INL/EXT-15-34225
Revision 0

As-Run Physics Analysis for the UCSB-1 Experiment in the Advanced Test Reactor

J. W. Nielsen

September 2015

The INL is a U.S. Department of Energy National Laboratory
operated by Battelle Energy Alliance

INL/EXT-15-34225
Revision 0

As-Run Physics Analysis for the UCSB-1 Experiment in the Advanced Test Reactor

J. W. Nielsen

September 2015

Idaho National Laboratory
Experiment Design and Analysis
Idaho Falls, Idaho 83415

http://www.inl.gov

Prepared for the
U.S. Department of Energy
Office of _____
Under DOE Idaho Operations Office
Contract DE-AC07-05ID14517

Experiment Design and Analysis

As-Run Physics Analysis for the UCSB-1 Experiment in the Advanced Test Reactor

INL/EXT-15-34225

September 2015

Approved by:

J. W. Nielsen Nuclear Engineer	Date
B. J. Gross Nuclear Engineer	Date
T. L. Maddock Experiment Manager	Date
D. J. Schoonen Experiment Design and Analysis Manager	Date

SUMMARY

The University of California Santa Barbara (UCSB) -1 experiment was irradiated in the A-10 position of the ATR. The experiment was irradiated during cycles 145A, 145B, 146A, and 146B. Capsule 6A was removed from the test train following Cycle 145A and replaced with Capsule 6B. This report documents the as-run physics analysis in support of Post-Irradiation Examination (PIE) of the test. This report documents the as-run fluence and displacements per atom (DPA) for each capsule of the experiment based on as-run operating history of the ATR. Average as-run heating rates for each capsule are also presented in this report to support the thermal analysis.

CONTENTS

FIGURES

TABLES

ACRONYMS

- ATR – Advanced Test Reactor
- MW – Megawatt
- UCSB – University of California Santa Barbara
- DPA – Displacements per atom
- NEFT – Northeast Flux Trap
- NWFT – Northwest Flux Trap
- SEFT – Southeast Flux Trap
- SWFT – Southwest Flux Trap

As-Run Physics Analysis for the UCSB-1 Experiment in the Advanced Test Reactor

1. Introduction

The purpose of this report is to document the as-run physics analysis for the University of California Santa Barbara (UCSB) -1 experiment in position A-10. The UCSB-1 experiment was irradiated during cycles 145A through 146B. Capsule 6A from the test train was removed following cycle 145A and replaced with Capsule 6B

The as-run heat rates, fluence results and DPA were calculated using the MCNP ATR full core model. The heating rates, fluence values were based on ATR operating conditions for the cycles of operation. The DPA was calculated using a 100 group cross-section library as provided in Attachment A.

2. Assumptions

The following assumptions are used in this analysis as stated below:

1. The MCNP models of ATR use three radial fuel regions to represent the ATR fuel elements (FEs)

2. ATR Cycle 145A cycle-averaged lobe powers are reported to be 18.0-17.9-23.2-23.8-25.7 MW (NW-NE-C-SW-SE) (Appendix B).

3. ATR Cycle 145B cycle-averaged lobe powers are reported to be 17.8-17.8-23.0-24.6-25.8 MW (NW-NE-C-SW-SE) (Appendix B).

4. ATR Cycle 146A cycle-averaged lobe powers are reported to be 18.0-18.0-24.3-25.8-26.0 MW (NW-NE-C-SW-SE) (Appendix B).

5. ATR Cycle 146B cycle-averaged lobe powers are reported to be 23.0-18.0-26.0-23.0-26.0 MW (NW-NE-C-SW-SE) (Appendix B).

6. The ATR Cycle 145A as-run cycle length was 54.7 effective full power days (EFPD) (Appendix B)

7. The ATR Cycle 145B as-run cycle length was 57.3 effective full power days (EFPD) (Appendix B)

8. The ATR Cycle 146A as-run cycle length was 50.5 effective full power days (EFPD) (Appendix B)

9. The ATR Cycle 146B as-run cycle length was 39.2 effective full power days (EFPD) (Appendix B)

10. The as-run hourly lobe power history for ATR may be used to scale the MCNP-calculated UCSB heat rate and flux results to represent specific operating conditions for specific times. To scale the UCSB results, the calculated results should be multiplied by the ratio of the desired SE lobe power to the analyzed center lobe power. The scaling equation is defined to be, $HGR_{desired} = HGR_{analyzed} \times SE_{desired} / SE_{analyzed}$ (e.g. to scale HGR values at 26 MW SE lobe power to HGR values at 25 MW SE lobe power, $HGR_{25\ MW} = HGR_{26\ MW} \times 25\ MW / 26\ MW$). This scaling method may also be used to adjust MCNP-calculated power dependent UCSB neutron fluxes.

3. Experiment Description

The objective of the UCSB experiment is to create a large library of irradiated alloys, covering a variety of specimen geometries, to address the following scientific questions [1].

1. The effect of low dose irradiations at many temperatures on the basic microstructures and constitutive properties in disc multi-purpose coupons in different material conditions.

2. The evolution of interface and bulk microstructure, microchemistry and micro-nano hardness in diffusion multiples and bonded and coated specimens.

3. The effects of irradiation at different temperatures on tensile and fracture behaviors of the materials to systematically explore the effects of radiation hardening at lower temperatures and microstructural and phase instabilities at higher temperatures.

4. The stability of the nanoscale Y-Ti-O features (NF) and nonstructured ferritic alloys (NFA) microstructures under high temperature irradiation.

As part of the UCSB experiment different classes of alloys and processing conditions are being investigated, along with nominal compositions of the alloys. The study is focusing on iron-based alloys being considered for next generation reactor applications as both cladding and structural materials and range from simple model alloys to complex commercially fabricated alloys. A listing of the experiment and compositions is presented in Table 1.

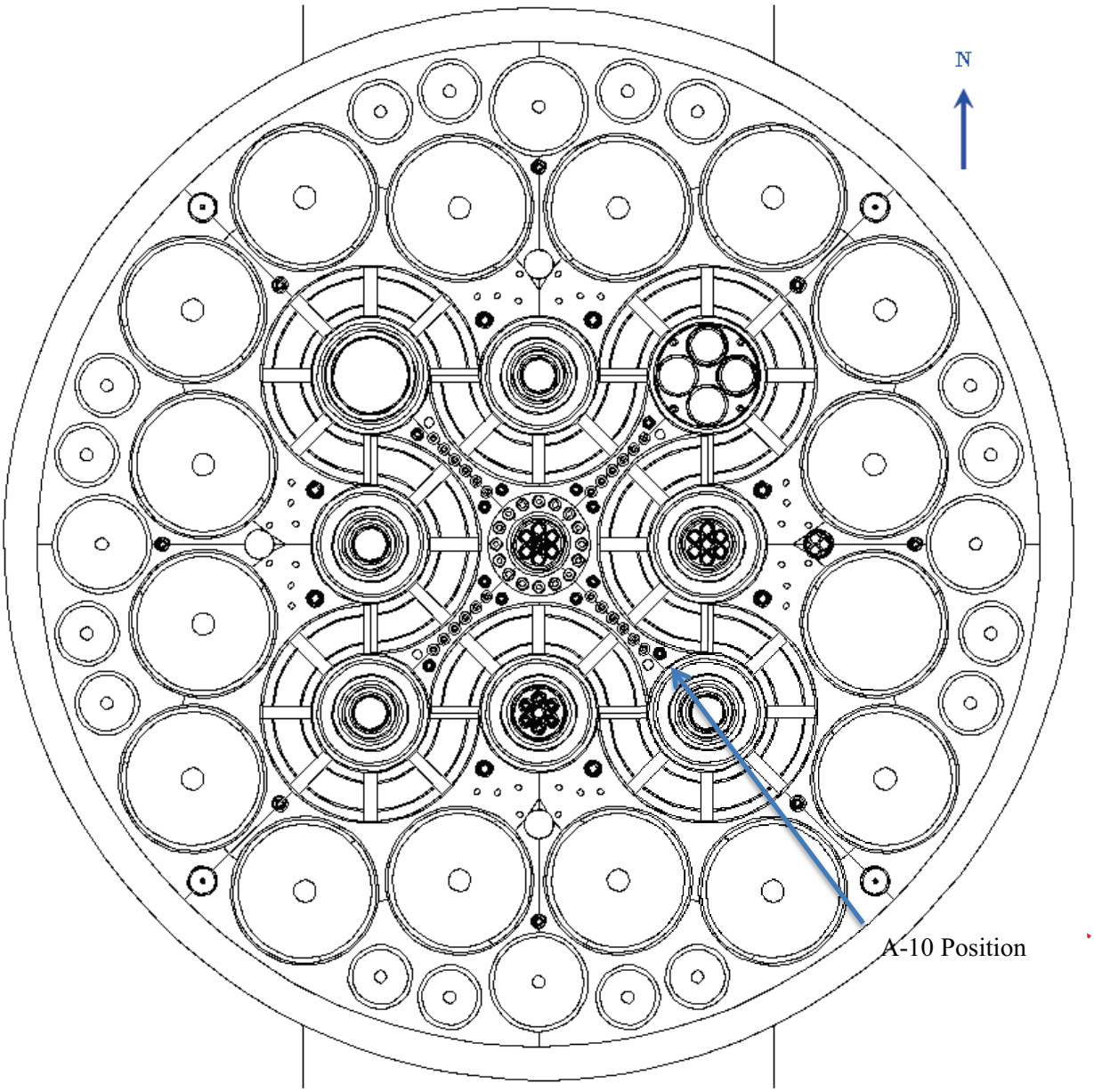

Figure 1. Radial cross section view of the ATR core, A-10 irradiation test position.

Table 1. Chemical composition of target materials [1].

Material ID	Cr	Ti	Mo	Y	O	C	Mn	Si	P	Ni	Al	S	Sn	Cu	W	N	Nb	V	B	Co	Fe
T91	9.24		.96				0.47	0.28		0.16								0.21			98.880
HT-9	12.2		1.10			0.21	0.32	0.29	0.002	0.57	0.010				0.51		0.010	0.30			96.678
NF616	8.82		0.47			0.109	0.45	0.10	0.012	0.17	0.005	0.003			1.87	0.047	0.064	0.19	0.0017		87.684
F82H IEA	7.82					0.090	0.10	0.07	0.003	0.02		0.001		0.01				0.19	0.001		91.695
F82H mod.3	8.16	0.005				0.097	0.13	0.10	0.005	0.01					1.98	0.007		0.20			89.306
Eurofer 97	8.93	0.01	0.001			0.200	0.49	0.04	0.005	0.02	0.009	0.004	0.005	0.0019	1.08		0.0017	0.20	0.001	0.006	97.929
MA957	13.57	0.98	0.30	0.26	0.22	0.02	0.07	0.03	0.004	0.10	0.090	0.006	0.00	0.01							84.357
MA956	20	0.40		0.5		0.1	0.3		0.020	0.5	4.75			0.15						0.3	72.980
PM2000	19.00	0.50		0.50							5.500										74.500
14CrYWT-UCSB1	14.00	0.50		0.25											3.00						82.250
14CrYWT-UCSB2	14.00	0.50		0.25											3.00						82.250
Cast SS	17.71		2.01			0.010	5.14	0.45	0.300	12.60		0.100		2.81	1.00	0.320					57.550
9Cr2WYT	9.01	0.23		0.36	0.08	0.140	0.09	0.06	0.005	0.03		0.020			1.96	0.009					88.006
15Cr2WYT	15.00	0.20		0.34	0.07	0.020	0.01	0.01	0.017	0.05		0.003			1.90	0.009					82.376
14CrYWT-H	14.50	0.23	0.03	0.23	0.16	0.048	0.52	0.05	0.008	0.02	0.002	0.002	0.01	0.005	1.04	0.012	0.001	0.21		0.184	82.736
14CrYWT-AR	14.29	0.23	0.03	0.22	0.15	0.069	0.66	0.04	0.008	0.03	0.003	0.002	0.01	0.007	1.06	0.027	0.001	0.22		0.164	82.776
14CrYWT ORNL 1	14.00	0.50		0.25											3.00						82.250
F82H-1.4Ni										1.40											98.600
Fe-3Cr	3.30			0.03		0.01										0.003					96.657
Fe-6Cr	6.00			0.03		0.01										0.003					93.957
Fe-9Cr	9.60			0.03		0.01										0.003					90.357
Fe-12Cr	11.60			0.03		0.01										0.003					88.357
Fe-15Cr	15.10			0.03		0.01										0.003					84.857
Fe-18Cr	18.30			0.03		0.01										0.003					81.657
SiC						36.460		63.54													0.000
MAR-1 / MAR-2	12.00		1.40			0.030		0.30		9.20	1.600										75.470
Diffusion Multiple	1.50	10.00													80.00						8.500
Diffusion Multiple	1.50									10.00					80.00						8.500
Diffusion Multiple										5.00				5.00	70.00						20.000

Material ID	Cr	Ti	Mo	Y	O	C	Mn	Si	P	Ni	Al	S	Sn	Cu	W	N	Nb	V	B	Co	Fe
Diffusion Multiple										98.00				1.00			1.00				0.000
Diffusion Multiple										96.00				2.00			2.00				0.000
Diffusion Multiple										94.00				3.00			3.00				0.000
Ni Foil (Pure Element)										100.00											0.000
Nb Foil (Pure Element)																	100.00				0.000
LA			0.540			0.140	1.370	0.220	0.005					0.400							97.325
LB			0.530			0.160	1.350	0.220	0.005	0.180				0.400							97.155
LC			0.550			0.140	1.440	0.230	0.005	0.860				0.410							96.365
LD			0.530			0.190	1.380	0.230	0.005	1.250				0.380							96.035
LG			0.550			0.160	1.370	0.220	0.005	0.740				0.010							96.945
LH			0.550			0.160	1.390	0.240	0.005	0.740				0.110							96.805
LI			0.550			0.160	1.370	0.240	0.005	0.740				0.200							96.735
OV1							1.600														98.400
OV2							1.600			0.800											97.600
OV3							1.600			1.600											96.800
OV4							1.600			0.800				0.050							97.550
OV5							1.600			1.600				0.050							96.750
OV6							1.600			0.800				0.100							97.500
OV7							1.600			1.600				0.100							96.700
CM6			0.540			0.150	1.550	0.170	0.007	1.680				0.020							95.883
JRQ	0.120		0.500			0.180	1.400	0.250	0.019	0.820		0.004		0.14				0.003			96.564
430SS	18.000					0.120	1.000	1.000													79.880

Most of the specimens used for the UCSB experiment are simple DMC samples (0.2 mm thick and ~10 mm in diameter) that will be used for microstructural studies (TEM, SANS, etc…) to study constitutive properties by advanced hardness techniques, shear punch tests (also making TEM discs), post irradiation annealing studies and disc bend (DB) fracture tests. Selected alloys are included in the form of sub-sized SS-J tensile specimens, disc tensile specimen (DTS), disc compact tension (DCT) fracture specimens, and deformation and fracture mini-beams (DFMB). The DM specimens, made of three to four joined elements (or different alloys), are used to study radiation modified inter-diffusion and phase formation processes, encompassing the entire phase diagram at the specified temperature. Some advanced sub-sized dual chevron notched cantilevered beam specimens and dual-notched disc (DCD) specimens are included. A summary of the samples used in the UCSB experiment can be found in Attachment B. The samples selected were inserted into the irradiation test assembly with target temperatures and displacements per atom (dpa) shown in Table 2.

Table 2. Target temperature and dose for each UCSB capsule [1].

Capsule ID	Target Temperature	Nominal Target Dose
UCSB-1	275 ºC	1.7 dpa
UCSB-2	550 - 750 ºC	2.4 to 4.2 dpa
UCSB-3	350 - 550 ºC	4.5 – 5.1 dpa
UCSB-4	650 - 750 ºC	5.5 – 5.8 dpa
UCSB-5	350 - 500 ºC	6.0 – 6.2 dpa
UCSB-6A*	275 ºC	1.7 dpa
UCSB-6B*	275 ºC	4.6 dpa
UCSB-7	275 ºC	6.0 – 6.2 dpa
UCSB-8	275 ºC	5.6 – 5.7 dpa
UCSB-9	275 ºC	4.2 – 5.2 dpa
UCSB-10	350 – 500 ºC	1.8 – 3.8 dpa

The stainless steel capsule assembly contain a vertical stack of sample packets with top and bottom caps for packet separation. The sample packets consist of samples rigidly fixed by aligning pins or cylindrical sample holders. The sample holders are machined from thermally conductive metal capable of withstanding the designed irradiation temperature. The endcaps are made of stainless steel with the sample packet on the bottom of the capsule sitting partially within the endcap.

A total of ten capsule assemblies were used in the UCSB experiment. Capsule 6A was removed after the first cycle and exchanged with a new capsule (6B) containing new specimens. A schematic of the capsule configuration is shown in Figure 2 and Table 3 gives the total length of each capsule. The test assembly that was used for the UCSB experiment was made of aluminum and designed to interface the capsule assemblies with the ATR A-10 position.

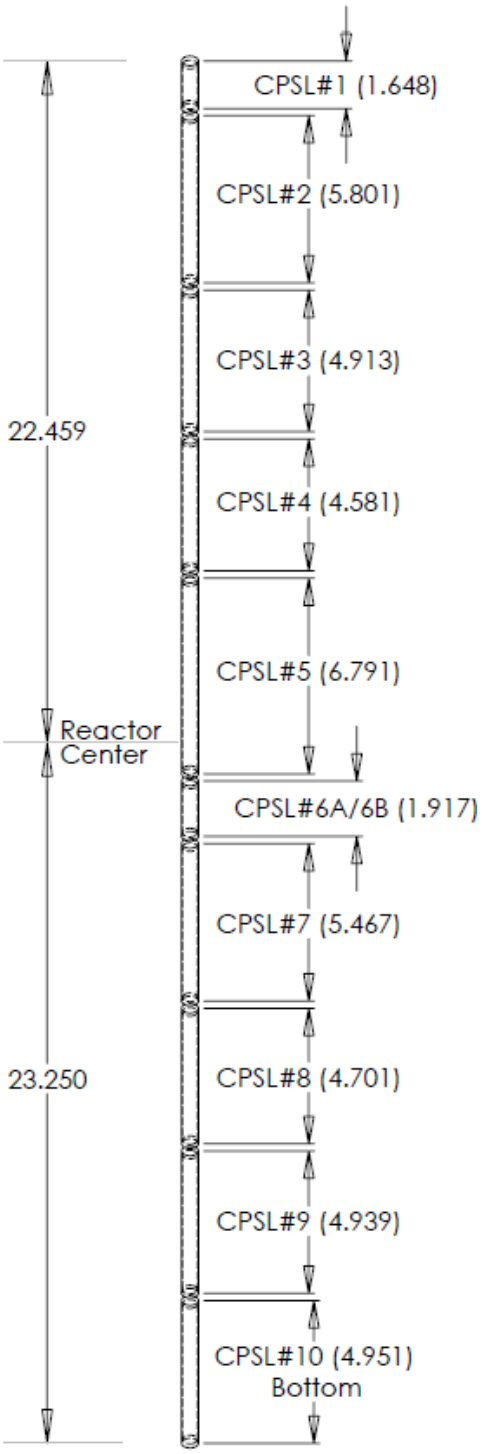

Figure 2. Capsule assembly schematic (lengths are in inches) [1].

Table 3. Capsule lengths for UCSB experiment [1].

Capsule	Length (in)
1	1.648
2	5.801
3	4.913
4	4.581
5	6.791
6A / 6B	1.917
7	5.467
8	4.701
9	4.939
10	4.951

4. Model Description and Data

MCNP [2][3], a general purpose Monte Carlo N-Particle transport code, was used to model and evaluate the UCSB experiment. A full core 3D model of the ATR was used for analyses.

The model for the UCSB experiment is based on the drawings listed in Table 4 and the Irradiation Test Plan for UCSB [1]. Nominal dimensions for the samples, sample holders, and capsules are used in the model. The experiment housing dimensions were obtained from existing INL drawings. Table 5 provides a summary of the dimensions used to model the UCSB experiment. The sample packet lengths were based on information provided in the irradiation test plan [1].

Table 4. List of drawings for UCSB experiment.

INL Drawing	Drawing Title
760173	ATR NSUF UNIVERSITY OF CALIFORNIA SANTA BARBARA A-HOLE OUTER CAPSULE ASSEMBLIES
760174	ATR NSUF UNIVERSITY OF CALIFORNIA SANTA BARBRA BASKET ASSEMBLIES

Table 5. Radial dimensions for modeling the UCSB experiment.

Design Parameter	**Radius (cm)**
Specimen Packet	0.500
Gas Fill	0.546
Capsule Outer Radius	0.610

4.1 Data Libraries

The standard MCNP cross-section data libraries [3] were used to calculate flux and heating rates for the UCSB experiment.

5. Analysis and Calculations

MCNP is used to calculate the heat generation rate and flux in the UCSB experiment. MCNP reports the flux tallies in units of $1/cm^2$ per source neutron. The following normalization factors are used to calculate a neutron flux and the heat generation rates from the MCNP tallies.

Neutron Flux Normalization Factor

Note, the MCNP f4 tally has units of $1/cm^2$ per source neutron.

$$\left(\frac{fission\ neutrons}{fission}\right)\left(\frac{fission}{MeV}\right)\left(\frac{MeV}{MW_{core\ power}-s}\right)=Flux\ Normalization$$

$$\left(\frac{2.43\ fission\ neutrons}{fission}\right)\left(\frac{fission}{200\ MeV}\right)\left(\frac{6.24146\times10^{18}\ MeV}{MW_{core\ power}-s}\right)=7.583\times10^{16}\frac{fission\ neutrons}{MW_{core\ power}-s}$$

Displacements per Atom

The DPA calculations were performed using the flux provided as described above multiplied by a 100 group cross-section for DPA (see Attachment B). The DPA is then calculated by the following formula:

$$\left(\phi\frac{neutrons}{cm^2-\sec}\right)\left(\sigma(keV-barns)\right)\left(\frac{1000eV}{keV}\right)\frac{1}{2*40eV}*\frac{1\times10^{-24}cm^2}{barn}=dpa/\sec$$

Neutron/Prompt Gamma Heating Normalization Factor (NHNF)

Note, MCNP f6 or f7 tally has units of MeV/g per source neutron.

$$\mathrm{NHNF}=\left(\frac{\text{fission neutrons}}{\text{fission}}\right)\left(\frac{\text{fission}}{\text{MeV}}\right)\left(\frac{\text{MeV}}{\mathrm{MW}_{\text{core power}}-\mathrm{s}}\right)\left(\frac{\mathrm{W}-\mathrm{s}}{\text{MeV}}\right)$$

$$=\left(\frac{7.583\times10^{16}\ fission\ neutrons}{MW_{core\ power}-s}\right)\left(\frac{1.60219\times10^{-13}W-s}{MeV}\right)$$

$$=\left(1.215\times10^{4}\ \frac{fission\ neutrons-W}{MW_{core\ power}-MeV}\right)$$

Delayed Fission Product Gamma Heating Normalization Factor

Note, the MCNP f6 tally has units of MeV/g per source photon.

$$\left(\frac{\mathrm{delayedfissionphotons}}{\text{fission}}\right)\left(\frac{\text{fission}}{\text{MeV}}\right)\left(\frac{\text{MeV}}{\mathrm{MW}_{\mathrm{corepower}}-\mathrm{s}}\right)\left(\frac{\mathrm{W}-\mathrm{s}}{\text{MeV}}\right)=\mathrm{HeatNormalizaiton}$$

$$\left(\frac{8.9603\ delayed\ fission\ photons}{fission}\right)\left(\frac{fission}{200\ MeV}\right)\left(\frac{6.24146\times10^{18}\ MeV}{MW_{core\ power}-s}\right)\left(\frac{1.60219\times10^{-13}W-s}{MeV}\right)=$$

$$4.48015\times10^{4}\frac{delyed\ fission\ photons-W}{MW_{core\ power}-MeV}$$

6. Software

The computer codes MCNP and ORIGEN2 are listed in the INL Enterprise Architecture (EA) Repository and are accepted as qualified scientific and engineering analysis software. Table 6 lists the version and EA ID for the computer codes used to perform the calculations and analyses documented by this ECAR.

Table 6. INL Qualified Analysis Software, Version, and EA ID.

Code Name	Version	EA ID
MCNP	5 (Release 1.40)	234166 [5]

MCNP has been verified and validated (V&V'd) for use at the INL as documented by the MCNP Version 5, Release 1.40 software management report [5]. The MCNP Version 5, Release 1.40 V&V process was performed and accepted on high performance computing (HPC) systems at the INL. The computer configurations listed in Table 7 were used to perform the MCNP5.

Table 7: Computer Configurations for INL Qualified MCNP5 installations.

Model of Computer	Processor	Operating System
fission is an Appro (Xtreme-X™ Supercomputer Series) distributed memory cluster	Two service nodes acting as login nodes each with: • Two 8 core 2.4 GHz AMD Opteron (6136) processors • 32 GB of shared memory (2 GB/core) 391 compute blades with: • Four 8 core 2.4 GHz AMD Opteron (6136) processors per blade (32 cores/node and 12512 cores total) • 64 GB of shared memory per node (2 GB/core) QDR InfiniBand interconnect network	RedHat Linux Enterprise Server 5.5

7. Analysis Results

The MCNP full core physics model was used to calculate as-run heat rates, flux and fluence for the UCSB experiment. The as-run flux was used to determine the DPA for the experiment based on the irradiation time. The calculated heat rates for cycle 145A is provided in Table 8 through Table 10. The heating rates for subsequent cycles can be scaled by their respective cycle powers from the analyzed cycle power in 145A of 25.70 MW. The lobe powers for 145B, 146A, and 146B are 25.8 MW, 26.0 MW and 26.0 MW, which results in a scaling factor of 1.004, 1.011, and 1.011 for cycles 145B, 146A, and 146B, respectively.

The calculated fluence and DPA were determined from the ATR MCNP model and as-run cycle data. The results for each packet are reported in Table 11 through Table 21. The DPA results are reported based on Fe damage cross-sections provide in Attachment B.

Table 8. Calculated as run heating rates for UCSB packets for Cycle 145A

Target	Core Elevation (inches from bottom of core)	Segment Length (inches)	Mass (grams)	Neutron Heating (Watts/gram)	Photon Heating (Watts/gram)	Heat Generation (Watts/gram)
packet 10-4	1.239	0.728	11.268	0.044	3.893	3.936
packet 10-3	2.007	0.807	12.370	0.049	4.335	4.384
packet 10-2	2.893	0.965	14.905	0.048	4.798	4.846
packet 10-1	3.857	0.965	14.873	0.052	5.352	5.403
packet 9-4	6.259	0.866	13.313	0.066	6.683	6.749
packet 9-3	7.273	1.161	18.320	0.072	7.947	8.019
packet 9-2	8.515	1.323	20.503	0.085	7.916	8.001
packet 9-1	9.649	0.945	14.727	0.115	8.294	8.409
packet 8-1	12.893	4.257	70.901	0.115	9.328	9.444
packet 7-3	16.214	1.496	23.233	0.105	10.134	10.238
packet 7-2	17.208	0.492	7.560	0.092	10.185	10.276
packet 7-1	18.872	2.835	43.813	0.109	10.486	10.595
packet 6A-1	21.563	1.260	19.489	0.104	10.611	10.714
packet 5-4	23.628	1.555	24.133	0.116	10.658	10.773
packet 5-3	25.055	1.299	20.052	0.116	10.551	10.667
packet 5-2	26.403	1.398	21.660	0.115	10.461	10.576
packet 5-1	27.811	1.417	21.909	0.112	10.399	10.511
packet 4-3	30.360	1.437	21.430	0.113	10.191	10.304
packet 4-2	31.816	1.476	22.497	0.098	9.772	9.870
packet 4-1	32.987	0.866	13.315	0.084	9.393	9.477
packet 3-4	35.255	2.067	32.057	0.100	8.797	8.897
packet 3-3	36.722	0.866	13.448	0.080	8.087	8.167
packet 3-2	37.454	0.598	9.247	0.082	7.819	7.901
packet 3-1	38.039	0.571	9.240	0.074	8.854	8.928
packet 2-7	39.568	0.866	13.328	0.069	6.907	6.975
packet 2-6	40.346	0.689	11.562	0.066	7.826	7.891
packet 2-5	40.936	0.492	7.430	0.062	6.227	6.288
packet 2-4	41.428	0.492	7.408	0.058	5.913	5.971
packet 2-3	42.078	0.807	12.305	0.059	5.483	5.542
packet 2-2	42.737	0.512	7.719	0.047	5.061	5.108

Target	Core Elevation (inches from bottom of core)	Segment Length (inches)	Mass (grams)	Neutron Heating (Watts/gram)	Photon Heating (Watts/gram)	Heat Generation (Watts/gram)
packet 2-1	43.239	0.492	7.417	0.044	4.679	4.723
packet 1-1	45.438	1.004	15.507	0.033	3.451	3.484

Table 9. Calculated heat rates for the UCSB capsules during cycle 145A.

Segment	Core Elevation (inches from bottom of core)	Segment Length (inches)	Mass (grams)	Neutron Heating (Watts/gram)	Photon Heating (Watts/gram)	Heat Generation (Watts/gram)
1	3.226	4.951	27.357	0.046	5.387	5.434
2	8.171	4.939	27.294	0.073	8.194	8.267
3	12.991	4.701	26.193	0.090	10.047	10.137
4	18.075	5.467	29.717	0.099	11.104	11.203
5	21.767	1.917	13.432	0.101	11.308	11.409
6	26.121	6.791	35.795	0.100	11.240	11.340
7	31.807	4.581	25.642	0.093	10.348	10.441
8	36.554	4.913	27.175	0.079	8.783	8.863
9	41.911	5.801	31.259	0.053	5.941	5.994
10	45.635	1.648	12.188	0.031	3.538	3.569

Table 10. Calculated heat rates for the Al basket in Cycle 145A.

Segment	Core Elevation (inches from bottom of core)	Segment Length (inches)	Mass (grams)	Neutron Heating (Watts/gram)	Photon Heating (Watts/gram)	Heat Generation (Watts/gram)
1	-7.375	17.958	48.360	0.019	0.937	0.956
2	2.007	0.807	2.173	0.128	3.827	3.955
3	2.893	0.965	2.598	0.142	4.226	4.368
4	3.857	0.965	2.598	0.157	4.740	4.897
5	5.516	2.353	6.335	0.189	5.577	5.766
6	7.273	1.161	3.128	0.224	6.427	6.651
7	8.515	1.323	3.562	0.241	6.948	7.189
8	9.649	0.945	2.545	0.253	7.351	7.604
9	12.571	4.900	13.197	0.283	8.179	8.462
10	15.992	1.940	5.226	0.306	8.898	9.203
11	17.208	0.492	1.325	0.310	9.008	9.318
12	18.872	2.835	7.634	0.315	9.194	9.509

Segment	Core Elevation (inches from bottom of core)	Segment Length (inches)	Mass (grams)	Neutron Heating (Watts/gram)	Photon Heating (Watts/gram)	Heat Generation (Watts/gram)
13	21.241	1.904	5.127	0.321	9.345	9.665
14	23.299	2.212	5.957	0.320	9.331	9.651
15	25.055	1.299	3.499	0.319	9.234	9.553
16	26.403	1.398	3.764	0.318	9.177	9.495
17	27.811	1.417	3.817	0.315	9.119	9.433
18	29.799	2.559	6.890	0.305	8.935	9.240
19	31.816	1.476	3.976	0.292	8.489	8.781
20	32.987	0.866	2.332	0.286	8.274	8.560
21	34.855	2.868	7.725	0.272	7.836	8.108
22	36.722	0.866	2.332	0.250	7.156	7.406
23	37.454	0.598	1.612	0.239	6.905	7.145
24	38.039	0.571	1.537	0.233	6.667	6.900
25	39.163	1.677	4.515	0.221	6.318	6.540
26	40.346	0.689	1.855	0.205	5.758	5.962
27	40.936	0.492	1.325	0.192	5.458	5.650
28	41.428	0.492	1.325	0.181	5.204	5.385
29	42.078	0.807	2.173	0.164	4.831	4.995
30	42.737	0.512	1.378	0.148	4.410	4.558
31	43.239	0.492	1.325	0.137	4.128	4.265
32	44.713	2.455	6.609	0.112	3.490	3.602
33	55.647	19.414	52.283	0.015	0.638	0.653

Table 11. Calculated fluence and DPA for Capsule 10 of the UCSB experiment.

	DPA xsec	10-4		10-3		10-2		10-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
1.00E-10		1.92E+14		0.00E+00		3.57E+14		3.67E+15	
1.00E-09	7.73	2.35E+17	2.27E-05	4.89E+17	4.73E-05	2.83E+17	2.73E-05	4.06E+17	3.92E-05
1.00E-08	2.444	5.34E+19	1.63E-03	5.28E+19	1.61E-03	5.57E+19	1.70E-03	6.39E+19	1.95E-03
2.30E-08	1.278	1.94E+20	3.09E-03	1.93E+20	3.08E-03	2.02E+20	3.23E-03	2.31E+20	3.68E-03
5.00E-08	0.857	4.77E+20	5.11E-03	4.76E+20	5.10E-03	5.14E+20	5.50E-03	5.67E+20	6.07E-03
7.60E-08	0.644	3.27E+20	2.63E-03	3.31E+20	2.66E-03	3.66E+20	2.95E-03	4.09E+20	3.29E-03
1.15E-07	0.523	2.74E+20	1.79E-03	2.80E+20	1.83E-03	3.17E+20	2.07E-03	3.51E+20	2.29E-03
1.70E-07	0.428	1.64E+20	8.75E-04	1.72E+20	9.21E-04	1.92E+20	1.03E-03	2.14E+20	1.14E-03
2.55E-07	0.351	1.08E+20	4.75E-04	1.22E+20	5.36E-04	1.34E+20	5.89E-04	1.54E+20	6.76E-04
3.80E-07	0.287	8.80E+19	3.16E-04	9.83E+19	3.53E-04	1.08E+20	3.87E-04	1.30E+20	4.68E-04
5.50E-07	0.237	8.22E+19	2.43E-04	9.19E+19	2.72E-04	1.02E+20	3.04E-04	1.16E+20	3.44E-04
8.40E-07	0.194	8.76E+19	2.12E-04	9.61E+19	2.33E-04	1.13E+20	2.74E-04	1.26E+20	3.05E-04
1.28E-06	0.157	8.40E+19	1.65E-04	9.72E+19	1.91E-04	1.12E+20	2.20E-04	1.25E+20	2.45E-04
1.90E-06	0.128	8.19E+19	1.31E-04	9.32E+19	1.49E-04	9.92E+19	1.59E-04	1.18E+20	1.89E-04
2.80E-06	0.105	7.74E+19	1.02E-04	9.13E+19	1.20E-04	1.01E+20	1.33E-04	1.12E+20	1.47E-04
4.25E-06	0.086	8.40E+19	9.02E-05	9.49E+19	1.02E-04	1.05E+20	1.13E-04	1.17E+20	1.26E-04
6.30E-06	0.07	7.85E+19	6.87E-05	8.90E+19	7.79E-05	9.69E+19	8.48E-05	1.10E+20	9.67E-05
9.20E-06	0.058	7.56E+19	5.48E-05	8.67E+19	6.28E-05	9.73E+19	7.06E-05	1.07E+20	7.76E-05
1.35E-05	0.048	7.75E+19	4.65E-05	8.83E+19	5.30E-05	1.02E+20	6.10E-05	1.14E+20	6.87E-05
2.10E-05	0.038	9.08E+19	4.31E-05	1.02E+20	4.86E-05	1.17E+20	5.58E-05	1.29E+20	6.12E-05
3.00E-05	0.031	7.25E+19	2.81E-05	8.20E+19	3.18E-05	9.50E+19	3.68E-05	1.05E+20	4.08E-05
4.50E-05	0.026	7.59E+19	2.47E-05	9.15E+19	2.98E-05	1.08E+20	3.49E-05	1.24E+20	4.01E-05
6.90E-05	0.021	8.78E+19	2.31E-05	1.01E+20	2.64E-05	1.17E+20	3.06E-05	1.29E+20	3.39E-05
1.00E-04	0.017	8.06E+19	1.71E-05	8.95E+19	1.90E-05	1.05E+20	2.23E-05	1.13E+20	2.40E-05
1.35E-04	0.014	6.38E+19	1.12E-05	7.22E+19	1.26E-05	8.09E+19	1.42E-05	9.38E+19	1.64E-05
1.70E-04	0.014	4.71E+19	8.24E-06	5.36E+19	9.38E-06	6.56E+19	1.15E-05	7.15E+19	1.25E-05
2.20E-04	0.011	5.41E+19	7.44E-06	6.17E+19	8.48E-06	7.04E+19	9.68E-06	8.47E+19	1.16E-05
2.80E-04	0.011	5.11E+19	7.03E-06	6.35E+19	8.73E-06	6.93E+19	9.53E-06	7.63E+19	1.05E-05

	DPA xsec	10-4		10-3		10-2		10-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
3.60E-04	0.01	5.15E+19	6.43E-06	6.11E+19	7.64E-06	6.98E+19	8.73E-06	7.57E+19	9.46E-06
4.50E-04	0.007	4.91E+19	4.30E-06	5.34E+19	4.67E-06	6.31E+19	5.52E-06	6.85E+19	5.99E-06
5.75E-04	0.005	5.40E+19	3.38E-06	6.14E+19	3.84E-06	7.03E+19	4.39E-06	8.03E+19	5.02E-06
7.60E-04	0.129	6.20E+19	9.99E-05	6.80E+19	1.10E-04	7.92E+19	1.28E-04	9.11E+19	1.47E-04
9.60E-04	0.308	5.33E+19	2.05E-04	5.85E+19	2.25E-04	6.67E+19	2.57E-04	7.66E+19	2.95E-04
1.28E-03	0.672	6.07E+19	5.10E-04	7.17E+19	6.03E-04	8.23E+19	6.91E-04	9.21E+19	7.74E-04
1.60E-03	0.477	4.99E+19	2.97E-04	5.54E+19	3.31E-04	6.43E+19	3.83E-04	7.02E+19	4.19E-04
2.00E-03	0.511	4.89E+19	3.12E-04	5.85E+19	3.74E-04	6.13E+19	3.91E-04	7.04E+19	4.50E-04
2.70E-03	0.568	6.48E+19	4.60E-04	7.81E+19	5.55E-04	8.20E+19	5.82E-04	9.66E+19	6.86E-04
3.40E-03	0.632	5.01E+19	3.96E-04	6.17E+19	4.87E-04	6.64E+19	5.25E-04	7.82E+19	6.18E-04
4.50E-03	0.822	6.21E+19	6.38E-04	7.13E+19	7.32E-04	8.35E+19	8.58E-04	9.44E+19	9.70E-04
5.50E-03	0.826	4.76E+19	4.91E-04	5.22E+19	5.39E-04	6.11E+19	6.31E-04	7.20E+19	7.43E-04
7.20E-03	1.671	6.09E+19	1.27E-03	7.29E+19	1.52E-03	8.79E+19	1.84E-03	9.39E+19	1.96E-03
9.20E-03	3.709	5.15E+19	2.39E-03	6.02E+19	2.79E-03	6.45E+19	2.99E-03	7.48E+19	3.47E-03
1.20E-02	1.491	6.40E+19	1.19E-03	6.74E+19	1.26E-03	8.01E+19	1.49E-03	9.03E+19	1.68E-03
1.50E-02	1.156	5.36E+19	7.74E-04	5.87E+19	8.48E-04	7.08E+19	1.02E-03	7.83E+19	1.13E-03
1.90E-02	0.973	5.65E+19	6.87E-04	6.35E+19	7.72E-04	7.58E+19	9.22E-04	8.26E+19	1.01E-03
2.55E-02	0.555	8.39E+19	5.82E-04	9.29E+19	6.44E-04	1.08E+20	7.48E-04	1.21E+20	8.38E-04
3.20E-02	26.762	7.03E+19	2.35E-02	8.38E+19	2.80E-02	9.42E+19	3.15E-02	1.07E+20	3.59E-02
4.00E-02	8.161	3.53E+19	3.60E-03	4.18E+19	4.27E-03	4.64E+19	4.73E-03	5.23E+19	5.34E-03
5.25E-02	6.515	7.06E+19	5.75E-03	8.36E+19	6.80E-03	9.04E+19	7.36E-03	1.05E+20	8.58E-03
6.60E-02	6.576	7.28E+19	5.98E-03	8.45E+19	6.95E-03	9.05E+19	7.44E-03	1.05E+20	8.64E-03
8.80E-02	13.137	1.08E+20	1.77E-02	1.17E+20	1.92E-02	1.36E+20	2.23E-02	1.53E+20	2.52E-02
1.10E-01	11.84	6.61E+19	9.78E-03	7.54E+19	1.12E-02	8.53E+19	1.26E-02	9.47E+19	1.40E-02
1.35E-01	11.27	8.93E+19	1.26E-02	1.08E+20	1.52E-02	1.24E+20	1.75E-02	1.41E+20	1.98E-02
1.60E-01	21.53	5.24E+19	1.41E-02	6.44E+19	1.73E-02	7.33E+19	1.97E-02	8.03E+19	2.16E-02
1.90E-01	15.85	7.80E+19	1.54E-02	9.15E+19	1.81E-02	1.02E+20	2.01E-02	1.15E+20	2.29E-02
2.20E-01	22.01	6.13E+19	1.69E-02	7.27E+19	2.00E-02	8.20E+19	2.26E-02	9.37E+19	2.58E-02
2.55E-01	18.27	7.46E+19	1.70E-02	8.35E+19	1.91E-02	9.59E+19	2.19E-02	1.10E+20	2.51E-02
2.90E-01	17.37	8.26E+19	1.79E-02	9.37E+19	2.03E-02	1.08E+20	2.34E-02	1.17E+20	2.55E-02

	DPA xsec	10-4		10-3		10-2		10-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
3.20E-01	13.51	5.95E+19	1.00E-02	6.67E+19	1.13E-02	7.45E+19	1.26E-02	8.13E+19	1.37E-02
3.60E-01	25.14	8.22E+19	2.58E-02	9.37E+19	2.95E-02	1.07E+20	3.35E-02	1.17E+20	3.68E-02
4.00E-01	46.52	6.99E+19	4.06E-02	7.67E+19	4.46E-02	9.00E+19	5.24E-02	9.62E+19	5.59E-02
4.50E-01	43.04	6.31E+19	3.40E-02	7.12E+19	3.83E-02	8.37E+19	4.50E-02	9.38E+19	5.05E-02
5.00E-01	36.4	7.62E+19	3.47E-02	8.46E+19	3.85E-02	9.40E+19	4.28E-02	1.07E+20	4.87E-02
5.50E-01	33.22	7.31E+19	3.04E-02	8.28E+19	3.44E-02	9.66E+19	4.01E-02	1.01E+20	4.18E-02
6.00E-01	34.18	6.94E+19	2.96E-02	8.14E+19	3.48E-02	9.07E+19	3.87E-02	1.00E+20	4.29E-02
6.60E-01	19.64	8.58E+19	2.11E-02	1.03E+20	2.53E-02	1.10E+20	2.70E-02	1.26E+20	3.10E-02
7.20E-01	48.89	8.92E+19	5.45E-02	1.01E+20	6.20E-02	1.14E+20	6.98E-02	1.29E+20	7.91E-02
7.80E-01	74.22	8.08E+19	7.50E-02	9.52E+19	8.84E-02	1.07E+20	9.90E-02	1.19E+20	1.11E-01
8.40E-01	44.02	6.72E+19	3.70E-02	7.48E+19	4.12E-02	8.24E+19	4.53E-02	9.31E+19	5.12E-02
9.20E-01	40.97	7.86E+19	4.02E-02	8.98E+19	4.60E-02	1.05E+20	5.40E-02	1.13E+20	5.78E-02
1.00E+00	50.95	7.22E+19	4.60E-02	8.63E+19	5.50E-02	9.61E+19	6.12E-02	1.02E+20	6.49E-02
1.20E+00	50.09	1.73E+20	1.08E-01	1.98E+20	1.24E-01	2.19E+20	1.37E-01	2.43E+20	1.52E-01
1.40E+00	64.54	1.61E+20	1.30E-01	1.86E+20	1.50E-01	1.98E+20	1.60E-01	2.18E+20	1.76E-01
1.60E+00	73.58	1.31E+20	1.20E-01	1.47E+20	1.36E-01	1.69E+20	1.55E-01	1.84E+20	1.69E-01
1.80E+00	76.46	1.13E+20	1.08E-01	1.31E+20	1.25E-01	1.49E+20	1.43E-01	1.63E+20	1.55E-01
2.00E+00	95.15	1.06E+20	1.26E-01	1.14E+20	1.36E-01	1.28E+20	1.52E-01	1.44E+20	1.71E-01
2.30E+00	93.75	1.26E+20	1.47E-01	1.45E+20	1.70E-01	1.63E+20	1.91E-01	1.79E+20	2.10E-01
2.60E+00	112.05	1.16E+20	1.63E-01	1.36E+20	1.91E-01	1.49E+20	2.09E-01	1.66E+20	2.33E-01
2.90E+00	123.55	9.03E+19	1.39E-01	9.84E+19	1.52E-01	1.09E+20	1.69E-01	1.24E+20	1.92E-01
3.30E+00	133.45	8.74E+19	1.46E-01	9.96E+19	1.66E-01	1.11E+20	1.86E-01	1.24E+20	2.07E-01
3.70E+00	135.25	5.98E+19	1.01E-01	7.07E+19	1.19E-01	7.61E+19	1.29E-01	8.36E+19	1.41E-01
4.10E+00	149.55	4.38E+19	8.19E-02	5.36E+19	1.00E-01	5.86E+19	1.10E-01	6.74E+19	1.26E-01
4.50E+00	158.25	4.11E+19	8.13E-02	4.08E+19	8.06E-02	4.76E+19	9.42E-02	4.99E+19	9.88E-02
5.00E+00	168.55	3.25E+19	6.85E-02	3.83E+19	8.07E-02	4.28E+19	9.01E-02	4.74E+19	9.99E-02
5.50E+00	176.46	2.26E+19	4.99E-02	2.64E+19	5.83E-02	3.02E+19	6.67E-02	3.33E+19	7.34E-02
6.00E+00	183.06	1.54E+19	3.54E-02	1.73E+19	3.97E-02	2.15E+19	4.92E-02	2.24E+19	5.12E-02
6.70E+00	189.26	1.50E+19	3.55E-02	1.69E+19	4.01E-02	1.97E+19	4.66E-02	2.03E+19	4.80E-02
7.40E+00	196.67	8.28E+18	2.03E-02	1.04E+19	2.56E-02	1.06E+19	2.61E-02	1.11E+19	2.73E-02

	DPA xsec	10-4		10-3		10-2		10-1	
Upper Energy(MeV)	**keV-barn**	**Total Fluence**	**DPA**	**Total Fluence**	**DPA**	**Total Fluence**	**DPA**	**Total Fluence**	**DPA**
8.20E+00	203.37	4.72E+18	1.20E-02	6.36E+18	1.62E-02	6.29E+18	1.60E-02	7.37E+18	1.87E-02
9.00E+00	214.58	3.14E+18	8.41E-03	2.18E+18	5.84E-03	4.39E+18	1.18E-02	3.89E+18	1.04E-02
1.00E+01	225.69	1.68E+18	4.73E-03	2.20E+18	6.21E-03	2.05E+18	5.77E-03	2.67E+18	7.54E-03
1.10E+01	237.6	7.76E+17	2.31E-03	6.98E+17	2.07E-03	9.90E+17	2.94E-03	1.15E+18	3.42E-03
1.20E+01	247.41	4.01E+17	1.24E-03	3.09E+17	9.56E-04	4.51E+17	1.40E-03	2.88E+17	8.90E-04
1.30E+01	258.52	3.85E+17	1.24E-03	3.63E+17	1.17E-03	3.50E+17	1.13E-03	3.44E+17	1.11E-03
1.40E+01	271.35	8.21E+16	2.78E-04	8.72E+16	2.96E-04	1.42E+16	4.82E-05	1.37E+17	4.64E-04
1.50E+01	290.27	6.69E+16	2.43E-04	4.15E+16	1.50E-04	8.84E+16	3.21E-04	2.20E+16	7.97E-05
1.60E+01	293.2	6.47E+15	2.37E-05	8.17E+16	2.99E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.70E+01	292.73	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.73E+16	9.99E-05
1.80E+01	297.65	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+16	5.98E-05	0.00E+00	0.00E+00
1.90E+01	307.26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.00E+01	316.36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
total			**2.36E+00**		**2.69E+00**		**3.02E+00**		**3.33E+00**

Table 12. Calculated fluence and DPA for capsule 9 of the UCSB experiment.

	DPA xsec	9-4		9-3		9-2		9-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
1.00E-10	0	4.70E+15		6.61E+14		0.00E+00		1.43E+15	
1.00E-09	7.73	5.08E+17	4.91E-05	5.45E+17	5.27E-05	5.46E+17	5.28E-05	8.01E+17	7.74E-05
1.00E-08	2.444	7.93E+19	2.42E-03	8.58E+19	2.62E-03	9.33E+19	2.85E-03	1.03E+20	3.13E-03
2.30E-08	1.278	2.87E+20	4.58E-03	3.03E+20	4.84E-03	3.38E+20	5.40E-03	3.67E+20	5.86E-03
5.00E-08	0.857	7.10E+20	7.61E-03	7.66E+20	8.21E-03	8.50E+20	9.10E-03	9.14E+20	9.80E-03
7.60E-08	0.644	5.04E+20	4.05E-03	5.45E+20	4.38E-03	6.05E+20	4.87E-03	6.50E+20	5.23E-03
1.15E-07	0.523	4.35E+20	2.84E-03	4.75E+20	3.11E-03	5.20E+20	3.40E-03	5.60E+20	3.66E-03
1.70E-07	0.428	2.78E+20	1.49E-03	3.03E+20	1.62E-03	3.27E+20	1.75E-03	3.57E+20	1.91E-03
2.55E-07	0.351	1.93E+20	8.49E-04	2.09E+20	9.18E-04	2.32E+20	1.02E-03	2.49E+20	1.09E-03
3.80E-07	0.287	1.64E+20	5.88E-04	1.78E+20	6.39E-04	1.95E+20	6.99E-04	2.04E+20	7.31E-04
5.50E-07	0.237	1.45E+20	4.30E-04	1.60E+20	4.75E-04	1.76E+20	5.21E-04	1.90E+20	5.61E-04
8.40E-07	0.194	1.66E+20	4.03E-04	1.78E+20	4.32E-04	1.94E+20	4.70E-04	2.05E+20	4.97E-04
1.28E-06	0.157	1.57E+20	3.08E-04	1.67E+20	3.29E-04	1.93E+20	3.80E-04	1.97E+20	3.87E-04
1.90E-06	0.128	1.43E+20	2.29E-04	1.62E+20	2.59E-04	1.76E+20	2.82E-04	1.81E+20	2.89E-04
2.80E-06	0.105	1.42E+20	1.87E-04	1.56E+20	2.04E-04	1.70E+20	2.23E-04	1.81E+20	2.38E-04
4.25E-06	0.086	1.55E+20	1.67E-04	1.50E+20	1.61E-04	1.79E+20	1.92E-04	1.88E+20	2.03E-04
6.30E-06	0.07	1.45E+20	1.27E-04	1.53E+20	1.34E-04	1.64E+20	1.43E-04	1.75E+20	1.53E-04
9.20E-06	0.058	1.42E+20	1.03E-04	1.46E+20	1.06E-04	1.59E+20	1.15E-04	1.73E+20	1.26E-04
1.35E-05	0.048	1.43E+20	8.57E-05	1.58E+20	9.47E-05	1.66E+20	9.95E-05	1.81E+20	1.08E-04
2.10E-05	0.038	1.65E+20	7.85E-05	1.53E+20	7.26E-05	1.88E+20	8.94E-05	2.01E+20	9.57E-05
3.00E-05	0.031	1.39E+20	5.40E-05	1.32E+20	5.12E-05	1.58E+20	6.11E-05	1.69E+20	6.56E-05
4.50E-05	0.026	1.58E+20	5.13E-05	1.66E+20	5.40E-05	1.80E+20	5.85E-05	1.90E+20	6.19E-05
6.90E-05	0.021	1.65E+20	4.34E-05	1.81E+20	4.76E-05	1.93E+20	5.07E-05	2.09E+20	5.48E-05
1.00E-04	0.017	1.47E+20	3.13E-05	1.58E+20	3.35E-05	1.68E+20	3.57E-05	1.83E+20	3.88E-05
1.35E-04	0.014	1.12E+20	1.96E-05	1.27E+20	2.23E-05	1.42E+20	2.48E-05	1.45E+20	2.54E-05
1.70E-04	0.014	8.68E+19	1.52E-05	9.80E+19	1.72E-05	1.09E+20	1.91E-05	1.15E+20	2.01E-05
2.20E-04	0.011	1.02E+20	1.40E-05	1.07E+20	1.47E-05	1.22E+20	1.68E-05	1.28E+20	1.76E-05

	DPA xsec	9-4		9-3		9-2		9-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
2.80E-04	0.011	1.01E+20	1.39E-05	1.04E+20	1.43E-05	1.13E+20	1.55E-05	1.20E+20	1.65E-05
3.60E-04	0.01	9.87E+19	1.23E-05	1.07E+20	1.33E-05	1.13E+20	1.41E-05	1.24E+20	1.55E-05
4.50E-04	0.007	8.73E+19	7.64E-06	9.65E+19	8.45E-06	1.01E+20	8.86E-06	1.10E+20	9.66E-06
5.75E-04	0.005	1.03E+20	6.41E-06	1.06E+20	6.60E-06	1.15E+20	7.20E-06	1.23E+20	7.67E-06
7.60E-04	0.129	1.13E+20	1.83E-04	1.21E+20	1.94E-04	1.35E+20	2.17E-04	1.37E+20	2.21E-04
9.60E-04	0.308	1.02E+20	3.91E-04	1.04E+20	4.01E-04	1.12E+20	4.31E-04	1.16E+20	4.46E-04
1.28E-03	0.672	1.19E+20	9.99E-04	1.23E+20	1.03E-03	1.36E+20	1.14E-03	1.41E+20	1.19E-03
1.60E-03	0.477	9.31E+19	5.55E-04	9.81E+19	5.85E-04	1.08E+20	6.44E-04	1.10E+20	6.58E-04
2.00E-03	0.511	8.81E+19	5.63E-04	9.96E+19	6.36E-04	1.09E+20	6.95E-04	1.19E+20	7.61E-04
2.70E-03	0.568	1.22E+20	8.66E-04	1.30E+20	9.26E-04	1.44E+20	1.02E-03	1.53E+20	1.09E-03
3.40E-03	0.632	9.74E+19	7.70E-04	1.03E+20	8.13E-04	1.14E+20	9.00E-04	1.19E+20	9.43E-04
4.50E-03	0.822	1.19E+20	1.22E-03	1.30E+20	1.33E-03	1.41E+20	1.45E-03	1.50E+20	1.55E-03
5.50E-03	0.826	8.84E+19	9.12E-04	9.40E+19	9.70E-04	1.04E+20	1.08E-03	1.06E+20	1.10E-03
7.20E-03	1.671	1.18E+20	2.46E-03	1.30E+20	2.71E-03	1.38E+20	2.88E-03	1.50E+20	3.13E-03
9.20E-03	3.709	9.34E+19	4.33E-03	1.04E+20	4.83E-03	1.11E+20	5.14E-03	1.17E+20	5.44E-03
1.20E-02	1.491	1.13E+20	2.11E-03	1.24E+20	2.31E-03	1.33E+20	2.48E-03	1.44E+20	2.69E-03
1.50E-02	1.156	1.03E+20	1.49E-03	1.10E+20	1.59E-03	1.16E+20	1.67E-03	1.21E+20	1.75E-03
1.90E-02	0.973	1.06E+20	1.29E-03	1.13E+20	1.37E-03	1.26E+20	1.53E-03	1.26E+20	1.54E-03
2.55E-02	0.555	1.50E+20	1.04E-03	1.65E+20	1.14E-03	1.82E+20	1.27E-03	1.89E+20	1.31E-03
3.20E-02	26.762	1.39E+20	4.66E-02	1.51E+20	5.06E-02	1.59E+20	5.32E-02	1.68E+20	5.64E-02
4.00E-02	8.161	6.89E+19	7.03E-03	7.48E+19	7.63E-03	7.69E+19	7.84E-03	7.96E+19	8.12E-03
5.25E-02	6.515	1.32E+20	1.07E-02	1.48E+20	1.20E-02	1.56E+20	1.27E-02	1.62E+20	1.32E-02
6.60E-02	6.576	1.35E+20	1.11E-02	1.46E+20	1.20E-02	1.55E+20	1.28E-02	1.62E+20	1.33E-02
8.80E-02	13.137	1.98E+20	3.25E-02	2.13E+20	3.50E-02	2.34E+20	3.84E-02	2.41E+20	3.95E-02
1.10E-01	11.84	1.24E+20	1.84E-02	1.33E+20	1.97E-02	1.42E+20	2.11E-02	1.50E+20	2.23E-02
1.35E-01	11.27	1.82E+20	2.57E-02	1.96E+20	2.76E-02	2.12E+20	2.98E-02	2.22E+20	3.12E-02
1.60E-01	21.53	1.07E+20	2.88E-02	1.13E+20	3.03E-02	1.25E+20	3.35E-02	1.28E+20	3.43E-02
1.90E-01	15.85	1.45E+20	2.87E-02	1.60E+20	3.17E-02	1.72E+20	3.41E-02	1.79E+20	3.55E-02
2.20E-01	22.01	1.15E+20	3.17E-02	1.31E+20	3.60E-02	1.40E+20	3.84E-02	1.48E+20	4.07E-02

	DPA xsec	9-4		9-3		9-2		9-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
2.55E-01	18.27	1.35E+20	3.08E-02	1.49E+20	3.40E-02	1.66E+20	3.80E-02	1.70E+20	3.89E-02
2.90E-01	17.37	1.50E+20	3.25E-02	1.67E+20	3.62E-02	1.77E+20	3.84E-02	1.84E+20	3.99E-02
3.20E-01	13.51	1.01E+20	1.71E-02	1.14E+20	1.92E-02	1.21E+20	2.05E-02	1.33E+20	2.25E-02
3.60E-01	25.14	1.48E+20	4.67E-02	1.62E+20	5.08E-02	1.75E+20	5.51E-02	1.83E+20	5.74E-02
4.00E-01	46.52	1.28E+20	7.46E-02	1.36E+20	7.93E-02	1.51E+20	8.76E-02	1.53E+20	8.88E-02
4.50E-01	43.04	1.16E+20	6.22E-02	1.34E+20	7.22E-02	1.43E+20	7.70E-02	1.46E+20	7.86E-02
5.00E-01	36.4	1.38E+20	6.28E-02	1.48E+20	6.75E-02	1.63E+20	7.41E-02	1.68E+20	7.66E-02
5.50E-01	33.22	1.35E+20	5.61E-02	1.51E+20	6.29E-02	1.57E+20	6.54E-02	1.62E+20	6.74E-02
6.00E-01	34.18	1.30E+20	5.55E-02	1.44E+20	6.13E-02	1.53E+20	6.52E-02	1.62E+20	6.90E-02
6.60E-01	19.64	1.54E+20	3.78E-02	1.75E+20	4.30E-02	1.92E+20	4.72E-02	1.98E+20	4.85E-02
7.20E-01	48.89	1.62E+20	9.90E-02	1.80E+20	1.10E-01	1.93E+20	1.18E-01	2.05E+20	1.25E-01
7.80E-01	74.22	1.57E+20	1.46E-01	1.71E+20	1.59E-01	1.82E+20	1.69E-01	1.89E+20	1.75E-01
8.40E-01	44.02	1.18E+20	6.48E-02	1.37E+20	7.56E-02	1.44E+20	7.91E-02	1.50E+20	8.24E-02
9.20E-01	40.97	1.51E+20	7.73E-02	1.60E+20	8.21E-02	1.72E+20	8.82E-02	1.86E+20	9.51E-02
1.00E+00	50.95	1.37E+20	8.71E-02	1.49E+20	9.50E-02	1.58E+20	1.01E-01	1.66E+20	1.06E-01
1.20E+00	50.09	3.25E+20	2.04E-01	3.43E+20	2.15E-01	3.77E+20	2.36E-01	3.95E+20	2.47E-01
1.40E+00	64.54	2.81E+20	2.26E-01	3.09E+20	2.49E-01	3.40E+20	2.74E-01	3.46E+20	2.79E-01
1.60E+00	73.58	2.41E+20	2.22E-01	2.73E+20	2.51E-01	2.86E+20	2.63E-01	2.97E+20	2.73E-01
1.80E+00	76.46	2.15E+20	2.05E-01	2.24E+20	2.14E-01	2.50E+20	2.39E-01	2.60E+20	2.48E-01
2.00E+00	95.15	1.85E+20	2.20E-01	2.01E+20	2.39E-01	2.19E+20	2.60E-01	2.34E+20	2.79E-01
2.30E+00	93.75	2.34E+20	2.74E-01	2.51E+20	2.94E-01	2.74E+20	3.21E-01	2.94E+20	3.45E-01
2.60E+00	112.05	2.12E+20	2.97E-01	2.34E+20	3.28E-01	2.53E+20	3.55E-01	2.64E+20	3.70E-01
2.90E+00	123.55	1.66E+20	2.57E-01	1.79E+20	2.76E-01	1.91E+20	2.96E-01	1.96E+20	3.03E-01
3.30E+00	133.45	1.63E+20	2.72E-01	1.79E+20	2.99E-01	1.88E+20	3.13E-01	2.00E+20	3.34E-01
3.70E+00	135.25	1.13E+20	1.91E-01	1.20E+20	2.03E-01	1.31E+20	2.22E-01	1.35E+20	2.28E-01
4.10E+00	149.55	8.60E+19	1.61E-01	9.42E+19	1.76E-01	9.98E+19	1.86E-01	1.06E+20	1.99E-01
4.50E+00	158.25	6.78E+19	1.34E-01	7.14E+19	1.41E-01	7.68E+19	1.52E-01	8.19E+19	1.62E-01
5.00E+00	168.55	6.01E+19	1.27E-01	6.78E+19	1.43E-01	7.42E+19	1.56E-01	7.57E+19	1.60E-01
5.50E+00	176.46	4.50E+19	9.92E-02	4.52E+19	9.96E-02	4.86E+19	1.07E-01	5.15E+19	1.14E-01

	DPA xsec	9-4		9-3		9-2		9-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
6.00E+00	183.06	3.02E+19	6.92E-02	3.15E+19	7.21E-02	3.38E+19	7.73E-02	3.58E+19	8.20E-02
6.70E+00	189.26	2.76E+19	6.52E-02	3.01E+19	7.11E-02	3.12E+19	7.39E-02	3.33E+19	7.88E-02
7.40E+00	196.67	1.53E+19	3.76E-02	1.73E+19	4.25E-02	1.89E+19	4.66E-02	2.12E+19	5.21E-02
8.20E+00	203.37	9.59E+18	2.44E-02	1.07E+19	2.73E-02	1.11E+19	2.83E-02	1.23E+19	3.12E-02
9.00E+00	214.58	5.16E+18	1.38E-02	5.59E+18	1.50E-02	6.35E+18	1.70E-02	7.54E+18	2.02E-02
1.00E+01	225.69	3.86E+18	1.09E-02	3.68E+18	1.04E-02	3.54E+18	9.99E-03	4.46E+18	1.26E-02
1.10E+01	237.6	1.61E+18	4.77E-03	1.35E+18	4.00E-03	1.84E+18	5.46E-03	2.47E+18	7.35E-03
1.20E+01	247.41	5.70E+17	1.76E-03	9.36E+17	2.89E-03	9.63E+17	2.98E-03	9.09E+17	2.81E-03
1.30E+01	258.52	3.43E+17	1.11E-03	3.34E+17	1.08E-03	3.88E+17	1.25E-03	4.01E+17	1.30E-03
1.40E+01	271.35	1.99E+17	6.74E-04	1.11E+17	3.78E-04	4.49E+16	1.52E-04	6.06E+16	2.05E-04
1.50E+01	290.27	3.77E+16	1.37E-04	1.27E+17	4.62E-04	7.74E+16	2.81E-04	1.00E+17	3.64E-04
1.60E+01	293.2	1.36E+16	4.99E-05	3.59E+16	1.32E-04	1.39E+16	5.11E-05	4.67E+15	1.71E-05
1.70E+01	292.73	6.89E+16	2.52E-04	1.30E+16	4.74E-05	8.80E+15	3.22E-05	0.00E+00	0.00E+00
1.80E+01	297.65	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.90E+01	307.26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.00E+01	316.36	0.00E+00	0.00E+00	2.95E+16	1.17E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
			4.36E+00		**4.74E+00**		**5.10E+00**		**5.35E+00**

Table 13. Calculated fluence and DPA for capsule 8 of the UCSB experiment.

	DPA xsec	8-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA
1.00E-10	0	1.20E+15	
1.00E-09	7.73	7.54E+17	7.29E-05
1.00E-08	2.444	1.14E+20	3.47E-03
2.30E-08	1.278	4.11E+20	6.56E-03
5.00E-08	0.857	1.03E+21	1.10E-02
7.60E-08	0.644	7.34E+20	5.91E-03
1.15E-07	0.523	6.30E+20	4.12E-03
1.70E-07	0.428	3.93E+20	2.10E-03
2.55E-07	0.351	2.75E+20	1.21E-03
3.80E-07	0.287	2.31E+20	8.28E-04
5.50E-07	0.237	2.07E+20	6.14E-04
8.40E-07	0.194	2.32E+20	5.63E-04
1.28E-06	0.157	2.24E+20	4.40E-04
1.90E-06	0.128	2.09E+20	3.34E-04
2.80E-06	0.105	2.04E+20	2.67E-04
4.25E-06	0.086	2.15E+20	2.31E-04
6.30E-06	0.07	1.97E+20	1.73E-04
9.20E-06	0.058	1.91E+20	1.38E-04
1.35E-05	0.048	2.00E+20	1.20E-04
2.10E-05	0.038	2.31E+20	1.10E-04
3.00E-05	0.031	1.89E+20	7.32E-05
4.50E-05	0.026	2.13E+20	6.93E-05
6.90E-05	0.021	2.30E+20	6.03E-05
1.00E-04	0.017	2.03E+20	4.31E-05
1.35E-04	0.014	1.65E+20	2.89E-05
1.70E-04	0.014	1.29E+20	2.26E-05
2.20E-04	0.011	1.44E+20	1.98E-05

	DPA xsec	8-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA
2.80E-04	0.011	1.35E+20	1.85E-05
3.60E-04	0.01	1.41E+20	1.76E-05
4.50E-04	0.007	1.24E+20	1.08E-05
5.75E-04	0.005	1.37E+20	8.55E-06
7.60E-04	0.129	1.56E+20	2.51E-04
9.60E-04	0.308	1.33E+20	5.11E-04
1.28E-03	0.672	1.59E+20	1.34E-03
1.60E-03	0.477	1.29E+20	7.67E-04
2.00E-03	0.511	1.30E+20	8.32E-04
2.70E-03	0.568	1.73E+20	1.23E-03
3.40E-03	0.632	1.37E+20	1.08E-03
4.50E-03	0.822	1.66E+20	1.70E-03
5.50E-03	0.826	1.26E+20	1.30E-03
7.20E-03	1.671	1.65E+20	3.44E-03
9.20E-03	3.709	1.28E+20	5.93E-03
1.20E-02	1.491	1.57E+20	2.93E-03
1.50E-02	1.156	1.36E+20	1.96E-03
1.90E-02	0.973	1.46E+20	1.78E-03
2.55E-02	0.555	2.18E+20	1.51E-03
3.20E-02	26.762	1.90E+20	6.36E-02
4.00E-02	8.161	9.32E+19	9.51E-03
5.25E-02	6.515	1.87E+20	1.52E-02
6.60E-02	6.576	1.84E+20	1.51E-02
8.80E-02	13.137	2.79E+20	4.58E-02
1.10E-01	11.84	1.70E+20	2.52E-02
1.35E-01	11.27	2.49E+20	3.51E-02
1.60E-01	21.53	1.43E+20	3.85E-02
1.90E-01	15.85	2.02E+20	4.01E-02
2.20E-01	22.01	1.63E+20	4.48E-02

	DPA xsec	8-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA
2.55E-01	18.27	1.94E+20	4.42E-02
2.90E-01	17.37	2.08E+20	4.52E-02
3.20E-01	13.51	1.48E+20	2.51E-02
3.60E-01	25.14	2.08E+20	6.53E-02
4.00E-01	46.52	1.77E+20	1.03E-01
4.50E-01	43.04	1.68E+20	9.02E-02
5.00E-01	36.4	1.90E+20	8.66E-02
5.50E-01	33.22	1.92E+20	7.95E-02
6.00E-01	34.18	1.83E+20	7.80E-02
6.60E-01	19.64	2.28E+20	5.59E-02
7.20E-01	48.89	2.33E+20	1.42E-01
7.80E-01	74.22	2.17E+20	2.02E-01
8.40E-01	44.02	1.70E+20	9.34E-02
9.20E-01	40.97	2.07E+20	1.06E-01
1.00E+00	50.95	1.89E+20	1.21E-01
1.20E+00	50.09	4.41E+20	2.76E-01
1.40E+00	64.54	3.98E+20	3.21E-01
1.60E+00	73.58	3.42E+20	3.15E-01
1.80E+00	76.46	2.95E+20	2.82E-01
2.00E+00	95.15	2.56E+20	3.05E-01
2.30E+00	93.75	3.23E+20	3.79E-01
2.60E+00	112.05	2.98E+20	4.17E-01
2.90E+00	123.55	2.26E+20	3.49E-01
3.30E+00	133.45	2.24E+20	3.73E-01
3.70E+00	135.25	1.52E+20	2.56E-01
4.10E+00	149.55	1.18E+20	2.20E-01
4.50E+00	158.25	9.00E+19	1.78E-01
5.00E+00	168.55	8.75E+19	1.84E-01
5.50E+00	176.46	5.99E+19	1.32E-01

	DPA xsec	8-1	
Upper Energy(MeV)	**keV-barn**	**Total Fluence**	**DPA**
6.00E+00	183.06	4.07E+19	9.32E-02
6.70E+00	189.26	3.71E+19	8.77E-02
7.40E+00	196.67	2.18E+19	5.36E-02
8.20E+00	203.37	1.36E+19	3.45E-02
9.00E+00	214.58	7.65E+18	2.05E-02
1.00E+01	225.69	4.36E+18	1.23E-02
1.10E+01	237.6	2.27E+18	6.73E-03
1.20E+01	247.41	8.85E+17	2.74E-03
1.30E+01	258.52	3.53E+17	1.14E-03
1.40E+01	271.35	1.84E+17	6.23E-04
1.50E+01	290.27	9.44E+16	3.43E-04
1.60E+01	293.2	6.15E+16	2.25E-04
1.70E+01	292.73	1.29E+16	4.74E-05
1.80E+01	297.65	9.44E+15	3.51E-05
1.90E+01	307.26	5.59E+15	2.15E-05
2.00E+01	316.36	0.00E+00	0.00E+00
			6.04E+00

Table 14. Calculated fluence and DPA for capsule 7 of the UCSB experiment.

	DPA xsec	7-3		7-2		7-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
1.00E-10	0	6.39E+15		6.54E+15		5.41E+15	
1.00E-09	7.73	8.31E+17	8.03E-05	9.11E+17	8.80E-05	8.12E+17	7.85E-05
1.00E-08	2.444	1.24E+20	3.77E-03	1.25E+20	3.82E-03	1.29E+20	3.93E-03
2.30E-08	1.278	4.51E+20	7.21E-03	4.50E+20	7.20E-03	4.66E+20	7.44E-03
5.00E-08	0.857	1.11E+21	1.19E-02	1.13E+21	1.21E-02	1.15E+21	1.24E-02
7.60E-08	0.644	8.05E+20	6.48E-03	8.08E+20	6.51E-03	8.25E+20	6.64E-03
1.15E-07	0.523	6.87E+20	4.49E-03	6.99E+20	4.57E-03	7.04E+20	4.60E-03
1.70E-07	0.428	4.24E+20	2.27E-03	4.39E+20	2.35E-03	4.44E+20	2.37E-03
2.55E-07	0.351	2.94E+20	1.29E-03	3.02E+20	1.33E-03	3.04E+20	1.33E-03
3.80E-07	0.287	2.46E+20	8.83E-04	2.50E+20	8.97E-04	2.57E+20	9.24E-04
5.50E-07	0.237	2.23E+20	6.62E-04	2.25E+20	6.67E-04	2.33E+20	6.91E-04
8.40E-07	0.194	2.53E+20	6.14E-04	2.56E+20	6.22E-04	2.57E+20	6.23E-04
1.28E-06	0.157	2.43E+20	4.76E-04	2.49E+20	4.88E-04	2.50E+20	4.91E-04
1.90E-06	0.128	2.26E+20	3.62E-04	2.27E+20	3.64E-04	2.32E+20	3.71E-04
2.80E-06	0.105	2.14E+20	2.80E-04	2.18E+20	2.86E-04	2.22E+20	2.91E-04
4.25E-06	0.086	2.31E+20	2.48E-04	2.29E+20	2.46E-04	2.33E+20	2.51E-04
6.30E-06	0.07	2.15E+20	1.88E-04	2.15E+20	1.88E-04	2.21E+20	1.93E-04
9.20E-06	0.058	2.12E+20	1.53E-04	2.09E+20	1.52E-04	2.11E+20	1.53E-04
1.35E-05	0.048	2.11E+20	1.27E-04	2.22E+20	1.33E-04	2.19E+20	1.32E-04
2.10E-05	0.038	2.42E+20	1.15E-04	2.53E+20	1.20E-04	2.51E+20	1.19E-04
3.00E-05	0.031	2.02E+20	7.82E-05	1.99E+20	7.72E-05	2.07E+20	8.01E-05
4.50E-05	0.026	2.31E+20	7.51E-05	2.36E+20	7.66E-05	2.39E+20	7.76E-05
6.90E-05	0.021	2.46E+20	6.45E-05	2.50E+20	6.56E-05	2.55E+20	6.69E-05
1.00E-04	0.017	2.17E+20	4.62E-05	2.19E+20	4.65E-05	2.26E+20	4.81E-05
1.35E-04	0.014	1.79E+20	3.13E-05	1.79E+20	3.13E-05	1.83E+20	3.21E-05
1.70E-04	0.014	1.38E+20	2.41E-05	1.41E+20	2.47E-05	1.42E+20	2.48E-05
2.20E-04	0.011	1.55E+20	2.13E-05	1.57E+20	2.16E-05	1.58E+20	2.17E-05

	DPA xsec	7-3		7-2		7-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
2.80E-04	0.011	1.49E+20	2.05E-05	1.44E+20	1.97E-05	1.52E+20	2.09E-05
3.60E-04	0.01	1.48E+20	1.85E-05	1.47E+20	1.83E-05	1.53E+20	1.92E-05
4.50E-04	0.007	1.31E+20	1.15E-05	1.28E+20	1.12E-05	1.32E+20	1.16E-05
5.75E-04	0.005	1.49E+20	9.31E-06	1.49E+20	9.31E-06	1.52E+20	9.52E-06
7.60E-04	0.129	1.69E+20	2.73E-04	1.75E+20	2.82E-04	1.73E+20	2.79E-04
9.60E-04	0.308	1.48E+20	5.69E-04	1.47E+20	5.66E-04	1.45E+20	5.59E-04
1.28E-03	0.672	1.73E+20	1.45E-03	1.78E+20	1.49E-03	1.76E+20	1.48E-03
1.60E-03	0.477	1.36E+20	8.10E-04	1.35E+20	8.04E-04	1.40E+20	8.36E-04
2.00E-03	0.511	1.42E+20	9.07E-04	1.41E+20	9.03E-04	1.42E+20	9.05E-04
2.70E-03	0.568	1.80E+20	1.28E-03	1.83E+20	1.30E-03	1.88E+20	1.34E-03
3.40E-03	0.632	1.49E+20	1.18E-03	1.47E+20	1.16E-03	1.50E+20	1.19E-03
4.50E-03	0.822	1.74E+20	1.79E-03	1.85E+20	1.90E-03	1.80E+20	1.85E-03
5.50E-03	0.826	1.29E+20	1.34E-03	1.35E+20	1.39E-03	1.37E+20	1.41E-03
7.20E-03	1.671	1.73E+20	3.62E-03	1.85E+20	3.86E-03	1.82E+20	3.80E-03
9.20E-03	3.709	1.39E+20	6.45E-03	1.42E+20	6.56E-03	1.46E+20	6.78E-03
1.20E-02	1.491	1.71E+20	3.18E-03	1.68E+20	3.14E-03	1.80E+20	3.35E-03
1.50E-02	1.156	1.53E+20	2.21E-03	1.55E+20	2.24E-03	1.54E+20	2.23E-03
1.90E-02	0.973	1.62E+20	1.97E-03	1.65E+20	2.01E-03	1.59E+20	1.93E-03
2.55E-02	0.555	2.30E+20	1.60E-03	2.31E+20	1.60E-03	2.37E+20	1.64E-03
3.20E-02	26.762	2.06E+20	6.90E-02	2.14E+20	7.16E-02	2.12E+20	7.10E-02
4.00E-02	8.161	9.74E+19	9.94E-03	9.92E+19	1.01E-02	1.02E+20	1.04E-02
5.25E-02	6.515	2.02E+20	1.65E-02	2.06E+20	1.68E-02	2.07E+20	1.69E-02
6.60E-02	6.576	1.97E+20	1.62E-02	1.96E+20	1.61E-02	2.05E+20	1.69E-02
8.80E-02	13.137	2.99E+20	4.91E-02	3.01E+20	4.93E-02	3.04E+20	5.00E-02
1.10E-01	11.84	1.77E+20	2.62E-02	1.86E+20	2.75E-02	1.87E+20	2.77E-02
1.35E-01	11.27	2.67E+20	3.76E-02	2.69E+20	3.79E-02	2.76E+20	3.88E-02
1.60E-01	21.53	1.60E+20	4.30E-02	1.56E+20	4.21E-02	1.63E+20	4.39E-02
1.90E-01	15.85	2.18E+20	4.33E-02	2.21E+20	4.38E-02	2.25E+20	4.45E-02
2.20E-01	22.01	1.73E+20	4.76E-02	1.83E+20	5.02E-02	1.82E+20	5.02E-02

	DPA xsec	7-3		7-2		7-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
2.55E-01	18.27	2.09E+20	4.77E-02	2.01E+20	4.59E-02	2.11E+20	4.81E-02
2.90E-01	17.37	2.19E+20	4.76E-02	2.24E+20	4.85E-02	2.30E+20	5.00E-02
3.20E-01	13.51	1.59E+20	2.68E-02	1.57E+20	2.64E-02	1.59E+20	2.69E-02
3.60E-01	25.14	2.21E+20	6.96E-02	2.24E+20	7.03E-02	2.26E+20	7.12E-02
4.00E-01	46.52	1.91E+20	1.11E-01	1.96E+20	1.14E-01	1.96E+20	1.14E-01
4.50E-01	43.04	1.79E+20	9.65E-02	1.81E+20	9.73E-02	1.86E+20	1.00E-01
5.00E-01	36.4	2.01E+20	9.15E-02	2.05E+20	9.34E-02	2.11E+20	9.60E-02
5.50E-01	33.22	2.04E+20	8.46E-02	2.01E+20	8.35E-02	2.07E+20	8.60E-02
6.00E-01	34.18	1.90E+20	8.13E-02	1.96E+20	8.38E-02	1.99E+20	8.52E-02
6.60E-01	19.64	2.39E+20	5.87E-02	2.37E+20	5.81E-02	2.46E+20	6.03E-02
7.20E-01	48.89	2.46E+20	1.50E-01	2.50E+20	1.53E-01	2.58E+20	1.58E-01
7.80E-01	74.22	2.31E+20	2.14E-01	2.34E+20	2.17E-01	2.38E+20	2.21E-01
8.40E-01	44.02	1.81E+20	9.98E-02	1.90E+20	1.04E-01	1.90E+20	1.04E-01
9.20E-01	40.97	2.21E+20	1.13E-01	2.22E+20	1.14E-01	2.24E+20	1.15E-01
1.00E+00	50.95	2.02E+20	1.29E-01	1.96E+20	1.25E-01	2.10E+20	1.34E-01
1.20E+00	50.09	4.76E+20	2.98E-01	4.79E+20	3.00E-01	4.87E+20	3.05E-01
1.40E+00	64.54	4.30E+20	3.47E-01	4.32E+20	3.48E-01	4.36E+20	3.52E-01
1.60E+00	73.58	3.61E+20	3.32E-01	3.66E+20	3.37E-01	3.70E+20	3.41E-01
1.80E+00	76.46	3.19E+20	3.05E-01	3.20E+20	3.06E-01	3.25E+20	3.11E-01
2.00E+00	95.15	2.78E+20	3.31E-01	2.83E+20	3.36E-01	2.89E+20	3.43E-01
2.30E+00	93.75	3.53E+20	4.13E-01	3.55E+20	4.16E-01	3.51E+20	4.11E-01
2.60E+00	112.05	3.19E+20	4.47E-01	3.26E+20	4.57E-01	3.30E+20	4.62E-01
2.90E+00	123.55	2.40E+20	3.71E-01	2.42E+20	3.74E-01	2.49E+20	3.85E-01
3.30E+00	133.45	2.42E+20	4.03E-01	2.36E+20	3.94E-01	2.48E+20	4.14E-01
3.70E+00	135.25	1.61E+20	2.72E-01	1.70E+20	2.87E-01	1.66E+20	2.80E-01
4.10E+00	149.55	1.28E+20	2.39E-01	1.28E+20	2.39E-01	1.29E+20	2.41E-01
4.50E+00	158.25	1.00E+20	1.99E-01	9.77E+19	1.93E-01	1.01E+20	1.99E-01
5.00E+00	168.55	9.29E+19	1.96E-01	9.71E+19	2.04E-01	9.62E+19	2.03E-01
5.50E+00	176.46	6.48E+19	1.43E-01	6.39E+19	1.41E-01	6.40E+19	1.41E-01

	DPA xsec	7-3		7-2		7-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
6.00E+00	183.06	4.30E+19	9.85E-02	4.17E+19	9.54E-02	4.55E+19	1.04E-01
6.70E+00	189.26	3.95E+19	9.35E-02	4.00E+19	9.45E-02	4.14E+19	9.79E-02
7.40E+00	196.67	2.39E+19	5.87E-02	2.32E+19	5.71E-02	2.41E+19	5.92E-02
8.20E+00	203.37	1.60E+19	4.07E-02	1.56E+19	3.96E-02	1.55E+19	3.93E-02
9.00E+00	214.58	7.93E+18	2.13E-02	9.20E+18	2.47E-02	8.84E+18	2.37E-02
1.00E+01	225.69	5.62E+18	1.59E-02	5.13E+18	1.45E-02	5.41E+18	1.53E-02
1.10E+01	237.6	2.67E+18	7.92E-03	1.97E+18	5.85E-03	2.30E+18	6.83E-03
1.20E+01	247.41	1.03E+18	3.19E-03	9.51E+17	2.94E-03	1.24E+18	3.84E-03
1.30E+01	258.52	3.66E+17	1.18E-03	3.31E+17	1.07E-03	4.74E+17	1.53E-03
1.40E+01	271.35	1.09E+17	3.70E-04	1.86E+17	6.29E-04	1.51E+17	5.12E-04
1.50E+01	290.27	5.29E+16	1.92E-04	1.74E+17	6.32E-04	5.44E+16	1.97E-04
1.60E+01	293.2	1.19E+17	4.37E-04	1.49E+17	5.48E-04	3.13E+16	1.15E-04
1.70E+01	292.73	7.04E+16	2.57E-04	5.28E+16	1.93E-04	7.36E+15	2.69E-05
1.80E+01	297.65	3.43E+16	1.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.90E+01	307.26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.00E+01	316.36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
			6.49E+00		**6.54E+00**		**6.65E+00**

Table 15. Calculated fluence and DPA for capsule 6 of the UCSB experiment.

	DPA xsec	6A		6-B	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA
1.00E-10	0	3.90E+14		1.06E+15	
1.00E-09	7.73	2.32E+17	2.24E-05	6.29E+17	6.08E-05
1.00E-08	2.444	3.48E+19	1.06E-03	9.44E+19	2.88E-03
2.30E-08	1.278	1.27E+20	2.03E-03	3.44E+20	5.49E-03
5.00E-08	0.857	3.15E+20	3.37E-03	8.53E+20	9.13E-03
7.60E-08	0.644	2.21E+20	1.78E-03	5.99E+20	4.82E-03
1.15E-07	0.523	1.91E+20	1.25E-03	5.19E+20	3.39E-03
1.70E-07	0.428	1.19E+20	6.37E-04	3.23E+20	1.73E-03
2.55E-07	0.351	8.27E+19	3.63E-04	2.24E+20	9.84E-04
3.80E-07	0.287	6.92E+19	2.48E-04	1.87E+20	6.73E-04
5.50E-07	0.237	6.31E+19	1.87E-04	1.71E+20	5.07E-04
8.40E-07	0.194	6.99E+19	1.70E-04	1.90E+20	4.60E-04
1.28E-06	0.157	6.83E+19	1.34E-04	1.85E+20	3.63E-04
1.90E-06	0.128	6.30E+19	1.01E-04	1.71E+20	2.73E-04
2.80E-06	0.105	6.11E+19	8.02E-05	1.66E+20	2.17E-04
4.25E-06	0.086	6.33E+19	6.80E-05	1.72E+20	1.84E-04
6.30E-06	0.07	5.99E+19	5.24E-05	1.62E+20	1.42E-04
9.20E-06	0.058	5.89E+19	4.27E-05	1.60E+20	1.16E-04
1.35E-05	0.048	5.95E+19	3.57E-05	1.61E+20	9.68E-05
2.10E-05	0.038	6.96E+19	3.31E-05	1.89E+20	8.96E-05
3.00E-05	0.031	5.73E+19	2.22E-05	1.55E+20	6.02E-05
4.50E-05	0.026	6.57E+19	2.14E-05	1.78E+20	5.79E-05
6.90E-05	0.021	7.00E+19	1.84E-05	1.90E+20	4.98E-05
1.00E-04	0.017	6.17E+19	1.31E-05	1.67E+20	3.55E-05
1.35E-04	0.014	5.02E+19	8.78E-06	1.36E+20	2.38E-05
1.70E-04	0.014	3.87E+19	6.77E-06	1.05E+20	1.84E-05
2.20E-04	0.011	4.28E+19	5.88E-06	1.16E+20	1.60E-05

	DPA xsec	6A		6-B	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA
2.80E-04	0.011	4.14E+19	5.69E-06	1.12E+20	1.54E-05
3.60E-04	0.01	4.12E+19	5.15E-06	1.12E+20	1.40E-05
4.50E-04	0.007	3.64E+19	3.18E-06	9.85E+19	8.62E-06
5.75E-04	0.005	4.12E+19	2.57E-06	1.12E+20	6.98E-06
7.60E-04	0.129	4.71E+19	7.59E-05	1.28E+20	2.06E-04
9.60E-04	0.308	3.96E+19	1.52E-04	1.07E+20	4.13E-04
1.28E-03	0.672	4.82E+19	4.05E-04	1.31E+20	1.10E-03
1.60E-03	0.477	3.82E+19	2.28E-04	1.03E+20	6.17E-04
2.00E-03	0.511	3.97E+19	2.53E-04	1.08E+20	6.87E-04
2.70E-03	0.568	5.22E+19	3.70E-04	1.41E+20	1.00E-03
3.40E-03	0.632	4.19E+19	3.31E-04	1.14E+20	8.98E-04
4.50E-03	0.822	4.99E+19	5.13E-04	1.35E+20	1.39E-03
5.50E-03	0.826	3.71E+19	3.83E-04	1.01E+20	1.04E-03
7.20E-03	1.671	4.90E+19	1.02E-03	1.33E+20	2.78E-03
9.20E-03	3.709	3.97E+19	1.84E-03	1.08E+20	4.99E-03
1.20E-02	1.491	4.93E+19	9.19E-04	1.34E+20	2.49E-03
1.50E-02	1.156	4.16E+19	6.01E-04	1.13E+20	1.63E-03
1.90E-02	0.973	4.41E+19	5.37E-04	1.20E+20	1.45E-03
2.55E-02	0.555	6.34E+19	4.40E-04	1.72E+20	1.19E-03
3.20E-02	26.762	5.79E+19	1.94E-02	1.57E+20	5.25E-02
4.00E-02	8.161	2.86E+19	2.92E-03	7.75E+19	7.91E-03
5.25E-02	6.515	5.62E+19	4.58E-03	1.52E+20	1.24E-02
6.60E-02	6.576	5.61E+19	4.61E-03	1.52E+20	1.25E-02
8.80E-02	13.137	8.10E+19	1.33E-02	2.19E+20	3.60E-02
1.10E-01	11.84	5.16E+19	7.64E-03	1.40E+20	2.07E-02
1.35E-01	11.27	7.53E+19	1.06E-02	2.04E+20	2.87E-02
1.60E-01	21.53	4.47E+19	1.20E-02	1.21E+20	3.26E-02
1.90E-01	15.85	6.08E+19	1.21E-02	1.65E+20	3.27E-02
2.20E-01	22.01	4.86E+19	1.34E-02	1.32E+20	3.63E-02

	DPA xsec	6A		6-B	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA
2.55E-01	18.27	5.71E+19	1.30E-02	1.55E+20	3.53E-02
2.90E-01	17.37	6.27E+19	1.36E-02	1.70E+20	3.69E-02
3.20E-01	13.51	4.32E+19	7.30E-03	1.17E+20	1.98E-02
3.60E-01	25.14	6.18E+19	1.94E-02	1.67E+20	5.26E-02
4.00E-01	46.52	5.38E+19	3.13E-02	1.46E+20	8.48E-02
4.50E-01	43.04	5.07E+19	2.73E-02	1.37E+20	7.39E-02
5.00E-01	36.4	5.82E+19	2.65E-02	1.58E+20	7.18E-02
5.50E-01	33.22	5.75E+19	2.39E-02	1.56E+20	6.47E-02
6.00E-01	34.18	5.30E+19	2.27E-02	1.44E+20	6.14E-02
6.60E-01	19.64	6.80E+19	1.67E-02	1.84E+20	4.53E-02
7.20E-01	48.89	6.87E+19	4.20E-02	1.86E+20	1.14E-01
7.80E-01	74.22	6.51E+19	6.04E-02	1.76E+20	1.64E-01
8.40E-01	44.02	5.19E+19	2.86E-02	1.41E+20	7.74E-02
9.20E-01	40.97	6.19E+19	3.17E-02	1.68E+20	8.60E-02
1.00E+00	50.95	5.79E+19	3.69E-02	1.57E+20	1.00E-01
1.20E+00	50.09	1.35E+20	8.44E-02	3.66E+20	2.29E-01
1.40E+00	64.54	1.20E+20	9.71E-02	3.26E+20	2.63E-01
1.60E+00	73.58	1.01E+20	9.29E-02	2.74E+20	2.52E-01
1.80E+00	76.46	8.92E+19	8.53E-02	2.42E+20	2.31E-01
2.00E+00	95.15	7.85E+19	9.34E-02	2.13E+20	2.53E-01
2.30E+00	93.75	9.70E+19	1.14E-01	2.63E+20	3.08E-01
2.60E+00	112.05	8.90E+19	1.25E-01	2.41E+20	3.38E-01
2.90E+00	123.55	6.93E+19	1.07E-01	1.88E+20	2.90E-01
3.30E+00	133.45	6.68E+19	1.11E-01	1.81E+20	3.02E-01
3.70E+00	135.25	4.61E+19	7.80E-02	1.25E+20	2.11E-01
4.10E+00	149.55	3.50E+19	6.55E-02	9.50E+19	1.78E-01
4.50E+00	158.25	2.78E+19	5.50E-02	7.53E+19	1.49E-01
5.00E+00	168.55	2.65E+19	5.57E-02	7.17E+19	1.51E-01
5.50E+00	176.46	1.76E+19	3.88E-02	4.77E+19	1.05E-01

	DPA xsec	6A		6-B	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA
6.00E+00	183.06	1.32E+19	3.02E-02	3.58E+19	8.18E-02
6.70E+00	189.26	1.13E+19	2.67E-02	3.06E+19	7.23E-02
7.40E+00	196.67	6.47E+18	1.59E-02	1.75E+19	4.31E-02
8.20E+00	203.37	4.31E+18	1.10E-02	1.17E+19	2.97E-02
9.00E+00	214.58	2.43E+18	6.51E-03	6.58E+18	1.77E-02
1.00E+01	225.69	1.45E+18	4.08E-03	3.92E+18	1.11E-02
1.10E+01	237.6	6.57E+17	1.95E-03	1.78E+18	5.29E-03
1.20E+01	247.41	2.39E+17	7.40E-04	6.49E+17	2.01E-03
1.30E+01	258.52	1.49E+17	4.81E-04	4.03E+17	1.30E-03
1.40E+01	271.35	7.66E+16	2.60E-04	2.08E+17	7.04E-04
1.50E+01	290.27	2.75E+16	9.99E-05	7.46E+16	2.71E-04
1.60E+01	293.2	2.01E+16	7.38E-05	5.45E+16	2.00E-04
1.70E+01	292.73	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.80E+01	297.65	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.90E+01	307.26	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.00E+01	316.36	0.00E+00	0.00E+00	0.00E+00	0.00E+00
			1.82E+00		**4.94E+00**

Table 16. Calculated fluence and DPA for capsule 5 of the UCSB experiment.

	DPA xsec	5-4		5-3		5-2		5-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
1.00E-10	0	3.04E+15		3.04E+15		5.59E+15		2.94E+15	
1.00E-09	7.73	8.07E+17	7.80E-05	7.77E+17	7.51E-05	9.15E+17	8.84E-05	6.79E+17	6.56E-05
1.00E-08	2.444	1.25E+20	3.82E-03	1.26E+20	3.85E-03	1.22E+20	3.72E-03	1.20E+20	3.65E-03
2.30E-08	1.278	4.50E+20	7.19E-03	4.42E+20	7.06E-03	4.37E+20	6.99E-03	4.37E+20	6.98E-03
5.00E-08	0.857	1.12E+21	1.20E-02	1.10E+21	1.17E-02	1.09E+21	1.17E-02	1.09E+21	1.17E-02
7.60E-08	0.644	7.99E+20	6.43E-03	7.86E+20	6.33E-03	7.78E+20	6.27E-03	7.78E+20	6.26E-03
1.15E-07	0.523	6.89E+20	4.50E-03	6.83E+20	4.47E-03	6.68E+20	4.37E-03	6.70E+20	4.38E-03
1.70E-07	0.428	4.36E+20	2.33E-03	4.29E+20	2.30E-03	4.19E+20	2.24E-03	4.24E+20	2.27E-03
2.55E-07	0.351	3.02E+20	1.33E-03	3.04E+20	1.33E-03	2.98E+20	1.31E-03	2.94E+20	1.29E-03
3.80E-07	0.287	2.56E+20	9.18E-04	2.53E+20	9.08E-04	2.52E+20	9.03E-04	2.52E+20	9.04E-04
5.50E-07	0.237	2.29E+20	6.78E-04	2.29E+20	6.80E-04	2.32E+20	6.87E-04	2.29E+20	6.80E-04
8.40E-07	0.194	2.59E+20	6.27E-04	2.57E+20	6.24E-04	2.57E+20	6.23E-04	2.54E+20	6.17E-04
1.28E-06	0.157	2.46E+20	4.83E-04	2.47E+20	4.85E-04	2.44E+20	4.80E-04	2.49E+20	4.88E-04
1.90E-06	0.128	2.34E+20	3.74E-04	2.31E+20	3.70E-04	2.29E+20	3.67E-04	2.27E+20	3.63E-04
2.80E-06	0.105	2.26E+20	2.96E-04	2.28E+20	2.99E-04	2.25E+20	2.95E-04	2.18E+20	2.86E-04
4.25E-06	0.086	2.41E+20	2.59E-04	2.37E+20	2.55E-04	2.35E+20	2.53E-04	2.34E+20	2.52E-04
6.30E-06	0.07	2.21E+20	1.94E-04	2.24E+20	1.96E-04	2.17E+20	1.90E-04	2.15E+20	1.88E-04
9.20E-06	0.058	2.13E+20	1.55E-04	2.11E+20	1.53E-04	2.09E+20	1.52E-04	2.14E+20	1.55E-04
1.35E-05	0.048	2.25E+20	1.35E-04	2.21E+20	1.33E-04	2.21E+20	1.33E-04	2.17E+20	1.30E-04
2.10E-05	0.038	2.48E+20	1.18E-04	2.53E+20	1.20E-04	2.49E+20	1.18E-04	2.46E+20	1.17E-04
3.00E-05	0.031	2.07E+20	8.03E-05	2.08E+20	8.05E-05	2.04E+20	7.89E-05	2.03E+20	7.88E-05
4.50E-05	0.026	2.40E+20	7.79E-05	2.44E+20	7.92E-05	2.37E+20	7.71E-05	2.33E+20	7.59E-05
6.90E-05	0.021	2.56E+20	6.71E-05	2.58E+20	6.76E-05	2.55E+20	6.70E-05	2.56E+20	6.73E-05
1.00E-04	0.017	2.27E+20	4.82E-05	2.30E+20	4.89E-05	2.28E+20	4.84E-05	2.22E+20	4.71E-05
1.35E-04	0.014	1.80E+20	3.14E-05	1.83E+20	3.21E-05	1.81E+20	3.17E-05	1.79E+20	3.13E-05
1.70E-04	0.014	1.42E+20	2.48E-05	1.42E+20	2.49E-05	1.42E+20	2.49E-05	1.42E+20	2.49E-05
2.20E-04	0.011	1.61E+20	2.21E-05	1.59E+20	2.18E-05	1.59E+20	2.19E-05	1.61E+20	2.21E-05

	DPA xsec	5-4		5-3		5-2		5-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
2.80E-04	0.011	1.53E+20	2.11E-05	1.49E+20	2.05E-05	1.53E+20	2.10E-05	1.53E+20	2.10E-05
3.60E-04	0.01	1.57E+20	1.96E-05	1.54E+20	1.93E-05	1.52E+20	1.90E-05	1.50E+20	1.88E-05
4.50E-04	0.007	1.37E+20	1.20E-05	1.38E+20	1.21E-05	1.34E+20	1.17E-05	1.33E+20	1.16E-05
5.75E-04	0.005	1.53E+20	9.55E-06	1.53E+20	9.58E-06	1.58E+20	9.85E-06	1.54E+20	9.63E-06
7.60E-04	0.129	1.77E+20	2.85E-04	1.80E+20	2.91E-04	1.77E+20	2.86E-04	1.76E+20	2.84E-04
9.60E-04	0.308	1.48E+20	5.69E-04	1.46E+20	5.61E-04	1.47E+20	5.66E-04	1.43E+20	5.51E-04
1.28E-03	0.672	1.80E+20	1.51E-03	1.77E+20	1.49E-03	1.79E+20	1.50E-03	1.73E+20	1.45E-03
1.60E-03	0.477	1.45E+20	8.67E-04	1.48E+20	8.80E-04	1.39E+20	8.30E-04	1.40E+20	8.35E-04
2.00E-03	0.511	1.46E+20	9.32E-04	1.41E+20	9.02E-04	1.45E+20	9.24E-04	1.40E+20	8.95E-04
2.70E-03	0.568	1.94E+20	1.38E-03	1.86E+20	1.32E-03	1.92E+20	1.37E-03	1.89E+20	1.34E-03
3.40E-03	0.632	1.52E+20	1.20E-03	1.52E+20	1.20E-03	1.49E+20	1.18E-03	1.48E+20	1.17E-03
4.50E-03	0.822	1.84E+20	1.89E-03	1.87E+20	1.92E-03	1.86E+20	1.92E-03	1.80E+20	1.85E-03
5.50E-03	0.826	1.43E+20	1.47E-03	1.41E+20	1.45E-03	1.37E+20	1.41E-03	1.39E+20	1.44E-03
7.20E-03	1.671	1.85E+20	3.86E-03	1.88E+20	3.93E-03	1.83E+20	3.81E-03	1.78E+20	3.72E-03
9.20E-03	3.709	1.49E+20	6.91E-03	1.48E+20	6.84E-03	1.46E+20	6.77E-03	1.48E+20	6.88E-03
1.20E-02	1.491	1.82E+20	3.38E-03	1.86E+20	3.47E-03	1.80E+20	3.35E-03	1.76E+20	3.28E-03
1.50E-02	1.156	1.59E+20	2.29E-03	1.60E+20	2.31E-03	1.56E+20	2.26E-03	1.53E+20	2.21E-03
1.90E-02	0.973	1.60E+20	1.94E-03	1.63E+20	1.98E-03	1.57E+20	1.91E-03	1.58E+20	1.93E-03
2.55E-02	0.555	2.42E+20	1.68E-03	2.45E+20	1.70E-03	2.41E+20	1.67E-03	2.31E+20	1.60E-03
3.20E-02	26.762	2.15E+20	7.19E-02	2.14E+20	7.16E-02	2.16E+20	7.23E-02	2.12E+20	7.08E-02
4.00E-02	8.161	1.02E+20	1.04E-02	1.04E+20	1.06E-02	1.02E+20	1.05E-02	1.02E+20	1.04E-02
5.25E-02	6.515	2.10E+20	1.71E-02	2.08E+20	1.69E-02	2.07E+20	1.69E-02	2.04E+20	1.66E-02
6.60E-02	6.576	2.11E+20	1.73E-02	2.09E+20	1.72E-02	2.06E+20	1.70E-02	2.01E+20	1.65E-02
8.80E-02	13.137	3.05E+20	5.00E-02	3.06E+20	5.02E-02	3.06E+20	5.02E-02	3.03E+20	4.97E-02
1.10E-01	11.84	1.85E+20	2.74E-02	1.86E+20	2.76E-02	1.83E+20	2.71E-02	1.80E+20	2.67E-02
1.35E-01	11.27	2.85E+20	4.02E-02	2.77E+20	3.91E-02	2.79E+20	3.93E-02	2.68E+20	3.78E-02
1.60E-01	21.53	1.64E+20	4.41E-02	1.62E+20	4.35E-02	1.63E+20	4.38E-02	1.57E+20	4.23E-02
1.90E-01	15.85	2.26E+20	4.47E-02	2.23E+20	4.42E-02	2.23E+20	4.42E-02	2.23E+20	4.41E-02
2.20E-01	22.01	1.83E+20	5.05E-02	1.86E+20	5.12E-02	1.85E+20	5.08E-02	1.79E+20	4.93E-02

	DPA xsec	5-4		5-3		5-2		5-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
2.55E-01	18.27	2.17E+20	4.96E-02	2.19E+20	5.01E-02	2.14E+20	4.88E-02	2.12E+20	4.84E-02
2.90E-01	17.37	2.32E+20	5.04E-02	2.29E+20	4.98E-02	2.32E+20	5.03E-02	2.31E+20	5.02E-02
3.20E-01	13.51	1.65E+20	2.78E-02	1.65E+20	2.78E-02	1.65E+20	2.78E-02	1.62E+20	2.74E-02
3.60E-01	25.14	2.31E+20	7.26E-02	2.33E+20	7.31E-02	2.27E+20	7.14E-02	2.27E+20	7.15E-02
4.00E-01	46.52	2.01E+20	1.17E-01	1.98E+20	1.15E-01	2.01E+20	1.17E-01	1.98E+20	1.15E-01
4.50E-01	43.04	1.87E+20	1.00E-01	1.89E+20	1.02E-01	1.85E+20	9.96E-02	1.85E+20	9.96E-02
5.00E-01	36.4	2.14E+20	9.72E-02	2.15E+20	9.79E-02	2.09E+20	9.51E-02	2.11E+20	9.58E-02
5.50E-01	33.22	2.10E+20	8.72E-02	2.14E+20	8.89E-02	2.10E+20	8.74E-02	2.09E+20	8.67E-02
6.00E-01	34.18	2.03E+20	8.67E-02	1.98E+20	8.45E-02	1.98E+20	8.44E-02	1.98E+20	8.48E-02
6.60E-01	19.64	2.48E+20	6.08E-02	2.51E+20	6.17E-02	2.48E+20	6.09E-02	2.43E+20	5.96E-02
7.20E-01	48.89	2.52E+20	1.54E-01	2.59E+20	1.58E-01	2.52E+20	1.54E-01	2.48E+20	1.51E-01
7.80E-01	74.22	2.43E+20	2.25E-01	2.41E+20	2.23E-01	2.39E+20	2.22E-01	2.41E+20	2.24E-01
8.40E-01	44.02	1.90E+20	1.05E-01	1.92E+20	1.05E-01	1.89E+20	1.04E-01	1.87E+20	1.03E-01
9.20E-01	40.97	2.32E+20	1.19E-01	2.32E+20	1.19E-01	2.28E+20	1.17E-01	2.25E+20	1.15E-01
1.00E+00	50.95	2.15E+20	1.37E-01	2.16E+20	1.38E-01	2.13E+20	1.36E-01	2.11E+20	1.34E-01
1.20E+00	50.09	4.92E+20	3.08E-01	4.92E+20	3.08E-01	4.96E+20	3.10E-01	4.85E+20	3.04E-01
1.40E+00	64.54	4.50E+20	3.63E-01	4.42E+20	3.57E-01	4.43E+20	3.58E-01	4.39E+20	3.54E-01
1.60E+00	73.58	3.80E+20	3.50E-01	3.79E+20	3.48E-01	3.76E+20	3.46E-01	3.71E+20	3.41E-01
1.80E+00	76.46	3.31E+20	3.16E-01	3.39E+20	3.24E-01	3.23E+20	3.09E-01	3.29E+20	3.14E-01
2.00E+00	95.15	2.84E+20	3.38E-01	2.90E+20	3.44E-01	2.91E+20	3.47E-01	2.88E+20	3.43E-01
2.30E+00	93.75	3.63E+20	4.25E-01	3.61E+20	4.23E-01	3.57E+20	4.18E-01	3.53E+20	4.14E-01
2.60E+00	112.05	3.33E+20	4.66E-01	3.33E+20	4.66E-01	3.34E+20	4.68E-01	3.31E+20	4.64E-01
2.90E+00	123.55	2.53E+20	3.90E-01	2.50E+20	3.86E-01	2.52E+20	3.89E-01	2.50E+20	3.85E-01
3.30E+00	133.45	2.49E+20	4.15E-01	2.52E+20	4.21E-01	2.47E+20	4.12E-01	2.47E+20	4.11E-01
3.70E+00	135.25	1.70E+20	2.87E-01	1.68E+20	2.84E-01	1.67E+20	2.82E-01	1.65E+20	2.80E-01
4.10E+00	149.55	1.30E+20	2.42E-01	1.31E+20	2.44E-01	1.33E+20	2.48E-01	1.29E+20	2.40E-01
4.50E+00	158.25	1.02E+20	2.01E-01	1.03E+20	2.04E-01	1.01E+20	1.99E-01	1.02E+20	2.01E-01
5.00E+00	168.55	9.65E+19	2.03E-01	9.45E+19	1.99E-01	9.89E+19	2.08E-01	9.53E+19	2.01E-01
5.50E+00	176.46	6.62E+19	1.46E-01	6.58E+19	1.45E-01	6.73E+19	1.48E-01	6.50E+19	1.43E-01

	DPA xsec	5-4		5-3		5-2		5-1	
Upper Energy(MeV)	**keV-barn**	**Total Fluence**	**DPA**	**Total Fluence**	**DPA**	**Total Fluence**	**DPA**	**Total Fluence**	**DPA**
6.00E+00	183.06	4.64E+19	1.06E-01	4.69E+19	1.07E-01	4.70E+19	1.08E-01	4.48E+19	1.03E-01
6.70E+00	189.26	4.33E+19	1.03E-01	4.35E+19	1.03E-01	4.24E+19	1.00E-01	4.20E+19	9.93E-02
7.40E+00	196.67	2.40E+19	5.91E-02	2.54E+19	6.24E-02	2.35E+19	5.78E-02	2.40E+19	5.89E-02
8.20E+00	203.37	1.47E+19	3.74E-02	1.54E+19	3.90E-02	1.58E+19	4.01E-02	1.53E+19	3.88E-02
9.00E+00	214.58	7.72E+18	2.07E-02	7.87E+18	2.11E-02	8.25E+18	2.21E-02	7.77E+18	2.08E-02
1.00E+01	225.69	5.14E+18	1.45E-02	4.79E+18	1.35E-02	5.70E+18	1.61E-02	5.43E+18	1.53E-02
1.10E+01	237.6	2.72E+18	8.08E-03	2.70E+18	8.00E-03	2.74E+18	8.13E-03	2.28E+18	6.78E-03
1.20E+01	247.41	9.87E+17	3.05E-03	1.07E+18	3.30E-03	1.11E+18	3.43E-03	1.54E+18	4.76E-03
1.30E+01	258.52	5.68E+17	1.83E-03	5.88E+17	1.90E-03	6.09E+17	1.97E-03	4.75E+17	1.53E-03
1.40E+01	271.35	1.12E+17	3.81E-04	1.21E+17	4.11E-04	2.05E+17	6.95E-04	3.72E+17	1.26E-03
1.50E+01	290.27	8.59E+16	3.12E-04	8.09E+16	2.94E-04	7.18E+16	2.60E-04	1.34E+17	4.87E-04
1.60E+01	293.2	7.08E+16	2.59E-04	7.88E+16	2.89E-04	3.32E+16	1.22E-04	1.01E+17	3.69E-04
1.70E+01	292.73	4.74E+16	1.73E-04	8.54E+15	3.12E-05	2.64E+16	9.67E-05	6.96E+16	2.55E-04
1.80E+01	297.65	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.90E+01	307.26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.00E+01	316.36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
			6.74E+00		**6.75E+00**		**6.72E+00**		**6.65E+00**

Table 17. Calculated fluence and DPA for Capsule 4 of the UCSB experiment.

	DPA xsec	4-3		4-2		4-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
1.00E-10	0	1.79E+15		3.10E+15		1.84E+15	
1.00E-09	7.73	7.24E+17	6.99E-05	6.02E+17	5.81E-05	6.68E+17	6.46E-05
1.00E-08	2.444	1.19E+20	3.62E-03	1.11E+20	3.39E-03	1.11E+20	3.40E-03
2.30E-08	1.278	4.26E+20	6.81E-03	4.06E+20	6.49E-03	4.02E+20	6.42E-03
5.00E-08	0.857	1.06E+21	1.13E-02	1.01E+21	1.08E-02	9.86E+20	1.06E-02
7.60E-08	0.644	7.56E+20	6.08E-03	7.25E+20	5.84E-03	7.08E+20	5.70E-03
1.15E-07	0.523	6.49E+20	4.25E-03	6.24E+20	4.08E-03	6.11E+20	4.00E-03
1.70E-07	0.428	4.12E+20	2.20E-03	3.98E+20	2.13E-03	3.85E+20	2.06E-03
2.55E-07	0.351	2.86E+20	1.25E-03	2.80E+20	1.23E-03	2.76E+20	1.21E-03
3.80E-07	0.287	2.41E+20	8.66E-04	2.30E+20	8.25E-04	2.22E+20	7.98E-04
5.50E-07	0.237	2.19E+20	6.50E-04	2.14E+20	6.33E-04	2.06E+20	6.10E-04
8.40E-07	0.194	2.43E+20	5.89E-04	2.35E+20	5.71E-04	2.28E+20	5.53E-04
1.28E-06	0.157	2.30E+20	4.51E-04	2.26E+20	4.44E-04	2.21E+20	4.33E-04
1.90E-06	0.128	2.16E+20	3.45E-04	2.11E+20	3.38E-04	2.06E+20	3.30E-04
2.80E-06	0.105	2.14E+20	2.80E-04	2.07E+20	2.72E-04	1.97E+20	2.59E-04
4.25E-06	0.086	2.23E+20	2.39E-04	2.16E+20	2.32E-04	2.12E+20	2.28E-04
6.30E-06	0.07	2.11E+20	1.85E-04	2.05E+20	1.80E-04	1.99E+20	1.74E-04
9.20E-06	0.058	2.07E+20	1.50E-04	1.98E+20	1.43E-04	1.92E+20	1.39E-04
1.35E-05	0.048	2.09E+20	1.26E-04	2.07E+20	1.24E-04	1.96E+20	1.17E-04
2.10E-05	0.038	2.39E+20	1.14E-04	2.29E+20	1.09E-04	2.22E+20	1.05E-04
3.00E-05	0.031	1.98E+20	7.66E-05	1.95E+20	7.55E-05	1.87E+20	7.23E-05
4.50E-05	0.026	2.27E+20	7.36E-05	2.25E+20	7.33E-05	2.16E+20	7.01E-05
6.90E-05	0.021	2.40E+20	6.31E-05	2.36E+20	6.19E-05	2.34E+20	6.15E-05
1.00E-04	0.017	2.14E+20	4.55E-05	2.08E+20	4.42E-05	2.08E+20	4.43E-05
1.35E-04	0.014	1.75E+20	3.07E-05	1.68E+20	2.95E-05	1.63E+20	2.85E-05
1.70E-04	0.014	1.38E+20	2.42E-05	1.30E+20	2.27E-05	1.27E+20	2.23E-05
2.20E-04	0.011	1.50E+20	2.06E-05	1.46E+20	2.01E-05	1.43E+20	1.97E-05

	DPA xsec	4-3		4-2		4-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
2.80E-04	0.011	1.46E+20	2.00E-05	1.40E+20	1.93E-05	1.34E+20	1.84E-05
3.60E-04	0.01	1.50E+20	1.88E-05	1.41E+20	1.76E-05	1.40E+20	1.76E-05
4.50E-04	0.007	1.29E+20	1.13E-05	1.26E+20	1.10E-05	1.22E+20	1.07E-05
5.75E-04	0.005	1.45E+20	9.04E-06	1.41E+20	8.81E-06	1.36E+20	8.49E-06
7.60E-04	0.129	1.64E+20	2.64E-04	1.58E+20	2.54E-04	1.54E+20	2.48E-04
9.60E-04	0.308	1.37E+20	5.28E-04	1.34E+20	5.16E-04	1.31E+20	5.04E-04
1.28E-03	0.672	1.67E+20	1.41E-03	1.61E+20	1.35E-03	1.59E+20	1.34E-03
1.60E-03	0.477	1.35E+20	8.06E-04	1.29E+20	7.68E-04	1.28E+20	7.62E-04
2.00E-03	0.511	1.39E+20	8.91E-04	1.34E+20	8.56E-04	1.30E+20	8.32E-04
2.70E-03	0.568	1.79E+20	1.27E-03	1.78E+20	1.27E-03	1.68E+20	1.20E-03
3.40E-03	0.632	1.45E+20	1.14E-03	1.37E+20	1.08E-03	1.38E+20	1.09E-03
4.50E-03	0.822	1.78E+20	1.83E-03	1.67E+20	1.72E-03	1.67E+20	1.72E-03
5.50E-03	0.826	1.28E+20	1.32E-03	1.28E+20	1.32E-03	1.25E+20	1.29E-03
7.20E-03	1.671	1.69E+20	3.53E-03	1.69E+20	3.53E-03	1.61E+20	3.37E-03
9.20E-03	3.709	1.40E+20	6.49E-03	1.38E+20	6.39E-03	1.39E+20	6.45E-03
1.20E-02	1.491	1.71E+20	3.18E-03	1.71E+20	3.18E-03	1.54E+20	2.87E-03
1.50E-02	1.156	1.51E+20	2.18E-03	1.49E+20	2.15E-03	1.40E+20	2.03E-03
1.90E-02	0.973	1.44E+20	1.75E-03	1.41E+20	1.71E-03	1.50E+20	1.82E-03
2.55E-02	0.555	2.22E+20	1.54E-03	2.22E+20	1.54E-03	2.16E+20	1.50E-03
3.20E-02	26.762	2.02E+20	6.76E-02	1.95E+20	6.52E-02	1.95E+20	6.52E-02
4.00E-02	8.161	9.97E+19	1.02E-02	9.74E+19	9.93E-03	9.16E+19	9.34E-03
5.25E-02	6.515	1.99E+20	1.62E-02	1.96E+20	1.59E-02	1.91E+20	1.55E-02
6.60E-02	6.576	1.99E+20	1.64E-02	1.94E+20	1.59E-02	1.85E+20	1.52E-02
8.80E-02	13.137	2.85E+20	4.69E-02	2.84E+20	4.66E-02	2.76E+20	4.53E-02
1.10E-01	11.84	1.80E+20	2.67E-02	1.75E+20	2.59E-02	1.72E+20	2.54E-02
1.35E-01	11.27	2.64E+20	3.72E-02	2.59E+20	3.65E-02	2.47E+20	3.47E-02
1.60E-01	21.53	1.60E+20	4.30E-02	1.48E+20	4.00E-02	1.51E+20	4.07E-02
1.90E-01	15.85	2.10E+20	4.16E-02	2.06E+20	4.08E-02	2.02E+20	3.99E-02
2.20E-01	22.01	1.74E+20	4.79E-02	1.68E+20	4.62E-02	1.66E+20	4.56E-02

	DPA xsec	4-3		4-2		4-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
2.55E-01	18.27	2.02E+20	4.61E-02	1.98E+20	4.51E-02	1.96E+20	4.48E-02
2.90E-01	17.37	2.22E+20	4.82E-02	2.14E+20	4.64E-02	2.09E+20	4.54E-02
3.20E-01	13.51	1.53E+20	2.58E-02	1.49E+20	2.51E-02	1.44E+20	2.43E-02
3.60E-01	25.14	2.21E+20	6.94E-02	2.14E+20	6.73E-02	2.06E+20	6.48E-02
4.00E-01	46.52	1.90E+20	1.11E-01	1.82E+20	1.06E-01	1.79E+20	1.04E-01
4.50E-01	43.04	1.78E+20	9.59E-02	1.74E+20	9.37E-02	1.67E+20	8.97E-02
5.00E-01	36.4	2.01E+20	9.15E-02	1.92E+20	8.75E-02	1.89E+20	8.61E-02
5.50E-01	33.22	1.99E+20	8.27E-02	1.91E+20	7.92E-02	1.91E+20	7.94E-02
6.00E-01	34.18	1.91E+20	8.15E-02	1.85E+20	7.91E-02	1.82E+20	7.78E-02
6.60E-01	19.64	2.31E+20	5.67E-02	2.27E+20	5.58E-02	2.21E+20	5.42E-02
7.20E-01	48.89	2.42E+20	1.48E-01	2.33E+20	1.42E-01	2.32E+20	1.42E-01
7.80E-01	74.22	2.30E+20	2.14E-01	2.19E+20	2.04E-01	2.23E+20	2.07E-01
8.40E-01	44.02	1.81E+20	9.98E-02	1.75E+20	9.62E-02	1.71E+20	9.41E-02
9.20E-01	40.97	2.20E+20	1.13E-01	2.05E+20	1.05E-01	2.02E+20	1.04E-01
1.00E+00	50.95	1.99E+20	1.27E-01	1.93E+20	1.23E-01	1.92E+20	1.22E-01
1.20E+00	50.09	4.69E+20	2.94E-01	4.57E+20	2.86E-01	4.39E+20	2.75E-01
1.40E+00	64.54	4.10E+20	3.31E-01	4.05E+20	3.27E-01	3.98E+20	3.21E-01
1.60E+00	73.58	3.55E+20	3.27E-01	3.53E+20	3.25E-01	3.48E+20	3.20E-01
1.80E+00	76.46	3.10E+20	2.96E-01	3.03E+20	2.89E-01	2.93E+20	2.80E-01
2.00E+00	95.15	2.76E+20	3.28E-01	2.67E+20	3.17E-01	2.61E+20	3.10E-01
2.30E+00	93.75	3.37E+20	3.95E-01	3.35E+20	3.92E-01	3.22E+20	3.77E-01
2.60E+00	112.05	3.12E+20	4.37E-01	3.07E+20	4.30E-01	2.98E+20	4.18E-01
2.90E+00	123.55	2.38E+20	3.68E-01	2.32E+20	3.58E-01	2.26E+20	3.49E-01
3.30E+00	133.45	2.36E+20	3.93E-01	2.30E+20	3.84E-01	2.26E+20	3.77E-01
3.70E+00	135.25	1.60E+20	2.70E-01	1.57E+20	2.66E-01	1.51E+20	2.56E-01
4.10E+00	149.55	1.24E+20	2.31E-01	1.19E+20	2.22E-01	1.20E+20	2.25E-01
4.50E+00	158.25	9.59E+19	1.90E-01	9.26E+19	1.83E-01	9.07E+19	1.79E-01
5.00E+00	168.55	8.77E+19	1.85E-01	8.83E+19	1.86E-01	8.46E+19	1.78E-01
5.50E+00	176.46	6.23E+19	1.37E-01	6.16E+19	1.36E-01	5.78E+19	1.28E-01

	DPA xsec	4-3		4-2		4-1	
Upper Energy(MeV)	**keV-barn**	**Total Fluence**	**DPA**	**Total Fluence**	**DPA**	**Total Fluence**	**DPA**
6.00E+00	183.06	4.44E+19	1.01E-01	4.34E+19	9.93E-02	4.19E+19	9.59E-02
6.70E+00	189.26	3.89E+19	9.20E-02	4.03E+19	9.54E-02	3.63E+19	8.59E-02
7.40E+00	196.67	2.23E+19	5.49E-02	2.12E+19	5.21E-02	2.16E+19	5.30E-02
8.20E+00	203.37	1.50E+19	3.81E-02	1.42E+19	3.60E-02	1.26E+19	3.19E-02
9.00E+00	214.58	8.55E+18	2.29E-02	7.15E+18	1.92E-02	8.44E+18	2.26E-02
1.00E+01	225.69	5.20E+18	1.47E-02	4.84E+18	1.36E-02	4.42E+18	1.25E-02
1.10E+01	237.6	1.95E+18	5.80E-03	2.17E+18	6.44E-03	2.66E+18	7.89E-03
1.20E+01	247.41	1.12E+18	3.47E-03	9.82E+17	3.04E-03	8.23E+17	2.55E-03
1.30E+01	258.52	5.90E+17	1.91E-03	3.84E+17	1.24E-03	5.30E+17	1.71E-03
1.40E+01	271.35	3.73E+17	1.26E-03	1.59E+17	5.39E-04	1.17E+17	3.98E-04
1.50E+01	290.27	4.42E+16	1.61E-04	8.78E+16	3.19E-04	2.79E+16	1.01E-04
1.60E+01	293.2	3.68E+16	1.35E-04	3.89E+16	1.43E-04	3.91E+16	1.43E-04
1.70E+01	292.73	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.80E+01	297.65	0.00E+00	0.00E+00	6.02E+15	2.24E-05	1.59E+16	5.91E-05
1.90E+01	307.26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.00E+01	316.36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
			6.35E+00		**6.19E+00**		**6.05E+00**

Table 18. Calculated fluence and DPA for capsule 3 of the UCSB experiment.

	DPA xsec	3-4		3-3		3-2		3-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
1.00E-10	0	2.38E+15		5.96E+15		2.33E+15		1.03E+16	
1.00E-09	7.73	5.98E+17	5.77E-05	5.43E+17	5.25E-05	6.02E+17	5.81E-05	3.23E+17	3.12E-05
1.00E-08	2.444	9.77E+19	2.98E-03	9.01E+19	2.75E-03	9.04E+19	2.76E-03	8.37E+19	2.56E-03
2.30E-08	1.278	3.56E+20	5.69E-03	3.33E+20	5.32E-03	3.13E+20	5.00E-03	3.08E+20	4.92E-03
5.00E-08	0.857	8.85E+20	9.48E-03	8.18E+20	8.76E-03	7.91E+20	8.48E-03	7.65E+20	8.20E-03
7.60E-08	0.644	6.35E+20	5.11E-03	5.85E+20	4.71E-03	5.64E+20	4.54E-03	5.42E+20	4.36E-03
1.15E-07	0.523	5.52E+20	3.61E-03	5.13E+20	3.35E-03	4.91E+20	3.21E-03	4.79E+20	3.13E-03
1.70E-07	0.428	3.48E+20	1.86E-03	3.26E+20	1.74E-03	3.12E+20	1.67E-03	3.02E+20	1.61E-03
2.55E-07	0.351	2.55E+20	1.12E-03	2.31E+20	1.02E-03	2.21E+20	9.71E-04	2.18E+20	9.57E-04
3.80E-07	0.287	2.08E+20	7.48E-04	1.92E+20	6.88E-04	1.88E+20	6.73E-04	1.83E+20	6.55E-04
5.50E-07	0.237	1.90E+20	5.63E-04	1.77E+20	5.25E-04	1.72E+20	5.09E-04	1.65E+20	4.90E-04
8.40E-07	0.194	2.13E+20	5.16E-04	1.99E+20	4.83E-04	1.95E+20	4.73E-04	1.92E+20	4.65E-04
1.28E-06	0.157	2.04E+20	4.00E-04	1.96E+20	3.84E-04	1.85E+20	3.64E-04	1.82E+20	3.58E-04
1.90E-06	0.128	1.92E+20	3.07E-04	1.80E+20	2.88E-04	1.71E+20	2.74E-04	1.69E+20	2.70E-04
2.80E-06	0.105	1.88E+20	2.46E-04	1.78E+20	2.33E-04	1.69E+20	2.22E-04	1.61E+20	2.11E-04
4.25E-06	0.086	1.98E+20	2.13E-04	1.87E+20	2.01E-04	1.74E+20	1.87E-04	1.52E+20	1.63E-04
6.30E-06	0.07	1.85E+20	1.62E-04	1.74E+20	1.52E-04	1.68E+20	1.47E-04	1.64E+20	1.43E-04
9.20E-06	0.058	1.80E+20	1.30E-04	1.64E+20	1.19E-04	1.67E+20	1.21E-04	1.55E+20	1.13E-04
1.35E-05	0.048	1.87E+20	1.12E-04	1.79E+20	1.07E-04	1.71E+20	1.02E-04	1.62E+20	9.71E-05
2.10E-05	0.038	2.11E+20	1.00E-04	2.02E+20	9.60E-05	1.86E+20	8.83E-05	1.48E+20	7.03E-05
3.00E-05	0.031	1.77E+20	6.86E-05	1.69E+20	6.55E-05	1.60E+20	6.21E-05	1.34E+20	5.20E-05
4.50E-05	0.026	2.02E+20	6.57E-05	1.90E+20	6.18E-05	1.84E+20	5.97E-05	1.75E+20	5.70E-05
6.90E-05	0.021	2.15E+20	5.64E-05	2.05E+20	5.38E-05	1.91E+20	5.02E-05	1.80E+20	4.72E-05
1.00E-04	0.017	1.95E+20	4.14E-05	1.76E+20	3.73E-05	1.68E+20	3.58E-05	1.66E+20	3.52E-05
1.35E-04	0.014	1.56E+20	2.73E-05	1.50E+20	2.62E-05	1.38E+20	2.41E-05	1.30E+20	2.28E-05
1.70E-04	0.014	1.19E+20	2.08E-05	1.14E+20	1.99E-05	1.13E+20	1.98E-05	1.01E+20	1.77E-05
2.20E-04	0.011	1.33E+20	1.83E-05	1.31E+20	1.81E-05	1.25E+20	1.72E-05	1.18E+20	1.62E-05

	DPA xsec	3-4		3-3		3-2		3-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
2.80E-04	0.011	1.30E+20	1.79E-05	1.22E+20	1.68E-05	1.21E+20	1.66E-05	1.13E+20	1.55E-05
3.60E-04	0.01	1.31E+20	1.64E-05	1.25E+20	1.56E-05	1.18E+20	1.47E-05	1.12E+20	1.40E-05
4.50E-04	0.007	1.15E+20	1.01E-05	1.09E+20	9.56E-06	1.06E+20	9.24E-06	9.70E+19	8.49E-06
5.75E-04	0.005	1.31E+20	8.18E-06	1.20E+20	7.48E-06	1.16E+20	7.26E-06	1.11E+20	6.96E-06
7.60E-04	0.129	1.49E+20	2.41E-04	1.38E+20	2.23E-04	1.33E+20	2.15E-04	1.29E+20	2.08E-04
9.60E-04	0.308	1.27E+20	4.88E-04	1.21E+20	4.65E-04	1.17E+20	4.51E-04	1.10E+20	4.23E-04
1.28E-03	0.672	1.48E+20	1.25E-03	1.41E+20	1.18E-03	1.36E+20	1.14E-03	1.33E+20	1.12E-03
1.60E-03	0.477	1.19E+20	7.12E-04	1.14E+20	6.80E-04	1.05E+20	6.26E-04	1.02E+20	6.09E-04
2.00E-03	0.511	1.24E+20	7.91E-04	1.17E+20	7.44E-04	1.15E+20	7.34E-04	1.10E+20	7.00E-04
2.70E-03	0.568	1.60E+20	1.14E-03	1.49E+20	1.05E-03	1.51E+20	1.07E-03	1.41E+20	1.00E-03
3.40E-03	0.632	1.27E+20	1.01E-03	1.20E+20	9.46E-04	1.17E+20	9.22E-04	1.13E+20	8.91E-04
4.50E-03	0.822	1.56E+20	1.60E-03	1.47E+20	1.51E-03	1.41E+20	1.45E-03	1.40E+20	1.44E-03
5.50E-03	0.826	1.16E+20	1.19E-03	1.13E+20	1.17E-03	1.07E+20	1.11E-03	1.08E+20	1.11E-03
7.20E-03	1.671	1.51E+20	3.15E-03	1.42E+20	2.97E-03	1.43E+20	2.99E-03	1.39E+20	2.90E-03
9.20E-03	3.709	1.26E+20	5.85E-03	1.15E+20	5.31E-03	1.11E+20	5.13E-03	1.07E+20	4.95E-03
1.20E-02	1.491	1.53E+20	2.85E-03	1.40E+20	2.61E-03	1.31E+20	2.44E-03	1.35E+20	2.52E-03
1.50E-02	1.156	1.31E+20	1.89E-03	1.23E+20	1.78E-03	1.16E+20	1.68E-03	1.14E+20	1.65E-03
1.90E-02	0.973	1.34E+20	1.63E-03	1.27E+20	1.54E-03	1.25E+20	1.52E-03	1.18E+20	1.43E-03
2.55E-02	0.555	2.01E+20	1.39E-03	1.89E+20	1.31E-03	1.80E+20	1.25E-03	1.75E+20	1.21E-03
3.20E-02	26.762	1.78E+20	5.96E-02	1.65E+20	5.53E-02	1.60E+20	5.35E-02	1.56E+20	5.24E-02
4.00E-02	8.161	8.81E+19	8.99E-03	8.20E+19	8.36E-03	7.70E+19	7.86E-03	7.66E+19	7.81E-03
5.25E-02	6.515	1.77E+20	1.45E-02	1.68E+20	1.37E-02	1.57E+20	1.28E-02	1.55E+20	1.26E-02
6.60E-02	6.576	1.77E+20	1.45E-02	1.63E+20	1.34E-02	1.60E+20	1.31E-02	1.50E+20	1.23E-02
8.80E-02	13.137	2.63E+20	4.31E-02	2.44E+20	4.01E-02	2.31E+20	3.79E-02	2.23E+20	3.67E-02
1.10E-01	11.84	1.59E+20	2.35E-02	1.46E+20	2.17E-02	1.40E+20	2.07E-02	1.39E+20	2.06E-02
1.35E-01	11.27	2.34E+20	3.30E-02	2.16E+20	3.04E-02	2.07E+20	2.92E-02	2.04E+20	2.87E-02
1.60E-01	21.53	1.40E+20	3.77E-02	1.29E+20	3.46E-02	1.22E+20	3.29E-02	1.23E+20	3.31E-02
1.90E-01	15.85	1.92E+20	3.80E-02	1.77E+20	3.50E-02	1.74E+20	3.44E-02	1.65E+20	3.26E-02
2.20E-01	22.01	1.56E+20	4.30E-02	1.43E+20	3.94E-02	1.37E+20	3.77E-02	1.35E+20	3.70E-02

	DPA xsec	3-4		3-3		3-2		3-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
2.55E-01	18.27	1.80E+20	4.12E-02	1.70E+20	3.88E-02	1.64E+20	3.74E-02	1.56E+20	3.56E-02
2.90E-01	17.37	1.94E+20	4.20E-02	1.86E+20	4.03E-02	1.80E+20	3.90E-02	1.76E+20	3.81E-02
3.20E-01	13.51	1.39E+20	2.34E-02	1.27E+20	2.15E-02	1.22E+20	2.06E-02	1.22E+20	2.06E-02
3.60E-01	25.14	1.93E+20	6.06E-02	1.80E+20	5.65E-02	1.78E+20	5.59E-02	1.68E+20	5.27E-02
4.00E-01	46.52	1.69E+20	9.82E-02	1.57E+20	9.11E-02	1.52E+20	8.85E-02	1.48E+20	8.59E-02
4.50E-01	43.04	1.58E+20	8.48E-02	1.43E+20	7.69E-02	1.41E+20	7.61E-02	1.41E+20	7.58E-02
5.00E-01	36.4	1.78E+20	8.11E-02	1.67E+20	7.59E-02	1.62E+20	7.36E-02	1.60E+20	7.26E-02
5.50E-01	33.22	1.77E+20	7.33E-02	1.70E+20	7.06E-02	1.59E+20	6.62E-02	1.58E+20	6.58E-02
6.00E-01	34.18	1.69E+20	7.23E-02	1.63E+20	6.97E-02	1.55E+20	6.63E-02	1.43E+20	6.10E-02
6.60E-01	19.64	2.07E+20	5.09E-02	1.98E+20	4.86E-02	1.82E+20	4.48E-02	1.87E+20	4.58E-02
7.20E-01	48.89	2.15E+20	1.31E-01	1.96E+20	1.20E-01	1.96E+20	1.20E-01	1.93E+20	1.18E-01
7.80E-01	74.22	2.05E+20	1.90E-01	1.87E+20	1.73E-01	1.83E+20	1.70E-01	1.79E+20	1.66E-01
8.40E-01	44.02	1.58E+20	8.72E-02	1.51E+20	8.31E-02	1.44E+20	7.93E-02	1.40E+20	7.69E-02
9.20E-01	40.97	1.91E+20	9.80E-02	1.79E+20	9.18E-02	1.72E+20	8.83E-02	1.68E+20	8.59E-02
1.00E+00	50.95	1.75E+20	1.12E-01	1.64E+20	1.05E-01	1.58E+20	1.00E-01	1.54E+20	9.80E-02
1.20E+00	50.09	4.16E+20	2.61E-01	3.91E+20	2.45E-01	3.67E+20	2.30E-01	3.60E+20	2.25E-01
1.40E+00	64.54	3.67E+20	2.96E-01	3.43E+20	2.77E-01	3.30E+20	2.66E-01	3.19E+20	2.57E-01
1.60E+00	73.58	3.15E+20	2.90E-01	2.90E+20	2.67E-01	2.92E+20	2.69E-01	2.70E+20	2.48E-01
1.80E+00	76.46	2.78E+20	2.66E-01	2.56E+20	2.44E-01	2.47E+20	2.36E-01	2.38E+20	2.28E-01
2.00E+00	95.15	2.45E+20	2.91E-01	2.23E+20	2.66E-01	2.22E+20	2.64E-01	2.09E+20	2.48E-01
2.30E+00	93.75	3.04E+20	3.56E-01	2.81E+20	3.29E-01	2.72E+20	3.18E-01	2.57E+20	3.02E-01
2.60E+00	112.05	2.79E+20	3.91E-01	2.56E+20	3.59E-01	2.46E+20	3.44E-01	2.37E+20	3.33E-01
2.90E+00	123.55	2.09E+20	3.23E-01	1.99E+20	3.07E-01	1.84E+20	2.84E-01	1.83E+20	2.83E-01
3.30E+00	133.45	2.13E+20	3.56E-01	1.91E+20	3.19E-01	1.88E+20	3.14E-01	1.81E+20	3.03E-01
3.70E+00	135.25	1.42E+20	2.39E-01	1.34E+20	2.27E-01	1.28E+20	2.17E-01	1.22E+20	2.06E-01
4.10E+00	149.55	1.11E+20	2.08E-01	1.04E+20	1.95E-01	9.70E+19	1.81E-01	9.45E+19	1.77E-01
4.50E+00	158.25	8.63E+19	1.71E-01	7.88E+19	1.56E-01	7.90E+19	1.56E-01	7.66E+19	1.52E-01
5.00E+00	168.55	7.97E+19	1.68E-01	7.61E+19	1.60E-01	7.18E+19	1.51E-01	7.00E+19	1.47E-01
5.50E+00	176.46	5.39E+19	1.19E-01	5.18E+19	1.14E-01	5.06E+19	1.12E-01	4.95E+19	1.09E-01

	DPA xsec	3-4		3-3		3-2		3-1	
Upper Energy(MeV)	**keV-barn**	**Total Fluence**	**DPA**	**Total Fluence**	**DPA**	**Total Fluence**	**DPA**	**Total Fluence**	**DPA**
6.00E+00	183.06	3.91E+19	8.94E-02	3.32E+19	7.60E-02	3.23E+19	7.40E-02	3.17E+19	7.25E-02
6.70E+00	189.26	3.55E+19	8.39E-02	3.33E+19	7.88E-02	3.29E+19	7.78E-02	3.14E+19	7.43E-02
7.40E+00	196.67	1.98E+19	4.87E-02	2.02E+19	4.96E-02	1.95E+19	4.80E-02	1.97E+19	4.84E-02
8.20E+00	203.37	1.28E+19	3.24E-02	1.24E+19	3.15E-02	1.19E+19	3.03E-02	1.12E+19	2.86E-02
9.00E+00	214.58	7.30E+18	1.96E-02	7.04E+18	1.89E-02	5.76E+18	1.55E-02	5.50E+18	1.48E-02
1.00E+01	225.69	4.19E+18	1.18E-02	4.39E+18	1.24E-02	3.50E+18	9.87E-03	3.38E+18	9.54E-03
1.10E+01	237.6	2.09E+18	6.21E-03	2.40E+18	7.12E-03	1.74E+18	5.16E-03	1.62E+18	4.81E-03
1.20E+01	247.41	7.25E+17	2.24E-03	1.02E+18	3.17E-03	8.72E+17	2.70E-03	5.91E+17	1.83E-03
1.30E+01	258.52	4.29E+17	1.39E-03	2.76E+17	8.93E-04	1.84E+17	5.94E-04	6.08E+17	1.96E-03
1.40E+01	271.35	1.33E+17	4.51E-04	1.82E+17	6.16E-04	1.36E+17	4.61E-04	4.08E+16	1.39E-04
1.50E+01	290.27	3.34E+16	1.21E-04	7.55E+16	2.74E-04	5.94E+16	2.16E-04	0.00E+00	0.00E+00
1.60E+01	293.2	1.67E+16	6.11E-05	5.16E+16	1.89E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.70E+01	292.73	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.82E+16	2.13E-04	0.00E+00	0.00E+00
1.80E+01	297.65	1.11E+16	4.12E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.90E+01	307.26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E+17	4.12E-04
2.00E+01	316.36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
			5.65E+00		**5.25E+00**		**5.07E+00**		**4.90E+00**

Table 19. Calculated fluence and DPA for capsule 2 of the UCSB experiment.

	DPA xsec	2-7		2-6		2-5		2-4	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
1.00E-10	0	0.00E+00		8.74E+13		6.52E+15		0.00E+00	
1.00E-09	7.73	5.22E+17	5.04E-05	3.98E+17	3.85E-05	4.41E+17	4.26E-05	4.72E+17	4.56E-05
1.00E-08	2.444	7.85E+19	2.40E-03	6.66E+19	2.03E-03	6.47E+19	1.98E-03	6.20E+19	1.89E-03
2.30E-08	1.278	2.75E+20	4.40E-03	2.49E+20	3.98E-03	2.46E+20	3.93E-03	2.28E+20	3.64E-03
5.00E-08	0.857	6.83E+20	7.32E-03	6.14E+20	6.58E-03	6.07E+20	6.50E-03	5.67E+20	6.08E-03
7.60E-08	0.644	4.91E+20	3.95E-03	4.55E+20	3.67E-03	4.41E+20	3.55E-03	4.12E+20	3.32E-03
1.15E-07	0.523	4.27E+20	2.79E-03	3.93E+20	2.57E-03	3.70E+20	2.42E-03	3.52E+20	2.30E-03
1.70E-07	0.428	2.69E+20	1.44E-03	2.54E+20	1.36E-03	2.42E+20	1.29E-03	2.35E+20	1.25E-03
2.55E-07	0.351	1.91E+20	8.40E-04	1.82E+20	8.00E-04	1.79E+20	7.85E-04	1.66E+20	7.29E-04
3.80E-07	0.287	1.65E+20	5.90E-04	1.55E+20	5.55E-04	1.47E+20	5.29E-04	1.42E+20	5.09E-04
5.50E-07	0.237	1.50E+20	4.45E-04	1.44E+20	4.27E-04	1.34E+20	3.96E-04	1.24E+20	3.69E-04
8.40E-07	0.194	1.70E+20	4.13E-04	1.55E+20	3.75E-04	1.46E+20	3.54E-04	1.35E+20	3.27E-04
1.28E-06	0.157	1.63E+20	3.20E-04	1.55E+20	3.04E-04	1.50E+20	2.95E-04	1.36E+20	2.67E-04
1.90E-06	0.128	1.56E+20	2.50E-04	1.46E+20	2.34E-04	1.37E+20	2.19E-04	1.31E+20	2.10E-04
2.80E-06	0.105	1.51E+20	1.98E-04	1.36E+20	1.79E-04	1.34E+20	1.76E-04	1.24E+20	1.62E-04
4.25E-06	0.086	1.57E+20	1.69E-04	1.27E+20	1.36E-04	1.34E+20	1.44E-04	1.32E+20	1.42E-04
6.30E-06	0.07	1.46E+20	1.27E-04	1.33E+20	1.16E-04	1.29E+20	1.13E-04	1.24E+20	1.08E-04
9.20E-06	0.058	1.39E+20	1.01E-04	1.21E+20	8.75E-05	1.26E+20	9.12E-05	1.20E+20	8.73E-05
1.35E-05	0.048	1.54E+20	9.23E-05	1.36E+20	8.19E-05	1.27E+20	7.64E-05	1.28E+20	7.67E-05
2.10E-05	0.038	1.68E+20	7.96E-05	1.19E+20	5.63E-05	1.44E+20	6.83E-05	1.42E+20	6.76E-05
3.00E-05	0.031	1.40E+20	5.41E-05	1.14E+20	4.43E-05	1.27E+20	4.93E-05	1.19E+20	4.63E-05
4.50E-05	0.026	1.66E+20	5.40E-05	1.50E+20	4.87E-05	1.47E+20	4.78E-05	1.33E+20	4.32E-05
6.90E-05	0.021	1.82E+20	4.77E-05	1.59E+20	4.17E-05	1.56E+20	4.10E-05	1.45E+20	3.79E-05
1.00E-04	0.017	1.51E+20	3.22E-05	1.46E+20	3.10E-05	1.39E+20	2.95E-05	1.29E+20	2.75E-05
1.35E-04	0.014	1.21E+20	2.12E-05	1.12E+20	1.96E-05	1.07E+20	1.86E-05	1.05E+20	1.83E-05
1.70E-04	0.014	9.47E+19	1.66E-05	9.03E+19	1.58E-05	8.79E+19	1.54E-05	8.41E+19	1.47E-05
2.20E-04	0.011	1.07E+20	1.47E-05	9.92E+19	1.36E-05	9.75E+19	1.34E-05	9.36E+19	1.29E-05

	DPA xsec	2-7		2-6		2-5		2-4	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
2.80E-04	0.011	1.07E+20	1.47E-05	9.32E+19	1.28E-05	9.27E+19	1.27E-05	8.99E+19	1.24E-05
3.60E-04	0.01	1.04E+20	1.30E-05	9.85E+19	1.23E-05	9.32E+19	1.17E-05	8.67E+19	1.08E-05
4.50E-04	0.007	9.20E+19	8.05E-06	8.66E+19	7.57E-06	8.40E+19	7.35E-06	7.09E+19	6.21E-06
5.75E-04	0.005	1.05E+20	6.55E-06	9.47E+19	5.92E-06	8.97E+19	5.60E-06	8.84E+19	5.52E-06
7.60E-04	0.129	1.22E+20	1.97E-04	1.11E+20	1.79E-04	1.06E+20	1.70E-04	1.00E+20	1.61E-04
9.60E-04	0.308	1.02E+20	3.91E-04	9.40E+19	3.62E-04	9.07E+19	3.49E-04	8.18E+19	3.15E-04
1.28E-03	0.672	1.17E+20	9.81E-04	1.09E+20	9.12E-04	1.07E+20	8.98E-04	1.02E+20	8.59E-04
1.60E-03	0.477	9.82E+19	5.86E-04	8.99E+19	5.36E-04	8.50E+19	5.07E-04	8.43E+19	5.03E-04
2.00E-03	0.511	1.01E+20	6.45E-04	9.05E+19	5.78E-04	8.81E+19	5.63E-04	7.95E+19	5.08E-04
2.70E-03	0.568	1.33E+20	9.43E-04	1.24E+20	8.80E-04	1.12E+20	7.92E-04	1.08E+20	7.65E-04
3.40E-03	0.632	1.02E+20	8.07E-04	9.20E+19	7.26E-04	9.04E+19	7.14E-04	8.82E+19	6.97E-04
4.50E-03	0.822	1.23E+20	1.26E-03	1.16E+20	1.19E-03	1.11E+20	1.14E-03	1.09E+20	1.11E-03
5.50E-03	0.826	9.42E+19	9.73E-04	8.92E+19	9.21E-04	8.63E+19	8.91E-04	8.08E+19	8.34E-04
7.20E-03	1.671	1.23E+20	2.57E-03	1.15E+20	2.41E-03	1.09E+20	2.27E-03	1.00E+20	2.09E-03
9.20E-03	3.709	9.75E+19	4.52E-03	9.48E+19	4.39E-03	8.97E+19	4.16E-03	8.13E+19	3.77E-03
1.20E-02	1.491	1.15E+20	2.15E-03	1.13E+20	2.10E-03	1.07E+20	1.99E-03	1.01E+20	1.89E-03
1.50E-02	1.156	1.02E+20	1.48E-03	9.69E+19	1.40E-03	9.35E+19	1.35E-03	8.80E+19	1.27E-03
1.90E-02	0.973	1.13E+20	1.38E-03	1.05E+20	1.27E-03	9.83E+19	1.20E-03	8.98E+19	1.09E-03
2.55E-02	0.555	1.62E+20	1.12E-03	1.52E+20	1.05E-03	1.45E+20	1.00E-03	1.35E+20	9.39E-04
3.20E-02	26.762	1.45E+20	4.85E-02	1.40E+20	4.68E-02	1.30E+20	4.35E-02	1.23E+20	4.11E-02
4.00E-02	8.161	6.70E+19	6.84E-03	6.60E+19	6.74E-03	6.17E+19	6.30E-03	6.11E+19	6.23E-03
5.25E-02	6.515	1.41E+20	1.15E-02	1.33E+20	1.08E-02	1.28E+20	1.05E-02	1.17E+20	9.57E-03
6.60E-02	6.576	1.38E+20	1.14E-02	1.31E+20	1.08E-02	1.27E+20	1.05E-02	1.15E+20	9.45E-03
8.80E-02	13.137	2.08E+20	3.41E-02	1.98E+20	3.26E-02	1.84E+20	3.02E-02	1.73E+20	2.84E-02
1.10E-01	11.84	1.28E+20	1.89E-02	1.19E+20	1.76E-02	1.15E+20	1.70E-02	1.08E+20	1.60E-02
1.35E-01	11.27	1.91E+20	2.70E-02	1.81E+20	2.56E-02	1.62E+20	2.28E-02	1.53E+20	2.15E-02
1.60E-01	21.53	1.12E+20	3.00E-02	1.08E+20	2.91E-02	1.02E+20	2.74E-02	9.36E+19	2.52E-02
1.90E-01	15.85	1.59E+20	3.16E-02	1.45E+20	2.87E-02	1.43E+20	2.83E-02	1.33E+20	2.63E-02
2.20E-01	22.01	1.22E+20	3.34E-02	1.21E+20	3.33E-02	1.10E+20	3.02E-02	1.04E+20	2.86E-02

	DPA xsec	2-7		2-6		2-5		2-4	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
2.55E-01	18.27	1.44E+20	3.28E-02	1.36E+20	3.10E-02	1.33E+20	3.03E-02	1.25E+20	2.86E-02
2.90E-01	17.37	1.55E+20	3.37E-02	1.50E+20	3.26E-02	1.43E+20	3.11E-02	1.35E+20	2.92E-02
3.20E-01	13.51	1.12E+20	1.90E-02	1.04E+20	1.75E-02	1.01E+20	1.71E-02	8.86E+19	1.50E-02
3.60E-01	25.14	1.58E+20	4.97E-02	1.50E+20	4.70E-02	1.41E+20	4.44E-02	1.30E+20	4.07E-02
4.00E-01	46.52	1.35E+20	7.83E-02	1.31E+20	7.60E-02	1.14E+20	6.62E-02	1.13E+20	6.60E-02
4.50E-01	43.04	1.31E+20	7.03E-02	1.23E+20	6.62E-02	1.14E+20	6.14E-02	1.06E+20	5.72E-02
5.00E-01	36.4	1.43E+20	6.51E-02	1.39E+20	6.34E-02	1.27E+20	5.77E-02	1.22E+20	5.56E-02
5.50E-01	33.22	1.42E+20	5.88E-02	1.36E+20	5.65E-02	1.27E+20	5.27E-02	1.22E+20	5.08E-02
6.00E-01	34.18	1.37E+20	5.84E-02	1.32E+20	5.64E-02	1.25E+20	5.32E-02	1.19E+20	5.09E-02
6.60E-01	19.64	1.68E+20	4.13E-02	1.54E+20	3.77E-02	1.49E+20	3.67E-02	1.50E+20	3.68E-02
7.20E-01	48.89	1.71E+20	1.04E-01	1.72E+20	1.05E-01	1.56E+20	9.53E-02	1.50E+20	9.19E-02
7.80E-01	74.22	1.65E+20	1.53E-01	1.58E+20	1.46E-01	1.47E+20	1.37E-01	1.37E+20	1.28E-01
8.40E-01	44.02	1.28E+20	7.03E-02	1.23E+20	6.79E-02	1.15E+20	6.33E-02	1.07E+20	5.86E-02
9.20E-01	40.97	1.57E+20	8.02E-02	1.48E+20	7.57E-02	1.37E+20	6.99E-02	1.31E+20	6.69E-02
1.00E+00	50.95	1.47E+20	9.35E-02	1.34E+20	8.51E-02	1.22E+20	7.79E-02	1.18E+20	7.49E-02
1.20E+00	50.09	3.29E+20	2.06E-01	3.13E+20	1.96E-01	2.91E+20	1.82E-01	2.82E+20	1.76E-01
1.40E+00	64.54	2.99E+20	2.41E-01	2.80E+20	2.26E-01	2.65E+20	2.14E-01	2.38E+20	1.92E-01
1.60E+00	73.58	2.60E+20	2.39E-01	2.48E+20	2.28E-01	2.39E+20	2.20E-01	2.15E+20	1.98E-01
1.80E+00	76.46	2.23E+20	2.14E-01	2.07E+20	1.98E-01	1.96E+20	1.88E-01	1.91E+20	1.82E-01
2.00E+00	95.15	1.97E+20	2.35E-01	1.88E+20	2.23E-01	1.72E+20	2.05E-01	1.66E+20	1.97E-01
2.30E+00	93.75	2.45E+20	2.87E-01	2.29E+20	2.68E-01	2.12E+20	2.48E-01	2.02E+20	2.37E-01
2.60E+00	112.05	2.30E+20	3.23E-01	2.05E+20	2.87E-01	2.03E+20	2.84E-01	1.88E+20	2.63E-01
2.90E+00	123.55	1.71E+20	2.64E-01	1.60E+20	2.47E-01	1.54E+20	2.39E-01	1.43E+20	2.20E-01
3.30E+00	133.45	1.73E+20	2.89E-01	1.60E+20	2.66E-01	1.56E+20	2.60E-01	1.36E+20	2.26E-01
3.70E+00	135.25	1.14E+20	1.92E-01	1.12E+20	1.89E-01	1.04E+20	1.76E-01	1.02E+20	1.72E-01
4.10E+00	149.55	8.87E+19	1.66E-01	8.54E+19	1.60E-01	8.09E+19	1.51E-01	7.46E+19	1.39E-01
4.50E+00	158.25	6.86E+19	1.36E-01	6.53E+19	1.29E-01	6.31E+19	1.25E-01	5.87E+19	1.16E-01
5.00E+00	168.55	6.76E+19	1.42E-01	6.01E+19	1.27E-01	5.94E+19	1.25E-01	5.45E+19	1.15E-01
5.50E+00	176.46	4.50E+19	9.94E-02	4.13E+19	9.11E-02	4.29E+19	9.46E-02	3.70E+19	8.16E-02

	DPA xsec	2-7		2-6		2-5		2-4	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
6.00E+00	183.06	3.22E+19	7.37E-02	2.88E+19	6.59E-02	2.77E+19	6.33E-02	2.70E+19	6.17E-02
6.70E+00	189.26	2.89E+19	6.83E-02	2.61E+19	6.17E-02	2.50E+19	5.91E-02	2.34E+19	5.54E-02
7.40E+00	196.67	1.51E+19	3.72E-02	1.55E+19	3.81E-02	1.32E+19	3.23E-02	1.30E+19	3.20E-02
8.20E+00	203.37	1.02E+19	2.60E-02	1.00E+19	2.55E-02	1.06E+19	2.70E-02	8.15E+18	2.07E-02
9.00E+00	214.58	6.42E+18	1.72E-02	4.75E+18	1.27E-02	5.41E+18	1.45E-02	3.13E+18	8.40E-03
1.00E+01	225.69	3.25E+18	9.18E-03	3.65E+18	1.03E-02	3.13E+18	8.84E-03	3.14E+18	8.86E-03
1.10E+01	237.6	1.57E+18	4.66E-03	1.26E+18	3.76E-03	1.83E+18	5.43E-03	1.70E+18	5.04E-03
1.20E+01	247.41	5.99E+17	1.85E-03	5.31E+17	1.64E-03	8.21E+17	2.54E-03	9.50E+17	2.94E-03
1.30E+01	258.52	1.11E+17	3.58E-04	2.81E+17	9.09E-04	2.35E+17	7.58E-04	2.64E+17	8.53E-04
1.40E+01	271.35	1.83E+17	6.20E-04	1.57E+17	5.32E-04	1.48E+17	5.01E-04	1.18E+17	3.99E-04
1.50E+01	290.27	6.98E+16	2.53E-04	7.19E+16	2.61E-04	0.00E+00	0.00E+00	4.64E+16	1.68E-04
1.60E+01	293.2	0.00E+00	0.00E+00	5.36E+16	1.97E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.70E+01	292.73	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.80E+01	297.65	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E+16	4.03E-05	6.63E+16	2.47E-04
1.90E+01	307.26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.00E+01	316.36	4.23E+16	1.67E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
			4.58E+00		**4.30E+00**		**4.09E+00**		**3.81E+00**

Table 20. Calculated fluence and DPA for capsule 2 of the UCSB experiment.

	DPA xsec	2-3		2-2		2-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
1.00E-10	0.00E+00	7.39E+14		0.00E+00		2.35E+15	
1.00E-09	7.73E+00	3.61E+17	3.49E-05	1.93E+17	1.87E-05	2.46E+17	2.37E-05
1.00E-08	2.44E+00	5.93E+19	1.81E-03	5.36E+19	1.64E-03	4.96E+19	1.52E-03
2.30E-08	1.28E+00	2.12E+20	3.39E-03	1.94E+20	3.10E-03	1.79E+20	2.86E-03
5.00E-08	8.57E-01	5.24E+20	5.61E-03	4.76E+20	5.10E-03	4.43E+20	4.75E-03
7.60E-08	6.44E-01	3.76E+20	3.03E-03	3.43E+20	2.76E-03	3.17E+20	2.55E-03
1.15E-07	5.23E-01	3.29E+20	2.15E-03	3.02E+20	1.97E-03	2.79E+20	1.83E-03
1.70E-07	4.28E-01	2.14E+20	1.15E-03	1.96E+20	1.05E-03	1.83E+20	9.78E-04
2.55E-07	3.51E-01	1.55E+20	6.81E-04	1.40E+20	6.15E-04	1.29E+20	5.68E-04
3.80E-07	2.87E-01	1.26E+20	4.53E-04	1.16E+20	4.18E-04	1.14E+20	4.10E-04
5.50E-07	2.37E-01	1.18E+20	3.50E-04	1.06E+20	3.15E-04	1.00E+20	2.97E-04
8.40E-07	1.94E-01	1.37E+20	3.31E-04	1.26E+20	3.06E-04	1.09E+20	2.64E-04
1.28E-06	1.57E-01	1.30E+20	2.55E-04	1.17E+20	2.29E-04	1.14E+20	2.24E-04
1.90E-06	1.28E-01	1.18E+20	1.89E-04	1.11E+20	1.77E-04	1.02E+20	1.64E-04
2.80E-06	1.05E-01	1.16E+20	1.53E-04	1.06E+20	1.39E-04	1.02E+20	1.34E-04
4.25E-06	8.60E-02	1.23E+20	1.32E-04	1.11E+20	1.19E-04	1.07E+20	1.16E-04
6.30E-06	7.00E-02	1.14E+20	9.93E-05	1.05E+20	9.16E-05	9.74E+19	8.53E-05
9.20E-06	5.80E-02	1.09E+20	7.90E-05	1.03E+20	7.47E-05	9.46E+19	6.86E-05
1.35E-05	4.80E-02	1.15E+20	6.90E-05	1.10E+20	6.57E-05	9.76E+19	5.86E-05
2.10E-05	3.80E-02	1.31E+20	6.21E-05	1.18E+20	5.61E-05	1.10E+20	5.22E-05
3.00E-05	3.10E-02	1.08E+20	4.19E-05	1.02E+20	3.97E-05	9.75E+19	3.78E-05
4.50E-05	2.60E-02	1.34E+20	4.35E-05	1.21E+20	3.94E-05	1.11E+20	3.61E-05
6.90E-05	2.10E-02	1.34E+20	3.51E-05	1.21E+20	3.18E-05	1.18E+20	3.10E-05
1.00E-04	1.70E-02	1.20E+20	2.54E-05	1.12E+20	2.39E-05	1.02E+20	2.16E-05
1.35E-04	1.40E-02	9.58E+19	1.68E-05	8.98E+19	1.57E-05	8.36E+19	1.46E-05
1.70E-04	1.40E-02	7.40E+19	1.29E-05	6.91E+19	1.21E-05	6.24E+19	1.09E-05
2.20E-04	1.10E-02	8.71E+19	1.20E-05	7.53E+19	1.03E-05	7.18E+19	9.88E-06

	DPA xsec	2-3		2-2		2-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
2.80E-04	1.10E-02	8.13E+19	1.12E-05	6.99E+19	9.61E-06	6.71E+19	9.22E-06
3.60E-04	1.00E-02	7.96E+19	9.94E-06	7.84E+19	9.80E-06	7.12E+19	8.89E-06
4.50E-04	7.00E-03	7.11E+19	6.22E-06	6.70E+19	5.86E-06	6.55E+19	5.73E-06
5.75E-04	5.00E-03	8.51E+19	5.32E-06	7.75E+19	4.84E-06	6.93E+19	4.33E-06
7.60E-04	1.29E-01	9.38E+19	1.51E-04	8.55E+19	1.38E-04	8.21E+19	1.32E-04
9.60E-04	3.08E-01	7.80E+19	3.00E-04	7.06E+19	2.72E-04	6.49E+19	2.50E-04
1.28E-03	6.72E-01	9.26E+19	7.78E-04	8.71E+19	7.32E-04	8.11E+19	6.82E-04
1.60E-03	4.77E-01	7.67E+19	4.57E-04	7.06E+19	4.21E-04	6.31E+19	3.76E-04
2.00E-03	5.11E-01	7.61E+19	4.86E-04	6.82E+19	4.35E-04	6.26E+19	4.00E-04
2.70E-03	5.68E-01	1.04E+20	7.38E-04	9.19E+19	6.53E-04	8.77E+19	6.23E-04
3.40E-03	6.32E-01	7.89E+19	6.24E-04	7.65E+19	6.05E-04	7.14E+19	5.64E-04
4.50E-03	8.22E-01	9.87E+19	1.01E-03	8.96E+19	9.20E-04	8.40E+19	8.63E-04
5.50E-03	8.26E-01	7.28E+19	7.52E-04	6.64E+19	6.86E-04	6.37E+19	6.58E-04
7.20E-03	1.67E+00	9.66E+19	2.02E-03	8.67E+19	1.81E-03	8.40E+19	1.76E-03
9.20E-03	3.71E+00	7.68E+19	3.56E-03	7.27E+19	3.37E-03	6.53E+19	3.03E-03
1.20E-02	1.49E+00	9.17E+19	1.71E-03	8.64E+19	1.61E-03	8.37E+19	1.56E-03
1.50E-02	1.16E+00	7.87E+19	1.14E-03	7.17E+19	1.04E-03	6.72E+19	9.71E-04
1.90E-02	9.73E-01	8.38E+19	1.02E-03	8.02E+19	9.76E-04	7.20E+19	8.76E-04
2.55E-02	5.55E-01	1.25E+20	8.66E-04	1.11E+20	7.72E-04	1.03E+20	7.11E-04
3.20E-02	2.68E+01	1.17E+20	3.91E-02	1.02E+20	3.42E-02	9.81E+19	3.28E-02
4.00E-02	8.16E+00	5.53E+19	5.64E-03	5.13E+19	5.23E-03	4.31E+19	4.40E-03
5.25E-02	6.52E+00	1.06E+20	8.62E-03	1.04E+20	8.45E-03	9.30E+19	7.57E-03
6.60E-02	6.58E+00	1.06E+20	8.72E-03	1.03E+20	8.48E-03	8.96E+19	7.36E-03
8.80E-02	1.31E+01	1.58E+20	2.60E-02	1.46E+20	2.40E-02	1.36E+20	2.24E-02
1.10E-01	1.18E+01	9.46E+19	1.40E-02	8.94E+19	1.32E-02	8.03E+19	1.19E-02
1.35E-01	1.13E+01	1.46E+20	2.05E-02	1.32E+20	1.86E-02	1.24E+20	1.74E-02
1.60E-01	2.15E+01	8.48E+19	2.28E-02	7.89E+19	2.12E-02	7.29E+19	1.96E-02
1.90E-01	1.59E+01	1.18E+20	2.34E-02	1.04E+20	2.05E-02	9.68E+19	1.92E-02
2.20E-01	2.20E+01	9.57E+19	2.63E-02	8.83E+19	2.43E-02	8.44E+19	2.32E-02

	DPA xsec	2-3		2-2		2-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA	Total Fluence	DPA	Total Fluence	DPA
2.55E-01	1.83E+01	1.13E+20	2.59E-02	1.04E+20	2.36E-02	9.23E+19	2.11E-02
2.90E-01	1.74E+01	1.18E+20	2.56E-02	1.08E+20	2.36E-02	9.91E+19	2.15E-02
3.20E-01	1.35E+01	8.52E+19	1.44E-02	7.82E+19	1.32E-02	6.82E+19	1.15E-02
3.60E-01	2.51E+01	1.22E+20	3.83E-02	1.05E+20	3.31E-02	9.61E+19	3.02E-02
4.00E-01	4.65E+01	1.04E+20	6.03E-02	9.12E+19	5.30E-02	8.41E+19	4.89E-02
4.50E-01	4.30E+01	9.55E+19	5.14E-02	8.67E+19	4.67E-02	8.23E+19	4.43E-02
5.00E-01	3.64E+01	1.11E+20	5.05E-02	1.00E+20	4.57E-02	9.28E+19	4.22E-02
5.50E-01	3.32E+01	1.07E+20	4.43E-02	9.82E+19	4.08E-02	9.18E+19	3.81E-02
6.00E-01	3.42E+01	1.03E+20	4.41E-02	9.58E+19	4.09E-02	8.69E+19	3.71E-02
6.60E-01	1.96E+01	1.28E+20	3.14E-02	1.21E+20	2.98E-02	1.06E+20	2.61E-02
7.20E-01	4.89E+01	1.31E+20	8.00E-02	1.20E+20	7.32E-02	1.12E+20	6.86E-02
7.80E-01	7.42E+01	1.22E+20	1.13E-01	1.07E+20	9.94E-02	1.11E+20	1.03E-01
8.40E-01	4.40E+01	1.01E+20	5.56E-02	8.79E+19	4.84E-02	8.21E+19	4.52E-02
9.20E-01	4.10E+01	1.17E+20	5.99E-02	1.07E+20	5.50E-02	9.89E+19	5.07E-02
1.00E+00	5.10E+01	1.08E+20	6.90E-02	9.87E+19	6.29E-02	9.43E+19	6.01E-02
1.20E+00	5.01E+01	2.56E+20	1.60E-01	2.26E+20	1.42E-01	2.15E+20	1.35E-01
1.40E+00	6.45E+01	2.25E+20	1.81E-01	2.00E+20	1.62E-01	1.91E+20	1.54E-01
1.60E+00	7.36E+01	1.93E+20	1.78E-01	1.72E+20	1.58E-01	1.67E+20	1.54E-01
1.80E+00	7.65E+01	1.74E+20	1.66E-01	1.48E+20	1.41E-01	1.39E+20	1.33E-01
2.00E+00	9.52E+01	1.50E+20	1.79E-01	1.38E+20	1.65E-01	1.16E+20	1.38E-01
2.30E+00	9.38E+01	1.90E+20	2.22E-01	1.65E+20	1.94E-01	1.51E+20	1.77E-01
2.60E+00	1.12E+02	1.75E+20	2.45E-01	1.55E+20	2.16E-01	1.42E+20	1.99E-01
2.90E+00	1.24E+02	1.32E+20	2.03E-01	1.16E+20	1.79E-01	1.02E+20	1.58E-01
3.30E+00	1.33E+02	1.25E+20	2.09E-01	1.16E+20	1.93E-01	1.07E+20	1.78E-01
3.70E+00	1.35E+02	8.66E+19	1.46E-01	7.69E+19	1.30E-01	7.44E+19	1.26E-01
4.10E+00	1.50E+02	6.90E+19	1.29E-01	5.91E+19	1.11E-01	5.53E+19	1.03E-01
4.50E+00	1.58E+02	5.30E+19	1.05E-01	4.33E+19	8.57E-02	4.40E+19	8.71E-02
5.00E+00	1.69E+02	4.98E+19	1.05E-01	4.69E+19	9.89E-02	3.97E+19	8.37E-02
5.50E+00	1.76E+02	3.16E+19	6.96E-02	3.02E+19	6.66E-02	2.82E+19	6.22E-02

	DPA xsec	2-3		2-2		2-1	
Upper Energy(MeV)	**keV-barn**	**Total Fluence**	**DPA**	**Total Fluence**	**DPA**	**Total Fluence**	**DPA**
6.00E+00	1.83E+02	2.23E+19	5.11E-02	2.14E+19	4.90E-02	1.80E+19	4.12E-02
6.70E+00	1.89E+02	2.18E+19	5.15E-02	1.86E+19	4.40E-02	1.88E+19	4.46E-02
7.40E+00	1.97E+02	1.21E+19	2.97E-02	1.05E+19	2.59E-02	1.03E+19	2.54E-02
8.20E+00	2.03E+02	7.18E+18	1.82E-02	7.40E+18	1.88E-02	7.28E+18	1.85E-02
9.00E+00	2.15E+02	3.89E+18	1.04E-02	3.28E+18	8.80E-03	3.50E+18	9.38E-03
1.00E+01	2.26E+02	3.02E+18	8.51E-03	2.44E+18	6.89E-03	2.50E+18	7.05E-03
1.10E+01	2.38E+02	1.13E+18	3.36E-03	1.27E+18	3.77E-03	9.30E+17	2.76E-03
1.20E+01	2.47E+02	5.75E+17	1.78E-03	2.90E+17	8.97E-04	2.50E+17	7.74E-04
1.30E+01	2.59E+02	2.59E+17	8.36E-04	2.07E+17	6.70E-04	3.65E+17	1.18E-03
1.40E+01	2.71E+02	7.73E+16	2.62E-04	2.80E+17	9.49E-04	1.43E+17	4.86E-04
1.50E+01	2.90E+02	9.59E+16	3.48E-04	2.50E+17	9.07E-04	4.31E+16	1.56E-04
1.60E+01	2.93E+02	3.80E+16	1.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.70E+01	2.93E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.80E+01	2.98E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.90E+01	3.07E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.00E+01	3.16E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
			3.47E+00		**3.10E+00**		**2.88E+00**

Table 21. Calculated fluence and DPA for capsule 1 of the UCSB experiment.

	DPA xsec	1-1	
Upper Energy(MeV)	keV-barn	Total Fluence	DPA
1.00E-10	0	0.00E+00	
1.00E-09	7.73	2.09E+17	2.02E-05
1.00E-08	2.444	3.03E+19	9.26E-04
2.30E-08	1.278	1.14E+20	1.82E-03
5.00E-08	0.857	2.72E+20	2.92E-03
7.60E-08	0.644	2.00E+20	1.61E-03
1.15E-07	0.523	1.74E+20	1.14E-03
1.70E-07	0.428	1.14E+20	6.12E-04
2.55E-07	0.351	8.40E+19	3.69E-04
3.80E-07	0.287	7.35E+19	2.64E-04
5.50E-07	0.237	6.73E+19	1.99E-04
8.40E-07	0.194	7.43E+19	1.80E-04
1.28E-06	0.157	7.37E+19	1.45E-04
1.90E-06	0.128	6.85E+19	1.10E-04
2.80E-06	0.105	6.83E+19	8.96E-05
4.25E-06	0.086	7.51E+19	8.07E-05
6.30E-06	0.07	7.02E+19	6.14E-05
9.20E-06	0.058	6.57E+19	4.77E-05
1.35E-05	0.048	6.87E+19	4.12E-05
2.10E-05	0.038	8.16E+19	3.88E-05
3.00E-05	0.031	6.68E+19	2.59E-05
4.50E-05	0.026	7.65E+19	2.49E-05
6.90E-05	0.021	8.10E+19	2.13E-05
1.00E-04	0.017	7.30E+19	1.55E-05
1.35E-04	0.014	5.94E+19	1.04E-05
1.70E-04	0.014	4.89E+19	8.55E-06
2.20E-04	0.011	5.26E+19	7.24E-06

2.80E-04	0.011	5.24E+19	7.20E-06
3.60E-04	0.01	5.11E+19	6.39E-06
4.50E-04	0.007	4.24E+19	3.71E-06
5.75E-04	0.005	5.07E+19	3.17E-06
7.60E-04	0.129	5.57E+19	8.98E-05
9.60E-04	0.308	4.82E+19	1.86E-04
1.28E-03	0.672	5.79E+19	4.86E-04
1.60E-03	0.477	4.57E+19	2.72E-04
2.00E-03	0.511	4.42E+19	2.82E-04
2.70E-03	0.568	6.01E+19	4.26E-04
3.40E-03	0.632	4.92E+19	3.89E-04
4.50E-03	0.822	5.83E+19	5.99E-04
5.50E-03	0.826	4.42E+19	4.57E-04
7.20E-03	1.671	6.01E+19	1.26E-03
9.20E-03	3.709	4.94E+19	2.29E-03
1.20E-02	1.491	5.89E+19	1.10E-03
1.50E-02	1.156	5.16E+19	7.46E-04
1.90E-02	0.973	5.16E+19	6.28E-04
2.55E-02	0.555	7.60E+19	5.27E-04
3.20E-02	26.762	6.67E+19	2.23E-02
4.00E-02	8.161	3.09E+19	3.15E-03
5.25E-02	6.515	6.91E+19	5.63E-03
6.60E-02	6.576	6.75E+19	5.55E-03
8.80E-02	13.137	9.78E+19	1.61E-02
1.10E-01	11.84	5.89E+19	8.72E-03
1.35E-01	11.27	9.09E+19	1.28E-02
1.60E-01	21.53	5.22E+19	1.40E-02
1.90E-01	15.85	7.05E+19	1.40E-02
2.20E-01	22.01	5.77E+19	1.59E-02
2.55E-01	18.27	7.04E+19	1.61E-02
2.90E-01	17.37	7.70E+19	1.67E-02
3.20E-01	13.51	5.46E+19	9.22E-03

3.60E-01	25.14	7.33E+19	2.30E-02
4.00E-01	46.52	6.61E+19	3.84E-02
4.50E-01	43.04	6.33E+19	3.41E-02
5.00E-01	36.4	7.03E+19	3.20E-02
5.50E-01	33.22	6.63E+19	2.75E-02
6.00E-01	34.18	6.39E+19	2.73E-02
6.60E-01	19.64	7.89E+19	1.94E-02
7.20E-01	48.89	8.42E+19	5.15E-02
7.80E-01	74.22	7.64E+19	7.09E-02
8.40E-01	44.02	6.10E+19	3.36E-02
9.20E-01	40.97	7.36E+19	3.77E-02
1.00E+00	50.95	6.70E+19	4.27E-02
1.20E+00	50.09	1.52E+20	9.53E-02
1.40E+00	64.54	1.37E+20	1.11E-01
1.60E+00	73.58	1.15E+20	1.06E-01
1.80E+00	76.46	1.06E+20	1.01E-01
2.00E+00	95.15	9.01E+19	1.07E-01
2.30E+00	93.75	1.14E+20	1.34E-01
2.60E+00	112.05	1.09E+20	1.53E-01
2.90E+00	123.55	7.97E+19	1.23E-01
3.30E+00	133.45	8.08E+19	1.35E-01
3.70E+00	135.25	5.44E+19	9.20E-02
4.10E+00	149.55	4.18E+19	7.81E-02
4.50E+00	158.25	3.26E+19	6.44E-02
5.00E+00	168.55	3.05E+19	6.43E-02
5.50E+00	176.46	1.97E+19	4.34E-02
6.00E+00	183.06	1.53E+19	3.50E-02
6.70E+00	189.26	1.25E+19	2.95E-02
7.40E+00	196.67	7.38E+18	1.82E-02
8.20E+00	203.37	4.25E+18	1.08E-02
9.00E+00	214.58	2.74E+18	7.36E-03
1.00E+01	225.69	1.57E+18	4.44E-03

1.10E+01	237.6	4.57E+17	1.36E-03
1.20E+01	247.41	4.60E+17	1.42E-03
1.30E+01	258.52	2.11E+17	6.82E-04
1.40E+01	271.35	1.20E+17	4.08E-04
1.50E+01	290.27	5.66E+16	2.05E-04
1.60E+01	293.2	0.00E+00	0.00E+00
1.70E+01	292.73	0.00E+00	0.00E+00
1.80E+01	297.65	0.00E+00	0.00E+00
1.90E+01	307.26	0.00E+00	0.00E+00
2.00E+01	316.36	0.00E+00	0.00E+00
			2.14E+00

8. References

[1] PLN-2996, "Irradiation Test Plan for the ATR National Scientific User Facility – University of California Santa Barbara," Rev. 3, July 27, 2009.

[2] Tim Goorley, Jeffrey S. Bull, Forrest B. Brown, et. al., "Release of MCNP5_RSICC_1.30," Trans. Am. Nucl. Soc., Vol. 91, pp. 693-694 (2004).

[3] X-5 Monte Carlo Team, "MCNP—A General Monte Carlo N-Particle Transport Code, Version 5," Volume I, LA-UR-03-1987, Los Alamos National Laboratory, April 24, 2003 (Revised 6/30/2004) and Volume II, LA-CP-0245, Los Alamos National Laboratory, April 24, 2003 (Revised 6/30/2004) (Vol. II is available with a licensed copy of MCNP).

[4] E. T. Boulette, W. L. Bunch, "Analysis of ZPPR/FTR Shield Experiments Gamma Distributions," WHAN-FR-13, February 1971.

[5] M. A. Lillo, J. R. Mitchell, "Software Management, MCNP Version 5, Release 1.40," INL/INT-08-15171 Rev. 0, August 2010, INL Record Number 234166.

[6] "MCNP5 Version 1.60 Software Management Plan," PLN-4099, Revision 0, January 2012

[7] S. S. Kim, B. G. Schnitzler, "Advanced Test Reactor: Serpentine Arrangement of Highly Enriched Water-Moderated Uranium-Aluminide Fuel Plates Reflected by Beryllium," INL/EXT-05-00780, September 2005; published in "International Handbook of Evaluated Criticality Safety Benchmark Experiments," NEA/NSC/DOC/(95)03/II, Volume II, HEU-MET-THERM-022, September 2005 Edition.

Appendix A: DPA Cross-Sections

Nielsen, Joseph W <joseph.nielsen@inl.gov>

Re: PNNL External Website Inquiry

3 messages

G. Robert Odette <odette@engineering.ucsb.edu> Sun, Jun 23, 2013 at 12:47 PM
To: Joseph W Nielsen <Joseph.Nielsen@inl.gov>

Hi Joe,

Below is an exchange with Larry Greenwood at PNNL. Larry developed the SPECTER code many years ago for damage calculations including dpa. He suggests the 100 group energy structure shown below. I could ask him for the corresponding dpa cross sections he uses if you like. BTW I am not retiring from research, only classroom teaching. Thanks for your help on this.

Regards,

Bob

On 6/23/13 11:25 AM, Greenwood, Larry R wrote:

> Bob - Thanks for your comments - I completely agree with your comments! I have attached the energy grid below. I can also send it in other formats if more convenient.
>
> One minor point is that the ASTM standard E693 has 640 energy groups. My version in SPECTER has only 100 groups which I have found to be adequate.
>
> I also hope our paths cross again in the near future! Good luck on your retirement! I am about a year behind you it appears. I may hang on here a few more years, perhaps going part time at some point.
>
> Best regards,
> Larry
>
> 101
> 1.0000E-10 1.0000E-09 1.0000E-08 2.3000E-08 5.0000E-08 7.6000E-08 1.1500E-07
> 1.7000E-07 2.5500E-07 3.8000E-07 5.5000E-07 8.4000E-07 1.2750E-06 1.9000E-06
> 2.8000E-06 4.2500E-06 6.3000E-06 9.2000E-06 1.3500E-05 2.1000E-05 3.0000E-05
> 4.5000E-05 6.9000E-05 1.0000E-04 1.3500E-04 1.7000E-04 2.2000E-04 2.8000E-04
> 3.6000E-04 4.5000E-04 5.7500E-04 7.6000E-04 9.6000E-04 1.2750E-03 1.6000E-03
> 2.0000E-03 2.7000E-03 3.4000E-03 4.5000E-03 5.5000E-03 7.2000E-03 9.2000E-03
> 1.2000E-02 1.5000E-02 1.9000E-02 2.5500E-02 3.2000E-02 4.0000E-02 5.2500E-02
> 6.6000E-02 8.8000E-02 1.1000E-01 1.3500E-01 1.6000E-01 1.9000E-01 2.2000E-01
> 2.5500E-01 2.9000E-01 3.2000E-01 3.6000E-01 4.0000E-01 4.5000E-01 5.0000E-01
> 5.5000E-01 6.0000E-01 6.6000E-01 7.2000E-01 7.8000E-01 8.4000E-01 9.2000E-01
> 1.0000E+00 1.2000E+00 1.4000E+00 1.6000E+00 1.8000E+00 2.0000E+00 2.3000E+00
> 2.6000E+00 2.9000E+00 3.3000E+00 3.7000E+00 4.1000E+00 4.5000E+00 5.0000E+00
> 5.5000E+00 6.0000E+00 6.7000E+00 7.4000E+00 8.2000E+00 9.0000E+00 1.0000E+01
> 1.1000E+01 1.2000E+01 1.3000E+01 1.4000E+01 1.5000E+01 1.6000E+01 1.7000E+01
> 1.8000E+01 1.9000E+01 2.0000E+01
>
> Larry Greenwood, Pacific Northwest National Laboratory

Laboratory Fellow
Phone: 509-375-5301

-----Original Message-----
From: G. Robert Odette [mailto:odette@engineering.ucsb.edu]
Sent: Saturday, June 22, 2013 9:15 AM
To: Greenwood, Larry R
Subject: Re: PNNL External Website Inquiry

Hi Larry,

Thanks so much for getting right back to me! It would make sense to adapt your 100 group structure since it is tailored to damage calculations. This is also the case since your dpa cross section is the ASTM standard. Would it be convenient for you to send me the group structure in a simple file or even in an e-mail so I can pass it on the the analyst at INL. Regarding you other comments, see below. Thanks again.

Regards,

Bob

PS It would be great if our paths crossed at some point in the near future! I am retiring (I will be 70) from teaching after the fall quarter, but will continue to run our very active research group as a Research Prof.

On 6/21/13 8:30 AM, Greenwood, Larry R wrote:

> Hi Bob,
> It is good to hear from you and I hope you and family are doing well!
> I am still using the SPECTER computer code based on your DISCS program and that code has a standard 100 group energy grid (also a 100 group recoil energy grid so 10,000 group array for every element. The SPECTER computer code is available on the IAEA web site if you don't already have it. Due to the large effort spent in creating all the libraries for SPECTER, obviously we don't change the energy grid but tried to give sufficient detail with 100 groups to fit most applications.
>
> http://www-nds.iaea.org/irdf2002/codes/index.htmlx
>
> The IAEA has a CRP to look at possible updates to damage cross sections and models and I will be attending the first meeting in November. Many others are involved such as Roger Stoller to look at alternative functions to dpa.

I am totally against alternate functions as a general dose unit to replace dpa. The overwhelming benefit of dpa is that is is at base a KERMA based DOSE UNIT!

> SPECTER has not been updated for many years although the Fe dpa cross section is an ASTM standard. Whereas some are pushing for a complete update with current cross sections, there is a problem I think in doing this too frequently since it can become impossible to figure out which version of dpa cross sections are being used in publications and for correlation of data from many different irradiation sources.

Totally agreed.

> The ASTM approach to the Fe standard provides some guidance on this. Codes such as NJOY can of course create dpa cross sections in any energy grid you like. However, putting together large libraries as used in SPECTER is still a formidable task that takes a lot of effort. There is also an effort to push dpa cross sections to much higher neutron energies. If you have any thoughts on any of this please let me know.

The need for higher energy cross sections is legitimate, and probably requires better nuclear reaction kinematics models. But I think a lot has been done on this already.

> Larry Greenwood, Pacific Northwest National Laboratory Laboratory
> Fellow
> Phone: 509-375-5301

From: odette@engineering.ucsb.edu [mailto:odette@engineering.ucsb.edu]
Sent: Friday, June 21, 2013 7:04 AM
To: Greenwood, Larry R
Subject: PNNL External Website Inquiry

PNNL External Website Inquiry

Name: Robert Odette

Sent: 6/21/2013 7:04:05 AM

Email: odette@engineering.ucsb.edu<mailto:odette@engineering.ucsb.edu>

Company: UCSB

Message

Hi Larry, Hope all is well. It has been a long time! I have a quick question. We had a NSUP irradiation in ATR and they will be doing as-run MPMC calculation of the dose and dose rate parameters. They ask about the group structure for dpa. Do you have a suggestion on a standard pick that is not too coarse or fine. Thanks. Regards, Bob

---

Joseph W Nielsen <joseph.nielsen@inl.gov> Mon, Jun 24, 2013 at 10:24 AM
To: odette@engineering.ucsb.edu

Thanks for the info. I will be able to get the cases ran this week and will have preliminary results next week. I spoke with Paul on the heat rates this morning and we are going to use what we currently have from the projection analysis and scale to the cycle averaged operating powers. I will pull the hourly data and see what the variation in lobe power was for the cycle, but since we were in A-10 near the SEFT, I don't expect much.

Joe
[Quoted text hidden]

Verify This Message with Penango.p7s
7K

G. Robert Odette <odette@engineering.ucsb.edu> Mon, Jun 24, 2013 at 11:32 AM
To: Joseph W Nielsen <joseph.nielsen@inl.gov>

Hi Joe,

Great!. I attach a 100 group file with the damage energy which can be converted to dpa by multiplying by 10. If you would like this in a more convenient format let me know. The dpa should be for Fe.

Regards,

Bob

On 6/24/13 9:24 AM, Joseph W Nielsen wrote:

Thanks for the info. I will be able to get the cases ran this week and will have preliminary results next week. I spoke with Paul on the heat rates this morning and we are going to use what we currently have from the projection analysis and scale to the cycle averaged operating powers. I will pull the hourly data and see what the variation in lobe power was for the cycle, but since we were in A-10 near the SEFT, I don't expect much.

Joe

On Sun, Jun 23, 2013 at 12:47 PM, G. Robert Odette <odette@engineering.ucsb.edu
[Quoted text hidden]
[Quoted text hidden]
http://www-nds.iaea.org/__irdf2002/codes/index.htmlx
[Quoted text hidden]
[mailto:odette@engineering.__ucsb.edu
<mailto:odette@engineering.ucsb.edu>]
Sent: Friday, June 21, 2013 7:04 AM
To: Greenwood, Larry R
Subject: PNNL External Website Inquiry

PNNL External Website Inquiry

Name: Robert Odette

Sent: 6/21/2013 7:04:05 AM

Email: odette@engineering.ucsb.edu
<mailto:odette@engineering.ucsb.edu><__mailto:odette@engineering.__ucsb.edu
<mailto:odette@engineering.ucsb.edu>>

Company: UCSB

Message

Hi Larry, Hope all is well. It has been a long time! I have a quick question. We had a NSUP irradiation in ATR and they will be doing as-run MPMC calculation of the dose and dose rate parameters. They ask about the group structure for dpa. Do you have a suggestion on a standard pick that is not too coarse or fine. Thanks. Regards, Bob

SIGD.txt
149K

FILE SIGD from email above

1

HYDROGEN 1301
EDL= 10.0 EV TGAM= 528. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	1.340	8.80E-02	6.92
1.000E-09	0.424	1.10E-01	6.52
1.000E-08	0.222	1.35E-01	6.15
2.300E-08	0.149	1.60E-01	5.78
5.000E-08	0.112	1.90E-01	5.44
7.600E-08	0.091	2.20E-01	5.13
1.150E-07	0.074	2.55E-01	4.83
1.700E-07	0.061	2.90E-01	4.62
2.550E-07	0.050	3.20E-01	4.38
3.800E-07	0.041	3.60E-01	4.16
5.500E-07	0.034	4.00E-01	3.94
8.400E-07	0.027	4.50E-01	3.74
1.275E-06	0.022	5.00E-01	3.56
1.900E-06	0.018	5.50E-01	3.41
2.800E-06	0.015	6.00E-01	3.26
4.250E-06	0.012	6.60E-01	3.12
6.300E-06	0.010	7.20E-01	2.98
9.200E-06	0.008	7.80E-01	2.89
1.350E-05	0.007	8.40E-01	2.76
2.100E-05	0.006	9.20E-01	2.64
3.000E-05	0.005	1.00E+00	2.48
4.500E-05	0.164	1.20E+00	2.28
6.900E-05	0.521	1.40E+00	2.12
1.000E-04	0.657	1.60E+00	1.98
1.350E-04	0.708	1.80E+00	1.87
1.700E-04	0.790	2.00E+00	1.75
2.200E-04	0.910	2.30E+00	1.63
2.800E-04	1.068	2.60E+00	1.53
3.600E-04	1.250	2.90E+00	1.43
4.500E-04	1.485	3.30E+00	1.34
5.750E-04	1.785	3.70E+00	1.26
7.600E-04	2.137	4.10E+00	1.19
9.600E-04	2.539	4.50E+00	1.12
1.275E-03	2.980	5.00E+00	1.06
1.600E-03	3.415	5.50E+00	1.00
2.000E-03	3.952	6.00E+00	0.95
2.700E-03	4.515	6.70E+00	0.89
3.400E-03	5.072	7.40E+00	0.84
4.500E-03	5.586	8.20E+00	0.79
5.500E-03	6.082	9.00E+00	0.74
7.200E-03	6.577	1.00E+01	0.70
9.200E-03	7.015	1.10E+01	0.67
1.200E-02	7.371	1.20E+01	0.64
1.500E-02	7.646	1.30E+01	0.61
1.900E-02	7.872	1.40E+01	0.59
2.550E-02	7.972	1.50E+01	0.57
3.200E-02	7.972	1.60E+01	0.56
4.000E-02	7.860	1.70E+01	0.54

5.250E-02	7.648	1.80E+01	0.53
6.600E-02	7.323	1.90E+01	0.52
		2.00E+01	

1

HELIUM 3 - 1146
EDL= 10.0 EV TGAM=3980. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	124949.992	8.80E-02	10.21
1.000E-09	39424.996	1.10E-01	9.83
1.000E-08	20629.998	1.35E-01	9.55
2.300E-08	13834.999	1.60E-01	9.36
5.000E-08	10397.499	1.90E-01	9.22
7.600E-08	8444.999	2.20E-01	9.08
1.150E-07	6912.500	2.55E-01	8.95
1.700E-07	5662.500	2.90E-01	8.87
2.550E-07	4635.000	3.20E-01	8.80
3.800E-07	3827.500	3.60E-01	8.73
5.500E-07	3137.500	4.00E-01	8.66
8.400E-07	2545.000	4.50E-01	8.61
1.275E-06	2078.000	5.00E-01	8.58
1.900E-06	1709.250	5.50E-01	8.53
2.800E-06	1398.750	6.00E-01	8.52
4.250E-06	1144.750	6.60E-01	8.53
6.300E-06	944.250	7.20E-01	8.60
9.200E-06	779.500	7.80E-01	8.69
1.350E-05	633.250	8.40E-01	8.84
2.100E-05	520.500	9.20E-01	9.01
3.000E-05	429.250	1.00E+00	9.32
4.500E-05	348.500	1.20E+00	9.70
6.900E-05	285.750	1.40E+00	10.08
1.000E-04	242.025	1.60E+00	10.25
1.350E-04	212.200	1.80E+00	10.25
1.700E-04	187.625	2.00E+00	10.10
2.200E-04	165.350	2.30E+00	9.92
2.800E-04	146.000	2.60E+00	9.67
3.600E-04	129.750	2.90E+00	9.35
4.500E-04	115.425	3.30E+00	8.95
5.750E-04	101.225	3.70E+00	8.60
7.600E-04	89.150	4.10E+00	8.27
9.600E-04	78.350	4.50E+00	7.91
1.275E-03	69.200	5.00E+00	7.55
1.600E-03	61.825	5.50E+00	7.21
2.000E-03	53.800	6.00E+00	6.84
2.700E-03	46.325	6.70E+00	6.41
3.400E-03	40.200	7.40E+00	6.02
4.500E-03	35.300	8.20E+00	5.62
5.500E-03	31.075	9.00E+00	5.27
7.200E-03	27.100	1.00E+01	4.87
9.200E-03	23.707	1.10E+01	4.53
1.200E-02	20.950	1.20E+01	4.24
1.500E-02	18.720	1.30E+01	3.97
1.900E-02	16.520	1.40E+01	3.74
2.550E-02	14.725	1.50E+01	3.54
3.200E-02	13.415	1.60E+01	3.34

4.000E-02	12.227	1.70E+01	3.15
5.250E-02	11.287	1.80E+01	3.00
6.600E-02	10.577	1.90E+01	2.87
		2.00E+01	

1

HELIUM 4 - 1270
EDL= 10.0 EV TGAM= 1. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	0.000	8.80E-02	2.12
1.000E-09	0.000	1.10E-01	2.26
1.000E-08	0.000	1.35E-01	2.38
2.300E-08	0.000	1.60E-01	2.50
5.000E-08	0.000	1.90E-01	2.64
7.600E-08	0.000	2.20E-01	2.79
1.150E-07	0.000	2.55E-01	2.98
1.700E-07	0.000	2.90E-01	3.16
2.550E-07	0.000	3.20E-01	3.41
3.800E-07	0.000	3.60E-01	3.74
5.500E-07	0.000	4.00E-01	4.20
8.400E-07	0.000	4.50E-01	4.84
1.275E-06	0.000	5.00E-01	5.67
1.900E-06	0.000	5.50E-01	6.72
2.800E-06	0.000	6.00E-01	8.18
4.250E-06	0.000	6.60E-01	10.22
6.300E-06	0.000	7.20E-01	12.91
9.200E-06	0.000	7.80E-01	15.53
1.350E-05	0.000	8.40E-01	19.38
2.100E-05	0.004	9.20E-01	23.19
3.000E-05	0.009	1.00E+00	26.25
4.500E-05	0.011	1.20E+00	24.41
6.900E-05	0.015	1.40E+00	20.40
1.000E-04	0.019	1.60E+00	17.19
1.350E-04	0.024	1.80E+00	14.96
1.700E-04	0.030	2.00E+00	13.12
2.200E-04	0.038	2.30E+00	11.70
2.800E-04	0.047	2.60E+00	10.77
3.600E-04	0.059	2.90E+00	10.04
4.500E-04	0.073	3.30E+00	9.45
5.750E-04	0.093	3.70E+00	9.01
7.600E-04	0.117	4.10E+00	8.65
9.600E-04	0.148	4.50E+00	8.28
1.275E-03	0.184	5.00E+00	7.91
1.600E-03	0.223	5.50E+00	7.56
2.000E-03	0.279	6.00E+00	7.17
2.700E-03	0.344	6.70E+00	6.75
3.400E-03	0.421	7.40E+00	6.33
4.500E-03	0.501	8.20E+00	5.93
5.500E-03	0.594	9.00E+00	5.51
7.200E-03	0.705	1.00E+01	5.11
9.200E-03	0.828	1.10E+01	4.75
1.200E-02	0.954	1.20E+01	4.42
1.500E-02	1.081	1.30E+01	4.14
1.900E-02	1.235	1.40E+01	3.88
2.550E-02	1.387	1.50E+01	3.65

3.200E-02	1.522	1.60E+01	3.44
4.000E-02	1.672	1.70E+01	3.26
5.250E-02	1.819	1.80E+01	3.10
6.600E-02	1.974	1.90E+01	2.95
		2.00E+01	

1

LITHIUM 6 1303

EDL= 10.0 EV TGAM=1824. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	65175.531	8.80E-02	9.68
1.000E-09	20635.168	1.10E-01	11.14
1.000E-08	10775.088	1.35E-01	14.37
2.300E-08	7230.059	1.60E-01	22.56
5.000E-08	5432.544	1.90E-01	43.48
7.600E-08	4412.536	2.20E-01	72.38
1.150E-07	3610.030	2.55E-01	59.48
1.700E-07	2957.524	2.90E-01	39.98
2.550E-07	2418.770	3.20E-01	27.08
3.800E-07	1997.016	3.60E-01	20.40
5.500E-07	1635.763	4.00E-01	16.71
8.400E-07	1326.261	4.50E-01	14.44
1.275E-06	1082.009	5.00E-01	13.15
1.900E-06	889.007	5.50E-01	12.27
2.800E-06	726.506	6.00E-01	11.63
4.250E-06	593.505	6.60E-01	11.14
6.300E-06	489.504	7.20E-01	10.77
9.200E-06	404.503	7.80E-01	10.56
1.350E-05	328.753	8.40E-01	10.33
2.100E-05	269.752	9.20E-01	10.16
3.000E-05	222.827	1.00E+00	10.02
4.500E-05	180.901	1.20E+00	9.92
6.900E-05	148.426	1.40E+00	10.02
1.000E-04	125.751	1.60E+00	10.38
1.350E-04	110.301	1.80E+00	11.17
1.700E-04	97.626	2.00E+00	12.21
2.200E-04	86.251	2.30E+00	13.35
2.800E-04	76.226	2.60E+00	14.50
3.600E-04	67.701	2.90E+00	16.04
4.500E-04	60.201	3.30E+00	17.29
5.750E-04	52.800	3.70E+00	18.04
7.600E-04	46.525	4.10E+00	18.04
9.600E-04	40.900	4.50E+00	17.79
1.275E-03	36.050	5.00E+00	17.35
1.600E-03	32.275	5.50E+00	17.09
2.000E-03	28.375	6.00E+00	16.69
2.700E-03	24.968	6.70E+00	16.40
3.400E-03	22.080	7.40E+00	15.89
4.500E-03	19.753	8.20E+00	15.35
5.500E-03	17.720	9.00E+00	14.82
7.200E-03	15.823	1.00E+01	14.16
9.200E-03	14.205	1.10E+01	13.59
1.200E-02	12.898	1.20E+01	13.05
1.500E-02	11.853	1.30E+01	12.51
1.900E-02	10.853	1.40E+01	12.01

2.550E-02	10.088	1.50E+01	11.57
3.200E-02	9.583	1.60E+01	11.14
4.000E-02	9.185	1.70E+01	10.75
5.250E-02	8.990	1.80E+01	10.42
6.600E-02	9.080	1.90E+01	10.13
		2.00E+01	

1

LITHIUM 7 1272
EDL= 10.0 EV TGAM=7555. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	1.963	8.80E-02	3.91
1.000E-09	0.637	1.10E-01	4.24
1.000E-08	0.341	1.35E-01	4.85
2.300E-08	0.231	1.60E-01	6.11
5.000E-08	0.174	1.90E-01	9.39
7.600E-08	0.141	2.20E-01	35.58
1.150E-07	0.116	2.55E-01	43.85
1.700E-07	0.095	2.90E-01	18.81
2.550E-07	0.078	3.20E-01	11.52
3.800E-07	0.064	3.60E-01	9.29
5.500E-07	0.053	4.00E-01	8.70
8.400E-07	0.043	4.50E-01	8.28
1.275E-06	0.035	5.00E-01	8.10
1.900E-06	0.029	5.50E-01	8.18
2.800E-06	0.023	6.00E-01	8.49
4.250E-06	0.019	6.60E-01	8.99
6.300E-06	0.016	7.20E-01	9.62
9.200E-06	0.013	7.80E-01	10.21
1.350E-05	0.011	8.40E-01	11.22
2.100E-05	0.009	9.20E-01	12.53
3.000E-05	0.015	1.00E+00	14.16
4.500E-05	0.020	1.20E+00	14.92
6.900E-05	0.022	1.40E+00	14.77
1.000E-04	0.026	1.60E+00	14.88
1.350E-04	0.031	1.80E+00	15.23
1.700E-04	0.037	2.00E+00	15.94
2.200E-04	0.045	2.30E+00	16.97
2.800E-04	0.055	2.60E+00	17.75
3.600E-04	0.068	2.90E+00	18.33
4.500E-04	0.084	3.30E+00	19.08
5.750E-04	0.107	3.70E+00	20.79
7.600E-04	0.135	4.10E+00	22.35
9.600E-04	0.172	4.50E+00	22.09
1.275E-03	0.218	5.00E+00	19.70
1.600E-03	0.268	5.50E+00	19.01
2.000E-03	0.341	6.00E+00	18.42
2.700E-03	0.431	6.70E+00	17.20
3.400E-03	0.542	7.40E+00	16.35
4.500E-03	0.665	8.20E+00	16.10
5.500E-03	0.815	9.00E+00	15.61
7.200E-03	1.008	1.00E+01	15.04
9.200E-03	1.236	1.10E+01	14.63
1.200E-02	1.478	1.20E+01	14.25
1.500E-02	1.738	1.30E+01	13.75

1.900E-02	2.071	1.40E+01	13.25
2.550E-02	2.411	1.50E+01	12.86
3.200E-02	2.718	1.60E+01	12.54
4.000E-02	3.063	1.70E+01	12.21
5.250E-02	3.380	1.80E+01	11.86
6.600E-02	3.673	1.90E+01	11.58
		2.00E+01	

1

BERYLLIUM 1304

EDL= 31.0 EV TGAM=1307. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	0.095	8.80E-02	31.02
1.000E-09	0.030	1.10E-01	33.67
1.000E-08	0.016	1.35E-01	35.69
2.300E-08	0.011	1.60E-01	37.16
5.000E-08	0.008	1.90E-01	38.07
7.600E-08	0.006	2.20E-01	38.44
1.150E-07	0.005	2.55E-01	38.85
1.700E-07	0.004	2.90E-01	39.40
2.550E-07	0.004	3.20E-01	39.57
3.800E-07	0.003	3.60E-01	39.53
5.500E-07	0.002	4.00E-01	39.16
8.400E-07	0.002	4.50E-01	38.43
1.275E-06	0.002	5.00E-01	38.65
1.900E-06	0.001	5.50E-01	43.03
2.800E-06	0.001	6.00E-01	65.51
4.250E-06	0.001	6.60E-01	42.34
6.300E-06	0.001	7.20E-01	41.31
9.200E-06	0.001	7.80E-01	46.31
1.350E-05	0.000	8.40E-01	42.36
2.100E-05	0.000	9.20E-01	41.48
3.000E-05	0.000	1.00E+00	39.20
4.500E-05	0.000	1.20E+00	34.04
6.900E-05	0.000	1.40E+00	28.99
1.000E-04	0.091	1.60E+00	25.54
1.350E-04	0.175	1.80E+00	23.85
1.700E-04	0.236	2.00E+00	26.34
2.200E-04	0.260	2.30E+00	35.75
2.800E-04	0.304	2.60E+00	49.54
3.600E-04	0.358	2.90E+00	40.27
4.500E-04	0.434	3.30E+00	33.02
5.750E-04	0.542	3.70E+00	28.85
7.600E-04	0.680	4.10E+00	28.49
9.600E-04	0.867	4.50E+00	28.56
1.275E-03	1.094	5.00E+00	28.45
1.600E-03	1.346	5.50E+00	28.11
2.000E-03	1.725	6.00E+00	27.77
2.700E-03	2.197	6.70E+00	27.31
3.400E-03	2.787	7.40E+00	26.97
4.500E-03	3.457	8.20E+00	26.61
5.500E-03	4.286	9.00E+00	26.17
7.200E-03	5.379	1.00E+01	25.68
9.200E-03	6.726	1.10E+01	25.13
1.200E-02	8.246	1.20E+01	24.50

1.500E-02	9.959	1.30E+01	23.95
1.900E-02	12.315	1.40E+01	23.22
2.550E-02	14.942	1.50E+01	22.79
3.200E-02	17.546	1.60E+01	21.99
4.000E-02	20.771	1.70E+01	21.99
5.250E-02	24.119	1.80E+01	21.86
6.600E-02	27.699	1.90E+01	21.42
		2.00E+01	

1

BORON 10 - 1305
EDL= 25.0 EV TGAM= 711. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	725627.688	8.80E-02	66.56
1.000E-09	231313.359	1.10E-01	66.00
1.000E-08	121250.453	1.35E-01	66.44
2.300E-08	81187.805	1.60E-01	67.50
5.000E-08	61056.477	1.90E-01	68.82
7.600E-08	49562.684	2.20E-01	70.00
1.150E-07	40543.898	2.55E-01	70.50
1.700E-07	33237.621	2.90E-01	70.82
2.550E-07	27175.100	3.20E-01	70.50
3.800E-07	22443.832	3.60E-01	70.32
5.500E-07	18381.318	4.00E-01	70.25
8.400E-07	14906.305	4.50E-01	69.69
1.275E-06	12156.295	5.00E-01	67.63
1.900E-06	9993.787	5.50E-01	64.50
2.800E-06	8162.530	6.00E-01	61.17
4.250E-06	6668.774	6.60E-01	58.12
6.300E-06	5503.146	7.20E-01	55.42
9.200E-06	4548.767	7.80E-01	53.63
1.350E-05	3695.639	8.40E-01	51.26
2.100E-05	3033.761	9.20E-01	49.31
3.000E-05	2505.009	1.00E+00	46.49
4.500E-05	2034.382	1.20E+00	42.58
6.900E-05	1670.006	1.40E+00	39.63
1.000E-04	1413.755	1.60E+00	40.49
1.350E-04	1236.880	1.80E+00	44.76
1.700E-04	1092.504	2.00E+00	40.53
2.200E-04	963.754	2.30E+00	42.64
2.800E-04	851.253	2.60E+00	47.97
3.600E-04	756.253	2.90E+00	40.36
4.500E-04	671.253	3.30E+00	33.92
5.750E-04	587.752	3.70E+00	34.45
7.600E-04	517.065	4.10E+00	36.47
9.600E-04	453.314	4.50E+00	32.31
1.275E-03	398.439	5.00E+00	27.83
1.600E-03	355.689	5.50E+00	27.19
2.000E-03	310.939	6.00E+00	29.35
2.700E-03	272.314	6.70E+00	30.98
3.400E-03	239.189	7.40E+00	30.78
4.500E-03	212.189	8.20E+00	30.09
5.500E-03	188.501	9.00E+00	29.94
7.200E-03	166.001	1.00E+01	30.59
9.200E-03	146.439	1.10E+01	31.06

1.200E-02	130.376	1.20E+01	30.98
1.500E-02	117.064	1.30E+01	30.86
1.900E-02	103.876	1.40E+01	30.86
2.550E-02	93.126	1.50E+01	30.90
3.200E-02	85.314	1.60E+01	30.84
4.000E-02	78.251	1.70E+01	30.83
5.250E-02	72.814	1.80E+01	30.81
6.600E-02	68.814	1.90E+01	30.77
		2.00E+01	

1

BORON 11 - 1160
EDL= 25.0 EV TGAM=4013. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	0.153	8.80E-02	27.71
1.000E-09	0.048	1.10E-01	30.70
1.000E-08	0.025	1.35E-01	33.11
2.300E-08	0.017	1.60E-01	35.26
5.000E-08	0.013	1.90E-01	37.36
7.600E-08	0.010	2.20E-01	39.31
1.150E-07	0.008	2.55E-01	40.02
1.700E-07	0.007	2.90E-01	40.53
2.550E-07	0.006	3.20E-01	41.33
3.800E-07	0.005	3.60E-01	44.90
5.500E-07	0.004	4.00E-01	76.56
8.400E-07	0.003	4.50E-01	59.78
1.275E-06	0.003	5.00E-01	48.72
1.900E-06	0.002	5.50E-01	46.32
2.800E-06	0.002	6.00E-01	45.06
4.250E-06	0.001	6.60E-01	44.05
6.300E-06	0.001	7.20E-01	43.53
9.200E-06	0.001	7.80E-01	43.26
1.350E-05	0.001	8.40E-01	42.43
2.100E-05	0.001	9.20E-01	41.03
3.000E-05	0.001	1.00E+00	41.74
4.500E-05	0.000	1.20E+00	62.43
6.900E-05	0.000	1.40E+00	45.70
1.000E-04	0.077	1.60E+00	43.95
1.350E-04	0.131	1.80E+00	40.50
1.700E-04	0.163	2.00E+00	35.35
2.200E-04	0.184	2.30E+00	37.99
2.800E-04	0.218	2.60E+00	35.51
3.600E-04	0.261	2.90E+00	31.89
4.500E-04	0.315	3.30E+00	34.24
5.750E-04	0.397	3.70E+00	32.39
7.600E-04	0.500	4.10E+00	29.43
9.600E-04	0.640	4.50E+00	37.35
1.275E-03	0.808	5.00E+00	36.88
1.600E-03	1.001	5.50E+00	36.73
2.000E-03	1.286	6.00E+00	35.26
2.700E-03	1.643	6.70E+00	33.04
3.400E-03	2.090	7.40E+00	33.68
4.500E-03	2.604	8.20E+00	30.69
5.500E-03	3.245	9.00E+00	30.47
7.200E-03	4.100	1.00E+01	30.43

9.200E-03	5.182	1.10E+01	30.53
1.200E-02	6.463	1.20E+01	31.23
1.500E-02	7.957	1.30E+01	33.18
1.900E-02	11.417	1.40E+01	33.42
2.550E-02	12.219	1.50E+01	33.20
3.200E-02	14.394	1.60E+01	32.83
4.000E-02	17.156	1.70E+01	32.46
5.250E-02	20.238	1.80E+01	32.09
6.600E-02	23.881	1.90E+01	31.70
		2.00E+01	

1

CARBON - 1306

EDL= 31.0 EV TGAM= 671. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	0.017	8.80E-02	28.51
1.000E-09	0.005	1.10E-01	32.63
1.000E-08	0.003	1.35E-01	36.37
2.300E-08	0.002	1.60E-01	39.88
5.000E-08	0.001	1.90E-01	43.11
7.600E-08	0.001	2.20E-01	46.04
1.150E-07	0.001	2.55E-01	48.58
1.700E-07	0.001	2.90E-01	50.67
2.550E-07	0.001	3.20E-01	52.40
3.800E-07	0.001	3.60E-01	54.03
5.500E-07	0.000	4.00E-01	55.45
8.400E-07	0.000	4.50E-01	56.61
1.275E-06	0.000	5.00E-01	57.44
1.900E-06	0.000	5.50E-01	57.98
2.800E-06	0.000	6.00E-01	58.33
4.250E-06	0.000	6.60E-01	58.43
6.300E-06	0.000	7.20E-01	58.24
9.200E-06	0.000	7.80E-01	58.20
1.350E-05	0.000	8.40E-01	57.68
2.100E-05	0.000	9.20E-01	57.02
3.000E-05	0.000	1.00E+00	55.62
4.500E-05	0.000	1.20E+00	53.29
6.900E-05	0.000	1.40E+00	50.89
1.000E-04	0.002	1.60E+00	48.63
1.350E-04	0.083	1.80E+00	46.62
1.700E-04	0.145	2.00E+00	50.21
2.200E-04	0.189	2.30E+00	45.62
2.800E-04	0.212	2.60E+00	55.72
3.600E-04	0.245	2.90E+00	58.12
4.500E-04	0.292	3.30E+00	72.73
5.750E-04	0.361	3.70E+00	61.36
7.600E-04	0.451	4.10E+00	52.53
9.600E-04	0.571	4.50E+00	39.43
1.275E-03	0.719	5.00E+00	36.31
1.600E-03	0.888	5.50E+00	33.61
2.000E-03	1.142	6.00E+00	35.14
2.700E-03	1.459	6.70E+00	30.33
3.400E-03	1.858	7.40E+00	51.57
4.500E-03	2.314	8.20E+00	31.47
5.500E-03	2.893	9.00E+00	30.54

7.200E-03	3.661	1.00E+01	33.43
9.200E-03	4.629	1.10E+01	39.79
1.200E-02	5.761	1.20E+01	39.13
1.500E-02	7.072	1.30E+01	38.51
1.900E-02	8.944	1.40E+01	39.11
2.550E-02	11.129	1.50E+01	43.03
3.200E-02	13.415	1.60E+01	44.28
4.000E-02	16.399	1.70E+01	42.79
5.250E-02	19.848	1.80E+01	45.59
6.600E-02	24.017	1.90E+01	46.58
		2.00E+01	

1

NITROGEN 1275

EDL= 30.0 EV TGAM=1659. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	0.951	8.80E-02	28.47
1.000E-09	0.301	1.10E-01	31.58
1.000E-08	0.157	1.35E-01	34.46
2.300E-08	0.105	1.60E-01	37.16
5.000E-08	0.079	1.90E-01	39.63
7.600E-08	0.064	2.20E-01	41.93
1.150E-07	0.053	2.55E-01	43.67
1.700E-07	0.043	2.90E-01	45.14
2.550E-07	0.035	3.20E-01	46.28
3.800E-07	0.029	3.60E-01	47.75
5.500E-07	0.024	4.00E-01	62.44
8.400E-07	0.019	4.50E-01	46.17
1.275E-06	0.016	5.00E-01	42.42
1.900E-06	0.013	5.50E-01	38.66
2.800E-06	0.011	6.00E-01	41.44
4.250E-06	0.009	6.60E-01	51.74
6.300E-06	0.007	7.20E-01	46.62
9.200E-06	0.006	7.80E-01	43.20
1.350E-05	0.005	8.40E-01	37.29
2.100E-05	0.004	9.20E-01	32.06
3.000E-05	0.003	1.00E+00	56.39
4.500E-05	0.003	1.20E+00	56.05
6.900E-05	0.002	1.40E+00	61.58
1.000E-04	0.002	1.60E+00	63.26
1.350E-04	0.114	1.80E+00	52.72
1.700E-04	0.248	2.00E+00	52.89
2.200E-04	0.345	2.30E+00	48.23
2.800E-04	0.383	2.60E+00	50.57
3.600E-04	0.439	2.90E+00	64.79
4.500E-04	0.509	3.30E+00	65.89
5.750E-04	0.621	3.70E+00	74.37
7.600E-04	0.768	4.10E+00	73.68
9.600E-04	0.954	4.50E+00	45.71
1.275E-03	1.185	5.00E+00	55.62
1.600E-03	1.434	5.50E+00	54.88
2.000E-03	1.809	6.00E+00	52.10
2.700E-03	2.270	6.70E+00	53.29
3.400E-03	2.846	7.40E+00	60.41
4.500E-03	3.497	8.20E+00	50.92

5.500E-03	4.302	9.00E+00	53.39
7.200E-03	5.370	1.00E+01	58.08
9.200E-03	6.684	1.10E+01	58.47
1.200E-02	8.175	1.20E+01	63.73
1.500E-02	9.803	1.30E+01	63.51
1.900E-02	11.970	1.40E+01	63.18
2.550E-02	14.378	1.50E+01	62.94
3.200E-02	16.665	1.60E+01	62.08
4.000E-02	19.373	1.70E+01	61.24
5.250E-02	22.140	1.80E+01	60.54
6.600E-02	25.283	1.90E+01	59.83
		2.00E+01	

1

OXYGEN 16 - 1276

EDL= 20.0 EV TGAM= 292. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	0.000	8.80E-02	23.26
1.000E-09	0.000	1.10E-01	27.87
1.000E-08	0.000	1.35E-01	32.53
2.300E-08	0.000	1.60E-01	37.49
5.000E-08	0.000	1.90E-01	42.70
7.600E-08	0.000	2.20E-01	48.38
1.150E-07	0.000	2.55E-01	54.95
1.700E-07	0.000	2.90E-01	61.90
2.550E-07	0.000	3.20E-01	73.15
3.800E-07	0.000	3.60E-01	99.00
5.500E-07	0.000	4.00E-01	201.30
8.400E-07	0.000	4.50E-01	110.10
1.275E-06	0.000	5.00E-01	60.11
1.900E-06	0.000	5.50E-01	58.64
2.800E-06	0.000	6.00E-01	61.30
4.250E-06	0.000	6.60E-01	64.98
6.300E-06	0.000	7.20E-01	68.39
9.200E-06	0.000	7.80E-01	73.17
1.350E-05	0.000	8.40E-01	86.70
2.100E-05	0.000	9.20E-01	162.90
3.000E-05	0.000	1.00E+00	133.42
4.500E-05	0.000	1.20E+00	101.10
6.900E-05	0.000	1.40E+00	75.15
1.000E-04	0.000	1.60E+00	75.97
1.350E-04	0.018	1.80E+00	73.06
1.700E-04	0.075	2.00E+00	52.54
2.200E-04	0.119	2.30E+00	29.65
2.800E-04	0.147	2.60E+00	46.05
3.600E-04	0.165	2.90E+00	70.21
4.500E-04	0.195	3.30E+00	117.97
5.750E-04	0.237	3.70E+00	92.77
7.600E-04	0.294	4.10E+00	73.87
9.600E-04	0.371	4.50E+00	53.60
1.275E-03	0.468	5.00E+00	54.74
1.600E-03	0.577	5.50E+00	58.51
2.000E-03	0.740	6.00E+00	48.52
2.700E-03	0.950	6.70E+00	63.85
3.400E-03	1.214	7.40E+00	61.20

4.500E-03	1.520	8.20E+00	67.20
5.500E-03	1.906	9.00E+00	64.77
7.200E-03	2.429	1.00E+01	69.82
9.200E-03	3.093	1.10E+01	86.62
1.200E-02	3.882	1.20E+01	78.15
1.500E-02	4.817	1.30E+01	79.95
1.900E-02	6.181	1.40E+01	83.55
2.550E-02	7.823	1.50E+01	82.43
3.200E-02	9.592	1.60E+01	80.70
4.000E-02	12.015	1.70E+01	82.95
5.250E-02	14.955	1.80E+01	81.60
6.600E-02	18.787	1.90E+01	82.35
		2.00E+01	

1

FLUORINE - 1309

EDL= 30.0 EV TGAM=1207. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	0.088	8.80E-02	94.07
1.000E-09	0.028	1.10E-01	39.31
1.000E-08	0.014	1.35E-01	31.37
2.300E-08	0.010	1.60E-01	32.17
5.000E-08	0.007	1.90E-01	38.66
7.600E-08	0.006	2.20E-01	62.90
1.150E-07	0.005	2.55E-01	108.70
1.700E-07	0.004	2.90E-01	108.01
2.550E-07	0.003	3.20E-01	109.13
3.800E-07	0.003	3.60E-01	115.66
5.500E-07	0.002	4.00E-01	117.60
8.400E-07	0.002	4.50E-01	85.96
1.275E-06	0.001	5.00E-01	88.88
1.900E-06	0.001	5.50E-01	84.99
2.800E-06	0.001	6.00E-01	80.63
4.250E-06	0.001	6.60E-01	68.39
6.300E-06	0.001	7.20E-01	92.40
9.200E-06	0.001	7.80E-01	96.60
1.350E-05	0.000	8.40E-01	94.88
2.100E-05	0.000	9.20E-01	92.63
3.000E-05	0.000	1.00E+00	99.45
4.500E-05	0.000	1.20E+00	125.41
6.900E-05	0.000	1.40E+00	111.76
1.000E-04	0.000	1.60E+00	119.10
1.350E-04	0.000	1.80E+00	113.40
1.700E-04	0.042	2.00E+00	114.98
2.200E-04	0.094	2.30E+00	123.38
2.800E-04	0.132	2.60E+00	122.26
3.600E-04	0.150	2.90E+00	105.91
4.500E-04	0.171	3.30E+00	98.56
5.750E-04	0.208	3.70E+00	87.68
7.600E-04	0.254	4.10E+00	98.86
9.600E-04	0.320	4.50E+00	93.91
1.275E-03	0.401	5.00E+00	90.46
1.600E-03	0.493	5.50E+00	101.03
2.000E-03	0.634	6.00E+00	93.76
2.700E-03	0.812	6.70E+00	94.73

3.400E-03	1.039	7.40E+00	99.53
4.500E-03	1.301	8.20E+00	102.46
5.500E-03	1.634	9.00E+00	103.21
7.200E-03	2.081	1.00E+01	106.13
9.200E-03	2.663	1.10E+01	106.36
1.200E-02	3.355	1.20E+01	107.93
1.500E-02	4.177	1.30E+01	108.76
1.900E-02	5.626	1.40E+01	110.33
2.550E-02	26.458	1.50E+01	111.76
3.200E-02	9.084	1.60E+01	111.61
4.000E-02	34.454	1.70E+01	110.86
5.250E-02	13.120	1.80E+01	110.48
6.600E-02	21.836	1.90E+01	109.82
		2.00E+01	

1

SODIUM - 1311

EDL= 25.0 EV TGAM= 618. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	2.494	8.80E-02	18.11
1.000E-09	0.789	1.10E-01	21.23
1.000E-08	0.412	1.35E-01	24.25
2.300E-08	0.277	1.60E-01	28.09
5.000E-08	0.208	1.90E-01	48.36
7.600E-08	0.169	2.20E-01	52.95
1.150E-07	0.138	2.55E-01	33.98
1.700E-07	0.113	2.90E-01	44.13
2.550E-07	0.093	3.20E-01	46.28
3.800E-07	0.076	3.60E-01	63.45
5.500E-07	0.063	4.00E-01	62.95
8.400E-07	0.051	4.50E-01	50.69
1.275E-06	0.041	5.00E-01	50.06
1.900E-06	0.034	5.50E-01	86.26
2.800E-06	0.028	6.00E-01	94.63
4.250E-06	0.023	6.60E-01	143.01
6.300E-06	0.019	7.20E-01	113.45
9.200E-06	0.016	7.80E-01	100.76
1.350E-05	0.013	8.40E-01	105.01
2.100E-05	0.011	9.20E-01	85.45
3.000E-05	0.009	1.00E+00	91.88
4.500E-05	0.007	1.20E+00	101.26
6.900E-05	0.006	1.40E+00	87.45
1.000E-04	0.005	1.60E+00	105.07
1.350E-04	0.005	1.80E+00	98.83
1.700E-04	0.037	2.00E+00	120.83
2.200E-04	0.075	2.30E+00	121.02
2.800E-04	0.103	2.60E+00	110.95
3.600E-04	0.114	2.90E+00	103.58
4.500E-04	0.134	3.30E+00	122.83
5.750E-04	0.165	3.70E+00	117.08
7.600E-04	0.215	4.10E+00	117.65
9.600E-04	0.302	4.50E+00	115.15
1.275E-03	0.486	5.00E+00	120.09
1.600E-03	1.049	5.50E+00	116.72
2.000E-03	10.928	6.00E+00	120.04

2.700E-03	37.288	6.70E+00	114.29
3.400E-03	5.712	7.40E+00	121.42
4.500E-03	3.080	8.20E+00	118.55
5.500E-03	2.727	9.00E+00	120.43
7.200E-03	2.829	1.00E+01	128.50
9.200E-03	3.185	1.10E+01	133.82
1.200E-02	3.696	1.20E+01	136.71
1.500E-02	4.353	1.30E+01	138.78
1.900E-02	5.368	1.40E+01	139.98
2.550E-02	6.675	1.50E+01	140.93
3.200E-02	8.172	1.60E+01	142.19
4.000E-02	11.814	1.70E+01	143.95
5.250E-02	22.187	1.80E+01	145.34
6.600E-02	14.994	1.90E+01	146.47
		2.00E+01	

1

MAGNESIUM 1312

EDL= 25.0 EV TGAM= 574. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	0.277	8.80E-02	51.94
1.000E-09	0.087	1.10E-01	27.88
1.000E-08	0.046	1.35E-01	29.98
2.300E-08	0.031	1.60E-01	34.36
5.000E-08	0.023	1.90E-01	51.18
7.600E-08	0.019	2.20E-01	86.06
1.150E-07	0.015	2.55E-01	119.06
1.700E-07	0.013	2.90E-01	99.69
2.550E-07	0.010	3.20E-01	77.75
3.800E-07	0.009	3.60E-01	66.25
5.500E-07	0.007	4.00E-01	132.25
8.400E-07	0.006	4.50E-01	82.72
1.275E-06	0.005	5.00E-01	69.22
1.900E-06	0.004	5.50E-01	69.53
2.800E-06	0.003	6.00E-01	46.72
4.250E-06	0.003	6.60E-01	84.78
6.300E-06	0.002	7.20E-01	69.10
9.200E-06	0.002	7.80E-01	79.16
1.350E-05	0.001	8.40E-01	76.97
2.100E-05	0.001	9.20E-01	60.61
3.000E-05	0.001	1.00E+00	67.53
4.500E-05	0.001	1.20E+00	88.97
6.900E-05	0.001	1.40E+00	72.10
1.000E-04	0.001	1.60E+00	110.78
1.350E-04	0.000	1.80E+00	99.72
1.700E-04	0.029	2.00E+00	105.97
2.200E-04	0.073	2.30E+00	105.53
2.800E-04	0.107	2.60E+00	127.16
3.600E-04	0.124	2.90E+00	103.66
4.500E-04	0.140	3.30E+00	118.41
5.750E-04	0.168	3.70E+00	101.54
7.600E-04	0.206	4.10E+00	134.67
9.600E-04	0.254	4.50E+00	129.98
1.275E-03	0.317	5.00E+00	124.61
1.600E-03	0.391	5.50E+00	124.68

2.000E-03	0.506	6.00E+00	108.75
2.700E-03	0.655	6.70E+00	122.44
3.400E-03	0.839	7.40E+00	121.45
4.500E-03	1.053	8.20E+00	130.33
5.500E-03	1.326	9.00E+00	130.22
7.200E-03	1.695	1.00E+01	137.29
9.200E-03	2.180	1.10E+01	143.99
1.200E-02	2.737	1.20E+01	150.93
1.500E-02	3.926	1.30E+01	153.75
1.900E-02	7.041	1.40E+01	159.95
2.550E-02	6.288	1.50E+01	158.59
3.200E-02	7.388	1.60E+01	158.22
4.000E-02	9.213	1.70E+01	159.54
5.250E-02	12.432	1.80E+01	160.18
6.600E-02	92.949	1.90E+01	160.31
		2.00E+01	

1

ALUMINIUM 1313

EDL= 27.0 EV TGAM= 674. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	1.195	8.80E-02	35.15
1.000E-09	0.378	1.10E-01	18.19
1.000E-08	0.198	1.35E-01	61.45
2.300E-08	0.133	1.60E-01	35.39
5.000E-08	0.100	1.90E-01	42.91
7.600E-08	0.081	2.20E-01	31.52
1.150E-07	0.066	2.55E-01	34.40
1.700E-07	0.054	2.90E-01	57.59
2.550E-07	0.044	3.20E-01	36.47
3.800E-07	0.037	3.60E-01	51.76
5.500E-07	0.030	4.00E-01	68.19
8.400E-07	0.024	4.50E-01	63.65
1.275E-06	0.020	5.00E-01	68.52
1.900E-06	0.016	5.50E-01	70.95
2.800E-06	0.013	6.00E-01	74.12
4.250E-06	0.011	6.60E-01	63.56
6.300E-06	0.009	7.20E-01	80.87
9.200E-06	0.007	7.80E-01	99.23
1.350E-05	0.006	8.40E-01	83.64
2.100E-05	0.005	9.20E-01	70.27
3.000E-05	0.004	1.00E+00	87.82
4.500E-05	0.003	1.20E+00	86.54
6.900E-05	0.003	1.40E+00	100.11
1.000E-04	0.002	1.60E+00	103.96
1.350E-04	0.002	1.80E+00	104.50
1.700E-04	0.002	2.00E+00	122.32
2.200E-04	0.020	2.30E+00	114.42
2.800E-04	0.035	2.60E+00	118.27
3.600E-04	0.047	2.90E+00	122.86
4.500E-04	0.052	3.30E+00	125.76
5.750E-04	0.061	3.70E+00	128.93
7.600E-04	0.074	4.10E+00	126.71
9.600E-04	0.091	4.50E+00	129.27
1.275E-03	0.114	5.00E+00	134.94

1.600E-03	0.140	5.50E+00	136.77
2.000E-03	0.180	6.00E+00	139.54
2.700E-03	0.230	6.70E+00	139.55
3.400E-03	0.290	7.40E+00	143.34
4.500E-03	0.369	8.20E+00	144.17
5.500E-03	0.877	9.00E+00	145.81
7.200E-03	0.579	1.00E+01	151.97
9.200E-03	0.705	1.10E+01	160.57
1.200E-02	0.841	1.20E+01	168.63
1.500E-02	0.821	1.30E+01	172.71
1.900E-02	0.801	1.40E+01	177.07
2.550E-02	2.263	1.50E+01	180.42
3.200E-02	32.802	1.60E+01	181.77
4.000E-02	8.200	1.70E+01	182.03
5.250E-02	5.273	1.80E+01	181.23
6.600E-02	24.454	1.90E+01	179.89
		2.00E+01	

1

SILICON - 1314

EDL= 25.0 EV TGAM= 565. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	0.694	8.80E-02	5.21
1.000E-09	0.220	1.10E-01	3.39
1.000E-08	0.115	1.35E-01	2.55
2.300E-08	0.077	1.60E-01	62.91
5.000E-08	0.058	1.90E-01	91.09
7.600E-08	0.047	2.20E-01	61.52
1.150E-07	0.039	2.55E-01	51.46
1.700E-07	0.032	2.90E-01	49.27
2.550E-07	0.026	3.20E-01	48.04
3.800E-07	0.021	3.60E-01	49.33
5.500E-07	0.017	4.00E-01	50.69
8.400E-07	0.014	4.50E-01	52.81
1.275E-06	0.011	5.00E-01	63.84
1.900E-06	0.009	5.50E-01	67.60
2.800E-06	0.008	6.00E-01	52.20
4.250E-06	0.006	6.60E-01	56.30
6.300E-06	0.005	7.20E-01	69.21
9.200E-06	0.004	7.80E-01	118.80
1.350E-05	0.004	8.40E-01	81.91
2.100E-05	0.003	9.20E-01	110.29
3.000E-05	0.002	1.00E+00	65.23
4.500E-05	0.002	1.20E+00	87.85
6.900E-05	0.002	1.40E+00	101.59
1.000E-04	0.001	1.60E+00	104.84
1.350E-04	0.001	1.80E+00	145.53
1.700E-04	0.002	2.00E+00	98.29
2.200E-04	0.030	2.30E+00	121.04
2.800E-04	0.052	2.60E+00	123.86
3.600E-04	0.068	2.90E+00	113.56
4.500E-04	0.076	3.30E+00	101.87
5.750E-04	0.090	3.70E+00	121.76
7.600E-04	0.108	4.10E+00	135.32
9.600E-04	0.134	4.50E+00	155.64

1.275E-03	0.168	5.00E+00	138.03
1.600E-03	0.207	5.50E+00	147.78
2.000E-03	0.264	6.00E+00	134.67
2.700E-03	0.337	6.70E+00	131.43
3.400E-03	0.430	7.40E+00	169.06
4.500E-03	0.562	8.20E+00	165.45
5.500E-03	0.683	9.00E+00	168.46
7.200E-03	0.857	1.00E+01	171.66
9.200E-03	1.071	1.10E+01	176.48
1.200E-02	1.330	1.20E+01	181.37
1.500E-02	1.638	1.30E+01	191.19
1.900E-02	2.027	1.40E+01	191.57
2.550E-02	2.452	1.50E+01	194.15
3.200E-02	3.004	1.60E+01	196.03
4.000E-02	2.632	1.70E+01	195.91
5.250E-02	14.335	1.80E+01	199.86
6.600E-02	6.313	1.90E+01	200.24
		2.00E+01	

1

PHOSPHORUS - 1315
EDL= 30.0 EV TGAM= 500. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	0.672	8.80E-02	13.90
1.000E-09	0.228	1.10E-01	10.71
1.000E-08	0.124	1.35E-01	17.65
2.300E-08	0.085	1.60E-01	19.64
5.000E-08	0.063	1.90E-01	22.34
7.600E-08	0.051	2.20E-01	20.62
1.150E-07	0.041	2.55E-01	28.01
1.700E-07	0.034	2.90E-01	23.69
2.550E-07	0.027	3.20E-01	28.25
3.800E-07	0.022	3.60E-01	48.71
5.500E-07	0.018	4.00E-01	46.70
8.400E-07	0.015	4.50E-01	54.62
1.275E-06	0.012	5.00E-01	37.14
1.900E-06	0.010	5.50E-01	57.32
2.800E-06	0.008	6.00E-01	46.96
4.250E-06	0.007	6.60E-01	46.94
6.300E-06	0.006	7.20E-01	46.17
9.200E-06	0.005	7.80E-01	45.48
1.350E-05	0.005	8.40E-01	63.79
2.100E-05	0.005	9.20E-01	87.87
3.000E-05	0.005	1.00E+00	77.97
4.500E-05	0.005	1.20E+00	89.60
6.900E-05	0.005	1.40E+00	96.73
1.000E-04	0.005	1.60E+00	104.76
1.350E-04	0.005	1.80E+00	115.33
1.700E-04	0.005	2.00E+00	120.21
2.200E-04	0.005	2.30E+00	126.06
2.800E-04	0.068	2.60E+00	140.98
3.600E-04	0.120	2.90E+00	151.03
4.500E-04	0.158	3.30E+00	134.54
5.750E-04	0.179	3.70E+00	151.27
7.600E-04	0.211	4.10E+00	162.52

9.600E-04	0.258	4.50E+00	149.33
1.275E-03	0.317	5.00E+00	150.08
1.600E-03	0.384	5.50E+00	141.84
2.000E-03	0.492	6.00E+00	155.87
2.700E-03	0.626	6.70E+00	166.22
3.400E-03	0.799	7.40E+00	165.25
4.500E-03	1.000	8.20E+00	168.18
5.500E-03	1.327	9.00E+00	170.36
7.200E-03	2.036	1.00E+01	169.99
9.200E-03	2.460	1.10E+01	172.39
1.200E-02	3.189	1.20E+01	177.64
1.500E-02	3.429	1.30E+01	186.93
1.900E-02	3.844	1.40E+01	186.63
2.550E-02	5.246	1.50E+01	192.86
3.200E-02	7.198	1.60E+01	192.03
4.000E-02	9.431	1.70E+01	192.11
5.250E-02	11.435	1.80E+01	190.76
6.600E-02	14.190	1.90E+01	192.79
		2.00E+01	

1

SULFUR - 1316

EDL= 30.0 EV TGAM= 473. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	1.340	8.80E-02	31.93
1.000E-09	0.495	1.10E-01	55.25
1.000E-08	0.284	1.35E-01	28.31
2.300E-08	0.202	1.60E-01	21.08
5.000E-08	0.158	1.90E-01	27.29
7.600E-08	0.133	2.20E-01	20.61
1.150E-07	0.111	2.55E-01	28.20
1.700E-07	0.094	2.90E-01	28.00
2.550E-07	0.079	3.20E-01	18.66
3.800E-07	0.067	3.60E-01	34.62
5.500E-07	0.056	4.00E-01	32.36
8.400E-07	0.048	4.50E-01	30.17
1.275E-06	0.047	5.00E-01	30.92
1.900E-06	0.047	5.50E-01	46.14
2.800E-06	0.046	6.00E-01	29.19
4.250E-06	0.045	6.60E-01	35.85
6.300E-06	0.044	7.20E-01	51.33
9.200E-06	0.044	7.80E-01	44.50
1.350E-05	0.043	8.40E-01	36.78
2.100E-05	0.043	9.20E-01	51.72
3.000E-05	0.042	1.00E+00	49.17
4.500E-05	0.042	1.20E+00	67.65
6.900E-05	0.041	1.40E+00	67.23
1.000E-04	0.041	1.60E+00	85.73
1.350E-04	0.040	1.80E+00	81.38
1.700E-04	0.040	2.00E+00	91.21
2.200E-04	0.040	2.30E+00	98.93
2.800E-04	0.055	2.60E+00	123.83
3.600E-04	0.069	2.90E+00	124.58
4.500E-04	0.080	3.30E+00	115.28
5.750E-04	0.085	3.70E+00	161.18

7.600E-04	0.092	4.10E+00	158.48
9.600E-04	0.101	4.50E+00	153.01
1.275E-03	0.111	5.00E+00	146.34
1.600E-03	0.125	5.50E+00	160.89
2.000E-03	0.147	6.00E+00	183.91
2.700E-03	0.176	6.70E+00	178.21
3.400E-03	0.214	7.40E+00	178.21
4.500E-03	0.258	8.20E+00	186.46
5.500E-03	0.324	9.00E+00	189.54
7.200E-03	0.423	1.00E+01	193.96
9.200E-03	0.574	1.10E+01	195.84
1.200E-02	0.760	1.20E+01	194.94
1.500E-02	0.794	1.30E+01	190.89
1.900E-02	0.797	1.40E+01	192.99
2.550E-02	1.209	1.50E+01	191.19
3.200E-02	0.972	1.60E+01	207.91
4.000E-02	1.095	1.70E+01	212.11
5.250E-02	1.241	1.80E+01	216.08
6.600E-02	4.500	1.90E+01	216.61
		2.00E+01	

1

CHLORINE 1149

EDL= 40.0 EV TGAM= 532. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	133.585	8.80E-02	7.33
1.000E-09	43.667	1.10E-01	8.00
1.000E-08	22.743	1.35E-01	12.51
2.300E-08	14.822	1.60E-01	11.93
5.000E-08	11.135	1.90E-01	14.97
7.600E-08	9.049	2.20E-01	14.46
1.150E-07	7.453	2.55E-01	16.55
1.700E-07	6.155	2.90E-01	19.65
2.550E-07	5.075	3.20E-01	24.26
3.800E-07	4.224	3.60E-01	23.54
5.500E-07	3.472	4.00E-01	27.58
8.400E-07	2.839	4.50E-01	30.57
1.275E-06	2.263	5.00E-01	31.95
1.900E-06	1.816	5.50E-01	29.57
2.800E-06	1.447	6.00E-01	35.01
4.250E-06	1.141	6.60E-01	35.34
6.300E-06	0.917	7.20E-01	38.47
9.200E-06	0.736	7.80E-01	41.36
1.350E-05	0.578	8.40E-01	46.79
2.100E-05	0.453	9.20E-01	47.02
3.000E-05	0.337	1.00E+00	54.82
4.500E-05	0.234	1.20E+00	65.31
6.900E-05	0.158	1.40E+00	75.92
1.000E-04	0.108	1.60E+00	86.57
1.350E-04	0.077	1.80E+00	94.82
1.700E-04	0.056	2.00E+00	108.00
2.200E-04	0.043	2.30E+00	118.20
2.800E-04	0.132	2.60E+00	126.80
3.600E-04	0.363	2.90E+00	134.80
4.500E-04	0.224	3.30E+00	139.40

5.750E-04	0.141	3.70E+00	139.10
7.600E-04	0.136	4.10E+00	141.80
9.600E-04	0.137	4.50E+00	146.90
1.275E-03	0.144	5.00E+00	147.80
1.600E-03	0.166	5.50E+00	153.60
2.000E-03	0.172	6.00E+00	173.40
2.700E-03	0.246	6.70E+00	176.70
3.400E-03	0.365	7.40E+00	188.00
4.500E-03	0.307	8.20E+00	194.70
5.500E-03	0.541	9.00E+00	200.70
7.200E-03	1.605	1.00E+01	208.40
9.200E-03	0.908	1.10E+01	219.20
1.200E-02	2.042	1.20E+01	229.20
1.500E-02	2.271	1.30E+01	237.50
1.900E-02	3.533	1.40E+01	243.30
2.550E-02	5.020	1.50E+01	244.70
3.200E-02	3.289	1.60E+01	244.90
4.000E-02	4.858	1.70E+01	247.70
5.250E-02	6.001	1.80E+01	249.80
6.600E-02	7.024	1.90E+01	258.70
		2.00E+01	

1

POTASSIUM 1150

EDL= 40.0 EV TGAM= 349. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	5.601	8.80E-02	8.92
1.000E-09	1.771	1.10E-01	8.36
1.000E-08	0.927	1.35E-01	11.12
2.300E-08	0.621	1.60E-01	8.22
5.000E-08	0.467	1.90E-01	9.31
7.600E-08	0.379	2.20E-01	11.86
1.150E-07	0.310	2.55E-01	17.07
1.700E-07	0.254	2.90E-01	23.45
2.550E-07	0.208	3.20E-01	19.57
3.800E-07	0.172	3.60E-01	21.97
5.500E-07	0.141	4.00E-01	28.43
8.400E-07	0.114	4.50E-01	26.92
1.275E-06	0.093	5.00E-01	24.93
1.900E-06	0.076	5.50E-01	30.25
2.800E-06	0.062	6.00E-01	31.96
4.250E-06	0.051	6.60E-01	34.85
6.300E-06	0.042	7.20E-01	37.76
9.200E-06	0.035	7.80E-01	40.69
1.350E-05	0.028	8.40E-01	43.99
2.100E-05	0.023	9.20E-01	48.31
3.000E-05	0.019	1.00E+00	58.16
4.500E-05	0.016	1.20E+00	67.01
6.900E-05	0.013	1.40E+00	80.31
1.000E-04	0.011	1.60E+00	88.95
1.350E-04	0.010	1.80E+00	103.51
1.700E-04	0.008	2.00E+00	108.81
2.200E-04	0.007	2.30E+00	121.11
2.800E-04	0.007	2.60E+00	138.11
3.600E-04	0.006	2.90E+00	152.31

4.500E-04	0.031	3.30E+00	157.61
5.750E-04	0.054	3.70E+00	161.01
7.600E-04	0.069	4.10E+00	160.41
9.600E-04	0.075	4.50E+00	156.11
1.275E-03	0.083	5.00E+00	185.11
1.600E-03	0.094	5.50E+00	192.01
2.000E-03	0.113	6.00E+00	211.41
2.700E-03	1.258	6.70E+00	214.61
3.400E-03	1.769	7.40E+00	227.61
4.500E-03	0.472	8.20E+00	233.11
5.500E-03	0.351	9.00E+00	239.11
7.200E-03	1.110	1.00E+01	245.51
9.200E-03	2.083	1.10E+01	248.11
1.200E-02	0.659	1.20E+01	255.11
1.500E-02	1.356	1.30E+01	254.51
1.900E-02	1.591	1.40E+01	256.71
2.550E-02	2.898	1.50E+01	258.81
3.200E-02	2.797	1.60E+01	261.61
4.000E-02	4.827	1.70E+01	266.21
5.250E-02	7.159	1.80E+01	271.81
6.600E-02	7.795	1.90E+01	275.51
		2.00E+01	

1

CALCIUM 1320

EDL= 40.0 EV TGAM= 388. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	1.275	8.80E-02	5.78
1.000E-09	0.403	1.10E-01	5.12
1.000E-08	0.211	1.35E-01	21.17
2.300E-08	0.141	1.60E-01	16.68
5.000E-08	0.106	1.90E-01	12.54
7.600E-08	0.086	2.20E-01	30.48
1.150E-07	0.071	2.55E-01	25.69
1.700E-07	0.058	2.90E-01	10.05
2.550E-07	0.047	3.20E-01	33.07
3.800E-07	0.039	3.60E-01	17.43
5.500E-07	0.032	4.00E-01	19.00
8.400E-07	0.026	4.50E-01	12.84
1.275E-06	0.021	5.00E-01	21.38
1.900E-06	0.017	5.50E-01	28.97
2.800E-06	0.014	6.00E-01	49.42
4.250E-06	0.012	6.60E-01	25.13
6.300E-06	0.010	7.20E-01	30.29
9.200E-06	0.008	7.80E-01	33.85
1.350E-05	0.006	8.40E-01	57.39
2.100E-05	0.005	9.20E-01	47.46
3.000E-05	0.004	1.00E+00	54.53
4.500E-05	0.004	1.20E+00	60.40
6.900E-05	0.003	1.40E+00	83.79
1.000E-04	0.002	1.60E+00	105.61
1.350E-04	0.002	1.80E+00	111.61
1.700E-04	0.002	2.00E+00	131.91
2.200E-04	0.002	2.30E+00	155.81
2.800E-04	0.002	2.60E+00	140.21

3.600E-04	0.001	2.90E+00	155.41
4.500E-04	0.051	3.30E+00	147.41
5.750E-04	0.108	3.70E+00	174.91
7.600E-04	0.152	4.10E+00	172.01
9.600E-04	0.170	4.50E+00	167.01
1.275E-03	0.196	5.00E+00	214.61
1.600E-03	0.224	5.50E+00	217.51
2.000E-03	0.266	6.00E+00	219.02
2.700E-03	0.321	6.70E+00	224.22
3.400E-03	0.389	7.40E+00	228.23
4.500E-03	0.462	8.20E+00	257.04
5.500E-03	0.549	9.00E+00	267.65
7.200E-03	0.661	1.00E+01	272.07
9.200E-03	0.855	1.10E+01	275.79
1.200E-02	1.025	1.20E+01	279.41
1.500E-02	1.258	1.30E+01	278.13
1.900E-02	1.609	1.40E+01	273.25
2.550E-02	1.616	1.50E+01	271.96
3.200E-02	1.883	1.60E+01	260.37
4.000E-02	2.327	1.70E+01	259.58
5.250E-02	2.981	1.80E+01	259.29
6.600E-02	3.802	1.90E+01	258.00
		2.00E+01	

1

TITANIUM 1322
EDL= 40.0 EV TGAM= 400. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	18.704	8.80E-02	9.41
1.000E-09	5.912	1.10E-01	7.82
1.000E-08	3.092	1.35E-01	7.30
2.300E-08	2.072	1.60E-01	6.62
5.000E-08	1.556	1.90E-01	16.07
7.600E-08	1.262	2.20E-01	13.76
1.150E-07	1.032	2.55E-01	21.09
1.700E-07	0.843	2.90E-01	15.16
2.550E-07	0.688	3.20E-01	19.19
3.800E-07	0.565	3.60E-01	13.41
5.500E-07	0.460	4.00E-01	22.22
8.400E-07	0.369	4.50E-01	35.46
1.275E-06	0.296	5.00E-01	24.89
1.900E-06	0.238	5.50E-01	30.71
2.800E-06	0.189	6.00E-01	34.90
4.250E-06	0.146	6.60E-01	56.21
6.300E-06	0.114	7.20E-01	55.29
9.200E-06	0.087	7.80E-01	41.42
1.350E-05	0.063	8.40E-01	50.06
2.100E-05	0.046	9.20E-01	58.55
3.000E-05	0.033	1.00E+00	48.98
4.500E-05	0.022	1.20E+00	72.74
6.900E-05	0.016	1.40E+00	88.17
1.000E-04	0.012	1.60E+00	89.11
1.350E-04	0.010	1.80E+00	119.65
1.700E-04	0.009	2.00E+00	121.76
2.200E-04	0.007	2.30E+00	139.96

2.800E-04	0.006	2.60E+00	139.56
3.600E-04	0.006	2.90E+00	146.57
4.500E-04	0.012	3.30E+00	157.56
5.750E-04	0.117	3.70E+00	162.26
7.600E-04	0.199	4.10E+00	172.26
9.600E-04	0.257	4.50E+00	171.45
1.275E-03	0.309	5.00E+00	173.24
1.600E-03	0.379	5.50E+00	176.34
2.000E-03	0.522	6.00E+00	181.93
2.700E-03	1.554	6.70E+00	186.83
3.400E-03	1.605	7.40E+00	192.13
4.500E-03	1.565	8.20E+00	197.13
5.500E-03	2.481	9.00E+00	204.03
7.200E-03	5.253	1.00E+01	208.63
9.200E-03	10.488	1.10E+01	209.83
1.200E-02	25.897	1.20E+01	218.26
1.500E-02	56.927	1.30E+01	231.22
1.900E-02	42.200	1.40E+01	244.00
2.550E-02	18.658	1.50E+01	255.83
3.200E-02	19.273	1.60E+01	268.37
4.000E-02	15.137	1.70E+01	279.30
5.250E-02	22.541	1.80E+01	289.53
6.600E-02	11.609	1.90E+01	298.68
		2.00E+01	

1

VANADIUM 1323
EDL= 40.0 EV TGAM= 447. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	17.285	8.80E-02	8.46
1.000E-09	5.467	1.10E-01	31.04
1.000E-08	2.859	1.35E-01	24.22
2.300E-08	1.917	1.60E-01	40.64
5.000E-08	1.441	1.90E-01	38.61
7.600E-08	1.170	2.20E-01	32.90
1.150E-07	0.957	2.55E-01	31.43
1.700E-07	0.784	2.90E-01	44.17
2.550E-07	0.641	3.20E-01	40.01
3.800E-07	0.530	3.60E-01	31.38
5.500E-07	0.434	4.00E-01	33.71
8.400E-07	0.352	4.50E-01	39.40
1.275E-06	0.287	5.00E-01	30.62
1.900E-06	0.236	5.50E-01	34.69
2.800E-06	0.193	6.00E-01	44.01
4.250E-06	0.157	6.60E-01	50.77
6.300E-06	0.130	7.20E-01	43.27
9.200E-06	0.107	7.80E-01	47.97
1.350E-05	0.087	8.40E-01	67.03
2.100E-05	0.072	9.20E-01	67.70
3.000E-05	0.060	1.00E+00	73.96
4.500E-05	0.049	1.20E+00	87.36
6.900E-05	0.041	1.40E+00	98.66
1.000E-04	0.036	1.60E+00	114.54
1.350E-04	0.183	1.80E+00	117.84
1.700E-04	0.048	2.00E+00	130.14

2.200E-04	0.024	2.30E+00	134.04
2.800E-04	0.021	2.60E+00	145.64
3.600E-04	0.019	2.90E+00	150.05
4.500E-04	0.017	3.30E+00	159.25
5.750E-04	0.137	3.70E+00	161.25
7.600E-04	0.255	4.10E+00	165.36
9.600E-04	0.379	4.50E+00	169.76
1.275E-03	0.518	5.00E+00	171.47
1.600E-03	0.570	5.50E+00	177.57
2.000E-03	0.833	6.00E+00	186.57
2.700E-03	1.929	6.70E+00	192.28
3.400E-03	23.352	7.40E+00	196.68
4.500E-03	15.982	8.20E+00	205.98
5.500E-03	24.973	9.00E+00	216.28
7.200E-03	7.428	1.00E+01	225.68
9.200E-03	25.463	1.10E+01	226.99
1.200E-02	30.910	1.20E+01	247.60
1.500E-02	23.624	1.30E+01	260.61
1.900E-02	13.545	1.40E+01	270.02
2.550E-02	9.243	1.50E+01	276.02
3.200E-02	5.764	1.60E+01	284.83
4.000E-02	6.028	1.70E+01	291.44
5.250E-02	14.110	1.80E+01	297.64
6.600E-02	19.721	1.90E+01	303.25
		2.00E+01	

1

CHROMIUM 1324
EDL= 40.0 EV TGAM= 554. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	13.124	8.80E-02	32.02
1.000E-09	4.151	1.10E-01	14.24
1.000E-08	2.171	1.35E-01	36.23
2.300E-08	1.456	1.60E-01	24.33
5.000E-08	1.094	1.90E-01	22.63
7.600E-08	0.889	2.20E-01	26.77
1.150E-07	0.727	2.55E-01	20.44
1.700E-07	0.596	2.90E-01	16.55
2.550E-07	0.487	3.20E-01	23.69
3.800E-07	0.402	3.60E-01	20.12
5.500E-07	0.330	4.00E-01	42.95
8.400E-07	0.267	4.50E-01	40.60
1.275E-06	0.218	5.00E-01	36.08
1.900E-06	0.179	5.50E-01	41.12
2.800E-06	0.146	6.00E-01	31.32
4.250E-06	0.120	6.60E-01	29.08
6.300E-06	0.099	7.20E-01	52.60
9.200E-06	0.082	7.80E-01	50.69
1.350E-05	0.066	8.40E-01	64.26
2.100E-05	0.055	9.20E-01	50.85
3.000E-05	0.045	1.00E+00	56.33
4.500E-05	0.037	1.20E+00	82.40
6.900E-05	0.030	1.40E+00	99.54
1.000E-04	0.026	1.60E+00	98.66
1.350E-04	0.023	1.80E+00	93.53

1.700E-04	0.020	2.00E+00	117.71
2.200E-04	0.018	2.30E+00	128.52
2.800E-04	0.016	2.60E+00	143.22
3.600E-04	0.015	2.90E+00	142.01
4.500E-04	0.014	3.30E+00	151.20
5.750E-04	0.099	3.70E+00	161.50
7.600E-04	0.187	4.10E+00	170.19
9.600E-04	0.268	4.50E+00	182.78
1.275E-03	0.327	5.00E+00	187.57
1.600E-03	0.659	5.50E+00	192.96
2.000E-03	0.651	6.00E+00	198.15
2.700E-03	1.305	6.70E+00	204.14
3.400E-03	3.336	7.40E+00	211.54
4.500E-03	4.301	8.20E+00	217.14
5.500E-03	5.329	9.00E+00	223.65
7.200E-03	5.550	1.00E+01	234.96
9.200E-03	2.472	1.10E+01	247.08
1.200E-02	1.771	1.20E+01	264.62
1.500E-02	1.611	1.30E+01	273.16
1.900E-02	1.943	1.40E+01	278.61
2.550E-02	3.376	1.50E+01	290.78
3.200E-02	3.050	1.60E+01	293.23
4.000E-02	11.534	1.70E+01	295.73
5.250E-02	7.697	1.80E+01	296.76
6.600E-02	4.458	1.90E+01	299.07
		2.00E+01	

1

MANGANESE 1325
EDL= 40.0 EV TGAM= 395. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	40.014	8.80E-02	14.00
1.000E-09	12.652	1.10E-01	42.05
1.000E-08	6.616	1.35E-01	19.53
2.300E-08	4.436	1.60E-01	23.52
5.000E-08	3.336	1.90E-01	32.82
7.600E-08	2.709	2.20E-01	26.17
1.150E-07	2.217	2.55E-01	16.95
1.700E-07	1.817	2.90E-01	27.45
2.550E-07	1.487	3.20E-01	25.85
3.800E-07	1.228	3.60E-01	29.69
5.500E-07	1.007	4.00E-01	36.18
8.400E-07	0.817	4.50E-01	41.91
1.275E-06	0.668	5.00E-01	34.97
1.900E-06	0.551	5.50E-01	40.43
2.800E-06	0.452	6.00E-01	45.13
4.250E-06	0.372	6.60E-01	44.78
6.300E-06	0.310	7.20E-01	45.99
9.200E-06	0.260	7.80E-01	50.90
1.350E-05	0.216	8.40E-01	61.33
2.100E-05	0.184	9.20E-01	61.84
3.000E-05	0.161	1.00E+00	74.23
4.500E-05	0.144	1.20E+00	89.66
6.900E-05	0.138	1.40E+00	95.19
1.000E-04	0.147	1.60E+00	102.45

1.350E-04	0.173	1.80E+00	108.95
1.700E-04	0.249	2.00E+00	114.06
2.200E-04	0.597	2.30E+00	119.36
2.800E-04	9.403	2.60E+00	127.87
3.600E-04	1.137	2.90E+00	138.47
4.500E-04	0.122	3.30E+00	147.57
5.750E-04	0.253	3.70E+00	159.97
7.600E-04	0.600	4.10E+00	154.08
9.600E-04	6.673	4.50E+00	159.78
1.275E-03	0.909	5.00E+00	169.08
1.600E-03	4.077	5.50E+00	175.68
2.000E-03	31.236	6.00E+00	182.48
2.700E-03	7.958	6.70E+00	191.48
3.400E-03	2.104	7.40E+00	199.68
4.500E-03	0.990	8.20E+00	199.39
5.500E-03	5.103	9.00E+00	204.60
7.200E-03	16.702	1.00E+01	218.42
9.200E-03	5.293	1.10E+01	237.44
1.200E-02	1.654	1.20E+01	249.56
1.500E-02	1.617	1.30E+01	257.88
1.900E-02	12.079	1.40E+01	259.79
2.550E-02	7.289	1.50E+01	270.59
3.200E-02	23.335	1.60E+01	279.78
4.000E-02	9.897	1.70E+01	284.77
5.250E-02	15.472	1.80E+01	293.95
6.600E-02	17.663	1.90E+01	304.63
		2.00E+01	

1

IRON - 1326

EDL= 40.0 EV TGAM= 395. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	7.730	8.80E-02	11.84
1.000E-09	2.444	1.10E-01	11.27
1.000E-08	1.278	1.35E-01	21.53
2.300E-08	0.857	1.60E-01	15.85
5.000E-08	0.644	1.90E-01	22.01
7.600E-08	0.523	2.20E-01	18.27
1.150E-07	0.428	2.55E-01	17.37
1.700E-07	0.351	2.90E-01	13.51
2.550E-07	0.287	3.20E-01	25.14
3.800E-07	0.237	3.60E-01	46.52
5.500E-07	0.194	4.00E-01	43.04
8.400E-07	0.157	4.50E-01	36.40
1.275E-06	0.128	5.00E-01	33.22
1.900E-06	0.105	5.50E-01	34.18
2.800E-06	0.086	6.00E-01	19.64
4.250E-06	0.070	6.60E-01	48.89
6.300E-06	0.058	7.20E-01	74.22
9.200E-06	0.048	7.80E-01	44.02
1.350E-05	0.038	8.40E-01	40.97
2.100E-05	0.031	9.20E-01	50.95
3.000E-05	0.026	1.00E+00	50.09
4.500E-05	0.021	1.20E+00	64.54
6.900E-05	0.017	1.40E+00	73.58

1.000E-04	0.014	1.60E+00	76.46
1.350E-04	0.014	1.80E+00	95.15
1.700E-04	0.011	2.00E+00	93.75
2.200E-04	0.011	2.30E+00	112.05
2.800E-04	0.010	2.60E+00	123.55
3.600E-04	0.007	2.90E+00	133.45
4.500E-04	0.005	3.30E+00	135.25
5.750E-04	0.129	3.70E+00	149.55
7.600E-04	0.308	4.10E+00	158.25
9.600E-04	0.672	4.50E+00	168.55
1.275E-03	0.477	5.00E+00	176.46
1.600E-03	0.511	5.50E+00	183.06
2.000E-03	0.568	6.00E+00	189.26
2.700E-03	0.632	6.70E+00	196.67
3.400E-03	0.822	7.40E+00	203.37
4.500E-03	0.826	8.20E+00	214.58
5.500E-03	1.671	9.00E+00	225.69
7.200E-03	3.709	1.00E+01	237.60
9.200E-03	1.491	1.10E+01	247.41
1.200E-02	1.156	1.20E+01	258.52
1.500E-02	0.973	1.30E+01	271.35
1.900E-02	0.555	1.40E+01	290.27
2.550E-02	26.762	1.50E+01	293.20
3.200E-02	8.161	1.60E+01	292.73
4.000E-02	6.515	1.70E+01	297.65
5.250E-02	6.576	1.80E+01	307.26
6.600E-02	13.137	1.90E+01	316.36
		2.00E+01	

1

COBALT - 1327
EDL= 40.0 EV TGAM= 360. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	102.420	8.80E-02	21.91
1.000E-09	32.386	1.10E-01	20.38
1.000E-08	16.942	1.35E-01	14.89
2.300E-08	11.365	1.60E-01	16.61
5.000E-08	8.543	1.90E-01	24.15
7.600E-08	6.941	2.20E-01	21.13
1.150E-07	5.681	2.55E-01	24.68
1.700E-07	4.658	2.90E-01	28.27
2.550E-07	3.812	3.20E-01	32.95
3.800E-07	3.154	3.60E-01	34.18
5.500E-07	2.589	4.00E-01	34.20
8.400E-07	2.106	4.50E-01	45.18
1.275E-06	1.728	5.00E-01	40.53
1.900E-06	1.431	5.50E-01	43.63
2.800E-06	1.184	6.00E-01	47.50
4.250E-06	0.986	6.60E-01	55.05
6.300E-06	0.836	7.20E-01	48.94
9.200E-06	0.721	7.80E-01	53.23
1.350E-05	0.631	8.40E-01	59.64
2.100E-05	0.583	9.20E-01	61.59
3.000E-05	0.588	1.00E+00	62.67
4.500E-05	0.727	1.20E+00	73.11

6.900E-05	1.524	1.40E+00	77.00
1.000E-04	58.432	1.60E+00	82.11
1.350E-04	16.307	1.80E+00	86.65
1.700E-04	0.631	2.00E+00	92.59
2.200E-04	0.153	2.30E+00	103.13
2.800E-04	0.058	2.60E+00	100.24
3.600E-04	0.028	2.90E+00	108.04
4.500E-04	0.015	3.30E+00	118.35
5.750E-04	0.033	3.70E+00	124.36
7.600E-04	0.077	4.10E+00	133.47
9.600E-04	0.094	4.50E+00	148.67
1.275E-03	0.098	5.00E+00	162.48
1.600E-03	0.084	5.50E+00	170.69
2.000E-03	0.095	6.00E+00	178.00
2.700E-03	0.244	6.70E+00	186.09
3.400E-03	7.530	7.40E+00	194.81
4.500E-03	23.447	8.20E+00	202.88
5.500E-03	6.123	9.00E+00	208.49
7.200E-03	3.330	1.00E+01	215.21
9.200E-03	3.425	1.10E+01	227.22
1.200E-02	1.916	1.20E+01	244.24
1.500E-02	4.683	1.30E+01	268.95
1.900E-02	12.376	1.40E+01	294.26
2.550E-02	11.431	1.50E+01	313.97
3.200E-02	11.296	1.60E+01	333.36
4.000E-02	11.192	1.70E+01	345.34
5.250E-02	16.081	1.80E+01	351.92
6.600E-02	16.002	1.90E+01	361.71
		2.00E+01	

1

NICKEL - 1328
EDL= 40.0 EV TGAM= 491. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	17.146	8.80E-02	14.01
1.000E-09	5.421	1.10E-01	11.13
1.000E-08	2.836	1.35E-01	23.21
2.300E-08	1.902	1.60E-01	26.96
5.000E-08	1.429	1.90E-01	36.35
7.600E-08	1.161	2.20E-01	33.70
1.150E-07	0.950	2.55E-01	33.61
1.700E-07	0.778	2.90E-01	37.17
2.550E-07	0.636	3.20E-01	39.38
3.800E-07	0.525	3.60E-01	32.00
5.500E-07	0.430	4.00E-01	35.15
8.400E-07	0.349	4.50E-01	40.79
1.275E-06	0.285	5.00E-01	39.84
1.900E-06	0.234	5.50E-01	34.26
2.800E-06	0.191	6.00E-01	48.93
4.250E-06	0.156	6.60E-01	42.08
6.300E-06	0.129	7.20E-01	40.10
9.200E-06	0.106	7.80E-01	52.49
1.350E-05	0.087	8.40E-01	54.98
2.100E-05	0.071	9.20E-01	54.00
3.000E-05	0.059	1.00E+00	59.75

4.500E-05	0.048	1.20E+00	80.38
6.900E-05	0.039	1.40E+00	80.69
1.000E-04	0.033	1.60E+00	77.53
1.350E-04	0.029	1.80E+00	82.03
1.700E-04	0.026	2.00E+00	91.54
2.200E-04	0.023	2.30E+00	102.03
2.800E-04	0.021	2.60E+00	113.83
3.600E-04	0.018	2.90E+00	113.04
4.500E-04	0.017	3.30E+00	127.34
5.750E-04	0.159	3.70E+00	132.14
7.600E-04	0.489	4.10E+00	160.45
9.600E-04	0.758	4.50E+00	168.66
1.275E-03	0.881	5.00E+00	179.88
1.600E-03	0.979	5.50E+00	186.99
2.000E-03	1.208	6.00E+00	207.51
2.700E-03	1.588	6.70E+00	218.93
3.400E-03	2.993	7.40E+00	223.75
4.500E-03	4.089	8.20E+00	231.66
5.500E-03	2.606	9.00E+00	256.66
7.200E-03	2.022	1.00E+01	269.45
9.200E-03	5.491	1.10E+01	281.94
1.200E-02	17.723	1.20E+01	289.52
1.500E-02	30.591	1.30E+01	296.51
1.900E-02	10.225	1.40E+01	300.19
2.550E-02	10.413	1.50E+01	303.49
3.200E-02	8.737	1.60E+01	309.09
4.000E-02	7.021	1.70E+01	324.69
5.250E-02	14.677	1.80E+01	333.60
6.600E-02	16.898	1.90E+01	337.61
		2.00E+01	

1

COPPER - 1329
EDL= 30.0 EV TGAM= 366. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	10.588	8.80E-02	14.13
1.000E-09	3.352	1.10E-01	16.02
1.000E-08	1.753	1.35E-01	20.21
2.300E-08	1.176	1.60E-01	21.06
5.000E-08	0.883	1.90E-01	20.34
7.600E-08	0.717	2.20E-01	23.92
1.150E-07	0.586	2.55E-01	25.21
1.700E-07	0.480	2.90E-01	30.31
2.550E-07	0.393	3.20E-01	29.74
3.800E-07	0.324	3.60E-01	31.76
5.500E-07	0.265	4.00E-01	31.85
8.400E-07	0.214	4.50E-01	39.75
1.275E-06	0.174	5.00E-01	40.95
1.900E-06	0.142	5.50E-01	41.35
2.800E-06	0.116	6.00E-01	44.91
4.250E-06	0.094	6.60E-01	46.78
6.300E-06	0.077	7.20E-01	49.16
9.200E-06	0.063	7.80E-01	51.37
1.350E-05	0.051	8.40E-01	53.35
2.100E-05	0.041	9.20E-01	55.43

3.000E-05	0.033	1.00E+00	58.77
4.500E-05	0.026	1.20E+00	65.96
6.900E-05	0.021	1.40E+00	66.37
1.000E-04	0.018	1.60E+00	72.07
1.350E-04	0.016	1.80E+00	79.20
1.700E-04	0.016	2.00E+00	86.43
2.200E-04	0.340	2.30E+00	95.25
2.800E-04	0.014	2.60E+00	103.48
3.600E-04	0.017	2.90E+00	112.88
4.500E-04	0.266	3.30E+00	122.79
5.750E-04	2.002	3.70E+00	132.50
7.600E-04	0.152	4.10E+00	146.71
9.600E-04	0.225	4.50E+00	157.72
1.275E-03	0.250	5.00E+00	164.63
1.600E-03	0.401	5.50E+00	172.04
2.000E-03	3.623	6.00E+00	180.85
2.700E-03	0.634	6.70E+00	186.77
3.400E-03	0.989	7.40E+00	198.38
4.500E-03	2.852	8.20E+00	209.10
5.500E-03	1.601	9.00E+00	223.02
7.200E-03	4.355	1.00E+01	245.64
9.200E-03	4.080	1.10E+01	260.36
1.200E-02	4.723	1.20E+01	272.08
1.500E-02	6.225	1.30E+01	284.80
1.900E-02	7.596	1.40E+01	296.41
2.550E-02	9.963	1.50E+01	306.43
3.200E-02	8.164	1.60E+01	313.75
4.000E-02	7.594	1.70E+01	321.76
5.250E-02	11.882	1.80E+01	332.88
6.600E-02	14.333	1.90E+01	347.39
		2.00E+01	

1

ZIRCONIUM 1340
EDL= 40.0 EV TGAM= 142. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	0.197	8.80E-02	16.31
1.000E-09	0.062	1.10E-01	18.66
1.000E-08	0.033	1.35E-01	22.77
2.300E-08	0.022	1.60E-01	26.39
5.000E-08	0.016	1.90E-01	26.40
7.600E-08	0.013	2.20E-01	32.35
1.150E-07	0.011	2.55E-01	32.55
1.700E-07	0.009	2.90E-01	33.55
2.550E-07	0.007	3.20E-01	38.52
3.800E-07	0.006	3.60E-01	43.68
5.500E-07	0.005	4.00E-01	50.61
8.400E-07	0.004	4.50E-01	50.34
1.275E-06	0.003	5.00E-01	53.74
1.900E-06	0.003	5.50E-01	54.54
2.800E-06	0.002	6.00E-01	57.87
4.250E-06	0.002	6.60E-01	63.34
6.300E-06	0.001	7.20E-01	62.03
9.200E-06	0.001	7.80E-01	61.87
1.350E-05	0.001	8.40E-01	68.38

2.100E-05	0.001	9.20E-01	67.80
3.000E-05	0.001	1.00E+00	71.83
4.500E-05	0.000	1.20E+00	76.83
6.900E-05	0.000	1.40E+00	81.41
1.000E-04	0.000	1.60E+00	87.55
1.350E-04	0.000	1.80E+00	91.56
1.700E-04	0.035	2.00E+00	96.00
2.200E-04	0.009	2.30E+00	101.98
2.800E-04	0.222	2.60E+00	107.44
3.600E-04	0.004	2.90E+00	113.82
4.500E-04	0.000	3.30E+00	119.62
5.750E-04	0.041	3.70E+00	125.02
7.600E-04	0.008	4.10E+00	131.52
9.600E-04	0.077	4.50E+00	139.99
1.275E-03	0.306	5.00E+00	148.77
1.600E-03	0.252	5.50E+00	157.66
2.000E-03	0.331	6.00E+00	167.26
2.700E-03	0.979	6.70E+00	177.15
3.400E-03	1.051	7.40E+00	187.04
4.500E-03	0.810	8.20E+00	198.64
5.500E-03	1.577	9.00E+00	210.94
7.200E-03	1.486	1.00E+01	224.15
9.200E-03	1.124	1.10E+01	235.46
1.200E-02	2.636	1.20E+01	247.58
1.500E-02	4.030	1.30E+01	254.20
1.900E-02	3.729	1.40E+01	259.01
2.550E-02	3.670	1.50E+01	262.91
3.200E-02	4.781	1.60E+01	270.72
4.000E-02	11.364	1.70E+01	288.62
5.250E-02	11.111	1.80E+01	312.01
6.600E-02	15.782	1.90E+01	343.61
		2.00E+01	

1

NIOBIUM 1189
EDL= 40.0 EV TGAM= 111. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	0.976	8.80E-02	12.26
1.000E-09	0.308	1.10E-01	17.66
1.000E-08	0.161	1.35E-01	20.78
2.300E-08	0.108	1.60E-01	24.05
5.000E-08	0.081	1.90E-01	27.40
7.600E-08	0.066	2.20E-01	30.80
1.150E-07	0.054	2.55E-01	34.19
1.700E-07	0.044	2.90E-01	37.06
2.550E-07	0.036	3.20E-01	39.72
3.800E-07	0.030	3.60E-01	42.37
5.500E-07	0.024	4.00E-01	44.89
8.400E-07	0.020	4.50E-01	47.13
1.275E-06	0.016	5.00E-01	49.27
1.900E-06	0.013	5.50E-01	51.42
2.800E-06	0.011	6.00E-01	53.56
4.250E-06	0.009	6.60E-01	55.65
6.300E-06	0.007	7.20E-01	57.26
9.200E-06	0.006	7.80E-01	58.65

1.350E-05	0.005	8.40E-01	59.12
2.100E-05	0.004	9.20E-01	59.75
3.000E-05	0.082	1.00E+00	60.85
4.500E-05	0.003	1.20E+00	64.28
6.900E-05	0.030	1.40E+00	68.15
1.000E-04	0.248	1.60E+00	75.30
1.350E-04	0.003	1.80E+00	82.37
1.700E-04	0.708	2.00E+00	89.13
2.200E-04	0.037	2.30E+00	96.56
2.800E-04	0.147	2.60E+00	101.43
3.600E-04	0.500	2.90E+00	107.13
4.500E-04	0.051	3.30E+00	112.42
5.750E-04	0.234	3.70E+00	120.51
7.600E-04	0.219	4.10E+00	130.11
9.600E-04	0.467	4.50E+00	140.50
1.275E-03	0.589	5.00E+00	149.60
1.600E-03	0.502	5.50E+00	158.00
2.000E-03	0.952	6.00E+00	170.31
2.700E-03	0.607	6.70E+00	181.91
3.400E-03	0.720	7.40E+00	191.51
4.500E-03	0.921	8.20E+00	200.11
5.500E-03	1.281	9.00E+00	207.81
7.200E-03	1.113	1.00E+01	218.80
9.200E-03	1.380	1.10E+01	228.70
1.200E-02	1.700	1.20E+01	237.90
1.500E-02	2.092	1.30E+01	251.00
1.900E-02	2.664	1.40E+01	271.00
2.550E-02	3.364	1.50E+01	295.60
3.200E-02	4.135	1.60E+01	313.41
4.000E-02	5.191	1.70E+01	332.31
5.250E-02	6.508	1.80E+01	350.21
6.600E-02	8.239	1.90E+01	367.52
		2.00E+01	

1

MOLY 1321

EDL= 60.0 EV TGAM= 105. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	2.126	8.80E-02	14.30
1.000E-09	0.673	1.10E-01	17.02
1.000E-08	0.352	1.35E-01	20.09
2.300E-08	0.236	1.60E-01	23.20
5.000E-08	0.177	1.90E-01	26.20
7.600E-08	0.144	2.20E-01	29.12
1.150E-07	0.118	2.55E-01	32.33
1.700E-07	0.096	2.90E-01	35.17
2.550E-07	0.079	3.20E-01	38.02
3.800E-07	0.065	3.60E-01	41.03
5.500E-07	0.053	4.00E-01	44.11
8.400E-07	0.043	4.50E-01	47.19
1.275E-06	0.035	5.00E-01	50.67
1.900E-06	0.029	5.50E-01	53.30
2.800E-06	0.024	6.00E-01	55.83
4.250E-06	0.020	6.60E-01	58.18
6.300E-06	0.016	7.20E-01	60.07

9.200E-06	0.254	7.80E-01	62.03
1.350E-05	0.015	8.40E-01	63.61
2.100E-05	0.019	9.20E-01	65.03
3.000E-05	2.688	1.00E+00	70.91
4.500E-05	1.669	1.20E+00	76.95
6.900E-05	0.154	1.40E+00	83.67
1.000E-04	1.751	1.60E+00	89.09
1.350E-04	0.106	1.80E+00	92.19
1.700E-04	0.007	2.00E+00	95.15
2.200E-04	0.034	2.30E+00	98.08
2.800E-04	0.238	2.60E+00	102.73
3.600E-04	0.385	2.90E+00	108.23
4.500E-04	0.371	3.30E+00	113.36
5.750E-04	0.122	3.70E+00	118.40
7.600E-04	0.144	4.10E+00	124.41
9.600E-04	0.841	4.50E+00	132.41
1.275E-03	0.852	5.00E+00	141.95
1.600E-03	2.841	5.50E+00	150.90
2.000E-03	4.642	6.00E+00	160.49
2.700E-03	5.647	6.70E+00	169.34
3.400E-03	6.034	7.40E+00	183.43
4.500E-03	6.654	8.20E+00	199.02
5.500E-03	7.540	9.00E+00	213.40
7.200E-03	8.867	1.00E+01	224.48
9.200E-03	10.512	1.10E+01	239.77
1.200E-02	12.434	1.20E+01	253.55
1.500E-02	14.602	1.30E+01	257.73
1.900E-02	17.537	1.40E+01	259.35
2.550E-02	20.542	1.50E+01	268.93
3.200E-02	23.163	1.60E+01	276.12
4.000E-02	25.473	1.70E+01	290.50
5.250E-02	25.053	1.80E+01	308.80
6.600E-02	21.531	1.90E+01	321.39
		2.00E+01	

1

SILVER 107-1371
EDL= 60.0 EV TGAM= 143. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	40.269	8.80E-02	11.65
1.000E-09	12.733	1.10E-01	13.95
1.000E-08	6.660	1.35E-01	16.17
2.300E-08	4.467	1.60E-01	18.43
5.000E-08	3.358	1.90E-01	20.66
7.600E-08	2.727	2.20E-01	23.01
1.150E-07	2.232	2.55E-01	25.25
1.700E-07	1.829	2.90E-01	27.08
2.550E-07	1.497	3.20E-01	28.62
3.800E-07	1.238	3.60E-01	30.36
5.500E-07	1.015	4.00E-01	31.86
8.400E-07	0.825	4.50E-01	33.51
1.275E-06	0.676	5.00E-01	35.22
1.900E-06	0.559	5.50E-01	37.23
2.800E-06	0.463	6.00E-01	39.12
4.250E-06	0.388	6.60E-01	41.25

6.300E-06	0.342	7.20E-01	43.13
9.200E-06	0.388	7.80E-01	45.20
1.350E-05	13.106	8.40E-01	47.50
2.100E-05	0.206	9.20E-01	50.08
3.000E-05	4.916	1.00E+00	55.04
4.500E-05	7.622	1.20E+00	61.36
6.900E-05	0.095	1.40E+00	67.86
1.000E-04	0.090	1.60E+00	73.95
1.350E-04	0.609	1.80E+00	79.04
1.700E-04	2.132	2.00E+00	84.20
2.200E-04	0.308	2.30E+00	90.43
2.800E-04	1.189	2.60E+00	96.06
3.600E-04	0.551	2.90E+00	101.81
4.500E-04	1.013	3.30E+00	107.64
5.750E-04	0.762	3.70E+00	115.04
7.600E-04	0.221	4.10E+00	122.92
9.600E-04	0.591	4.50E+00	131.74
1.275E-03	0.587	5.00E+00	141.09
1.600E-03	0.680	5.50E+00	149.90
2.000E-03	0.947	6.00E+00	159.55
2.700E-03	1.121	6.70E+00	169.54
3.400E-03	1.163	7.40E+00	178.82
4.500E-03	1.233	8.20E+00	186.46
5.500E-03	1.353	9.00E+00	189.00
7.200E-03	1.549	1.00E+01	197.55
9.200E-03	1.804	1.10E+01	207.15
1.200E-02	2.130	1.20E+01	213.30
1.500E-02	2.552	1.30E+01	222.45
1.900E-02	3.175	1.40E+01	236.55
2.550E-02	3.961	1.50E+01	249.15
3.200E-02	4.804	1.60E+01	256.65
4.000E-02	5.985	1.70E+01	263.70
5.250E-02	7.464	1.80E+01	272.55
6.600E-02	9.386	1.90E+01	281.40
		2.00E+01	

1

SILVER 109-1373
EDL= 60.0 EV TGAM= 166. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	115.387	8.80E-02	11.45
1.000E-09	36.537	1.10E-01	13.64
1.000E-08	19.190	1.35E-01	15.80
2.300E-08	12.966	1.60E-01	17.94
5.000E-08	9.844	1.90E-01	20.06
7.600E-08	8.093	2.20E-01	22.29
1.150E-07	6.740	2.55E-01	24.44
1.700E-07	5.671	2.90E-01	26.21
2.550E-07	4.832	3.20E-01	27.60
3.800E-07	4.235	3.60E-01	29.05
5.500E-07	3.818	4.00E-01	30.72
8.400E-07	3.647	4.50E-01	32.50
1.275E-06	3.901	5.00E-01	34.29
1.900E-06	5.185	5.50E-01	36.10
2.800E-06	14.360	6.00E-01	38.18

4.250E-06	536.305	6.60E-01	40.51
6.300E-06	5.264	7.20E-01	42.47
9.200E-06	0.608	7.80E-01	44.57
1.350E-05	0.164	8.40E-01	46.75
2.100E-05	0.750	9.20E-01	49.57
3.000E-05	11.531	1.00E+00	54.40
4.500E-05	3.491	1.20E+00	60.81
6.900E-05	6.393	1.40E+00	66.40
1.000E-04	5.203	1.60E+00	71.85
1.350E-04	0.356	1.80E+00	76.66
1.700E-04	3.024	2.00E+00	81.81
2.200E-04	0.496	2.30E+00	87.17
2.800E-04	1.933	2.60E+00	91.94
3.600E-04	1.318	2.90E+00	97.00
4.500E-04	1.922	3.30E+00	103.53
5.750E-04	0.827	3.70E+00	111.13
7.600E-04	0.386	4.10E+00	119.30
9.600E-04	0.793	4.50E+00	128.81
1.275E-03	0.778	5.00E+00	138.85
1.600E-03	0.814	5.50E+00	147.95
2.000E-03	1.090	6.00E+00	157.44
2.700E-03	1.245	6.70E+00	166.54
3.400E-03	1.300	7.40E+00	174.02
4.500E-03	1.350	8.20E+00	181.36
5.500E-03	1.454	9.00E+00	182.40
7.200E-03	1.638	1.00E+01	194.40
9.200E-03	1.906	1.10E+01	198.45
1.200E-02	2.235	1.20E+01	206.25
1.500E-02	2.656	1.30E+01	212.55
1.900E-02	3.279	1.40E+01	222.00
2.550E-02	4.041	1.50E+01	230.40
3.200E-02	4.877	1.60E+01	240.15
4.000E-02	6.034	1.70E+01	251.55
5.250E-02	7.463	1.80E+01	261.60
6.600E-02	9.314	1.90E+01	270.00
		2.00E+01	

1

TANTALUM 1285

EDL= 53.0 EV TGAM= 19. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	3.046	8.80E-02	6.93
1.000E-09	0.964	1.10E-01	7.88
1.000E-08	0.506	1.35E-01	8.81
2.300E-08	0.341	1.60E-01	9.87
5.000E-08	0.258	1.90E-01	11.04
7.600E-08	0.212	2.20E-01	12.33
1.150E-07	0.176	2.55E-01	13.59
1.700E-07	0.147	2.90E-01	14.71
2.550E-07	0.124	3.20E-01	15.91
3.800E-07	0.107	3.60E-01	17.16
5.500E-07	0.096	4.00E-01	18.68
8.400E-07	0.090	4.50E-01	20.50
1.275E-06	0.097	5.00E-01	22.16
1.900E-06	0.145	5.50E-01	23.88

2.800E-06	6.218	6.00E-01	25.69
4.250E-06	13.758	6.60E-01	27.72
6.300E-06	0.066	7.20E-01	29.95
9.200E-06	3.315	7.80E-01	31.09
1.350E-05	0.713	8.40E-01	32.75
2.100E-05	1.111	9.20E-01	35.09
3.000E-05	3.306	1.00E+00	40.11
4.500E-05	0.191	1.20E+00	46.90
6.900E-05	1.095	1.40E+00	53.43
1.000E-04	0.694	1.60E+00	57.88
1.350E-04	0.361	1.80E+00	60.82
1.700E-04	0.834	2.00E+00	64.74
2.200E-04	0.549	2.30E+00	69.93
2.800E-04	0.410	2.60E+00	73.43
3.600E-04	0.349	2.90E+00	76.99
4.500E-04	0.322	3.30E+00	80.93
5.750E-04	0.293	3.70E+00	83.84
7.600E-04	0.254	4.10E+00	89.62
9.600E-04	0.219	4.50E+00	96.73
1.275E-03	0.190	5.00E+00	103.44
1.600E-03	0.166	5.50E+00	108.79
2.000E-03	0.145	6.00E+00	116.01
2.700E-03	0.131	6.70E+00	125.27
3.400E-03	0.120	7.40E+00	134.48
4.500E-03	0.586	8.20E+00	150.49
5.500E-03	1.040	9.00E+00	166.57
7.200E-03	1.370	1.00E+01	178.94
9.200E-03	1.531	1.10E+01	184.19
1.200E-02	1.712	1.20E+01	195.73
1.500E-02	1.951	1.30E+01	205.88
1.900E-02	2.288	1.40E+01	215.76
2.550E-02	2.735	1.50E+01	224.99
3.200E-02	3.309	1.60E+01	232.93
4.000E-02	4.101	1.70E+01	240.13
5.250E-02	4.937	1.80E+01	250.48
6.600E-02	5.850	1.90E+01	259.25
		2.00E+01	

1

TUNGSTEN 182 - 1128
EDL= 90.0 EV TGAM= 14. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	2.185	8.80E-02	6.62
1.000E-09	0.692	1.10E-01	8.33
1.000E-08	0.363	1.35E-01	9.32
2.300E-08	0.244	1.60E-01	10.39
5.000E-08	0.185	1.90E-01	11.51
7.600E-08	0.151	2.20E-01	12.70
1.150E-07	0.125	2.55E-01	13.87
1.700E-07	0.104	2.90E-01	14.95
2.550E-07	0.087	3.20E-01	16.14
3.800E-07	0.075	3.60E-01	17.54
5.500E-07	0.066	4.00E-01	19.19
8.400E-07	0.060	4.50E-01	20.93
1.275E-06	0.062	5.00E-01	22.72

1.900E-06	0.088	5.50E-01	24.51
2.800E-06	12.479	6.00E-01	26.53
4.250E-06	0.811	6.60E-01	28.57
6.300E-06	0.026	7.20E-01	30.84
9.200E-06	0.022	7.80E-01	33.16
1.350E-05	1.277	8.40E-01	35.67
2.100E-05	6.150	9.20E-01	38.92
3.000E-05	0.006	1.00E+00	43.22
4.500E-05	0.002	1.20E+00	46.69
6.900E-05	0.003	1.40E+00	47.93
1.000E-04	0.743	1.60E+00	50.30
1.350E-04	0.002	1.80E+00	53.51
1.700E-04	0.002	2.00E+00	57.97
2.200E-04	0.240	2.30E+00	62.46
2.800E-04	0.016	2.60E+00	66.62
3.600E-04	0.161	2.90E+00	71.02
4.500E-04	0.056	3.30E+00	76.62
5.750E-04	0.075	3.70E+00	81.39
7.600E-04	0.036	4.10E+00	86.36
9.600E-04	0.061	4.50E+00	92.79
1.275E-03	0.046	5.00E+00	99.72
1.600E-03	0.023	5.50E+00	106.74
2.000E-03	0.041	6.00E+00	114.93
2.700E-03	0.027	6.70E+00	124.24
3.400E-03	0.030	7.40E+00	132.96
4.500E-03	0.739	8.20E+00	141.85
5.500E-03	1.377	9.00E+00	157.93
7.200E-03	1.786	1.00E+01	168.28
9.200E-03	1.930	1.10E+01	176.77
1.200E-02	2.114	1.20E+01	182.41
1.500E-02	2.354	1.30E+01	190.70
1.900E-02	2.749	1.40E+01	200.48
2.550E-02	3.182	1.50E+01	209.73
3.200E-02	3.634	1.60E+01	222.25
4.000E-02	4.204	1.70E+01	235.66
5.250E-02	4.786	1.80E+01	247.17
6.600E-02	5.399	1.90E+01	256.66
		2.00E+01	

1

TUNGSTEN 183 - 1129
EDL= 90.0 EV TGAM= 20. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	1.533	8.80E-02	7.43
1.000E-09	0.485	1.10E-01	8.41
1.000E-08	0.253	1.35E-01	9.40
2.300E-08	0.169	1.60E-01	10.47
5.000E-08	0.127	1.90E-01	11.53
7.600E-08	0.103	2.20E-01	12.53
1.150E-07	0.084	2.55E-01	13.48
1.700E-07	0.069	2.90E-01	14.44
2.550E-07	0.056	3.20E-01	15.57
3.800E-07	0.046	3.60E-01	16.88
5.500E-07	0.038	4.00E-01	18.38
8.400E-07	0.032	4.50E-01	19.96

1.275E-06	0.028	5.00E-01	21.63
1.900E-06	0.025	5.50E-01	23.30
2.800E-06	0.027	6.00E-01	25.18
4.250E-06	0.052	6.60E-01	27.30
6.300E-06	4.718	7.20E-01	29.22
9.200E-06	0.028	7.80E-01	31.12
1.350E-05	0.025	8.40E-01	33.08
2.100E-05	6.886	9.20E-01	35.19
3.000E-05	0.417	1.00E+00	38.67
4.500E-05	3.546	1.20E+00	43.30
6.900E-05	0.016	1.40E+00	47.09
1.000E-04	0.346	1.60E+00	50.54
1.350E-04	0.982	1.80E+00	53.57
1.700E-04	0.386	2.00E+00	57.30
2.200E-04	0.441	2.30E+00	61.15
2.800E-04	0.389	2.60E+00	64.88
3.600E-04	0.253	2.90E+00	68.99
4.500E-04	0.176	3.30E+00	74.03
5.750E-04	0.268	3.70E+00	78.61
7.600E-04	0.185	4.10E+00	83.63
9.600E-04	0.157	4.50E+00	89.43
1.275E-03	0.135	5.00E+00	95.89
1.600E-03	0.119	5.50E+00	102.07
2.000E-03	0.104	6.00E+00	103.59
2.700E-03	0.092	6.70E+00	120.57
3.400E-03	0.084	7.40E+00	133.05
4.500E-03	0.824	8.20E+00	143.53
5.500E-03	1.460	9.00E+00	156.66
7.200E-03	1.937	1.00E+01	169.50
9.200E-03	2.064	1.10E+01	177.60
1.200E-02	2.289	1.20E+01	184.45
1.500E-02	2.555	1.30E+01	192.57
1.900E-02	2.994	1.40E+01	200.99
2.550E-02	3.490	1.50E+01	209.74
3.200E-02	4.026	1.60E+01	222.39
4.000E-02	4.696	1.70E+01	234.09
5.250E-02	5.458	1.80E+01	244.47
6.600E-02	6.420	1.90E+01	258.46
		2.00E+01	

1

TUNGSTEN 184 - 1130
EDL= 90.0 EV TGAM= 13. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	0.174	8.80E-02	4.87
1.000E-09	0.055	1.10E-01	8.45
1.000E-08	0.029	1.35E-01	9.34
2.300E-08	0.019	1.60E-01	10.28
5.000E-08	0.014	1.90E-01	11.29
7.600E-08	0.012	2.20E-01	12.42
1.150E-07	0.010	2.55E-01	13.60
1.700E-07	0.008	2.90E-01	14.68
2.550E-07	0.006	3.20E-01	15.94
3.800E-07	0.005	3.60E-01	17.27
5.500E-07	0.004	4.00E-01	18.89

8.400E-07	0.003	4.50E-01	20.72
1.275E-06	0.003	5.00E-01	22.49
1.900E-06	0.002	5.50E-01	24.32
2.800E-06	0.002	6.00E-01	26.39
4.250E-06	0.001	6.60E-01	28.74
6.300E-06	0.001	7.20E-01	31.06
9.200E-06	0.001	7.80E-01	33.62
1.350E-05	0.001	8.40E-01	36.68
2.100E-05	0.001	9.20E-01	39.45
3.000E-05	0.000	1.00E+00	43.07
4.500E-05	0.001	1.20E+00	46.44
6.900E-05	0.001	1.40E+00	48.36
1.000E-04	0.049	1.60E+00	52.10
1.350E-04	0.005	1.80E+00	55.65
1.700E-04	0.363	2.00E+00	59.70
2.200E-04	0.001	2.30E+00	63.46
2.800E-04	0.074	2.60E+00	66.74
3.600E-04	0.047	2.90E+00	70.48
4.500E-04	0.000	3.30E+00	75.81
5.750E-04	0.040	3.70E+00	81.00
7.600E-04	0.060	4.10E+00	86.45
9.600E-04	0.066	4.50E+00	92.80
1.275E-03	0.043	5.00E+00	99.75
1.600E-03	0.032	5.50E+00	106.69
2.000E-03	0.035	6.00E+00	114.77
2.700E-03	0.025	6.70E+00	123.73
3.400E-03	0.023	7.40E+00	123.25
4.500E-03	0.794	8.20E+00	144.02
5.500E-03	1.517	9.00E+00	157.00
7.200E-03	1.994	1.00E+01	166.15
9.200E-03	2.080	1.10E+01	173.74
1.200E-02	2.252	1.20E+01	182.38
1.500E-02	2.450	1.30E+01	190.08
1.900E-02	2.745	1.40E+01	196.83
2.550E-02	3.036	1.50E+01	205.15
3.200E-02	3.278	1.60E+01	216.43
4.000E-02	3.461	1.70E+01	228.93
5.250E-02	3.482	1.80E+01	243.13
6.600E-02	3.205	1.90E+01	253.07
		2.00E+01	

1

TUNGSTEN 186 - 1131
EDL= 90.0 EV TGAM= 15. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	4.283	8.80E-02	4.34
1.000E-09	1.355	1.10E-01	8.41
1.000E-08	0.710	1.35E-01	9.28
2.300E-08	0.477	1.60E-01	10.18
5.000E-08	0.359	1.90E-01	11.13
7.600E-08	0.293	2.20E-01	12.25
1.150E-07	0.241	2.55E-01	13.38
1.700E-07	0.199	2.90E-01	14.40
2.550E-07	0.164	3.20E-01	15.59
3.800E-07	0.138	3.60E-01	16.91

5.500E-07	0.116	4.00E-01	18.49
8.400E-07	0.098	4.50E-01	20.30
1.275E-06	0.085	5.00E-01	22.05
1.900E-06	0.076	5.50E-01	23.83
2.800E-06	0.072	6.00E-01	25.87
4.250E-06	0.075	6.60E-01	28.15
6.300E-06	0.094	7.20E-01	30.29
9.200E-06	0.180	7.80E-01	32.10
1.350E-05	17.833	8.40E-01	34.38
2.100E-05	0.267	9.20E-01	36.33
3.000E-05	0.018	1.00E+00	39.50
4.500E-05	0.004	1.20E+00	44.47
6.900E-05	0.001	1.40E+00	48.97
1.000E-04	0.001	1.60E+00	53.19
1.350E-04	0.006	1.80E+00	56.63
1.700E-04	0.477	2.00E+00	60.34
2.200E-04	0.025	2.30E+00	63.75
2.800E-04	0.059	2.60E+00	66.70
3.600E-04	0.063	2.90E+00	70.16
4.500E-04	0.092	3.30E+00	75.12
5.750E-04	0.104	3.70E+00	79.78
7.600E-04	0.014	4.10E+00	85.03
9.600E-04	0.055	4.50E+00	91.17
1.275E-03	0.026	5.00E+00	98.02
1.600E-03	0.014	5.50E+00	104.86
2.000E-03	0.026	6.00E+00	112.88
2.700E-03	0.023	6.70E+00	121.26
3.400E-03	0.016	7.40E+00	127.14
4.500E-03	0.726	8.20E+00	139.05
5.500E-03	1.434	9.00E+00	154.16
7.200E-03	1.901	1.00E+01	163.88
9.200E-03	2.022	1.10E+01	170.97
1.200E-02	2.144	1.20E+01	178.69
1.500E-02	2.346	1.30E+01	186.73
1.900E-02	2.605	1.40E+01	194.22
2.550E-02	2.850	1.50E+01	204.73
3.200E-02	3.031	1.60E+01	217.09
4.000E-02	3.119	1.70E+01	228.03
5.250E-02	3.006	1.80E+01	238.41
6.600E-02	2.520	1.90E+01	253.53
		2.00E+01	

1

GOLD - 1379

EDL= 30.0 EV TGAM= 66. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	49.328	8.80E-02	8.12
1.000E-09	15.622	1.10E-01	9.41
1.000E-08	8.204	1.35E-01	10.62
2.300E-08	5.544	1.60E-01	11.82
5.000E-08	4.209	1.90E-01	12.89
7.600E-08	3.461	2.20E-01	13.93
1.150E-07	2.883	2.55E-01	14.75
1.700E-07	2.426	2.90E-01	15.65
2.550E-07	2.069	3.20E-01	16.55

3.800E-07	1.815	3.60E-01	17.56
5.500E-07	1.641	4.00E-01	18.79
8.400E-07	1.578	4.50E-01	19.90
1.275E-06	1.715	5.00E-01	20.74
1.900E-06	2.380	5.50E-01	21.48
2.800E-06	8.476	6.00E-01	22.13
4.250E-06	217.739	6.60E-01	23.31
6.300E-06	1.441	7.20E-01	24.72
9.200E-06	0.205	7.80E-01	26.17
1.350E-05	0.054	8.40E-01	27.82
2.100E-05	0.023	9.20E-01	29.13
3.000E-05	0.019	1.00E+00	32.37
4.500E-05	5.534	1.20E+00	37.98
6.900E-05	0.634	1.40E+00	43.83
1.000E-04	0.371	1.60E+00	49.03
1.350E-04	1.672	1.80E+00	53.72
1.700E-04	0.369	2.00E+00	59.20
2.200E-04	0.968	2.30E+00	64.84
2.800E-04	1.329	2.60E+00	71.27
3.600E-04	0.798	2.90E+00	77.27
4.500E-04	0.651	3.30E+00	83.10
5.750E-04	1.151	3.70E+00	86.98
7.600E-04	0.664	4.10E+00	92.61
9.600E-04	0.554	4.50E+00	101.39
1.275E-03	0.438	5.00E+00	107.90
1.600E-03	0.632	5.50E+00	111.36
2.000E-03	0.914	6.00E+00	117.67
2.700E-03	0.901	6.70E+00	125.17
3.400E-03	1.090	7.40E+00	126.70
4.500E-03	0.960	8.20E+00	143.64
5.500E-03	1.045	9.00E+00	168.32
7.200E-03	1.237	1.00E+01	185.36
9.200E-03	1.490	1.10E+01	195.44
1.200E-02	1.789	1.20E+01	202.28
1.500E-02	2.146	1.30E+01	209.39
1.900E-02	2.642	1.40E+01	217.78
2.550E-02	3.194	1.50E+01	220.78
3.200E-02	3.793	1.60E+01	223.78
4.000E-02	4.622	1.70E+01	229.33
5.250E-02	5.587	1.80E+01	236.61
6.600E-02	6.797	1.90E+01	243.81
		2.00E+01	

1

LEAD - 1382

EDL= 25.0 EV TGAM= 126. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	0.171	8.80E-02	8.18
1.000E-09	0.054	1.10E-01	10.03
1.000E-08	0.028	1.35E-01	10.90
2.300E-08	0.019	1.60E-01	12.09
5.000E-08	0.014	1.90E-01	13.20
7.600E-08	0.012	2.20E-01	15.05
1.150E-07	0.009	2.55E-01	16.67
1.700E-07	0.008	2.90E-01	16.94

2.550E-07	0.006	3.20E-01	19.28
3.800E-07	0.005	3.60E-01	18.41
5.500E-07	0.004	4.00E-01	16.72
8.400E-07	0.003	4.50E-01	14.82
1.275E-06	0.003	5.00E-01	20.14
1.900E-06	0.002	5.50E-01	22.73
2.800E-06	0.002	6.00E-01	25.03
4.250E-06	0.002	6.60E-01	25.74
6.300E-06	0.001	7.20E-01	28.57
9.200E-06	0.001	7.80E-01	32.97
1.350E-05	0.001	8.40E-01	30.58
2.100E-05	0.001	9.20E-01	31.16
3.000E-05	0.001	1.00E+00	34.64
4.500E-05	0.000	1.20E+00	41.37
6.900E-05	0.000	1.40E+00	45.41
1.000E-04	0.000	1.60E+00	57.42
1.350E-04	0.000	1.80E+00	58.45
1.700E-04	0.000	2.00E+00	72.95
2.200E-04	0.000	2.30E+00	85.63
2.800E-04	0.000	2.60E+00	96.38
3.600E-04	0.000	2.90E+00	107.51
4.500E-04	0.000	3.30E+00	109.38
5.750E-04	0.000	3.70E+00	113.26
7.600E-04	0.000	4.10E+00	114.63
9.600E-04	0.000	4.50E+00	114.19
1.275E-03	0.067	5.00E+00	114.07
1.600E-03	0.199	5.50E+00	115.57
2.000E-03	0.317	6.00E+00	120.64
2.700E-03	0.393	6.70E+00	125.40
3.400E-03	0.452	7.40E+00	137.41
4.500E-03	0.535	8.20E+00	152.24
5.500E-03	0.656	9.00E+00	162.51
7.200E-03	0.839	1.00E+01	172.96
9.200E-03	1.041	1.10E+01	185.64
1.200E-02	1.295	1.20E+01	193.26
1.500E-02	1.617	1.30E+01	197.94
1.900E-02	2.005	1.40E+01	203.50
2.550E-02	2.416	1.50E+01	211.43
3.200E-02	2.994	1.60E+01	226.43
4.000E-02	4.962	1.70E+01	233.30
5.250E-02	5.285	1.80E+01	234.80
6.600E-02	7.764	1.90E+01	244.89
		2.00E+01	

1

YTTRIUM 1234
EDL= 20.0 EV TGAM= 70. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	0.688	8.80E-02	13.97
1.000E-09	0.217	1.10E-01	19.70
1.000E-08	0.114	1.35E-01	21.05
2.300E-08	0.076	1.60E-01	23.09
5.000E-08	0.057	1.90E-01	23.98
7.600E-08	0.047	2.20E-01	32.25
1.150E-07	0.038	2.55E-01	36.57

1.700E-07	0.031	2.90E-01	41.23
2.550E-07	0.026	3.20E-01	38.28
3.800E-07	0.021	3.60E-01	48.01
5.500E-07	0.017	4.00E-01	51.42
8.400E-07	0.014	4.50E-01	53.07
1.275E-06	0.011	5.00E-01	60.84
1.900E-06	0.009	5.50E-01	56.70
2.800E-06	0.008	6.00E-01	59.75
4.250E-06	0.006	6.60E-01	63.24
6.300E-06	0.005	7.20E-01	64.78
9.200E-06	0.004	7.80E-01	66.35
1.350E-05	0.003	8.40E-01	67.82
2.100E-05	0.003	9.20E-01	69.19
3.000E-05	0.002	1.00E+00	72.40
4.500E-05	0.002	1.20E+00	77.68
6.900E-05	0.002	1.40E+00	82.66
1.000E-04	0.001	1.60E+00	86.15
1.350E-04	0.001	1.80E+00	89.03
1.700E-04	0.001	2.00E+00	95.33
2.200E-04	0.001	2.30E+00	103.18
2.800E-04	0.001	2.60E+00	111.19
3.600E-04	0.001	2.90E+00	118.50
4.500E-04	0.001	3.30E+00	124.59
5.750E-04	0.001	3.70E+00	129.99
7.600E-04	0.001	4.10E+00	136.39
9.600E-04	0.135	4.50E+00	143.48
1.275E-03	0.260	5.00E+00	152.06
1.600E-03	0.347	5.50E+00	160.54
2.000E-03	0.641	6.00E+00	170.63
2.700E-03	0.523	6.70E+00	180.74
3.400E-03	0.574	7.40E+00	189.96
4.500E-03	0.690	8.20E+00	197.17
5.500E-03	0.791	9.00E+00	203.39
7.200E-03	1.867	1.00E+01	209.41
9.200E-03	2.088	1.10E+01	217.32
1.200E-02	2.139	1.20E+01	225.01
1.500E-02	2.938	1.30E+01	236.20
1.900E-02	3.860	1.40E+01	249.88
2.550E-02	5.011	1.50E+01	264.66
3.200E-02	5.709	1.60E+01	279.64
4.000E-02	6.449	1.70E+01	295.33
5.250E-02	11.082	1.80E+01	309.92
6.600E-02	13.203	1.90E+01	324.31
		2.00E+01	

1

BARIUM

EDL= 20.0 EV TGAM= 41. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	0.354	8.80E-02	7.91
1.000E-09	0.112	1.10E-01	11.06
1.000E-08	0.059	1.35E-01	11.56
2.300E-08	0.039	1.60E-01	11.82
5.000E-08	0.030	1.90E-01	12.96
7.600E-08	0.024	2.20E-01	13.14

1.150E-07	0.020	2.55E-01	14.89
1.700E-07	0.016	2.90E-01	16.42
2.550E-07	0.013	3.20E-01	17.69
3.800E-07	0.011	3.60E-01	18.47
5.500E-07	0.009	4.00E-01	19.98
8.400E-07	0.007	4.50E-01	22.22
1.275E-06	0.006	5.00E-01	25.58
1.900E-06	0.005	5.50E-01	28.58
2.800E-06	0.004	6.00E-01	31.35
4.250E-06	0.003	6.60E-01	35.56
6.300E-06	0.003	7.20E-01	38.91
9.200E-06	0.003	7.80E-01	41.96
1.350E-05	0.002	8.40E-01	46.74
2.100E-05	0.002	9.20E-01	51.59
3.000E-05	0.002	1.00E+00	61.03
4.500E-05	0.002	1.20E+00	72.09
6.900E-05	0.001	1.40E+00	80.80
1.000E-04	0.001	1.60E+00	88.17
1.350E-04	0.001	1.80E+00	92.50
1.700E-04	0.001	2.00E+00	96.51
2.200E-04	0.001	2.30E+00	102.67
2.800E-04	0.001	2.60E+00	106.47
3.600E-04	0.001	2.90E+00	109.06
4.500E-04	0.011	3.30E+00	111.06
5.750E-04	0.014	3.70E+00	112.86
7.600E-04	0.011	4.10E+00	118.75
9.600E-04	0.010	4.50E+00	126.25
1.275E-03	0.026	5.00E+00	135.15
1.600E-03	0.149	5.50E+00	144.84
2.000E-03	0.336	6.00E+00	155.44
2.700E-03	0.435	6.70E+00	167.54
3.400E-03	0.526	7.40E+00	184.45
4.500E-03	0.606	8.20E+00	201.75
5.500E-03	0.709	9.00E+00	219.46
7.200E-03	0.955	1.00E+01	242.27
9.200E-03	0.958	1.10E+01	263.58
1.200E-02	1.165	1.20E+01	283.29
1.500E-02	1.418	1.30E+01	301.61
1.900E-02	1.954	1.40E+01	326.43
2.550E-02	2.887	1.50E+01	347.05
3.200E-02	3.122	1.60E+01	372.17
4.000E-02	4.069	1.70E+01	391.19
5.250E-02	4.876	1.80E+01	411.51
6.600E-02	6.389	1.90E+01	428.52
		2.00E+01	

1

BA-138 1353
EDL= 20.0 EV TGAM= 41. EV

LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)	LOWER ENERGY (MEV)	CROSS SECTION (KEV-B)
1.000E-10	0.109	8.80E-02	8.32
1.000E-09	0.035	1.10E-01	12.16
1.000E-08	0.018	1.35E-01	12.25
2.300E-08	0.012	1.60E-01	11.99
5.000E-08	0.009	1.90E-01	12.88

7.600E-08	0.007	2.20E-01	12.33
1.150E-07	0.006	2.55E-01	13.90
1.700E-07	0.005	2.90E-01	15.24
2.550E-07	0.004	3.20E-01	16.14
3.800E-07	0.003	3.60E-01	16.22
5.500E-07	0.003	4.00E-01	17.08
8.400E-07	0.002	4.50E-01	18.80
1.275E-06	0.002	5.00E-01	22.07
1.900E-06	0.002	5.50E-01	24.81
2.800E-06	0.001	6.00E-01	27.12
4.250E-06	0.001	6.60E-01	31.29
6.300E-06	0.001	7.20E-01	34.17
9.200E-06	0.001	7.80E-01	36.62
1.350E-05	0.001	8.40E-01	41.23
2.100E-05	0.001	9.20E-01	45.62
3.000E-05	0.001	1.00E+00	55.00
4.500E-05	0.001	1.20E+00	65.28
6.900E-05	0.001	1.40E+00	72.31
1.000E-04	0.001	1.60E+00	77.96
1.350E-04	0.001	1.80E+00	79.85
1.700E-04	0.001	2.00E+00	81.53
2.200E-04	0.001	2.30E+00	86.66
2.800E-04	0.001	2.60E+00	88.42
3.600E-04	0.001	2.90E+00	88.16
4.500E-04	0.001	3.30E+00	87.96
5.750E-04	0.001	3.70E+00	87.84
7.600E-04	0.001	4.10E+00	93.80
9.600E-04	0.001	4.50E+00	102.21
1.275E-03	0.018	5.00E+00	111.51
1.600E-03	0.158	5.50E+00	121.22
2.000E-03	0.284	6.00E+00	131.72
2.700E-03	0.368	6.70E+00	142.72
3.400E-03	0.424	7.40E+00	154.63
4.500E-03	0.505	8.20E+00	165.03
5.500E-03	0.608	9.00E+00	173.83
7.200E-03	0.894	1.00E+01	187.34
9.200E-03	0.830	1.10E+01	197.85
1.200E-02	1.032	1.20E+01	206.56
1.500E-02	1.285	1.30E+01	213.97
1.900E-02	1.888	1.40E+01	230.19
2.550E-02	3.008	1.50E+01	240.50
3.200E-02	3.150	1.60E+01	257.02
4.000E-02	4.219	1.70E+01	265.04
5.250E-02	5.027	1.80E+01	274.66
6.600E-02	6.709	1.90E+01	284.16
		2.00E+01	

Appendix B: ATR Power History for Cycle 153B

INTEROFFICE MEMORANDUM

Idaho National Laboratory INL

Date: April 22, 2013

To: R. A. Jordan

From: D. E. Hale

Subject: ADVANCED TEST REACTOR (ATR) POWER HISTORY THROUGH CYCLE 153A/B-1

References:
(a) A. V. Briscoe letter to J. L. Durney, AVB-9-77, ATR Power History Through Cycle 34C-1, June 7, 1977
(b) C. C. Swanson letter to J. L. Durney, CAS-05-86, ATR Power History Through Cycle 72A-1, February 3, 1986
(c) L. S. Loret letter to E. C. Anderson, Sr., LSL-11-94, ATR Power History Through Cycle 102B-1, February 28, 1994
(d) D. E. Hale letter to J. C. Chapman, DEH-05-04, Advanced Test Reactor (ATR) Power History Through Cycle 133B-1, August 18, 2004

Table 1 lists the ATR N-16 constrained power history data since the Beryllium VI Core Internals Changeout (Cycle 134A-1) through Cycle 153A/B-1. The ATR power history prior to Cycle 134A-1 is presented in the references.

Table 2 lists the accumulated N-16 total lobe MWd and total core MWd as obtained from the ATR DAS for Cycle 134A-1 through 153A/B-1.

DEH

cc: J. O. Brower, MS 3407
G. S. Chang, MS 3870
C. D. Cooper, MS 3407
C. A. Dahl, MS 3818
M. A. David, MS 7136
G. W. Davis, MS 7117
K. R. Estes, MS 7130
R. L. Fulks, MS 7130
J. E. Giebel, MS 7104
G. C. Hawkley, MS 7136
R. Holtz, MS 7136
R. C. Howard, MS 7101
C. D. Jackson, MS 7106
C. C. Jensen, MS 7113

W. F. Jones, MS 3818
T. L. Julius, MS 7104
V. C. Kirkpatrick, MS 7106
A. W. LaPorta, MS 7136
M. A. Lillo, MS 3870
S. G. Louk, MS 7111
M. D. Love, MS 7117
Z. S. Miller, MS 7136
M. K. Morrison, MS 7136
R. K. Murray, MS 7111
D. Ogden, MS 3818
J. R. Peters, MS 7103
P. A. Roth, MS 3425
D. J. Schoonen, MS 3870
C. J. Stanley, MS 7136
M. E. Stengel (2), MS 7103
C. R. Tyler, MtyS 3835
D. J. Utterbeck, MS 3870
J. F. Williams, MS 7101
CSAP Surveillance File
D. E. Hale Letter File (DEH-02-13)

Uniform File Code: 8153
Disposition Authority: A17-32-b-1
Retention Schedule: Destroy when 6 years old

NOTE: Original disposition authority, retention schedule, and Uniform Filing Code applied by the sender may not be appropriate for all recipients. Make adjustments as needed.

TABLE 1
SUMMARY OF ATR POWER HISTORY

Cycle No.	N-16 Average Lobe Powers (MW)					N-16 Lobe MWd						
	NW	NE	C	SW	SE	NW	NE	C	SW	SE	Total	EFPD
134A-1	----	----	----	----	----	0	0	0	0	0	0	----
134A-2	----	----	----	----	----	0.2	0.3	0.4	0.4	0.4	2.0	----
						0.2	0.3	0.4	0.4	0.4	2.0	
134B-1	18.0	18.0	24.5	23.0	25.0	452.8	452.2	615.5	578.5	628.6	2727.6	25.1
134B-2	18.0	18.0	25.8	23.0	25.0	385.6	385.8	553.5	493.2	536.1	2354.2	21.4
						838.4	838.0	1169.0	1071.7	1164.7	5081.8	46.5
135A-1	18.0	18.0	29.8	28.1	35.4	236.2	236.0	391.1	368.6	464.0	1695.8	13.1
135B-1	18.0	18.0	24.8	23.0	25.0	458.3	458.4	630.8	585.3	636.5	2769.2	25.5
135B-2	18.0	18.0	25.2	23.0	25.0	405.0	405.7	567.4	517.8	563.0	2458.9	22.5
						863.3	864.1	1198.2	1103.1	1199.5	5228.1	48.0
135C-1	18.0	18.0	25.0	23.0	25.0	729.9	729.7	1013.5	933.0	1013.9	4419.9	40.6
136A-1	18.0	18.0	24.0	23.0	23.0	916.2	916.4	1218.9	1169.5	1170.2	5391.1	50.9
136B-1	18.0	18.0	23.9	23.0	23.0	701.9	702.3	931.2	896.9	897.0	4129.4	39.0
137A-1	18.0	18.0	24.7	20.0	25.0	975.4	974.8	1336.2	1083.2	1353.3	5722.8	54.1
137B-1	20.0	17.9	35.5	56.6	30.4	242.0	217.0	429.6	685.4	367.6	1941.6	12.1
138A-1	18.0	18.0	23.6	23.0	25.0	1046.9	1047.7	1370.7	1336.4	1453.5	6255.1	58.1
138B-1	18.0	18.0	23.3	23.0	25.0	838.5	839.6	1084.8	1070.9	1164.6	4998.5	46.6
139A-1	18.0	18.0	23.9	23.0	25.0	928.7	929.1	1231.1	1186.3	1289.5	5564.6	51.6
139B-1	18.0	18.0	23.2	23.0	23.0	919.7	919.7	1187.5	1174.9	1175.0	5376.8	51.1
140A-1	18.0	18.0	21.8	23.0	23.0	837.0	837.2	1012.9	1069.7	1069.4	4826.1	46.5
140B-1	18.0	17.7	21.8	23.6	23.0	641.7	629.5	777.2	842.9	820.0	3711.3	35.7
141A-1	18.0	18.0	23.4	23.0	23.0	583.3	583.1	756.8	745.1	745.5	3413.7	32.4
142A-1	23.0	18.0	24.7	24.8	23.0	1104.9	864.8	1186.0	1192.5	1104.0	5452.2	48.0
142B-1	23.0	18.0	25.4	25.4	25.0	1196.9	936.7	1323.4	1322.5	1298.7	6078.2	52.0
143A-1/2	18.0	18.0	24.3	26.9	25.0	880.0	882.5	1187.7	1315.4	1223.1	5488.7	48.9
143B-1	18.0	18.0	24.9	27.0	25.1	1032.1	1032.6	1423.5	1543.7	1435.0	6466.9	57.3
144A-1	18.0	18.0	23.1	23.0	25.1	787.0	787.0	1006.7	1004.5	1093.4	4678.6	43.7
144B-1	18.0	18.1	22.4	23.0	23.0	932.3	933.4	1155.7	1190.7	1190.9	5403.0	51.7

TABLE 1
SUMMARY OF ATR POWER HISTORY

Cycle No.	N-16 Average Lobe Powers (MW)					N-16 Lobe MWd						
	NW	NE	C	SW	SE	NW	NE	C	SW	SE	Total	EFPD
145A-1	18.0	17.9	23.2	23.8	25.7	983.0	980.9	1267.3	1299.5	1407.8	5938.4	54.7
145B-1	17.8	17.8	23.0	24.6	25.8	1020.5	1020.0	1321.4	1407.8	1478.3	6247.9	57.3
146A-1	18.0	18.0	24.3	25.8	26.0	906.8	906.8	1225.7	1300.0	1312.6	5651.9	50.5
146B-1	23.0	18.0	26.0	23.0	26.0	903.7	707.1	1021.6	903.9	1021.0	4557.2	39.2
147A-1	23.0	18.0	24.1	20.9	23.0	1156.9	904.4	1208.4	1049.4	1155.2	5474.3	50.2
148A-1	18.0	18.0	23.6	22.0	23.0	856.0	855.8	1121.4	1043.8	1093.6	4970.6	47.5
148B-1	18.0	18.0	23.0	23.8	23.0	927.5	926.7	1181.6	1224.0	1185.0	5444.8	51.5
149A-1	18.0	18.0	24.2	24.0	23.0	662.5	662.7	891.3	883.3	846.8	3946.5	36.8
149B-1	18.0	18.0	24.2	23.0	23.0	964.4	964.5	1297.8	1231.6	1230.8	5689.0	53.6
150A-1	18.9	18.0	30.5	37.5	35.1	233.4	221.6	375.9	462.7	432.6	1726.2	12.3
150B-1	19.9	18.0	24.2	23.0	23.1	832.8	754.7	1014.6	964.9	966.0	4533.0	41.9
151A-1	18.9	14.2	22.0	23.6	23.0	1058.6	800.0	1237.0	1324.4	1289.0	5709.0	56.1
151B-1/2	18.9	14.5	22.1	23.0	23.0	971.4	741.8	1134.9	1181.9	1180.0	5209.9	51.3
152A-1/6	----	----	----	----	----	0.3	0.3	0.5	0.4	0.5	2	----
152B-1	18.9	15.9	22.4	23.0	23.0	966.4	813.0	1141.3	1172.1	1173.6	5266.4	51.0
153A/B-1	19.7	19.7	30.8	35.4	44.0	265.2	265.4	414.5	476.1	591.4	2012.6	13.45

TABLE 2
SUMMARY OF ACCUMULATED N-16 MWd

Cycle No.	Lobe					Total MWd
	NW	NE	C	SW	SE	
134A-1	0	0	0	0	0	0
134A-2	0.2	0.3	0.4	0.4	0.4	2.0
134B-1	453.0	452.5	615.9	578.9	629.0	2729.6
134B-2	838.6	838.3	1169.4	1072.1	1165.1	5083.8
135A-1	1074.8	1074.3	1560.4	1440.8	1629.0	6779.7
135B-1	1533.1	1532.7	2191.2	2026.0	2265.5	9548.9
135B-2	1938.1	1938.4	2758.6	2543.8	2828.5	12007.8
135C-1	2668.0	2668.1	3772.1	3476.8	3842.4	16427.7
136A-1	3584.2	3584.5	4991.0	4646.3	5012.6	21818.8
136B-1	4286.1	4286.8	5922.2	5543.2	5909.5	25948.2
137A-1	5261.5	5261.6	7258.3	6626.4	7262.8	31670.9
137B-1	5503.5	5478.6	7687.9	7311.8	7630.5	33612.5
138A-1	6550.3	6526.3	9058.6	8648.2	9083.9	39867.7
138B-1	7388.9	7365.9	10143.4	9719.2	10248.6	44866.2
139A-1	8317.6	8295.0	11374.5	10905.4	11538.1	50430.8
139B-1	9237.3	9214.6	12562.0	12080.3	12713.1	55807.6
140A-1	10074.3	10051.8	13574.9	13150.0	13782.5	60633.7
140B-1	10716.0	10681.3	14352.1	13992.9	14602.5	64345.0
141A-1	11299.3	11264.4	15108.9	14737.9	15347.9	67758.6
142A-1	12404.2	12129.1	16294.9	15930.4	16452.0	73210.9
142B-1	13601.1	13065.8	17618.4	17252.8	17750.7	79289.0
143A-1/2	14481.1	13948.3	18806.0	18568.3	18973.7	84777.7
143B-1	15513.1	14980.9	20229.6	20112.0	20408.8	91244.7