	R	S	T	U
307				
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310				
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313				
314				
315				
316				
317				
318				
319				
320				
321				
322	**DHLW**		(atoms/barn cm)	
323				
324	H	1001.50C	2.0022E-02	
325	O	8016.50C	2.3337E-02	
326	F	9019.50C	4.3534E-07	
327	Na	11023.50C	1.8485E-05	
328	Mg	12000.50C	1.9042E-04	
329	Al	13027.50C	8.7415E-04	
330	Si	14000.50C	4.5802E-03	
331	P	15031.50C	1.3060E-06	
332	K	19000.50C	3.3981E-04	
333	Ca	20000.50C	9.9735E-05	
334	Mn	25055.50C	1.8519E-04	
335	Fe	26000.55C	1.2398E-03	
336	Ni	28000.50C	1.5235E-04	
337				
338				
339				
340	Pu-239	94239.55C	7.6576E-10	
341	Total		5.1041E-02	
342				
343				
344				
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353				
354				
355				
356				
357	**DHLW**		(atoms/barn cm)	

	R	S	T	U
358				
359	H	1001.50C	2.0022E-02	
360	O	8016.50C	2.3337E-02	
361	F	9019.50C	4.3534E-07	
362	Na	11023.50C	1.8485E-05	
363	Mg	12000.50C	1.9042E-04	
364	Al	13027.50C	8.7415E-04	
365	Si	14000.50C	4.5802E-03	
366	P	15031.50C	1.3060E-06	
367	K	19000.50C	3.3981E-04	
368	Ca	20000.50C	9.9735E-05	
369	Mn	25055.50C	1.8519E-04	
370	Fe	26000.55C	1.2398E-03	
371	Ni	28000.50C	1.5235E-04	
372				
373				
374				
375	Pu-239	94239.55C	7.6576E-10	
376	Total		5.1041E-02	
377				
378				
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380				
381				
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386				
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388				
389				
390				
391				
392	**DHLW**		(atoms/barn cm)	
393				
394	H	1001.50C	2.0022E-02	
395	O	8016.50C	2.3337E-02	
396	F	9019.50C	4.3534E-07	
397	Na	11023.50C	1.8485E-05	
398	Mg	12000.50C	1.9042E-04	
399	Al	13027.50C	8.7415E-04	
400	Si	14000.50C	4.5802E-03	
401	P	15031.50C	1.3060E-06	
402	K	19000.50C	3.3981E-04	
403	Ca	20000.50C	9.9735E-05	
404	Mn	25055.50C	1.8519E-04	
405	Fe	26000.55C	1.2398E-03	
406	Ni	28000.50C	1.5235E-04	
407				
408				

	R	S	T	U
409				
410	Pu-239	94239.55C	7.6576E-10	
411	Total		5.1041E-02	
412				
413				
414				
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416				
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418				
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421				
422				
423				
424				
425				
426				
427	**DHLW**		(atoms/barn cm)	
428				
429	H	1001.50C	2.0022E-02	
430	O	8016.50C	2.3337E-02	
431	F	9019.50C	4.3534E-07	
432	Na	11023.50C	1.8485E-05	
433	Mg	12000.50C	1.9042E-04	
434	Al	13027.50C	8.7415E-04	
435	Si	14000.50C	4.5802E-03	
436	P	15031.50C	1.3060E-06	
437	K	19000.50C	3.3981E-04	
438	Ca	20000.50C	9.9735E-05	
439	Mn	25055.50C	1.8519E-04	
440	Fe	26000.55C	1.2398E-03	
441	Ni	28000.50C	1.5235E-04	
442				
443				
444				
445	Pu-239	94239.55C	7.6576E-10	
446	Total		5.1041E-02	
447				
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	R	S	T	U
460				
461				
462	**DHLW**		(atoms/barn cm)	
463				
464	H	1001.50C	2.0022E-02	
465	O	8016.50C	2.3337E-02	
466	F	9019.50C	4.3534E-07	
467	Na	11023.50C	1.8485E-05	
468	Mg	12000.50C	1.9042E-04	
469	Al	13027.50C	8.7415E-04	
470	Si	14000.50C	4.5802E-03	
471	P	15031.50C	1.3060E-06	
472	K	19000.50C	3.3981E-04	
473	Ca	20000.50C	9.9735E-05	
474	Mn	25055.50C	1.8519E-04	
475	Fe	26000.55C	1.2398E-03	
476	Ni	28000.50C	1.5235E-04	
477				
478				
479				
480	Pu-239	94239.55C	7.6576E-10	
481	Total		5.1041E-02	
482				
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491				
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493				
494				
495				
496				
497	**DHLW**		(atoms/barn cm)	
498				
499	H	1001.50C	2.0022E-02	
500	O	8016.50C	2.3337E-02	
501	F	9019.50C	4.3534E-07	
502	Na	11023.50C	1.8485E-05	
503	Mg	12000.50C	1.9042E-04	
504	Al	13027.50C	8.7415E-04	
505	Si	14000.50C	4.5802E-03	
506	P	15031.50C	1.3060E-06	
507	K	19000.50C	3.3981E-04	
508	Ca	20000.50C	9.9735E-05	
509	Mn	25055.50C	1.8519E-04	
510	Fe	26000.55C	1.2398E-03	

	R	S	T	U
511	Ni	28000.50C	1.5235E-04	
512				
513				
514				
515	Pu-239	94239.55C	7.6576E-10	
516	Total		5.1041E-02	
517				
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529				
530				
531				
532	**DHLW**		(atoms/barn cm)	
533				
534	H	1001.50C	2.0022E-02	
535	O	8016.50C	2.3337E-02	
536	F	9019.50C	4.3534E-07	
537	Na	11023.50C	1.8485E-05	
538	Mg	12000.50C	1.9042E-04	
539	Al	13027.50C	8.7415E-04	
540	Si	14000.50C	4.5802E-03	
541	P	15031.50C	1.3060E-06	
542	K	19000.50C	3.3981E-04	
543	Ca	20000.50C	9.9735E-05	
544	Mn	25055.50C	1.8519E-04	
545	Fe	26000.55C	1.2398E-03	
546	Ni	28000.50C	1.5235E-04	
547				
548				
549				
550	Pu-239	94239.55C	7.6576E-10	
551	Total		5.1041E-02	
552				
553				
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558				
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560				
561				

	A	B	C	D	E	F	G	H
1								
2		**50% Uranium Loading**						
3								
4								
5				**DHLW and Degraded MIT Fuel Homogeneous Mixture below**				
6				**(0% DHLW in Mixture, 0.272 Void Fraction, 0 g Gd, 0 g Fe2O3**				
7							DHLW Clay	
8		Cylinder Segment Volume Calculation					(atom/barn/cm)	
9							H	3.55893E-03
10		Geometry Calculations					O	1.97883E-02
11							F	5.88292E-07
12		UO2 Frac. Remaing		0.50			Na	2.49797E-05
13		Cylinder Radius		86.5	cm		Mg	2.57324E-04
14		Cylinder Length		304	cm		Al	1.18129E-03
15		Cylinder Volume		7.1459E+06	cm^3		Si	6.18950E-03
16		1/2 Cylinder Volume		3.5729E+06			P	1.76488E-06
17		DHLW Volume		4.9933E+06	cm^3		K	4.59207E-04
18		Degraded MIT Volume		1.9914E+05	cm^3		Ca	1.34777E-04
19		Mass of Gd		0.0000E+00	g		Mn	2.50252E-04
20		Den. of Gd		7.9004E+00	g/cm^3		Fe	1.67546E-03
21		Vol. of Gd		0.0000E+00	cm^3		Ni	2.05882E-04
22		Mass of Fe2O3		0.0000E+00	g		U-238	0.00000E+00
23		Den. of Fe2O3		5.2400E+00	g/cm^3			
24		Vol. of Fe2O3		0.0000E+00	cm^3			
25	Total	Void Fraction					Pu-239	1.03481E-09
26		Total Volume		7.1325E+06	cm^3			
27		Calculated Volume		7.1325E+06	cm^3		Total	3.37283E-02
28	Mixture	Distance from Center		8.46500E+01	cm			
29		Frac. of DHLW Mixed						
30		with MIT Fuel		0.0000E+00				
31		Mixture Volume		2.7354E+05	cm^3			
32		Calculated Volume		2.7354E+05	cm^3			
33		Distance from Center		-7.24600E+01	cm			
34								
35								
36								
37								
38								
39								
40				**DHLW and Degraded MIT Fuel Homogeneous Mixture below**				
41				**(5% DHLW in Mixture, 0.272 Void Fraction, 0 g Gd, 0 g Fe2O3**				
42							DHLW Clay	
43		Cylinder Segment Volume Calculation					(atom/barn/cm)	
44							H	3.55893E-03
45		Geometry Calculations					O	1.97883E-02
46							F	5.88292E-07
47		UO2 Frac. Remaing		0.50			Na	2.49797E-05
48		Cylinder Radius		86.5	cm		Mg	2.57324E-04
49		Cylinder Length		304	cm		Al	1.18129E-03
50		Cylinder Volume		7.1459E+06	cm^3		Si	6.18950E-03
51		1/2 Cylinder Volume		3.5729E+06			P	1.76488E-06

	A	B	C	D	E	F	G	H
52		DHLW Volume		4.9933E+06	cm^3		K	4.59207E-04
53		Degraded MIT Volume		1.9914E+05	cm^3		Ca	1.34777E-04
54		Mass of Gd		0.0000E+00	g		Mn	2.50252E-04
55		Den. of Gd		7.9004E+00	g/cm^3		Fe	1.67546E-03
56		Vol. of Gd		0.0000E+00	cm^3		Ni	2.05882E-04
57		Mass of Fe2O3		0.0000E+00	g		U-238	0.00000E+00
58		Den. of Fe2O3		5.2400E+00	g/cm^3			
59		Vol. of Fe2O3		0.0000E+00	cm^3			
60	Total	Void Fraction					Pu-239	1.03481E-09
61		Total Volume		7.1325E+06	cm^3			
62		Calculated Volume		7.1325E+06	cm^3		Total	3.37283E-02
63	Mixture	Distance from Center		8.46500E+01	cm			
64		Frac. of DHLW Mixed						
65		with MIT Fuel		5.0000E-02				
66		Mixture Volume		6.1649E+05	cm^3			
67		Calculated Volume		6.1649E+05	cm^3			
68		Distance from Center		-6.20500E+01	cm			
69								
70								
71								
72								
73								
74								
75				**DHLW and Degraded MIT Fuel Homogeneous Mixture below**				
76				**(10% DHLW in Mixture, 0.272 Void Fraction, 0 g Gd, 0 g Fe2O**				
77							DHLW Clay	
78		Cylinder Segment Volume Calculation					(atom/barn/cm)	
79							H	3.55893E-03
80		Geometry Calculations					O	1.97883E-02
81							F	5.88292E-07
82		UO2 Frac. Remaing		0.50			Na	2.49797E-05
83		Cylinder Radius		86.5	cm		Mg	2.57324E-04
84		Cylinder Length		304	cm		Al	1.18129E-03
85		Cylinder Volume		7.1459E+06	cm^3		Si	6.18950E-03
86		1/2 Cylinder Volume		3.5729E+06			P	1.76488E-06
87		DHLW Volume		4.9933E+06	cm^3		K	4.59207E-04
88		Degraded MIT Volume		1.9914E+05	cm^3		Ca	1.34777E-04
89		Mass of Gd		0.0000E+00	g		Mn	2.50252E-04
90		Den. of Gd		7.9004E+00	g/cm^3		Fe	1.67546E-03
91		Vol. of Gd		0.0000E+00	cm^3		Ni	2.05882E-04
92		Mass of Fe2O3		0.0000E+00	g		U-238	0.00000E+00
93		Den. of Fe2O3		5.2400E+00	g/cm^3			
94		Vol. of Fe2O3		0.0000E+00	cm^3			
95	Total	Void Fraction					Pu-239	1.03481E-09
96		Total Volume		7.1325E+06	cm^3			
97		Calculated Volume		7.1325E+06	cm^3		Total	3.37283E-02
98	Mixture	Distance from Center		8.46500E+01	cm			
99		Frac. of DHLW Mixed						
100		with MIT Fuel		1.0000E-01				
101		Mixture Volume		9.5944E+05	cm^3			
102		Calculated Volume		9.5944E+05	cm^3			

	A	B	C	D	E	F	G	H
103		Distance from Center		5.32886E+01	cm			
104								
105								
106								
107								
108								
109								
110				**DHLW and Degraded MIT Fuel Homogeneous Mixture below**				
111				**(15% DHLW in Mixture, 0.272 Void Fraction, 0 g Gd, 0 g Fe2O**				
112							DHLW Clay	
113		Cylinder Segment Volume Calculation					(atom/barn/cm)	
114							H	3.55893E-03
115		Geometry Calculations					O	1.97883E-02
116							F	5.88292E-07
117		UO2 Frac. Remaing		0.50			Na	2.49797E-05
118		Cylinder Radius		86.5	cm		Mg	2.57324E-04
119		Cylinder Length		304	cm		Al	1.18129E-03
120		Cylinder Volume		7.1459E+06	cm^3		Si	6.18950E-03
121		1/2 Cylinder Volume		3.5729E+06			P	1.76488E-06
122		DHLW Volume		4.9933E+06	cm^3		K	4.59207E-04
123		Degraded MIT Volume		1.9914E+05	cm^3		Ca	1.34777E-04
124		Mass of Gd		0.0000E+00	g		Mn	2.50252E-04
125		Den. of Gd		7.9004E+00	g/cm^3		Fe	1.67546E-03
126		Vol. of Gd		0.0000E+00	cm^3		Ni	2.05882E-04
127		Mass of Fe2O3		0.0000E+00	g		U-238	0.00000E+00
128		Den. of Fe2O3		5.2400E+00	g/cm^3			
129		Vol. of Fe2O3		0.0000E+00	cm^3			
130	Total	Void Fraction					Pu-239	1.03481E-09
131		Total Volume		7.1325E+06	cm^3			
132		Calculated Volume		7.1325E+06	cm^3		Total	3.37283E-02
133	Mixture	Distance from Center		8.46500E+01	cm			
134		Frac. of DHLW Mixed						
135		with MIT Fuel		1.5000E-01				
136		Mixture Volume		1.3024E+06	cm^3			
137		Calculated Volume		1.3024E+06	cm^3			
138		Distance from Center		-4.53450E+01	cm			
139								
140								
141								
142								
143								
144								
145				**DHLW and Degraded MIT Fuel Homogeneous Mixture below**				
146				**(20% DHLW in Mixture, 0.272 Void Fraction, 0 g Gd, 0 g Fe2O**				
147							DHLW Clay	
148		Cylinder Segment Volume Calculation					(atom/barn/cm)	
149							H	3.55893E-03
150		Geometry Calculations					O	1.97883E-02
151							F	5.88292E-07
152		UO2 Frac. Remaing		0.50			Na	2.49797E-05
153		Cylinder Radius		86.5	cm		Mg	2.57324E-04

	A	B	C	D	E	F	G	H
154		Cylinder Length		304	cm		Al	1.18129E-03
155		Cylinder Volume		7.1459E+06	cm^3		Si	6.18950E-03
156		1/2 Cylinder Volume		3.5729E+06			P	1.76488E-06
157		DHLW Volume		4.9933E+06	cm^3		K	4.59207E-04
158		Degraded MIT Volume		1.9914E+05	cm^3		Ca	1.34777E-04
159		Mass of Gd		0.0000E+00	g		Mn	2.50252E-04
160		Den. of Gd		7.9004E+00	g/cm^3		Fe	1.67546E-03
161		Vol. of Gd		0.0000E+00	cm^3		Ni	2.05882E-04
162		Mass of Fe2O3		0.0000E+00	g		U-238	0.00000E+00
163		Den. of Fe2O3		5.2400E+00	g/cm^3			
164		Vol. of Fe2O3		0.0000E+00	cm^3			
165	Total	Void Fraction					Pu-239	1.03481E-09
166		Total Volume		7.1325E+06	cm^3			
167		Calculated Volume		7.1325E+06	cm^3		Total	3.37283E-02
168	Mixture	Distance from Center		8.46500E+01	cm			
169		Frac. of DHLW Mixed						
170		with MIT Fuel		2.0000E-01				
171		Mixture Volume		1.6453E+06	cm^3			
172		Calculated Volume		1.6453E+06	cm^3			
173		Distance from Center		-3.79030E+01	cm			
174								
175								
176								
177								
178								
179								
180				**DHLW and Degraded MIT Fuel Homogeneous Mixture below**				
181				**(25% DHLW in Mixture, 0.272 Void Fraction, 0 g Gd, 0 g Fe2O**				
182							DHLW Clay	
183		Cylinder Segment Volume Calculation					(atom/barn/cm)	
184							H	3.55893E-03
185		Geometry Calculations					O	1.97883E-02
186							F	5.88292E-07
187		UO2 Frac. Remaing		0.50			Na	2.49797E-05
188		Cylinder Radius		86.5	cm		Mg	2.57324E-04
189		Cylinder Length		304	cm		Al	1.18129E-03
190		Cylinder Volume		7.1459E+06	cm^3		Si	6.18950E-03
191		1/2 Cylinder Volume		3.5729E+06			P	1.76488E-06
192		DHLW Volume		4.9933E+06	cm^3		K	4.59207E-04
193		Degraded MIT Volume		1.9914E+05	cm^3		Ca	1.34777E-04
194		Mass of Gd		0.0000E+00	g		Mn	2.50252E-04
195		Den. of Gd		7.9004E+00	g/cm^3		Fe	1.67546E-03
196		Vol. of Gd		0.0000E+00	cm^3		Ni	2.05882E-04
197		Mass of Fe2O3		0.0000E+00	g		U-238	0.00000E+00
198		Den. of Fe2O3		5.2400E+00	g/cm^3			
199		Vol. of Fe2O3		0.0000E+00	cm^3			
200	Total	Void Fraction					Pu-239	1.03481E-09
201		Total Volume		7.1325E+06	cm^3			
202		Calculated Volume		7.1325E+06	cm^3		Total	3.37283E-02
203	Mixture	Distance from Center		8.46500E+01	cm			
204		Frac. of DHLW Mixed						

	A	B	C	D	E	F	G	H
205		with MIT Fuel		2.5000E-01				
206		Mixture Volume		1.9883E+06	cm^3			
207		Calculated Volume		1.9883E+06	cm^3			
208		Distance from Center		-3.0794OE+01	cm			
209								
210								
211								

	I	J	K	L	M	N	O	P	Q
1									
2									
3									
4						Void Frac.	0.272		
5	**DHLW**								
6	)								
7		Degraded MIT Fuel				**Mixture**		(atoms/barn cm)	
8			Mass(g)	WT					
9						H	1001.50C	1.8191E-02	
10		O	3.71E+05	15.99492		O	8016.50C	6.0103E-02	
11						F	9019.50C	0.0000E+00	
12						Na	11023.50C	0.0000E+00	
13						Mg	12000.50C	0.0000E+00	
14		Al	4.14E+05	26.98154		Al	13027.50C	3.3797E-02	
15						Si	14000.50C	0.0000E+00	
16						P	15031.50C	0.0000E+00	
17						K	19000.50C	0.0000E+00	
18						Ca	20000.50C	0.0000E+00	
19						Mn	25055.50C	0.0000E+00	
20		Fe	0.00E+00	55.847		Fe	26000.55C	0.0000E+00	
21						Ni	28000.50C	0.0000E+00	
22		U-238	968	238.0508		U-238	92238.50C	8.9527E-06	
23		U-235	16456	235.0439		U-235	92235.50C	1.5414E-04	
24		U-234	176	234.0409		U-234	92234.50C	1.6557E-06	
25						Pu-239	94239.55C	0.0000E+00	
26		Gd	0.0000E+00	157.25		Gd-152	64152.50C	0.0000E+00	
27						Gd-154	64154.50C	0.0000E+00	
28						Gd-155	64155.50C	0.0000E+00	
29						Gd-156	64156.50C	0.0000E+00	
30						Gd-157	64157.50C	0.0000E+00	
31						Gd-158	64158.50C	0.0000E+00	
32						Gd-160	64160.50C	0.0000E+00	
33									
34						Total		1.1226E-01	
35									
36						H/U-235		118.012192	
37									
38									
39						Void Frac.	0.272		
40	**DHLW**								
41	)								
42		Degraded MIT Fuel				**Mixture**		(atoms/barn cm)	
43			Mass(g)	WT					
44						H	1001.50C	1.9632E-02	
45		O	3.71E+05	15.99492		O	8016.50C	3.9742E-02	
46						F	9019.50C	2.3824E-07	
47						Na	11023.50C	1.0116E-05	
48						Mg	12000.50C	1.0421E-04	
49		Al	4.14E+05	26.98154		Al	13027.50C	1.5475E-02	
50						Si	14000.50C	2.5066E-03	
51						P	15031.50C	7.1473E-07	

	I	J	K	L	M	N	O	P	Q
52						K	19000.50C	1.8597E-04	
53						Ca	20000.50C	5.4582E-05	
54						Mn	25055.50C	1.0135E-04	
55		Fe	0.00E+00	55.847		Fe	26000.55C	6.7852E-04	
56						Ni	28000.50C	8.3378E-05	
57		U-238	968	238.0508		U-238	92238.50C	3.9724E-06	
58		U-235	16456	235.0439		U-235	92235.50C	6.8395E-05	
59		U-234	176	234.0409		U-234	92234.50C	7.3464E-07	
60						Pu-239	94239.55C	4.1907E-10	
61		Gd	0.0000E+00	157.25		Gd-152	64152.50C	0.0000E+00	
62						Gd-154	64154.50C	0.0000E+00	
63						Gd-155	64155.50C	0.0000E+00	
64						Gd-156	64156.50C	0.0000E+00	
65						Gd-157	64157.50C	0.0000E+00	
66						Gd-158	64158.50C	0.0000E+00	
67						Gd-160	64160.50C	0.0000E+00	
68									
69						Total		7.8647E-02	
70									
71						H/U-235		287.038452	
72									
73									
74						Void Frac.	0.272		
75	**DHLW**								
76	**3)**								
77		Degraded MIT Fuel				**Mixture**		(atoms/barn cm)	
78			Mass(g)	WT					
79						H	1001.50C	2.0043E-02	
80		O	3.71E+05	15.99492		O	8016.50C	3.3937E-02	
81						F	9019.50C	3.0617E-07	
82						Na	11023.50C	1.3000E-05	
83						Mg	12000.50C	1.3392E-04	
84		Al	4.14E+05	26.98154		Al	13027.50C	1.0251E-02	
85						Si	14000.50C	3.2213E-03	
86						P	15031.50C	9.1851E-07	
87						K	19000.50C	2.3899E-04	
88						Ca	20000.50C	7.0143E-05	
89						Mn	25055.50C	1.3024E-04	
90		Fe	0.00E+00	55.847		Fe	26000.55C	8.7198E-04	
91						Ni	28000.50C	1.0715E-04	
92		U-238	968	238.0508		U-238	92238.50C	2.5525E-06	
93		U-235	16456	235.0439		U-235	92235.50C	4.3948E-05	
94		U-234	176	234.0409		U-234	92234.50C	4.7204E-07	
95						Pu-239	94239.55C	5.3855E-10	
96		Gd	0.0000E+00	157.25		Gd-152	64152.50C	0.0000E+00	
97						Gd-154	64154.50C	0.0000E+00	
98						Gd-155	64155.50C	0.0000E+00	
99						Gd-156	64156.50C	0.0000E+00	
100						Gd-157	64157.50C	0.0000E+00	
101						Gd-158	64158.50C	0.0000E+00	
102						Gd-160	64160.50C	0.0000E+00	

	I	J	K	L	M	N	O	P	Q
103									
104						Total		6.9065E-02	
105									
106						H/U-235		456.064713	
107									
108									
109						Void Frac.	0.272		
110	**DHLW**								
111	**3)**								
112		Degraded MIT Fuel				**Mixture**		(atoms/barn cm)	
113			Mass(g)	WT					
114						H	1001.50C	2.0238E-02	
115		O	3.71E+05	15.99492		O	8016.50C	3.1189E-02	
116						F	9019.50C	3.3832E-07	
117						Na	11023.50C	1.4366E-05	
118						Mg	12000.50C	1.4799E-04	
119		Al	4.14E+05	26.98154		Al	13027.50C	7.7779E-03	
120						Si	14000.50C	3.5596E-03	
121						P	15031.50C	1.0150E-06	
122						K	19000.50C	2.6409E-04	
123						Ca	20000.50C	7.7510E-05	
124						Mn	25055.50C	1.4392E-04	
125		Fe	0.00E+00	55.847		Fe	26000.55C	9.6355E-04	
126						Ni	28000.50C	1.1840E-04	
127		U-238	968	238.0508		U-238	92238.50C	1.8804E-06	
128		U-235	16456	235.0439		U-235	92235.50C	3.2375E-05	
129		U-234	176	234.0409		U-234	92234.50C	3.4774E-07	
130						Pu-239	94239.55C	5.9511E-10	
131		Gd	0.0000E+00	157.25		Gd-152	64152.50C	0.0000E+00	
132						Gd-154	64154.50C	0.0000E+00	
133						Gd-155	64155.50C	0.0000E+00	
134						Gd-156	64156.50C	0.0000E+00	
135						Gd-157	64157.50C	0.0000E+00	
136						Gd-158	64158.50C	0.0000E+00	
137						Gd-160	64160.50C	0.0000E+00	
138									
139						Total		6.4530E-02	
140									
141						H/U-235		625.090973	
142									
143									
144						Void Frac.	0.272		
145	**DHLW**								
146	**3)**								
147		Degraded MIT Fuel				**Mixture**		(atoms/barn cm)	
148			Mass(g)	WT					
149						H	1001.50C	2.0351E-02	
150		O	3.71E+05	15.99492		O	8016.50C	2.9586E-02	
151						F	9019.50C	3.5707E-07	
152						Na	11023.50C	1.5162E-05	
153						Mg	12000.50C	1.5619E-04	

	I	J	K	L	M	N	O	P	Q
154		Al	4.14E+05	26.98154		Al	13027.50C	6.3360E-03	
155						Si	14000.50C	3.7568E-03	
156						P	15031.50C	1.0712E-06	
157						K	19000.50C	2.7872E-04	
158						Ca	20000.50C	8.1805E-05	
159						Mn	25055.50C	1.5189E-04	
160		Fe	0.00E+00	55.847		Fe	26000.55C	1.0169E-03	
161						Ni	28000.50C	1.2496E-04	
162		U-238	968	238.0508		U-238	92238.50C	1.4884E-06	
163		U-235	16456	235.0439		U-235	92235.50C	2.5627E-05	
164		U-234	176	234.0409		U-234	92234.50C	2.7526E-07	
165						Pu-239	94239.55C	6.2809E-10	
166		Gd	0.0000E+00	157.25		Gd-152	64152.50C	0.0000E+00	
167						Gd-154	64154.50C	0.0000E+00	
168						Gd-155	64155.50C	0.0000E+00	
169						Gd-156	64156.50C	0.0000E+00	
170						Gd-157	64157.50C	0.0000E+00	
171						Gd-158	64158.50C	0.0000E+00	
172						Gd-160	64160.50C	0.0000E+00	
173									
174						Total		6.1885E-02	
175									
176						H/U-235		794.117233	
177									
178									
179						Void Frac.	0.272		
180	**DHLW**								
181	**3)**								
182		Degraded MIT Fuel				**Mixture**		(atoms/barn cm)	
183			Mass(g)	WT					
184						H	1001.50C	2.0425E-02	
185		O	3.71E+05	15.99492		O	8016.50C	2.8537E-02	
186						F	9019.50C	3.6935E-07	
187						Na	11023.50C	1.5683E-05	
188						Mg	12000.50C	1.6156E-04	
189		Al	4.14E+05	26.98154		Al	13027.50C	5.3915E-03	
190						Si	14000.50C	3.8860E-03	
191						P	15031.50C	1.1081E-06	
192						K	19000.50C	2.8831E-04	
193						Ca	20000.50C	8.4619E-05	
194						Mn	25055.50C	1.5712E-04	
195		Fe	0.00E+00	55.847		Fe	26000.55C	1.0519E-03	
196						Ni	28000.50C	1.2926E-04	
197		U-238	968	238.0508		U-238	92238.50C	1.2317E-06	
198		U-235	16456	235.0439		U-235	92235.50C	2.1207E-05	
199		U-234	176	234.0409		U-234	92234.50C	2.2778E-07	
200						Pu-239	94239.55C	6.4970E-10	
201		Gd	0.0000E+00	157.25		Gd-152	64152.50C	0.0000E+00	
202						Gd-154	64154.50C	0.0000E+00	
203						Gd-155	64155.50C	0.0000E+00	
204						Gd-156	64156.50C	0.0000E+00	

	I	J	K	L	M	N	O	P	Q
205						Gd-157	64157.50C	0.0000E+00	
206						Gd-158	64158.50C	0.0000E+00	
207						Gd-160	64160.50C	0.0000E+00	
208									
209						Total		6.0152E-02	
210									
211						H/U-235		963.143493	

	R	S	T	U
1				
2				
3				
4				
5				
6				
7	**DHLW**		(atoms/barn cm)	
8				
9	H	1001.50C	2.0782E-02	
10	O	8016.50C	2.3501E-02	
11	F	9019.50C	4.2828E-07	
12	Na	11023.50C	1.8185E-05	
13	Mg	12000.50C	1.8733E-04	
14	Al	13027.50C	8.5998E-04	
15	Si	14000.50C	4.5060E-03	
16	P	15031.50C	1.2848E-06	
17	K	19000.50C	3.3430E-04	
18	Ca	20000.50C	9.8118E-05	
19	Mn	25055.50C	1.8218E-04	
20	Fe	26000.55C	1.2197E-03	
21	Ni	28000.50C	1.4988E-04	
22				
23				
24				
25	Pu-239	94239.55C	7.5334E-10	
26	Total		5.1840E-02	
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42	**DHLW**		(atoms/barn cm)	
43				
44	H	1001.50C	2.0782E-02	
45	O	8016.50C	2.3501E-02	
46	F	9019.50C	4.2828E-07	
47	Na	11023.50C	1.8185E-05	
48	Mg	12000.50C	1.8733E-04	
49	Al	13027.50C	8.5998E-04	
50	Si	14000.50C	4.5060E-03	
51	P	15031.50C	1.2848E-06	

	R	S	T	U
52	K	19000.50C	3.3430E-04	
53	Ca	20000.50C	9.8118E-05	
54	Mn	25055.50C	1.8218E-04	
55	Fe	26000.55C	1.2197E-03	
56	Ni	28000.50C	1.4988E-04	
57				
58				
59				
60	Pu-239	94239.55C	7.5334E-10	
61	Total		5.1840E-02	
62				
63				
64				
65				
66				
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77	**DHLW**		(atoms/barn cm)	
78				
79	H	1001.50C	2.0782E-02	
80	O	8016.50C	2.3501E-02	
81	F	9019.50C	4.2828E-07	
82	Na	11023.50C	1.8185E-05	
83	Mg	12000.50C	1.8733E-04	
84	Al	13027.50C	8.5998E-04	
85	Si	14000.50C	4.5060E-03	
86	P	15031.50C	1.2848E-06	
87	K	19000.50C	3.3430E-04	
88	Ca	20000.50C	9.8118E-05	
89	Mn	25055.50C	1.8218E-04	
90	Fe	26000.55C	1.2197E-03	
91	Ni	28000.50C	1.4988E-04	
92				
93				
94				
95	Pu-239	94239.55C	7.5334E-10	
96	Total		5.1840E-02	
97				
98				
99				
100				
101				
102				

	R	S	T	U
103				
104				
105				
106				
107				
108				
109				
110				
111				
112	**DHLW**		(atoms/barn cm)	
113				
114	H	1001.50C	2.0782E-02	
115	O	8016.50C	2.3501E-02	
116	F	9019.50C	4.2828E-07	
117	Na	11023.50C	1.8185E-05	
118	Mg	12000.50C	1.8733E-04	
119	Al	13027.50C	8.5998E-04	
120	Si	14000.50C	4.5060E-03	
121	P	15031.50C	1.2848E-06	
122	K	19000.50C	3.3430E-04	
123	Ca	20000.50C	9.8118E-05	
124	Mn	25055.50C	1.8218E-04	
125	Fe	26000.55C	1.2197E-03	
126	Ni	28000.50C	1.4988E-04	
127				
128				
129				
130	Pu-239	94239.55C	7.5334E-10	
131	Total		5.1840E-02	
132				
133				
134				
135				
136				
137				
138				
139				
140				
141				
142				
143				
144				
145				
146				
147	**DHLW**		(atoms/barn cm)	
148				
149	H	1001.50C	2.0782E-02	
150	O	8016.50C	2.3501E-02	
151	F	9019.50C	4.2828E-07	
152	Na	11023.50C	1.8185E-05	
153	Mg	12000.50C	1.8733E-04	

	R	S	T	U
154	Al	13027.50C	8.5998E-04	
155	Si	14000.50C	4.5060E-03	
156	P	15031.50C	1.2848E-06	
157	K	19000.50C	3.3430E-04	
158	Ca	20000.50C	9.8118E-05	
159	Mn	25055.50C	1.8218E-04	
160	Fe	26000.55C	1.2197E-03	
161	Ni	28000.50C	1.4988E-04	
162				
163				
164				
165	Pu-239	94239.55C	7.5334E-10	
166	Total		5.1840E-02	
167				
168				
169				
170				
171				
172				
173				
174				
175				
176				
177				
178				
179				
180				
181				
182	**DHLW**		(atoms/barn cm)	
183				
184	H	1001.50C	2.0782E-02	
185	O	8016.50C	2.3501E-02	
186	F	9019.50C	4.2828E-07	
187	Na	11023.50C	1.8185E-05	
188	Mg	12000.50C	1.8733E-04	
189	Al	13027.50C	8.5998E-04	
190	Si	14000.50C	4.5060E-03	
191	P	15031.50C	1.2848E-06	
192	K	19000.50C	3.3430E-04	
193	Ca	20000.50C	9.8118E-05	
194	Mn	25055.50C	1.8218E-04	
195	Fe	26000.55C	1.2197E-03	
196	Ni	28000.50C	1.4988E-04	
197				
198				
199				
200	Pu-239	94239.55C	7.5334E-10	
201	Total		5.1840E-02	
202				
203				
204				

	R	S	T	U
205				
206				
207				
208				
209				
210				
211				

	A	B	C	D	E	F	G	H
1								
2		**Number Density Works**			Isotope List			
3								
4								
5		Element	Symbol	Isotope	MCNP ID	Atomic Weight	Isotopic Fraction	
6	1	Hydrogen	H	H-1	1001.50C	1.00782519		
7			D	H-2	1002.55C	2.01410222		
8			T	H-3	1003.50C	3.01604971		
9	2	Helium	He	nat.	2000.01C	4.0026		
10			He	He-4	2004.50C	4.00260312		
11	3	Lithium	Li	Li-6	3006.50C	6.0151247		
12			Li	Li-7	3007.55C	7.0160039		
13	4	Beryillium	Be	Be-9	4009.50C	9.0121855		
14	5	Boron	B	B-10	5010.50C	10.0129388	0.199	
15			B	B-11	5011.56C	11.0093053	0.801	
16	6	Carbon	C	nat.	6000.50C	12.01115		
17			C	C-12	6012.50C	12		
18	7	Nitrogen	N	N-14	7014.50C	14.00307439		
19	8	Oxygen	O	O-16	8016.50C	15.994915		
20	9	Fluorine	F	F-19	9019.50C	18.9984046		
21	11	Sodium	Na	Na-23	11023.50C	22.9897707		
22	12	Magnesiun	Mg	nat.	12000.50C	24.312		
23	13	Aluminum	Al	Al-27	13027.50C	26.9815389		
24	14	Silicon	Si	nat.	14000.50C	28.086		
25	15	Phosphoru	P	P-31	15031.50C	30.9737647		
26	16	Sulfur	S	S-32	16032.50C	31.9720737		
27	17	Chlorine	Cl	nat.	17000.50C	35.452		
28	19	Potasium	K	nat.	19000.50C	39.102		
29	20	Calcium	Ca	nat.	20000.50C	40.08		
30	22	Titanium	Ti	nat.	22000.50C	47.9		
31	23	Vanadium	V	nat.	23000.50C	50.942		
32	24	Chromium	Cr	nat.	24000.50C	51.996		
33	25	Manganes	Mn	Mn-55	25055.50C	54.9380503		
34	26	Iron	Fe	nat.	26000.55C	55.847		
35	27	Cobalt	Co	Co-59	27059.50C	58.933189		
36	28	Nickel	Ni	nat.	28000.50C	58.71		
37	29	Copper	Cu	nat.	29000.50C	63.54		
38	30	Zinc	Zn	nat.		65.37		
39	33	Arsenic	As	As-75	33075.35C	74.9215964		
40	38	Strontium	Sr	nat.		87.62		
41	40	Zirconium	Zr	nat.	40000.50C	91.22		
42	41	Niobium	Nb	Nb-93	41093.50C	92.906382		
43	42	Molybdenu	Mo	nat.	42000.50C	95.94		
44			Mo	Mo-95		94.905839		
45	43	Technetiun	Tc	Tc-99*		98.90627501		
46	44	Ruthenium	Ru	Ru-101		100.905576		
47	45	Rhodium	Rh	Rh-103	45103.50C	102.905511		
48	47	Silver	Ag	Ag-109	47109.50C	108.904756		
49	48	Cadmium	Cd	nat.	48000.50C	112.4		
50	49	Indium	In	nat.		114.82		
51	50	Tin	Sn	nat.	50000.35C	118.69		
52	55	Cesium	Cs	Cs-133		132.905355		
53			Cs	Cs-135		134.90577		
54	56	Barium	Ba	nat.		137.34		
55	57	Lanthanum	La	nat.		138.91		
56	58	Cerium	Ce	nat.		140.12		
57	60	Neodymiur	Nd	Nd-143		142.909779		
58			Nd	Nd-145		144.912538		
59								
60								
61								
62								
63		**Number Density Works**			Isotope List (Continued)			
64								
65								

	A	B	C	D	E	F	G	H
66		Element	Symbol	Isotope	MCNP ID	Atomic Weight		
67	62	Samarium	Sm	Sm-147		146.914867		
68			Sm	Sm-149	62149.50C	148.91718		
69			Sm	Sm-150		149.917276		
70			Sm	Sm-151		150.919919		
71			Sm	Sm-152		151.919756		
72	63	Europium	Eu	Eu-151	63151.55C	150.919838		
73			Eu	Eu-153	63153.55C	152.921242		
74			Eu	Eu-154	63154.50C	153.923053		
75	64	Gadolinium	Gd	nat.	64000.35C	157.25		
76			Gd	Gd-155	64155.50C	154.922664		
77			Gd	Gd-157	64157.50C	156.924025		
78	72	Hafnium	Hf	nat.	72000.50C	178.49		
79	73	Tantalum	Ta	Ta-181	73181.50C	180.948007		
80	74	Tungsten	W	nat.	74000.55C	183.85		
81	82	Lead	Pb	nat.	82000.50C	207.19		
82	92	Uranium	U	U-233	92233.50C	233.039522		
83			U	U-234	92234.50C	234.040904		
84			U	U-235	92235.50C	235.043915		
85			U	U-236	92236.50C	236.045637		
86			U	U-238	92238.50C	238.05077		
87	93	Neptunium	Np	Np-237	93237.55C	237.048056		
88	94	Plutonium	Pu	Pu-238	94238.50C	238.049511		
89			Pu	Pu-239	94239.55C	239.052146		
90			Pu	Pu-240	94240.50C	240.053882		
91			Pu	Pu-241	94241.50C	241.056737		
92			Pu	Pu-242	94242.50C	242.058725		
93			Pu	Pu-243	94243.35C	243.061972		
94	95	Americium	Am	Am-241	95241.50C	241.056714		
95			Am	Am-242m	95242.50C	242.059502		
96			Am	Am-243	95243.50C	243.061367		
97	96	Curium	Cm	Cm-243	96243.35C	243.06137		
98			Cm	Cm-245	96245.35C	245.065371		
99			Cm	Cm-248	96248.35C	248.0722		
100								
101								
102		**Number Density Worksheet:**						
103								
104		Number Density = (Weight %) * (Density) * (Na) / (Aw)						
105		Avogadro's Number [N		0.602252				
106		Atomic Weight [Aw]						
107								

	I	J	K	L
1	**Solids produced at the end of 6545 years**			
2	Phase/End-member	Log moles	Moles	Mass, g
3				
4	Albite_low, NaAlSi3O8	-1.0000E+20	0.0000E+00	0.0000E+00
5	**Borax, Na2B4O7*10(H2O)**	-1.0000E+20	0.0000E+00	0.0000E+00
6	Celadonite, KMgAlSi4O(10)(OH)2	-5.5490E-01	2.7868E-01	1.1057E+02
7	Chalcedony, SiO2	-6.1000E-03	9.8605E-01	5.9250E+01
8	PuO2	-5.5313E+00	2.9424E-06	8.1219E-04
9	Stilbite, Ca(1.019)Na(0.136)K(0.006)Al(2.18)Si(6.82)O(18):7.33H2O	-5.6970E-01	2.6934E-01	1.9247E+02
10	Fluorapatite, Ca5F(PO4)3	-2.7687E+00	1.7033E-03	8.5903E-01
11	Maximum_Microcline, KAlSi3O8	-1.6400E-02	9.6294E-01	2.6800E+02
12	Na4UO2(CO3)3	-1.0000E+20	0.0000E+00	0.0000E+00
13	Ni2SiO4	-5.2560E-01	2.9813E-01	6.2446E+01
14	Pyrolusite, MnO2	-1.3990E-01	7.2460E-01	6.2994E+01
15	Plattnerite (PbO2)	-1.0000E+20	0.0000E+00	0.0000E+00
16	Witherite (BaCO3)	-1.0000E+20	0.0000E+00	0.0000E+00
17				
18				
19	**Carbonate-Calcite**	-1.0000E+20	0.0000E+00	0.0000E+00
20	Calcite, CaCO3	-1.0000E+20	0.0000E+00	0.0000E+00
21	Magnesite, MgCO3	-1.0000E+20	0.0000E+00	0.0000E+00
22	Rhodochrosite, MnCO3	-1.0000E+20	0.0000E+00	0.0000E+00
23	Siderite, FeCO3	-1.0000E+20	0.0000E+00	0.0000E+00
24				
25				
26				
27	**Smectite-di**	4.6230E-01	2.8993E+00	1.1994E+03
28	Beidellite-Ca	-4.6819E+00	2.0802E-05	7.6246E-03
29	Beidellite-K	-5.1078E+00	7.8019E-06	2.9090E-03
30	Beidellite-Mg	-4.2518E+00	5.6002E-05	2.0384E-02
31	Beidellite-Na	-5.4898E+00	3.2374E-06	1.1897E-03
32	Montmor-Ca	-1.1195E+00	7.5945E-02	2.7797E+01
33	Montmor-K	-1.3324E+00	4.6516E-02	1.7320E+01
34	Montmor-Mg	-4.7840E-01	3.3235E-01	1.2078E+02
35	Montmor-Na	-1.7253E+00	1.8823E-02	6.9081E+00
36	Nontronite-Ca, Ca(0.165)Fe2Al(0.33)Si(3.67)O(10)(OH)2	-2.4100E-01	5.7412E-01	2.4357E+02
37	Nontronite-K, K(0.33)Fe2Al(0.33)Si(3.67)O(10)(OH)2	-6.6690E-01	2.1533E-01	9.2716E+01
38	Nontronite-Mg, Mg(0.165)Fe2Al(0.33)Si(3.67)O(10)(OH)2	1.8940E-01	1.5467E+00	6.5229E+02
39	Nontronite-Na, Na(0.33)Fe2Al(0.33)Si(3.67)O(10)(OH)2	-1.0489E+00	8.9351E-02	3.7994E+01
40				
41	**Rhabdophane-ss**	-2.2946E+00	5.0746E-03	1.3120E+00
42	**LaPO4:H2O**	-1.4000E+01	1.0000E-14	2.5189E-12
43	**CePO4:H2O**	-2.4000E+01	9.9977E-25	2.5306E-22
44	**NdPO4:H2O**	-2.3973E+00	4.0059E-03	1.0305E+00
45	**GdPO4:H2O**	-1.4001E+01	9.9885E-15	2.6990E-12
46	**SmPO4:H2O**	-2.9710E+00	1.0691E-03	2.8150E-01
47				3.1580E+03
48				
49				
50			Volume Multiplier	2.8632E+03
51			Total DHLW Vol.	4.9933E+06
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1								ISOTOPIC MATRIX
2	Volume cc	Density g/cc		Atomic Weight	Atom Density			
3					mass/(total volume)/AW*Av			
4	0.0000E+00	0.0000E+00		262.1886296	0.0000E+00			
5	0.0000E+00	0.0000E+00		381.2937137	0.0000E+00	***		
6	4.3783E+01	2.5254E+00		396.6941693	9.6254E-05			
7	2.2373E+01	2.6483E+00		60.0758300	3.4059E-04			
8	7.0125E-05	1.1582E+01		271.0419760	1.0348E-09			
9	8.9824E+01	2.1427E+00		714.4949299	9.3025E-05			
10	8.5170E-01	1.0086E+00		504.2586787	5.8829E-07			
11	1.0470E+02	2.5597E+00		278.3008589	3.3255E-04			
12	0.0000E+00	0.0000E+00		541.9873678	0.0000E+00			
13	1.2703E+01	4.9158E+00		209.4856600	1.0294E-04			
14	3.6230E+02	1.7387E-01		86.9278803	2.5025E-04			
15	0.0000E+00	0.0000E+00		239.1798300	0.0000E+00			
16	0.0000E+00	0.0000E+00		197.3358950	0.0000E+00			
17								
18								
19	0.0000E+00	0.0000E+00						
20	0.0000E+00	0.0000E+00		100.0758950	0.0000E+00			
21	0.0000E+00	0.0000E+00		84.3078950	0.0000E+00			
22	0.0000E+00	0.0000E+00		114.9339453	0.0000E+00			
23	0.0000E+00	0.0000E+00		115.8428950	0.0000E+00			
24								
25								
26								
27	5.5372E+02	2.1661E+00						
28	2.6943E-03	2.8299E+00		366.5104360	7.1840E-09			
29	1.0431E-03	2.7888E+00		372.8008960	2.6947E-09			
30	6.8996E-03	2.9544E+00		363.9087160	1.9343E-08			
31	4.2257E-04	2.8154E+00		367.4838603	1.1180E-09			
32	3.7969E+01	7.3210E-01		365.9939603	2.6228E-05			
33	2.3259E+01	7.4466E-01		372.2844203	1.6066E-05			
34	1.6616E+02	7.2689E-01		363.3922403	1.1478E-04			
35	9.4111E+00	7.3404E-01		366.9673847	6.5008E-06			
36	7.5261E+01	3.2363E+00		424.2413582	1.9827E-04			
37	2.9127E+01	3.1832E+00		430.5318182	7.4368E-05			
38	2.0072E+02	3.2498E+00		421.6396382	5.3424E-04			
39	1.1803E+01	3.2190E+00		425.2147825	3.0856E-05			
40								
41	0.0000E+00			TOTAL	2.2175E-03			
42	0.0000E+00		*** indicates not included in total or isotopic number densities					
43	0.0000E+00							
44	0.0000E+00							
45	0.0000E+00							
46	0.0000E+00							
47	1.7440E+03	1.810816879						
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	U	V	W	X	Y	Z
1		1001.50C	6000.50C	8016.50C	9019.50C	11023.50C
2		1.00782519	12.01115	15.994915	18.9984046	22.9897707
3	Albite_low, NaAlSi3O8	0		8		1
4	Celadonite, KMgAlSi4O(10)(OH)2	2		12		
5	Fluorapatite, Ca5F(PO4)3	0		12	1	
6	Maximum_Microcline, KAlSi3O8	0		8		
7	Chalcedony, SiO2			2		
8	PuO2			2		
9	Stilbite, Ca(1.019)Na(0.136)K(0.006)Al(2.18)Si(6.82)O(18):7.33H2O	14.66		25.33		0.136
10	Na4UO2(CO3)3	0	3	11		4
11	Ni2SiO4	0		4		
12	Pyrolusite, MnO2	0		2		
13	Plattnerite (PbO2)	0		2		
14	Witherite (BaCO3)	0	1	3		
15	Calcite, CaCO3	0	1	3		
16	Magnesite, MgCO3	0	1	3		
17	Rhodochrosite, MnCO3	0	1	3		
18	Siderite, FeCO3	0	1	3		
19	Beidellite-Ca	2		12		
20	Beidellite-K	2		12		
21	Beidellite-Mg	2		12		
22	Beidellite-Na	2		12		0.33
23	Montmor-Ca	2		12		
24	Montmor-K	2		12		
25	Montmor-Mg	2		12		
26	Montmor-Na	2		12		0.33
27	Nontronite-Ca, Ca(0.165)Fe2Al(0.33)Si(3.67)O(10)(OH)2	2		12		
28	Nontronite-K, K(0.33)Fe2Al(0.33)Si(3.67)O(10)(OH)2	2		12		
29	Nontronite-Mg, Mg(0.165)Fe2Al(0.33)Si(3.67)O(10)(OH)2	2		12		
30	Nontronite-Na, Na(0.33)Fe2Al(0.33)Si(3.67)O(10)(OH)2	2		12		0.33
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	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
1	12000.50C	13027.50C	14000.50C	15031.50C	19000.50C	20000.50C	25055.50C	26000.55C	28000.50C	56?
2	24.312	26.9815389	28.086	30.9737647	39.102	40.08	54.9380503	55.847	58.71	137.34
3		1	3							
4	1	1	4		1					
5				3		5				
6		1	3		1					
7			1							
8										
9		2.18	6.82		0.006	1.019				
10										
11			1						2	
12							1			
13										
14										1
15						1				
16	1									
17							1			
18								1		
19		2.33	3.67			0.165				
20		2.33	3.67		0.33					
21	0.165	2.33	3.67							
22		2.33	3.67							
23	0.33	1.67	4			0.165				
24	0.33	1.67	4		0.33					
25	0.495	1.67	4							
26	0.33	1.67	4							
27		0.33	3.67			0.165		2		
28		0.33	3.67		0.33			2		
29	0.165	0.33	3.67					2		
30		0.33	3.67					2		
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	AK	AL	AM	AN	AO	AP	AQ	AR	AS
1	82000.50C	92238.50C	94239.55C	MASS MATRIX	1001.50C	6000.50C	8016.50C	9019.50C	11023.50C
2	207.19	238.05077	239.052146						
3					0	0	127.95932	0	22.9897707
4					2.01565038	0	191.93898	0	0
5					0	0	191.93898	18.9984046	0
6					0	0	127.95932	0	0
7					0	0	31.98983	0	0
8			1		0	0	31.98983	0	0
9					14.77471729	0	405.151197	0	3.126608815
10		1			0	36.03345	175.944065	0	91.9590828
11					0	0	63.97966	0	0
12					0	0	31.98983	0	0
13	1				0	0	31.98983	0	0
14					0	12.01115	47.984745	0	0
15					0	12.01115	47.984745	0	0
16					0	12.01115	47.984745	0	0
17					0	12.01115	47.984745	0	0
18					0	12.01115	47.984745	0	0
19					2.01565038	0	191.93898	0	0
20					2.01565038	0	191.93898	0	0
21					2.01565038	0	191.93898	0	0
22					2.01565038	0	191.93898	0	7.586624331
23					2.01565038	0	191.93898	0	0
24					2.01565038	0	191.93898	0	0
25					2.01565038	0	191.93898	0	0
26					2.01565038	0	191.93898	0	7.586624331
27					2.01565038	0	191.93898	0	0
28					2.01565038	0	191.93898	0	0
29					2.01565038	0	191.93898	0	0
30					2.01565038	0	191.93898	0	7.586624331
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	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC
1	12000.50C	13027.50C	14000.50C	15031.50C	19000.50C	20000.50C	25055.50C	26000.55C	28000.50C	56?
2										
3	0	26.9815389	84.258	0	0	0	0	0	0	0
4	24.312	26.9815389	112.344	0	39.102	0	0	0	0	0
5	0	0	0	92.9212941	0	200.4	0	0	0	0
6	0	26.9815389	84.258	0	39.102	0	0	0	0	0
7	0	0	28.086	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	58.8197548	191.54652	0	0.234612	40.84152	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0
11	0	0	28.086	0	0	0	0	0	117.42	0
12	0	0	0	0	0	0	54.9380503	0	0	0
13	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	137.34
15	0	0	0	0	0	40.08	0	0	0	0
16	24.312	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	54.9380503	0	0	0
18	0	0	0	0	0	0	0	55.847	0	0
19	0	62.86698564	103.07562	0	0	6.6132	0	0	0	0
20	0	62.86698564	103.07562	0	12.90366	0	0	0	0	0
21	4.01148	62.86698564	103.07562	0	0	0	0	0	0	0
22	0	62.86698564	103.07562	0	0	0	0	0	0	0
23	8.02296	45.05916996	112.344	0	0	6.6132	0	0	0	0
24	8.02296	45.05916996	112.344	0	12.90366	0	0	0	0	0
25	12.03444	45.05916996	112.344	0	0	0	0	0	0	0
26	8.02296	45.05916996	112.344	0	0	0	0	0	0	0
27	0	8.903907837	103.07562	0	0	6.6132	0	111.694	0	0
28	0	8.903907837	103.07562	0	12.90366	0	0	111.694	0	0
29	4.01148	8.903907837	103.07562	0	0	0	0	111.694	0	0
30	0	8.903907837	103.07562	0	0	0	0	111.694	0	0
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	BD	BE	BF	BG	BH	BI	BJ	BK	BL
1	82000.50C	92238.50C	94239.55C				ATOMIC MATRIX	1001.50C	6000.50C
2				AT WT	MASS	AT DENS			
3	0	0	0	262.1886	0.0000E+00	0.0000E+00		0	0
4	0	0	0	396.6942	1.1057E+02	9.6254E-05		0.000192508	0
5	0	0	0	504.2587	8.5903E-01	5.8829E-07		0	0
6	0	0	0	278.3009	2.6800E+02	3.3255E-04		0	0
7	0	0	0	60.0758	5.9250E+01	3.4059E-04		0	0
8	0	0	239.052146	271.0420	8.1219E-04	1.0348E-09		0	0
9	0	0	0	714.4949	1.9247E+02	9.3025E-05		0.001363753	0
10	0	238.05077	0	541.9874	0.0000E+00	0.0000E+00		0	0
11	0	0	0	209.4857	6.2446E+01	1.0294E-04		0	0
12	0	0	0	86.9279	6.2994E+01	2.5025E-04		0	0
13	207.19	0	0	239.1798	0.0000E+00	0.0000E+00		0	0
14	0	0	0	197.3359	0.0000E+00	0.0000E+00		0	0
15	0	0	0	100.0759	0.0000E+00	0.0000E+00		0	0
16	0	0	0	84.3079	0.0000E+00	0.0000E+00		0	0
17	0	0	0	114.9339	0.0000E+00	0.0000E+00		0	0
18	0	0	0	115.8429	0.0000E+00	0.0000E+00		0	0
19	0	0	0	366.5104	7.6246E-03	7.1840E-09		1.43681E-08	0
20	0	0	0	372.8009	2.9090E-03	2.6947E-09		5.38933E-09	0
21	0	0	0	363.9087	2.0384E-02	1.9343E-08		3.8687E-08	0
22	0	0	0	367.4839	1.1897E-03	1.1180E-09		2.23598E-09	0
23	0	0	0	365.9940	2.7797E+01	2.6228E-05		5.24556E-05	0
24	0	0	0	372.2844	1.7320E+01	1.6066E-05		3.21322E-05	0
25	0	0	0	363.3922	1.2078E+02	1.1478E-04		0.000229555	0
26	0	0	0	366.9674	6.9081E+00	6.5008E-06		1.30017E-05	0
27	0	0	0	424.2414	2.4357E+02	1.9827E-04		0.000396532	0
28	0	0	0	430.5318	9.2716E+01	7.4368E-05		0.000148736	0
29	0	0	0	421.6396	6.5229E+02	5.3424E-04		0.001068482	0
30	0	0	0	425.2148	3.7994E+01	3.0856E-05		6.17127E-05	0
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	BM	BN	BO	BP	BQ	BR	BS	BT
1	8016.50C	9019.50C	11023.50C	12000.50C	13027.50C	14000.50C	15031.50C	19000.50C
2								
3	0	0	0	0	0	0	0	0
4	0.001155049	0	0	9.62541E-05	9.62541E-05	0.000385016	0	9.62541E-05
5	7.0595E-06	5.88292E-07	0	0	0	0	1.76488E-06	0
6	0.002660406	0	0	0	0.000332551	0.000997652	0	0.000332551
7	0.000681171	0	0	0	0	0.000340586	0	0
8	2.06961E-09	0	0	0	0	0	0	0
9	0.002356334	0	1.26515E-05	0	0.000202795	0.000634433	0	5.58153E-07
10	0	0	0	0	0	0	0	0
11	0.000411764	0	0	0	0	0.000102941	0	0
12	0.000500504	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0
19	8.62084E-08	0	0	0	1.67388E-08	2.63654E-08	0	0
20	3.2336E-08	0	0	0	6.27857E-09	9.88942E-09	0	8.89239E-10
21	2.32122E-07	0	0	3.19167E-09	4.50703E-08	7.09906E-08	0	0
22	1.34159E-08	0	3.68936E-10	0	2.60491E-09	4.10301E-09	0	0
23	0.000314734	0	0	8.65517E-06	4.38004E-05	0.000104911	0	0
24	0.000192793	0	0	5.30182E-06	2.68304E-05	6.42644E-05	0	5.30182E-06
25	0.001377331	0	0	5.68149E-05	0.000191679	0.00045911	0	0
26	7.801E-05	0	2.14527E-06	2.14527E-06	1.08564E-05	2.60033E-05	0	0
27	0.002379194	0	0	0	6.54278E-05	0.000727637	0	0
28	0.000892418	0	0	0	2.45415E-05	0.000272931	0	2.45415E-05
29	0.00641089	0	0	8.81497E-05	0.000176299	0.001960664	0	0
30	0.000370276	0	1.01826E-05	0	1.01826E-05	0.000113243	0	0
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	BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD
1	20000.50C	25055.50C	26000.55C	28000.50C	56?	82000.50C	92238.50C	94239.50C		MCNP
2										
3	0	0	0	0	0	0	0	0	H	1001.50C
4	0	0	0	0	0	0	0	0	C	6000.50C
5	2.94146E-06	0	0	0	0	0	0	0	O	8016.50C
6	0	0	0	0	0	0	0	0	F	9019.50C
7	0	0	0	0	0	0	0	0	Na	11023.50C
8	0	0	0	0	0	0	0	1.03481E-09	Mg	12000.50C
9	9.47929E-05	0	0	0	0	0	0	0	Al	13027.50C
10	0	0	0	0	0	0	0	0	Si	14000.50C
11	0	0	0	0.000205882	0	0	0	0	P	15031.50C
12	0	0.000250252	0	0	0	0	0	0	K	19000.50C
13	0	0	0	0	0	0	0	0	Ca	20000.50C
14	0	0	0	0	0	0	0	0	Mn	25055.50C
15	0	0	0	0	0	0	0	0	Fe	26000.55C
16	0	0	0	0	0	0	0	0	Ni	28000.50C
17	0	0	0	0	0	0	0	0		56?
18	0	0	0	0	0	0	0	0		82000.50C
19	1.18537E-09	0	0	0	0	0	0	0	U-238	92238.50C
20	0	0	0	0	0	0	0	0	Pu-239	92239.55C
21	0	0	0	0	0	0	0	0		
22	0	0	0	0	0	0	0	0		TOTAL
23	4.32759E-06	0	0	0	0	0	0	0		
24	0	0	0	0	0	0	0	0		
25	0	0	0	0	0	0	0	0		
26	0	0	0	0	0	0	0	0		
27	3.27139E-05	0	0.000396532	0	0	0	0	0		
28	0	0	0.000148736	0	0	0	0	0		
29	0	0	0.001068482	0	0	0	0	0		
30	0	0	6.17127E-05	0	0	0	0	0		
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1		Void Frac of DHLW	
2		0	
3	3.5589E-03	3.5589E-03	
4	0.0000E+00	0.0000E+00	
5	1.9788E-02	1.9788E-02	
6	5.8829E-07	5.8829E-07	
7	2.4980E-05	2.4980E-05	
8	2.5732E-04	2.5732E-04	
9	1.1813E-03	1.1813E-03	
10	6.1895E-03	6.1895E-03	
11	1.7649E-06	1.7649E-06	
12	4.5921E-04	4.5921E-04	
13	1.3478E-04	1.3478E-04	
14	2.5025E-04	2.5025E-04	
15	1.6755E-03	1.6755E-03	
16	2.0588E-04	2.0588E-04	
17	0.0000E+00	0.0000E+00	
18	0.0000E+00	0.0000E+00	
19	0.0000E+00	0.0000E+00	
20	1.0348E-09	1.0348E-09	
21			
22	3.3728E-02	3.3728E-02	
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	A	B	C	D	E	F	G	H	I	J
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2		Cylinder Segment Volume Calculation							**Degraded ORR Fuel**	
3										
4									Mass of Fe2O3 in Mixture	
5		**Top of Degraded DHLW Layer**							Nominal Dry Density of Soddyite/	
6		Cylinder Radius		20.965	cm				Total Mass of Soddyite/Al2O3/SiC	
7		Cylinder Length		287.092	cm				Void Fraction	
8		Cylinder Volume		3.96425E+05	cm^3				Den of Soddyite/Al2O3/SiO2/Fe2	
9		Segment Volume		3.96425E+05	cm^3				Vol. Occupied by Soddyite/Al2O3	
10		Target Cell		3.08646E+05						
11		Distance from Center		9.51104E+00	cm					
12										
13										
14										
15									**Degraded ORR Fuel Mixture Co**	
16										WT
17	Estimated Amount of Steel in Basket								U-235	235.043915
18	9784.37	cm^3							U-234	234.040904
19	7.745	g/cm^3							U-238	238.05077
20	303.1198	kg							Fe2O3	159.678745
21									Al	26.9815389
22	Esitmated Amount of Steel in Axial Plates								Si Total	28.086
23	3947.25	cm^3							Si to Soddyite	28.086
24	7.745	g/cm^3							Si to SiO2	28.086
25	30.57145	kg							O from soddyite	15.994915
26									O from Al2O3	15.994915
27	333.6912	kg Total							O from SiO2	15.994915
28									H from soddyite	1.007825
29	215.7299	kg Total Fe								
30	3862.874	moles Fe							U/Si Ratio	
31	1931.437	moles Fe2O3								
32	308.4095	kg Total Fe2O3								
33	154.2047	kg 50% Fe2O3								
34									Note: for determining the amoun	
35										the U, Al, and
36										Al oxidizes to

	A	B	C	D	E	F	G	H	I	J
37										
38									Avogadro's Number [Na]	
39	Gd Number Densities									
40				Mass Gd (g)		Gd number density for insert			Soddyite/Al2O3/SiO2/Water Mixt	
41		Abundance	MW	100	250	250	100		% of Basket Oxide	53%
42	Gd-152	0.20%	151.919788	2.0000E-09	5.0000E-09	1.2912E-07	5.1647E-08		kg Fe2O3	163.3
43	Gd-154	2.18%	153.920862	2.1517E-08	5.3792E-08	1.3891E-06	5.5563E-07		Void Fraction	0.7058
44	Gd-155	14.80%	154.922619	1.4513E-07	3.6283E-07	9.3695E-06	3.7478E-06		Mixture Volume (cr	396424.692
45	Gd-156	20.47%	155.922119	1.9945E-07	4.9862E-07	1.2876E-05	5.1504E-06		Height of Mix abov	full
46	Gd-157	15.65%	156.923957	1.5151E-07	3.7878E-07	9.7813E-06	3.9125E-06		U-235	8.9713E-05
47	Gd-158	24.84%	157.9241	2.3896E-07	5.9739E-07	1.5427E-05	6.1707E-06		U-238	3.4226E-04
48	Gd-160	21.86%	159.92705	2.0766E-07	5.1914E-07	1.3406E-05	5.3624E-06		Fe	3.1074E-03
49	Total			9.6622E-07	2.4156E-06	6.2378E-05	2.4951E-05		Al	7.5694E-03
50						8.5488E-02	8.5451E-02		Si	2.8797E-04
51									O	4.1920E-02
52									H	4.8065E-02
53									Total	1.0138E-01
54									H/U-235 Ratio	535.8
55										
56	Volume & Mass of Cs/Gd Inserts									
57	Vertical Inserts				kg Fe2O3 for				Fe2O3 (kg)	Gd (g)
58	thickness	0.5	cm		keff = 0.93				163.3	0
59	width	8.864	cm		369.214868				326.6	0
60	length	70.898	cm						489.9	0
61	volume	314.219936	cm^3						163.3	250
62	Horz. Inserts								163.3	100
63	thickness	0.5	cm							
64	width	8.118	cm							
65	length	70.898	cm							
66	volume	287.774982	cm^3							
67	Angle Inserts									
68	volume	584.270418	cm^3							
69										
70	vert. Inserts per basket		3							
71	horz. Inserts per basket		6							
72	angle inserts		2							

	A	B	C	D	E	F	G	H	I	J
73										
74	total volume per basket		3837.850536	cm^3						
75	total volume per canister		15351.40214	cm^3						
76	mass per canister		120.2321816	kg						
77	mass additional Fe		117.827538	kg						
78			2109.827528	moles Fe						
79			1054.913764	moles Fe2O3						
80			168.4473059	kg Total Fe2O3						
81			84.22365296	kg 50% Fe2O3						

	K	L	M	N	O	P	Q	R	S
1							Cladding/Inner	Al	88.04321712
2							Cladding/Oute	Al	154.0862428
3							Side Plate	Al	599.5214337
4			0	kg					
5	Al2O3/SiO2/Fe2O3 mixture		4.1142	g/cm^3					
6	02/Fe2O3 mixture		3.51637E+05	g					
7			0.7844						
8	O3 mixture + Void		8.87021E-01	g/cm^3					
9	/SiO2/Fe2O3+Void		3.96425E+05	cm^3			Outer Plates/A	2	
10							Inner Plates/A	17	
11							Side Plates/As	2	
12							Assemblies/W	40	
13									
14							DENSITIES		
15	**mpositon**						Aluminum den	2.702	g/cm^3
16	Total Mass(g)	Total Moles		Mass/Assy (g)	Moles/Assy		SiO2	2.365	g/cm^3
17	13879.88	5.9052E+01		347.00	1.48		Al2O3	3.965	g/cm^3
18	n/a	n/a		n/a	n/a		soddyite nat.	4.7	g/cm^3
19	53630.16	2.2529E+02		1340.75	5.63		soddyite enrich	4.691131841	g/cm^3
20	n/a	n/a		n/a	n/a		Fe2O3	5.24	g/cm^3
21	1.34E+05	4.9824E+03		3360.85	124.56				
22	5.32E+03	-		133.10			U235 Enrichm	20.56%	
23	3.99E+03	1.4217E+02	calculated	99.83	3.55		soddyite densi	0.998113158	
24	1.33E+03	4.7383E+01	calculated	33.27	1.18				
25	2.2740E+04	1.4217E+03	calculated	568.50	35.54		DEGRADED VOLUMES (MASS/DENSITY)		
26	1.1954E+05	7.4737E+03	calculated	2988.51	186.84		Al2O3	64054.05992	cm^3
27	1.5158E+03	9.4766E+01	calculated	37.89	2.37		SiO2	1203.624922	cm^3
28	5.7313E+02	5.6868E+02	calculated	14.33	14.22		Soddyite	20211.80166	cm^3
29							Fe2O3	0	cm^3
30		1.50E+00	More than enough Si for soddyite				Total Vol.	8.55E+04	cm^3
31									
32									
33									
34	of oxygen associated with oxidation of								
35	Si, it is assumed that U and Si go to (UO2)2(SiO4):2H2O					3.80E-01	5.43E-03		
36	Al2O3, leftover Si goes to SiO2, and Fe goes to Fe2O3								

	K	L	M	N	O	P	Q	R	S
37						0.01428			
38	0.602252								
39									
40	ıre Number Densities								
41	106%	159%	123%	0%					
42	326.6	489.9	380.0	0.0					
43	0.6272	0.5486	0.6015	0.7844					
44	396424.6915	396424.6915	396424.6915	396424.6915					
45	full	full	full	full					
46	8.9713E-05	8.9713E-05	8.9713E-05	8.9713E-05					
47	3.4226E-04	3.4226E-04	3.4226E-04	3.4226E-04					
48	6.2149E-03	9.3223E-03	7.2308E-03	0.0000E+00					
49	7.5694E-03	7.5694E-03	7.5694E-03	7.5694E-03					
50	2.8797E-04	2.8797E-04	2.8797E-04	2.8797E-04					
51	4.3952E-02	4.5985E-02	4.4616E-02	3.9887E-02					
52	4.2808E-02	3.7551E-02	4.1089E-02	5.3323E-02					
53	1.0126E-01	1.0115E-01	1.0123E-01	1.0150E-01					
54	477.2	418.6	458.0	594.4					
55									
56									
57	void	H/U235	keff	2sigma	AEF (eV)	case name			
58	0.7058	535.8	1.04402	0.00222	0.01242	orrhom3	0.00111	4.28E-01	5.32E-03
59	0.6272	477.2	0.95213	0.00216	0.01379	orrhom2	0.00108	3.90E-01	5.37E-03
60	0.5486	418.6	0.8673	0.00226	0.01539	orrhom1	0.00113	3.55E-01	5.47E-03
61	0.7058	535.8	0.55132	0.00152	0.02292	orrhom4	0.00076	2.27E-01	5.20E-03
62	0.7058	535.8	0.75501	0.00204	0.01660	orrhom5	0.00102	3.10E-01	5.14E-03
63									
64									
65									
66									
67									
68									
69									
70									
71									
72									

	K	L	M	N	O	P	Q	R	S
73									
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75									
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77									
78									
79									
80									
81									

	T	U	V	W	X	Y	Z	AA
1	g	see volume calcs =====>		Side Plate Volume Calculation				
2	g	see volume calcs =====>		from M-11495-OR-003E				
3	g	see volume calcs =====>		Width	3.169	in		
4				Length	27.13	in		
5				Thickness	0.187	in		
6								
7				Outer groove length	0.087	in		
8				Outer groove width	0.07	in		
9				Inner groove length	0.087	in		
10				Inner groove width	0.055	in		
11								
12				Side Plate Volume	13.53999	in^3		
13					221.8806	cm^3		
14	Reference							
15	CRC, p. B-68							
16	CRC, p. B-138 (quartz)			Cladding volume				
17	CRC, p. B-69			dimmensions from BBA000000-01717-0200-00052 REV01 pp. 8 and III-3				
18				Outside plate length	27.13	in		
19				Outside plate width	0.066	in		
20				Outside plate thickness	2.7955	in		
21				Outer plate volume	82.02654	cm^3		
22				Outer fuel volume/plate	24.9998	cm^3		
23				Outer cladding volume/plate	57.02674	cm^3		
24								
25				Inner plate legth	24.63	in		
26				Inner plate width	2.7955	in		
27				Inner plate thickness	0.051	in		
28				Inner plate volume	57.54336	cm^3		
29				Inner fuel volume/plate	24.9589	cm^3		
30				Inner cladding volume/plate	32.58446	cm^3		
31								
32								
33								
34								
35								
36								

	T	U	V	W	X	Y	Z	AA
37								
38								
39								
40								
41								
42								
43								
44								
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67								
68								
69								
70								
71								
72								

	T	U	V	W	X	Y	Z	AA
73								
74								
75								
76								
77								
78								
79								
80								
81								

	A	B	C	D	E	F
1	**Reevaluation of degraded fuel in intact basket with carbon steel basket**					
2						
3	**Degraded ORR Assembly**				**Fuel Cell ID**	
4		Mass/Assy (g)	Moles/Assy (10^24)		Width	8.118
5	U-235	347.00	1.48		Height	8.864
6	U-238	1340.75	5.63		Length	70.898
7	Al	3360.85	124.56		Volume	5101.675
8	Si	133.10	4.74			
9	O	3594.91	224.75		Volume of Basket Mat	
10	H	14.33	14.22		Mass of Fe per Cell (A	
11						
12	Volume Degraded ORR Assy	2136.737163				
13	Avogadro's Number [Na]		0.602252			
14						
15						
16	% Deg. Basket	0%	10%			
17	Vol Homogenized Material (cm^3)	5101.675	5163.647			
18	Volume Fe_2O_3 per Cell (cm^3)	0.000	130.480			
19	Vol% Water	58.12%	56.09%		old ORRoz3a	
20	Mix Number Densities					
21	U-235	1.7428E-04	1.7219E-04		1.97E-04	
22	U-238	6.6488E-04	6.5690E-04		7.52E-04	
23	Al	1.4704E-02	1.4528E-02		1.81E-02	
24	Si	5.5942E-04	5.5271E-04		6.33E-04	
25	O	4.5966E-02	4.6469E-02		2.23E-02	
26	H	4.0546E-02	3.9172E-02		4.87E-02	
27	Fe	0.0000E+00	9.9880E-04			
28	Total	1.0261E-01	1.0255E-01			
29	H/U-235	232.65	227.50		246.93	
30						
31	Cell Width (cm)	8.118	8.167			
32	Cell Height (cm)	8.864	8.918			
33	MCNP half cell Width	4.059	4.084			
34	MCNP top cell Height	4.137	4.162			
35	MCNP bottom cell Height	-4.727	-4.756			

	G	H	I	J
1				
2				
3				
4	cm	0.9570		
5	cm	1.044937584		
6	cm	8.48280331		
7	cm^3			
8				
9	erial per Cell		619.7194	cm^3
10	516 CS = 98.535% Fe)		4782.537	g
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				

	A	B	C	D	E	F	G	H	I
1									
2		Cylinder Segment Volume Calculation					**Degraded ORR Fuel**		
3									
4									
5		**Top of Degraded DHLW Layer**					Nominal Dry Density of Soddyite/Al2O3/SiO2 mixture		
6		Cylinder Radius		86.5	cm		Total Mas of Soddyite/Al2O3/SiO2 mixture		
7		Cylinder Length		304	cm		Void Fraction		
8		Cylinder Volume		7.14588E+06	cm^3		Den of Soddyite/Al2O3/SiO2 mixture		
9		Segment Volume		4.99330E+06	cm^3		Vol. Occupied by UO2+Al2O3+Void		
10		Target Cell		4.99330E+06					
11		Distance from Center		2.74765E+01	cm				
12									
13									
14									
15		**Top of Soddyite/Al2O3/SiO2 mixture layer**					**Degraded ORR Fuel Mixture Compositon**		
16		1/2 Cylinder Volume		3.57294E+06	cm^3			Mass(g)	WT
17		Segment - 1/2 Cylin.		1.42036E+06	cm^3		U-235	13879.88	235.043915
18		Layer Volume		2.13674E+05	cm^3		U-234	n/a	234.040904
19		Target Cell		2.13674E+05			U-238	53630.16	238.05077
20		Distance from Center		3.18017E+01	cm		Al	1.34E+05	26.9815389
21							Si Total	5.32E+03	28.086
22							Si to Soddyite	3.99E+03	28.086
23							Si to SiO2	1.33E+03	28.086
24							O Total	1.4380E+05	
25							O from soddyite	2.2740E+04	15.994915
26							O from Al2O3	1.1954E+05	15.994915
27							O from SiO2	1.5158E+03	15.994915
28							H from soddyite	5.7313E+02	1.007825
29									
30									
31							U/Si Ratio		
32									
33							Note: for determining the amount of oxygen associated with c		
34								the U, Al, and Si, it is assume	
35								Al oxidizes to Al2O3, and lefto	
36									

	A	B	C	D	E	F	G	H	I
37							Avogadro's Number [Na]		0.602252
38									
39									
40							Soddyite/Al2O3/SiO2/Water Mixture Number Densities (at To		
41							Void Fraction	0.6	0.7
42							Mixture Volume (cm^3)	2.13674E+05	2.84898E+05
43							Height of Mix above cener (cm)	31.8017	33.2633
44							U-235	1.6644E-04	1.2483E-04
45							U-238	6.3499E-04	4.7624E-04
46							Al	1.4043E-02	1.0532E-02
47							Si	5.3427E-04	4.0070E-04
48							O	4.5403E-02	4.2412E-02
49							H	4.1730E-02	4.8017E-02
50							Total	1.0251E-01	1.0196E-01
51							H/U-235 Ratio	250.7	384.7
52									
53							void	H/U-235	keff
54							0.6	250.7	0.57698
55							0.7	384.7	0.65638
56							0.75	491.8	0.70040
57							0.8	652.5	0.75264
58							0.85	920.4	0.80175
59							0.9	1456.1	0.81721
60									
61									
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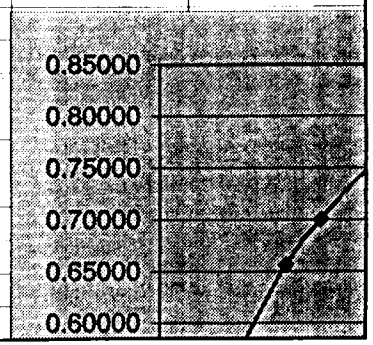
71									
72									



	A	B	C	D	E	F	G	H	I
73									
74									
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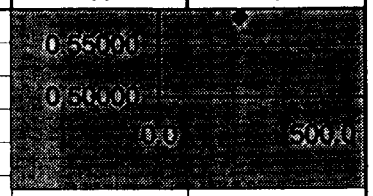
76									
77									
78									



	J	K	L	M	N	O	P	Q	R	S
1						Cladding/Inner Plate	Al	88.04322	g	see volume calc
2						Cladding/Outer plate	Al	154.0862	g	see volume calc
3						Side Plate	Al	599.5214	g	see volume calc
4										
5		5.79661E+00	g/cm^3							
6		4.95433E+05	g							
7		6.00000E-01								
8		2.31864E+00	g/cm^3							
9		2.13674E+05	cm^3			Outer Plates/Assembl	2			
10						Inner Plates/Assembly	17			
11						Side Plates/Assembly	2			
12						Assemblies/WP	40			
13										
14						DENSITIES			Reference	
15						Aluminum density	2.702	g/cm^3	CRC, p. B-68	
16	moles of components					SiO2	2.365	g/cm^3	CRC, p. B-138 (quartz)	
17	5.9052E+01					Al2O3	3.965	g/cm^3	CRC, p. B-69	
18	n/a					soddyite nat.	4.7	g/cm^3		
19	2.2529E+02					soddyite enriched	4.691132	g/cm^3		
20	4.9824E+03									
21	-									
22	1.4217E+02	calculated				U235 Enrichment	20.56%			
23	4.7383E+01	calculated				soddyite density adj.	0.998113			
24										
25	1.4217E+03	calculated				DEGRADED VOLUMES (MASS/DENSITY)				
26	7.4737E+03	calculated				Al2O3	64054.06	cm^3		
27	9.4766E+01	calculated				SiO2	1203.625	cm^3		
28	5.6868E+02	calculated				Soddyite	20211.8	cm^3		
29										
30						Total Vol.	8.55E+04	cm^3		
31	1.50E+00	More than enough Si for soddyite								
32										
33	xidation of									
34	d that U and Si go to (UO2)2(SiO4):2H2O									
35	ver Si goes to SiO2									
36										

	J	K	L	M	N	O	P	Q	R	S
37										
38										
39										
40	b)							31.8017		
41	0.75	0.8	0.85	0.9				33.2633		
42	3.41878E+05	427347.4325	5.69797E+05	8.54695E+05				34.4407		
43	34.4407	36.2211	39.2313	45.4458				36.2211		
44	1.0403E-04	8.3221E-05	6.2416E-05	4.1611E-05				39.2313		
45	3.9687E-04	3.1749E-04	2.3812E-04	1.5875E-04				45.4458		
46	8.7771E-03	7.0216E-03	5.2662E-03	3.5108E-03						
47	3.3392E-04	2.6713E-04	2.0035E-04	1.3357E-04						
48	4.0916E-02	3.9421E-02	3.7925E-02	3.6430E-02						
49	5.1160E-02	5.4304E-02	5.7447E-02	6.0591E-02						
50	1.0169E-01	1.0141E-01	1.0114E-01	1.0087E-01						
51	491.8	652.5	920.4	1456.1						
52										
53	2sigma	AEF(eV)	case name							
54	0.00246	0.02099	orr060	0.00123	2.38E-01	4.99E-03				
55	0.00222	0.01616	orr070	0.00111	2.70E-01	4.36E-03				
56	0.00224	0.01383	orr075	0.00112	2.88E-01	3.98E-03				
57	0.00250	0.01079	orr080	0.00125	3.11E-01	3.35E-03				
58	0.00204	0.00841	orr085	0.00102	3.30E-01	2.77E-03				
59	0.00194	0.00622	orr090	0.00097	3.37E-01	2.09E-03				
60										
61										
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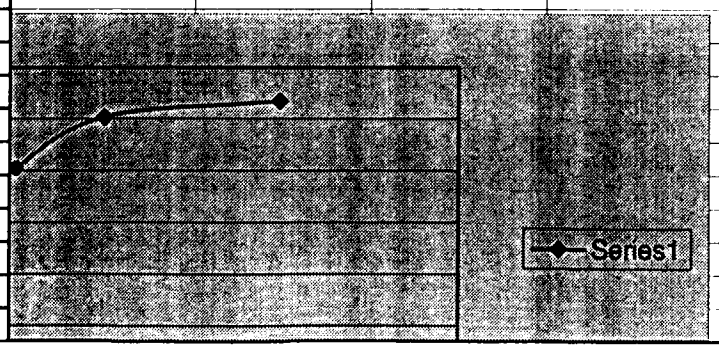

	J	K	L	M	N	O	P	Q	R	S
73										
74										
75										
76	1000.0	1500.0	2000.0							
77										
78										

	T	U	V	W	X	Y
1	s =====>	Side Plate Volume Calculation				
2	s =====>	from M-11495-OR-003E				
3	s =====>	Width	3.169	in		
4		Length	27.13	in		
5		Thickness	0.187	in		
6						
7		Outer groove length	0.087	in		
8		Outer groove width	0.07	in		
9		Inner groove length	0.087	in		
10		Inner groove width	0.055	in		
11						
12		Side Plate Volume	13.53999	in^3		
13			221.8806	cm^3		
14						
15						
16		Cladding volume				
17		dimmensions from BBA000000-01717-0200-00052 REV01 pp. 8 and III-3				
18		Outside plate length	27.13	in		
19		Outside plate width	0.066	in		
20		Outside plate thickness	2.7955	in		
21		Outer plate volume	82.02654	cm^3		
22		Outer fuel volume/plate	24.9998	cm^3		
23		Outer cladding volume/plate	57.02674	cm^3		
24						
25		Inner plate legth	24.63	in		
26		Inner plate width	2.7955	in		
27		Inner plate thickness	0.051	in		
28		Inner plate volume	57.54336	cm^3		
29		Inner fuel volume/plate	24.9589	cm^3		
30		Inner cladding volume/plate	32.58446	cm^3		
31						
32						
33						
34						
35						
36						

	T	U	V	W	X	Y
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38						
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72						

	T	U	V	W	X	Y
73						
74						
75						
76						
77						
78						

	M	N	O	P	Q
1					
2		Homogeneous Mixture			
3				(atoms/barn cm)	
4					
5					
6		H	1001.50C	3.5665E-03	
7		O	8016.50C	2.0521E-02	
8		F	9019.50C	5.7839E-07	
9		Na	11023.50C	2.4559E-05	
10		Mg	12000.50C	2.5299E-04	
11		Al	13027.50C	1.7522E-03	
12		Si	14000.50C	6.1078E-03	
13		P	15031.50C	1.7352E-06	
14		K	19000.50C	4.5148E-04	
15		Ca	20000.50C	1.3251E-04	
16		Mn	25055.50C	2.4604E-04	
17		Fe	26000.55C	1.6473E-03	
18		Ni	28000.50C	2.0242E-04	
19		U-238	92238.50C	2.6715E-05	
20		U-235	92235.50C	7.0026E-06	
21					
22		Pu-239	94239.55C	1.0174E-09	
23					
24		Total		3.4941E-02	
25					

	A	B	C	D	E	F	G	H
1								
2					**DHLW and Degraded ORR Fuel Homogeneous Mixtu**			
3								
4								DHLW Clay
5			Cylinder Segment Volume Calculation					(atom/barn/c
6								H
7			Geometry Calculations					O
8								F
9			Cylinder Radius		86.5	cm		Na
10			Cylinder Length		304	cm		Mg
11			Cylinder Volume		7.1459E+06	cm^3		Al
12			1/2 Cylinder Volume		3.5729E+06			Si
13			DHLW Volume		4.9933E+06	cm^3		P
14			Degraded ORR Volum		8.54695E+04	cm^3		K
15			Mass of Gd		0.0000E+00	g		Ca
16			Den. of Gd		7.9004E+00	g/cm^3		Mn
17			Vol. of Gd		0.0000E+00			Fe
18			Void Fraction		2.8927E-01			Ni
19		Total	Total Volume		7.1459E+06	cm^3		U-238
20			Calculated Volume		7.1459E+06	cm^3		
21			Distance from Center		86.5000	cm		
22		Mixture	Frac. of DHLW Mixed					Pu-239
23			with ORR Fuel		2.5000E-01			
24			Mixture Volume		1.8767E+06	cm^3		Total
25			Calculated Volume		1.8767E+06	cm^3		
26			Distance from Center		-33.0784	cm		
27								
28						Clay Mixed		Distance fror
29						w/ ORR	Void	DHLW Clay
30						0.25	0.2893	full
31						0.25	0.25	69.1276
32						0.25	0.2	57.2957
33						0.2	0.2	57.2957
34						0.15	0.2	57.2957
35						0.1	0.2	57.2957
36						0	0.2	57.2957
37								
38	Clay Mixed							Distance fror
39	w/ ORR	Void	H/U-235	keff	2sigma	AEF(eV)	case	DHLW Clay
40	0.1	0.2	334.5238	0.66714	0.00214	0.01802	OB10V20	57.2957
41	0.15	0.2	476.8803	0.6706	0.0023	0.01441	OB15V20	57.2957
42	0.2	0.2	619.2367	0.65526	0.00204	0.01197	OB20V20	57.2957
43	0.25	0.2	761.5931	0.6343	0.00178	0.01056	OB25V20	57.2957
44	0.25	0.25	970.6074	0.65487	0.00188	0.00922	OB25V25	69.1276
45	0.25	0.2893	1155.411	0.66108	0.00166	0.00786	OB25V29	full
46								
47								
48								
49								
50								
51								

	A	B	C	D	E	F	G	H
52								
53								
54								
55								
56								
65								
66								
67								
68								
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70								
71								
72								
73								
74								
75								
76								
77								
78								
79								
80								
81								

	I	J	K	L	M	N	O
1							Void Frac.
2	**'e below DHLW**						
3							
4			Degraded ORR Fuel				**Mixture**
5	m)			Mass(g)	WT		
6	3.55893E-03		H	573.1320015	1.007825		H
7	1.97883E-02		O	1.44E+05	15.99492		O
8	5.88292E-07						F
9	2.49797E-05						Na
10	2.57324E-04						Mg
11	1.18129E-03		Al	1.34E+05	26.98154		Al
12	6.18950E-03		Si	5323.8	28.086		Si
13	1.76488E-06						P
14	4.59207E-04						K
15	1.34777E-04						Ca
16	2.50252E-04						Mn
17	1.67546E-03						Fe
18	2.05882E-04						Ni
19	0.00000E+00		U-238	53630.16	238.0508		U-238
20			U-235	13879.88	235.0439		U-235
21							Pu-239
22	1.03481E-09						Gd-152
23			Gd	0.0000E+00	157.25		Gd-154
24	3.37283E-02						Gd-155
25							Gd-156
26							Gd-157
27							Gd-158
28	n Center						Gd-160
29	ORR/Clay Mix	H/U-235					
30	-33.0784	1155.411					Total
31	-35.1116	970.6074					
32	-37.4398	761.5931					H/U-235
33	-44.1725	619.2367					
34	-51.2921	476.8803					
35	-59.0016	334.5238					
36	-79.0576	49.81102					
37							
38	n Center						
39	ORR/Clay Mix			sigma			
40	-59.0016	2.74E-01	4.93E-03	0.00107			
41	-51.2921	2.76E-01	3.97E-03	0.00115			
42	-44.1725	2.69E-01	3.22E-03	0.00102			
43	-37.4398	2.61E-01	2.76E-03	0.00089			
44	-35.1116	2.69E-01	2.48E-03	0.00094			
45	-33.0784	2.73E-01	2.14E-03	0.00083			
46							
47							
48							
49							
50							
51							

	I	J	K	L	M	N	O
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79							
80							
81							

	P	Q	R	S	T	U
1	0.289272974					
2						
3						
4		(atoms/barn cm)		**DHLW**		(atoms/barn
5						
6	1001.50C	2.1896E-02		H	1001.50C	2.1875E-02
7	8016.50C	2.5721E-02		O	8016.50C	2.3737E-02
8	9019.50C	3.9132E-07		F	9019.50C	4.1811E-07
9	11023.50C	1.6616E-05		Na	11023.50C	1.7754E-05
10	12000.50C	1.7117E-04		Mg	12000.50C	1.8289E-04
11	13027.50C	2.3847E-03		Al	13027.50C	8.3957E-04
12	14000.50C	4.1780E-03		Si	14000.50C	4.3990E-03
13	15031.50C	1.1740E-06		P	15031.50C	1.2543E-06
14	19000.50C	3.0546E-04		K	19000.50C	3.2637E-04
15	20000.50C	8.9651E-05		Ca	20000.50C	9.5790E-05
16	25055.50C	1.6646E-04		Mn	25055.50C	1.7786E-04
17	26000.55C	1.1145E-03		Fe	26000.55C	1.1908E-03
18	28000.50C	1.3695E-04		Ni	28000.50C	1.4633E-04
19	92238.50C	7.2299E-05		Pu-239	94239.55C	7.3546E-10
20	92235.50C	1.8951E-05		Total		5.2991E-02
21	94239.55C	6.8834E-10				
22	64152.50C	0.0000E+00				
23	64154.50C	0.0000E+00				
24	64155.50C	0.0000E+00				
25	64156.50C	0.0000E+00				
26	64157.50C	0.0000E+00				
27	64158.50C	0.0000E+00				
28	64160.50C	0.0000E+00				
29						
30		5.6273E-02				
31						
32		1155.400974				
33						
34						
35	Fraction Clay Mixed w/ ORR		0.25	0.25	0.25	0.2
36	Void in Clay & Clay/ORR Mix		0.2893	0.25	0.2	0.2
37	Dist. From Top of DHLW Clay to Center		full	69.1276	57.2957	57.2957
38	Dist. From Top of Clay/ORR Mix to Center		-33.0784	-35.1116	-37.4398	-44.1725
39	H/U-235		1155.411036	970.60737	761.59307	619.23666
40	Clay/ORR Mix Number Densities					
41	H	1001.50C	2.1896E-02	1.9410E-02	1.6246E-02	1.6251E-02
42	O	8016.50C	2.5721E-02	2.5294E-02	2.4751E-02	2.5266E-02
43	F	9019.50C	3.9132E-07	4.1295E-07	4.4048E-07	4.3353E-07
44	Na	11023.50C	1.6616E-05	1.7534E-05	1.8703E-05	1.8408E-05
45	Mg	12000.50C	1.7117E-04	1.8063E-04	1.9267E-04	1.8963E-04
46	Al	13027.50C	2.3847E-03	2.5165E-03	2.6843E-03	3.0848E-03
47	Si	14000.50C	4.1780E-03	4.4089E-03	4.7028E-03	4.6455E-03
48	P	15031.50C	1.1740E-06	1.2388E-06	1.3214E-06	1.3006E-06
49	K	19000.50C	3.0546E-04	3.2234E-04	3.4383E-04	3.3840E-04
50	Ca	20000.50C	8.9651E-05	9.4605E-05	1.0091E-04	9.9321E-05
51	Mn	25055.50C	1.6646E-04	1.7566E-04	1.8737E-04	1.8442E-04

	P	Q	R	S	T	U
52	Fe	26000.55C	1.1145E-03	1.1761E-03	1.2545E-03	1.2347E-03
53	Ni	28000.50C	1.3695E-04	1.4452E-04	1.5415E-04	1.5172E-04
54	U-238	92238.50C	7.2299E-05	7.6294E-05	8.1380E-05	1.0012E-04
55	U-235	92235.50C	1.8951E-05	1.9998E-05	2.1331E-05	2.6244E-05
56	Pu-239	94239.55C	6.8834E-10	7.2637E-10	7.7480E-10	7.6258E-10
65	Total		5.6273E-02	5.3839E-02	5.0741E-02	5.1592E-02
66	Remaining DHLW Clay Number Densities					
67	H	1001.50C	2.1875E-02	1.9389E-02	1.6223E-02	1.6223E-02
68	O	8016.50C	2.3737E-02	2.3201E-02	2.2518E-02	2.2518E-02
69	F	9019.50C	4.1811E-07	4.4122E-07	4.7063E-07	4.7063E-07
70	Na	11023.50C	1.7754E-05	1.8735E-05	1.9984E-05	1.9984E-05
71	Mg	12000.50C	1.8289E-04	1.9299E-04	2.0586E-04	2.0586E-04
72	Al	13027.50C	8.3957E-04	8.8597E-04	9.4503E-04	9.4503E-04
73	Si	14000.50C	4.3990E-03	4.6421E-03	4.9516E-03	4.9516E-03
74	P	15031.50C	1.2543E-06	1.3237E-06	1.4119E-06	1.4119E-06
75	K	19000.50C	3.2637E-04	3.4441E-04	3.6737E-04	3.6737E-04
76	Ca	20000.50C	9.5790E-05	1.0108E-04	1.0782E-04	1.0782E-04
77	Mn	25055.50C	1.7786E-04	1.8769E-04	2.0020E-04	2.0020E-04
78	Fe	26000.55C	1.1908E-03	1.2566E-03	1.3404E-03	1.3404E-03
79	Ni	28000.50C	1.4633E-04	1.5441E-04	1.6471E-04	1.6471E-04
80	Pu-239	94239.55C	7.3546E-10	7.7610E-10	8.2784E-10	8.2784E-10
81	Total		5.2991E-02	5.0375E-02	4.7046E-02	4.7046E-02

	V	W	X
1			
2			
3			
4	cm)		
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29			
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31			
32			
33			
34			
35	0.15	0.1	0
36	0.2	0.2	0.2
37	57.2957	57.2957	57.2957
38	-51.2921	-59.0016	-79.0576
39	476.8802519	334.5238426	49.81102387
40			
41	1.6259E-02	1.6275E-02	1.6581E-02
42	2.6088E-02	2.7612E-02	5.7366E-02
43	4.2243E-07	4.0185E-07	0.0000E+00
44	1.7937E-05	1.7063E-05	0.0000E+00
45	1.8477E-04	1.7577E-04	0.0000E+00
46	3.7250E-03	4.9118E-03	2.8087E-02
47	4.5539E-03	4.3841E-03	1.0685E-03
48	1.2673E-06	1.2055E-06	0.0000E+00
49	3.2974E-04	3.1367E-04	0.0000E+00
50	9.6778E-05	9.2063E-05	0.0000E+00
51	1.7970E-04	1.7094E-04	0.0000E+00

	V	W	X
52	1.2031E-03	1.1445E-03	0.0000E+00
53	1.4784E-04	1.4063E-04	0.0000E+00
54	1.3008E-04	1.8561E-04	1.2700E-03
55	3.4096E-05	4.8652E-05	3.3288E-04
56	7.4305E-10	7.0685E-10	0.0000E+00
65	5.2952E-02	5.5473E-02	1.0471E-01
66			
67	1.6223E-02	1.6223E-02	1.6223E-02
68	2.2518E-02	2.2518E-02	2.2518E-02
69	4.7063E-07	4.7063E-07	4.7063E-07
70	1.9984E-05	1.9984E-05	1.9984E-05
71	2.0586E-04	2.0586E-04	2.0586E-04
72	9.4503E-04	9.4503E-04	9.4503E-04
73	4.9516E-03	4.9516E-03	4.9516E-03
74	1.4119E-06	1.4119E-06	1.4119E-06
75	3.6737E-04	3.6737E-04	3.6737E-04
76	1.0782E-04	1.0782E-04	1.0782E-04
77	2.0020E-04	2.0020E-04	2.0020E-04
78	1.3404E-03	1.3404E-03	1.3404E-03
79	1.6471E-04	1.6471E-04	1.6471E-04
80	8.2784E-10	8.2784E-10	8.2784E-10
81	4.7046E-02	4.7046E-02	4.7046E-02

	A	B	C	D	E	F	G
1							
2			Avogadro's number =			6.02252E-01	atoms/mol
3				steel			
4			mass (gm)	unoxidized volume	oxide mass X	oxide mass	density
5		U-234	3.520000E+02		1.136684782	4.001130E+02	10.79813
6		U-235	3.291200E+04		1.136101503	3.739137E+04	10.83884
7		U-238	1.936000E+03		1.134382384	2.196164E+03	10.96089
8		Al in Fuel	1.544748E+04		1.889214384	2.918361E+04	3.97
9		Al Clad etc.	1.092926E+05		1.889214384	2.064772E+05	3.97
10		Abs. Steel	1.071865E+05	13685.71	1.40867E+00	1.509899E+05	5.24
11		Bask. Steel	5.231749E+05	66799.65	1.40867E+00	7.369782E+05	5.24
12		Assume vol of CS same as for SS basket					
13		volume of degraded canister =				358739.1319	
14							
15		Atom densities for water from BBA000000-01717-0200-00002 REV 00					
16		H	6.69E-02				
17		O	3.34E-02			Atomic Weights	
18						U234	234.0409
19		Gd in DOE-SNF canister				U235	235.0439
20		0	g			U238	238.0508
21						Al	26.98154
22						Fe	55.847
23						Gd	157.25
24		#########				For purpose calculating oxygen	
25						assume oxides of UO2, Fe2O3, &	
26							
27							
28							
29							
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45							

	H	I	J	K	L	M	N	O	P	Q
1					Cylinder Segment Volume Calculation					
2		Fraction of			Top Mix Water Fraction Required for full can		0.4526			
3	Complete	Total Vol	Volume at	Volume at	Bottom Mix Water Fraction					
4	Oxidation Vol.	at Bottom	Bottom	Top	Top Mix Volume		2.91578E+05	cm^3		
5	37.05392624	0.78	28.90206	8.151864	Cylinder Radius		20.965	cm		
6	3449.757744	0.78	2690.811	758.9467	Cylinder Length		259.8	cm		
7	200.3637256	0.78	156.2837	44.08002	Cylinder Volume		3.58739E+05	cm^3		
8	7351.034168	0.78	5733.807	1617.228	1/2 Cylinder Volume		1.79370E+05	cm^3		
9	52009.35819	0.78	40567.3	11442.06	Fill Fraction		1.87215E-01			
10	28814.859889	0.14	1915.999	24780.78	Degraded Volume		6.71612E+04	cm^3		
11	140644.698401	0.14	9351.951	120954.4	Calculated Volume		6.71612E+04	cm^3		
12	232507.126	Total	60445.05	159605.7	Distance from Center		[redacted]	cm	height	10.2
13	Note that 14% Steel at bottom is unoxidized									
14						Number Densities for Bottom Mix				H/U235
15						1001.50C	6.6878E-03		Bottom	6.83
16						8016.50C	5.3942E-02		Top	475.73
17		Isotope	Fraction *			13027.50C	3.2337E-02			
18		64152.50C	0.002			26000.55C	1.4170E-02			
19		64154.50C	0.0218			64152.50C	0.0000E+00			
20		64155.50C	0.148			64154.50C	0.0000E+00			
21		64156.50C	0.2047			64155.50C	0.0000E+00			
22		64157.50C	0.1565			64156.50C	0.0000E+00			
23		64158.50C	0.2484			64157.50C	0.0000E+00			
24		64160.50C	0.2186			64158.50C	0.0000E+00			
25	Al2O3	* Chart of the Nuclides, 14th Edition				64160.50C	0.0000E+00			
26						92234.50C	1.0520E-05			
27						92235.50C	9.7940E-04			
28						92238.50C	5.6884E-05			
29						TOTAL	1.0818E-01			
30						Number Densities for Top Mix				
31						1001.50C	3.0270E-02			
32						8016.50C	4.8497E-02			
33						13027.50C	2.1008E-03			
34						26000.55C	2.0050E-02			
35						64152.50C	0.0000E+00			
36						64154.50C	0.0000E+00			
37						64155.50C	0.0000E+00			
38						64156.50C	0.0000E+00			
39						64157.50C	0.0000E+00			
40						64158.50C	0.0000E+00			
41						64160.50C	0.0000E+00			
42						92234.50C	6.8343E-07			
43						92235.50C	6.3628E-05			
44						92238.50C	3.6956E-06			
45						TOTAL	1.0099E-01			

	A	B	C	D	E	F	G	H
1								
2			Avogadro's number =			6.02252E-01	atoms/mole	
3				steel				Complete
4			mass (gm)	unoxidized volume	oxide mass X	oxide mass	density	Oxidation Vol.
5		U-234	3.520000E+02		1.136684782	4.001130E+02	10.79813	37.05392624
6		U-235	3.291200E+04		1.136101503	3.739137E+04	10.83884	3449.757744
7		U-238	1.936000E+03		1.134382384	2.196164E+03	10.96089	200.3637256
8		Al in Fuel	1.544748E+04		1.889214384	2.918361E+04	3.97	7351.034168
9		Al Clad etc.	1.092926E+05		1.889214384	2.064772E+05	3.97	52009.35819
10		Abs. Steel	1.071865E+05	13685.71	1.40867E+00	1.509899E+05	5.24	28814.859889
11		Bask. Steel	5.231749E+05	66799.65	1.40867E+00	7.369782E+05	5.24	140644.698401
12		Assume vol of CS same as for SS basket						232507.126
13		volume of degraded canister =				358739.1319		Note that 14% S
14								
15		Atom densities for water from BBA000000-01717-0200-00002 REV 00						
16		H	6.69E-02					
17		O	3.34E-02			Atomic Weights		
18						U234	234.0409	
19		Gd in DOE-SNF canister				U235	235.0439	
20		0	g			U238	238.0508	
21						Al	26.98154	
22		45.5				Fe	55.847	
23						Gd	157.25	
24		#########				For purpose calculating oxygen		
25						assume oxides of UO2, Fe2O3, & Al2O3		
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								
41								
42								
43								
44								
45								

	I	J	K	L	M	N	O	P	Q
1				Cylinder Segment Volume Calculation					
2	Fraction of			Top Mix Water Fraction Required for full can		0.4141			
3	Total Vol	Volume at	Volume at	Bottom Mix Water Fraction		[redacted]			
4	at Bottom	Bottom	Top	Top Mix Volume		2.72389E+05	cm^3		
5	0.78	28.90206	8.151864	Cylinder Radius		20.965	cm		
6	0.78	2690.811	758.9467	Cylinder Length		259.8	cm		
7	0.78	156.2837	44.08002	Cylinder Volume		3.58739E+05	cm^3		
8	0.78	5733.807	1617.228	1/2 Cylinder Volume		1.79370E+05	cm^3		
9	0.78	40567.3	11442.06	Fill Fraction		2.40704E-01			
10	0.14	1915.999	24780.78	Degraded Volume		8.63501E+04	cm^3		
11	0.14	9351.951	120954.4	Calculated Volume		8.63501E+04	cm^3		
12	Total	60445.05	159605.7	Distance from Center		[redacted]	cm	height	12.2
13	teel at bottom is unoxidized								
14					Number Densities for Bottom Mix				H/U235
15					1001.50C	2.0063E-02		Bottom	26.34
16					8016.50C	4.9386E-02		Top	406.56
17	Isotope	Fraction *			13027.50C	2.5151E-02			
18	64152.50C	0.002			26000.55C	1.1021E-02			
19	64154.50C	0.0218			64152.50C	0.0000E+00			
20	64155.50C	0.148			64154.50C	0.0000E+00			
21	64156.50C	0.2047			64155.50C	0.0000E+00			
22	64157.50C	0.1565			64156.50C	0.0000E+00			
23	64158.50C	0.2484			64157.50C	0.0000E+00			
24	64160.50C	0.2186			64158.50C	0.0000E+00			
25	* Chart of the Nuclides, 14th Edition				64160.50C	0.0000E+00			
26					92234.50C	8.1820E-06			
27					92235.50C	7.6176E-04			
28					92238.50C	4.4243E-05			
29					TOTAL	1.0644E-01			
30					Number Densities for Top Mix				
31					1001.50C	2.7691E-02			
32					8016.50C	4.9558E-02			
33					13027.50C	2.2488E-03			
34					26000.55C	2.1462E-02			
35					64152.50C	0.0000E+00			
36					64154.50C	0.0000E+00			
37					64155.50C	0.0000E+00			
38					64156.50C	0.0000E+00			
39					64157.50C	0.0000E+00			
40					64158.50C	0.0000E+00			
41					64160.50C	0.0000E+00			
42					92234.50C	7.3158E-07			
43					92235.50C	6.8111E-05			
44					92238.50C	3.9559E-06			
45					TOTAL	1.0103E-01			

	A	B	C	D	E	F	G	H
1								
2			Avogadro's number =			6.02252E-01	atoms/mole	
3				steel				Complete
4			mass (gm)	unoxidized volume	oxide mass X	oxide mass	density	Oxidation Vol.
5		U-234	3.520000E+02		1.136684782	4.001130E+02	10.79813	37.05392624
6		U-235	3.291200E+04		1.136101503	3.739137E+04	10.83884	3449.757744
7		U-238	1.936000E+03		1.134382384	2.196164E+03	10.96089	200.3637256
8		Al in Fuel	1.544748E+04		1.889214384	2.918361E+04	3.97	7351.034168
9		Al Clad etc.	1.092926E+05		1.889214384	2.064772E+05	3.97	52009.35819
10		Abs. Steel	1.071865E+05	13685.71	1.40867E+00	1.509899E+05	5.24	28814.859889
11		Bask. Steel	5.231749E+05	66799.65	1.40867E+00	7.369782E+05	5.24	140644.698401
12		Assume vol of CS same as for SS basket						232507.126
13		volume of degraded canister =				358739.1319		Note that 14% S
14								
15		Atom densities for water from BBA000000-01717-0200-00002 REV 00						
16		H	6.69E-02					
17		O	3.34E-02			Atomic Weights		
18						U234	234.0409	
19		Gd in DOE-SNF canister				U235	235.0439	
20		0	g			U238	238.0508	
21						Al	26.98154	
22						Fe	55.847	
23						Gd	157.25	
24		#########				For purpose calculating oxygen		
25						assume oxides of UO2, Fe2O3, & Al2O3		
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								
41								
42								
43								
44								
45								

	I	J	K	L	M	N	O	P	Q	R
1				Cylinder Segment Volume Calculation						
2	Fraction of			Water Mix Fraction of Bottom Layer		0.3260		Water Fraction of Bottom Mix		
3	Total Vol	Volume at	Volume at	Water Fraction		[redacted]		0.151583		
4	at Bottom	Bottom	Top	Water Mix Volume		2.98294E+05	cm^3			
5	0.78	28.90206	8.15186377	Cylinder Radius		20.965	cm			
6	0.78	2690.811	758.946704	Cylinder Length		259.8	cm			
7	0.78	156.2837	44.0800196	Cylinder Volume		3.58739E+05	cm^3			
8	0.78	5733.807	1617.22752	1/2 Cylinder Volume		1.79370E+05	cm^3			
9	0.78	40567.3	11442.0588	Bottom Layer Fill Fraction		2.50000E-01				
10	0.14	1915.999	24780.7795	Degraded Volume		8.96848E+04	cm^3			
11	0.14	9351.951	120954.441	Calculated Volume		8.96848E+04	cm^3			
12	Total	60445.05	159605.685	Distance from Center		[redacted]	cm	height	12.5	
13	eel at bottom is unoxidized									
14					Number Densities for Bottom Mix				H/U235	
15					1001.50C	1.0138E-02		Bottom	13.45	
16					8016.50C	5.4639E-02		Top	499.94	
17	Isotope	Fraction *			13027.50C	2.4885E-02				
18	64152.50C	0.002			26000.55C	1.7001E-02				
19	64154.50C	0.0218			64152.50C	0.0000E+00				
20	64155.50C	0.148			64154.50C	0.0000E+00				
21	64156.50C	0.2047			64155.50C	0.0000E+00				
22	64157.50C	0.1565			64156.50C	0.0000E+00				
23	64158.50C	0.2484			64157.50C	0.0000E+00				
24	64160.50C	0.2186			64158.50C	0.0000E+00				
25	* Chart of the Nuclides, 14th Edition				64160.50C	0.0000E+00				
26					92234.50C	8.0956E-06				
27					92235.50C	7.5371E-04				
28					92238.50C	4.3776E-05				
29					TOTAL	1.0747E-01				
30					Number Densities for Top Mix					
31					1001.50C	3.1094E-02				
32					8016.50C	4.8158E-02				
33					13027.50C	2.0535E-03				
34					26000.55C	1.9598E-02				
35					64152.50C	0.0000E+00				
36					64154.50C	0.0000E+00				
37					64155.50C	0.0000E+00				
38					64156.50C	0.0000E+00				
39					64157.50C	0.0000E+00				
40					64158.50C	0.0000E+00				
41					64160.50C	0.0000E+00				
42					92234.50C	6.6805E-07				
43					92235.50C	6.2196E-05				
44					92238.50C	3.6124E-06				
45					TOTAL	1.0097E-01				

	A	B	C	D	E	F	G
1							
2							
3				**DHLW and Degraded MIT Fuel Homogeneous Mixture be**			
4				**(15% DHLW in Mixture, 0.272 Void Fraction, 100 g Gd, 0 g**			
5							DHLW Clay
6		Cylinder Segment Volume Calculation					(atom/barn/cm)
7							H
8		Geometry Calculations					O
9							F
10		UO2 Frac. Remaing		1.00			Na
11		Cylinder Radius		86.5	cm		Mg
12		Cylinder Length		304	cm		Al
13		Cylinder Volume		7.1459E+06	cm^3		Si
14		1/2 Cylinder Volume		3.5729E+06			P
15		DHLW Volume		4.9933E+06	cm^3		K
16		Degraded MIT Volume		2.0097E+05	cm^3		Ca
17		Mass of Gd		1.0000E+02	g		Mn
18		Den. of Gd		7.9004E+00	g/cm^3		Fe
19		Vol. of Gd		1.2658E+01	cm^3		Ni
20		Mass of Fe2O3		0.0000E+00	g		U-238
21		Den. of Fe2O3		5.2400E+00	g/cm^3		
22		Vol. of Fe2O3		0.0000E+00	cm^3		
23	Total	Void Fraction					Pu-239
24		Total Volume		7.1350E+06	cm^3		
25		Calculated Volume		7.1350E+06	cm^3		Total
26	Mixture	Distance from Center		8.48900E+01	cm		
27		Frac. of DHLW Mixed					
28		with MIT Fuel		1.5000E-01			
29		Mixture Volume		1.3049E+06	cm^3		
30		Calculated Volume		1.3049E+06	cm^3		
31		Distance from Center		-4.52889E+01	cm		
32							
33							
34							
35							
36							
37							
38							
39				**DHLW and Degraded MIT Fuel Homogeneous Mixture be**			
40				**(15% DHLW in Mixture, 0.272 Void Fraction, 50 g Gd, 0 g**			
41							DHLW Clay
42		Cylinder Segment Volume Calculation					(atom/barn/cm)
43							H
44		Geometry Calculations					O
45							F
46		UO2 Frac. Remaing		1.00			Na
47		Cylinder Radius		86.5	cm		Mg
48		Cylinder Length		304	cm		Al
49		Cylinder Volume		7.1459E+06	cm^3		Si
50		1/2 Cylinder Volume		3.5729E+06			P
51		DHLW Volume		4.9933E+06	cm^3		K

	A	B	C	D	E	F	G
52		Degraded MIT Volume		2.0097E+05	cm^3		Ca
53		Mass of Gd		5.0000E+01	g		Mn
54		Den. of Gd		7.9004E+00	g/cm^3		Fe
55		Vol. of Gd		6.3288E+00	cm^3		Ni
56		Mass of Fe2O3		0.0000E+00	g		U-238
57		Den. of Fe2O3		5.2400E+00	g/cm^3		
58		Vol. of Fe2O3		0.0000E+00	cm^3		
59	Total	Void Fraction		[redacted]			Pu-239
60		Total Volume		7.1350E+06	cm^3		
61		Calculated Volume		7.1350E+06	cm^3		Total
62	Mixture	Distance from Center		8.48900E+01	cm		
63		Frac. of DHLW Mixed					
64		with MIT Fuel		1.5000E-01			
65		Mixture Volume		1.3049E+06	cm^3		
66		Calculated Volume		1.3049E+06	cm^3		
67		Distance from Center		-4.52889E+01	cm		
68							
69							
70							
71				**DHLW and Degraded MIT Fuel Homogeneous Mixture be**			
72				**(15% DHLW in Mixture, 0.26 Void Fraction, 0 g Gd, 29510**			
73							DHLW Clay
74		Cylinder Segment Volume Calculation					(atom/barn/cm)
75							H
76		Geometry Calculations					O
77							F
78		UO2 Frac. Remaing		1.00			Na
79		Cylinder Radius		86.5	cm		Mg
80		Cylinder Length		304	cm		Al
81		Cylinder Volume		7.1459E+06	cm^3		Si
82		1/2 Cylinder Volume		3.5729E+06			P
83		DHLW Volume		4.9933E+06	cm^3		K
84		Degraded MIT Volume		2.0097E+05	cm^3		Ca
85		Mass of Gd		0.0000E+00	g		Mn
86		Den. of Gd		7.9004E+00	g/cm^3		Fe
87		Vol. of Gd		0.0000E+00	cm^3		Ni
88		Mass of Fe2O3		2.9511E+05	g		U-238
89		Den. of Fe2O3		5.2400E+00	g/cm^3		
90		Vol. of Fe2O3		5.6318E+04	cm^3		
91	Total	Void Fraction		[redacted]			Pu-239
92		Total Volume		7.0954E+06	cm^3		
93		Calculated Volume		7.0954E+06	cm^3		Total
94	Mixture	Distance from Center		8.20000E+01	cm		
95		Frac. of DHLW Mixed					
96		with MIT Fuel		1.5000E-01			
97		Mixture Volume		1.3598E+06	cm^3		
98		Calculated Volume		1.3598E+06	cm^3		
99		Distance from Center		-4.40692E+01	cm		
100							
101							
102							

	A	B	C	D	E	F	G
103							
104							
105							
106				**DHLW and Degraded MIT Fuel Homogeneous Mixture be**			
107				**(15% DHLW in Mixture, 0.26 Void Fraction, 20 g Gd, 2951**			
108							DHLW Clay
109		Cylinder Segment Volume Calculation					(atom/barn/cm)
110							H
111		Geometry Calculations					O
112							F
113		UO2 Frac. Remaing		1.00			Na
114		Cylinder Radius		86.5	cm		Mg
115		Cylinder Length		304	cm		Al
116		Cylinder Volume		7.1459E+06	cm^3		Si
117		1/2 Cylinder Volume		3.5729E+06			P
118		DHLW Volume		4.9933E+06	cm^3		K
119		Degraded MIT Volume		2.0097E+05	cm^3		Ca
120		Mass of Gd		2.0000E+01	g		Mn
121		Den. of Gd		7.9004E+00	g/cm^3		Fe
122		Vol. of Gd		2.5315E+00	cm^3		Ni
123		Mass of Fe2O3		2.9511E+05	g		U-238
124		Den. of Fe2O3		5.2400E+00	g/cm^3		
125		Vol. of Fe2O3		5.6318E+04	cm^3		
126	Total	Void Fraction					Pu-239
127		Total Volume		7.0954E+06	cm^3		
128		Calculated Volume		7.0954E+06	cm^3		Total
129	Mixture	Distance from Center		8.20000E+01	cm		
130		Frac. of DHLW Mixed					
131		with MIT Fuel		1.5000E-01			
132		Mixture Volume		1.3598E+06	cm^3		
133		Calculated Volume		1.3598E+06	cm^3		
134		Distance from Center		-4.40692E+01	cm		
135							
136							
137							
138				**DHLW and Degraded MIT Fuel Homogeneous Mixture be**			
139				**(15% DHLW in Mixture, 0.26 Void Fraction, 40 g Gd, 2951**			
140							DHLW Clay
141		Cylinder Segment Volume Calculation					(atom/barn/cm)
142							H
143		Geometry Calculations					O
144							F
145		UO2 Frac. Remaing		1.00			Na
146		Cylinder Radius		86.5	cm		Mg
147		Cylinder Length		304	cm		Al
148		Cylinder Volume		7.1459E+06	cm^3		Si
149		1/2 Cylinder Volume		3.5729E+06			P
150		DHLW Volume		4.9933E+06	cm^3		K
151		Degraded MIT Volume		2.0097E+05	cm^3		Ca
152		Mass of Gd		4.0000E+01	g		Mn
153		Den. of Gd		7.9004E+00	g/cm^3		Fe

	A	B	C	D	E	F	G
154		Vol. of Gd		5.0630E+00	cm^3		Ni
155		Mass of Fe2O3		2.9511E+05	g		U-238
156		Den. of Fe2O3		5.2400E+00	g/cm^3		
157		Vol. of Fe2O3		5.6318E+04	cm^3		
158	Total	Void Fraction		[redacted]			Pu-239
159		Total Volume		7.0954E+06	cm^3		
160		Calculated Volume		7.0954E+06	cm^3		Total
161	Mixture	Distance from Center		8.20000E+01	cm		
162		Frac. of DHLW Mixed					
163		with MIT Fuel		1.5000E-01			
164		Mixture Volume		1.3598E+06	cm^3		
165		Calculated Volume		1.3598E+06	cm^3		
166		Distance from Center		-4.40692E+01	cm		
167							
168							
169							
170							
171							
172							
173				**DHLW and Degraded MIT Fuel Homogeneous Mixture be**			
174				**(15% DHLW in Mixture, 0.26 Void Fraction, 50 g Gd, 2951**			
175							DHLW Clay
176		Cylinder Segment Volume Calculation					(atom/barn/cm)
177							H
178		Geometry Calculations					O
179							F
180		UO2 Frac. Remaing		1.00			Na
181		Cylinder Radius		86.5	cm		Mg
182		Cylinder Length		304	cm		Al
183		Cylinder Volume		7.1459E+06	cm^3		Si
184		1/2 Cylinder Volume		3.5729E+06			P
185		DHLW Volume		4.9933E+06	cm^3		K
186		Degraded MIT Volume		2.0097E+05	cm^3		Ca
187		Mass of Gd		5.0000E+01	g		Mn
188		Den. of Gd		7.9004E+00	g/cm^3		Fe
189		Vol. of Gd		6.3288E+00	cm^3		Ni
190		Mass of Fe2O3		2.9511E+05	g		U-238
191		Den. of Fe2O3		5.2400E+00	g/cm^3		
192		Vol. of Fe2O3		5.6318E+04	cm^3		
193	Total	Void Fraction		[redacted]			Pu-239
194		Total Volume		7.0954E+06	cm^3		
195		Calculated Volume		7.0954E+06	cm^3		Total
196	Mixture	Distance from Center		8.20000E+01	cm		
197		Frac. of DHLW Mixed					
198		with MIT Fuel		1.5000E-01			
199		Mixture Volume		1.3598E+06	cm^3		
200		Calculated Volume		1.3598E+06	cm^3		
201		Distance from Center		-4.40692E+01	cm		
202							
203							
204							

	A	B	C	D	E	F	G
205				**DHLW and Degraded MIT Fuel Homogeneous Mixture be**			
206				**(15% DHLW in Mixture, 0.255 Void Fraction, 0 g Gd, 5902**			
207							DHLW Clay
208		Cylinder Segment Volume Calculation					(atom/barn/cm)
209							H
210		Geometry Calculations					O
211							F
212		UO2 Frac. Remaing		1.00			Na
213		Cylinder Radius		86.5	cm		Mg
214		Cylinder Length		304	cm		Al
215		Cylinder Volume		7.1459E+06	cm^3		Si
216		1/2 Cylinder Volume		3.5729E+06			P
217		DHLW Volume		4.9933E+06	cm^3		K
218		Degraded MIT Volume		2.0097E+05	cm^3		Ca
219		Mass of Gd		0.0000E+00	g		Mn
220		Den. of Gd		7.9004E+00	g/cm^3		Fe
221		Vol. of Gd		0.0000E+00	cm^3		Ni
222		Mass of Fe2O3		5.9021E+05	g		U-238
223		Den. of Fe2O3		5.2400E+00	g/cm^3		
224		Vol. of Fe2O3		1.1264E+05	cm^3		
225	Total	Void Fraction					Pu-239
226		Total Volume		7.1234E+06	cm^3		
227		Calculated Volume		7.1234E+06	cm^3		Total
228	Mixture	Distance from Center		8.38787E+01	cm		
229		Frac. of DHLW Mixed					
230		with MIT Fuel		1.5000E-01			
231		Mixture Volume		1.4263E+06	cm^3		
232		Calculated Volume		1.4263E+06	cm^3		
233		Distance from Center		-4.26088E+01	cm		
234							
235							
236							
237							
238							
239							
240							
241				**DHLW and Degraded MIT Fuel Homogeneous Mixture be**			
242				**(15% DHLW in Mixture, 0.26 Void Fraction, 0 g Gd, 59021**			
243							DHLW Clay
244		Cylinder Segment Volume Calculation					(atom/barn/cm)
245							H
246		Geometry Calculations					O
247							F
248		UO2 Frac. Remaing		1.00			Na
249		Cylinder Radius		86.5	cm		Mg
250		Cylinder Length		304	cm		Al
251		Cylinder Volume		7.1459E+06	cm^3		Si
252		1/2 Cylinder Volume		3.5729E+06			P
253		DHLW Volume		4.9933E+06	cm^3		K
254		Degraded MIT Volume		2.0097E+05	cm^3		Ca
255		Mass of Gd		0.0000E+00	g		Mn

	A	B	C	D	E	F	G
256		Den. of Gd		7.9004E+00	g/cm^3		Fe
257		Vol. of Gd		0.0000E+00	cm^3		Ni
258		Mass of Fe2O3		5.9021E+05	g		U-238
259		Den. of Fe2O3		5.2400E+00	g/cm^3		
260		Vol. of Fe2O3		1.1264E+05	cm^3		
261	Total	Void Fraction			0.21858		Pu-239
262		Total Volume		7.0759E+06	cm^3		
263		Calculated Volume		7.0759E+06	cm^3		Total
264	Mixture	Distance from Center		8.08973E+01	cm		
265		Frac. of DHLW Mixed					
266		with MIT Fuel		1.5000E-01			
267		Mixture Volume		1.4168E+06	cm^3		
268		Calculated Volume		1.4168E+06	cm^3		
269		Distance from Center		4.28167E+01	cm		
270							
271						3.5420E+05	
272							

	H	I	J	K	L	M	N
1							H/U-235
2							Void Frac.
3	**low DHLW**						
4	**Fe2O3)**						
5			Degraded MIT Fuel				**Mixture**
6				Mass(g)	WT		
7	3.55893E-03						H
8	1.97883E-02		O	3.73E+05	15.994915		O
9	5.88292E-07						F
10	2.49797E-05						Na
11	2.57324E-04						Mg
12	1.18129E-03		Al	4.14E+05	26.9815389		Al
13	6.18950E-03						Si
14	1.76488E-06						P
15	4.59207E-04						K
16	1.34777E-04						Ca
17	2.50252E-04						Mn
18	1.67546E-03		Fe	0.00E+00	55.847		Fe
19	2.05882E-04						Ni
20	0.00000E+00		U-238	1936	238.05077		U-238
21			U-235	32912	235.043915		U-235
22			U-234	352	234.040904		U-234
23	1.03481E-09						Pu-239
24			Gd	1.0000E+02	157.25		Gd-152
25	3.37283E-02						Gd-154
26							Gd-155
27							Gd-156
28							Gd-157
29							Gd-158
30							Gd-160
31							
32							Total
33							
34							H/U-235
35							
36							
37							
38							Void Frac.
39	**low DHLW**						
40	**Fe2O3)**						
41			Degraded MIT Fuel				**Mixture**
42				Mass(g)	WT		
43	3.55893E-03						H
44	1.97883E-02		O	3.73E+05	15.994915		O
45	5.88292E-07						F
46	2.49797E-05						Na
47	2.57324E-04						Mg
48	1.18129E-03		Al	4.14E+05	26.9815389		Al
49	6.18950E-03						Si
50	1.76488E-06						P
51	4.59207E-04						K

	H	I	J	K	L	M	N
52	1.34777E-04						Ca
53	2.50252E-04						Mn
54	1.67546E-03		Fe	0.00E+00	55.847		Fe
55	2.05882E-04						Ni
56	0.00000E+00		U-238	1936	238.05077		U-238
57			U-235	32912	235.043915		U-235
58			U-234	352	234.040904		U-234
59	1.03481E-09						Pu-239
60			Gd	5.0000E+01	157.25		Gd-152
61	3.37283E-02						Gd-154
62							Gd-155
63							Gd-156
64							Gd-157
65							Gd-158
66							Gd-160
67							
68							Total
69							H/U
70							Void Frac.
71	**low DHLW**						
72	**5 g Fe2O3)**						
73			Degraded MIT Fuel				**Mixture**
74				Mass(g)	WT		
75	3.55893E-03						H
76	1.97883E-02		O	4.62E+05	15.994915		O
77	5.88292E-07						F
78	2.49797E-05						Na
79	2.57324E-04						Mg
80	1.18129E-03		Al	4.14E+05	26.9815389		Al
81	6.18950E-03						Si
82	1.76488E-06						P
83	4.59207E-04						K
84	1.34777E-04						Ca
85	2.50252E-04						Mn
86	1.67546E-03		Fe	2.06E+05	55.847		Fe
87	2.05882E-04						Ni
88	0.00000E+00		U-238	1936	238.05077		U-238
89			U-235	32912	235.043915		U-235
90			U-234	352	234.040904		U-234
91	1.03481E-09						Pu-239
92			Gd	0.0000E+00	157.25		Gd-152
93	3.37283E-02						Gd-154
94							Gd-155
95							Gd-156
96							Gd-157
97							Gd-158
98							Gd-160
99							
100							Total
101							
102							H/U-235

	H	I	J	K	L	M	N
103							
104							
105							Void Frac.
106	**low DHLW**						
107	**05 g Fe2O3)**						
108			Degraded MIT Fuel				**Mixture**
109				Mass(g)	WT		
110	3.55893E-03						H
111	1.97883E-02		O	4.62E+05	15.994915		O
112	5.88292E-07						F
113	2.49797E-05						Na
114	2.57324E-04						Mg
115	1.18129E-03		Al	4.14E+05	26.9815389		Al
116	6.18950E-03						Si
117	1.76488E-06						P
118	4.59207E-04						K
119	1.34777E-04						Ca
120	2.50252E-04						Mn
121	1.67546E-03		Fe	2.06E+05	55.847		Fe
122	2.05882E-04						Ni
123	0.00000E+00		U-238	1936	238.05077		U-238
124			U-235	32912	235.043915		U-235
125			U-234	352	234.040904		U-234
126	1.03481E-09						Pu-239
127			Gd	2.0000E+01	157.25		Gd-152
128	3.37283E-02						Gd-154
129							Gd-155
130							Gd-156
131							Gd-157
132							Gd-158
133							Gd-160
134							
135							Total
136							
137							H/U-235
138	**low DHLW**						
139	**05 g Fe2O3)**						
140			Degraded MIT Fuel				**Mixture**
141				Mass(g)	WT		
142	3.55893E-03						H
143	1.97883E-02		O	4.62E+05	15.994915		O
144	5.88292E-07						F
145	2.49797E-05						Na
146	2.57324E-04						Mg
147	1.18129E-03		Al	4.14E+05	26.9815389		Al
148	6.18950E-03						Si
149	1.76488E-06						P
150	4.59207E-04						K
151	1.34777E-04						Ca
152	2.50252E-04						Mn
153	1.67546E-03		Fe	2.06E+05	55.847		Fe

	H	I	J	K	L	M	N
154	2.05882E-04						Ni
155	0.00000E+00		U-238	1936	238.05077		U-238
156			U-235	32912	235.043915		U-235
157			U-234	352	234.040904		U-234
158	1.03481E-09						Pu-239
159			Gd	4.0000E+01	157.25		Gd-152
160	3.37283E-02						Gd-154
161							Gd-155
162							Gd-156
163							Gd-157
164							Gd-158
165							Gd-160
166							
167							Total
168							
169							H/U-235
170							
171							
172							
173	**low DHLW**						
174	**05 g Fe2O3)**						
175			Degraded MIT Fuel				**Mixture**
176				Mass(g)	WT		
177	3.55893E-03						H
178	1.97883E-02		O	4.62E+05	15.994915		O
179	5.88292E-07						F
180	2.49797E-05						Na
181	2.57324E-04						Mg
182	1.18129E-03		Al	4.14E+05	26.9815389		Al
183	6.18950E-03						Si
184	1.76488E-06						P
185	4.59207E-04						K
186	1.34777E-04						Ca
187	2.50252E-04						Mn
188	1.67546E-03		Fe	2.06E+05	55.847		Fe
189	2.05882E-04						Ni
190	0.00000E+00		U-238	1936	238.05077		U-238
191			U-235	32912	235.043915		U-235
192			U-234	352	234.040904		U-234
193	1.03481E-09						Pu-239
194			Gd	5.0000E+01	157.25		Gd-152
195	3.37283E-02						Gd-154
196							Gd-155
197							Gd-156
198							Gd-157
199							Gd-158
200							Gd-160
201							
202							Total
203							
204							Void Frac.

	H	I	J	K	L	M	N
205	**low DHLW**						
206	**10 g Fe2O3)**						
207			Degraded MIT Fuel				**Mixture**
208				Mass(g)	WT		
209	3.55893E-03						H
210	1.97883E-02		O	5.50E+05	15.994915		O
211	5.88292E-07						F
212	2.49797E-05						Na
213	2.57324E-04						Mg
214	1.18129E-03		Al	4.14E+05	26.9815389		Al
215	6.18950E-03						Si
216	1.76488E-06						P
217	4.59207E-04						K
218	1.34777E-04						Ca
219	2.50252E-04						Mn
220	1.67546E-03		Fe	4.13E+05	55.847		Fe
221	2.05882E-04						Ni
222	0.00000E+00		U-238	1936	238.05077		U-238
223			U-235	32912	235.043915		U-235
224			U-234	352	234.040904		U-234
225	1.03481E-09						Pu-239
226			Gd	0.0000E+00	157.25		Gd-152
227	3.37283E-02						Gd-154
228							Gd-155
229							Gd-156
230							Gd-157
231							Gd-158
232							Gd-160
233							
234							Total
235							
236							H/U-235
237							
238							
239							
240							Void Frac.
241	**low DHLW**						
242	**0 g Fe2O3)**						
243			Degraded MIT Fuel				**Mixture**
244				Mass(g)	WT		
245	3.55893E-03						H
246	1.97883E-02		O	5.50E+05	15.994915		O
247	5.88292E-07						F
248	2.49797E-05						Na
249	2.57324E-04						Mg
250	1.18129E-03		Al	4.14E+05	26.9815389		Al
251	6.18950E-03						Si
252	1.76488E-06						P
253	4.59207E-04						K
254	1.34777E-04						Ca
255	2.50252E-04						Mn

	H	I	J	K	L	M	N
256	1.67546E-03		Fe	4.13E+05	55.847		Fe
257	2.05882E-04						Ni
258	0.00000E+00		U-238	1936	238.05077		U-238
259			U-235	32912	235.043915		U-235
260			U-234	352	234.040904		U-234
261	1.03481E-09						Pu-239
262			Gd	0.0000E+00	157.25		Gd-152
263	3.37283E-02						Gd-154
264							Gd-155
265							Gd-156
266							Gd-157
267							Gd-158
268							Gd-160
269							
270							Total
271							
272							H/U-235

	O	P	Q	R	S	T
1		#REF!				
2	0.272					
3						
4						
5		(atoms/barn cm)		**DHLW**		(atoms/barn cm)
6						
7	1001.50C	2.0234E-02		H	1001.50C	2.0782E-02
8	8016.50C	3.1215E-02		O	8016.50C	2.3501E-02
9	9019.50C	3.3767E-07		F	9019.50C	4.2828E-07
10	11023.50C	1.4338E-05		Na	11023.50C	1.8185E-05
11	12000.50C	1.4770E-04		Mg	12000.50C	1.8733E-04
12	13027.50C	7.7629E-03		Al	13027.50C	8.5998E-04
13	14000.50C	3.5527E-03		Si	14000.50C	4.5060E-03
14	15031.50C	1.0130E-06		P	15031.50C	1.2848E-06
15	19000.50C	2.6358E-04		K	19000.50C	3.3430E-04
16	20000.50C	7.7360E-05		Ca	20000.50C	9.8118E-05
17	25055.50C	1.4364E-04		Mn	25055.50C	1.8218E-04
18	26000.55C	9.6169E-04		Fe	26000.55C	1.2197E-03
19	28000.50C	1.1817E-04		Ni	28000.50C	1.4988E-04
20	92238.50C	3.7535E-06				
21	92235.50C	6.4625E-05				
22	92234.50C	6.9414E-07				
23	94239.55C	5.9396E-10		Pu-239	94239.55C	7.5334E-10
24	64152.50C	5.8700E-10		Total		5.1840E-02
25	64154.50C	6.3983E-09				
26	64155.50C	4.3438E-08				
27	64156.50C	6.0079E-08				
28	64157.50C	4.5933E-08				
29	64158.50C	7.2905E-08				
30	64160.50C	6.4159E-08				
31						
32		6.4562E-02				
33						
34		313.0898433				
35						
36						
37						
38	0.272					
39						
40						
41		(atoms/barn cm)		**DHLW**		(atoms/barn cm)
42						
43	1001.50C	2.0234E-02		H	1001.50C	2.0782E-02
44	8016.50C	3.1215E-02		O	8016.50C	2.3501E-02
45	9019.50C	3.3767E-07		F	9019.50C	4.2828E-07
46	11023.50C	1.4338E-05		Na	11023.50C	1.8185E-05
47	12000.50C	1.4770E-04		Mg	12000.50C	1.8733E-04
48	13027.50C	7.7630E-03		Al	13027.50C	8.5998E-04
49	14000.50C	3.5527E-03		Si	14000.50C	4.5060E-03
50	15031.50C	1.0130E-06		P	15031.50C	1.2848E-06
51	19000.50C	2.6358E-04		K	19000.50C	3.3430E-04

	O	P	Q	R	S	T
52	20000.50C	7.7360E-05		Ca	20000.50C	9.8118E-05
53	25055.50C	1.4364E-04		Mn	25055.50C	1.8218E-04
54	26000.55C	9.6169E-04		Fe	26000.55C	1.2197E-03
55	28000.50C	1.1817E-04		Ni	28000.50C	1.4988E-04
56	92238.50C	3.7535E-06				
57	92235.50C	6.4626E-05				
58	92234.50C	6.9415E-07				
59	94239.55C	5.9397E-10		Pu-239	94239.55C	7.5334E-10
60	64152.50C	2.9350E-10		Total		5.1840E-02
61	64154.50C	3.1992E-09				
62	64155.50C	2.1719E-08				
63	64156.50C	3.0040E-08				
64	64157.50C	2.2967E-08				
65	64158.50C	3.6453E-08				
66	64160.50C	3.2080E-08				
67						
68		6.4562E-02				
69		3.1309E+02				
70	0.26					
71						
72						
73		(atoms/barn cm)		**DHLW**		(atoms/barn cm)
74						
75	1001.50C	1.9349E-02		H	1001.50C	2.0022E-02
76	8016.50C	3.2376E-02		O	8016.50C	2.3337E-02
77	9019.50C	3.2403E-07		F	9019.50C	4.3534E-07
78	11023.50C	1.3759E-05		Na	11023.50C	1.8485E-05
79	12000.50C	1.4173E-04		Mg	12000.50C	1.9042E-04
80	13027.50C	7.4493E-03		Al	13027.50C	8.7415E-04
81	14000.50C	3.4092E-03		Si	14000.50C	4.5802E-03
82	15031.50C	9.7209E-07		P	15031.50C	1.3060E-06
83	19000.50C	2.5293E-04		K	19000.50C	3.3981E-04
84	20000.50C	7.4235E-05		Ca	20000.50C	9.9735E-05
85	25055.50C	1.3784E-04		Mn	25055.50C	1.8519E-04
86	26000.55C	2.5599E-03		Fe	26000.55C	1.2398E-03
87	28000.50C	1.1340E-04		Ni	28000.50C	1.5235E-04
88	92238.50C	3.6019E-06				
89	92235.50C	6.2015E-05				
90	92234.50C	6.6611E-07				
91	94239.55C	5.6997E-10		Pu-239	94239.55C	7.6576E-10
92	64152.50C	0.0000E+00		Total		5.1041E-02
93	64154.50C	0.0000E+00				
94	64155.50C	0.0000E+00				
95	64156.50C	0.0000E+00				
96	64157.50C	0.0000E+00				
97	64158.50C	0.0000E+00				
98	64160.50C	0.0000E+00				
99						
100		6.5944E-02				
101						
102		311.997187				

	O	P	Q	R	S	T
103						
104						
105	0.26					
106						
107						
108		(atoms/barn cm)		**DHLW**		(atoms/barn cm)
109						
110	1001.50C	1.9349E-02		H	1001.50C	2.0022E-02
111	8016.50C	3.2376E-02		O	8016.50C	2.3337E-02
112	9019.50C	3.2403E-07		F	9019.50C	4.3534E-07
113	11023.50C	1.3759E-05		Na	11023.50C	1.8485E-05
114	12000.50C	1.4173E-04		Mg	12000.50C	1.9042E-04
115	13027.50C	7.4493E-03		Al	13027.50C	8.7415E-04
116	14000.50C	3.4092E-03		Si	14000.50C	4.5802E-03
117	15031.50C	9.7209E-07		P	15031.50C	1.3060E-06
118	19000.50C	2.5293E-04		K	19000.50C	3.3981E-04
119	20000.50C	7.4235E-05		Ca	20000.50C	9.9735E-05
120	25055.50C	1.3784E-04		Mn	25055.50C	1.8519E-04
121	26000.55C	2.5598E-03		Fe	26000.55C	1.2398E-03
122	28000.50C	1.1340E-04		Ni	28000.50C	1.5235E-04
123	92238.50C	3.6019E-06				
124	92235.50C	6.2015E-05				
125	92234.50C	6.6610E-07				
126	94239.55C	5.6997E-10		Pu-239	94239.55C	7.6576E-10
127	64152.50C	1.1266E-10		Total		5.1041E-02
128	64154.50C	1.2280E-09				
129	64155.50C	8.3367E-09				
130	64156.50C	1.1531E-08				
131	64157.50C	8.8155E-09				
132	64158.50C	1.3992E-08				
133	64160.50C	1.2313E-08				
134						
135		6.5944E-02				
136						
137		311.9978924				
138						
139						
140		(atoms/barn cm)		**DHLW**		(atoms/barn cm)
141						
142	1001.50C	1.9349E-02		H	1001.50C	2.0022E-02
143	8016.50C	3.2376E-02		O	8016.50C	2.3337E-02
144	9019.50C	3.2403E-07		F	9019.50C	4.3534E-07
145	11023.50C	1.3759E-05		Na	11023.50C	1.8485E-05
146	12000.50C	1.4173E-04		Mg	12000.50C	1.9042E-04
147	13027.50C	7.4493E-03		Al	13027.50C	8.7415E-04
148	14000.50C	3.4092E-03		Si	14000.50C	4.5802E-03
149	15031.50C	9.7209E-07		P	15031.50C	1.3060E-06
150	19000.50C	2.5293E-04		K	19000.50C	3.3981E-04
151	20000.50C	7.4235E-05		Ca	20000.50C	9.9735E-05
152	25055.50C	1.3784E-04		Mn	25055.50C	1.8519E-04
153	26000.55C	2.5598E-03		Fe	26000.55C	1.2398E-03

	O	P	Q	R	S	T
154	28000.50C	1.1340E-04		Ni	28000.50C	1.5235E-04
155	92238.50C	3.6019E-06				
156	92235.50C	6.2015E-05				
157	92234.50C	6.6610E-07				
158	94239.55C	5.6997E-10		Pu-239	94239.55C	7.6576E-10
159	64152.50C	2.2531E-10		Total		5.1041E-02
160	64154.50C	2.4559E-09				
161	64155.50C	1.6673E-08				
162	64156.50C	2.3061E-08				
163	64157.50C	1.7631E-08				
164	64158.50C	2.7984E-08				
165	64160.50C	2.4627E-08				
166						
167		6.5944E-02				
168						
169		311.9985978				
170						
171						
172						
173						
174						
175		(atoms/barn cm)		**DHLW**		(atoms/barn cm)
176						
177	1001.50C	1.9349E-02		H	1001.50C	2.0022E-02
178	8016.50C	3.2376E-02		O	8016.50C	2.3337E-02
179	9019.50C	3.2403E-07		F	9019.50C	4.3534E-07
180	11023.50C	1.3759E-05		Na	11023.50C	1.8485E-05
181	12000.50C	1.4173E-04		Mg	12000.50C	1.9042E-04
182	13027.50C	7.4493E-03		Al	13027.50C	8.7415E-04
183	14000.50C	3.4091E-03		Si	14000.50C	4.5802E-03
184	15031.50C	9.7208E-07		P	15031.50C	1.3060E-06
185	19000.50C	2.5293E-04		K	19000.50C	3.3981E-04
186	20000.50C	7.4235E-05		Ca	20000.50C	9.9735E-05
187	25055.50C	1.3784E-04		Mn	25055.50C	1.8519E-04
188	26000.55C	2.5598E-03		Fe	26000.55C	1.2398E-03
189	28000.50C	1.1340E-04		Ni	28000.50C	1.5235E-04
190	92238.50C	3.6018E-06				
191	92235.50C	6.2015E-05				
192	92234.50C	6.6610E-07				
193	94239.55C	5.6997E-10		Pu-239	94239.55C	7.6576E-10
194	64152.50C	2.8164E-10		Total		5.1041E-02
195	64154.50C	3.0699E-09				
196	64155.50C	2.0842E-08				
197	64156.50C	2.8826E-08				
198	64157.50C	2.2039E-08				
199	64158.50C	3.4980E-08				
200	64160.50C	3.0784E-08				
201						
202		6.5944E-02				
203						
204	0.255					

	O	P	Q	R	S	T
205						
206						
207		(atoms/barn cm)		**DHLW**		(atoms/barn cm)
208						
209	1001.50C	1.8923E-02		H	1001.50C	1.9705E-02
210	8016.50C	3.3446E-02		O	8016.50C	2.3269E-02
211	9019.50C	3.0893E-07		F	9019.50C	4.3828E-07
212	11023.50C	1.3118E-05		Na	11023.50C	1.8610E-05
213	12000.50C	1.3513E-04		Mg	12000.50C	1.9171E-04
214	13027.50C	7.1022E-03		Al	13027.50C	8.8006E-04
215	14000.50C	3.2503E-03		Si	14000.50C	4.6112E-03
216	15031.50C	9.2679E-07		P	15031.50C	1.3148E-06
217	19000.50C	2.4114E-04		K	19000.50C	3.4211E-04
218	20000.50C	7.0776E-05		Ca	20000.50C	1.0041E-04
219	25055.50C	1.3142E-04		Mn	25055.50C	1.8644E-04
220	26000.55C	4.0013E-03		Fe	26000.55C	1.2482E-03
221	28000.50C	1.0811E-04		Ni	28000.50C	1.5338E-04
222	92238.50C	3.4340E-06				
223	92235.50C	5.9125E-05				
224	92234.50C	6.3506E-07				
225	94239.55C	5.4341E-10		Pu-239	94239.55C	7.7093E-10
226	64152.50C	0.0000E+00		Total		5.0708E-02
227	64154.50C	0.0000E+00				
228	64155.50C	0.0000E+00				
229	64156.50C	0.0000E+00				
230	64157.50C	0.0000E+00				
231	64158.50C	0.0000E+00				
232	64160.50C	0.0000E+00				
233						
234		6.7487E-02				
235						
236		320.046738				
237						
238						
239						
240	0.25					
241						
242						
243		(atoms/barn cm)		**DHLW**		(atoms/barn cm)
244						
245	1001.50C	1.8601E-02		H	1001.50C	1.9389E-02
246	8016.50C	3.3446E-02		O	8016.50C	2.3201E-02
247	9019.50C	3.1100E-07		F	9019.50C	4.4122E-07
248	11023.50C	1.3206E-05		Na	11023.50C	1.8735E-05
249	12000.50C	1.3604E-04		Mg	12000.50C	1.9299E-04
250	13027.50C	7.1499E-03		Al	13027.50C	8.8597E-04
251	14000.50C	3.2721E-03		Si	14000.50C	4.6421E-03
252	15031.50C	9.3301E-07		P	15031.50C	1.3237E-06
253	19000.50C	2.4276E-04		K	19000.50C	3.4441E-04
254	20000.50C	7.1251E-05		Ca	20000.50C	1.0108E-04
255	25055.50C	1.3230E-04		Mn	25055.50C	1.8769E-04

	O	P	Q	R	S	T
256	26000.55C	4.0281E-03		Fe	26000.55C	1.2566E-03
257	28000.50C	1.0884E-04		Ni	28000.50C	1.5441E-04
258	92238.50C	3.4571E-06				
259	92235.50C	5.9522E-05				
260	92234.50C	6.3933E-07				
261	94239.55C	5.4706E-10		Pu-239	94239.55C	7.7610E-10
262	64152.50C	0.0000E+00		Total		5.0375E-02
263	64154.50C	0.0000E+00				
264	64155.50C	0.0000E+00				
265	64156.50C	0.0000E+00				
266	64157.50C	0.0000E+00				
267	64158.50C	0.0000E+00				
268	64160.50C	0.0000E+00				
269						
270		6.7267E-02				
271						
272		312.5058897				