.8	154.7	132.9	116.2	109.4	110.9	114.2	115.3	115.3		- 160
	-23.97 -	169.8	153.1	140.5	126.0	105.5	89.5	78.1	72.2	66.2	58.8	54.5		
	-25.44 -	168.9	151.0	134.9	120.6	99.1	83.1	71.7	65.9	60.4	52.5	48.3		
	-26.315 -	177.7	158.2	143.6	126.8	103.5	86.4	73.9	66.1	60.3	52.7	48.4		
	-26.94 -	193.1	169.9	157.2	137.6	115.7	95.7	80.7	71.4	63.0	55.7	50.4		
	-27.44 -	219.6	200.5	189.5	173.9	150.3	125.0	104.5	91.1	77.5	66.0	57.5		- 80
	-27.94 -	245.3	233.4	223.7	214.8	187.7	157.4	131.3	113.1	94.1	77.2	65.1		
		15.139	15.521	15.837	16.252	17.007 R m	18.007 esh [19.006 cm]	19.752	20.279	20.67	20.955		

Figure 157. Heat flux distribution for alternate 3 design OFE region on day 1 (see Section 7.4.4).

	27.94 -	263.8	256.6	249.0	246.1	223.8	196.8	171.8	155.7	138.1	121.8	112.4		
	27.44 -	230.7	215.5	204.9	196.3	175.1	152.6	133.8	123.3	113.4	103.8	98.9		
	26.94 -	200.3	179.0	165.9	151.7	130.6	112.3	100.0	95.0	91.1	87.6	86.7		
	26.315 -	188.5	167.7	153.9	137.3	115.5	98.8	90.0	87.5	84.7	83.2	82.8		- 400
	25.44 -	177.6	158.3	143.4	128.4	108.2	92.7	85.0	83.0	83.8	82.8	81.2		
	23.97 -	176.8	159.6	146.8	132.8	112.3	97.8	91.3	92.2	93.0	92.8	92.8		
	20.5 -	206.6	188.7	176.0	161.1	139.4	124.2	120.7	128.1	137.2	144.5	148.3		
	15.5 -	258.5	237.9	222.8	204.9	178.9	162.2	162.4	177.5	196.4	211.6	218.7		- 320
	10.5 -	303.3	279.5	262.1	242.8	214.3	196.5	202.4	229.6	263.1	292.6	307.3		520
	5.5 -	336.3	309.8	291.2	269.7	239.4	223.0	237.9	281.5	337.8	389.3	417.7		
сIJ	2.0 -	346.9	319.0	300.4	280.3	249.5	234.3	252.1	300.6	362.2	421.9	454.4		(cm2]
esh [0.0 -	348.3	322.5	302.5	280.6	250.0	234.2	252.8	302.5	366.1	425.9	457.8		lux [W/
Ĕ	-2.0 -	346.9	320.5	300.2	279.6	249.4	232.7	250.6	299.4	363.2	421.7	451.4		Heat f
	-5.5 -	333.9	309.0	289.7	268.5	238.8	222.3	236.5	280.4	336.8	389.7	417.8		
	-10.5 -	299.5	276.9	259.7	239.5	210.6	192.4	196.2	220.3	249.9	275.5	287.7		
	-15.5 -	252.4	232.0	216.6	198.6	173.9	156.1	154.3	166.3	182.1	193.9	198.8		
	-20.5 -	198.8	182.5	169.6	154.2	133.7	117.1	113.2	117.4	124.3	128.8	130.4		- 160
	-23.97 -	170.1	152.3	139.9	126.2	106.0	90.1	80.7	76.0	71.3	65.2	61.1		
	-25.44 -	170.3	150.6	135.6	120.7	100.0	83.5	72.7	67.1	60.8	54.5	49.9		
	-26.315 -	179.3	156.9	143.4	127.2	105.3	87.1	75.7	67.8	60.9	53.4	50.2		
	-26.94 -	191.9	172.4	154.9	139.8	116.9	96.5	83.6	74.0	64.8	56.1	52.0		
	-27.44 -	218.2	201.8	189.2	176.1	151.2	126.6	107.5	92.4	78.6	66.1	59.8		- 80
	-27.94 -	245.3	230.6	227.4	215.8	188.6	159.7	133.7	112.1	93.9	77.0	68.8		
		15.139	15.521	15.837	16.252	17.007 R m	18.007 esh [-	19.006 cm]	19.752	20.279	20.67	20.955		

Figure 158. Heat flux distribution for alternate 3 design OFE region on day 2 (see Section 7.4.4).

	27.94 -	243.1	238.4	240.6	233.1	216.5	195.8	178.3	166.9	153.9	141.7	132.2		
	27.44	217.0	209.1	2021	102.0	172.6	155.0	142.2	125 1	120.0	124.0	110.7		
	27.44 -	217.9	208.1	203.1	193.0	173.0		142.2	133.1	130.0	124.0	119.7		- 360
	26.94 -	192.5	177.6	167.4	155.7	133.9	118.1	109.2	107.6	110.4	109.6	110.0		
	26.315 -	178.9	162.5	151.8	138.6	119.2	103.0	98.1	101.3	105.7	108.7	110.6		
	25.44 -	170.5	156.5	142.4	130.1	111.2	96.5	93.0	99.0	105.7	110.0	112.0		
	23.97 -	171.2	157.5	146.5	132.9	114.9	101.4	99.3	106.9	114.8	121.3	122.1		
	20.5 -	195.6	181.8	172.4	159.1	139.0	125.4	124.5	134.3	146.3	154.7	158.5		- 300
	15.5 -	240.3	225.3	214.4	199.9	177.3	162.4	167.7	190.1	216.4	236.5	245.3		
	10.5 -	276.3	262.1	249.4	233.9	209.9	196.5	210.9	250.0	294.8	328.1	340.3		
	5.5 -	299.8	283.9	272.3	256.3	230.5	217.2	235.3	282.0	332.4	366.1	377.3		
cm]	2.0 -	307.2	292.3	281.3	264.5	238.3	223.9	242.9	291.9	344.2	376.8	385.5		cm2]
ssh [0.0 -	308.9	293.7	282.3	265.6	238.4	225.0	245.4	294.3	345.6	378.5	388.1		- 240 Å
ŭ Z	-2.0 -	305.9	291.2	280.4	264.1	237.2	224.1	243.4	291.6	342.7	375.7	387.4		Heat f
	-5.5 -	299.0	284.9	272.1	256.3	230.7	217.4	237.1	283.4	334.0	367.8	378.6		
	-10.5 -	276.0	260.9	249.7	234.0	209.2	196.0	211.0	250.9	297.2	331.2	345.8		
	-15.5 -	239.0	225.5	213.3	199.2	175.9	160.2	164.1	183.2	206.1	223.9	231.3		- 180
	-20.5 -	195.1	181.9	171.1	157.8	137.1	121.8	118.4	125.1	132.5	137.2	138.3		100
	-23.97 -	169.9	155.7	145.7	131.2	111.9	97.5	94.0	97.7	102.2	106.3	107.5		
	-25.44 -	171.7	156.0	144.2	128.9	107.5	92.2	87.3	90.1	93.5	95.4	96.9		
	-26.315 -	181.4	163.1	150.7	135.8	115.0	98.1	89.8	90.0	89.5	90.2	90.7		
	-26.94 -	194.6	178.5	165.6	151.0	129.2	110.2	98.7	94.0	91.0	88.2	86.6		- 120
	-27.44 -	220.5	209.1	200.2	188.4	166.2	142.1	124.5	113.6	103.9	94.2	88.8		
	-27.94 -	246.6	239.7	236.0	227.9	206.0	176.3	152.4	136.1	118.7	102.4	93.2		
		15.139	15.521	15.837	16.252	17.007 R m	18.007 esh [19.006 cm]	19.752	20.279	20.67	20.955		

Figure 159. Heat flux distribution for alternate 3 design OFE region on day 15 (see Section 7.4.4).

	27.94 -	237.1	237.9	244.7	244.8	234.6	219.7	208.2	208.7	205.5	196.2	190.7			- 320
	27.44 -	216.8	210.8	209.0	203.8	190.6	176.6	170.0	174.8	178.5	179.8	179.0			
	26.94 -	196.0	184.8	175.3	165.4	148.8	135.6	134.2	143.8	155.3	165.7	169.0			
	26.315 -	183.5	171.9	161.3	149.8	131.1	118.5	120.5	133.9	151.2	164.9	170.5		- 2	
	25.44 -	173.1	160.2	152.1	139.5	121.1	109.9	114.4	131.4	154.3	173.6	183.4			- 280
	23.97 -	171.6	159.8	151.5	141.3	123.7	114.0	121.6	144.3	175.3	200.3	211.6			
	20.5 -	190.2	181.8	174.1	164.6	146.8	137.9	151.0	182.4	219.6	249.3	262.2			
	15.5 -	222.4	214.7	207.8	197.4	177.9	169.4	186.1	224.9	267.1	296.2	305.2			
	10.5 -	245.0	237.3	232.4	221.2	200.5	191.1	210.6	252.9	293.9	314.2	315.8			- 240
	5.5 -	257.4	251.0	246.4	236.1	214.5	204.2	225.1	268.4	306.8	320.3	316.4			
cm]	2.0 -	263.4	257.3	251.5	241.4	220.0	209.8	229.7	274.0	311.9	323.4	317.2			(cm2]
esh [0.0 -	262.7	255.6	251.8	242.4	221.2	211.1	231.3	274.9	313.0	323.9	317.5			lux [W/
Ĕ	-2.0 -	262.7	256.9	252.3	240.9	220.2	210.3	231.4	275.3	312.6	322.8	316.7			Heat
	-5.5 -	259.7	254.0	247.8	237.5	215.7	206.2	226.9	271.3	308.9	321.7	318.0			- 200
	-10.5 -	247.4	239.8	235.0	224.3	203.4	193.3	212.3	254.6	295.6	315.4	317.1			
	-15.5 -	227.3	219.1	212.4	201.4	181.7	171.9	188.5	228.2	271.6	301.9	313.2			
	-20.5 -	196.3	186.8	178.8	168.2	150.4	140.9	153.5	185.9	224.9	257.1	273.7			
	-23.97 -	177.5	167.6	155.6	144.1	126.2	115.8	122.8	145.6	175.1	201.2	214.4			- 160
	-25.44 -	180.8	167.1	158.0	144.9	123.5	111.3	113.5	129.5	148.6	165.8	172.6			
	-26.315 -	192.4	178.4	167.8	154.7	133.8	119.3	117.1	126.4	140.0	149.9	155.8			
	-26.94 -	205.7	193.7	187.0	174.4	152.9	135.0	128.8	134.1	140.3	148.4	150.7			
	-27.44 -	228.6	224.4	221.2	214.0	195.1	175.8	163.9	163.4	162.0	160.2	156.2			- 120
	-27.94 -	251.4	256.0	254.2	253.9	238.9	219.7	202.3	195.6	188.5	173.9	164.1			120
		15.139	15.521	15.837	16.252	17.007 R m	18.007 esh [19.006 cm]	19.752	20.279	20.67	20.955			

Figure 160. Heat flux distribution for alternate 3 design OFE region on day 27 (see Section 7.4.4).