GULF GENERAL ATOMIC

Gulf-GA-B12697
UC-80

FUEL FABRICATION ACCEPTANCE REPORT

FSV - INITIAL CORE

By

R. J. Kapernick and R. J. Nirschl

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Prepared under
Contract AT(04-3)-633
for the
San Francisco Operations Office
United States Atomic Energy Commission

NOTICE

Gulf General Atomic Project 901

December 1, 1973

GULF GENERAL ATOMIC COMPANY
P O BOX 608, SAN DIEGO, CALIFORNIA 92112

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SUMMARY

This report documents the fabrication of the Fort St. Vrain initial core. Detailed summaries of the final fuel element metal loadings and other properties are given. Problems that occurred during fabrication and their resolutions have been given special attention, including the results of analyses made prior to their adoption. A final substantiation for the Fort St. Vrain initial core was provided by a full-core, three-dimensional analysis considering control rod insertion and fuel depletion and with explicit representation of the as-built fuel elements. The results of this analysis are documented separately, in Reference 11. The calculated power distributions from the three dimensional analysis are well within the limits specified for the reference design.

During fabrication of the initial core fuel elements, some difficulties with assayed quantities of uranium and thorium were encountered. These difficulties resulted from changes in the fuel rod standards used in assay equipment calibration and in the techniques employed for assaying fuel particles and fuel rods. As a result the apparent values for the average metal loadings for some fuel rods and fuel elements changed.

This problem first became apparent when about 40 percent of the total fuel rod requirement was in some state of production. Fuel blends 4, 6 and 8 were most directly affected because fuel rod production in these blends was further along and because they experienced greater changes in measured metal loadings. Blend 4 was 95 percent complete with an average uranium loading 3-4 percent high. Blends 6 and 8 were about 60 percent complete with average uranium loadings about 3 percent high.

For these blends some already-assembled fuel elements were outside the tolerances given in the fuel specification.

A study was undertaken at this time to make recommendations on the disposition of already-fabricated fuel and adjustments for the remainder of fuel fabrication. This study, which comprises a large part of this report, focused on utilizing, as much as possible, already-fabricated fuel without compromising the performance of the core. A variety of adjustments were considered and used in some instances, but the most successful method was the imposition of a layer location on fuel elements. By use of this additional core assembly requirement, a distribution of high metal load and low metal load fuel elements was obtained that assured that power perturbations would be small and localized and that temperature perturbations would be small and confined to axial layers where temperatures are nominally low.

A summary of the initial core fuel loading is as follows:

1. The total core uranium loading is about 0.1 percent high.
2. The total core thorium loading is about 0.4 percent low.
3. All but two fuel blends are within 1.0 percent of the specified metal loadings and the maximum blend deviation is 1.4 percent low.
4. The calculated power distribution for the as-built core is within the limits given for the reference design.
5. The calculated core excess reactivity is slightly higher and the shutdown margin slightly lower than the reference design. One additional burnable poison rod has been selectively added to 144 fuel elements to make the expected performance consistent with the reference design.

1. INTRODUCTION

1.1 GENERAL CORE DESCRIPTION

The Fort St. Vrain HTGR is a semihomogeneous graphite moderated core using the thorium/uranium fuel cycle. Highly enriched uranium (93.15%) is used as the fissile feed material for the initial core and first reload segments.

The active core is approximately a right circular cylinder consisting of 6 axial layers of fuel elements with 247 fuel elements per layer. The fuel elements are grouped into 37 separate refueling regions, as shown in Fig. 1. The individual fuel elements are right hexagonal prisms, 14.17 in. across the flats and 31.22 in. long. Fuel elements in the central column of each refueling region have three large channels; two for the insertion of a control rod pair and the third as a reserve shutdown channel. A detailed description of the fuel elements is given in Ref. 1 and a cross section of the two types is shown in Figs. 2 and 3.

Fuel and coolant channels are distributed on a triangular array of 0.74 in. pitch and run parallel along the length of the element. There are approximately two fuel holes for each coolant hole. The fuel holes are 0.50 in. in diameter and are filled with bonded fuel rods. The fuel rods contain coated fuel particles which are bonded with carbonaceous material into a close-packed matrix. The fuel particles are carbide kernels coated with layers of pyrolytic carbon and silicon carbide. Two types of particles are used; a smaller fissile particle which contains all of the enriched uranium and some thorium ($\text{Th/U}=4.25$) and a larger fertile particle containing only thorium.

Fig. 1 - Initial Core Fuel Loading Distribution

Fig. 2 - Fuel Element

Fig. 3 - Control Fuel Elements

The reactor is designed to operate on a graded fuel cycle so that about one-sixth of the total core is replaced at each refueling. To mock up the equilibrium core and to satisfy the radial and axial zoning requirements, the initial core consists of 13 different fuel compositions or blends. The distribution of the 13 fuel blends within the initial core is also shown on Fig. 1.

1.2 FUEL LOADING SPECIFICATION REQUIREMENTS

To insure that the core power distribution and thermal performance are close to design calculations, metal loading tolerances are given in the HTGR Fuel Specifications.⁽²⁾ For the Fort St. Vrain initial core, metal loading tolerances were specified for each of the thirteen fuel blends, for each fuel element and for each fuel rod.

Each of these requirements is discussed below, with particular emphasis on the purpose of the requirement. This emphasis is relevant because, as is discussed in following sections, in some instances during the early production phase the fuel specification was met but the intent of the requirement was not met. As part of the resolution of various metal loading problems encountered during fuel fabrication of the Fort St. Vrain initial core, departures from the intent of the fuel specification were treated equally as violations of the specific requirements given in the HTGR Fuel Specifications.

A tolerance of $\pm 1\%$ for the total uranium and thorium loading of each fuel blend was specified. The purposes of this requirement were to guarantee that the total core metal loading would be within $\pm 1\%$ and to limit deviations from design power distributions within refueling regions. Each refueling region contains one blend in the top half and one blend in the bottom half of the region so the blend loading tolerance applies to both radial and axial power distributions.* Since a one percent change in either uranium or thorium is worth about $0.003 \Delta k$, this would mean that the maximum, total core reactivity uncertainty associated with the uranium and thorium loading would be about $\pm 0.006 \Delta k$, which is small.

* Fuel elements in the core periphery also contain Blend 13 fuel.

Table 1

Fuel Service Limit Assignment for Fuel Blends
for Both the 5 and 6 Year Cycle

6 Year Cycle

Axial Core Layer	Segment 1 1 Year	Segment 2 2 Years	Segment 3 3 Years	Segment 4 4 Years	Segment 5 5 Years	Segment 6 6 Years
	Fuel Blend 1		Blend 9,11	Fuel Blends 3,5,7		
4	A	B	B	D	D	D
5	A	B	B	D	D	D
6	A	B	B	D	D	D
	Fuel Blend 2		Blend 10,12	Fuel Blends 4,6,8		
7	A	B	B	D	D	D
8	A	B	B	D	D	D
9	A	B	B	D	D	D

5 Year Cycle

Axial Core Layer	Segment 1 6 Months	Segment 2 1 Year	Segment 3 2 Years	Segment 4 3 Years	Segment 5 4 Years	Segment 6 5 Years
	Fuel Blend 1		Blends 9,11	Fuel Blends 3,5,7		
4	H	A	A	AA	B	D
5	H	A	AA	B	D	D
6	H	A	B	B	D	D
	Fuel Blend 2		Blends 10,12	Fuel Blends 4,6,8		
7	H	A	B	B	D	D
8	A	A	B	B	D	D
9	A	A	B	B	D	D

By the time approximately 40 percent of the fuel rods were in some state of production, this equipment was recalibrated using additional standard samples from fuel blends 4, 7, 8 and 13. As a result, the measured value for the average uranium and thorium loading for the fuel rods already fabricated changed, and since some of these rods had been loaded into elements, the measured element loadings changed. For fuel blends 1, 2, 6, 8 and 13 some of these fuel elements were outside the limits of the fuel specification for either the total uranium and/or thorium loading or the fuel homogeneity limit.

Of the total blend 4 requirements about 95 percent of the fuel rods had been fabricated and the average loading for these rods was about 4 percent high in both uranium and thorium. After recalibration, these rods remained about 4 percent high in uranium and about 2 percent low in thorium. With only 5 percent left to be fabricated, a correction in the target loading to meet the blend average tolerance of ± 1 percent for uranium and thorium and still satisfy the loading tolerances for the individual fuel elements was required.

Although blends 6 and 8 were only about 50 percent complete, a problem similar to that for blend 4 was evident. For these blends the "D" service limit requirements had been nearly fulfilled and the average loading was about 3 percent high in uranium and about 1 percent low in thorium. An adjustment was possible to stay within the blend average tolerance, but this would cause the "B" service limit fuel to be uniformly low. The result would be refueling regions using "D" service limit fuel would be preferentially high in uranium loading while regions using "B" service limit fuel would be preferentially low in uranium loading.

About a month after recalibrating the ISAS equipment with the additional standard samples, it was discovered that the thorium being used in the fabrication of the later fuel rods had a different chronological age as measured from the extraction plant than that of the thorium used to make the standard samples, so the ISAS measurements for the later rod lots were questionable. As a consequence, the assay determination for the last

half of the total fuel rod production was made using x-ray fluorescence techniques for thorium and Delayed Neutron Activation Analysis for uranium. Since the agreement between these various assay methods was quite good, this is not pointed out to indicate any uncertainty in the final assayed values, but rather to document the reason for changing measurement techniques.

1.4 RESOLUTION OF METAL LOADING PROBLEMS

As discussed above, the metal loading values of some of the fuel elements and at least one of the fuel blends and the homogeneity values for some of the rod lots were outside the fuel specification limits. At the time of resolution a significant fraction of the fuel was in some state of production.

It was, of course, desirable to utilize as much of the fabricated fuel as possible providing the core power distribution and fuel performance would not be adversely affected. This was accomplished by imposing additional core assembly requirements on many fuel elements, with regard to the axial layer location, by adjusting the fuel loading of some of the fuel rods still to be fabricated, and by adjusting the fuel loading in some of the fuel elements still to be loaded.

Prior to the adoption of any specific resolution, detailed analysis was performed to ensure that the power distribution and fuel performance were not adversely affected. As a final verification of the total resolution for the Fort St. Vrain initial core, fuel depletion and fuel performance analyses were made for the complete as-built core.

2. SUMMARY OF "AS-BUILT" CORE

2.1 TOTAL CORE LOADING FOR CARBON, SILICON, URANIUM AND THORIUM

A summary of the measured material loading for all of the "as-built" fuel elements is given in Table 2, where a comparison is made with the specified loadings that were used in the design analyses.

Table 2

MATERIAL COMPOSITION OF "AS-BUILT" INITIAL CORE ASSEMBLY

Material	"As-Built" Loading (kg)	Nominal Load for Design Analysis (kg)	"As-Built" Difference (%)	Change on Core Reactivity ($\Delta k/k$)
Uranium	774.1	773.2	+ 0.1	+0.0005
Thorium	15,905	15,971	- 0.4	+0.0015
Silicon	6,099	5,458	+10.5	-0.0010
Carbon (fuel rods)	24,048	28,600	+ 1.5	-
Carbon (fuel blocks)	132,539	131,890	+ 0.5	+0.0012
Total				+0.0022

Using statistical sampling techniques, the average material composition for the fuel rods was determined and this, in turn, was used to determine the metal loading, uranium and thorium, for each of the fuel elements. Each element was weighed before and after the addition of the fuel rods so that the total mass of the fuel block was also known. The average silicon and carbon content of the fuel rods was also measured, and except for the silicon content, the measured loadings are very close

to those expected. Since the nominal thickness of the silicon carbide layer within the fissile and fertile particles is only 25 microns, it does not require much of an increase in thickness to yield a 10% uncertainty in the total Si load.

The net effect on the expected initial core excess reactivity due to these loading differences is also shown in Table 2. Because the differences are small, their affect is negligible, only $+0.0022 \Delta k/k$ for the total loadings. This reactivity change was estimated from sensitivity studies in which small changes to the material composition were introduced homogeneously in the reactor core.⁽³⁾

2.2 FUEL BLEND-URANIUM AND THORIUM LOADING

The Fort St. Vrain core is a patch loaded design with about one-sixth of the total fuel elements replaced at each refueling interval. By using 13 fuel blends, each having different uranium and thorium loadings, a mockup of the equilibrium core was obtained. Fuel elements to be removed at the first refueling interval contain a light uranium loading and a heavy thorium loading so they simulate depleted fuel with large concentrations of fission products. Those to be removed at the later refuelings have a higher than average initial core uranium loading. (See Fig. 1).

The summary of the "as-built" fuel loading for each of the 13 fuel blends is shown in Table 3. The percent deviation for the total uranium and thorium from that specified is given in parentheses. For all blends except 4 and 6, this deviation is less than $\pm 1\%$, and for these two blends it is slightly lower than 1%. These results are extremely favorable.

Table 3

FUEL LOADING SUMMARY FOR ALL INITIAL CORE FUEL BLENDS

Fuel Blend	Number of Fuel Blocks	U Weight (kg)	Th Weight (kg)
1	255	106.0 (.4%)	2882.6 (-.8%)
2	255	80.2 (- .3%)	2595.6 (-.0%)
3	63	39.5 (.8%)	631.8 (-.7%)
4	63	28.5 (-1.4%)	541.0 (-.6%)
5	126	89.2 (.4%)	1325.2 (.1%)
6	126	65.1 (-1.2%)	1159.0 (.1%)
7	162	112.1 (.5%)	1442.6 (-.3%)
8	162	84.9 (.5%)	1277.9 (-.7%)
9	63	36.3 (.4%)	717.9 (-.3%)
10	63	25.8 (.1%)	594.3 (-.8%)
11	54	32.2 (.3%)	550.0 (.2%)
12	54	23.7 (- .2%)	471.6 (-.5%)
13	36	50.5 (.4%)	1715.6 (-.9%)
Total	1482	774.1 (.1%)	15905.0 (-.4%)

2.3 FUEL ELEMENT LOADINGS/FUEL HOMOGENEITY LIMIT

A detailed description of the material loading for each of the 1482 assembled fuel elements is given in Appendix A of this report.

As mentioned earlier, part way through the fuel rod fabrication period, the ISAS material assay equipment was recalibrated. At that time, it was discovered that 135 fuel elements exceeded the uranium and/or thorium loadings or did not meet the fuel homogeneity limit as defined in the fuel specification.⁽²⁾ Resolution for these 135 fuel elements was made in the following way:

1. Five fuel elements were unloaded and loaded with new fuel rods.

2. Fifty-one fuel elements were accepted for use after their service limit was downgraded to a lower value. The majority of these elements were designated for selected core locations.
3. The remainder were accepted for use only in selected core locations. These were given identification to insure that they will be placed in the correct location.

As part of the resolution of the 135 fuel elements, some new fuel elements were assembled with metal loadings lower than those given in the fuel specification. In general, these fuel elements were made to compensate previously loaded elements high in metal loading and were also given selected core locations. In this manner both the blend and region average metal loadings were maintained to about 1 percent without compromise to the thermal performance of the reactor core.

Altogether, of the 1482 fuel elements required for core assembly, 736 have been identified for selected core locations.

2.4 FUEL ELEMENT IMPURITIES

Two types of impurities can be present within the fuel elements; additional moderator material or parasitic absorbers. The former consists of residual hydrogen present in the matrix material of the bonded fuel rods or in absorbed water present in either the fuel rods or fuel elements. Because of the high temperatures encountered during the heat treating and cleaning for the fuel rods, only a small amount of residual hydrogen or water remains within the fuel rods. A summary of the expected hydrogen content within the initial core fuel elements is given in Table 4, along with a comparison to the value used during the design analysis and the expected change to the beginning of cycle core reactivity.

During the fabrication of the fuel particles and rods, difficulties with thorium surface contamination required an additional cleaning process involving gaseous hydrochloric acid. Because of this, some residual chlorine remained in the fuel rods after cleaning. The maximum allowable concentration was limited in the fuel specification separate from the

Table 4

IMPURITIES IN "AS-BUILT" INITIAL CORE ASSEMBLY

Material	"As-Built" Assembly	Nominal Amount in Design Analysis	Change to Core Reactivity ($\Delta k/k$)
Residual hydrogen (PPM in fuel rods)	110	0	+0.002
Absorbed water (lbs. in total core)	8-12	0	+0.002*
Residual chlorine (PPM in fuel rods)	60	0	-0.001
Other Impurities (PPM boron equivalent in fuel rods)	1-2	1.3	-0.0005

*Since the absorbed water will most likely be removed before a significant temperature is reached, this should not affect the expected core excess reactivity for operation.

boron equivalent allowed for all other impurities. A summary of the expected amount of these materials is also shown in Table 4. The reactivity worth for these additional poisons almost cancels the additional worth expected from the residual hydrogen so that practically no change is expected in the initial core reactivity.

2.5 ANTICIPATED INITIAL CORE LOADING

Using the "as-built" mass loading data for each fuel element and several random core loading patterns, in which the designated core layer elements were selected first, a computer study was made to determine the expected initial core loading distribution. The deviation for the uranium and thorium from the specified loading used in the design analysis was calculated for each of the 37 refueling regions and for each of the six core layers for the various loading patterns. The results of this analysis are shown in Table 5.

It can be seen that little change is obtained between the various patterns. This might well be expected since nearly half of the fuel elements

Table 5

Projected Uranium and Thorium Loading Deviations (Percent From Nominal)
For Refueling Regions and Axial Core Layers in Initial Core Assembly

	Loading 1 Pattern		Loading 2 Pattern		Loading 3 Pattern	
Axial Layer	Uranium	Thorium	Uranium	Thorium	Uranium	Thorium
4*	0.40	0.19	0.37	-0.26	0.22	0.20
5	1.22	-0.49	1.48	-0.65	1.11	-0.71
6	-0.16	-0.95	-0.40	-0.33	0.14	-0.73
7	2.13	-0.35	2.29	-0.56	2.13	-0.35
8	0.32	-0.50	0.43	-0.77	0.47	-0.59
9**	-3.53	-0.38	-3.81	0.11	-3.68	-0.29
Average	0.06	-0.41	0.06	-0.41	0.07	-0.41
Refueling Region	Uranium	Thorium	Uranium	Thorium	Uranium	Thorium
1	1.96	-1.39	1.96	-1.39	1.96	-1.39
2	-1.55	-0.21	-0.46	-0.81	-0.46	-0.61
3	-0.26	-0.56	0.41	-0.79	-0.22	-0.56
4	1.08	-2.83	0.91	-1.32	1.72	-1.43
5	-0.33	-0.40	-0.96	0.35	-0.30	-0.53
6	0.33	-1.03	0.22	-0.85	0.58	-0.74
7	0.93	-0.63	-0.06	-0.41	-0.41	-0.52
8	1.40	-1.34	1.04	-0.61	1.05	-0.87
9	0.64	-0.38	-0.68	0.58	0.36	-0.29
10	0.27	-0.29	-0.11	-0.20	-0.05	0.16
11	0.02	-0.02	0.47	-0.47	0.02	-0.02
12	-0.85	0.30	-0.23	0.45	-0.79	0.28
13	0.45	-0.32	0.37	-0.26	0.45	-0.32
14	-0.20	0.42	-1.43	0.22	0.07	0.34
15	0.81	0.65	0.67	-0.76	0.41	0.29
16	-0.17	-0.45	0.84	-0.29	-0.17	-0.45
17	-0.37	-0.70	-0.22	-0.87	-0.27	-0.70
18	0.59	-0.70	0.00	-0.53	0.55	-0.70
19	-1.10	0.61	-0.63	0.00	-1.14	0.69
20	0.36	-1.38	0.44	-1.10	0.39	-1.20
21	-0.29	-0.04	-0.18	-0.06	-0.39	-0.14
22	0.34	-0.63	-0.81	-0.21	0.34	-0.63
23	0.80	-1.06	0.60	-0.73	0.81	-0.86
24	0.15	-0.87	0.71	-1.17	0.13	-1.86
25	-0.18	-0.00	-0.20	-0.13	-0.38	-0.25
26	-0.02	-0.55	0.27	-0.05	-0.02	-0.55
27	1.02	-0.57	1.07	-0.58	0.92	-0.49
28	-0.84	0.16	-0.34	0.23	-0.73	0.04
29	0.66	-0.44	0.66	-0.44	0.66	-0.44
30	0.08	-0.64	-0.06	-0.50	0.08	-0.64
31	0.78	-0.86	0.45	-0.95	0.77	-0.94
32	-0.24	0.18	-0.06	-0.12	-0.27	0.11
33	-0.66	-0.28	0.29	-0.70	-0.66	-0.28
34	0.78	-0.28	0.53	-0.48	0.88	-0.37
35	-0.60	0.71	-0.24	0.54	-0.45	0.68
36	-0.86	0.18	-0.31	-0.08	-0.46	-0.27
37	-0.01	-0.49	0.00	-0.91	-0.01	-0.49

* Top

** Bottom

have been designated for use in specific core layers and in some cases, because of their blend and service limit, in specific refueling regions. In only six of the 37 refueling regions does the uranium loading deviation exceed one percent and in none does it exceed two percent. The same is true for the thorium loading.

The variation by core layer is also small. Of importance here is that the uranium loading is low in layers 6 and 9, where maximum fuel temperatures occur. The results of this study show the degree of success that was obtained in making the fuel rod metal loading adjustments and selectively loading fuel elements in the reactor.

The three dimensional depletion analysis to substantiate acceptable core behavior for the projected "as built" initial loading was made using core loading pattern 1 from Table 5. The details of that analysis are documented separately in reference 11. As mentioned in the summary of this report, the calculated power distribution was well within the limits required for the reference design. In that analysis, each of the fuel elements was represented explicitly and was an adequate test for the acceptance of the fuel loading adjustments.

3. DETAILED DESCRIPTION OF FUEL LOADING ADJUSTMENTS

This chapter discusses in detail the various fuel loading adjustments considered, the analysis to determine the adequacy of the adjustment, and the final adjustment selected. Since the analysis discussed in this chapter was made before all of the fuel was fabricated some reference is made to the expected loading for the fuel not yet fabricated. During the production of the latter half of the core, no fuel was accepted that did not meet the expected adjusted loading. For more detail of the as built core loading see reference 11.

3.1 METAL ASSAY DETERMINATION

The mean value for the uranium and thorium loading within the fuel rods used in the initial core fuel elements was determined by utilization of the ISAS (Isotopic Source Assay System),⁽⁴⁾ Delayed Neutron Activation Analysis or X-ray Fluorescence Analysis. All of these techniques must be calibrated using some standard fuel rod samples.

For the first half of the fuel rod fabrication, the ISAS system was used exclusively to determine both the uranium and thorium loading in the fuel rods. For the last half of fabrication, because the thorium being used in fabrication had a different radioactive background than was used to make the calibration standard sample, the Delayed Neutron Activation Analysis was used to determine the uranium content and X-ray Fluorescence the thorium content. The agreement between these techniques was generally within one percent if the same calibration standards were used as the basis.

3.2 STATUS OF FUEL RODS AND ELEMENTS PRIOR TO LOADING ADJUSTMENTS

A capsule summary of the fuel rod and fuel element loading status after recalibration of the ISAS equipment was made is given in Table 6. The information noted in the table was obtained from a RODS computer run⁽⁵⁾ early in January 1972 and represents the best estimate of the data available at that time. It contains metal loading data for accepted fuel rods and fuel elements only and does not intend to describe the status of all the fuel fabricated at that time.

Table 6. FSV INITIAL CORE - CAPSULE SUMMARY - FUEL RODS AND FUEL ELEMENTS ASSEMBLED (JANUARY, 1972)

Fuel Blend	Accepted Fuel Rods				Assembled Fuel Elements		
	Number Rods	Percent Complete	U(gm/rod) (Deviation %)	Th(gm/rod) (Deviation %)	Elements Assemb./Reqd.	Elem. Outside Loading Spec	Additional Considerations
1	188428	26.8	0.153(2.0)	4.01(-2.9)	63/255	25	14 of 21 F.E. req. in Refuel Reg. 1 assembled, 8 do not meet spec.
2	319542	45.8	0.117(1.5)	3.65(-1.9)	87/262	28	15 of 21 F.E. lower half of R.R. 1 assembled, 15 out of spec. (4 of 4 spare F.E. out of spec.
3	75279	40.7	0.216(1.9)	3.39(-1.1)	26/63	0	
4	174696	95.1	0.163(3.7)	2.91(-1.7)	36/63	0	
5	86881	23.5	0.248(3.2)	3.48(-2.8)	22/129	0	
6	234533	63.8	0.185(3.2)	3.14(-0.4)	80/129	27	80 of 85 Service Limit "D" F.E. are assembled. 27 out of spec. average U is 3% too high
7	90311	22.2	0.283(3.0)	3.52(-1.1)	34/162	0	
8	221993	55.0	0.215(2.8)	3.16(-0.9)	67/165	29	All 60 Service Limit "D" F.E. assembled. 28 out of spec. Average U loading is 3% too high
9	34170	18.5	0.198(1.0)	3.87(-0.5)	11/63	0	
10	0	0	-	-	0/63	0	
11	76030	56.1	0.243(2.7)	3.96(-2.1)	28/54	0	
12	26873	20.0	0.180(2.2)	3.47(-1.5)	8/54	0	
13	254152	69.1	0.142(3.9)	4.77(1.3)	37/38	16	All blend 13 only elements assembled. Average U 3% too high
Total	1782888	41.2	0.180(2.8)	3.63(-1.7)	499/1500	135	

As noted in Table 6, of the first 500 fuel elements assembled, about 135 of them did not meet either the fuel loading or fuel homogeneity tolerance limit in the assembly loading specification. In addition, the average uranium loading in all of the elements was about 2.5 percent high and the average thorium about 1.5 percent low. For information on the loading within each specific fuel element reference must be made to the data shown on Appendix A.

Four of the fuel blends had more than 50 percent of the fuel rods made and the average uranium loading for them was almost 4 percent high. In particular, fuel blend 4 had 95 percent of the rods made and the average uranium was 3.7 percent high, and the average thorium was 1.7 percent low. Of added importance was the fact that all four of these blends were located in the lower half of the core assembly, and this variation could affect the axial power distribution during power operation.

3.3 DISCUSSION OF LOADING ADJUSTMENTS CONSIDERED

After determining an inventory for the best estimate of the uranium and thorium loading for the fuel rods and elements already assembled as given in Table 6, a study was made to determine what affect using these components would have on the core performance. Of particular importance was the effect they have on maximum control rod worth, shutdown margin, and the overall and local power distribution.

A variety of adjustments was considered, but most of them concentrated on using the "as-built" components as they were and applying modifications to the fuel still to be fabricated. A brief discussion is given below of each type of adjustment. Some of these were rejected as impractical; the others were used, sometimes in combination, according to what correction was needed.

Increase in the Total Core Uranium Loading Uniformly by About Four Percent

This adjustment would maintain the power distributions as in the design analysis. However, this modification was not considered reasonable because it represents a large perturbation from the reference design core metal loading and from subsequent reload segments. No further analysis was made for this consideration.

Increase the Uranium Loading in Fuel Blends 3, 5 and 7 Which are Located in the Top Three Core Layers Above Fuel Blends 4, 6 and 8

Based on the premise that the design axial power distribution must be maintained and the fact that the majority of the fuel components that had been fabricated, rods and elements, were for the lower half of the core, an analysis was made assuming that the upper half of the core not yet fabricated would be made to match that of the lower half. That is, for those regions containing the fuel elements assembled for the lower half, if the uranium loading was 4 percent high, the upper half could also fabricate 4 percent too high. This would mean that several regions in the core would contain uranium and or thorium loadings that differ from the design values by as much as 4 percent.

Since the coolant flow through each region is controlled by the orifice setting, and since the axial profile would be conserved, this would not necessarily result in higher fuel temperatures. However, the radial power distribution, control rod worth, and core reactivity could be affected by this kind of perturbation.

Using the element loading data as given in Table 6 and Appendix A, an estimate was made of the core uranium and thorium loading if the "as-built" components were accepted and the upper half fabricated to match accordingly. The remaining core loading was assumed to be the nominal design value. A summary of that loading is given in Fig. 4 which shows the fuel blends already fabricated located in the appropriate core region. The maximum deviation from the design value for the total uranium and thorium loading for each region is also shown. This projected loading contained an additional 10 kg of uranium in the core or about 1 percent more than that specified.

The calculated power distribution for this initial core loading configuration as obtained with the average core GAUGE model⁽⁶⁾ is shown in Fig. 5. The calculated radial power peaking factors for each refueling region relative to the core average are shown for the reference design loading in Fig. 5A and for the "as-built" loading described above in Fig. 5B.

REFUELING REGION IDEN.

FUEL BLEND & SERVICE LIMIT

AS BUILT URAN. & THORIUM LOADING

Figure 4

5A UNRODDED - REF. DESIGN
(NOMINAL LOADING)
 $k = 1.073$

5B UNRODDED - (AS BUILT LOADING
IN UNDERLINED REGIONS - FIG. 4
TABLE 5) $k = 1.078$
(9.8 ADDIT. kg U)

5C COMPARISON OF MODIFIED "AS BUILT"
TO REFERENCE DESIGN
RADIAL POWER (% DIFF FROM REF)

Fig. 5 - Calculated Radial Power Distribution

In Fig. 5C, the percent difference in the regional power factor between the distribution given in 5A and 5B is shown. These calculated distributions were obtained for the hot, unrodded and clean core configuration. Although an acceptable power distribution was obtained for the modified core loading, it should be noted that some significant changes from the reference distribution were obtained. This is true not only in those regions in which the loading was changed but also in those regions in which the nominal design loading was used. Since the control rod sequence was carefully selected for the reference design, it was felt that these changes in the radial power distribution (or flux distribution) would be undesirable.

Both the core reactivity and the worth of the maximum worth single control rod pair are affected by these estimated loading changes. A summary of these calculated parameters is given in Table 7. The increase in core reactivity would be acceptable and could be compensated by adjusting the loading in the remainder of the core to be fabricated or by the use of additional burnable poison. However, the increase in the worth of the maximum worth control rod pair is significant.

Consequently, this method for acceptance of the already assembled fuel elements by fabricating the upper half of the core for those regions already assembled to match the discrepancy in the design loading was not pursued further.

Unload Fuel Elements and Reload to Improve Metal Loading

This adjustment was considered acceptable and used in some instances, as discussed in Section 3.7. This correction was generally undesirable, however, because of the time and difficulty involved in unloading fuel elements and was used only when other adjustments could not be used.

Table 7. COMPARISON OF CALCULATED CORE PERFORMANCE FOR REFERENCE DESIGN AND CORE WITH MODIFIED RADIAL FUEL ZONING

Core Parameters	Reference Design	"As Built" Fuel Elements — Fuel Blends 4,6,8 Blends 3,5,7 Modified to Match
Uranium Load (kg)	773	783
Thorium Load (kg)	15,970	15,910
k_{eff} (Hot, Clean BOC — GAUGE)	1.073	1.078
k_{eff} (Hot, Clean Fully Rodded)	0.843	0.846
Δk (Total Control Rod Bank)	0.230	0.232
Maximum Worth Control Rod (Δk)	0.057	0.063

Downgrade Fuel Elements to a Lower Service Limit Classification

The adoption of the five-year cycle initial core resulted in several fuel blends having mixed service limit requirements. Because the priority in the fabrication of fuel rods and the assembly of fuel elements was to complete the high service limit first, in instances where the recalibration of the ISAS equipment caused already-fabricated fuel to be high in metal loading, this fuel was primarily higher service limit fuel.

To enable use of this fuel and still maintain a region loading tolerance of about 1%, it was decided to downgrade a sufficient number of fuel elements to permit new fuel elements to be fabricated with adjusted, light metal loadings. This correction scheme was also desirable because fuel elements containing fuel rods exceeding the fuel homogeneity limits could be included in the fuel elements to be downgraded. Since the fuel homogeneity for lower service limit fuel is less stringent, most of these downgraded fuel elements were within the fuel homogeneity specification.

Identify Fuel Elements for Selected Locations in the Reactor

The two previous schemes were used to ensure that high-load and low-load fuel elements would be distributed approximately evenly, among refueling regions, so that the metal loading by refueling region would be acceptable. In conjunction with these schemes, most of these fuel elements were given core layer designations to ensure that high-load and low-load fuel elements would be located in the core such that the radial power distribution and the axial power profiles would not be adversely affected.

3.4 GROUND RULES FOR THE BASIS OF ACCEPTABILITY OF ANY LOAD ADJUSTMENTS

Physics Considerations

As discussed in the previous section, no fuel specification deviations were allowed and no adjustments were made which would have caused a significant perturbation (larger than allowed by the given loading tolerances) on the overall core power distribution, radial or axial. The reasons for this are as follows:

1. The uranium and thorium loading for the top and bottom core halves was chosen to achieve an acceptable axial power distribution over the life of the reactor. As shown by the analysis discussed in Ref. 7, partially inserted control rods have a significant effect on the axial power distribution, particularly in the region in which the control rods are partially inserted. To insure that an acceptable axial power distribution is maintained for all levels of power operation, partial control rod insertion is restricted to one control rod group in addition to the regulating rod in region 1. Because of this sensitivity, it was assumed throughout this study that the reference axial power distribution must be maintained and any fuel loading that might adversely affect this distribution would not be accepted.
2. Analyses for the radial power distribution as discussed in Section 3.3 have indicated that the calculated radial power distribution and maximum control rod worth can vary by 10 percent if the total fuel loading in some refueling regions varies by 5 percent. This would be an unacceptable change to the overall power distribution and the core shutdown margin.

In addition to these general restrictions, all adjustments made were subject to the requirement that they would not adversely affect the core thermal performance.

Fuel Performance Considerations

A uniform increase in metal loading throughout the region has little effect on fuel temperatures. Using the variable orifice, the coolant flow to each region is adjusted according to its power level so that the coolant temperature rise in all regions is nearly equal.

Within a refueling region no such control is available, so that perturbations to the power distribution within a region can affect fuel temperatures. The fuel element metal loading tolerances and the fuel homogeneity requirements are important to insure that intra-region power deviations, thus temperature hot spots, remain at an acceptable level.

The fuel element metal loading affects the power generated in the fuel element, which in turn determines the temperature rise in the coolant flowing through the element. Since the variable orifices are set for the average coolant temperature for a region and thus do not regulate flow to individual columns within a region, it is important that the columns in a region be near nominal to minimize intra-region power tilting. Consequently, when specific adjustments were made which involved fuel elements exceeding the metal loading tolerances, these elements were accepted only for designated core axial layer locations with the knowledge that fuel elements in other layer locations would compensate with correspondingly low loadings. In this manner, fuel elements which exceeded the fuel element loading specification could be accepted for use with no adverse effect to the core thermal performance.

Fuel rod homogeneity deviation affects the local power generation, the local heat flux and consequently the local temperature rise from the coolant into the fuel rod. The fuel homogeneity specifications are very general in application, being a function only of service limit classification. As a result, the fuel homogeneity specifications were set according to the maximum acceptable inhomogeneity at the highest temperature core locations (bottom of each fuel zone), and are in other locations unnecessarily restrictive.

In instances where fuel elements were assembled containing fuel rods which exceeded the fuel homogeneity allowance, they were given core layer designations other than the lower layer of either fuel zone. By doing so deviations from the fuel homogeneity specifications were allowed without adverse effect to the fuel temperature.

3.5 SELECTION OF THE "AS-BUILT" FUEL ELEMENTS FOR AXIAL CORE LAYERS

There are six layers of fuel elements in the core assembly which make up two axial fuel zones of three layers each. The upper fuel zone of the core contains all of the odd numbered fuel blends, 1, 3, 5, 7, 9 and 11, and the lower fuel zone the even numbered blends, 2, 4, 6, 8, 10 and 12. Fuel blend 13 is uniform in the axial direction and is located in the radial buffer zone at the core side reflector interface.⁽⁸⁾ The maximum fuel temperature for all of the blends occurs in the lowest layer of each axial zone, core layer 6 and 9.

Since most of the refueling regions had less than two thirds of the fuel elements assembled, it was possible to locate the already assembled elements such that none of them are located in core layers 6 and 9. This has the following distinct advantages:

1. Designating those fuel elements with either a high or low uranium and thorium metal loading for use in specific axial layers, insures that these elements will be distributed among the refueling regions. If the total blend loading is within one percent of the design value, the likelihood that the loading for the individual regions is also within one percent is increased.
2. It precludes the possibility of combining higher loaded fuel elements in one column and lower loaded fuel elements in a separate column. Therefore, the intra region power peaking factor for each column is minimized.
3. In general, fuel elements with a high metal loading contained fuel rods high in fuel rod inhomogeneity. By assigning the already fabricated elements with the highest metal loading to core layers 4 and 7, high inhomogeneity fuel rods were placed in the lower temperature core locations. New fuel rods to be used in the lower core layers would have a reduced uranium loading and consequently better homogeneity values.

Using this procedure, an analysis was made to determine what effect loading the "as-built" fuel elements would have on the axial power distribution. Since the axial power distribution is sensitive to fuel depletion, the analysis included the effects of fuel burnup. The analysis was made with the FEVER-M1⁽⁹⁾ one-dimensional burnup code and was made with the model in which each fuel blend was located in a separate radial burnup zone. The axial fuel loading used in the analysis is given in Fig. 6. For fuel blends 1D, 2D, 4, 6 and 8 where a large fraction of the required fuel elements had already been assembled, the as built loading data was used. An adjusted fuel loading was assumed for those elements loaded in the lowest core layer of the refueling region containing those blends. It was also assumed that the fuel loading for the fuel blends to be loaded in those same refueling regions (top half) would contain the nominal specified loading.

* ADJUSTED FUEL LOADING

** ASSUMED NOMINAL LOADING

Fig. 6 - Axial Core Description
(Blends 1, 2, 4, 6, 8)

The calculated change to the average core axial power distribution is summarized in Figs. 7 through 11 for the first four years of reactor operation. The calculated distribution for the reference design loading is also shown. As seen by that comparison, the core average axial power distribution throughout the lifetime of the core is essentially unchanged by these loading variations. If anything, the power distribution with the modified loadings appears to be slightly better during the first two years in the region of the core where the fuel temperature is highest, that is, the lower core layer. It is not surprising that the average core axial distribution is nearly the same as the design analysis since the loading modification occurred in only about half of the total core regions. Of more importance is the axial power distribution within the regions where the fuel loading was modified. Each of these is discussed separately in the following sections.

3.6 LOADING ADJUSTMENTS FOR FUEL BLENDS 1D AND 2D (Central Refueling Region)

All fuel elements containing fuel blends 1 and 2 have a one year service limit (A or H) except those used in the central refueling region. These require a B or D service limit. Almost all of the required fuel elements for the central refueling region had been assembled and about half of them had high uranium and low thorium loading or did not meet the fuel homogeneity limit.

To permit use of most of the already fabricated fuel elements, the blend 2 fuel elements with a 5 percent high uranium and 5 percent low thorium loading were designated for core layers 7 and 8 and blend 2 fuel rods for use in the lower core layer 9, were fabricated to contain a loading 6 percent lower in uranium and 5 percent higher in thorium. In the upper half of this region all of the fuel elements contained a uranium loading slightly higher than nominal, from 1 to 3 percent, and a nearly nominal thorium loading. This yielded a total uranium loading for that region about 2 percent higher than specified but the axial zoning from top to bottom was essentially maintained. The control rods in this central region are designated as the regulating rods for the reactor and consequently will be partially inserted throughout the operation. The axial zoning therefore, is quite important, but since the power from this region is generally lower than the core average, the total loading can be somewhat higher without significant effect.

Fig. 7 - Average Core Axial Power Distribution
Beginning of Cycle

Fig. 8 - Average Core Axial Power Distribution
End of One Year

Fig. 9 - Average Core Axial Power Distribution
End of Two Years

Fig. 10 - Average Core Axial Power Distribution
End of Three Years

Fig. 11 - Average Core Axial Power Distribution
End of Four Years

A description of the expected fuel loading for that region including the above modifications is shown in Table 8 and the calculated axial power distribution within that region is shown in Figs. 12, 13 and 14. These calculations were done with the FEVER one-dimensional depletion code using the fuel loading for the central region as given in Table 8. A comparison to the calculated reference axial power distribution is also shown in these figures. Although there is a fairly substantial difference in the power distribution at the beginning of the cycle, after a few years of burnup, there is essentially no difference.

Since the regulating control rods for the reactor are located in this region, the power distribution at BOC (Fig. 12) is also shown with the control rods partially inserted. As for the unrodded case, there is some difference for the core with the modified loading.

Some of the fuel elements that were accepted for Region 1 contained fuel rods which were above the fuel homogeneity limit. These elements were restricted to core layers 4, 5 and 7.

Figure 15 shows the fuel centerline temperature profiles for the BOC, partial rod insertion axial power profiles of Fig. 12. Temperature increases due to fuel rod inhomogeneity are included in these calculations. Although the "as-built" fuel temperatures are slightly higher in some places, this increase is acceptable. The relative level of fuel temperatures in this region are significantly lower than those used to select the allowable fuel rod inhomogeneity.

3.7 LOADING ADJUSTMENT FOR FUEL BLEND 4

About 95 percent of the fuel rods required for completion of fuel blend 4 had been fabricated and the average uranium loading was about 3.7 percent higher than that specified. Since this fuel blend is located in the lower half of the core assembly, some adjustment was required to conserve the axial power profile in blend 4 regions. Analysis showed that if the already assembled elements were used in core layers 7 and 8, and if an axial buffer zone were placed at the core lower reflector interface, the calculated axial power distribution would be as acceptable as the reference distribution. The axial buffer zone used consists of 2 layers of fuel rods containing no uranium and about 3.5 gm/rod of thorium. With this buffer zone the

Table 8. MODIFIED FUEL LOADING IN CENTRAL REGION (BLENDS 1D AND 2D)

Axial Core Layer	Fuel Element Types	Elements Fabricated Before Adjustment/ Total Elements Required	Avg Uranium ¹ Loading Deviation (%)	Avg Thorium ¹ Loading Deviation (%)
4	101B4, 176B4	2/7	+1.0	-0.3
5	101D5, 113D5	7/7	+2.3	-2.0
6	101D6, 113D6	6/7	+1.1	-2.1
7	102D7, 114D7	7/7	+5.4	-5.4
8	102D8, 114D8	7/7	+9.3	-4.8
9	102D9, 125D9	0/7 ⁽²⁾	-6.0	+5.0

1. The deviation in percent from design loading.

2. These fuel elements contain the adjusted uranium and thorium loading.

Fig. 12 - Blends 1, 2 - Axial Power Distribution
- 0 Days

Fig. 13 - Blends 1,2 - Axial Power Distribution
- 584.4 Days

Fig. 14 - Blends 1,2 - Axial Power Distribution
- 1,168.8 Days

Fig. 15 - Blends 1, 2 - Fuel Centerline Temperature - 0 Days

total blend loading is within the specified tolerance of 1 percent and the axial distribution is acceptable. Because all of the 104B type fuel elements had been assembled, the five elements that were to be used in the lower core layer had to be unloaded so the buffer zone could be inserted in these elements.

Fuel blend 4 is located in the lower half of refueling regions 2, 6 and 7. A detailed description of the expected fuel element loading in each of the axial core layers is given in Table 9. The results of the axial depletion analysis are given in Figs. 16 through 18, and the effect of the axial buffer zone can easily be seen. Of primary importance is the fact that the power distribution in the lower layer of fuel elements is no greater than it is in the reference case. No significant amount of power is generated in the 2 layers of buffer fuel rods until after nearly four years of operation and even after six years, the power from these would not be as great as with the reference loading.

Figure 19 shows the resulting fuel temperature profiles from the BOC axial power profiles from Fig. 16. The effect on fuel temperatures is very small.

3.8 LOADING ADJUSTMENT FOR FUEL BLENDS 6 AND 8

For fuel blends 6 and 8, about 60 percent of the fuel rods had been made and the average uranium loading was about 3 percent higher than specified (Table 6). In addition, a large quantity of the required fuel elements were assembled, and about one-third of them were high in uranium loading in some instances as much as 5 to 6 percent. Since both of these blends are used in the lower half of the core assembly a modification of the remainder of the fuel rods and elements yet to be made was necessary. An analysis showed that if the fuel elements not yet assembled were made with fuel rods from 7 to 9 percent (lower) in uranium than the nominal specified value, and these elements are located in core layer 9, the resulting axial power distribution is essentially the same as for the reference design loading. In addition, the total uranium and thorium loading for these blends would be within one percent of the specified value.

Table 9. MODIFIED FUEL LOADING FOR FUEL BLEND 4 (REFUELING REGIONS 2, 6 AND 7)

Axial Core Layer	Fuel Element Types	Fuel Elements Made Before Adjustment/ Total Elements Required	Avg Uranium ¹ Loading Deviation (%)	Avg Thorium ¹ Loading Deviation (%)
7	104B7, 116B7	7/7	+2.0	-1.0
	104D7, 116D7	4/14	+5.0	-1.0
8	104B8, 116B8	6/7	+2.0	-1.0
	104D8, 116D8	12/14	+2.5	-1.0
9	104B9, 126B9	6/7	(2)	(2)
	104D9, 126D9	0/14		

1. The deviation in percent from design loading.
2. These fuel elements were fabricated with an axial buffer zone. There are 15 layers of fuel rods in each fuel element. The top 13 layers contain fuel rods about 6 percent high in uranium and nominal thorium and the bottom two layers contain no uranium and 10 percent high in thorium. The 104B9 fuel elements had to be unloaded so that this buffer zone could be added.

Fig. 16 - Blends 3, 4 - Axial Power Distribution - 0 Days

Fig. 17 - Blends 3, 4 - Axial Power Distribution - 584.4 Days

Fig. 18 - Blends 3,4 - Axial Power Distribution - 1,168.8 Days

Fig. 19 - Blends 3, 4 - Fuel Centerline Temperatures - 0 Days

A description of the core loading for each of the core layers in which these fuel blends are located is given in Table 10. The calculated axial power distribution in core regions containing fuel blends 7 and 8 is compared with that for the reference design loading in Figs. 20 thru 22. As seen in these figures, the power distribution at the beginning of the cycle is somewhat affected, but after 1 year there is very little difference from the reference case.

Figure 23 shows the fuel centerline temperature profiles for the BOC axial power profiles of Fig. 20. The difference between the "as-built" and the nominal is very small.

The corrections applied to blend 6 were very similar to those for blend 8, so that the resulting effects on axial power distribution and fuel temperatures are similar.

3.9 LOADING ADJUSTMENT FOR BUFFER FUEL BLEND 13

The buffer fuel rods, blend 13, are located in the outer five rows of fuel holes in all fuel elements at the core-side reflector interface and in the six control rod columns which are adjacent to the side reflector.⁽⁸⁾ These areas of the core are not zoned axially and, except for fuel blend 2, fuel blend 13 contains the lowest uranium loading. The buffer blend is used to reduce the power spike caused by incoming thermalized neutrons from the side reflector.

At the time of recalibration about 70% of the blend 13 fuel requirement was fulfilled. The uranium loading was about 4% high and most of the fuel had been loaded into fuel elements. In particular the requirement for control rod elements loaded with blend 13 fuel only was complete and some of these elements were 5 percent high in uranium loading. Since the average power of these control rod columns is nominally below their region average power,** a higher uranium loading could be accepted without adversely

**In the early designs, a buffer zone consisting of several rows of fuel rod columns was located in these elements just as it was in the adjacent buffer fuel elements. However in the present reference design, the fuel loading in these six control rod columns was modified so that all elements in these columns contain the buffer fuel composition (blend 13) only. This reduced the uranium loading in these elements and also reduced the power generated from them.⁽⁸⁾

Table 10. MODIFIED FUEL LOADING FOR FUEL BLENDS 7 AND 8

Axial Core Layer	Fuel Element Types	Elements Fabricated Before Adjustment/ Total Elements Required	Avg Uranium ¹ Loading Deviation (%)	Avg Thorium ¹ Loading Deviation (%)
	(Fuel Blend 6)			
7	106B7, 118B7 106D7, 118D7	14/14 27/28	+5.0	-1.0
8	106B8, 118B8 106D8, 118D8	6/14 28/28	+2.0	-1.0
9	106B9, 127B9 106D9, 127D9	0/14 4/28	(2)	(2)
	(Fuel Blend 8)			
7	108B7, 120B7 108D7, 120D7	8/10 20/20	+6.0	-2.0
8	108B8, 120B8 108D8, 120D8	8/10 20/20	+2.9	-1.0
9	108B9, 128B9 108D9, 128D9	1/10 3/20	(2)	(2)

1. The deviation in percent from design loading.
2. These fuel elements were loaded with fuel rods having an adjusted loading (-8.0 uranium, + 1.0 thorium).

Fig. 20 - Blends 7, 8 - Axial Power Distribution - 0 Days

Fig. 21 - Blends 7, 8 - Axial Power Distribution - 292.2 Days

Fig. 22 - Blends 7, 8 - Axial Power Distribution - 876.6 Days

Fig. 23 - Blends 7, 8 - Fuel Centerline Temperature - 0 Days

affecting core performance. To minimize any possible effects, however, all of these elements were given layer designations. (See Table 11.)

Already assembled fuel elements which contained blend 13 in combination with another blend and which were high in uranium loading were also assigned layer locations to insure they would not be placed in the higher temperature locations in the core. This was true also for the remaining fabricated fuel rods which had not yet been loaded into fuel elements.

All subsequent blend 13 fuel rod production was done using adjusted, light metal loading. New elements loaded with this fuel were also designated for specific core layers (the bottom in each fuel zone), so that every element containing blend 13 fuel was given a specific layer location.

By assigning all fuel elements to specific core layers, it was possible to maintain a good axial fuel loading distribution and to use fuel rods high in inhomogeneity in lower temperature locations. Table 12 shows the complete blend 13 fuel elements as assigned. In most cases the column average deviation is about ± 1 percent, uranium and thorium. By assigning all of the fuel elements a specific core layer, it was insured that fuel elements with high metal loading could not be combined in one column. In this manner, the column integrated deviation is acceptable. Since the gas temperature rise is an additive effect through the column, the total temperature rise is near nominal.

In addition to controlling the loading of the Blend 13 fuel rods in the buffer fuel elements, the loading for the fuel rods of other blends adjacent to the buffer rods was also treated in the same manner. A summary of these loadings by axial layer and fuel type is given in Table 13.

Table 11. "AS BUILT" FUEL ELEMENT URANIUM LOADING DEVIATIONS (%) FOR
ELEMENTS WITH BLEND 13 FUEL RODS ONLY (CONTROL ROD COLUMNS
IN REGIONS 20, 23, 26, 29, 32, 35)

Axial Core Layer	Region 35		Region 32		Region 29		Region 26		Region 23		Region 20	
	Service Limit	U Dev	Service Limit	U Dev	Service Limit	U Dev	Service Limit	U Dev	Service Limit	U Dev	Service Limit	U Dev
4	H	+2.0	A	+2.0	A	+2.0	AA	+2.0	B	+6.0	D	+4.0
5	H	+2.0	A	+2.0	AA	+2.0	B	+4.0	D	+4.0	D	+1.0
6	H	+2.0	A	+2.0	B	+1.0	B	+1.0	D	+1.0	D	+1.0
7	H	+2.0	A	+6.0	B	+6.0	B	+6.0	D	+4.0	D	+4.0
8	A	+2.0	A	+2.0	B	+6.0	B	+6.0	D	+1.0	D	+1.0
9	A	+2.0	A	+2.0	B	+6.0	B	+6.0	D	+1.5	D	+1.5

Table 12. DEVIATIONS FROM NOMINAL LOADING (URANIUM/THORIUM %) FOR BUFFER FUEL (BLEND 13) IN ALL RADIAL BUFFER FUEL ELEMENTS

Axial Layer (Service Limit)	Uranium Deviation (%) / Thorium Deviation (%)				
	Core Segment 1 (Refueling Regions 21, 28, 35)				
	<u>Element 136</u>	<u>Element 142</u>	<u>Element 148</u>	<u>Element 154</u>	<u>Element 160</u>
4H	+5.5/+10.0	+5.5/+10.0	+5.0/+1.5	+5.0/+1.5	+5.5/+10.0
5H	+2.5/+3.5	+2.5/+3.5	+5.0/+1.5	+3.5/+1.5	+2.5/+3.5
6H	+2.5/+3.5	+2.5/+3.5	-6.0/-3.0	+2.6/+3.5	-6.0/-3.0
	<u>Element 137</u>	<u>Element 143</u>	<u>Element 149</u>	<u>Element 155</u>	<u>Element 161</u>
7H	+2.5/+3.5	+4.0/+7.0	+2.0/+3.5	+2.5/+2.0	+5.5/+10.0
8A	0.0/0.0	0.0/0.0	+2.0/0.0	+2.0/+0.0	0.0/0.0
9A	-6.5/-3.0	-6.5/-3.0	-6.5/-3.0	-6.5/-3.0	-6.5/-3.0
	Core Segment 2 (Refueling Regions 25, 32, 36)				
	<u>Element 136</u>	<u>Element 142</u>	<u>Element 148</u>	<u>Element 154</u>	<u>Element 160</u>
4A	+3.0/+0.5	+3.0/+0.5	+3.0/+0.5	+3.0/+0.5	6.5/5.5
5A	+3.0/+0.5	+3.0/+0.5	+3.0/+0.5	+3.0/+0.5	0.0/0.0
6A	-6.5/-3.0	-6.5/-3.0	-6.5/-3.0	-6.5/-3.0	-6.5/-3.0
	<u>Element 137</u>	<u>Element 143</u>	<u>Element 149</u>	<u>Element 155</u>	<u>Element 161</u>
7A	+6.5/+5.5	+6.5/+5.5	+6.5/+5.5	2.0/0.0	2.0/0.0
8A	0.0/0.0	0.0/0.0	0.0/0.0	2.0/0.0	0.0/0.0
9A	-6.5/-3.0	-6.5/-3.0	-6.5/-3.0	-6.5/-3.0	-6.5/-3.0
	Core Segment 3 (Refueling Regions 22, 29, 33)				
	<u>Element 140</u>	<u>Element 146</u>	<u>Element 152</u>	<u>Element 158</u>	<u>Element 164</u>
4A	+2.0/-1.5	+2.0/-1.5	+2.0/-1.5	+1.5/1.5	+2.0/-1.5
5AA	+2.0/-1.5	+2.0/-1.5	+2.0/-1.5	+6.5/5.5	+6.5/5.5
6B	+1.0/-1.0	-5.0/-1.0	-5.0/-1.0	+1.0/-1.0	-5.0/-1.0
	<u>Element 141</u>	<u>Element 147</u>	<u>Element 153</u>	<u>Element 159</u>	<u>Element 165</u>
7B	+6.0/+4.0	+6.0/+4.0	+6.0/+4.0	+6.0/+4.0	+6.0/+4.0
8B	-5.0/-1.0	-5.0/-1.0	-5.0/-1.0	-5.0/-1.0	-5.0/-1.0
9B	-5.0/-1.0	-5.0/-1.0	-5.0/-1.0	-5.0/-1.0	-5.0/-1.0
	Core Segment 4 (Refueling Regions 26, 30, 37)				
	<u>Element 138</u>	<u>Element 144</u>	<u>Element 150</u>	<u>Element 156</u>	<u>Element 162</u>
4AA	+6.5/+5.5	+6.5/+5.5	+6.5/+5.5	+6.5/+5.5	+6.5/+5.5
5B	+4.5/+1.5	+4.5/+1.5	+3.0/-1.0	+4.5/+1.5	+4.5/+1.5
6B	-5.0/-1.0	-5.0/-1.0	-5.0/-1.0	-5.0/-1.0	-5.0/-1.0
	<u>Element 139</u>	<u>Element 145</u>	<u>Element 151</u>	<u>Element 157</u>	<u>Element 163</u>
7B	+4.5/+1.5	+4.5/+1.5	+4.5/+1.5	+4.5/+1.5	+4.5/+1.5
8B	-5.0/-1.0	-5.0/-1.0	-5.0/-1.0	-5.0/-1.0	-5.0/-1.0
9B	-5.0/-1.0	-5.0/-1.0	-5.0/-1.0	-5.0/-1.0	-5.0/-1.0
	Core Segment 5 (Refueling Regions 23, 27, 34)				
	<u>Element 138</u>	<u>Element 144</u>	<u>Element 180</u>	<u>Element 156</u>	<u>Element 162</u>
4B	+7.5/+3.5	+7.5/+3.5	+1.5/-3.5	+7.5/+3.5	+7.5/+3.5
5D	-6.5/-2.0	+1.5/-2.0	+1.5/-3.5	+3.5/-2.5	+3.5/-2.5
6D	-6.5/-2.0	-6.5/-2.0	-6.5/-2.0	-6.5/-2.0	-6.5/-2.0
	<u>Element 135</u>	<u>Element 145</u>	<u>Element 151</u>	<u>Element 157</u>	<u>Element 163</u>
7D	+1.5/-3.5	+2.0/-1.5	+3.5/-2.5	+1.5/-2.0	+3.5/-2.5
8D	+1.5/-3.5	+1.5/-2.0	+1.5/-2.0	+1.5/-2.0	-2.0/-1.0
9D	+1.5/-3.5	-6.5/-2.0	-6.5/-2.0	-6.5/-2.0	-6.5/-2.0
	Core Segment 6 (Refueling Regions 20, 24, 31)				
	<u>Element 138</u>	<u>Element 144</u>	<u>Element 150</u>	<u>Element 156</u>	<u>Element 162</u>
4D	+3.5/-2.5	+1.5/-2.0	+1.5/-3.5	+3.5/-2.5	+1.5/-3.5
5D	-6.5/-2.0	+1.5/-2.0	+1.5/-3.5	+3.5/-2.5	+3.5/-2.5
6D	-6.5/-2.0	-6.5/-2.0	-6.5/-2.0	-6.5/-2.0	-6.5/-2.0
	<u>Element 139</u>	<u>Element 145</u>	<u>Element 151</u>	<u>Element 157</u>	<u>Element 163</u>
7D	+1.5/-3.5	+2.0/-1.5	+3.5/-2.5	+1.5/-2.0	+3.5/-2.5
8D	+1.5/-3.5	+1.5/-2.0	+1.5/-2.0	+1.5/-2.0	-2.0/-1.0
9D	+1.5/-3.5	-6.5/-2.0	-6.5/-2.0	-6.5/-2.0	-6.5/-2.0

Table 13. DEVIATIONS FROM NOMINAL LOADING (URANIUM/THORIUM %) FOR FUEL ADJACENT TO BUFFER ZONE IN ALL RADIAL BUFFER FUEL ELEMENTS

Axial Layer (Service Limit)	Uranium Deviation (%) / Thorium Deviation (%)					
	Core Segment 1 (Refueling Regions 21, 28, 35)					
4H 5H 6H	Fuel Blend 1					
	Element 136	Element 142	Element 148	Element 154	Element 160	
	+2/-3	+2/-3	+1/+2	+1/+2	+2/-3	
	0/-2	+1/-3	+1/+2	+1/+2	+3/+2	
7H 8A 9A	Fuel Blend 2					
	Element 137	Element 143	Element 149	Element 155	Element 161	
	-2.5/0	0/+5	+1/0	-4/-3	0/+5	
	-4/+3	-4/+3	+2/-5	+1/+2	-4/+4	
9A	Fuel Blend 2					
	Element 137	Element 143	Element 149	Element 155	Element 161	
	-7/+3	-2/+4	-7/+3	-7/+3	-8/+3	
4A 5A 6A	Core Segment 2 (Refueling Regions 25, 32, 36)					
	Fuel Blend 1					
	-1/-1	-1/-1	-1/-1	-1/-1	0/0	
	-1/-1	-1/-1	-1/-1	-1/-1	-1/-1	
7A 8A 9A	Fuel Blend 2					
	-3/+2	-3/+2	-3/+2	0/-1	-1/-1	
	7A	-4/+4	-4/+4	+2/-5	+1/+2	+1/+2
	8A	-4/+3	-4/+3	+2/-5	+1/+2	-4/+4
9A	Fuel Blend 2					
	Element 140	Element 146	Element 152	Element 158	Element 164	
	-7/+3	-2/+4	-7/+3	-7/+3	-8/+3	
4A 5AA 6B	Core Segment 3 (Refueling Regions 22, 29, 33)					
	Fuel Blend 11 and 12					
	Element 140	Element 146	Element 152	Element 158	Element 164	
	+4/0	+4/0	+4/0	+3/0	+4/0	
7B 8B 9B	Fuel Blend 11 and 12					
	Element 140	Element 146	Element 152	Element 158	Element 164	
	+4/0	+4/0	+4/0	+2/-2	+2/-2	
	+1/-3	-2/+1	-2/+1	+1/-3	-2/+1	
7B 8B 9B	Fuel Blend 11 and 12					
	Element 141	Element 147	Element 153	Element 159	Element 165	
	-1/-1	-1/-1	-1/-1	0/-2	0/-2	
	-1/-1	-1/-1	-1/-1	0/-2	-2/+2	
9B	Fuel Blend 11 and 12					
	Element 141	Element 147	Element 153	Element 159	Element 165	
	-1/-1	-1/-1	-1/-1	-2/+2	-2/+2	
4AA 5B 6B	Core Segment 4 (Refueling Regions 26, 30, 37)					
	Fuel Blend 7 and 8					
	Element 138	Element 144	Element 150	Element 156	Element 162	
	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	
7B 8B 9B	Fuel Blend 7 and 8					
	Element 138	Element 144	Element 150	Element 156	Element 162	
	+3/-3	+3/+3	+5/-2	+3/-4	+2/-3	
	-1/+3	-1/+3	-1/+3	-3/+3	-1/+2	
7B 8B 9B	Fuel Blend 7 and 8					
	Element 139	Element 145	Element 151	Element 157	Element 163	
	-1/-2	-1/-2	-1/-2	0/-1	0/-1	
	-1/-2	-1/-2	-1/-2	0/-1	0/-1	
9B	Fuel Blend 7 and 8					
	Element 139	Element 145	Element 151	Element 157	Element 163	
	-1/-2	-1/-2	-1/-2	0/-1	0/-1	
4B 5D 6D	Core Segment 5 (Refueling Regions 23, 27, 34)					
	Fuel Blend 7 and 8					
	+3/+3	+3/+3	+5/-2	+3/+3	+2/-3	
	+3/-1	0/-3	+5/-2	-6/+1.5	+3/-1	
7D 8D 9D	Fuel Blend 7 and 8					
	Element 139	Element 145	Element 151	Element 157	Element 163	
	-6/+1.5	-2/+1	-7/+3	-6/+1.5	-7/+3	
	+1/-1	0/-1	+2/-1	0/-2	+2/-1	
7D 8D 9D	Fuel Blend 7 and 8					
	Element 139	Element 145	Element 151	Element 157	Element 163	
	+1/-1	+3/+2	+2/0	0/-2	+2/-1	
	+1/-1	+2/-1	+2/-1	+2/-1	0/-3	
4D 5D 6D	Core Segment 6 (Refueling Regions 20, 24, 31)					
	Fuel Blend 7 and 8					
	+3/-1	0/-3	+5/-2	-1.5/0	+5/-2	
	+3/-1	0/-3	+5/-2	+3/-1	+3/-1	
7D 8D 9D	Fuel Blend 7 and 8					
	Element 139	Element 145	Element 151	Element 157	Element 163	
	-6/+1.5	-2/+1	-7/+3	-6/+1.5	-7/+3	
	+1/-1	+3/+2	+2/-1	0/-2	+2/-1	
7D 8D 9D	Fuel Blend 7 and 8					
	Element 139	Element 145	Element 151	Element 157	Element 163	
	+1/-1	+3/+2	+2/0	0/-2	+2/-1	
	+1/-1	0/-3	+2/-1	+2/-1	0/-3	

4. BURNABLE POISON LOADING IN "AS-BUILT" CORE

4.1 DESCRIPTION OF INITIAL CORE LOADING REQUIREMENTS

Burnable poison rods are used in the initial core to minimize the reactivity swing resulting from fuel depletion. It is also desirable to have some burnable poison rods available for use as reactivity shim if it is decided, either before or after the core is loaded, that the expected reactivity deviates significantly from that predicted. Three types of poison rods were selected for use with the initial core, one for use with the reference core loading and two to be used for reactivity shimming, if necessary.

About two thirds of all the fuel elements in the initial core contain one or two poison rods located in opposite corners of the element. Each corner of the hexagonal element has a location available for the insertion of a poison rod, but to minimize interference between the poison rods they are located so that each corner where three elements adjoin generally contains only one poison rod. The exact location within each element and within the initial core is shown in Fig. 24.

The selection for the poison rod loading was based on several factors, including reactivity behavior during depletion and consequent control rod adjustment during operation as well as the time required to adjust the initial core excess reactivity. Consideration was given to the reference case with two poison rods per element and the more dilute case with six poison rods per element. A detailed discussion of that selection as well as a description of the three types of burnable poison rods is given in Ref. 8.

4.2 "AS-BUILT" BURNABLE POISON RODS

Based on the results of sample analysis discussed in Ref. 10, the geometrical description and boron density for the "as-built" burnable poison

Fig. 24 - Lumped Poison Distribution in the Initial Core

rods was obtained and is shown in Table 14. It can be seen that the boron density for the Types I and II poison rods is about 10 percent lower than that specified.

The Type I poison rods had been previously selected as the reference to achieve the reactivity control desired during the initial cycle. (2 rods/fuel block in 24 refueling regions.) Types II and III were requested primarily as a shim provision, in which about 0.01 Δk additional reactivity control can be achieved by exchanging all of the Type I rods with Type II rods or by adding some Type II or III rods to regions not containing burnable poison.

Table 14

GEOMETRICAL DESCRIPTION OF BURNABLE POISON RODS

Type and Designation	Avg Boron Density (gm B _N /cc)		Average Length (in.)		Average OD (in.)	
	As-Built	Requested	As-Built	Requested	As-Built	Requested
I Low Boron	0.0219	0.025	28.40	28.50	0.413	0.405
II Medium Boron	0.0546	0.059	28.41	28.50	0.300	0.300
III High Boron	0.112	0.114	28.42	28.50	0.300	0.300

Moreover, since the boron density for both the Type I and II "as-built" burnable poison rods was about 10 percent lower than that specified, after about 15 percent of the fuel had been fabricated an analysis was made to determine which poison rods should be loaded in the initial core fuel elements. The analysis was made with the GAUGE depletion code and considered loading either Type I or II "as-built" burnable poison rods in the reference locations. The results of that analysis are given in Fig. 25 and they show that there is about 0.01 Δk more core excess reactivity during the first half of the cycle

Fig. 25 - Initial Core Reactivity (Ref. 12 Design) As A Function of Burnup in First Year

if the Type I poison rods are loaded in the core rather than the Type II rods. At that time, with so little of the fuel fabricated, it was decided that to insure sufficient core excess reactivity during the cycle, it would be more desirable to load the Type I poison rods in the initial core. That analysis also showed that because of the reduced poison loading in the "as-built" rods, there would be about 0.004 Δk more excess reactivity for the initial core if the fuel met the design loading requirements, at least during the early portion of the reactor cycle.

Based on that analytical result, all of the initial core fuel elements requiring burnable poison rods were loaded with two type I poison rods in the appropriate location. After the core fabrication was complete and an explicit three dimensional depletion analysis for the as built core assembly made,⁽¹¹⁾ it was learned that although the operating power distribution was acceptable, there were some slight changes to the calculated core excess reactivity and shutdown margin. The core excess reactivity is about .005 Δk higher at the beginning of the cycle and the shutdown margin with one or two control rods stuck out is about .015 Δk lower than that from the design analysis. By adding one type I burnable poison rods to some of the fuel elements, both the initial excess reactivity and the calculated maximum worth control rods is reduced, so that the shutdown margin is the same as for the design. By adding these shim poison rods prior to core loading, the margin for both the excess reactivity and the core shutdown is nearly equal so that the probability of having to add shim later is reduced. This has been done, so that 144 of the initial core fuel elements have three rather than two burnable poison rods. This is reflected by the data shown in Fig. 24.

APPENDIX A

The following table gives a detailed description of the identification and mass loading for each of the fuel elements assembled for use in the initial FSV reactor core. The following data is given for each fuel element fabricated.

Segment Number - This refers to the order in which the fuel elements were fabricated. There is no identification on the fuel element showing this number.

Element Type - This shows the element type and core service limit for each element. The element type defines a location in the core where the fuel element can be used. The service limit shown is the minimum service limit for fuel rods contained in that fuel element. This identification is painted on the top and the side of each fuel element.

Layer Designator - This is also painted on the top of the fuel element and identifies which axial core layer in which that fuel element must be located.

Serial Number - Each fuel element has this number stamped in the graphite fuel block.

Total Number of Fuel Rods - The actual number of 2 inch fuel rods contained within each fuel element.

Nuclide Weights - The total mass in kilograms for uranium, thorium, carbon and silicon is given.

Percent Deviation - This represents the deviation in percent of the actual uranium and thorium loading for that fuel element from the value given in the Fuel Specifications.

INDIVIDUAL FUEL ELEMENT LOADING

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					URANIUM	THORIUM	CARBON	SILICON	URANIUM	THORIUM	
1	102A		1 811	3132	.013	11.693	21.330	4.270	-1.0	.4	127.000
2	102A	7	1- 649	3132	.356	11.488	20.770	4.820	-1.4	-1.4	127.000
3	102A	7	1- 342	3132	.357	11.463	20.890	4.870	-1.1	-1.6	127.000
4	102H		1 1136	3132	.346	11.602	20.630	4.700	-4.3	.1	126.500
5	102A		1-1032	3132	.343	11.541	21.330	4.690	-4.9	-1.0	127.000
6	102A		1 2783	3132	.349	11.626	21.300	4.640	-3.4	-.2	128.000
7	102A	7	1-1015	3132	.347	11.574	21.300	4.690	-3.8	-.7	126.000
8	102A		1-2642	3132	.347	11.617	21.250	4.650	-3.8	-.3	128.000
9	102A		1-1186	3132	.360	11.620	20.950	4.970	-.4	-.3	126.500
10	102A		1-2731	3132	.357	11.839	20.550	4.670	-1.1	1.6	126.500
11	102H		1-1593	3132	.356	11.775	20.800	4.650	-1.3	1.1	128.000
12	102H		1-2718	3132	.368	11.861	19.630	4.590	2.1	1.8	128.000
13	102H		1-1923	3132	.353	11.536	21.150	4.930	-2.3	-1.0	126.000
14	102H		1-2309	3132	.351	11.651	20.980	4.760	-2.8	-.0	127.500
15	102H		1-1679	3132	.368	11.559	20.730	4.690	2.0	-.8	127.000
16	102H		1-1446	3132	.368	11.559	20.730	4.690	2.0	-.8	127.000
17	102H		1-1625	3132	.363	11.448	20.990	4.700	.6	-1.7	127.000
18	102H		1-2175	3132	.367	11.542	20.160	4.880	1.6	-1.0	127.000
19	102H		1- 904	3132	.348	11.372	20.450	5.130	-3.7	-2.4	127.000
20	102H		1- 411	3132	.348	11.372	20.450	5.180	-3.7	-2.4	128.000
21	102H		1 2179	3132	.348	11.421	20.520	5.200	-3.7	-2.0	126.500
22	102H		1-1450	3132	.367	11.663	19.300	4.720	1.7	.1	127.000
23	102H		1-1909	3132	.367	11.663	19.300	4.720	1.7	.1	126.000
24	102H		1- 343	3132	.364	11.660	19.370	4.720	.8	.1	127.000
25	102H		1-1075	3132	.367	11.552	19.460	4.720	1.7	.1	127.000
26	102H		1-2008	3132	.364	11.680	19.340	4.700	.9	.2	127.000
27	1060	8	1- 545	3132	.561	9.772	21.200	4.790	-.2	-1.0	126.500
28	1060	8	1-1878	3132	.561	9.772	21.200	4.790	-.2	-1.0	126.000
29	1060	8	1- 374	3132	.551	9.772	20.830	5.070	-1.9	-1.0	126.000
30	1060	8	1-1158	3132	.551	9.772	20.830	5.070	-1.9	-1.0	126.000
31	1060	8	1-2505	3132	.551	9.772	20.630	5.170	-1.9	-1.0	125.500
32	1060	8	1-1467	3132	.551	9.772	20.770	5.170	-1.9	-1.0	126.000
33	1060	8	1-1470	3132	.551	9.772	20.810	5.100	-1.9	-1.0	126.500
34	1060	8	1- 312	3132	.545	9.960	21.110	4.820	-3.0	.9	126.000
35	1060	8	1 2115	3132	.545	9.960	21.110	4.820	-3.0	.9	125.500
36	1060	8	1-1029	3132	.545	9.960	21.110	4.820	-3.0	.9	125.000
37	1060	8	1-1793	3132	.545	9.960	21.080	4.820	-3.0	.9	126.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					URANIUM	THORIUM	CARBON	SILICON	URANIUM	THORIUM	
38	1060	8	1-1110	3132	.545	9.866	20.700	4.980	-3.0	-.0	125.000
39	1060	8	1-1149	3132	.545	9.866	20.700	4.980	-3.0	-.0	125.500
40	1060	8	1-1238	3132	.545	9.866	20.700	4.980	-3.0	-.0	124.500
41	1060	8	1- 523	3132	.554	9.846	21.170	4.800	-1.3	-.3	126.500
42	1180	8	2-1909	1782	.310	5.667	12.010	2.740	-3.1	.9	107.000
43	1180	8	2 2429	1782	.310	5.667	11.800	2.830	-3.1	.9	107.000
44	1180	9	2-2025	1782	.310	5.667	11.800	2.830	-3.1	.9	108.000
45	1180	8	2-1391	1782	.310	5.650	11.790	2.830	-3.1	.6	107.500
46	1668	4	5 672	1782	.260	8.462	11.930	2.240	6.2	.7	108.500
47	1668	7	6 2593	1782	.260	8.462	11.930	2.240	6.2	.7	109.000
48	1668	7	6 209	1782	.260	8.462	11.930	2.240	6.2	.7	109.500
49	1668	7	6 1715	1782	.260	8.462	11.930	2.240	6.2	.7	109.500
50	1668	8	6 961	1782	.260	8.462	11.930	2.240	6.2	.7	108.500
51	1678	9	7 1652	1302	.190	6.193	8.710	1.640	6.2	.7	111.000
52	1678	9	7 2499	1302	.190	6.193	8.710	1.640	6.2	.7	111.500
53	1668	8	6 998	1782	.260	8.462	11.930	2.240	6.2	.7	109.500
54	1180	7	2 1449	1782	.326	5.563	12.010	2.740	2.0	-.9	108.000
55	1180	7	2 942	1782	.327	5.651	11.900	2.800	2.2	.6	107.500
56	154A	4	5 903	3132	.459	13.469	20.690	4.450	.3	-.5	128.500
57	1180	7	2 2743	1782	.327	5.651	11.900	2.800	2.2	.6	107.500
58	1270	9	3-1996	1302	.239	4.129	8.700	2.040	2.1	.6	109.500
59	1270	9	3-2600	1302	.239	4.129	8.700	2.040	2.1	.6	109.500
60	1270	9	3-2858	1302	.239	4.129	8.700	2.040	2.1	.6	110.000
61	1270	9	3-2498	1302	.239	4.129	8.700	2.040	2.1	.6	110.500
62	1200	7	2-1258	1782	.390	5.701	11.980	2.760	4.5	.3	107.000
63	1200	7	2-1964	1782	.390	5.701	11.980	2.760	4.5	.3	107.000
64	1200	7	2-2775	1782	.390	5.701	11.980	2.760	4.5	.3	107.000
65	1200	7	2-1831	1782	.390	5.701	11.980	2.760	4.5	.3	106.500
66	1200	8	2-2170	1782	.390	5.701	11.980	2.760	4.5	.3	107.500
67	1200	8	2- 986	1782	.390	5.701	11.980	2.760	4.5	.3	106.500
68	1200	8	2-1547	1782	.390	5.701	11.980	2.760	4.5	.3	108.000
69	1200	8	2-2302	1782	.390	5.701	11.980	2.760	4.5	.3	107.000
70	1283	9	3-1980	1302	.295	4.165	8.750	2.020	4.7	.3	110.000
71	1060	7	1- 399	3132	.535	9.766	21.200	4.820	4.1	-1.1	126.000
72	1060	7	1- 397	3132	.535	9.766	21.200	4.820	4.1	-1.1	125.500
73	1060	7	1-2487	3132	.585	9.766	21.200	4.820	4.1	-1.1	125.500
74	1060	7	1-1407	3132	.535	9.766	21.200	4.820	4.1	-1.1	126.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	----- SILICON	URANIUM	THORIUM	
75	1188	7	2-1889	1782	.333	5.556	12.060	2.740	4.0	-1.1	108.500
76	1060	7	1- 313	3132	.579	9.863	20.850	4.930	3.0	-.1	125.500
77	1060	7	1-2409	3132	.579	9.863	20.950	4.930	3.0	-.1	125.500
78	1060	7	1-2397	3132	.579	9.863	20.850	4.930	3.0	-.1	125.500
79	1060	7	1- 232	3132	.579	9.863	20.850	4.930	3.0	-.1	126.500
80	1060	7	1- 902	3132	.579	9.863	20.850	4.930	3.0	-.1	125.500
81	1068	7	1-1611	3132	.583	9.970	20.810	4.820	3.8	1.0	126.000
82	1068	8	1-1430	3132	.583	9.970	20.810	4.820	3.8	1.0	126.000
83	1068	8	1-1781	3132	.583	9.970	20.810	4.820	3.8	1.0	125.500
84	1060	8	1-1830	3132	.570	9.749	21.420	4.820	1.5	-1.2	125.000
85	1060	8	1-1813	3132	.568	9.747	21.450	4.820	1.1	-1.3	126.500
86	1060	8	1-1581	3132	.568	9.747	21.450	4.820	1.1	-1.3	126.000
87	1068	8	1- 203	3132	.581	9.829	21.010	4.820	3.4	-.4	125.500
88	1068	8	1-1348	3132	.573	9.814	21.260	4.820	2.0	-.6	125.500
89	1010	5	1-2141	3132	.431	12.581	21.050	4.260	2.4	-2.8	128.000
90	1010	5	1-2808	3132	.481	12.581	21.050	4.260	2.4	-2.8	127.500
91	1010	5	1-1453	3132	.481	12.581	21.050	4.260	2.4	-2.8	128.500
92	1010	5	1- 486	3132	.481	12.581	21.050	4.260	2.4	-2.8	128.500
93	1010	5	1-1723	3132	.481	12.581	21.050	4.260	2.4	-2.8	128.500
94	1080	8	1-1248	3132	.649	9.722	21.170	4.890	-1.0	-2.7	125.500
95	1080	8	1- 164	3132	.649	9.722	21.170	4.890	-1.0	-2.7	126.000
96	1088	8	1-2555	3132	.649	9.722	21.170	4.890	-1.0	-2.7	125.500
97	1088	8	1- 750	3132	.649	9.722	21.170	4.890	-1.0	-2.7	124.500
98	1018	4	1- 15	3132	.485	12.826	21.420	4.320	3.1	-.9	126.000
99	1018	4	1- 310	3132	.485	12.826	21.420	4.320	3.1	-.9	128.500
100	1130	5	2-1982	1782	.274	7.361	11.370	2.460	2.4	-.0	108.500
101	1280	9	3-2215	1302	.270	4.041	8.800	2.030	-.9	-2.7	110.000
102	1010	6	1-1718	3132	.477	12.609	21.200	4.230	1.4	-2.6	128.500
103	1010	6	1-1445	3132	.477	12.609	21.200	4.230	1.4	-2.6	128.500
104	1010	6	1- 896	3132	.477	12.609	21.200	4.230	1.4	-2.6	127.000
105	1010	6	1- 823	3132	.477	12.609	21.200	4.230	1.4	-2.6	129.000
106	1010	6	1- 939	3132	.477	12.609	21.200	4.230	1.4	-2.6	128.000
107	1130	6	2-2884	1782	.271	7.174	12.060	2.410	1.2	-2.6	108.500
108	1080	7	1-1827	3132	.681	9.928	20.950	4.950	4.0	-.6	126.000
109	1080	7	1- 934	3132	.681	9.928	20.950	4.950	4.0	-.6	126.500
110	1080	7	1-1942	3132	.681	9.928	20.950	4.950	4.0	-.6	126.000
111	1080	7	1-2639	3132	.681	9.928	20.950	4.950	4.0	-.6	126.500

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	----- SILICON	URANIUM	THORIUM	
112	1080	7	1- 418	3132	.681	9.925	21.000	4.940	4.0	-.6	126.000
113	1060	8	1-2874	3132	.574	9.778	21.110	4.820	2.1	-.9	126.000
114	1060	8	1-2786	3132	.574	9.778	21.110	4.820	2.1	-.9	126.000
115	1060	7	1- 73	3132	.574	9.778	21.110	4.820	2.1	-.9	125.500
116	1060	7	1-2706	3132	.574	9.778	21.110	4.820	2.1	-.9	126.000
117	1060	7	1- 511	3132	.574	9.778	21.110	4.820	2.1	-.9	126.000
118	1080	7	1- 445	3132	.679	9.907	21.230	4.890	3.7	-.8	126.000
119	1080	7	1- 483	3132	.679	9.907	21.230	4.890	3.7	-.8	126.200
120	1080	7	1-2029	3132	.679	9.907	21.230	4.890	3.7	-.8	126.000
121	1080	7	1-2448	3132	.679	9.907	21.230	4.890	3.7	-.8	126.500
122	1080	7	1- 656	3132	.687	9.888	21.200	4.920	4.8	-1.0	126.000
123	1080	7	1- 522	3132	.687	9.888	21.200	4.920	4.8	-1.0	126.500
124	1080	7	1- 832	3132	.687	9.888	21.200	4.920	4.8	-1.0	127.500
125	1080	7	1-1783	3132	.687	9.888	21.200	4.920	4.8	-1.0	126.500
126	1080	7	1- 220	3132	.687	9.888	21.200	4.920	4.8	-1.0	126.500
127	1080	7	1- 936	3132	.680	9.905	21.230	4.890	3.8	-.8	125.000
128	1040	8	1-2426	3132	.504	9.137	21.000	4.770	2.2	-1.5	125.700
129	1040	8	1-1902	3132	.504	9.137	21.000	4.770	2.2	-1.5	125.700
130	1040	8	1-1326	3132	.504	9.137	21.000	4.770	2.2	-1.5	125.500
131	1040	8	1- 897	3132	.504	9.137	21.000	4.770	2.2	-1.5	125.500
132	1040	8	1-1762	3132	.504	9.137	21.000	4.770	2.2	-1.5	125.700
133	1040	8	1-2469	3132	.504	9.137	21.000	4.770	2.2	-1.5	125.000
134	1040	8	1-2273	3132	.504	9.137	21.000	4.770	2.2	-1.5	126.000
135	1040	8	1-1265	3132	.504	9.137	21.000	4.770	2.2	-1.5	125.000
136	1040	9	1-1443	3132	.508	9.184	21.330	4.620	3.0	-1.0	126.700
137	1040	8	1-1368	3132	.508	9.184	21.330	4.620	3.0	-1.0	125.700
138	1040	9	1-1466	3132	.508	9.184	21.330	4.620	3.0	-1.0	126.200
139	1040	8	1- 361	3132	.508	9.184	21.330	4.620	3.0	-1.0	124.500
140	1040	7	1-2405	3132	.508	9.184	21.330	4.620	3.0	-1.0	126.000
141	1040	7	1-2114	3132	.508	9.184	21.330	4.620	3.0	-1.0	125.500
142	1040	7	1- 257	3132	.511	9.172	21.350	4.620	3.6	-1.1	125.000
143	1040	7	1- 235	3132	.511	9.172	21.350	4.620	3.6	-1.1	126.200
144	1048	9	1 2030	3132	.435	9.289	21.250	4.680	-11.8	.1	125.500
145	1048	9	1 1795	3132	.435	9.283	21.300	4.680	-11.8	.1	125.000
146	1048	9	1 1270	3132	.435	9.283	21.300	4.680	-11.8	.1	125.000
147	1048	9	1 2753	3132	.435	9.283	21.300	4.680	-11.8	.1	125.000
148	1048	9	1 1197	3132	.435	9.283	21.300	4.680	-11.8	.1	125.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					URANIUM	THORIUM	CARBON	SILICON	URANIUM	THORIUM	
149	1048	8	1- 894	3132	.502	9.142	21.360	4.760	1.9	-1.4	125.200
150	1048	8	1-2545	3132	.502	9.142	21.360	4.760	1.9	-1.4	126.000
151	1048	8	1-2855	3132	.502	9.142	21.360	4.760	1.9	-1.4	126.500
152	1048	8	1-2789	3132	.502	9.142	21.360	4.760	1.9	-1.4	126.700
153	1660	4	6-1065	1782	.255	8.413	12.140	2.250	4.2	.1	109.500
154	1660	5	6-2866	1782	.255	8.413	12.140	2.250	4.2	.1	109.500
155	1660	5	6- 935	1782	.255	8.413	12.140	2.250	4.2	.1	109.000
156	1660	5	6- 985	1782	.255	8.413	12.140	2.250	4.2	.1	109.000
157	1660	7	6- 729	1782	.255	8.413	12.140	2.250	4.2	.1	109.000
158	1660	7	6- 937	1782	.255	8.413	12.140	2.250	4.2	.1	109.000
159	1660	8	6 2774	1782	.248	8.346	11.740	2.440	1.2	-.7	109.000
160	1088	7	1-1644	3132	.692	10.119	21.290	4.700	5.6	1.3	126.500
161	1088	7	1-1441	3132	.692	10.119	21.290	4.700	5.6	1.3	126.500
162	1088	7	1-1548	3132	.692	10.119	21.290	4.700	5.6	1.3	127.000
163	1088	7	1- 955	3132	.692	10.119	21.290	4.700	5.6	1.3	125.500
164	1088	7	1- 40	3132	.692	10.119	21.290	4.700	5.6	1.3	125.000
165	1088	7	1-1713	3132	.692	10.119	21.290	4.700	5.6	1.3	127.000
166	1088	7	1-1885	3132	.692	10.119	21.290	4.700	5.6	1.3	127.000
167	1088	7	1-1703	3132	.693	10.119	21.260	4.710	5.7	1.3	125.500
168	1060	7	1- 631	3132	.585	9.825	21.520	4.670	4.1	-.5	125.500
169	1060	7	1- 875	3132	.585	9.825	21.520	4.670	4.1	-.5	125.000
170	1060	7	1- 124	3132	.585	9.825	21.520	4.670	4.1	-.5	126.000
171	1060	7	1-2322	3132	.585	9.825	21.520	4.670	4.1	-.5	128.000
172	1060	7	1- 964	3132	.585	9.825	21.520	4.670	4.1	-.5	126.000
173	1060	7	1-1195	3132	.585	9.825	21.520	4.670	4.1	-.5	125.000
174	1060	7	1- 41	3132	.585	9.825	21.520	4.670	4.1	-.5	124.000
175	1060	7	1- 759	3132	.585	9.825	21.520	4.670	4.1	-.5	125.500
176	1068	7	1- 96	3132	.588	9.914	21.030	4.810	4.7	.4	126.000
177	1068	7	1-1589	3132	.588	9.914	21.030	4.810	4.7	.4	127.000
178	1068	7	1-2301	3132	.588	9.914	21.030	4.810	4.7	.4	128.000
179	1068	7	1- 399	3132	.588	9.914	21.030	4.810	4.7	.4	126.000
180	1068	7	1-2522	3132	.588	9.914	21.030	4.810	4.7	.4	126.500
181	1068	7	1- 966	3132	.588	9.914	21.030	4.810	4.7	.4	126.000
182	1068	7	1- 81	3132	.588	9.914	21.030	4.810	4.7	.4	126.000
183	1068	7	1- 347	3132	.588	9.914	21.030	4.810	4.7	.4	126.000
184	1068	7	1-2801	3132	.588	9.914	21.030	4.810	4.7	.4	127.000
185	1068	7	1- 325	3132	.588	9.914	21.030	4.810	4.7	.4	126.200

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (K
					----- URANIUM	THORIUM	CARBON	----- SILICON	URANIUM	THORIUM	
186	1063	7	1-1002	3132	.588	9.914	21.030	4.910	4.7	.4	125.000
187	1080	7	1-1377	3132	.669	9.828	20.920	5.010	2.2	-1.6	126.000
188	1090	8	1- 154	3132	.669	9.828	20.920	5.010	2.2	-1.6	126.500
189	1080	8	1- 687	3132	.669	9.828	20.920	5.010	2.2	-1.6	126.000
190	1090	8	1-1384	3132	.669	9.828	20.920	5.010	2.2	-1.6	126.000
191	1088	8	1 2782	3132	.682	9.937	20.980	4.920	4.1	-.5	126.200
192	1020	7	1-1173	3132	.380	11.115	20.890	5.540	5.3	-4.6	127.000
193	1020	7	1- 189	3132	.380	11.115	20.890	5.540	5.3	-4.6	128.500
194	1020	8	1- 458	3132	.380	11.115	20.890	5.540	5.3	-4.6	127.500
195	1020	8	1- 1	3132	.380	11.115	20.890	5.540	5.3	-4.6	127.000
196	1020	8	1-1360	3132	.380	11.115	20.890	5.540	5.3	-4.6	127.000
197	1020	8	1-1507	3132	.380	11.115	20.890	5.540	5.3	-4.6	127.000
198	1020	8	1-2060	3132	.380	11.115	20.890	5.540	5.3	-4.6	127.500
199	1020	8	1-2450	3132	.380	11.115	20.890	5.540	5.3	-4.6	127.000
200	1048	8	1- 306	3132	.501	9.217	20.610	4.760	1.7	-.6	125.000
201	1048	8	1- 888	3132	.501	9.217	20.610	4.760	1.7	-.6	124.500
202	1048	7	1-1753	3132	.501	9.217	20.610	4.760	1.7	-.6	125.500
203	1048	7	1- 864	3132	.501	9.217	20.610	4.760	1.7	-.6	125.000
204	1048	7	1- 977	3132	.501	9.217	20.610	4.760	1.7	-.6	125.000
205	1048	7	1-2705	3132	.501	9.217	20.610	4.760	1.7	-.6	124.000
206	1048	7	1-2375	3132	.501	9.217	20.610	4.760	1.7	-.6	125.000
207	1048	7	1-1155	3132	.501	9.217	20.610	4.760	1.7	-.6	125.000
208	1080	8	1-1255	3132	.669	10.000	20.700	4.950	2.2	.1	125.000
209	1080	8	1-2113	3132	.669	10.000	20.700	4.950	2.2	.1	125.500
210	1080	8	1-1478	3132	.669	10.000	20.700	4.950	2.2	.1	127.000
211	1080	8	1-2716	3132	.669	10.000	20.700	4.950	2.2	.1	126.000
212	1080	8	1-1007	3132	.664	9.903	20.890	4.700	1.4	-.8	125.000
213	1080	8	1- 664	3132	.664	9.903	20.890	4.700	1.4	-.8	126.000
214	1080	8	1- 60	3132	.664	9.903	20.890	4.700	1.4	-.8	125.000
215	1080	8	1-1619	3132	.664	9.903	20.890	4.700	1.4	-.8	126.000
216	1080	8	1-1863	3132	.664	9.903	20.890	4.700	1.4	-.8	125.000
217	1080	8	1-2340	3132	.664	9.903	20.890	4.700	1.4	-.8	128.000
218	1090	8	1-1893	3132	.664	9.903	20.890	4.700	1.4	-.8	125.000
219	1168	7	2-2162	1782	.285	5.244	11.730	2.710	1.9	-.6	106.000
220	1268	9	3- 800	1302	.203	3.932	9.570	1.980	1.7	-.6	109.500
221	1088	8	1-1619	3132	.672	10.195	20.860	4.890	2.6	2.1	126.000
222	1093	8	1-2395	3132	.672	10.195	20.860	4.890	2.6	2.1	126.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	----- SILICON	URANIUM	THORIUM	
223	108B	8	1- 924	3132	.672	10.195	20.860	4.890	2.6	2.1	125.000
224	108B	8	1-2784	3132	.672	10.195	20.860	4.890	2.6	2.1	126.500
225	108B	8	1-2009	3132	.670	10.124	20.870	4.840	2.3	1.4	126.200
226	101A		1-1210	3132	.475	12.609	20.580	4.320	1.1	-2.6	126.500
227	101A		1-2306	3132	.475	12.609	20.580	4.320	1.1	-2.6	128.000
228	101A		1- 161	3132	.475	12.609	20.580	4.320	1.1	-2.6	128.000
229	101A		1-1142	3132	.475	12.609	20.580	4.320	1.1	-2.6	127.500
230	101A		1- 380	3132	.475	12.609	20.580	4.320	1.1	-2.6	127.500
231	101A		1-2156	3132	.475	12.609	20.580	4.320	1.1	-2.6	128.000
232	101A		1-2223	3132	.475	12.609	20.580	4.320	1.1	-2.6	128.000
233	113A		2- 518	1782	.270	7.174	11.710	2.460	.9	-2.6	109.000
234	126D	9	3-2421	1302	.210	3.799	8.590	1.860	2.4	-1.7	109.000
235	102A	7	1- 250	3132	.377	10.881	21.830	4.540	4.5	-6.6	126.500
236	102A	7	1- 284	3132	.377	10.881	21.830	4.540	4.5	-6.6	127.000
237	102A	7	1- 351	3132	.377	10.881	21.830	4.540	4.5	-6.6	127.000
238	128D	9	3- 774	1302	.278	4.157	8.610	2.060	2.3	.1	110.000
239	103D		1- 201	3132	.661	10.379	21.200	5.010	-3.3	-3.5	127.000
240	115D		2-2236	1782	.376	5.906	12.060	2.850	-3.3	-3.5	110.000
241	166B	6	6-2776	1782	.248	8.362	12.260	2.200	1.1	-.5	109.500
242	166B	6	6- 67	1782	.248	8.362	12.260	2.200	1.1	-.5	109.000
243	166D	8	6- 682	1782	.248	8.346	11.740	2.440	1.2	-.7	109.500
244	166D	6	6-2702	1782	.248	8.346	11.740	2.440	1.2	-.7	109.000
245	166D	6	6-2598	1782	.248	8.346	11.740	2.440	1.2	-.7	109.500
246	167D	9	7- 807	1302	.182	6.104	8.620	1.770	1.6	-.6	112.000
247	167D	9	7-1630	1302	.182	6.104	8.620	1.770	1.6	-.6	112.000
248	106D	7	1-2227	3132	.574	9.938	21.200	4.820	2.2	.7	126.000
249	106B	8	1- 32	3132	.574	9.938	21.200	4.820	2.2	.7	125.000
250	106B	8	1-2252	3132	.574	9.938	21.200	4.820	2.2	.7	127.000
251	106D	8	1- 848	3132	.571	9.715	21.450	4.820	1.5	-1.6	127.000
252	106D	8	1- 290	3132	.571	9.715	21.450	4.820	1.5	-1.6	126.000
253	106D	8	1-2451	3132	.571	9.715	21.450	4.820	1.5	-1.6	127.000
254	103D		1- 218	3132	.670	10.527	20.950	4.980	1.0	-2.1	127.000
255	103D		1-1879	3132	.670	10.527	20.950	4.980	1.0	-2.1	127.000
256	103D		1-2635	3132	.670	10.527	20.950	4.980	1.0	-2.1	127.000
257	103D		1-2717	3132	.669	10.524	20.960	4.980	1.0	-2.2	126.000
258	150D	4	5- 105	3132	.694	12.444	21.130	4.390	4.0	-2.5	128.200
259	150D	4	5- 626	3132	.694	12.444	21.130	4.390	4.0	-2.5	128.700

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (K)
					URANIUM	THORIUM	CARBON	SILICON	URANIUM	THORIUM	
260	1500	5	5-2083	3132	.694	12.444	21.130	4.390	4.0	-2.5	128.700
261	1500	5	5-2484	3132	.694	12.444	21.130	4.390	4.0	-2.5	128.700
262	1500	5	5- 539	3132	.694	12.444	21.130	4.390	4.0	-2.5	127.700
263	1500	5	5- 76	3132	.694	12.444	21.130	4.390	4.0	-2.5	128.200
264	1508	4	5- 726	3132	.694	12.444	21.130	4.390	4.0	-2.5	127.200
265	1508	4	5- 917	3132	.694	12.444	21.130	4.390	4.0	-2.5	127.200
266	1508	5	5- 972	3132	.694	12.444	21.130	4.390	4.0	-2.5	127.700
267	1620	4	5- 784	3132	.695	12.438	21.130	4.390	4.0	-2.5	128.700
269	1390	7	5-1141	3132	.589	11.306	21.100	4.720	1.3	-2.0	127.500
269	1390	7	5- 227	3132	.589	11.306	21.100	4.720	1.3	-2.0	127.500
270	1390	8	5-1569	3132	.589	11.306	21.100	4.720	1.3	-2.0	127.500
271	1390	8	5-1414	3132	.589	11.306	21.100	4.720	1.3	-2.0	126.000
272	1390	9	5-1379	3132	.589	11.306	21.100	4.720	1.3	-2.0	127.000
273	1390	9	5-1731	3132	.589	11.306	21.100	4.720	1.3	-2.0	127.000
274	166A	4	6-2222	1782	.249	8.281	11.870	2.230	1.8	-1.4	109.000
275	166A	4	6-2288	1782	.249	8.281	11.870	2.230	1.8	-1.4	110.000
276	166A	4	6-2723	1782	.249	8.281	11.870	2.230	1.8	-1.4	108.000
277	166A	5	6-1984	1782	.249	8.281	11.870	2.230	1.8	-1.4	109.500
278	166A	5	6- 735	1782	.249	8.281	11.870	2.230	1.8	-1.4	109.000
279	166A	6	6-2285	1782	.249	8.281	11.870	2.230	1.8	-1.4	110.500
280	166A	8	6- 675	1782	.249	8.281	11.870	2.230	1.8	-1.4	108.500
281	166A	8	6- 111	1782	.249	8.281	11.870	2.230	1.8	-1.4	109.000
282	167A	9	7-1670	1302	.182	6.050	8.670	1.630	1.8	-1.4	111.000
283	167A	9	7-1451	1302	.182	6.050	8.670	1.630	1.8	-1.4	112.000
284	1290	9	3-1794	1302	.276	4.116	8.780	2.040	1.3	-.9	110.000
285	109A		1- 684	3132	.620	12.180	20.390	4.380	1.3	.0	127.000
286	109A		1-1019	3132	.620	12.180	20.390	4.380	1.3	.0	126.500
287	109A		1- 647	3132	.620	12.180	20.390	4.380	1.3	.0	127.000
288	109A		1- 670	3132	.620	12.180	20.390	4.380	1.3	.0	126.500
289	109A		1- 940	3132	.620	12.180	20.390	4.380	1.3	.0	127.000
290	109A		1- 57	3132	.620	12.180	20.390	4.380	1.3	.0	127.500
291	109A		1-2560	3132	.620	12.180	20.390	4.380	1.3	.0	126.500
292	109A		1-2282	3132	.620	12.180	20.390	4.380	1.3	.0	128.000
293	109A		1- 337	3132	.620	12.180	20.390	4.380	1.3	.0	127.500
294	109A		1-1612	3132	.620	12.180	20.390	4.380	1.3	.0	127.000
295	140A	5	5-1176	3132	.665	13.313	20.920	4.230	3.7	-.4	127.500
296	140A	4	5-2213	3132	.665	13.313	20.920	4.230	3.7	-.4	128.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIS	TOTAL		NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
			SERIAL NUMBER	NUMBER OF RODS	----- URANIUM	THORIUM	CARBON	----- SILICON	URANIUM	THORIUM	
297	146A	5	5-2275	3132	.706	13.088	20.930	4.290	4.0	-.1	129.000
298	146A	5	5- 26	3132	.706	13.088	20.930	4.290	4.0	-.1	127.000
299	146A	4	5- 805	3132	.706	13.088	20.930	4.290	4.0	-.1	128.500
300	146A	4	5- 723	3132	.706	13.088	20.930	4.290	4.0	-.1	128.000
301	152A	4	5- 854	3132	.623	13.542	20.910	4.170	3.5	-.6	129.500
302	152A	4	5- 731	3132	.623	13.542	20.910	4.170	3.5	-.6	128.000
303	152A	5	5- 962	3132	.623	13.542	20.910	4.170	3.5	-.6	128.000
304	152A	5	5-2460	3132	.623	13.542	20.910	4.170	3.5	-.6	128.000
305	121A		2-1707	1782	.353	6.930	11.600	2.490	1.4	.0	108.000
306	164A	4	5- 892	3132	.624	13.526	20.920	4.180	3.5	-.7	127.000
307	101A		1-2857	3132	.474	12.544	20.390	4.290	.8	-3.1	127.000
308	101A		1-2561	3132	.474	12.544	20.390	4.290	.8	-3.1	127.000
309	101A		1-1516	3132	.474	12.544	20.390	4.290	.8	-3.1	128.000
310	101A		1-1184	3132	.474	12.544	20.390	4.290	.8	-3.1	126.500
311	101A		1-1268	3132	.474	12.544	20.390	4.290	.8	-3.1	127.000
312	101A		1-2281	3132	.474	12.544	20.390	4.290	.8	-3.1	128.000
313	101A		1- 874	3132	.474	12.544	20.390	4.290	.8	-3.1	127.000
314	101H		1-2735	3132	.471	12.331	21.550	4.450	.3	-4.7	126.000
315	101H		1-1021	3132	.471	12.331	21.550	4.450	.3	-4.7	127.000
316	101H		1- 890	3132	.471	12.331	21.550	4.450	.3	-4.7	127.000
317	113H		2- 732	1782	.268	7.016	12.260	2.530	.1	-4.7	108.500
318	102A		1- 778	3132	.366	11.576	21.020	4.640	1.5	-.6	127.000
319	102A		1-1914	3132	.366	11.576	21.020	4.640	1.5	-.6	126.500
320	102A		1-1969	3132	.366	11.576	21.020	4.640	1.5	-.6	127.000
321	114H	7	2 1520	1782	.215	7.016	11.710	2.720	4.5	5.8	107.500
322	107D		1-1930	3132	.859	10.768	21.490	4.260	-.1	-3.3	126.000
323	107D		1-1241	3132	.859	10.768	21.490	4.260	-.1	-3.3	126.500
324	107D		1- 75	3132	.859	10.768	21.490	4.260	-.1	-3.3	126.000
325	107D		1- 872	3132	.859	10.768	21.490	4.260	-.1	-3.3	127.000
326	107D		1-1587	3132	.859	10.768	21.490	4.260	-.1	-3.3	127.000
327	106D	7	1-1665	3132	.578	10.129	21.020	4.950	2.8	2.6	126.500
328	106D	7	1-1281	3132	.578	10.129	21.020	4.950	2.8	2.6	126.500
329	106D	7	1- 321	3132	.578	10.129	21.020	4.950	2.8	2.6	126.000
330	102A	7	1- 839	3132	.387	11.078	21.550	4.540	7.3	-4.9	127.000
331	114D	8	2 2761	1782	.217	6.313	12.420	2.530	5.2	-4.7	107.000
332	114D	7	2 2477	1782	.219	6.310	12.330	2.580	6.2	-4.8	108.000
333	114A	7	2-1590	1782	.215	6.113	12.450	2.530	4.6	-7.8	108.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	----- SILICON	URANIUM	THORIUM	
334	125A	9	3-1814	1302	.157	4.523	9.070	1.890	4.5	-6.6	111.000
335	102D	7	1-1242	3132	.380	11.043	21.580	4.600	5.2	-5.2	127.000
336	102D	7	1- 383	3132	.380	11.043	21.580	4.600	5.2	-5.2	127.000
337	102D	7	1-1672	3132	.380	11.043	21.580	4.600	5.2	-5.2	127.000
338	102D	7	1-1237	3132	.380	11.043	21.580	4.600	5.2	-5.2	126.000
339	125A	9	3- 919	1302	.158	4.591	8.970	1.910	5.3	-5.2	109.500
340	106D	8	1-2507	3132	.575	10.023	21.140	4.910	2.3	1.5	127.000
341	107D		1- 16	3132	.879	11.056	21.170	4.350	2.2	-.8	125.000
342	107D		1-1681	3132	.879	11.056	21.170	4.350	2.2	-.8	127.000
343	107D		1-2666	3132	.879	11.056	21.170	4.350	2.2	-.8	126.500
344	107D		1-2697	3132	.877	11.028	21.200	4.340	2.0	-1.0	127.500
345	145D	7	5-2680	3132	.609	10.815	21.230	4.500	-.2	-1.2	127.000
346	114H		2 2209	1782	.198	6.273	11.890	3.070	-4.0	-5.4	108.000
347	114H		2- 827	1782	.198	6.273	11.890	3.070	-4.0	-5.4	108.000
348	114H		2 2733	1782	.198	6.273	11.890	3.070	-4.0	-5.4	107.500
349	114H		2 2722	1782	.198	6.273	11.890	3.070	-4.0	-5.4	107.500
350	102H		1 2543	3132	.370	11.598	21.080	4.980	2.4	-.5	125.500
351	102H		1-1741	3132	.370	11.598	21.080	4.980	2.4	-.5	127.000
352	102H		1-1544	3132	.370	11.598	21.080	4.980	2.4	-.5	127.500
353	102H		1 2865	3132	.370	11.598	21.080	4.980	2.4	-.5	127.000
354	102H		1- 551	3132	.348	11.338	20.960	5.170	-3.7	-2.7	126.500
355	102H		1 1108	3132	.348	11.077	20.890	5.350	-3.7	-4.9	126.000
356	102A		1-1717	3132	.351	11.635	20.930	4.740	-2.9	-.1	127.000
357	154A	4	5 255	3132	.459	13.469	20.690	4.450	.3	-.5	129.500
358	166H	4	6- 488	1782	.250	8.472	11.440	2.570	1.9	.8	110.000
359	166H	5	6- 844	1782	.250	8.472	11.440	2.570	1.9	.8	109.000
360	166H	6	6 2792	1782	.250	8.472	11.440	2.570	1.9	.8	109.000
361	166H	7	6- 820	1782	.250	8.472	11.440	2.570	1.9	.8	109.500
362	131H		4 716	3132	.471	12.791	21.330	4.190	.2	-1.2	127.500
363	157D	7	5 1853	3132	.583	11.335	21.110	4.520	.1	-1.7	127.500
364	157D	7	5 830	3132	.583	11.335	21.110	4.520	.1	-1.7	128.000
365	157D	7	5 1047	3132	.583	11.341	21.070	4.530	.1	-1.7	126.500
366	103D		1-1089	3132	.673	10.574	20.730	4.670	1.6	-1.7	125.500
367	103D		1-2533	3132	.673	10.574	20.730	4.670	1.6	-1.7	126.500
368	103D		1-1763	3132	.673	10.574	20.730	4.670	1.6	-1.7	127.000
369	103D		1-1710	3132	.673	10.574	20.730	4.670	1.6	-1.7	126.500
370	103D		1-2363	3132	.673	10.574	20.730	4.670	1.6	-1.7	126.500

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					URANIUM	THORIUM	CARBON	SILICON	URANIUM	THORIUM	
371	103D		1-1174	3132	.673	10.574	20.730	4.670	1.6	-1.7	126.500
372	103D		1-1100	3132	.673	10.574	20.730	4.670	1.6	-1.7	126.500
373	103D		1-2812	3132	.673	10.574	20.730	4.670	1.6	-1.7	127.000
374	103D		1-1769	3132	.673	10.574	20.730	4.670	1.6	-1.7	126.500
375	103D		1-1907	3132	.673	10.574	20.730	4.670	1.6	-1.7	126.000
376	103D		1-1214	3132	.673	10.574	20.730	4.670	1.6	-1.7	125.500
377	115D		2- 548	1792	.393	6.016	11.900	2.660	1.6	-1.7	107.500
378	118B	7	2 2233	1782	.320	5.591	11.950	2.780	.1	-.4	107.000
379	157D	7	5 861	3132	.593	11.341	21.070	4.530	.1	-1.7	127.000
380	119D		2-1859	1782	.499	6.127	12.220	2.420	.0	-3.3	107.000
391	101A		1- 175	3132	.437	13.101	19.500	4.640	3.7	1.2	127.000
382	101A		1- 199	3132	.489	13.151	19.420	4.670	4.0	1.6	127.500
393	101A		1- 515	3132	.439	13.151	19.420	4.670	4.0	1.6	126.500
394	101A		1-2759	3132	.489	13.151	19.420	4.670	4.0	1.6	126.000
395	113A		2- 962	1782	.276	7.331	11.250	2.600	2.9	.4	106.500
386	102A	7	1-1251	3132	.390	11.631	20.890	4.560	5.3	-.2	126.000
397	102A	7	1-1367	3132	.390	11.631	20.890	4.560	5.3	-.2	126.000
388	102A		1- 166	3132	.375	11.591	20.940	4.580	4.0	-.5	126.000
389	102A		1- 393	3132	.374	11.573	20.950	4.570	3.7	-.7	126.000
390	102A		1-1690	3132	.374	11.573	20.950	4.570	3.7	-.7	126.000
391	102A	7	1- 172	3132	.378	11.368	20.890	4.400	4.8	-2.4	127.000
392	102A	7	1- 48	3132	.390	11.291	20.860	4.320	5.3	-3.2	125.000
393	102A	7	1-1305	3132	.390	11.291	20.860	4.320	5.3	-3.2	125.000
394	114A	7	2- 228	1782	.216	6.419	11.870	2.460	5.0	-3.2	107.500
395	101A	5	1-1535	3132	.491	12.252	19.930	4.890	4.4	-5.3	126.000
396	101A	5	1- 304	3132	.491	12.252	19.930	4.890	4.4	-5.3	127.000
397	101A	5	1- 396	3132	.491	12.252	19.930	4.890	4.4	-5.3	127.000
398	101A	5	1-1497	3132	.491	12.252	19.930	4.890	4.4	-5.3	127.000
399	101A	5	1-2364	3132	.491	12.252	19.930	4.890	4.4	-5.3	127.000
400	101A	5	1-2256	3132	.491	12.252	19.930	4.890	4.4	-5.3	128.000
401	101A	5	1-2777	3132	.435	11.939	20.610	4.870	3.2	-7.7	126.500
402	101A	5	1- 308	3132	.495	11.939	20.610	4.870	3.2	-7.7	127.000
403	101A	5	1- 538	3132	.435	11.939	20.610	4.870	3.2	-7.7	127.000
404	102A		1-2869	3132	.371	11.795	20.550	4.380	2.7	1.2	128.000
405	102A		1-1177	3132	.371	11.795	20.550	4.380	2.7	1.2	126.000
406	102A		1-1212	3132	.371	11.795	20.550	4.380	2.7	1.2	125.500
407	137H	7	5-1987	3132	.379	12.700	20.810	4.630	-1.2	.3	127.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	----- SILICON	URANIUM	THORIUM	
403	155H	7	5- 799	3132	.392	12.633	20.100	4.750	2.0	-.2	126.500
409	155H	7	5-1014	3132	.378	12.627	20.690	4.940	-1.6	-.3	127.000
410	149H	7	5- 825	3132	.394	13.330	18.950	4.570	.4	2.2	128.000
411	149H	7	5-1024	3132	.403	13.238	20.610	4.680	2.8	1.8	126.000
412	148H	4	5- 68	3132	.466	13.969	20.020	4.420	2.8	1.5	127.500
413	148H	4	5-1515	3132	.466	13.969	20.020	4.420	2.8	1.5	129.000
414	148H	5	5-1269	3132	.466	13.969	20.020	4.420	2.8	1.5	127.500
415	148H	5	5-2703	3132	.466	13.969	20.020	4.420	2.8	1.5	128.000
416	154H	4	5-2685	3132	.469	13.745	20.030	4.450	2.6	1.6	127.000
417	154H	4	5- 683	3132	.469	13.745	20.030	4.450	2.6	1.6	127.500
418	154H	5	5-2481	3132	.467	13.744	20.010	4.450	2.3	1.6	128.000
419	154H	5	5-2579	3132	.464	13.743	20.000	4.450	1.6	1.6	128.000
420	158A	4	5-1799	3132	.657	13.460	20.150	4.130	2.4	.8	127.000
421	158A	4	5-2022	3132	.657	13.460	20.150	4.130	2.4	.8	128.000
422	111A	5	1-1121	3132	.762	12.741	20.330	4.070	2.7	.4	127.000
423	111A	5	1-1235	3132	.762	12.741	20.330	4.070	2.7	.4	127.000
424	111A	5	1-1163	3132	.762	12.741	20.330	4.070	2.7	.4	127.500
425	111A	5	1- 157	3132	.762	12.741	20.330	4.070	2.7	.4	128.000
426	111A	5	1-1004	3132	.762	12.741	20.330	4.070	2.7	.4	126.500
427	101H		1-1459	3132	.478	13.026	20.080	4.700	1.7	.7	128.000
428	101H		1-2255	3132	.478	13.026	20.080	4.700	1.7	.7	129.000
429	1050		1- 783	3132	.767	11.115	21.170	4.600	2.1	-.7	127.000
430	1050		1- 815	3132	.767	11.115	21.170	4.600	2.1	-.7	128.000
431	1050		1-1399	3132	.767	11.115	21.170	4.600	2.1	-.7	127.000
432	1050		1-1662	3132	.767	11.115	21.170	4.600	2.1	-.7	126.000
433	1050		1- 770	3132	.767	11.115	21.170	4.600	2.1	-.7	127.000
434	1050		1-2018	3132	.767	11.115	21.170	4.600	2.1	-.7	128.000
435	1050		1-1387	3132	.767	11.115	21.170	4.600	2.1	-.7	127.000
436	1050		1-2770	3132	.768	11.144	20.200	4.540	2.3	-.5	126.000
437	1050		1-2565	3132	.768	11.144	20.200	4.540	2.3	-.5	126.500
438	1050		1-1743	3132	.768	11.144	20.200	4.540	2.3	-.5	127.500
439	1050		1-2347	3132	.768	11.144	20.200	4.540	2.3	-.5	127.000
440	1050		1-1900	3132	.768	11.144	20.200	4.540	2.3	-.5	127.000
441	1050		1- 271	3132	.768	11.144	20.200	4.540	2.3	-.5	128.000
442	1050		1-2651	3132	.768	11.144	20.200	4.540	2.3	-.5	126.000
443	1050		1-2291	3132	.768	11.144	20.200	4.540	2.3	-.5	128.500
444	1030		1-1139	3132	.679	10.708	20.860	4.730	2.4	-.4	127.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	SILICON	URANIUM	THORIUM	
445	103D		1-2500	3132	.679	10.708	20.860	4.730	2.4	-.4	127.000
446	103D		1-1765	3132	.679	10.708	20.860	4.730	2.4	-.4	126.500
447	103D		1- 866	3132	.679	10.708	20.860	4.730	2.4	-.4	126.000
448	103D		1-1263	3132	.679	10.708	20.860	4.730	2.4	-.4	126.000
449	103D		1-1736	3132	.679	10.708	20.860	4.730	2.4	-.4	126.000
450	115D		2-1545	1782	.396	6.093	11.870	2.690	2.4	-.5	109.000
451	107D		1-1262	3132	.864	11.200	20.840	4.620	.5	.5	127.000
452	107D		1-1634	3132	.864	11.200	20.840	4.620	.5	.5	127.000
453	107D		1-2487	3132	.864	11.200	20.840	4.620	.5	.5	128.000
454	107D		1-2647	3132	.864	11.200	20.840	4.620	.5	.5	128.000
455	107D		1-2734	3132	.864	11.200	20.840	4.620	.5	.5	125.000
456	107D		1- 264	3132	.864	11.200	20.840	4.620	.5	.5	128.500
457	107D		1- 291	3132	.864	11.200	20.840	4.620	.5	.5	126.000
458	107D		1-1132	3132	.864	11.200	20.840	4.620	.5	.5	127.000
459	113H		2-2385	1782	.270	6.980	11.370	3.150	.8	-5.2	108.500
460	113H		2-2158	1782	.270	6.980	11.370	3.150	.8	-5.2	108.000
461	113H		2- 455	1782	.270	6.980	11.370	3.150	.8	-5.2	108.500
462	102A		1-2929	3132	.369	11.533	20.970	4.570	2.1	-1.0	127.000
463	107D		1- 605	3132	.858	10.868	21.300	4.340	-.3	-2.4	127.000
464	107D		1- 280	3132	.871	11.032	21.110	4.380	1.3	-1.0	128.000
465	107D		1-2490	3132	.871	11.032	21.110	4.380	1.3	-1.0	127.000
466	107D		1- 267	3132	.871	11.032	21.110	4.380	1.3	-1.0	127.000
467	107D		1-2558	3132	.871	11.032	21.110	4.390	1.3	-1.0	127.000
468	102A		1- 89	3132	.369	11.704	20.830	4.630	2.2	.4	126.000
469	102A		1- 140	3132	.369	11.704	20.830	4.630	2.2	.4	126.000
470	102A		1- 212	3132	.369	11.704	20.830	4.630	2.2	.4	127.500
471	102A		1-1315	3132	.369	11.704	20.830	4.630	2.2	.4	126.000
472	102A		1-2157	3132	.369	11.704	20.830	4.630	2.2	.4	125.500
473	102A		1-2832	3132	.369	11.704	20.830	4.630	2.2	.4	126.500
474	102A		1-1243	3132	.369	11.704	20.830	4.630	2.2	.4	126.000
475	102A		1-2842	3132	.369	11.704	20.830	4.630	2.2	.4	127.000
476	105D		1- 320	3132	.780	10.868	21.550	4.540	3.8	-2.9	126.500
477	105D		1- 142	3132	.780	10.868	21.550	4.540	3.8	-2.9	126.500
478	105D		1-1390	3132	.790	10.868	21.550	4.540	3.8	-2.9	126.000
479	105D		1- 182	3132	.790	10.868	21.550	4.540	3.8	-2.9	126.000
480	105D		1-1689	3132	.780	10.868	21.550	4.540	3.8	-2.9	126.000
481	117D		2- 967	1782	.444	6.184	12.260	2.580	3.9	-2.9	107.500

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	----- SILICON	URANIUM	THORIUM	
482	113H		2- 47	1782	.268	7.132	11.590	2.820	-.1	-2.3	107.000
483	113A		2-2350	1782	.274	7.121	11.550	2.600	2.1	-3.3	108.000
484	102A		1-2931	3132	.366	12.247	20.370	4.860	1.5	5.1	126.000
485	105D		1-1848	3132	.773	11.051	20.930	4.560	3.0	-1.3	127.000
486	107D		1-1724	3132	.871	11.034	21.130	4.520	1.2	-1.0	127.000
487	121B		2 1120	1782	.348	6.867	12.310	2.530	.0	-.9	107.500
488	121B		2 1519	1782	.348	6.867	12.310	2.530	.0	-.9	109.000
489	123B		2-1182	1782	.429	7.010	11.880	2.520	1.7	-2.9	107.500
490	111B		1-1378	3132	.749	12.212	21.010	4.420	.9	-3.7	127.000
491	111B		1- 843	3132	.749	12.212	21.010	4.420	.9	-3.7	127.500
492	111B		1- 877	3132	.749	12.212	21.010	4.420	.9	-3.7	127.500
493	111B		1-1584	3132	.749	12.212	21.010	4.420	.9	-3.7	128.000
494	111B		1- 990	3132	.749	12.212	21.010	4.420	.9	-3.7	127.500
495	140B	6	5- 749	3132	.647	13.004	21.200	4.230	.9	-2.7	127.500
496	158B	6	5- 751	3132	.647	13.004	21.200	4.230	.9	-2.7	127.500
497	158B	6	5- 746	3132	.647	13.004	21.200	4.230	.9	-2.7	127.500
498	123B		2-1471	1782	.429	7.010	11.880	2.520	1.7	-2.9	108.500
499	112B		1-1806	3132	.560	11.068	21.200	4.800	1.5	.3	126.500
500	112B		1-1750	3132	.560	11.068	21.200	4.800	1.5	.3	127.500
501	112B		1- 912	3132	.560	11.068	21.200	4.800	1.5	.3	127.500
502	112B		1- 504	3132	.560	11.068	21.200	4.800	1.5	.3	127.000
503	112B		1-1224	3132	.560	11.068	21.200	4.800	1.5	.3	126.500
504	112B		1-2134	3132	.560	11.068	21.200	4.800	1.5	.3	126.000
505	112B		1-2019	3132	.560	11.068	21.200	4.800	1.5	.3	127.500
506	124B		2-1028	1782	.319	6.327	12.020	2.720	1.7	.8	107.000
507	136H	5	5-2154	3132	.460	13.557	20.820	4.340	.6	.2	128.000
508	136H	6	5-2728	3132	.460	13.557	20.820	4.340	.6	.2	127.500
509	142H	5	5- 766	3132	.466	13.128	20.770	4.340	.9	-1.3	127.500
510	142H	5	5-2813	3132	.462	13.246	20.920	4.300	-.0	-.5	128.500
511	142H	6	5 2165	3132	.453	13.709	20.060	4.460	-1.9	3.0	128.000
512	142H	6	5 2736	3132	.453	13.709	20.060	4.460	-1.9	3.0	128.000
513	160H	5	5-1486	3132	.465	13.943	20.650	4.320	2.6	1.4	129.000
514	115D		2 2739	1782	.380	6.067	11.970	2.730	.9	-.9	108.500
515	149A	7	5-2549	3132	.399	12.716	21.270	4.200	1.7	-2.6	128.500
516	149A	7	5-2907	3132	.399	12.716	21.270	4.200	1.7	-2.6	126.500
517	149A	8	5-4764	3132	.399	12.716	21.270	4.200	1.7	-2.6	126.000
518	149A	8	5- 819	3132	.399	12.716	21.270	4.200	1.7	-2.6	128.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					URANIUM	THORIUM	CARBON	SILICON	URANIUM	THORIUM	
519	149A	8	5- 836	3132	.399	12.716	21.270	4.200	1.7	-2.6	127.500
520	149A	8	5-2456	3132	.399	12.716	21.270	4.200	1.7	-2.6	127.000
521	155A	7	5 700	3132	.387	12.810	20.870	4.450	.7	1.2	128.000
522	155A	7	5 801	3132	.387	12.810	20.870	4.450	.7	1.2	127.500
523	155A	8	5 1039	3132	.387	12.810	20.870	4.450	.7	1.2	127.500
524	155A	8	5 1818	3132	.387	12.810	20.870	4.450	.7	1.2	129.500
525	155A	8	5 850	3132	.387	12.810	20.870	4.450	.7	1.2	128.500
526	155A	8	5 704	3132	.387	12.810	20.870	4.450	.7	1.2	127.000
527	161A	7	5 1144	3132	.396	13.186	20.800	4.410	1.0	1.1	128.500
528	121B		2 5178	1782	.348	6.867	12.310	2.530	.0	-.9	107.500
529	143H	7	5 2838	3132	.369	12.668	20.680	4.360	-1.6	3.2	128.500
530	102A		1-1829	3132	.366	11.021	21.220	4.200	1.5	-5.4	126.000
531	102A		1- 910	3132	.366	11.021	21.220	4.200	1.5	-5.4	126.500
532	102A		1-1931	3132	.366	11.021	21.220	4.200	1.5	-5.4	126.000
533	102A		1-1033	3132	.366	11.021	21.220	4.200	1.5	-5.4	126.000
534	102A		1- 882	3132	.366	11.021	21.220	4.200	1.5	-5.4	126.500
535	102A		1- 623	3132	.366	11.021	21.220	4.200	1.5	-5.4	126.500
536	102A		1-2719	3132	.366	11.021	21.220	4.200	1.5	-5.4	126.000
537	102A		1-2445	3132	.366	11.021	21.220	4.200	1.5	-5.4	127.000
538	102A		1- 613	3132	.366	11.021	21.220	4.200	1.5	-5.4	126.500
539	102A		1-2392	3132	.366	11.021	21.220	4.200	1.5	-5.4	127.000
540	102A		1-1825	3132	.366	11.021	21.220	4.200	1.5	-5.4	126.500
541	1040	7	1-1042	3132	.513	9.224	21.470	4.650	4.0	-.6	124.500
542	1040	7	1- 307	3132	.513	9.224	21.470	4.650	4.0	-.6	124.500
543	1040	7	1-1157	3132	.513	9.224	21.470	4.650	4.0	-.6	125.500
544	1040	7	1- 133	3132	.513	9.224	21.470	4.650	4.0	-.6	125.000
545	1040	7	1-1300	3132	.513	9.224	21.470	4.650	4.0	-.6	125.000
546	1040	7	1-1579	3132	.513	9.224	21.470	4.650	4.0	-.6	126.000
547	1040	7	1-1752	3132	.513	9.224	21.470	4.650	4.0	-.6	125.000
548	1040	7	1-1392	3132	.513	9.224	21.470	4.650	4.0	-.6	125.000
549	1160	7	2- 217	1782	.292	5.248	12.220	2.650	4.2	-.6	106.500
550	1160	7	2-1774	1782	.292	5.248	12.220	2.650	4.2	-.6	107.000
551	1160	8	2-1226	1782	.292	5.248	12.220	2.650	4.2	-.6	106.000
552	1160	8	2-2694	1782	.292	5.248	12.220	2.650	4.2	-.6	106.500
553	1098		1-1850	3132	.607	12.069	21.480	4.450	-.9	-.9	128.000
554	1098		1-2440	3132	.607	12.069	21.480	4.450	-.8	-.9	127.500
555	1098		1- 162	3132	.611	12.069	21.610	4.450	-.2	-.9	127.500

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	----- SILICON	URANIUM	THORIUM	
556	1098		1-1998	3132	.607	12.069	21.480	4.450	-.9	-.9	127.000
557	1098		1- 580	3132	.607	12.069	21.480	4.450	-.8	-.9	128.000
558	1098		1- 948	3132	.609	12.068	21.600	4.470	-.4	-.9	127.500
559	1098		1-1336	3132	.609	12.068	21.600	4.470	-.4	-.9	127.500
560	1098		1-2570	3132	.609	12.068	21.600	4.470	-.4	-.9	129.000
561	1098		1-1988	3132	.609	12.068	21.600	4.470	-.4	-.9	128.500
562	1098		1-1918	3132	.609	12.068	21.600	4.470	-.4	-.9	128.500
563	1098		1- 285	3132	.609	12.068	21.600	4.470	-.4	-.9	128.000
564	1098		1-1228	3132	.609	12.068	21.600	4.470	-.4	-.9	127.500
565	1098		1-2447	3132	.609	12.068	21.600	4.470	-.4	-.9	128.000
566	1098		1-1397	3132	.609	12.068	21.600	4.470	-.4	-.9	128.500
567	1098		1- 873	3132	.609	12.068	21.600	4.470	-.4	-.9	126.500
568	1098		1-2351	3132	.609	12.068	21.600	4.470	-.4	-.9	127.500
569	1098		1-1876	3132	.611	12.069	21.620	4.460	-.2	-.9	128.000
570	1570	8	5-1124	3132	.583	11.340	21.100	4.560	.2	-1.7	127.500
571	1570	8	5-2504	3132	.583	11.340	21.100	4.560	.2	-1.7	125.500
572	1570	8	5-1092	3132	.583	11.340	21.100	4.560	.2	-1.7	127.500
573	1570	8	5- 741	3132	.583	11.340	21.100	4.560	.2	-1.7	127.500
574	1450	7	5 1127	3132	.611	10.769	21.090	4.630	.2	-1.6	127.000
575	1070		1- 544	3132	.887	10.978	20.940	4.540	3.2	-1.5	127.500
576	1070		1- 671	3132	.887	10.978	20.940	4.540	3.2	-1.5	126.500
577	1070		1- 925	3132	.887	10.978	20.940	4.540	3.2	-1.5	126.500
578	1070		1-2502	3132	.887	10.978	20.940	4.540	3.2	-1.5	127.500
579	1070		1 1735	3132	.887	10.978	20.940	4.540	3.2	-1.5	127.000
580	1070		1 2287	3132	.887	10.978	20.940	4.540	3.2	-1.5	126.500
581	1070		1 2664	3132	.887	10.978	20.940	4.540	3.2	-1.5	126.000
582	1070		1 2690	3132	.887	10.978	20.940	4.540	3.2	-1.5	127.000
583	1070		1 1609	3132	.887	10.978	20.940	4.540	3.2	-1.5	128.000
584	1070		1 1645	3132	.832	10.928	20.940	4.340	2.5	-1.9	128.000
585	1078		1-1604	3132	.869	10.964	21.440	4.090	1.1	-1.6	128.000
586	1078		1-1905	3132	.869	10.964	21.440	4.090	1.1	-1.6	127.500
587	1078		1- 879	3132	.869	10.964	21.440	4.090	1.1	-1.6	128.000
588	1078		1-2787	3132	.869	10.964	21.440	4.090	1.1	-1.6	128.000
589	1078		1-2007	3132	.869	10.964	21.440	4.090	1.1	-1.6	128.000
590	1078		1-1352	3132	.869	10.964	21.440	4.090	1.1	-1.6	127.500
591	1078		1 309	3132	.869	10.964	21.440	4.090	1.1	-1.6	128.000
592	1078		1 2625	3132	.869	10.964	21.440	4.090	1.1	-1.6	127.500

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	SILICON	URANIUM	THORIUM	
593	107B		1 868	3132	.369	10.964	21.440	4.090	1.1	-1.6	128.000
594	107B		1 2512	3132	.869	10.964	21.440	4.090	1.1	-1.6	128.000
595	107B		1 2730	3132	.869	10.964	21.440	4.090	1.1	-1.6	127.000
596	107B		1 219	3132	.869	10.964	21.440	4.090	1.1	-1.6	127.000
597	105D		1 565	3132	.774	11.162	20.830	4.490	3.1	-.3	127.000
598	105D		1 2311	3132	.774	11.162	20.830	4.490	3.1	-.3	128.500
599	105D		1 2133	3132	.774	11.162	20.830	4.490	3.1	-.3	126.500
600	105D		1 2833	3132	.774	11.162	20.830	4.490	3.1	-.3	126.000
601	105D		1 1448	3132	.774	11.162	20.830	4.490	3.1	-.3	127.000
602	105D		1 229	3132	.774	11.162	20.830	4.490	3.1	-.3	127.000
603	105D		1 2875	3132	.774	11.162	20.830	4.490	3.1	-.3	126.000
604	105D		1 2675	3132	.774	11.162	20.830	4.490	3.1	-.3	126.500
605	105D		1 1745	3132	.774	11.162	20.830	4.490	3.1	-.3	127.000
606	105D		1 213	3132	.774	11.162	20.830	4.490	3.1	-.3	127.500
607	105D		1 2204	3132	.774	11.162	20.830	4.490	3.1	-.3	127.000
608	103B		1 1358	3132	.645	10.973	20.670	4.620	-2.7	2.0	128.000
609	103B		1 1317	3132	.645	10.973	20.670	4.620	-2.7	2.0	126.500
610	103B		1 2184	3132	.645	10.973	20.670	4.620	-2.7	2.0	127.500
611	103B		1 502	3132	.645	10.973	20.670	4.620	-2.7	2.0	127.500
612	103B		1 2388	3132	.645	10.973	20.670	4.620	-2.7	2.0	127.500
613	103B		1 1425	3132	.645	10.973	20.670	4.620	-2.7	2.0	128.000
614	103B		1 1067	3132	.687	10.710	21.210	4.020	3.6	-.4	126.500
615	103B		1 2131	3132	.687	10.710	21.210	4.020	3.6	-.4	126.500
616	103B		1 2537	3132	.687	10.710	21.210	4.020	3.6	-.4	126.500
617	103B		1 555	3132	.687	10.710	21.210	4.020	3.6	-.4	126.500
618	103B		1 473	3132	.687	10.710	21.210	4.020	3.6	-.4	126.500
619	103B		1 83	3132	.687	10.710	21.210	4.020	3.6	-.4	127.000
620	103B		1- 289	3132	.687	10.710	21.210	4.020	3.6	-.4	126.000
621	103B		1-1310	3132	.687	10.710	21.210	4.020	3.6	-.4	126.500
622	103B		1 1252	3132	.687	10.710	21.210	4.020	3.6	-.4	126.000
623	103B		1 2374	3132	.687	10.710	21.210	4.020	3.6	-.4	127.000
624	103B		1 421	3132	.687	10.710	21.210	4.020	3.6	-.4	127.000
625	115B		2 2863	1782	.389	6.132	12.180	2.300	3.1	.2	108.000
626	115B		2 2661	1782	.389	6.132	12.180	2.300	3.1	.2	108.000
627	115B		2 244	1782	.389	6.132	12.180	2.300	3.1	.2	108.000
628	101H		1 2682	3132	.475	12.663	20.580	4.870	1.1	-2.2	128.500
629	101H		1 1099	3132	.475	12.663	20.580	4.870	1.1	-2.2	128.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	-----NUCLIDE WEIGHTS (KG)-----				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					URANIUM	THORIUM	CARBON	SILICON	URANIUM	THORIUM	
630	101H		1 1178	3132	.475	12.663	20.580	4.870	1.1	-2.2	127.500
631	101H		1 791	3132	.475	12.663	20.580	4.870	1.1	-2.2	127.500
632	101H		1- 641	3132	.470	13.424	20.670	4.540	.0	3.7	128.000
633	105D		1 1420	3132	.755	11.137	21.170	4.450	.5	-.5	127.000
634	101A		1- 419	3132	.487	12.591	20.920	4.420	3.6	-2.7	128.000
635	101A		1-1961	3132	.487	12.591	20.920	4.420	3.6	-2.7	127.000
636	101A		1- 471	3132	.492	12.630	20.990	4.390	2.5	-2.4	128.000
637	102A		1 2427	3132	.364	11.319	21.140	4.480	.7	-2.9	127.000
638	102A		1 30	3132	.364	11.319	21.140	4.480	.7	-2.9	126.500
639	102A		1 1057	3132	.361	11.886	21.060	4.260	-.1	2.0	127.000
640	102A		1 2336	3132	.381	11.886	21.060	4.260	-.1	2.0	129.000
641	102A		1 1054	3132	.361	11.886	21.060	4.260	-.1	2.0	127.000
642	102A		1-1574	3132	.361	11.888	21.060	4.260	-.1	2.0	127.000
643	102A		1-2243	3132	.360	11.624	21.390	4.170	-.3	-.2	128.000
644	102A		1-1706	3132	.360	11.624	21.390	4.170	-.3	-.2	128.000
645	105D		1- 584	3132	.773	11.158	20.850	4.490	2.9	-.4	128.500
646	107D		1 2483	3132	.375	10.940	21.190	4.490	1.7	-1.8	127.000
647	174B		1-2606	3130	.615	12.068	21.690	4.420	.4	-.9	128.500
648	104D	9	1- 155	3132	.451	9.313	21.140	4.650	-8.5	.4	125.500
649	104D	9	1-2810	3132	.451	9.313	21.140	4.650	-8.5	.4	125.000
650	104D	9	1-1193	3132	.451	9.313	21.140	4.650	-8.5	.4	124.500
651	104D	9	1-2296	3132	.449	9.278	21.360	4.600	-9.0	.0	126.000
652	104D	9	1-1508	3132	.449	9.278	21.360	4.600	-9.0	.0	125.000
653	104D	9	1-2805	3132	.449	9.278	21.360	4.600	-9.0	.0	125.000
654	104D	9	1- 106	3132	.449	9.278	21.360	4.600	-9.0	.0	125.000
655	104D	9	1- 826	3132	.448	9.362	21.440	4.650	-9.1	.9	126.000
656	104D	9	1 1746	3132	.443	9.349	21.530	4.610	-10.2	.8	126.000
657	104D	9	1-1364	3132	.447	9.316	21.310	4.660	-9.3	.4	124.500
658	126D	9	3-1755	1302	.171	3.833	8.780	1.980	-16.7	.7	110.000
659	171D	9	1- 173	3130	.440	9.340	21.350	4.510	-10.8	.7	126.000
660	101A		1- 901	3132	.474	12.954	21.110	4.130	1.0	.1	127.500
661	168A		1 1764	3130	.463	12.695	21.100	4.260	-1.5	-1.9	128.000
662	101A		1-1797	3132	.474	12.954	21.110	4.130	1.0	.1	127.500
663	101A		1-2017	3132	.474	12.954	21.110	4.130	1.0	.1	128.000
664	101A		1- 347	3132	.474	12.954	21.110	4.130	1.0	.1	127.500
665	101A		1-2535	3132	.474	12.954	21.110	4.130	1.0	.1	128.000
666	101A		1-2199	3132	.474	12.954	21.110	4.130	1.0	.1	127.500

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	----- SILICON	URANIUM	THORIUM	
667	101A		1-1329	3132	.474	12.954	21.110	4.130	1.0	.1	127.000
668	101A		1-1374	3132	.474	12.954	21.110	4.130	1.0	.1	127.500
669	101A		1-1321	3132	.474	12.954	21.110	4.130	1.0	.1	126.000
670	101A		1-1767	3132	.474	12.954	21.110	4.130	1.0	.1	128.000
671	101A		1-2371	3132	.474	12.956	21.080	4.140	.9	.1	127.000
672	171B	9	1- 55	3130	.435	9.278	21.290	4.670	-11.8	.0	125.000
673	107D		1-2135	3132	.861	11.034	21.060	4.280	.1	-.5	127.500
674	107D		1-2402	3132	.861	11.034	21.060	4.280	.1	-.5	127.000
675	107D		1- 982	3132	.861	11.034	21.060	4.280	.1	-.5	128.000
676	107D		1- 927	3132	.861	11.034	21.060	4.280	.1	-.5	126.500
677	101A		1- 653	3132	.471	12.979	20.800	4.170	.2	.3	127.000
678	101A		1-2377	3132	.471	12.979	20.800	4.170	.2	.3	126.500
679	101A		1-1720	3132	.471	12.979	20.800	4.170	.2	.3	128.000
680	102A		1- 931	3132	.356	11.696	21.090	4.450	-1.5	.4	126.500
681	102A		1- 205	3132	.357	11.931	21.100	4.320	-1.0	2.8	128.000
682	102A		1-1694	3132	.355	12.120	20.460	4.610	-1.7	4.0	127.500
683	102A		1- 711	3132	.356	11.876	20.700	4.560	-1.3	1.9	127.000
684	102A		1- 903	3132	.367	11.618	21.100	4.520	1.8	-.3	127.500
685	102A		1- 126	3132	.355	11.664	20.940	4.510	-1.7	.1	127.000
686	102A		1-1949	3132	.355	11.791	20.760	4.190	-1.7	1.2	126.500
687	102A		1-1985	3132	.355	11.342	21.100	4.380	-1.7	-2.7	127.500
688	102A		1-1952	3132	.356	11.646	21.180	4.300	-1.4	-.0	127.000
689	102A		1-1361	3132	.353	11.795	21.160	4.240	-2.1	1.2	127.000
690	102A		1-2758	3132	.353	11.795	21.160	4.240	-2.1	1.2	126.500
691	102A		1- 612	3132	.353	11.795	21.160	4.240	-2.1	1.2	128.000
692	102A		1-2665	3132	.353	11.795	21.160	4.240	-2.1	1.2	127.000
693	102A		1-2080	3132	.353	11.795	21.160	4.240	-2.1	1.2	128.000
694	102A		1- 542	3132	.353	11.795	21.160	4.240	-2.1	1.2	127.000
695	102A		1-2453	3132	.353	11.795	21.160	4.240	-2.1	1.2	127.500
696	102A		1- 891	3132	.353	11.795	21.160	4.240	-2.1	1.2	127.000
697	102A		1-1030	3132	.353	11.795	21.160	4.240	-2.1	1.2	126.000
698	102A		1- 215	3132	.353	11.795	21.160	4.240	-2.1	1.2	128.000
699	102A		1- 163	3132	.353	11.795	21.160	4.240	-2.1	1.2	126.000
700	102A		1-2352	3132	.353	11.795	21.160	4.240	-2.1	1.2	128.000
701	101A		1- 275	3132	.477	13.007	20.680	4.490	1.6	.5	128.000
702	101A		1- 989	3132	.477	13.007	20.680	4.490	1.6	.5	128.500
703	101A		1- 736	3132	.477	13.007	20.680	4.490	1.6	.5	127.500

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	----- SILICON	URANIUM	THORIUM	
704	101A		1-2515	3132	.477	13.007	20.680	4.490	1.6	.5	129.000
705	101A		1- 727	3132	.477	13.007	20.680	4.490	1.6	.5	128.000
706	113A		2-2531	1782	.271	7.397	11.770	2.550	1.3	.5	108.000
707	113A		2-2851	1782	.271	7.397	11.770	2.550	1.3	.5	109.000
703	113A		2- 298	1782	.271	7.397	11.770	2.550	1.3	.5	109.000
709	113A		2- 806	1782	.271	7.397	11.770	2.550	1.3	.5	109.000
710	113A		2- 532	1782	.271	7.397	11.770	2.550	1.3	.5	109.000
711	113A		2-2084	1782	.271	7.397	11.770	2.550	1.3	.5	109.000
712	113A		2- 415	1782	.271	7.337	11.770	2.550	1.3	.5	108.500
713	136A	4	5-1682	3132	.459	13.469	20.690	4.450	.3	-.5	128.500
714	136A	5	5-4837	3132	.459	13.469	20.690	4.450	.3	-.5	127.000
715	142A	4	5-1722	3132	.462	13.227	20.850	4.460	-.1	-.6	128.500
716	142A	4	5-1388	3132	.462	13.227	20.850	4.460	-.1	-.6	128.500
717	142A	5	5-1417	3132	.462	13.227	20.850	4.460	-.1	-.6	128.500
718	142A	5	5-1912	3132	.462	13.227	20.850	4.460	-.1	-.6	128.000
719	148A	4	5-2478	3132	.456	13.714	20.530	4.440	.6	-.3	128.500
720	148A	4	5- 957	3132	.456	13.714	20.530	4.440	.6	-.3	128.000
721	148A	5	5- 268	3132	.456	13.714	20.530	4.440	.6	-.3	127.500
722	148A	5	5-1008	3132	.456	13.714	20.530	4.440	.6	-.3	129.000
723	154A	5	5-1086	3132	.457	13.407	20.780	4.340	.0	-.9	126.500
724	171D	9	1- 883	3130	.434	9.271	21.580	4.250	-12.0	-.0	126.500
725	173D	9	1- 849	3130	.512	9.775	22.620	4.180	-8.9	-1.0	126.000
726	173D	9	1-2299	3130	.512	9.775	22.620	4.180	-8.9	-1.0	127.500
727	168A		1-2820	3130	.463	12.695	21.100	4.260	-1.5	-1.9	128.000
728	101A		1-2155	3132	.477	13.074	20.060	4.560	1.5	1.0	127.500
729	154A	6	5-1837	3132	.454	13.465	20.380	4.390	-.6	-.5	128.000
730	160A	5	5-2879	3132	.452	13.610	20.900	4.200	-.1	-1.1	128.000
731	160A	6	5-1192	3132	.438	13.408	21.080	4.160	-3.3	-2.5	128.500
732	101D	5	1-1770	3132	.484	12.848	21.140	4.320	3.0	-.7	127.500
733	105D		1 1327	3132	.722	11.419	21.200	4.200	-3.9	2.0	127.500
734	101H		1-1035	3132	.476	12.639	20.640	4.670	1.2	-2.3	127.000
735	101H		1- 3	3132	.463	12.893	20.280	4.590	-1.4	-.4	127.500
736	101H		1- 771	3132	.463	12.893	20.280	4.590	-1.4	-.4	128.000
737	101H		1-1215	3132	.463	12.893	20.280	4.590	-1.4	-.4	127.500
733	101H		1-1183	3132	.461	12.731	20.900	4.360	-1.9	-1.6	127.000
739	101H		1-1301	3132	.461	12.731	20.900	4.360	-1.9	-1.6	127.500
740	101H		1-1116	3132	.461	12.731	20.900	4.360	-1.9	-1.6	127.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL		NUCLIDE WEIGHTS (KG)			PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
				NUMBER OF RODS	----- URANIUM	THORIUM	CARBON	----- SILICON	URANIUM	THORIUM	
741	101H		1- 457	3132	.461	12.731	20.900	4.360	-1.9	-1.6	128.500
742	101H		1-2120	3132	.461	12.731	20.900	4.360	-1.9	-1.6	127.000
743	101H		1-1669	3132	.461	12.731	20.900	4.360	-1.9	-1.6	128.000
744	101H		1- 148	3132	.461	12.731	20.900	4.360	-1.9	-1.6	128.000
745	101H		1-1782	3132	.461	12.731	20.900	4.360	-1.9	-1.6	128.000
746	101H		1- 552	3132	.461	12.731	20.900	4.360	-1.9	-1.6	128.500
747	101H		1-2230	3132	.461	12.731	20.900	4.360	-1.9	-1.6	128.000
748	101H		1- 599	3132	.461	12.731	20.900	4.360	-1.9	-1.6	128.500
749	101H		1-1894	3132	.461	12.731	20.900	4.360	-1.9	-1.6	128.000
750	119D		2-5007	1782	.490	6.287	12.050	2.350	.3	-.8	107.000
751	119D		2-1232	1782	.490	6.287	12.050	2.350	.3	-.8	108.000
752	119D		2-1933	1782	.490	6.287	12.050	2.350	.3	-.8	108.000
753	119D		2-4108	1782	.490	6.287	12.050	2.350	.3	-.8	105.500
754	119D		2-4925	1782	.490	6.287	12.050	2.350	.3	-.8	107.500
755	119D		2-5154	1782	.490	6.287	12.050	2.350	.3	-.8	108.000
756	119D		2- 102	1782	.490	6.287	12.050	2.350	.3	-.8	108.000
757	119D		2- 513	1782	.490	6.287	12.050	2.350	.3	-.8	107.000
758	119D		2-1603	1782	.490	6.287	12.050	2.350	.3	-.8	107.500
759	133D		4- 758	3132	.862	11.050	21.170	4.130	.2	-.8	126.000
760	133D		4- 737	3132	.862	11.052	21.180	4.160	.3	-.8	126.500
761	112B		1- 932	3132	.564	10.986	21.400	4.690	2.2	-.4	127.000
762	112B		1-2174	3132	.567	11.125	21.200	4.640	2.7	.8	127.000
763	112B		1-1872	3132	.567	11.125	21.200	4.640	2.7	.8	128.000
764	112B		1- 975	3132	.567	11.125	21.200	4.640	2.7	.8	126.500
765	112B		1- 824	3132	.567	11.125	21.200	4.640	2.7	.8	128.000
766	102A		1- 702	3132	.361	11.823	20.660	4.620	.1	1.5	127.500
767	102A		1-2068	3132	.364	11.853	20.650	4.640	.8	1.7	127.500
768	102A		1-2000	3132	.364	11.853	20.650	4.640	.8	1.7	128.000
769	102A		1-1714	3132	.364	11.853	20.650	4.640	.8	1.7	128.000
770	102A		1-1614	3132	.364	11.853	20.650	4.640	.8	1.7	128.000
771	102A		1- 272	3132	.364	11.853	20.650	4.640	.8	1.7	128.500
772	102A		1-2676	3132	.364	11.853	20.650	4.640	.8	1.7	126.500
773	102A		1- 463	3132	.364	11.853	20.650	4.640	.8	1.7	128.000
774	102A		1- 22	3132	.364	11.853	20.650	4.640	.8	1.7	125.000
775	102A		1- 510	3132	.364	11.852	20.650	4.640	.8	1.7	127.500
776	112B		1-2529	3132	.547	11.209	21.120	4.670	-.9	1.6	127.500
777	112B		1- 195	3132	.546	11.219	21.110	4.670	-1.0	1.7	127.500

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	SILICON	URANIUM	THORIUM	
778	145D	7	5- 583	3132	.627	11.163	20.700	4.700	2.8	2.0	127.500
779	145D	7	5-2465	3132	.627	11.163	20.700	4.700	2.8	2.0	126.500
780	145D	8	5- 838	3132	.627	11.163	20.700	4.700	2.9	2.0	127.000
781	145D	8	5-2546	3132	.627	11.163	20.700	4.700	2.8	2.0	127.500
782	145D	8	5-1469	3132	.627	11.163	20.700	4.700	2.9	2.0	128.500
783	145D	8	5-1754	3132	.627	11.163	20.700	4.700	2.8	2.0	127.500
784	151D	8	5-2048	3132	.567	12.157	20.810	4.550	2.3	.2	129.000
785	151D	8	5- 638	3132	.568	12.197	20.780	4.560	2.6	.5	128.500
786	151D	8	5-1661	3132	.568	12.187	20.780	4.560	2.6	.5	128.000
787	151D	8	5-1419	3132	.568	12.197	20.780	4.560	2.6	.5	128.500
788	144D	4	5- 781	3132	.779	11.480	21.500	4.310	.8	-3.3	127.000
789	144D	4	5-2700	3132	.779	11.480	21.500	4.310	.8	-3.3	128.000
790	144D	5	5- 273	3132	.739	11.944	20.950	4.360	-4.4	.6	129.500
791	144D	5	5- 408	3132	.783	11.480	21.490	4.430	1.3	-3.3	128.000
792	144D	5	5-2911	3132	.783	11.480	21.490	4.430	1.3	-3.3	129.500
793	144D	5	5-1784	3132	.781	11.525	21.420	4.380	1.1	-2.9	128.500
794	105A	4	1-1279	3132	.744	11.256	20.450	4.890	-.9	.5	127.500
795	105A	4	1- 149	3132	.744	11.256	20.450	4.890	-.9	.5	128.000
796	105A	4	1-2799	3132	.744	11.256	20.450	4.890	-.9	.5	128.500
797	105A	4	1-2796	3132	.744	11.256	20.450	4.890	-.9	.5	126.000
798	105A	4	1-1234	3132	.744	11.256	20.450	4.890	-.9	.5	127.500
799	105A	4	1- 338	3132	.744	11.256	20.450	4.890	-.9	.5	128.000
800	105A	4	1-1602	3132	.744	11.256	20.450	4.890	-.9	.5	128.000
801	105A	4	1-2365	3132	.744	11.256	20.450	4.890	-.9	.5	127.000
802	170D		1-2297	3130	.665	10.717	21.060	4.790	.4	-.4	129.000
803	170D		1- 987	3130	.665	10.717	21.060	4.790	.4	-.4	127.000
804	102A		1-1062	3132	.368	11.712	20.780	4.790	1.9	.5	127.500
805	102A		1-1066	3132	.368	11.690	20.800	4.780	1.8	.3	127.500
806	169A		1- 867	3130	.367	11.687	20.780	4.790	1.7	.3	128.000
807	101A		1 368	3132	.477	12.649	20.230	4.470	1.4	-2.2	126.500
808	169A		1-1989	3130	.367	11.687	20.780	4.790	1.7	.3	128.000
809	169A		1-1787	3130	.367	11.687	20.780	4.790	1.7	.3	128.500
810	103D		1- 752	3132	.666	10.724	21.080	4.790	.4	-.3	127.000
811	103D		1-1454	3132	.666	10.724	21.080	4.790	.4	-.3	127.500
812	103D		1- 489	3132	.666	10.724	21.080	4.790	.4	-.3	127.500
813	103D		1-2604	3132	.666	10.724	21.080	4.790	.4	-.3	127.000
814	103D		1-1789	3132	.666	10.724	21.080	4.790	.4	-.3	127.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	TOTAL		NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
			SERIAL NUMBER	NUMBER OF RODS	URANIUM	THORIUM	CARBON	SILICON	URANIUM	THORIUM	
815	1050		1-2595	3132	.722	11.419	21.200	4.200	-3.9	2.0	128.000
816	1050		1- 46	3132	.722	11.419	21.200	4.200	-3.9	2.0	127.000
817	1050		1-2564	3132	.722	11.419	21.200	4.200	-3.9	2.0	127.000
818	1050		1-2378	3132	.722	11.419	21.200	4.200	-3.9	2.0	127.500
819	1050		1- 125	3132	.722	11.419	21.200	4.200	-3.9	2.0	127.000
820	1050		1-2418	3132	.722	11.419	21.200	4.200	-3.9	2.0	128.000
821	1050		1- 662	3132	.722	11.419	21.200	4.200	-3.9	2.0	128.000
822	1050		1-2503	3132	.722	11.419	21.200	4.200	-3.9	2.0	128.000
823	1050		1- 540	3132	.722	11.419	21.200	4.200	-3.9	2.0	127.500
824	1050		1- 465	3132	.722	11.419	21.200	4.200	-3.9	2.0	127.500
825	1050		1- 331	3132	.722	11.419	21.200	4.200	-3.9	2.0	128.000
826	1050		1- 509	3132	.722	11.419	21.200	4.200	-3.9	2.0	126.500
827	1050		1-1188	3132	.722	11.419	21.200	4.200	-3.9	2.0	126.500
828	1050		1- 950	3132	.722	11.419	21.200	4.200	-3.9	2.0	126.500
829	1050		1- 403	3132	.722	11.419	21.200	4.200	-3.9	2.0	128.000
830	1050		1- 933	3132	.722	11.419	21.200	4.200	-3.9	2.0	127.000
831	1050		1- 355	3132	.722	11.419	21.200	4.200	-3.9	2.0	127.000
832	1050		1- 287	3132	.722	11.419	21.200	4.200	-3.9	2.0	128.000
833	1050		1-1034	3132	.722	11.419	21.200	4.200	-3.9	2.0	127.000
834	1050		1-2686	3132	.722	11.419	21.200	4.200	-3.9	2.0	128.000
835	1050		1- 520	3132	.722	11.419	21.200	4.200	-3.9	2.0	127.500
836	107B		1-1427	3132	.881	10.840	21.890	4.480	2.4	-2.7	127.500
837	107B		1- 454	3132	.881	10.840	21.890	4.480	2.4	-2.7	126.500
838	107B		1-2803	3132	.881	10.840	21.890	4.480	2.4	-2.7	127.000
839	107B		1-1063	3132	.881	10.840	21.890	4.480	2.4	-2.7	127.000
840	107B		1-1883	3132	.881	10.840	21.890	4.480	2.4	-2.7	127.000
841	107B		1-1199	3132	.881	10.840	21.890	4.480	2.4	-2.7	126.000
842	107B		1-2217	3132	.881	10.840	21.890	4.480	2.4	-2.7	127.000
843	107B		1-2928	3132	.881	10.840	21.890	4.480	2.4	-2.7	126.000
844	101A		1-2650	3132	.474	12.959	21.050	4.140	.8	.1	127.500
845	101A		1-2738	3132	.494	12.871	20.920	4.160	3.1	-.5	128.000
846	101A		1-1571	3132	.486	12.860	20.890	4.170	3.4	-.6	128.500
847	101A		1- 812	3132	.486	12.860	20.890	4.170	3.4	-.6	128.000
848	101A		1- 424	3132	.486	12.860	20.890	4.170	3.4	-.6	127.500
849	106D	9	1-1306	3132	.521	9.963	21.580	4.540	-7.3	.9	127.000
850	106D	9	1-1759	3132	.521	9.963	21.580	4.540	-7.3	.9	127.500
851	106D	9	1-2410	3132	.521	9.963	21.580	4.540	-7.3	.9	127.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					URANIUM	THORIUM	CARBON	SILICON	URANIUM	THORIUM	
852	106D	9	1-1804	3132	.521	9.963	21.580	4.540	-7.3	.9	126.500
853	106D	9	1- 969	3132	.521	9.963	21.580	4.540	-7.3	.9	126.000
854	106D	9	1- 887	3132	.521	9.963	21.580	4.540	-7.3	.9	126.000
855	106D	9	1-1983	3132	.521	9.963	21.580	4.540	-7.3	.9	127.000
856	106D	9	1- 596	3132	.521	9.963	21.580	4.540	-7.3	.9	126.500
857	106D	9	1-2398	3132	.521	9.963	21.580	4.540	-7.3	.9	127.000
858	106D	9	1- 134	3132	.521	9.963	21.580	4.540	-7.3	.9	126.000
859	106D	9	1-1206	3132	.521	9.963	21.580	4.540	-7.3	.9	127.000
860	106D	9	1- 388	3132	.521	9.963	21.580	4.540	-7.3	.9	126.500
861	117A	4	2 84	1782	.438	6.223	11.870	2.620	2.6	-2.3	108.000
862	191A	4	1 2768	3132	.771	10.929	20.880	4.590	2.7	-2.4	126.500
863	112B		1- 409	3132	.551	11.098	21.260	4.400	-.1	.6	127.000
864	112B		1-2923	3132	.551	10.834	21.640	4.260	-.1	-1.8	127.500
865	112B		1-2403	3132	.551	10.834	21.640	4.260	-.1	-1.8	127.000
866	112B		1-1111	3132	.551	10.834	21.640	4.260	-.1	-1.8	128.500
867	112B		1- 720	3132	.551	10.834	21.640	4.260	-.1	-1.8	128.000
868	112B		1-1353	3132	.551	10.834	21.640	4.260	-.1	-1.8	127.500
869	109A	5	1- 34	3132	.602	12.175	21.070	4.520	-1.6	-.0	127.500
870	109A	5	1-1153	3132	.601	12.317	21.100	4.670	-1.8	1.2	128.000
871	109A	5	1-1101	3132	.601	12.317	21.100	4.670	-1.8	1.2	128.500
872	109A	5	1- 462	3132	.601	12.317	21.100	4.670	-1.8	1.2	129.500
873	109A	5	1- 305	3132	.601	12.317	21.100	4.670	-1.8	1.2	129.000
874	109A	5	1-2044	3132	.601	12.317	21.100	4.670	-1.8	1.2	129.500
875	109A	5	1- 43	3132	.601	12.317	21.100	4.670	-1.8	1.2	127.500
876	109A	5	1-1990	3132	.601	12.317	21.100	4.670	-1.8	1.2	129.000
877	109A	5	1- 974	3132	.601	12.317	21.100	4.670	-1.8	1.2	128.500
878	109A	5	1-2919	3132	.601	12.317	21.100	4.670	-1.8	1.2	130.000
879	109A	5	1-1555	3132	.601	12.317	21.100	4.670	-1.8	1.2	130.500
880	156D	4	5- 979	3132	.633	12.330	20.950	4.340	-3.9	.1	128.000
881	156D	6	5-2269	3132	.631	12.326	20.190	4.390	-5.5	.1	130.000
882	156D	6	5-1179	3132	.631	12.326	20.190	4.390	-5.5	.1	128.500
883	156D	6	5- 978	3132	.631	12.326	20.190	4.390	-5.5	.1	127.500
884	156D	6	5-2089	3132	.631	12.326	20.190	4.390	-5.5	.1	128.500
885	156D	5	5- 906	3132	.635	12.305	20.970	4.340	-3.5	-.1	128.000
886	156D	5	5-2240	3132	.635	12.305	20.970	4.340	-3.5	-.1	128.500
887	138D	6	5- 258	3132	.631	12.326	20.190	4.390	-5.5	.1	128.000
888	138D	6	5-1160	3132	.631	12.326	20.190	4.390	-5.5	.1	127.500

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	SILICON	URANIUM	THORIUM	
889	101A		1 23	3132	.477	12.649	20.230	4.470	1.4	-2.2	126.000
890	106D	9	1- 93	3132	.519	10.197	21.030	4.620	-7.6	3.3	126.000
891	106D	9	1-1409	3132	.519	10.232	20.950	4.640	-7.7	3.7	127.000
892	106D	9	1-2271	3132	.519	10.232	20.950	4.640	-7.7	3.7	127.500
893	106D	9	1-1732	3132	.519	10.232	20.950	4.640	-7.7	3.7	127.500
894	106D	9	1- 433	3132	.519	10.232	20.950	4.640	-7.7	3.7	126.500
895	106D	9	1-1712	3132	.519	10.232	20.950	4.640	-7.7	3.7	127.000
896	106D	9	1-1699	3132	.519	10.232	20.950	4.640	-7.7	3.7	127.500
897	106D	9	1-1494	3132	.519	10.232	20.950	4.640	-7.7	3.7	127.500
898	105B		1-2476	3132	.728	11.335	21.440	4.420	-3.1	1.2	128.500
899	105B		1-1102	3132	.728	11.335	21.440	4.420	-3.1	1.2	127.000
900	105B		1- 85	3132	.728	11.335	21.440	4.420	-3.1	1.2	127.000
901	105B		1- 432	3132	.728	11.335	21.440	4.420	-3.1	1.2	127.000
902	105B		1-1370	3132	.728	11.335	21.440	4.420	-3.1	1.2	128.000
903	105B		1-1537	3132	.728	11.335	21.440	4.420	-3.1	1.2	128.500
904	105B		1- 185	3132	.728	11.335	21.440	4.420	-3.1	1.2	127.000
905	105B		1- 366	3132	.728	11.335	21.440	4.420	-3.1	1.2	127.000
906	101H		1-1311	3132	.471	12.400	20.330	4.070	.3	-4.2	127.000
907	111A		1-1458	3132	.728	12.914	20.350	4.450	-1.9	1.8	127.000
908	111A		1-1692	3132	.719	12.997	20.270	4.700	-3.1	2.4	127.000
909	111A		1- 661	3132	.719	12.997	20.270	4.700	-3.1	2.4	129.000
910	111A		1- 152	3132	.719	12.997	20.270	4.700	-3.1	2.4	127.500
911	111A		1- 556	3132	.719	12.997	20.270	4.700	-3.1	2.4	129.000
912	111A		1-2715	3132	.719	12.997	20.270	4.700	-3.1	2.4	128.500
913	123A		2-2088	1792	.409	7.396	11.540	2.680	-3.1	2.5	109.500
914	123A		2-2882	1782	.409	7.396	11.540	2.680	-3.1	2.5	109.500
915	135A		4- 765	3132	.719	12.997	20.270	4.700	-3.1	2.4	128.500
916	135A		4 1994	3132	.723	12.997	20.260	4.700	-2.5	2.4	128.500
917	101H		1- 467	3132	.466	12.979	20.650	4.450	-.8	.3	128.000
918	103A	4	1-1371	3132	.636	10.629	20.520	4.890	-4.1	-1.2	127.000
919	103A	4	1-2910	3132	.636	10.629	20.520	4.890	-4.1	-1.2	126.500
920	103A	4	1-2129	3132	.636	10.629	20.520	4.890	-4.1	-1.2	126.500
921	103A	4	1-4817	3132	.636	10.629	20.520	4.890	-4.1	-1.2	125.000
922	103A	4	1-5115	3132	.636	10.629	20.520	4.890	-4.1	-1.2	126.500
923	103A	4	1-2497	3132	.636	10.629	20.520	4.890	-4.1	-1.2	127.000
924	115A	4	2-2090	1782	.362	6.048	11.670	2.780	-4.1	-1.2	108.500
925	101H		1-4381	3132	.473	12.921	20.560	4.490	.6	-.2	127.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	----- THORIUM	----- CARBON	----- SILICON	URANIUM	THORIUM	
926	101H		1-1331	3132	.473	12.921	20.560	4.490	.6	-.2	128.000
927	101H		1 449	3132	.473	12.921	20.560	4.490	.6	-.2	127.000
928	101H		1-2755	3132	.473	12.921	20.560	4.490	.6	-.2	128.000
929	101H		1 204	3132	.473	12.921	20.560	4.490	.6	-.2	129.000
930	101H		1-2337	3132	.473	12.921	20.560	4.490	.6	-.2	130.000
931	101H		1- 993	3132	.473	12.921	20.560	4.490	.6	-.2	128.000
932	101H		1- 938	3132	.473	12.921	20.560	4.490	.6	-.2	128.500
933	101H		1-2767	3132	.473	12.921	20.560	4.490	.6	-.2	127.500
934	101H		1- 344	3132	.473	12.921	20.560	4.490	.6	-.2	129.000
935	101H		1-1658	3132	.473	12.921	20.560	4.490	.6	-.2	128.000
936	101H		1-1006	3132	.466	13.035	20.580	4.450	-.9	.7	128.000
937	101H		1-2942	3132	.466	13.035	20.580	4.450	-.9	.7	130.000
938	101H		1- 733	3132	.466	13.035	20.580	4.450	-.9	.7	128.000
939	132A	4	4-2219	3132	.751	11.173	20.560	4.810	.0	-.2	127.500
940	132A	4	4-2523	3132	.751	11.173	20.560	4.810	.0	-.2	127.500
941	177A		2- 786	1780	.427	6.350	11.690	2.730	-.0	-.3	107.500
942	110B		1- 667	3132	.455	10.141	21.830	4.290	3.4	-.7	127.500
943	110B		1-2946	3132	.455	10.141	21.830	4.290	3.4	-.7	127.500
944	110B		1- 191	3132	.455	10.141	21.830	4.290	3.4	-.7	127.000
945	110B		1-2939	3132	.455	10.141	21.830	4.290	3.4	-.7	127.000
946	110B		1-5217	3132	.455	10.141	21.830	4.290	3.4	-.7	126.900
947	110B		1-4304	3132	.455	10.141	21.830	4.290	3.4	-.7	127.000
948	110B		1-4318	3132	.455	10.141	21.830	4.290	3.4	-.7	125.000
949	110B		1-5152	3132	.455	10.141	21.830	4.290	3.4	-.7	126.500
950	110B		1-1673	3132	.455	10.141	21.830	4.290	3.4	-.7	127.000
951	102A		1-1649	3132	.354	11.645	21.350	4.300	-1.8	-.1	127.500
952	102A		1- 33	3132	.352	11.791	21.480	4.470	-2.4	1.2	126.000
953	102A		1-2119	3132	.353	11.792	21.750	4.450	-2.1	1.2	128.000
954	102A		1-2143	3132	.354	11.765	20.720	4.590	-1.8	1.0	127.000
955	102A		1- 951	3132	.355	11.820	21.200	4.520	-1.8	1.4	127.000
956	102A		1-1357	3132	.350	11.860	21.680	4.490	-2.9	1.8	128.000
957	102A		1-2284	3132	.354	11.865	21.260	4.530	-1.8	1.8	129.000
958	101A		1- 589	3132	.469	13.026	20.450	4.580	-.3	.7	129.000
959	106B	8	1- 625	3132	.574	9.794	21.180	4.790	2.1	-.9	126.000
960	106B	9	1- 970	3132	.517	9.789	21.610	4.090	-8.1	-.8	126.500
961	106B	9	1-2547	3132	.517	9.789	21.610	4.080	-8.1	-.8	126.000
962	106B	3	1- 753	3132	.517	9.739	21.610	4.090	-8.1	-.8	125.900

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	SILICON	URANIUM	THORIUM	
963	1068	9	1- 246	3132	.517	9.799	21.610	4.080	-8.1	-.8	126.000
964	1068	9	1- 487	3132	.518	9.561	21.830	4.080	-7.9	-3.1	126.000
965	1068	9	1- 151	3132	.517	9.715	21.680	4.080	-8.0	-1.6	126.500
966	1068	9	1- 949	3132	.522	9.686	21.620	3.800	-7.2	-1.9	126.000
967	1068	9	1-1418	3132	.522	9.688	21.610	3.790	-7.2	-1.8	126.000
968	1068	9	1- 703	3132	.522	9.638	21.610	3.790	-7.2	-1.8	126.000
969	1068	9	1- 112	3132	.522	9.688	21.610	3.790	-7.2	-1.8	126.000
970	1068	9	1-1259	3132	.524	10.185	20.960	4.630	-6.7	3.2	126.500
971	1068	8	1- 590	3132	.556	9.748	22.180	4.440	-1.0	-1.2	126.500
972	1068	8	1- 560	3132	.556	9.748	22.180	4.440	-1.0	-1.2	127.500
973	1068	8	1-2912	3132	.556	9.748	22.180	4.440	-1.0	-1.2	126.000
974	1068	8	1-1211	3132	.556	9.748	22.180	4.440	-1.0	-1.2	125.000
975	1068	8	1- 18	3132	.556	9.748	22.180	4.440	-1.0	-1.2	123.500
976	1620	6	5 2583	3132	.626	12.792	19.820	4.380	-6.3	.2	129.500
977	1620	6	5 1068	3132	.626	12.792	19.820	4.380	-6.3	.2	129.000
978	1188	8	2-2152	1782	.324	5.617	12.170	2.560	1.2	.0	108.000
979	1188	8	2- 461	1782	.319	5.589	12.350	2.590	-.3	-.5	109.000
980	1278	9	3-1889	1302	.218	4.032	8.970	1.590	-6.9	-1.7	110.500
981	1278	9	3- 923	1302	.218	4.032	8.970	1.590	-6.9	-1.7	110.000
982	1738	9	1- 260	3130	.517	9.798	22.440	4.220	-8.1	-.8	126.000
983	1180	7	2-1840	1792	.328	5.605	11.970	2.760	2.6	-.2	107.000
984	1058		1-1629	3132	.773	11.124	21.480	4.160	2.9	-.7	127.000
985	1058		1-1772	3132	.773	11.124	21.480	4.160	2.9	-.7	127.000
986	1058		1-2924	3132	.773	11.124	21.480	4.160	2.9	-.7	127.500
987	1058		1-2401	3132	.773	11.124	21.480	4.160	2.9	-.7	127.500
988	1058		1-1734	3132	.773	11.124	21.480	4.160	2.9	-.7	128.000
989	1058		1- 370	3132	.773	11.124	21.480	4.160	2.9	-.7	127.500
990	1058		1-1944	3132	.773	11.124	21.480	4.160	2.9	-.7	127.000
991	1058		1-4928	3132	.766	11.020	21.580	4.240	2.0	-1.6	126.500
992	1058		1- 842	3132	.766	11.020	21.580	4.240	2.0	-1.6	127.000
993	1058		1- 719	3132	.766	11.020	21.580	4.240	2.0	-1.6	127.500
994	1058		1- 358	3132	.766	11.020	21.580	4.240	2.0	-1.6	127.000
995	1058		1- 80	3132	.766	11.020	21.580	4.240	2.0	-1.6	127.000
996	1058		1-1674	3132	.766	11.020	21.580	4.240	2.0	-1.6	127.000
997	1058		1- 438	3132	.774	11.196	21.490	4.160	3.1	-.0	127.500
998	1058		1-2913	3132	.774	11.196	21.490	4.160	3.1	-.0	126.000
999	1058		1-5205	3132	.774	11.196	21.490	4.160	3.1	-.0	126.500

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	----- SILICON	URANIUM	THORIUM	
1000	105B		1-1557	3132	.774	11.196	21.490	4.160	3.1	-.0	128.000
1001	105B		1- 763	3132	.774	11.196	21.490	4.160	3.1	-.0	128.500
1002	105B		1-5003	3132	.774	11.196	21.490	4.160	3.1	-.0	126.500
1003	105B		1-4329	3132	.774	11.196	21.490	4.160	3.1	-.0	125.500
1004	105B		1- 170	3132	.774	11.196	21.490	4.160	3.1	-.0	128.000
1005	105B		1-1154	3132	.774	11.196	21.490	4.160	3.1	-.0	127.500
1006	117B		2- 776	1782	.440	6.370	12.230	2.370	3.2	-.0	108.000
1007	117B		2-2727	1782	.440	6.370	12.230	2.370	3.2	-.0	107.500
1008	117B		2-2247	1782	.440	6.370	12.230	2.370	3.2	-.0	109.500
1009	117B		2-1166	1782	.440	6.370	12.230	2.370	3.2	-.0	107.500
1010	117B		2-2444	1782	.440	6.370	12.230	2.370	3.2	-.0	108.500
1011	132B		4-2399	3132	.771	11.056	21.600	4.160	2.6	-1.3	128.000
1012	1500	6	5-2860	3132	.625	12.788	19.810	4.390	-6.3	.2	128.500
1013	1500	6	5-1993	3132	.625	12.738	19.810	4.380	-6.3	.2	130.000
95 1014	1500	6	5- 992	3132	.625	12.738	19.810	4.380	-6.3	.2	128.500
1015	101A		1- 858	3132	.477	12.649	20.230	4.470	1.4	-2.2	128.000
1016	101A		1-4987	3132	.473	12.727	20.480	4.470	.6	-1.7	128.000
1017	101A		1- 108	3132	.475	12.826	20.980	4.540	1.2	-.9	128.000
1018	101A		1-4716	3132	.475	12.826	20.980	4.540	1.2	-.9	127.000
1019	101A		1-1913	3132	.475	12.826	20.980	4.540	1.2	-.9	127.500
1020	101A		1-2415	3132	.475	12.826	20.980	4.540	1.2	-.9	129.000
1021	101A		1-1727	3132	.475	12.826	20.980	4.540	1.2	-.9	128.000
1022	101A		1-2038	3132	.475	12.826	20.980	4.540	1.2	-.9	128.500
1023	101A		1- 792	3132	.475	12.826	20.980	4.540	1.2	-.9	128.000
1024	101H		1-1346	3132	.466	13.319	21.060	4.460	-.8	2.9	128.500
1025	101H		1-2551	3132	.466	13.319	21.060	4.460	-.8	2.9	128.500
1026	101H		1-1135	3132	.466	13.319	21.060	4.460	-.8	2.9	128.000
1027	101A		1-2373	3132	.467	12.929	20.580	4.540	-.7	-.1	128.000
1028	101A		1- 294	3132	.467	12.929	20.580	4.540	-.7	-.1	127.500
1029	101A		1- 798	3132	.467	12.929	20.580	4.540	-.7	-.1	127.000
1030	1380	4	5- 845	3132	.743	12.144	21.400	3.890	3.0	-1.4	127.000
1031	1510	7	5- 693	3132	.570	11.904	21.340	4.000	2.9	-1.9	127.000
1032	1510	7	5-2590	3132	.570	11.904	21.340	4.000	2.9	-1.9	128.500
1033	1510	7	5- 988	3132	.570	11.904	21.340	4.000	2.9	-1.9	127.000
1034	1510	7	5-1395	3132	.570	11.904	21.340	4.000	2.9	-1.9	127.500
1035	1560	4	5-1060	3132	.743	12.144	21.400	3.890	3.0	-1.4	128.500
1036	1560	5	5-2673	3132	.743	12.144	21.400	3.890	3.0	-1.4	128.500

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	----- THORIUM	----- CARBON	----- SILICON	URANIUM	THORIUM	
1037	156D	5	5-2885	3132	.743	12.144	21.400	3.890	3.0	-1.4	128.500
1038	162D	5	5-334	3132	.689	12.553	21.330	3.950	3.1	-1.6	128.000
1039	162D	5	5-853	3132	.699	12.553	21.330	3.950	3.1	-1.6	128.500
1040	163D	7	5-709	3132	.570	11.896	21.350	4.000	2.8	-1.9	127.000
1041	163D	7	5-1935	3132	.570	11.896	21.350	4.000	2.8	-1.9	128.000
1042	138D	5	5-748	3132	.728	12.165	20.620	3.940	1.0	-1.2	127.500
1043	138D	5	5-869	3132	.728	12.165	20.620	3.940	1.0	-1.2	128.000
1044	144D	6	5-2544	3132	.762	11.865	20.730	4.070	-1.4	-.0	128.000
1045	144D	6	5-714	3132	.762	11.865	20.730	4.070	-1.4	-.0	128.000
1046	144D	6	5-2473	3132	.762	11.865	20.730	4.070	-1.4	-.0	128.000
1047	144D	6	5-706	3132	.764	11.820	20.780	4.090	-1.1	-.4	128.000
1048	145D	9	5-857	3132	.616	10.800	21.010	3.930	1.0	-1.3	126.500
1049	145D	9	5-755	3132	.616	10.800	21.010	3.930	1.0	-1.3	126.000
1050	145D	9	5-1798	3132	.607	10.627	21.410	4.060	-.6	-2.9	125.000
1051	145D	9	5-821	3132	.607	10.627	21.410	4.060	-.6	-2.9	127.500
1052	151D	9	5-104	3132	.550	11.932	20.260	4.070	-.7	-1.6	128.000
1053	151D	9	5-692	3132	.550	11.932	20.260	4.070	-.7	-1.6	128.000
1054	151D	9	5-2026	3132	.550	11.932	20.260	4.070	-.7	-1.6	129.000
1055	151D	9	5-756	3132	.550	11.932	20.260	4.070	-.7	-1.6	128.000
1056	157D	9	5-1884	3132	.583	11.362	20.640	4.000	.3	-1.5	128.000
1057	157D	9	5-679	3132	.583	11.362	20.640	4.000	.3	-1.5	127.000
1058	157D	9	5-803	3132	.583	11.362	20.640	4.000	.3	-1.5	128.000
1059	157D	9	5-1845	3132	.583	11.362	20.640	4.000	.3	-1.5	127.500
1060	163D	9	5-2122	3132	.544	11.804	20.550	4.160	-2.0	-2.6	128.500
1061	163D	9	5-1693	3132	.544	11.804	20.550	4.160	-2.0	-2.6	128.000
1062	179D	6	5-1200	3130	.625	12.779	19.800	4.380	-6.4	.1	128.000
1063	163D	8	5-1159	3132	.557	11.926	20.700	4.040	.4	-1.6	128.500
1064	163D	8	5-2118	3132	.558	11.950	20.710	4.040	.5	-1.4	128.000
1065	138B	4	5-817	3132	.751	12.727	21.200	4.020	4.1	3.3	130.000
1066	144B	4	5-2645	3132	.803	12.271	21.410	3.910	3.9	3.4	128.500
1067	144B	4	5-2295	3132	.803	12.271	21.410	3.910	3.9	3.4	130.000
1068	156B	4	5-1240	3132	.751	12.727	21.200	4.020	4.1	3.3	128.000
1069	156B	4	5-2040	3132	.751	12.727	21.200	4.020	4.1	3.3	128.500
1070	162B	4	5-1778	3132	.693	12.804	20.850	4.580	3.7	.4	129.000
1071	136H	4	5-2528	3132	.471	13.764	20.730	4.530	3.1	1.7	128.500
1072	142H	4	5-785	3132	.474	13.321	21.170	4.470	2.7	.1	128.500
1073	142H	4	5-2238	3132	.474	13.321	21.170	4.470	2.7	.1	130.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	----- SILICON	URANIUM	THORIUM	
1074	143H	7	5- 965	3132	.372	12.953	20.270	4.420	-.8	4.7	128.000
1075	160H	4	5-1979	3132	.468	14.207	20.280	4.580	3.3	3.3	128.500
1076	161H	7	5-2826	3132	.397	13.993	19.660	4.550	1.2	6.4	128.500
1077	138B	5	5- 448	3132	.747	12.629	21.150	4.010	3.6	2.6	128.500
1078	139B	7	5-2054	3132	.596	11.432	21.150	4.240	.7	-.9	128.000
1079	144B	5	5- 371	3132	.801	12.210	21.380	3.900	3.6	2.9	128.000
1030	144B	5	5- 59	3132	.801	12.210	21.380	3.900	3.6	2.9	128.000
1081	145B	7	5- 256	3132	.611	10.796	21.380	4.180	.2	-1.4	126.500
1082	145B	7	5- 507	3132	.611	10.796	21.380	4.180	.2	-1.4	127.000
1083	150B	5	5-2506	3132	.688	12.707	20.890	4.400	3.2	-.5	128.500
1084	151B	7	5-1633	3132	.561	12.078	20.910	4.310	1.3	-.4	127.000
1085	151B	7	5-1995	3132	.561	12.078	20.910	4.310	1.3	-.4	127.500
1086	156B	5	5-2006	3132	.743	12.074	21.170	4.490	3.1	-2.0	128.000
1087	156B	5	5- 788	3132	.722	12.534	20.700	4.100	.2	1.8	128.000
1088	157B	7	5- 767	3132	.593	11.419	21.270	4.150	1.9	-1.0	127.000
1089	157B	7	5-2033	3132	.598	11.447	21.130	4.210	1.1	-.8	127.500
1090	162B	5	5-2195	3132	.687	12.668	20.780	4.570	2.8	-.7	130.000
1091	163B	7	5-1556	3132	.564	12.120	21.330	4.330	1.7	-.0	130.000
1092	175B		1-2943	3130	.441	10.154	21.820	4.070	.3	-.6	126.500
1093	175B		1- 335	3130	.441	10.154	21.820	4.070	.3	-.6	126.000
1094	1103		1- 251	3132	.442	10.160	21.830	4.070	.4	-.5	127.000
1095	110B		1- 994	3132	.442	10.160	21.830	4.070	.4	-.5	126.000
1096	110B		1-1773	3132	.437	10.164	21.920	4.070	-.7	-.5	127.000
1097	110B		1- 24	3132	.431	10.156	22.000	3.980	-2.2	-.5	126.500
1098	110B		1-2720	3132	.431	10.156	22.000	3.980	-2.2	-.5	126.500
1099	110B		1-2021	3132	.431	10.156	22.000	3.980	-2.2	-.5	127.000
1100	110B		1-1737	3132	.431	10.156	22.000	3.980	-2.2	-.5	126.500
1101	110B		1- 581	3132	.431	10.156	22.000	3.980	-2.2	-.5	127.000
1102	110B		1-2760	3132	.431	10.156	22.000	3.980	-2.2	-.5	126.500
1103	110B		1-1890	3132	.431	10.156	22.000	3.980	-2.2	-.5	127.500
1104	110B		1-1273	3132	.431	10.156	22.000	3.980	-2.2	-.5	127.000
1105	110B		1- 91	3132	.431	10.156	22.000	3.980	-2.2	-.5	126.500
1106	110B		1- 324	3132	.431	9.926	22.240	3.960	-2.0	-2.8	127.000
1107	110B		1- 834	3132	.431	9.926	22.240	3.960	-2.0	-2.8	127.000
1108	110B		1- 536	3132	.431	9.926	22.240	3.960	-2.0	-2.8	127.500
1109	110B		1- 443	3132	.431	9.926	22.240	3.960	-2.0	-2.8	127.000
1110	110B		1-1817	3132	.431	9.926	22.240	3.960	-2.0	-2.8	127.500

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	SILICON	URANIUM	THORIUM	
1111	108B	9	1-4983	3132	.610	9.694	21.640	4.570	-6.8	-2.9	126.500
1112	108B	9	1-5891	3132	.610	9.694	21.640	4.570	-6.8	-2.9	126.500
1113	108B	9	1-6004	3132	.610	9.694	21.640	4.570	-6.8	-2.9	127.000
1114	108B	9	1-4572	3132	.610	9.694	21.640	4.570	-6.8	-2.9	127.500
1115	108B	9	1-2316	3132	.610	9.694	21.640	4.570	-6.8	-2.9	128.000
1116	108B	9	1-2472	3132	.610	9.694	21.640	4.570	-6.8	-2.9	127.500
1117	108B	9	1-1363	3132	.610	9.694	21.640	4.570	-6.8	-2.9	126.000
1118	108B	9	1-2387	3132	.610	9.694	21.640	4.570	-6.8	-2.9	126.500
1119	121A	5	2- 673	1782	.352	6.930	12.190	2.540	1.1	.0	110.000
1120	121A	5	2-2815	1782	.357	6.935	11.970	2.460	2.5	.1	109.000
1121	121A	5	2-2263	1782	.357	6.935	11.970	2.460	2.5	.1	110.000
1122	109A	5	1- 192	3132	.627	12.185	21.050	4.320	2.5	.1	128.000
1123	109A	5	1-1204	3132	.627	12.185	21.050	4.320	2.5	.1	128.000
1124	109A	5	1-2206	3132	.627	12.185	21.050	4.320	2.5	.1	128.500
1125	109A	5	1-1410	3132	.627	12.185	21.050	4.320	2.5	.1	128.000
1126	109A	5	1-2521	3132	.627	12.185	21.050	4.320	2.5	.1	129.500
1127	109A	5	1-1053	3132	.627	12.185	21.050	4.320	2.5	.1	126.500
1128	109A	5	1- 367	3132	.627	12.185	21.050	4.320	2.5	.1	128.000
1129	124B		2-1726	1782	.314	6.164	12.310	2.420	-.1	-1.8	108.500
1130	132A	4	4- 841	3132	.751	11.173	20.570	4.810	.0	-.2	127.500
1131	108D	9	1- 620	3132	.618	9.953	22.930	4.010	-5.7	-.3	127.000
1132	108D	9	1-2242	3132	.618	9.953	22.930	4.010	-5.7	-.3	126.000
1133	108D	9	1- 391	3132	.618	9.953	22.930	4.010	-5.7	-.3	125.000
1134	108D	9	1-2027	3132	.618	9.953	22.930	4.010	-5.7	-.3	127.000
1135	108D	9	1- 639	3132	.618	9.953	22.930	4.010	-5.7	-.3	127.000
1136	108D	9	1-2390	3132	.618	9.953	22.930	4.010	-5.7	-.3	127.500
1137	108D	9	1- 568	3132	.618	9.953	22.930	4.010	-5.7	-.3	126.500
1138	108D	9	1-1659	3132	.618	9.953	22.930	4.010	-5.7	-.3	126.500
1139	108D	9	1-1194	3132	.618	9.953	22.930	4.010	-5.7	-.3	127.500
1140	108D	9	1-2536	3132	.618	9.953	22.930	4.010	-5.7	-.3	126.500
1141	108D	9	1-2921	3132	.618	9.953	22.930	4.010	-5.7	-.3	126.500
1142	101H		1-1349	3132	.465	13.062	20.680	4.350	-1.0	.9	128.000
1143	101H		1-1147	3132	.465	13.062	20.680	4.350	-1.0	.9	127.500
1144	101H		1-2674	3132	.465	13.062	20.680	4.350	-1.0	.9	128.000
1145	101H		1-2368	3132	.465	13.062	20.680	4.350	-1.0	.9	128.500
1146	101H		1-2485	3132	.465	13.062	20.680	4.350	-1.0	.9	128.500
1147	101H		1- 478	3132	.465	13.062	20.680	4.350	-1.0	.9	129.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					URANIUM	THORIUM	CARBON	SILICON	URANIUM	THORIUM	
1148	101H		1-1589	3132	.465	13.062	20.680	4.350	-1.0	.9	130.000
1149	101H		1-1822	3132	.465	13.062	20.680	4.350	-1.0	.9	128.000
1150	101H		1-1676	3132	.465	13.062	20.680	4.350	-1.0	.9	128.000
1151	101H		1-1624	3132	.465	13.062	20.680	4.350	-1.0	.9	128.500
1152	101H		1-1585	3132	.465	13.062	20.680	4.350	-1.0	.9	128.900
1153	101H		1-2935	3132	.465	13.062	20.680	4.350	-1.0	.9	128.000
1154	101H		1- 52	3132	.465	13.062	20.680	4.350	-1.0	.9	128.500
1155	101H		1-1069	3132	.465	13.062	20.680	4.350	-1.0	.9	128.000
1156	101H		1-1440	3132	.465	13.062	20.680	4.350	-1.0	.9	128.900
1157	101H		1- 323	3132	.465	13.062	20.680	4.350	-1.0	.9	129.000
1158	101H		1- 494	3132	.465	13.062	20.680	4.350	-1.0	.9	129.000
1159	101H		1- 794	3132	.465	13.062	20.680	4.350	-1.0	.9	127.500
1160	101H		1- 94	3132	.465	13.062	20.680	4.350	-1.0	.9	127.900
1161	101A		1-2423	3132	.465	13.062	20.680	4.350	-1.0	.9	128.000
1162	101A		1-2936	3132	.465	13.062	20.680	4.350	-1.0	.9	128.500
1163	101H		1- 681	3132	.477	12.774	20.960	4.200	1.4	-1.3	126.500
1164	1280	9	3-1922	1302	.279	4.107	8.980	1.590	2.4	-1.1	109.500
1165	1708		1-2511	3130	.683	10.771	21.390	4.050	3.0	.1	127.000
1166	1030	4	1- 144	3132	.694	10.809	21.390	4.070	3.1	.5	127.500
1167	1150	4	2-2413	1782	.389	6.150	12.170	2.320	3.2	.5	108.000
1168	1208	7	2-2644	1782	.376	5.567	12.430	2.350	.9	-2.0	107.500
1169	1208	7	2-2197	1782	.377	5.520	12.490	2.360	1.2	-2.8	108.000
1170	1208	8	2-2892	1782	.379	5.563	12.380	2.420	1.7	-2.1	107.000
1171	1208	8	2- 437	1782	.374	5.497	12.580	2.260	.4	-3.2	107.500
1172	1080	9	1-2668	3132	.610	10.007	21.740	3.990	-6.8	.2	128.500
1173	1080	9	1- 707	3132	.610	10.007	21.740	3.980	-6.8	.2	126.000
1174	1080	9	1-2212	3132	.610	10.007	21.740	3.980	-6.8	.2	126.000
1175	1080	9	1 2495	3132	.610	10.007	21.740	3.980	-6.8	.2	126.500
1176	1080	9	1-1757	3132	.617	9.960	22.770	4.000	-5.8	-.3	127.000
1177	1298		3-1719	1302	.180	4.200	8.830	1.590	-1.5	-1.1	110.500
1178	1298		3-1766	1302	.180	4.200	8.830	1.590	-1.5	-1.1	110.000
1179	1298		3- 787	1302	.180	4.200	8.830	1.590	-1.5	-1.1	109.500
1180	1228		2-1606	1782	.247	5.749	12.080	2.170	-1.3	-1.1	108.500
1181	1228		2- 265	1782	.247	5.749	12.080	2.170	-1.3	-1.1	108.500
1182	1228		2-1489	1782	.247	5.749	12.080	2.170	-1.3	-1.1	108.500
1183	1228		2-1950	1782	.247	5.749	12.080	2.170	-1.3	-1.1	106.000
1184	1228		2-1044	1782	.247	5.749	12.080	2.170	-1.3	-1.1	106.500

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	TOTAL SERIAL NUMBER OF RODS		NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	----- SILICON	URANIUM	THORIUM	
1185	122B		2- 577	1782	.247	5.749	12.080	2.170	-1.3	-1.1	108.500
1186	110B		1-1621	3132	.434	10.104	21.230	3.820	-1.4	-1.1	126.000
1187	110B		1-2396	3132	.434	10.104	21.230	3.820	-1.4	-1.1	125.500
1188	110B		1-2944	3132	.438	10.102	21.780	4.000	-.5	-1.1	125.500
1189	110B		1-2106	3132	.434	10.104	21.230	3.820	-1.4	-1.1	126.500
1190	102A		1-1421	3132	.363	11.546	21.140	4.260	.6	-.9	127.000
1191	102A		1- 242	3132	.363	11.546	21.140	4.260	.6	-.9	127.500
1192	102A		1-1832	3132	.363	11.546	21.140	4.260	.6	-.9	126.000
1193	102A		1-2035	3132	.363	11.546	21.140	4.260	.6	-.9	128.000
1194	102A		1-1861	3132	.363	11.546	21.140	4.260	.6	-.9	127.500
1195	102A		1-1011	3132	.363	11.546	21.140	4.260	.6	-.9	126.500
1196	102A		1-1223	3132	.363	11.546	21.140	4.260	.6	-.9	126.500
1197	102A		1 2798	3132	.363	11.546	21.140	4.260	.6	-.9	127.500
1198	102A		1-2407	3132	.363	11.546	21.140	4.260	.6	-.9	127.000
1199	102A		1-1278	3132	.363	11.546	21.140	4.260	.6	-.9	127.000
1200	102A		1-1742	3132	.363	11.546	21.140	4.260	.6	-.9	127.500
1201	102A		1-1161	3132	.363	11.546	21.140	4.260	.6	-.9	126.000
1202	102A		1- 238	3132	.363	11.546	21.140	4.260	.6	-.9	127.500
1203	102A		1-5198	3132	.363	11.546	21.140	4.260	.6	-.9	127.500
1204	110B		1-1337	3132	.441	10.152	21.750	4.040	.1	-.6	126.500
1205	116B	8	2-2452	1782	.288	5.203	12.090	2.700	2.8	-1.4	107.000
1206	113H		2- 688	1782	.273	7.165	12.460	2.490	1.9	-2.7	108.500
1207	113H		2-2880	1782	.273	7.165	12.460	2.490	1.9	-2.7	107.500
1208	113H		2-2683	1782	.273	7.165	12.460	2.490	1.9	-2.7	109.500
1209	113H		2-2102	1782	.273	7.165	12.460	2.490	1.9	-2.7	109.500
1210	113H		2- 211	1782	.273	7.165	12.460	2.490	1.9	-2.7	109.500
1211	113H		2- 95	1782	.273	7.165	12.460	2.490	1.9	-2.7	109.500
1212	113H		2-2548	1782	.273	7.165	12.460	2.490	1.9	-2.7	109.000
1213	113H		2-2260	1782	.273	7.165	12.460	2.490	1.9	-2.7	110.500
1214	113H		2- 286	1782	.273	7.165	12.460	2.490	1.9	-2.7	109.000
1215	101H		1-1271	3132	.471	12.825	21.430	4.390	.2	-.9	128.000
1216	141B	7	5 1563	3132	.515	12.188	21.060	4.250	.5	-.4	129.000
1217	147B	7	5 1739	3132	.525	11.702	21.280	4.130	-.4	-.7	127.000
1218	147B	7	5 2933	3132	.525	11.702	21.280	4.130	-.4	-.7	126.500
1219	153B	7	5 2031	3132	.501	12.704	20.840	4.280	.9	-.0	128.500
1220	159B	7	5- 127	3132	.518	12.293	20.840	4.280	1.1	.4	127.500
1221	159B	7	5-1460	3132	.518	12.293	20.840	4.280	1.1	.4	127.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	----- SILICON	URANIUM	THORIUM	
1222	165B	7	5 2530	3132	.506	12.815	20.620	4.340	1.6	.9	128.000
1223	138A	4	5-1244	3132	.713	12.629	20.420	4.660	-1.1	2.6	126.500
1224	144A	4	5-1168	3132	.760	12.106	20.610	4.660	-1.7	2.0	127.000
1225	144A	4	5-2136	3132	.760	12.106	20.610	4.660	-1.7	2.0	128.500
1226	150A	4	5- 274	3132	.666	13.162	20.220	4.650	-.2	3.1	129.500
1227	150A	4	5-2103	3132	.666	13.162	20.220	4.650	-.2	3.1	129.000
1228	156A	4	5- 376	3132	.713	12.629	20.420	4.660	-1.1	2.6	128.000
1229	156A	4	5- 818	3132	.713	12.629	20.420	4.660	-1.1	2.6	129.000
1230	158A	5	5-1058	3132	.637	13.613	20.300	4.580	-.6	1.9	128.500
1231	158A	5	5-2430	3132	.637	13.613	20.300	4.580	-.6	1.9	128.500
1232	162A	4	5-1748	3132	.666	12.864	20.570	4.410	-.3	.8	129.000
1233	164A	5	5- 27	3132	.612	13.530	20.660	4.290	1.5	-.6	128.000
1234	137A	7	5- 654	3132	.382	12.971	20.290	4.410	-.6	2.4	129.000
1235	143A	7	5-1307	3132	.368	12.672	20.190	4.460	-1.7	3.2	128.000
1236	143A	7	5- 373	3132	.368	12.672	20.190	4.460	-1.7	3.2	127.500
1237	154A	5	5 1225	3132	.457	13.355	21.420	3.990	-.1	-1.3	128.000
1238	160A	4	5- 782	3132	.456	13.922	20.990	4.160	.6	.5	128.000
1239	154H	6	5-2436	3132	.451	13.853	20.040	4.470	-1.3	2.4	128.500
1240	102A		1-1977	3132	.360	12.108	20.860	4.070	-.2	3.9	127.500
1241	102A		1 4834	3132	.360	12.108	20.860	4.070	-.2	3.9	126.000
1242	102A		1-2952	3132	.360	12.108	20.860	4.070	-.2	3.9	127.500
1243	102A		1- 529	3132	.360	12.108	20.860	4.070	-.2	3.9	127.500
1244	102A		1-2086	3132	.360	12.108	20.860	4.070	-.2	3.9	127.500
1245	102A		1-4361	3132	.360	12.108	20.860	4.070	-.2	3.9	125.500
1246	102A		1-2773	3132	.360	12.108	20.860	4.070	-.2	3.9	126.000
1247	102A		1-2873	3132	.360	12.108	20.860	4.070	-.2	3.9	127.000
1248	102A		1- 239	3132	.360	12.108	20.860	4.070	-.2	3.9	128.000
1249	102A		1-2087	3132	.360	12.108	20.860	4.070	-.2	3.9	128.000
1250	102A		1- 143	3132	.356	11.840	19.070	4.080	-1.4	1.6	127.000
1251	101H		1- 537	3132	.478	12.800	21.300	4.190	1.8	-1.1	129.000
1252	138B	6	5- 722	3132	.700	12.278	21.320	3.870	-2.9	-.3	128.000
1253	139B	8	5-1039	3132	.570	11.119	21.750	3.910	-2.0	-3.6	126.500
1254	139B	9	5-2137	3132	.570	11.119	21.750	3.910	-2.0	-3.6	127.500
1255	141B	8	5-2556	3132	.497	11.886	21.660	3.870	-2.9	-2.9	128.000
1256	141B	9	5-2688	3132	.497	11.886	21.660	3.870	-2.9	-2.9	128.000
1257	144B	6	5- 999	3132	.757	11.965	21.100	3.800	-2.0	.8	126.000
1258	144B	6	5 2876	3132	.757	11.965	21.100	3.800	-2.0	.8	126.500

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	----- THORIUM	----- CARBON	----- SILICON	URANIUM	THORIUM	
1259	1458	8	5-1431	3132	.601	10.602	21.750	3.970	-1.4	-3.2	126.500
1260	1458	8	5- 397	3132	.601	10.602	21.750	3.970	-1.4	-3.2	126.500
1261	1458	9	5 4312	3132	.601	10.602	21.750	3.970	-1.4	-3.2	125.500
1262	1458	9	5-1599	3132	.601	10.602	21.750	3.970	-1.4	-3.2	127.500
1263	1468	6	5 2104	3132	.660	13.014	21.180	4.000	-2.8	-.7	128.000
1264	1468	6	5 4278	3132	.660	13.014	21.180	4.000	-2.8	-.7	127.000
1265	1478	8	5 2159	3132	.515	11.507	21.650	3.920	-2.3	-2.4	127.000
1266	1478	8	5-1095	3132	.515	11.507	21.650	3.920	-2.3	-2.4	126.500
1267	1478	9	5-1148	3132	.515	11.507	21.650	3.920	-2.3	-2.4	128.000
1268	1478	9	5-1249	3132	.515	11.507	21.650	3.920	-2.3	-2.4	127.000
1269	1508	6	5-1064	3132	.647	12.586	21.290	3.730	-3.1	-1.4	128.500
1270	1508	6	5-2117	3132	.647	12.586	21.290	3.730	-3.1	-1.4	128.500
1271	1518	8	5-1020	3132	.539	11.644	21.740	3.850	-2.7	-4.0	127.000
1272	1518	8	5-1868	3132	.539	11.644	21.740	3.850	-2.7	-4.0	127.000
1273	1518	9	5- 710	3132	.539	11.644	21.740	3.850	-2.7	-4.0	127.500
1274	1518	9	5-1246	3132	.539	11.644	21.740	3.850	-2.7	-4.0	127.000
1275	1528	6	5- 427	3132	.579	13.310	21.340	3.860	-3.8	-2.3	129.000
1276	1538	8	5-1865	3132	.479	12.270	21.670	3.810	-3.6	-3.4	127.000
1277	1538	8	5-2349	3132	.479	12.270	21.670	3.810	-3.6	-3.4	128.500
1278	1538	9	5-1974	3132	.479	12.270	21.670	3.810	-3.6	-3.4	128.000
1279	1538	9	5-2001	3132	.479	12.270	21.670	3.810	-3.6	-3.4	128.000
1280	1568	6	5- 514	3132	.693	12.273	21.310	3.970	-3.8	-.3	128.500
1281	1568	6	5-1598	3132	.692	12.265	21.160	3.900	-4.1	-.4	129.000
1282	1578	8	5-2626	3132	.574	11.182	22.260	3.930	-1.4	-3.1	127.500
1283	1578	8	5-2764	3132	.574	11.182	22.260	3.930	-1.4	-3.1	126.000
1284	1578	9	5- 893	3132	.574	11.182	22.260	3.930	-1.4	-3.1	127.500
1285	1578	9	5-2176	3132	.574	11.182	22.260	3.930	-1.4	-3.1	127.000
1286	1598	8	5- 831	3132	.500	11.792	21.600	3.930	-2.4	-3.7	128.500
1287	1598	8	5-2235	3132	.500	11.792	21.600	3.930	-2.4	-3.7	128.000
1288	1538	7	5- 36	3132	.503	12.761	21.140	4.220	1.2	.4	127.500
1289	109A		1-2228	3132	.618	11.619	21.440	4.160	1.0	-4.6	128.000
1290	109A		1- 65	3132	.621	11.964	21.170	3.910	1.5	-1.7	126.500
1291	109A		1-1771	3132	.621	11.964	21.170	3.910	1.5	-1.7	127.000
1292	109A		1-2142	3132	.621	11.964	21.170	3.910	1.5	-1.7	128.000
1293	148H	6	5- 430	3132	.434	13.832	20.150	4.350	-4.1	.5	129.000
1294	148H	6	5-2417	3132	.434	13.832	20.150	4.350	-4.1	.5	129.000
1295	154H	6	5- 541	3132	.449	13.734	20.260	4.330	-1.8	1.5	128.500

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	----- THORIUM	----- CARBON	----- SILICON	URANIUM	THORIUM	
1296	160H	6	5-2039	3132	.444	13.854	20.390	4.260	-1.9	.7	128.000
1297	131H		4-2464	3132	.479	12.623	21.820	4.390	1.9	-2.5	127.500
1298	131H		4- 101	3132	.457	13.311	19.980	4.450	-2.8	2.9	127.500
1299	131H		4-1055	3132	.457	13.311	19.980	4.450	-2.8	2.9	127.500
1300	131H		4-1050	3132	.457	13.311	19.980	4.450	-2.8	2.9	127.500
1301	117D		2- 78	1782	.419	6.444	12.150	2.350	-2.0	1.1	108.000
1302	117D		2-1175	1782	.419	6.444	12.150	2.350	-2.0	1.1	107.500
1303	117D		2-2372	1782	.419	6.444	12.150	2.350	-2.0	1.1	108.000
1304	117D		2-2348	1782	.419	6.444	12.150	2.350	-2.0	1.1	108.000
1305	117D		2-2264	1792	.419	6.444	12.150	2.350	-2.0	1.1	110.000
1306	117D		2-1866	1782	.419	6.444	12.150	2.350	-2.0	1.1	108.500
1307	117D		2-1350	1782	.419	6.444	12.150	2.350	-2.0	1.1	106.500
1308	117D		2-2883	1782	.419	6.444	12.150	2.350	-2.0	1.1	109.500
1309	172D		1-2677	3130	.735	11.321	21.340	4.130	-2.2	1.1	127.500
1310	172D		1- 617	3130	.735	11.321	21.340	4.130	-2.2	1.1	127.500
103 1311	177D		2-2704	1780	.418	6.436	12.130	2.350	-2.1	1.0	108.500
1312	132D		4- 855	3132	.738	11.141	21.220	4.260	-1.7	-.5	127.500
1313	132D		4-2740	3132	.747	11.382	21.170	4.110	-.5	1.6	127.500
1314	107A	4	1-2526	3132	.837	11.246	20.930	4.660	-2.7	1.0	128.000
1315	107A	4	1- 880	3132	.837	11.246	20.930	4.660	-2.7	1.0	127.000
1316	107A	4	1- 628	3132	.837	11.246	20.930	4.660	-2.7	1.0	126.500
1317	107A	4	1-1048	3132	.837	11.246	20.930	4.660	-2.7	1.0	126.500
1318	107A	4	1-1261	3132	.837	11.246	20.930	4.660	-2.7	1.0	127.000
1319	119A	4	2-2164	1782	.476	6.399	11.910	2.650	-2.7	1.0	108.000
1320	119A	4	2- 496	1782	.476	6.399	11.910	2.650	-2.7	1.0	109.000
1321	133A	4	4-2435	3132	.837	11.246	20.930	4.660	-2.7	1.0	127.000
1322	133A	4	4- 929	3132	.837	11.246	20.930	4.660	-2.7	1.0	127.000
1323	119B		2- 11	1782	.506	6.556	12.380	2.120	3.5	3.4	108.500
1324	119B		2- 780	1782	.506	6.556	12.380	2.120	3.5	3.4	109.000
1325	119B		2-1811	1782	.506	6.556	12.380	2.120	3.5	3.4	108.500
1326	119B		2-1539	1782	.506	6.556	12.380	2.120	3.5	3.4	108.500
1327	119B		2-1477	1782	.506	6.556	12.380	2.120	3.5	3.4	108.500
1328	119B		2-1319	1782	.506	6.556	12.380	2.120	3.5	3.4	109.000
1329	124B		2- 642	1782	.311	6.116	12.260	2.330	-.8	-2.6	108.000
1330	124B		2-2836	1792	.311	6.116	12.260	2.330	-.8	-2.6	109.500
1331	130B		3-2850	1302	.228	4.468	8.960	1.710	-.6	-2.6	110.500
1332	130B		3- 893	1302	.228	4.468	3.960	1.710	-.6	-2.6	110.500

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	TOTAL		NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
			SERIAL NUMBER	NUMBER OF RODS	URANIUM	THORIUM	CARBON	SILICON	URANIUM	THORIUM	
1333	102H		1- 326	3132	.361	11.857	20.690	4.500	-.1	1.8	127.500
1334	102H		1-1677	3132	.351	12.008	20.770	4.320	-2.7	3.1	127.000
1335	102H		1-1903	3132	.351	12.008	20.770	4.320	-2.7	3.1	127.000
1336	111A	5	1-2400	3132	.724	12.695	20.770	4.550	-2.4	.1	128.000
1337	111A	5	1-1117	3132	.724	12.695	20.770	4.550	-2.4	.1	128.000
1338	111A	5	1-2455	3132	.724	12.695	20.770	4.550	-2.4	.1	128.000
1339	123A	5	2-2891	1782	.412	7.224	11.910	2.590	-2.4	.1	109.000
1340	114A		2 1570	1782	.202	6.587	11.960	2.500	-1.7	-.6	109.500
1341	114A		2 2169	1782	.202	6.587	11.960	2.500	-1.7	-.6	109.000
1342	114A		2- 400	1782	.202	6.587	11.960	2.500	-1.7	-.6	108.000
1343	114A		2- 655	1782	.202	6.587	11.960	2.500	-1.7	-.6	109.000
1344	114A		2-2138	1782	.202	6.587	11.960	2.500	-1.7	-.6	107.000
1345	114A		2-2501	1782	.202	6.587	11.960	2.500	-1.7	-.6	109.000
1346	114A		2-2893	1782	.202	6.587	11.960	2.500	-1.7	-.6	109.000
1347	114A		2-1133	1782	.202	6.587	11.960	2.500	-1.7	-.6	109.500
1348	114A		2-1324	1782	.202	6.587	11.960	2.500	-1.7	-.6	107.500
1349	114A		2-1532	1782	.202	6.587	11.960	2.500	-1.7	-.6	109.000
1350	114A		2-1529	1782	.201	6.621	11.960	2.490	-2.2	-.1	108.500
1351	112B		1- 921	3132	.546	10.793	21.580	4.070	-1.0	-2.2	127.000
1352	110B		1 2474	3132	.440	10.117	21.730	4.010	-.1	-.9	126.500
1353	110B		1-1796	3132	.434	9.979	21.390	3.820	-1.4	-2.3	125.500
1354	110B		1 1904	3132	.434	9.979	21.390	3.820	-1.4	-2.3	126.000
1355	110B		1 2940	3132	.434	9.979	21.390	3.820	-1.4	-2.3	126.000
1356	110B		1-1805	3132	.434	9.979	21.390	3.820	-1.4	-2.3	125.500
1357	110B		1- 292	3132	.434	9.979	21.390	3.820	-1.4	-2.3	126.000
1358	110B		1-1701	3132	.434	9.979	21.390	3.820	-1.4	-2.3	126.000
1359	110B		1- 614	3132	.434	9.979	21.390	3.820	-1.4	-2.3	126.000
1360	159B	9	5-1801	3132	.502	12.283	21.080	4.110	-2.0	.3	128.500
1361	159B	9	5- 190	3132	.502	12.283	21.080	4.110	-2.0	.3	129.000
1362	136A	6	5 1628	3132	.438	13.596	20.700	4.160	-4.2	.5	128.000
1363	137A	9	5- 928	3132	.357	12.802	20.440	4.190	-7.0	1.1	127.500
1364	137A	9	5- 375	3132	.357	12.802	20.440	4.190	-7.0	1.1	127.000
1365	142A	6	5 2692	3132	.443	13.437	20.760	4.150	-4.0	1.0	129.000
1366	142A	6	5 2037	3132	.443	13.437	20.760	4.150	-4.0	1.0	129.000
1367	143A	9	5-2151	3132	.364	12.601	20.930	3.800	-2.8	2.6	127.500
1368	143A	9	5 2670	3132	.364	12.601	20.930	3.800	-2.8	2.6	127.500
1369	143A	9	5-2360	3132	.364	12.601	20.930	3.800	-2.8	2.6	128.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	----- SILICON	URANIUM	THORIUM	
1370	143A	9	5-2020	3132	.364	12.601	20.930	3.800	-2.8	2.6	128.000
1371	148A	6	5 100	3132	.432	13.758	20.630	4.180	-4.6	-.0	128.000
1372	148A	6	5 1844	3132	.432	13.758	20.630	4.180	-4.6	-.0	127.500
1373	162B	6	5-2592	3132	.659	12.860	20.920	3.950	-1.3	.8	128.500
1374	163B	8	5-1568	3132	.550	12.035	21.680	4.090	-.9	-.7	128.000
1375	163B	9	5-1401	3132	.540	11.999	21.190	4.150	-2.8	-1.0	128.000
1376	164B	6	5-2908	3132	.587	13.654	20.870	4.090	-2.6	.3	127.500
1377	165B	8	5- 129	3132	.485	12.782	20.900	4.120	-2.6	.6	128.500
1378	165B	9	5-2416	3132	.485	12.782	20.900	4.120	-2.6	.6	128.500
1379	180B	6	5-2191	3130	.587	13.643	20.870	4.090	-2.5	.2	129.500
1380	128B	9	3- 809	1302	.267	4.123	8.990	1.890	-1.9	-.7	110.000
1381	107B		1- 270	3132	.853	11.382	21.110	3.850	-.8	2.2	128.000
1382	107B		1-4387	3132	.853	11.382	21.110	3.850	-.8	2.2	125.500
1383	133B		4-2591	3132	.853	11.382	21.110	3.850	-.8	2.2	127.500
1384	133B		4-2459	3132	.853	11.382	21.110	3.850	-.8	2.2	127.000
1385	154A	6	5-2841	3132	.447	13.270	21.450	4.000	-2.2	-1.9	128.500
1386	176A		2-2769	1780	.265	7.266	12.300	2.260	-1.2	-1.3	108.000
1387	113A		2 1131	1782	.262	7.473	11.730	2.590	-2.4	1.5	109.500
1388	113A		2 1299	1782	.262	7.473	11.730	2.590	-2.4	1.5	108.500
1389	113A		2 2693	1782	.262	7.473	11.730	2.590	-2.4	1.5	109.000
1390	113A		2 1835	1782	.262	7.473	11.730	2.590	-2.4	1.5	109.000
1391	102A		1 456	3132	.352	11.648	20.810	4.530	-2.5	-.0	127.500
1392	102A		1 1043	3132	.355	11.779	20.900	4.400	-1.7	1.1	125.300
1393	1320		4-2463	3132	.784	11.049	21.190	4.060	4.4	-1.3	127.000
1394	172B		1-2488	3130	.777	11.052	21.410	4.040	3.4	-1.3	127.500
1395	177B		2- 254	1780	.442	6.285	12.180	2.300	3.5	-1.3	108.000
1396	181B		1-1143	3132	.765	11.172	21.480	4.090	1.8	-.2	127.000
1397	132B		4- 914	3132	.765	11.172	21.480	4.090	1.8	-.2	127.000
1398	132B		4- 697	3132	.774	11.077	21.490	4.060	3.1	-1.1	127.500
1399	1060	9	1- 402	3132	.511	9.781	22.680	4.170	-9.2	-.9	126.500
1400	1060	9	1- 25	3132	.511	9.781	22.680	4.170	-9.2	-.9	125.500
1401	1010	6	1-2904	3132	.485	12.709	21.320	4.110	3.2	-1.8	128.000
1402	176B	4	2-1260	1780	.274	7.599	10.940	2.330	2.1	3.2	109.000
1403	101B	4	1- 708	3132	.481	13.371	19.070	4.100	2.4	3.3	128.500
1404	101B	4	1-2454	3132	.481	13.371	19.070	4.100	2.4	3.3	128.000
1405	101B	4	1-2915	3132	.481	13.371	19.070	4.100	2.4	3.3	129.000
1406	101B	4	1-2843	3132	.482	13.267	19.440	4.110	2.6	2.5	129.500

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	TOTAL		NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
			SERIAL NUMBER	NUMBER OF RODS	----- URANIUM	THORIUM	CARBON	----- SILICON	URANIUM	THORIUM	
1407	112B		1-1940	3132	.541	11.197	21.110	4.170	-2.0	1.5	126.500
1408	112B		1-1023	3132	.541	11.197	21.110	4.170	-2.0	1.5	126.500
1409	112B		1- 459	3132	.541	11.197	21.110	4.170	-2.0	1.5	128.000
1410	111B		1- 420	3132	.737	12.798	20.910	4.170	-.7	.9	128.500
1411	111B		1-2920	3132	.737	12.798	20.910	4.170	-.7	.9	126.500
1412	111B		1-1403	3132	.744	12.497	20.950	4.310	.3	-1.5	128.500
1413	107A	4	1- 635	3132	.853	11.382	21.110	3.850	-.8	2.2	127.000
1414	102D	9	1-2762	3132	.339	12.121	21.490	3.950	-6.2	4.0	127.500
1415	102D	9	1-2489	3132	.339	12.121	21.490	3.950	-6.2	4.0	128.000
1416	102D	9	1-2828	3132	.339	12.121	21.490	3.950	-6.2	4.0	127.500
1417	102D	9	1-1929	3132	.339	12.121	21.490	3.950	-6.2	4.0	128.000
1418	102D	9	1-2036	3132	.339	12.121	21.490	3.950	-6.2	4.0	128.500
1419	102D	9	1-2442	3132	.339	12.121	21.490	3.950	-6.2	4.0	128.000
1420	125D	9	3-1090	1302	.141	5.039	8.930	1.640	-6.2	4.0	110.000
1421	114A		2-1468	1782	.204	6.811	11.980	2.270	-1.1	2.7	109.000
1422	168H		1- 743	3130	.465	12.777	21.630	3.980	-1.0	-1.3	127.500
1423	168H		1-1253	3130	.465	12.777	21.630	3.980	-1.0	-1.3	128.000
1424	176H		2-2187	1780	.265	7.266	12.300	2.260	-1.2	-1.3	108.500
1425	169A		1 553	3130	.342	11.969	20.940	4.380	-5.1	2.7	128.000
1426	114A		2- 980	1782	.195	6.814	11.920	2.490	-5.4	2.8	108.500
1427	137A	8	5- 610	3132	.374	12.932	20.680	4.360	-2.6	2.1	127.000
1428	137A	8	5-2839	3132	.373	12.840	20.870	4.300	-2.9	1.4	127.500
1429	143A	8	5 2846	3132	.360	12.492	20.940	4.310	-4.0	1.7	127.500
1430	143A	8	5-1963	3132	.360	12.492	20.940	4.310	-4.0	1.7	127.000
1431	149A	9	5- 333	3132	.367	13.024	20.740	4.110	-6.5	-.2	128.500
1432	149A	9	5 2802	3132	.367	13.024	20.740	4.110	-6.5	-.2	129.000
1433	149A	9	5-2608	3132	.367	13.024	20.740	4.110	-6.5	-.2	128.500
1434	149A	9	5-2713	3132	.367	13.024	20.740	4.110	-6.5	-.2	128.500
1435	155A	9	5-2181	3132	.357	12.740	20.670	4.120	-6.9	.6	129.000
1436	155A	9	5- 365	3132	.357	12.740	20.670	4.120	-6.9	.6	127.000
1437	155A	9	5- 279	3132	.357	12.740	20.670	4.120	-6.9	.6	129.000
1438	155A	9	5-1954	3132	.357	12.740	20.670	4.120	-6.9	.6	127.500
1439	161A	9	5- 517	3132	.366	13.042	20.980	4.130	-6.7	-.0	127.500
1440	161A	9	5-2110	3132	.366	13.042	20.980	4.130	-6.7	-.0	128.500
1441	178A		2-2781	1780	.358	6.915	11.140	2.560	2.8	-.2	109.000
1442	121A		2-2424	1782	.358	6.923	11.160	2.570	2.9	-.1	108.000
1443	134A		4-2339	3132	.630	12.168	19.610	4.510	2.9	-.1	128.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL NUMBER OF RODS	NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
					----- URANIUM	THORIUM	CARBON	----- SILICON	URANIUM	THORIUM	
1444	134A		4- 981	3132	.630	12.168	19.610	4.510	2.9	-.1	127.900
1445	134A		4- 463	3132	.630	12.168	19.610	4.510	2.9	-.1	127.500
1446	110B		1 2795	3132	.437	10.047	21.320	3.860	-.7	-1.6	125.000
1447	110B		1 2519	3132	.449	10.307	21.050	4.010	1.9	.9	127.000
1448	110B		1- 530	3132	.449	10.307	21.050	4.010	1.9	.9	126.500
1449	110B		1 2640	3132	.449	10.307	21.050	4.010	1.9	.9	126.500
1450	110B		1 4430	3132	.449	10.307	21.050	4.010	1.9	.9	127.000
1451	110B		1-1049	3132	.449	10.307	21.050	4.010	1.9	.9	126.500
1452	110B		1- 715	3132	.449	10.307	21.050	4.010	1.9	.9	127.000
1453	110B		1- 88	3132	.449	10.307	21.050	4.010	1.9	.9	126.000
1454	131A		4- 930	3132	.463	13.112	21.380	3.930	-1.4	1.3	129.000
1455	131A		4-2646	3132	.460	13.124	21.360	3.950	-2.2	1.4	128.500
1456	143A	8	5-1987	3132	.365	12.702	20.170	4.440	-2.7	3.4	129.000
1457	143A	8	5- 773	3132	.365	12.677	20.180	4.440	-2.6	3.2	127.500
1458	161A	8	5-2353	3132	.386	13.355	20.210	4.450	-1.5	2.4	128.500
1459	161A	8	5- 401	3132	.393	13.230	20.410	4.310	-2.2	1.4	127.500
1460	125A		3 2852	1302	.144	5.065	8.320	1.890	-3.9	4.6	111.000
1461	125A		3 2422	1302	.144	5.065	8.320	1.890	-3.9	4.6	110.500
1462	125A		3-1412	1302	.144	5.065	8.320	1.890	-3.9	4.6	110.000
1463	125A		3-1711	1302	.144	5.065	8.320	1.890	-3.9	4.6	111.000
1464	125A		3-1171	1302	.144	5.065	8.320	1.890	-3.9	4.6	110.000
1465	125A		3- 574	1302	.144	5.065	8.320	1.890	-3.9	4.6	111.500
1466	125A		3-1965	1302	.144	4.798	8.720	1.840	-4.2	-1.0	110.500
1467	125A		3-1282	1302	.144	4.798	8.720	1.840	-4.2	-1.0	110.500
1468	102A		1 99	3132	.346	11.499	21.000	4.500	-4.2	-1.3	127.500
1469	123A	5	2-1792	1782	.415	7.176	11.880	2.570	-1.7	-.6	110.000
1470	110B		1- 587	3132	.449	10.267	21.270	4.440	2.1	.5	127.000
1471	110B		1- 725	3132	.449	10.251	21.360	4.600	2.2	.4	126.000
1472	110B		1- 428	3132	.449	10.251	21.360	4.600	2.2	.4	126.500
1473	110B		1-4715	3132	.449	10.251	21.360	4.600	2.2	.4	125.500
1474	109A		1- 137	3132	.601	12.011	20.930	3.860	-1.3	-1.4	127.500
1475	102A	9	1-1869	3132	.346	11.739	20.870	4.300	-4.0	.8	127.000
1476	101A		1 1780	3132	.463	12.734	20.600	4.540	-1.5	-1.6	128.000
1477	101A		1-1296	3132	.465	13.156	20.940	4.210	-1.1	1.7	128.000
1478	101H		1-1345	3132	.464	12.707	21.580	3.980	-1.4	-1.8	129.000
1479	101H		1-1264	3132	.464	12.844	21.200	4.130	-1.2	-.8	128.000
1480	101H		1- 769	3132	.460	12.597	21.480	3.980	-2.1	-2.7	129.000

SEQ. NUMBER	ELEMENT TYPE	LAYER DESIG	SERIAL NUMBER	TOTAL		NUCLIDE WEIGHTS (KG)				PERCENT DEVIATION		ASSEMBLED ELEMENT WEIGHT (KG)
				NUMBER	OF RODS	URANIUM	THORIUM	CARBON	SILICON	URANIUM	THORIUM	
1481	101H		1- 566	3132		.464	12.798	21.330	4.080	-1.3	-1.1	128.500
1482	110B		1-2563	3132		.449	10.251	21.360	4.600	2.2	.4	128.000

APPENDIX B

The following table summarizes the number of fuel elements fabricated for each of the fuel element assembly types to be used in the initial FSV reactor core. Both the initial number requested and the number fabricated is shown for each of the fuel service limits. Since it is allowable to use fuel elements with a higher service limit fuel rod in core locations requiring a lower service limit, in some cases more elements were fabricated with the higher limit fuel rods. That is, for a specific fuel assembly type, there may be more D elements and less B elements than specified, because the D service limit elements can be used in a B service limit location. In general this was not done but there are a few instances where it was.

APPENDIX B

TOTAL CORE ASSEMBLY FUEL ELEMENT SUMMARY

Fuel Element Assy	Service Limit H		Service Limit A		Service Limit AA		Service Limit B		Service Limit D		Total	
	Fab	Reqd	Fab	Reqd	Fab	Reqd	Fab	Reqd	Fab	Reqd	Fab	Reqd
← Fuel Elements →												
101	71	71	74	74	0	0	6	6	12	12	163	163
102	26	26	126	126	0	0	0	0	18	18	170	170
103					6	6	17	17	28	28	51	51
104							17	17	34	34	51	51
105					8	8	30	31	56	55	94	94
106							35	35	70	70	105	105
107					6	6	22	22	38	38	66	66
108							24	24	48	48	72	72
109			15	15	18	18	17	17			50	50
110							52	52			52	52
111			6	6	8	8	8	8			22	22
112							24	24			24	24
← Control Rod Fuel Elements →												
113	14	14	14	14					2	2	30	30
114	5	5	15	15					2	2	22	22
115					1	1	3	3	5	5	9	9
116							2	2	4	4	6	6
117					1	1	5	5	9	9	15	15
118							4	4	8	8	12	12
119					2	2	6	6	10	10	18	18
120							4	4	8	8	12	12
121			2	2	3	3	3	3			8	8
122							6	6			6	6
123			2	2	2	2	2	2			6	6
124							4	4			4	4
← Bottom Control Rod Fuel Elements →												
125			10	10					1	1	11	11
126							1	1	2	2	3	3
127							2	2	4	4	6	6
128							2	2	4	4	6	6
129							3	3			3	3
130							2	2			2	2
← Top Source Fuel Elements →												
131	5	5	2	2							7	7
132					3	3	3	3	3	3	9	9
133					2	2	2	2	2	2	6	6
134			3	3							3	3
135			2	2							2	2

APPENDIX B (Continued)

Fuel Element Assy	Service Limit H		Service Limit A		Service Limit AA		Service Limit B		Service Limit D		Total	
	Fab	Reqd	Fab	Reqd	Fab	Reqd	Fab	Reqd	Fab	Reqd	Fab	Reqd
	← Buffer Fuel Elements →											
136	3	3	3	3							6	6
137	1	1	5	5							6	6
138					1	1	3	3	5	5	9	9
139							3	3	6	6	9	9
140			0	1	2	1	1	1			3	3
141						3	3				3	3
142	6	6	6	6							12	12
143	2	2	10	10							12	12
144					2	2	6	6	10	10	18	18
145							6	6	12	12	18	18
146			0	2	4	2	2	2			6	6
147							6	6			6	6
148	6	6	6	6							12	12
149	2	2	10	10							12	12
150					2	2	6	6	9	9	17	17
151							6	6	12	12	18	18
152			0	2	4	2	1	1			5	5
153			0	2	4	2	6	6			6	6
154	6	6	6	6							12	12
155	2	2	10	10							12	12
156					2	2	6	6	10	10	18	18
157							6	6	12	12	18	18
158			0	2	4	2	2	2			6	6
159							6	6			6	6
160	3	3	3	3							6	6
161	1	1	5	5							6	6
162					1	1	3	3	5	5	9	9
163							3	3	6	6	9	9
164			0	1	2	1	1	1			3	3
165							3	3			3	3
166	5	4	3	7	5	2	8	8	10	9	31	30
167			2	2			2	2	2	2	6	6
	← Surveillance Fuel Elements →											
168	2	2	2	2							4	4
169			4	4							4	4
170							1	1	2	2	3	3
171							1	1	2	2	3	3
172							1	1	2	2	3	3
173							1	1	2	2	3	3
174							1	1			1	1
175							2	2			2	2
176	1	1	1	1			1	1			3	3
177					1	1	1	1	1	1	3	3
178			1	1							1	1
179									1	1	1	1
180							1	1			1	1
	← Source Fuel Element →											
181					1	1	1	1			2	2

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