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BUILDUP OF RADIOACTIVE PRODUCTS IN THERMAL REACTORS

II. ^{226}Ra Targets

by

D. C. Stewart, E. S. Macias,
L. J. Basile, and J. Milsted

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Printed in the United States of America
Available from
Clearinghouse for Federal Scientific and Technical Information
National Bureau of Standards, U. S. Department of Commerce
Springfield, Virginia 22151
Price: Printed Copy $3.00; Microfiche $0.65

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Chemistry

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Chemistry Division

September 1968

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This report continues a series describing the buildup of isotopic products obtained when heavy-element targets are irradiated in thermal-neutron fluxes at various levels. References are given in its immediate predecessor[1] to reports where the calculation techniques used are described in detail.

Since there is possibly less than 100 g of purified radium in existence, it would seem at first glance that this element is an odd choice as a candidate for a target in a production-type reactor irradiation. The justification for such an irradiation, however, is that it is the most direct way of obtaining the still rarer element, actinium, a species whose chemistry has still received relatively little study. From Fig. 1, it will be seen that the most abundant actinium isotope produced from radium irradiation is ^{227}Ac, the longest-lived isotope of the element, and therefore the one of most interest to the research chemist anxious to work with the least radioactive material possible. Other than radium irradiation, the only practicable source of ^{227}Ac is by laborious processing of uranium ore residues to recover the minute amount of the nuclide present in nature.

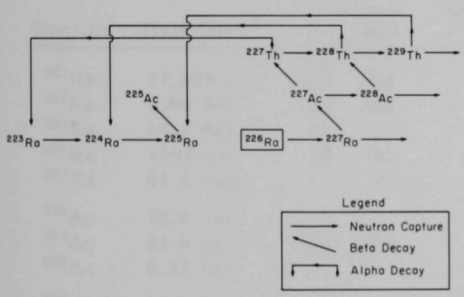

Fig. 1. Assumed Reaction Scheme for ^{226}Ra Target

^{227}Ac is also of some interest as a possible heat source, since it acts as the parent of a chain of alpha emitters. This application, however, will probably always be restricted in view of the difficulty of obtaining the nuclide in any quantity. There are also several intense gamma emitters among the daughters in the decay chain of the nuclide. These would present some problems in handling the material for heat source applications.

Grove, Russell, and Orr[2] calculated the buildup of ^{227}Ac and ^{228}Th from radium irradiated in fluxes ranging from 10^{13} to 5×10^{14} n/cm^2-sec. In these calculations, they used a destruction cross section for ^{227}Ac of 493 b, substantially less than the 830 b now recommended.[3] Hanson,[4] also

calculated yields of ^{227}Ac for conditions in the Materials Testing Reactor--a thermal flux of 2×10^{14} and a fast flux of 1×10^{14} n/cm^2-sec. He also used the lower destruction cross section for ^{227}Ac. More recently, Foster[5] has examined ^{227}Ac as a possible heat source and calculated yields of actinium from radium irradiated at four different fluxes. He did not consider the associated buildup of any side products.

The buildup scheme and the products considered in the present work are given in Fig. 1, and the nuclear data used are presented in Table I. During any long irradiation, substantial amounts of daughter activities will also arise from the ^{227}Ac as it is formed. The only one considered here was the ^{227}Th formed by the 98.8% beta-decay branching of ^{227}Ac. The subsequent buildup of the balance of the actinium series has been presented elsewhere.[6]

TABLE I. Nuclear Data Used for ^{226}Ra Irradiation

		Cross Sections					
		Capture		Fission		Destruction,	Specific Activity,
Nuclide	Half-life[a]	b	Ref	b	Ref	b	dis/sec-μg
^{223}Ra	11.435 day	130	(b)	-	-	130	1.89×10^9
^{224}Ra	3.64 day	12	(b)	-	-	12	6.93×10^9
^{225}Ra	14.8 day	-	-	-	-	-	1.45×10^9
^{226}Ra	1602 yr	20	(b)	-	-	20	36400
^{227}Ra	41.2 min	-	-	-	-	-	7.44×10^{11}
^{225}Ac	10.0 day	-	-	-	-	-	2.14×10^9
^{227}Ac	21.6 yr	830	(c)	-	-	830	2.69×10^6
^{228}Ac	6.13 hr	-	-	-	-	-	8.30×10^{10}
^{227}Th	18.2 day	-	-	1500	(a)	1500	1.17×10^9
^{228}Th	1.910 yr	120	(b)	<0.3	(a)	120	3.04×10^7
^{229}Th	7340 yr	-	-	32	(c)	32	7850

[a] C. M. Lederer, J. M. Holland, and I. Perlman, Table of Isotopes, 6th Ed., John Wiley & Sons, Inc., New York (1967).
[b] D. T. Goldman and J. R. Roesser, Chart of the Nuclides, 9th Ed., Rev. to July 1966, Knolls Atomic Power Laboratory.
[c] J. R. Stehn et al., Neutron Cross Sections, Vol. III, Z = 88 to 98, BNL-325, 2nd Ed., Suppl. 2 (Feb 1965).

The results of the present calculations are given at the end of this report in Tables III-IX in the form of reproductions of the computer sheets. Time is expressed in units of 10^6 sec, and a notation in the data of "1.30-02" should be read as meaning that 0.013 atom of that particular product per original atom of target is present at the indicated time. "Comb 1" refers to the total amount of mass-227 products, i.e., ^{227}Ra plus ^{227}Ac.

The situation has been considered for seven different flux levels. The graphed data are rather uniform, the chief difference being in the time needed to reach the maximum point on the various curves (this time is roughly inversely proportional to the flux). Those short-lived products (^{227}Ra and ^{228}Ac) coming into rapid equilibrium with long-lived target nuclides reach maxima directly proportional to the flux. Figure 2 graphs the yield curves for a flux of 7 x 10^{13} n/cm^2-sec, and Fig. 3 the radioactivity buildup for a flux of 3 x 10^{14} as examples. ^{227}Ra and ^{228}Ac dominate in the latter, but substantial quantities of ^{228}Th and ^{224}Ra activity are also present in a long irradiation. An interesting point in the yield curves of Fig. 2 is the fact that two higher-order products, ^{228}Th and ^{229}Th, eventually attain greater concentrations than the essentially first-order ^{227}Ac, in spite of the latter's relatively long half-life. This comes about, of course, because of the very high capture cross section of ^{227}Ac.

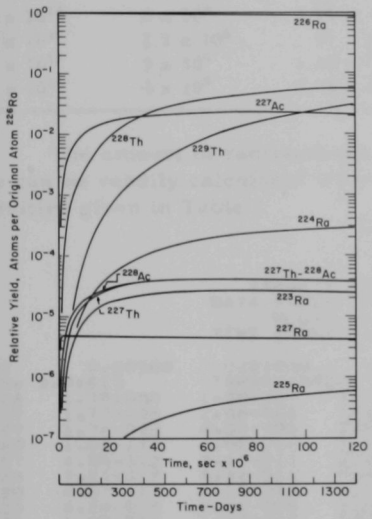

Fig. 2. Relative Yields for ^{226}Ra Target in a Flux of 7 x 10^{13} n/cm^2-sec

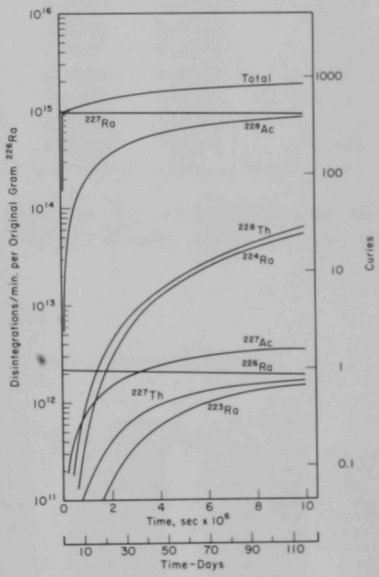

Fig. 3. Radioactivity Buildup for ^{226}Ra Target in a Flux of 3 x 10^{14} n/cm^2-sec

In evaluating maximum yields of ^{227}Ac, it is necessary to add in the small amount of the 41-min ^{227}Ra parent present, since this obviously will decay completely in the interval between removal from the reactor and beginning of any large-scale chemical processing. The situation at the point of maximum yield of the mass-227 chain is summarized in Table II. From this table, it will be observed that varying the flux level by a factor of over 300 has relatively little effect on the maximum amount of radium that can be transmuted to actinium. The dynamics of the system are such that

The situation has been considered for seven different flux levels. The graphed data are rather uniform, the chief differences being in the time needed to reach the maximum point on the various curves (this time is roughly inversely proportional to the flux). Those short-lived products (^{224}Ra and ^{224}Ac) coming into rapid equilibrium with long-lived target nuclides reach maxima directly proportional to the flux. Figure 2 graphs the yield curves for a flux of 7×10^{11} n/cm^2-sec, and Fig. 3 the radioactivity buildup for a flux of 7×10^{11} as examples. ^{224}Ra and ^{224}Ac dominate in the latter, but substantial quantities of ^{224}Th and ^{224}Ra activity are also present in a long irradiation. An interesting point in the yield curves of Fig. 2 is the fact that two higher-order products, ^{224}Th and ^{224}Th, eventually attain greater concentrations than the essentially first-order ^{224}Ac, in spite of the latter's relatively long half-life. This comes about, of course, because of the very high capture cross sections of ^{224}Ac.

Fig. 2. Yields for ^{224}Ra Target in a flux of 7×10^{11} n/cm^2-sec

Fig. 3. Radioactivity Buildup for ^{224}Ra Target in a flux of 7×10^{11} n/cm^2-sec

In evaluating maximum yields of ^{224}Ac, it is necessary to add in the small amount of the 4-min ^{224}Ra parent present, since this obviously will decay completely in the interval between removal from the reactor and beginning of any large-scale chemical processing. The situation at the point of maximum yield of the mass 227 chain is summarized in Table II. From this table, it will be observed that varying the flux level by a factor of over 300 has relatively little effect on the maximum amount of radium that can be transmuted to actinium. The dynamics of the system are such that

the maximum yield for the mass-227 chain obtainable in a single irradiation is slightly over 2 atoms per 100 atoms of original ^{226}Ra, the process of reaching this maximum quite uniformly involving the loss of about 8 out of 100 target atoms. Foster[5] made a similar observation. He also showed that for maximum efficiency (greatest total production of atoms of actinium per atom of radium consumed) the radium should be cycled through short irradiations at higher fluxes, the ^{227}Ac product being removed from the target well before the time of reaching maximum yield.

TABLE II. Maximum Obtainable Yields of the Mass-227 Chain

Flux, n/cm^2-sec	At Point of Maximum Yield				
	Time Needed, sec	As ^{277}Ra	As ^{277}Ac	Total	^{226}Ra Remaining in Target
3×10^{13}	1.3×10^{8}	1.98×10^{-6}	0.0211	0.0211	0.923
7×10^{13}	6×10^{7}	4.59×10^{-6}	0.0216	0.0216	0.919
3×10^{14}	1.4×10^{7}	1.97×10^{-5}	0.0219	0.0219	0.919
7×10^{14}	6×10^{6}	4.59×10^{-5}	0.0219	0.0220	0.919
2×10^{15}	2.2×10^{6}	1.31×10^{-4}	0.0219	0.0221	0.919
5×10^{15}	9×10^{5}	3.26×10^{-4}	0.0220	0.0223	0.914
1×10^{16}	4×10^{5}	6.59×10^{-4}	0.0219	0.0226	0.923

The amount of radioactivity present for any given time-flux situation can be readily calculated from the data of Tables III-IX and the specific activities given in Table I.

TABLE III

TARGET= RA226
DATA TYPE= YIELD ATOMS PER ATOM TARGET
FLUX= 3.0+013
TIME SPAN= 0-150

TIME	0.00500	0.01000	0.05000	0.10000	0.50000	0.80000
FLUX= 3.0+013		TARGET=RA226		DATA TYPE=YIELD		
RA226	1.00+000	1.00+000	1.00+000	1.00+000	1.00+000	1.00+000
RA227	1.73-006	2.06-006	2.14-006	2.14-006	2.14-006	2.14-006
AC227	1.76-006	4.52-006	2.84-005	5.84-005	2.97-004	4.73-004
AC228	1.08-010	4.92-010	1.11-008	3.23-008	2.21-007	3.61-007
TH227	4.56-012	2.17-011	6.98-010	2.88-009	6.96-008	1.70-007
TH228	7.21-012	5.66-011	6.44-009	4.03-008	1.63-006	4.36-006
TH229	4.87-017	6.19-016	3.14-013	4.08-012	9.24-010	4.04-009
RA223	4.24-015	3.45-014	5.07-012	4.16-011	4.78-009	1.80-008
RA224	1.55-016	1.97-015	9.82-013	1.25-011	2.32-009	8.88-009
RA225	9.61-023	1.88-021	3.85-018	9.87-017	9.91-014	6.12-013
AC225	8.37-026	2.44-024	1.90-020	9.65-019	5.01-015	4.94-014
COMB1	3.48-006	6.58-006	3.06-005	6.05-005	2.99-004	4.76-004

TIME	1.00000	1.10000	1.20000	1.40000	1.60000	1.80000
FLUX= 3.0+013		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.99-001	9.99-001	9.99-001	9.99-001	9.99-001	9.99-001
RA227	2.14-006	2.14-006	2.14-006	2.14-006	2.14-006	2.14-006
AC227	5.91-004	6.49-004	7.07-004	8.23-004	9.38-004	1.05-003
AC228	4.54-007	5.00-007	5.46-007	6.38-007	7.30-007	8.21-007
TH227	2.58-007	3.07-007	3.60-007	4.75-007	6.02-007	7.40-007
TH228	6.90-006	8.39-006	1.00-005	1.37-005	1.80-005	2.28-005
TH229	8.06-009	1.08-008	1.41-008	2.26-008	3.40-008	4.86-008
RA223	3.32-008	4.30-008	5.43-008	8.15-008	1.15-007	1.55-007
RA224	1.63-008	2.10-008	2.64-008	3.93-008	5.50-008	7.36-008
RA225	1.40-012	1.98-012	2.71-012	4.68-012	7.43-012	1.11-011
AC225	1.40-013	2.18-013	3.23-013	6.43-013	1.15-012	1.91-012
COMB1	5.93-004	6.51-004	7.09-004	8.25-004	9.41-004	1.06-003

TABLE III (Contd.)

TIME	2.00000	2.20000	2.50000	3.00000	3.20000	3.50000
FLUX= 3.0+013		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.99-001	9.99-001	9.98-001	9.98-001	9.98-001	9.98-001
RA227	2.14-006	2.14-006	2.14-006	2.14-006	2.14-006	2.14-006
AC227	1.17-003	1.28-003	1.45-003	1.73-003	1.84-003	2.00-003
AC228	9.11-007	1.00-006	1.14-006	1.36-006	1.44-006	1.58-006
TH227	8.87-007	1.04-006	1.29-006	1.73-006	1.92-006	2.20-006
TH228	2.81-005	3.41-005	4.39-005	6.31-005	7.17-005	8.56-005
TH229	6.69-008	8.93-008	1.31-007	2.27-007	2.76-007	3.60-007
RA223	2.02-007	2.55-007	3.46-007	5.25-007	6.06-007	7.37-007
RA224	9.52-008	1.20-007	1.62-007	2.46-007	2.85-007	3.48-007
RA225	1.57-011	2.15-011	3.24-011	5.71-011	6.95-011	9.09-011
AC225	2.97-012	4.39-012	7.35-012	1.49-011	1.91-011	2.66-011
COMB1	1.17-003	1.28-003	1.45-003	1.73-003	1.84-003	2.01-003

TIME	4.00000	4.50000	5.00000	6.00000	7.00000	8.00000
FLUX= 3.0+013		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.98-001	9.97-001	9.97-001	9.96-001	9.96-001	9.95-001
RA227	2.13-006	2.13-006	2.13-006	2.13-006	2.13-006	2.13-006
AC227	2.28-003	2.54-003	2.81-003	3.33-003	3.83-003	4.32-003
AC228	1.79-006	2.00-006	2.21-006	2.62-006	3.03-006	3.42-006
TH227	2.70-006	3.21-006	3.72-006	4.78-006	5.84-006	6.89-006
TH228	1.11-004	1.40-004	1.72-004	2.45-004	3.29-004	4.25-004
TH229	5.37-007	7.62-007	1.04-006	1.79-006	2.82-006	4.17-006
RA223	9.76-007	1.24-006	1.52-006	2.11-006	2.74-006	3.39-006
RA224	4.67-007	6.03-007	7.55-007	1.11-006	1.52-006	2.00-006
RA225	1.34-010	1.88-010	2.52-010	4.12-010	6.14-010	8.59-010
AC225	4.31-011	6.51-011	9.30-011	1.68-010	2.70-010	4.01-010
COMB1	2.28-003	2.55-003	2.81-003	3.33-003	3.83-003	4.33-003

TIME	9.00000	10.00000	12.00000	14.00000	16.00000	18.00000
FLUX= 3.0+013		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.94-001	9.94-001	9.93-001	9.91-001	9.90-001	9.89-001
RA227	2.13-006	2.13-006	2.12-006	2.12-006	2.12-006	2.12-006
AC227	4.80-003	5.27-003	6.16-003	7.01-003	7.82-003	8.58-003
AC228	3.79-006	4.16-006	4.88-006	5.55-006	6.19-006	6.79-006
TH227	7.93-006	8.95-006	1.09-005	1.28-005	1.46-005	1.63-005
TH228	5.31-004	6.47-004	9.08-004	1.20-003	1.53-003	1.89-003
TH229	5.88-006	7.99-006	1.35-005	2.11-005	3.09-005	4.31-005
RA223	4.04-006	4.69-006	5.95-006	7.16-006	8.31-006	9.41-006
RA224	2.52-006	3.11-006	4.43-006	5.93-006	7.61-006	9.43-006
RA225	1.14-009	1.47-009	2.24-009	3.15-009	4.20-009	5.37-009
AC225	5.59-010	7.45-010	1.20-009	1.75-009	2.40-009	3.14-009
COMB1	4.80-003	5.27-003	6.17-003	7.01-003	7.82-003	8.58-003

TIME	20.00000	22.00000	25.00000	30.00000	32.00000	35.00000
FLUX= 3.0+013		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.88-001	9.87-001	9.85-001	9.82-001	9.81-001	9.79-001
RA227	2.11-006	2.11-006	2.11-006	2.10-006	2.10-006	2.09-006
AC227	9.30-003	9.99-003	1.09-002	1.24-002	1.29-002	1.36-002
AC228	7.37-006	7.91-006	8.67-006	9.81-006	1.02-005	1.08-005
TH227	1.79-005	1.94-005	2.15-005	2.47-005	2.59-005	2.75-005
TH228	2.27-003	2.67-003	3.32-003	4.48-003	4.97-003	5.72-003
TH229	5.80-005	7.56-005	1.08-004	1.77-004	2.11-004	2.68-004
RA223	1.05-005	1.14-005	1.28-005	1.49-005	1.56-005	1.67-005
RA224	1.14-005	1.35-005	1.68-005	2.28-005	2.54-005	2.93-005
RA225	6.65-009	8.05-009	1.03-008	1.45-008	1.63-008	1.91-008
AC225	3.96-009	4.86-009	6.33-009	9.08-009	1.03-008	1.21-008
COMB1	9.30-003	9.99-003	1.09-002	1.24-002	1.29-002	1.36-002

TIME	40.00000	45.00000	50.00000	60.00000	70.00000	80.00000
FLUX= 3.0+013		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.76-001	9.73-001	9.70-001	9.64-001	9.58-001	9.52-001
RA227	2.09-006	2.08-006	2.08-006	2.06-006	2.05-006	2.04-006
AC227	1.47-002	1.57-002	1.65-002	1.78-002	1.89-002	1.96-002
AC228	1.17-005	1.24-005	1.31-005	1.41-005	1.49-005	1.55-005
TH227	2.99-005	3.20-005	3.38-005	3.68-005	3.91-005	4.07-005
TH228	7.00-003	8.32-003	9.64-003	1.23-002	1.48-002	1.72-002
TH229	3.81-004	5.16-004	6.75-004	1.06-003	1.54-003	2.10-003
RA223	1.83-005	1.96-005	2.08-005	2.28-005	2.42-005	2.53-005
RA224	3.59-005	4.28-005	4.97-005	6.34-005	7.67-005	8.91-005
RA225	2.41-008	2.93-008	3.47-008	4.59-008	5.73-008	6.87-008
AC225	1.54-008	1.89-008	2.25-008	3.01-008	3.78-008	4.54-008
COMB1	1.47-002	1.57-002	1.65-002	1.78-002	1.89-002	1.96-002

TABLE III (Contd.)

TIME	90.00000	100.00000	110.00000	120.00000	130.00000	150.00000
FLUX= 3.0+013		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.46-001	9.40-001	9.35-001	9.29-001	9.23-001	9.12-001
RA227	2.02-006	2.01-006	2.00-006	1.99-006	1.98-006	1.95-006
AC227	2.01-002	2.05-002	2.08-002	2.10-002	2.11-002	2.11-002
AC228	1.60-005	1.63-005	1.65-005	1.66-005	1.67-005	1.68-005
TH227	4.19-005	4.28-005	4.34-005	4.38-005	4.41-005	4.42-005
TH228	1.94-002	2.14-002	2.31-002	2.47-002	2.61-002	2.84-002
TH229	2.73-003	3.43-003	4.20-003	5.02-003	5.88-003	7.72-003
RA223	2.61-005	2.67-005	2.71-005	2.74-005	2.75-005	2.77-005
RA224	1.01-004	1.11-004	1.20-004	1.29-004	1.36-004	1.48-004
RA225	7.98-008	9.07-008	1.01-007	1.11-007	1.21-007	1.39-007
AC225	5.30-008	6.04-008	6.75-008	7.44-008	8.10-008	9.33-008
COMB1	2.01-002	2.05-002	2.08-002	2.10-002	2.11-002	2.11-002

TABLE IV

TARGET= RA226
DATA TYPE= YIELD-ATOMS PER ATOM TARGET
FLUX= 7.0+013
TIME SPAN= 0- 150

TIME	0.00500	0.01000	0.05000	0.10000	0.50000	0.80000
FLUX= 7.0+013		TARGET=RA226		DATA TYPE=YIELD		
RA226	1.00+000	1.00+000	1.00+000	1.00+000	9.99-001	9.99-001
RA227	4.03-006	4.81-006	4.99-006	4.99-006	4.99-006	4.99-006
AC227	4.10-006	1.05-005	6.63-005	1.36-004	6.86-004	1.09-003
AC228	5.88-010	2.68-009	6.06-008	1.76-007	1.19-006	1.94-006
TH227	1.06-011	5.07-011	1.63-009	6.70-009	1.60-007	3.88-007
TH228	3.93-011	3.08-010	3.50-008	2.19-007	8.80-006	2.35-005
TH229	6.18-016	7.86-015	3.99-012	5.18-011	1.17-008	5.09-008
RA223	9.90-015	8.04-014	1.18-011	9.69-011	1.10-008	4.12-008
RA224	8.45-016	1.07-014	5.35-012	6.78-011	1.26-008	4.80-008
RA225	1.22-021	2.39-020	4.89-017	1.25-015	1.25-012	7.72-012
AC225	1.06-024	3.10-023	2.42-019	1.23-017	6.34-014	6.24-013
COMB1	8.13-006	1.53-005	7.13-005	1.41-004	6.91-004	1.09-003

TIME	1.00000	1.10000	1.20000	1.40000	1.60000	1.80000
FLUX= 7.0+013		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.99-001	9.98-001	9.98-001	9.98-001	9.98-001	9.97-001
RA227	4.99-006	4.99-006	4.98-006	4.98-006	4.98-006	4.98-006
AC227	1.36-003	1.49-003	1.62-003	1.88-003	2.13-003	2.38-003
AC228	2.43-006	2.67-006	2.92-006	3.40-006	3.87-006	4.34-006
TH227	5.84-007	6.93-007	8.10-007	1.06-006	1.34-006	1.64-006
TH228	3.71-005	4.50-005	5.37-005	7.33-005	9.58-005	1.21-004
TH229	1.01-007	1.36-007	1.77-007	2.84-007	4.25-007	6.07-007
RA223	7.57-008	9.77-008	1.23-007	1.84-007	2.59-007	3.47-007
RA224	8.78-008	1.13-007	1.42-007	2.11-007	2.94-007	3.93-007
RA225	1.77-011	2.50-011	3.41-011	5.88-011	9.31-011	1.39-010
AC225	1.77-012	2.74-012	4.07-012	8.09-012	1.45-011	2.39-011
COMB1	1.36-003	1.49-003	1.62-003	1.88-003	2.14-003	2.39-003

TIME	2.00000	2.20000	2.50000	3.00000	3.20000	3.50000
FLUX= 7.0+013		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.97-001	9.97-001	9.96-001	9.96-001	9.95-001	9.95-001
RA227	4.98-006	4.98-006	4.98-006	4.97-006	4.97-006	4.97-006
AC227	2.63-003	2.88-003	3.24-003	3.84-003	4.07-003	4.41-003
AC228	4.80-006	5.26-006	5.93-006	7.03-006	7.46-006	8.10-006
TH227	1.95-006	2.28-006	2.80-006	3.71-006	4.09-006	4.67-006
TH228	1.49-004	1.80-004	2.32-004	3.31-004	3.75-004	4.46-004
TH229	8.34-007	1.11-006	1.63-006	2.80-006	3.39-006	4.42-006
RA223	4.49-007	5.64-007	7.59-007	1.14-006	1.31-006	1.58-006
RA224	5.07-007	6.35-007	8.56-007	1.29-006	1.49-006	1.82-006
RA225	1.96-010	2.68-010	4.02-010	7.06-010	8.58-010	1.12-009
AC225	3.71-011	5.49-011	9.16-011	1.86-010	2.36-010	3.29-010
COMB1	2.64-003	2.89-003	3.25-003	3.84-003	4.07-003	4.42-003

TABLE IV (Contd.)

TIME	4.00000	4.50000	5.00000	6.00000	7.00000	8.00000
FLUX= 7.0+013		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.94-001	9.94-001	9.93-001	9.92-001	9.90-001	9.89-001
RA227	4.96-006	4.96-006	4.96-006	4.95-006	4.94-006	4.94-006
AC227	4.97-003	5.51-003	6.04-003	7.04-003	7.98-003	8.87-003
AC228	9.13-006	1.01-005	1.11-005	1.30-005	1.47-005	1.64-005
TH227	5.65-006	6.64-006	7.63-006	9.58-006	1.15-005	1.33-005
TH228	5.76-004	7.21-004	8.80-004	1.24-003	1.64-003	2.09-003
TH229	6.56-006	9.27-006	1.26-005	2.14-005	3.34-005	4.90-005
RA223	2.07-006	2.60-006	3.15-006	4.30-006	5.47-006	6.63-006
RA224	2.43-006	3.11-006	3.88-006	5.62-006	7.63-006	9.88-006
RA225	1.64-009	2.29-009	3.05-009	4.93-009	7.27-009	1.01-008
AC225	5.31-010	7.97-010	1.13-009	2.03-009	3.23-009	4.73-009
COMB1	4.97-003	5.52-003	6.04-003	7.04-003	7.99-003	8.87-003

TIME	9.00000	10.00000	12.00000	14.00000	16.00000	18.00000
FLUX= 7.0+013		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.87-001	9.86-001	9.83-001	9.80-001	9.78-001	9.75-001
RA227	4.93-006	4.92-006	4.91-006	4.90-006	4.88-006	4.87-006
AC227	9.70-003	1.05-002	1.19-002	1.32-002	1.43-002	1.53-002
AC228	1.79-005	1.94-005	2.20-005	2.43-005	2.64-005	2.82-005
TH227	1.50-005	1.66-005	1.96-005	2.23-005	2.46-005	2.67-005
TH228	2.59-003	3.11-003	4.27-003	5.53-003	6.88-003	8.30-003
TH229	6.85-005	9.23-005	1.54-004	2.35-004	3.38-004	4.63-004
RA223	7.76-006	8.84-006	1.08-005	1.26-005	1.42-005	1.56-005
RA224	1.24-005	1.50-005	2.09-005	2.74-005	3.43-005	4.16-005
RA225	1.33-008	1.68-008	2.51-008	3.45-008	4.50-008	5.63-008
AC225	6.53-009	8.62-009	1.36-008	1.94-008	2.61-008	3.33-008
COMB1	9.71-003	1.05-002	1.19-002	1.32-002	1.43-002	1.53-002

TIME	20.00000	22.00000	25.00000	30.00000	32.00000	35.00000
FLUX= 7.0+013		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.72-001	9.69-001	9.65-001	9.58-001	9.56-001	9.52-001
RA227	4.85-006	4.84-006	4.82-006	4.79-006	4.77-006	4.75-006
AC227	1.61-002	1.69-002	1.79-002	1.91-002	1.95-002	2.00-002
AC228	2.98-005	3.13-005	3.31-005	3.54-005	3.61-005	3.70-005
TH227	2.85-005	3.01-005	3.22-005	3.48-005	3.57-005	3.67-005
TH228	9.76-003	1.13-002	1.36-002	1.74-002	1.89-002	2.12-002
TH229	6.13-004	7.86-004	1.09-003	1.73-003	2.02-003	2.51-003
RA223	1.69-005	1.80-005	1.94-005	2.12-005	2.18-005	2.25-005
RA224	4.92-005	5.70-005	6.90-005	8.90-005	9.70-005	1.09-004
RA225	6.83-008	8.09-008	1.01-007	1.35-007	1.49-007	1.70-007
AC225	4.12-008	4.94-008	6.24-008	8.52-008	9.46-008	1.09-007
COMB1	1.62-002	1.69-002	1.79-002	1.91-002	1.95-002	2.00-002

TIME	40.00000	45.00000	50.00000	60.00000	70.00000	80.00000
FLUX= 7.0+013		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.45-001	9.38-001	9.32-001	9.19-001	9.06-001	8.93-001
RA227	4.72-006	4.69-006	4.65-006	4.59-006	4.52-006	4.46-006
AC227	2.06-002	2.11-002	2.13-002	2.16-002	2.16-002	2.15-002
AC228	3.82-005	3.90-005	3.95-005	3.99-005	3.99-005	3.97-005
TH227	3.81-005	3.90-005	3.96-005	4.02-005	4.02-005	4.00-005
TH228	2.48-002	2.82-002	3.14-002	3.71-002	4.18-002	4.56-002
TH229	3.45-003	4.52-003	5.71-003	8.44-003	1.15-002	1.49-002
RA223	2.34-005	2.40-005	2.45-005	2.49-005	2.50-005	2.49-005
RA224	1.28-004	1.46-004	1.62-004	1.92-004	2.17-004	2.37-004
RA225	2.04-007	2.38-007	2.71-007	3.34-007	3.90-007	4.41-007
AC225	1.32-007	1.55-007	1.78-007	2.20-007	2.59-007	2.94-007
COMB1	2.07-002	2.11-002	2.13-002	2.16-002	2.16-002	2.15-002

TIME	90.00000	100.00000	110.00000	120.00000	130.00000	150.00000
FLUX= 7.0+013		TARGET=RA226		DATA TYPE=YIELD		
RA226	8.81-001	8.68-001	8.56-001	8.44-001	8.32-001	8.09-001
RA227	4.40-006	4.33-006	4.27-006	4.21-006	4.15-006	4.04-006
AC227	2.12-002	2.10-002	2.07-002	2.05-002	2.02-002	1.96-002
AC228	3.93-005	3.88-005	3.83-005	3.78-005	3.73-005	3.63-005
TH227	3.97-005	3.92-005	3.87-005	3.82-005	3.77-005	3.67-005
TH228	4.86-002	5.10-002	5.28-002	5.41-002	5.50-002	5.60-002
TH229	1.85-002	2.22-002	2.60-002	2.99-002	3.38-002	4.14-002
RA223	2.46-005	2.44-005	2.41-005	2.38-005	2.34-005	2.28-005
RA224	2.53-004	2.65-004	2.75-004	2.82-004	2.87-004	2.92-004
RA225	4.86-007	5.27-007	5.63-007	5.96-007	6.26-007	6.77-007
AC225	3.25-007	3.53-007	3.78-007	4.00-007	4.20-007	4.56-007
COMB1	2.12-002	2.10-002	2.07-002	2.05-002	2.02-002	1.96-002

TABLE V

TARGET= RA226
DATA TYPE= YIELD-ATOMS PER ATOM TARGET
FLUX= 3.0+014
TIME SPAN= 0- 100

TIME	0.05000	0.10000	0.20000	0.30000	0.40000	0.50000
FLUX= 3.0+014		TARGET=RA226		DATA TYPE=YIELD		
RA226	1.00+000	9.99-001	9.99-001	9.98-001	9.98-001	9.97-001
RA227	2.14-005	2.14-005	2.14-005	2.14-005	2.13-005	2.13-005
AC227	2.83-004	5.77-004	1.16-003	1.72-003	2.27-003	2.80-003
AC228	1.11-006	3.20-006	7.76-006	1.23-005	1.66-005	2.09-005
TH227	6.91-009	2.82-008	1.11-007	2.42-007	4.16-007	6.28-007
TH228	6.42-007	4.01-006	2.12-005	5.26-005	9.77-005	1.56-004
TH229	3.13-010	4.06-009	4.55-008	1.75-007	4.42-007	8.95-007
RA223	5.03-011	4.10-010	3.20-009	1.04-008	2.36-008	4.41-008
RA224	9.80-011	1.24-009	1.32-008	4.83-008	1.16-007	2.25-007
RA225	3.84-015	9.83-014	2.17-012	1.21-011	3.96-011	9.65-011
AC225	1.90-017	9.61-016	4.30-014	3.66-013	1.60-012	4.90-012
COMB1	3.04-004	5.99-004	1.18-003	1.74-003	2.29-003	2.82-003

TIME	0.60000	0.80000	1.00000	1.20000	1.40000	1.60000
FLUX= 3.0+014		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.96-001	9.95-001	9.94-001	9.93-001	9.92-001	9.90-001
RA227	2.13-005	2.13-005	2.13-005	2.12-005	2.12-005	2.12-005
AC227	3.32-003	4.33-003	5.28-003	6.19-003	7.05-003	7.86-003
AC228	2.51-005	3.31-005	4.07-005	4.80-005	5.48-005	6.13-005
TH227	8.74-007	1.45-006	2.11-006	2.84-006	3.61-006	4.41-006
TH228	2.28-004	4.08-004	6.35-004	9.07-004	1.22-003	1.57-003
TH229	1.58-006	3.84-006	7.56-006	1.31-005	2.07-005	3.07-005
RA223	7.28-008	1.58-007	2.82-007	4.47-007	6.50-007	8.91-007
RA224	3.79-007	8.41-007	1.52-006	2.43-006	3.56-006	4.91-006
RA225	1.97-010	5.86-010	1.33-009	2.54-009	4.33-009	6.79-009
AC225	1.20-011	4.76-011	1.34-010	3.06-010	6.02-010	1.07-009
COMB1	3.35-003	4.35-003	5.30-003	6.21-003	7.07-003	7.88-003

TIME	1.80000	2.00000	2.20000	2.50000	3.00000	3.50000
FLUX= 3.0+014		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.89-001	9.88-001	9.87-001	9.85-001	9.82-001	9.79-001
RA227	2.12-005	2.11-005	2.11-005	2.11-005	2.10-005	2.10-005
AC227	8.64-003	9.37-003	1.01-002	1.11-002	1.25-002	1.38-002
AC228	6.75-005	7.34-005	7.90-005	8.69-005	9.86-005	1.09-004
TH227	5.23-006	6.06-006	6.89-006	8.11-006	1.01-005	1.19-005
TH228	1.96-003	2.38-003	2.84-003	3.57-003	4.93-003	6.43-003
TH229	4.33-005	5.88-005	7.75-005	1.12-004	1.87-004	2.88-004
RA223	1.16-006	1.47-006	1.80-006	2.33-006	3.30-006	4.31-006
RA224	6.47-006	8.23-006	1.02-005	1.35-005	1.97-005	2.68-005
RA225	9.99-009	1.40-008	1.89-008	2.79-008	4.77-008	7.35-008
AC225	1.75-009	2.69-009	3.94-009	6.49-009	1.28-008	2.22-008
COMB1	8.66-003	9.39-003	1.01-002	1.11-002	1.26-002	1.38-002

TIME	4.00000	5.00000	6.00000	7.00000	8.00000	9.00000
FLUX= 3.0+014		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.76-001	9.70-001	9.65-001	9.59-001	9.53-001	9.47-001
RA227	2.09-005	2.08-005	2.06-005	2.05-005	2.04-005	2.03-005
AC227	1.50-002	1.68-002	1.82-002	1.93-002	2.01-002	2.07-002
AC228	1.18-004	1.33-004	1.44-004	1.53-004	1.59-004	1.64-004
TH227	1.35-005	1.64-005	1.86-005	2.03-005	2.17-005	2.27-005
TH228	8.04-003	1.15-002	1.53-002	1.91-002	2.30-002	2.69-002
TH229	4.17-004	7.63-004	1.23-003	1.84-003	2.58-003	3.45-003
RA223	5.33-006	7.27-006	8.97-006	1.04-005	1.15-005	1.24-005
RA224	3.46-005	5.19-005	7.08-005	9.06-005	1.11-004	1.31-004
RA225	1.05-007	1.85-007	2.82-007	3.95-007	5.17-007	6.47-007
AC225	3.50-008	7.10-008	1.21-007	1.83-007	2.55-007	3.34-007
COMB1	1.50-002	1.68-002	1.83-002	1.93-002	2.01-002	2.07-002

TIME	10.00000	12.00000	14.00000	16.00000	18.00000	20.00000
FLUX= 3.0+014		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.42-001	9.30-001	9.19-001	9.08-001	8.97-001	8.87-001
RA227	2.01-005	1.99-005	1.97-005	1.94-005	1.92-005	1.90-005
AC227	2.11-002	2.17-002	2.19-002	2.19-002	2.18-002	2.16-002
AC228	1.67-004	1.72-004	1.73-004	1.73-004	1.73-004	1.72-004
TH227	2.34-005	2.43-005	2.48-005	2.50-005	2.49-005	2.48-005
TH228	3.07-002	3.81-002	4.50-002	5.13-002	5.71-002	6.22-002
TH229	4.45-003	6.82-003	9.66-003	1.29-002	1.65-002	2.05-002
RA223	1.31-005	1.40-005	1.45-005	1.48-005	1.48-005	1.48-005
RA224	1.51-004	1.90-004	2.27-004	2.60-004	2.91-004	3.18-004
RA225	7.81-007	1.05-006	1.32-006	1.57-006	1.81-006	2.03-006
AC225	4.19-007	5.98-007	7.79-007	9.56-007	1.12-006	1.28-006
COMB1	2.12-002	2.17-002	2.19-002	2.19-002	2.18-002	2.17-002

TABLE V (Contd.)

TIME	22.00000	24.00000	26.00000	30.00000	35.00000	40.00000
FLUX= 3.0+014		TARGET=RA226		DATA TYPE=YIELD		
RA226	8.76-001	8.66-001	8.55-001	8.35-001	8.10-001	7.86-001
RA227	1.87-005	1.85-005	1.83-005	1.79-005	1.73-005	1.68-005
AC227	2.14-002	2.12-002	2.10-002	2.05-002	1.99-002	1.93-002
AC228	1.70-004	1.68-004	1.66-004	1.63-004	1.58-004	1.53-004
TH227	2.46-005	2.44-005	2.41-005	2.36-005	2.29-005	2.22-005
TH228	6.68-002	7.09-002	7.45-002	8.04-002	8.58-002	8.94-002
TH229	2.47-002	2.91-002	3.38-002	4.35-002	5.61-002	6.89-002
RA223	1.47-005	1.46-005	1.45-005	1.41-005	1.37-005	1.33-005
RA224	3.43-004	3.65-004	3.84-004	4.16-004	4.45-004	4.65-004
RA225	2.24-006	2.42-006	2.59-006	2.88-006	3.17-006	3.39-006
AC225	1.42-006	1.56-006	1.68-006	1.89-006	2.10-006	2.26-006
COMB1	2.15-002	2.12-002	2.10-002	2.05-002	1.99-002	1.93-002

TIME	45.00000	50.00000	55.00000	60.00000	65.00000	70.00000
FLUX= 3.0+014		TARGET=RA226		DATA TYPE=YIELD		
RA226	7.63-001	7.40-001	7.18-001	6.97-001	6.76-001	6.56-001
RA227	1.63-005	1.58-005	1.54-005	1.49-005	1.45-005	1.40-005
AC227	1.88-002	1.82-002	1.77-002	1.71-002	1.66-002	1.61-002
AC228	1.49-004	1.44-004	1.40-004	1.36-004	1.32-004	1.28-004
TH227	2.16-005	2.09-005	2.03-005	1.97-005	1.91-005	1.85-005
TH228	9.16-002	9.27-002	9.30-002	9.26-002	9.17-002	9.05-002
TH229	8.16-002	9.40-002	1.06-001	1.17-001	1.28-001	1.38-001
RA223	1.29-005	1.26-005	1.22-005	1.18-005	1.15-005	1.11-005
RA224	4.77-004	4.83-004	4.85-004	4.83-004	4.79-004	4.72-004
RA225	3.56-006	3.69-006	3.78-006	3.84-006	3.87-006	3.89-006
AC225	2.38-006	2.47-006	2.54-006	2.58-006	2.61-006	2.63-006
COMB1	1.88-002	1.82-002	1.77-002	1.72-002	1.66-002	1.62-002

TIME	75.00000	80.00000	85.00000	90.00000	95.00000	100.00000
FLUX= 3.0+014		TARGET=RA226		DATA TYPE=YIELD		
RA226	6.37-001	6.18-001	6.00-001	5.82-001	5.65-001	5.48-001
RA227	1.36-005	1.32-005	1.28-005	1.25-005	1.21-005	1.17-005
AC227	1.57-002	1.52-002	1.47-002	1.43-002	1.39-002	1.35-002
AC228	1.24-004	1.21-004	1.17-004	1.13-004	1.10-004	1.07-004
TH227	1.80-005	1.75-005	1.69-005	1.64-005	1.60-005	1.55-005
TH228	8.90-002	8.73-002	8.54-002	8.34-002	8.14-002	7.94-002
TH229	1.47-001	1.56-001	1.64-001	1.71-001	1.77-001	1.83-001
RA223	1.08-005	1.05-005	1.02-005	9.87-006	9.58-006	9.30-006
RA224	4.64-004	4.56-004	4.46-004	4.36-004	4.25-004	4.15-004
RA225	3.90-006	3.89-006	3.87-006	3.85-006	3.82-006	3.78-006
AC225	2.63-006	2.63-006	2.62-006	2.60-006	2.58-006	2.56-006
COMB1	1.57-002	1.52-002	1.48-002	1.43-002	1.39-002	1.35-002

TABLE VI

TARGET= RA226
DATA TYPE= YIELD-ATOMS PER ATOM TARGET
FLUX= 7.0+014
TIME SPAN= 0- 80

TIME	0.05000	0.10000	0.20000	0.30000	0.40000	0.50000
FLUX= 7.0+014		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.99-001	9.99-001	9.97-001	9.96-001	9.94-001	9.93-001
RA227	4.99-005	4.99-005	4.98-005	4.97-005	4.97-005	4.96-005
AC227	6.55-004	1.33-003	2.61-003	3.82-003	4.95-003	6.03-003
AC228	6.00-006	1.72-005	4.10-005	6.38-005	8.52-005	1.05-004
TH227	1.59-008	6.39-008	2.44-007	5.16-007	8.62-007	1.26-006
TH228	3.48-006	2.16-005	1.13-004	2.76-004	5.07-004	8.01-004
TH229	3.97-009	5.12-008	5.68-007	2.16-006	5.41-006	1.09-005
RA223	1.16-010	9.33-010	7.11-009	2.25-008	4.99-008	9.12-008
RA224	5.31-010	6.70-009	7.07-008	2.56-007	6.10-007	1.17-006
RA225	4.86-014	1.24-012	2.71-011	1.51-010	4.88-010	1.18-009
AC225	2.40-016	1.21-014	5.40-013	4.56-012	1.98-011	6.03-011
COMB1	7.05-004	1.38-003	2.66-003	3.87-003	5.00-003	6.08-003

TABLE VI (Contd.)

TIME	0.60000	0.80000	1.00000	1.20000	1.40000	1.60000
FLUX= 7.0+014		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.92-001	9.89-001	9.86-001	9.83-001	9.81-001	9.78-001
RA227	4.95-005	4.94-005	4.92-005	4.91-005	4.90-005	4.88-005
AC227	7.04-003	8.88-003	1.05-002	1.20-002	1.32-002	1.44-002
AC228	1.24-004	1.59-004	1.90-004	2.17-004	2.41-004	2.63-004
TH227	1.71-006	2.68-006	3.71-006	4.74-006	5.74-006	6.70-006
TH228	1.15-003	2.02-003	3.07-003	4.28-003	5.63-003	7.09-003
TH229	1.90-005	4.53-005	8.75-005	1.49-004	2.31-004	3.36-004
RA223	1.47-007	3.05-007	5.22-007	7.91-007	1.10-006	1.45-006
RA224	1.95-006	4.24-006	7.51-006	1.17-005	1.68-005	2.28-005
RA225	2.39-009	7.00-009	1.56-008	2.93-008	4.92-008	7.58-008
AC225	1.47-010	5.74-010	1.60-009	3.59-009	6.96-009	1.22-008
COMB1	7.08-003	8.93-003	1.06-002	1.20-002	1.33-002	1.44-002

TIME	1.80000	2.00000	2.20000	2.50000	3.00000	3.50000
FLUX= 7.0+014		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.75-001	9.72-001	9.70-001	9.66-001	9.59-001	9.52-001
RA227	4.87-005	4.86-005	4.84-005	4.82-005	4.79-005	4.75-005
AC227	1.54-002	1.63-002	1.70-002	1.80-002	1.93-002	2.03-002
AC228	2.82-004	2.98-004	3.13-004	3.32-004	3.56-004	3.74-004
TH227	7.59-006	8.42-006	9.19-006	1.02-005	1.16-005	1.26-005
TH228	8.66-003	1.03-002	1.20-002	1.47-002	1.93-002	2.40-002
TH229	4.67-004	6.24-004	8.08-004	1.14-003	1.83-003	2.72-003
RA223	1.82-006	2.21-006	2.61-006	3.20-006	4.15-006	5.01-006
RA224	2.94-005	3.66-005	4.44-005	5.69-005	7.94-005	1.03-004
RA225	1.10-007	1.51-007	2.01-007	2.90-007	4.75-007	7.03-007
AC225	1.97-008	2.98-008	4.31-008	6.94-008	1.32-007	2.21-007
COMB1	1.54-002	1.63-002	1.71-002	1.81-002	1.94-002	2.03-002

TIME	4.00000	5.00000	6.00000	7.00000	8.00000	9.00000
FLUX= 7.0+014		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.45-001	9.32-001	9.19-001	9.07-001	8.94-001	8.82-001
RA227	4.72-005	4.66-005	4.59-005	4.53-005	4.46-005	4.40-005
AC227	2.09-002	2.16-002	2.19-002	2.19-002	2.18-002	2.16-002
AC228	3.86-004	4.00-004	4.05-004	4.06-004	4.03-004	4.00-004
TH227	1.34-005	1.43-005	1.48-005	1.49-005	1.49-005	1.48-005
TH228	2.87-002	3.79-002	4.65-002	5.44-002	6.16-002	6.80-002
TH229	3.79-003	6.47-003	9.84-003	1.38-002	1.83-002	2.33-002
RA223	5.74-006	6.85-006	7.55-006	7.95-006	8.14-006	8.21-006
RA224	1.27-004	1.76-004	2.22-004	2.65-004	3.04-004	3.39-004
RA225	9.66-007	1.57-006	2.24-006	2.92-006	3.59-006	4.23-006
AC225	3.36-007	6.36-007	1.01-006	1.43-006	1.87-006	2.32-006
COMB1	2.09-002	2.17-002	2.20-002	2.20-002	2.18-002	2.16-002

TIME	10.00000	12.00000	14.00000	16.00000	18.00000	20.00000
FLUX= 7.0+014		TARGET=RA226		DATA TYPE=YIELD		
RA226	8.69-001	8.45-001	8.22-001	7.99-001	7.77-001	7.56-001
RA227	4.34-005	4.22-005	4.10-005	3.99-005	3.88-005	3.77-005
AC227	2.14-002	2.08-002	2.03-002	1.97-002	1.92-002	1.86-002
AC228	3.95-004	3.85-004	3.75-004	3.64-004	3.54-004	3.45-004
TH227	1.47-005	1.43-005	1.39-005	1.36-005	1.32-005	1.28-005
TH228	7.37-002	8.32-002	9.05-002	9.59-002	9.97-002	1.02-001
TH229	2.87-002	4.04-002	5.29-002	6.59-002	7.91-002	9.23-002
RA223	8.20-006	8.07-006	7.88-006	7.68-006	7.47-006	7.26-006
RA224	3.70-004	4.22-004	4.63-004	4.93-004	5.15-004	5.30-004
RA225	4.83-006	5.89-006	6.75-006	7.44-006	7.98-006	8.39-006
AC225	2.74-006	3.53-006	4.19-006	4.73-006	5.15-006	5.49-006
COMB1	2.14-002	2.09-002	2.03-002	1.97-002	1.92-002	1.87-002

TIME	25.00000	30.00000	35.00000	40.00000	45.00000	50.00000
FLUX= 7.0+014		TARGET=RA226		DATA TYPE=YIELD		
RA226	7.04-001	6.57-001	6.12-001	5.71-001	5.32-001	4.96-001
RA227	3.52-005	3.28-005	3.06-005	2.85-005	2.66-005	2.48-005
AC227	1.74-002	1.62-002	1.51-002	1.41-002	1.31-002	1.22-002
AC228	3.21-004	3.00-004	2.79-004	2.60-004	2.43-004	2.26-004
TH227	1.20-005	1.11-005	1.04-005	9.69-006	9.03-006	8.42-006
TH228	1.05-001	1.04-001	1.00-001	9.59-002	9.08-002	8.55-002
TH229	1.24-001	1.52-001	1.77-001	1.97-001	2.13-001	2.26-001
RA223	6.77-006	6.31-006	5.89-006	5.49-006	5.12-006	4.77-006
RA224	5.45-004	5.41-004	5.24-004	5.01-004	4.74-004	4.47-004
RA225	9.00-006	9.20-006	9.15-006	8.94-006	8.65-006	8.31-006
AC225	6.00-006	6.19-006	6.20-006	6.08-006	5.90-006	5.67-006
COMB1	1.74-002	1.62-002	1.51-002	1.41-002	1.31-002	1.23-002

TABLE VI (Contd.)

TIME	55.00000	60.00000	65.00000	70.00000	75.00000	80.00000
FLUX= 7.0+014		TARGET=RA226		DATA TYPE=YIELD		
RA226	4.63-001	4.31-001	4.02-001	3.75-001	3.50-001	3.26-001
RA227	2.31-005	2.15-005	2.01-005	1.87-005	1.75-005	1.63-005
AC227	1.14-002	1.06-002	9.91-003	9.24-003	8.62-003	8.03-003
AC228	2.11-004	1.97-004	1.83-004	1.71-004	1.59-004	1.49-004
TH227	7.85-006	7.32-006	6.82-006	6.36-006	5.93-006	5.53-006
TH228	8.03-002	7.52-002	7.03-002	6.57-002	6.13-002	5.72-002
TH229	2.35-001	2.41-001	2.44-001	2.45-001	2.44-001	2.42-001
RA223	4.45-006	4.15-006	3.87-006	3.60-006	3.36-006	3.13-006
RA224	4.20-004	3.93-004	3.68-004	3.44-004	3.21-004	2.99-004
RA225	7.94-006	7.56-006	7.18-006	6.81-006	6.45-006	6.10-006
AC225	5.43-006	5.17-006	4.92-006	4.67-006	4.42-006	4.18-006
COMB1	1.14-002	1.07-002	9.93-003	9.26-003	8.63-003	8.05-003

TABLE VII

TARGET= RA226
DATA TYFE= YIELD-ATOMS PER ATOM TARGET
FLUX= 2.0+015
TIME SPAN= 0- 5

TIME	0.00500	0.00800	0.01000	0.05000	0.08000	0.10000
FLUX= 2.0+015		TARGET=RA226		DATA TYPE=YIELD		
RA226	1.00+000	1.00+000	1.00+000	9.98-001	9.97-001	9.96-001
RA227	1.11-004	1.30-004	1.36-004	1.42-004	1.42-004	1.42-004
AC227	1.04-004	2.07-004	2.61-004	1.80-003	2.89-003	3.58-003
AC228	3.66-007	1.12-006	1.87-006	4.67-005	9.72-005	1.33-004
TH227	2.32-010	7.26-010	1.23-009	4.20-008	1.07-007	1.63-007
TH228	2.00-008	9.23-008	1.91-007	2.63-005	9.36-005	1.65-004
TH229	7.01-012	4.74-011	1.20-010	8.28-008	4.90-007	1.11-006
RA223	1.76-013	8.29-013	1.74-012	3.01-010	1.24-009	2.40-009
RA224	3.35-013	2.27-012	5.71-012	3.89-009	2.27-008	5.07-008
RA225	1.04-017	1.00-016	3.04-016	9.71-013	9.27-012	2.63-011
AC225	6.60-021	8.86-020	3.20-019	4.55-015	7.02-014	2.51-013
COMB1	2.15-004	3.37-004	4.17-004	1.95-003	3.03-003	3.72-003

TIME	0.20000	0.30000	0.40000	0.50000	0.60000	0.70000
FLUX= 2.0+015		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.92-001	9.88-001	9.84-001	9.80-001	9.76-001	9.72-001
RA227	1.42-004	1.41-004	1.40-004	1.40-004	1.39-004	1.39-004
AC227	6.69-003	9.32-003	1.15-002	1.34-002	1.49-002	1.62-002
AC228	3.04-004	4.50-004	5.74-004	6.78-004	7.65-004	8.38-004
TH227	5.70-007	1.10-006	1.69-006	2.28-006	2.84-006	3.36-006
TH228	8.47-004	2.00-003	3.55-003	5.41-003	7.52-003	9.82-003
TH229	1.22-005	4.55-005	1.11-004	2.17-004	3.70-004	5.75-004
RA223	1.71-008	5.07-008	1.05-007	1.79-007	2.70-007	3.76-007
RA224	5.33-007	1.88-006	4.38-006	8.14-006	1.32-005	1.96-005
RA225	5.83-010	3.21-009	1.02-008	2.41-008	4.77-008	8.35-008
AC225	1.15-011	9.71-011	4.17-010	1.25-009	2.99-009	6.13-009
COMB1	6.83-003	9.46-003	1.17-002	1.35-002	1.51-002	1.64-002

TIME	0.80000	0.90000	1.00000	1.10000	1.20000	1.30000
FLUX= 2.0+015		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.68-001	9.65-001	9.61-001	9.57-001	9.53-001	9.49-001
RA227	1.38-004	1.38-004	1.37-004	1.37-004	1.36-004	1.35-004
AC227	1.73-002	1.82-002	1.90-002	1.96-002	2.01-002	2.06-002
AC228	8.99-004	9.50-004	9.92-004	1.03-003	1.06-003	1.08-003
TH227	3.83-006	4.25-006	4.62-006	4.94-006	5.21-006	5.45-006
TH228	1.23-002	1.48-002	1.75-002	2.02-002	2.29-002	2.57-002
TH229	8.35-004	1.15-003	1.53-003	1.97-003	2.48-003	3.04-003
RA223	4.93-007	6.18-007	7.48-007	8.81-007	1.01-006	1.15-006
RA224	2.71-005	3.57-005	4.53-005	5.58-005	6.69-005	7.87-005
RA225	1.34-007	2.00-007	2.85-007	3.88-007	5.12-007	6.56-007
AC225	1.13-008	1.91-008	3.02-008	4.53-008	6.53-008	9.06-008
COMB1	1.75-002	1.84-002	1.91-002	1.98-002	2.03-002	2.07-002

TABLE VII (Contd.)

TIME	1.40000	1.50000	1.60000	1.70000	1.80000	1.90000
FLUX= 2.0+015		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.46-001	9.42-001	9.38-001	9.34-001	9.31-001	9.27-001
RA227	1.35-004	1.34-004	1.34-004	1.33-004	1.33-004	1.32-004
AC227	2.09-002	2.12-002	2.14-002	2.16-002	2.17-002	2.18-002
AC228	1.10-003	1.12-003	1.13-003	1.14-003	1.15-003	1.15-003
TH227	5.65-006	5.82-006	5.96-006	6.07-006	6.17-006	6.25-006
TH228	2.84-002	3.11-002	3.38-002	3.65-002	3.92-002	4.17-002
TH229	3.67-003	4.36-003	5.11-003	5.92-003	6.79-003	7.71-003
RA223	1.27-006	1.40-006	1.52-006	1.63-006	1.74-006	1.84-006
RA224	9.09-005	1.04-004	1.16-004	1.30-004	1.43-004	1.56-004
RA225	8.20-007	1.01-006	1.21-006	1.44-006	1.68-006	1.94-006
AC225	1.22-007	1.60-007	2.06-007	2.59-007	3.20-007	3.90-007
COMB1	2.10-002	2.13-002	2.15-002	2.17-002	2.19-002	2.19-002

TIME	2.00000	2.10000	2.20000	2.30000	2.40000	2.50000
FLUX= 2.0+015		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.23-001	9.19-001	9.16-001	9.12-001	9.08-001	9.05-001
RA227	1.32-004	1.31-004	1.31-004	1.30-004	1.30-004	1.29-004
AC227	2.19-002	2.19-002	2.20-002	2.20-002	2.20-002	2.19-002
AC228	1.16-003	1.16-003	1.16-003	1.16-003	1.16-003	1.16-003
TH227	6.31-006	6.36-006	6.39-006	6.42-006	6.44-006	6.46-006
TH228	4.43-002	4.68-002	4.92-002	5.16-002	5.39-002	5.62-002
TH229	8.69-003	9.73-003	1.08-002	1.19-002	1.31-002	1.44-002
RA223	1.94-006	2.02-006	2.11-006	2.18-006	2.25-006	2.32-006
RA224	1.69-004	1.83-004	1.96-004	2.09-004	2.21-004	2.34-004
RA225	2.22-006	2.52-006	2.83-006	3.16-006	3.50-006	3.85-006
AC225	4.68-007	5.56-007	6.53-007	7.59-007	8.74-007	9.98-007
COMB1	2.20-002	2.21-002	2.21-002	2.21-002	2.21-002	2.21-002

TIME	2.60000	2.70000	2.80000	2.90000	3.00000	3.10000
FLUX= 2.0+015		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.01-001	8.98-001	8.94-001	8.90-001	8.87-001	8.83-001
RA227	1.29-004	1.28-004	1.28-004	1.27-004	1.27-004	1.26-004
AC227	2.19-002	2.19-002	2.18-002	2.18-002	2.17-002	2.17-002
AC228	1.16-003	1.16-003	1.15-003	1.15-003	1.15-003	1.15-003
TH227	6.46-006	6.46-006	6.46-006	6.46-006	6.45-006	6.44-006
TH228	5.84-002	6.05-002	6.26-002	6.46-002	6.66-002	6.85-002
TH229	1.56-002	1.70-002	1.83-002	1.97-002	2.12-002	2.27-002
RA223	2.38-006	2.43-006	2.48-006	2.52-006	2.56-006	2.60-006
RA224	2.47-004	2.59-004	2.71-004	2.82-004	2.94-004	3.05-004
RA225	4.21-006	4.59-006	4.97-006	5.36-006	5.75-006	6.16-006
AC225	1.13-006	1.27-006	1.42-006	1.58-006	1.75-006	1.93-006
COMB1	2.20-002	2.20-002	2.20-002	2.19-002	2.18-002	2.18-002

TIME	3.20000	3.30000	3.40000	3.50000	3.60000	3.80000
FLUX= 2.0+015		TARGET=RA226		DATA TYPE=YIELD		
RA226	8.80-001	8.76-001	8.73-001	8.69-001	8.66-001	8.59-001
RA227	1.26-004	1.25-004	1.25-004	1.24-004	1.24-004	1.23-004
AC227	2.16-002	2.15-002	2.15-002	2.14-002	2.13-002	2.12-002
AC228	1.14-003	1.14-003	1.13-003	1.13-003	1.13-003	1.12-003
TH227	6.42-006	6.41-006	6.39-006	6.37-006	6.35-006	6.31-006
TH228	7.03-002	7.21-002	7.39-002	7.55-002	7.72-002	8.03-002
TH229	2.42-002	2.57-002	2.73-002	2.89-002	3.06-002	3.39-002
RA223	2.63-006	2.66-006	2.69-006	2.71-006	2.73-006	2.76-006
RA224	3.15-004	3.26-004	3.36-004	3.46-004	3.56-004	3.74-004
RA225	6.56-006	6.97-006	7.39-006	7.80-006	8.22-006	9.06-006
AC225	2.11-006	2.30-006	2.50-006	2.70-006	2.91-006	3.34-006
COMB1	2.17-002	2.16-002	2.16-002	2.15-002	2.14-002	2.13-002

TIME	4.00000	4.20000	4.40000	4.60000	4.80000	5.00000
FLUX= 2.0+015		TARGET=RA226		DATA TYPE=YIELD		
RA226	8.52-001	8.45-001	8.39-001	8.32-001	8.25-001	8.19-001
RA227	1.22-004	1.21-004	1.20-004	1.19-004	1.18-004	1.17-004
AC227	2.10-002	2.08-002	2.07-002	2.05-002	2.04-002	2.02-002
AC228	1.11-003	1.10-003	1.09-003	1.09-003	1.08-003	1.07-003
TH227	6.27-006	6.22-006	6.18-006	6.13-006	6.08-006	6.04-006
TH228	8.32-002	8.59-002	8.84-002	9.07-002	9.29-002	9.49-002
TH229	3.74-002	4.10-002	4.46-002	4.83-002	5.21-002	5.59-002
RA223	2.78-006	2.79-006	2.80-006	2.81-006	2.81-006	2.80-006
RA224	3.92-004	4.08-004	4.23-004	4.38-004	4.51-004	4.63-004
RA225	9.89-006	1.07-005	1.15-005	1.23-005	1.31-005	1.39-005
AC225	3.80-006	4.27-006	4.75-006	5.24-006	5.74-006	6.24-006
COMB1	2.11-002	2.10-002	2.08-002	2.06-002	2.05-002	2.03-002

TABLE VIII

TARGET= RA226
DATA TYPE= YIELD-ATOMS PER ATOM TARGET
FLUX= 5.0+015
TIME SPAN= 0- 5

TIME	0.00500	0.00800	0.01000	0.05000	0.08000	0.10000
FLUX= 5.0+015		TARGET=RA226		DATA TYPE=YIELD		
RA226	1.00+000	9.99-001	9.99-001	9.95-001	9.92-001	9.90-001
RA227	2.78-004	3.25-004	3.39-004	3.55-004	3.54-004	3.53-004
AC227	2.59-004	5.14-004	6.97-004	4.26-003	6.56-003	7.94-003
AC228	2.28-006	6.95-006	1.16-005	2.79-004	5.64-004	7.55-004
TH227	5.75-010	1.79-009	3.03-009	9.43-008	2.24-007	3.28-007
TH228	1.24-007	5.74-007	1.19-006	1.59-004	5.51-004	9.58-004
TH229	1.09-010	7.38-010	1.86-009	1.26-006	7.29-006	1.63-005
RA223	4.37-013	2.05-012	4.28-012	6.91-010	2.70-009	5.04-009
RA224	2.09-012	1.41-011	3.55-011	2.36-008	1.35-007	2.98-007
RA225	1.62-016	1.56-015	4.72-015	1.48-011	1.39-010	3.91-010
AC225	1.03-019	1.38-018	4.98-018	6.97-014	1.06-012	3.76-012
COMB1	5.37-004	8.39-004	1.04-003	4.61-003	6.92-003	8.30-003

TIME	0.20000	0.30000	0.40000	0.50000	0.60000	0.70000
FLUX= 5.0+015		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.80-001	9.70-001	9.61-001	9.51-001	9.42-001	9.32-001
RA227	3.50-004	3.46-004	3.43-004	3.39-004	3.36-004	3.33-004
AC227	1.33-002	1.68-002	1.90-002	2.04-002	2.12-002	2.17-002
AC228	1.55-003	2.08-003	2.42-003	2.64-003	2.77-003	2.84-003
TH227	9.34-007	1.50-006	1.95-006	2.27-006	2.49-006	2.63-006
TH228	4.51-003	9.86-003	1.62-002	2.30-002	2.99-002	3.67-002
TH229	1.68-004	5.88-004	1.35-003	2.50-003	4.03-003	5.95-003
RA223	3.06-008	7.77-008	1.40-007	2.10-007	2.82-007	3.52-007
RA224	2.94-006	9.75-006	2.13-005	3.73-005	5.71-005	7.99-005
RA225	8.23-009	4.30-008	1.30-007	2.93-007	5.53-007	9.25-007
AC225	1.65-010	1.33-009	5.49-009	1.58-008	3.63-008	7.16-008
COMB1	1.37-002	1.71-002	1.93-002	2.07-002	2.15-002	2.20-002

TIME	0.80000	0.90000	1.00000	1.10000	1.20000	1.30000
FLUX= 5.0+015		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.23-001	9.14-001	9.05-001	8.96-001	8.87-001	8.78-001
RA227	3.29-004	3.26-004	3.23-004	3.20-004	3.16-004	3.13-004
AC227	2.19-002	2.20-002	2.19-002	2.19-002	2.17-002	2.16-002
AC228	2.88-003	2.90-003	2.90-003	2.89-003	2.88-003	2.86-003
TH227	2.72-006	2.77-006	2.79-006	2.80-006	2.79-006	2.78-006
TH228	4.32-002	4.95-002	5.54-002	6.09-002	6.61-002	7.09-002
TH229	8.23-003	1.09-002	1.38-002	1.71-002	2.06-002	2.43-002
RA223	4.18-007	4.79-007	5.33-007	5.81-007	6.23-007	6.59-007
RA224	1.05-004	1.32-004	1.59-004	1.87-004	2.15-004	2.42-004
RA225	1.42-006	2.04-006	2.78-006	3.65-006	4.64-006	5.74-006
AC225	1.27-007	2.07-007	3.16-007	4.60-007	6.40-007	8.61-007
COMB1	2.22-002	2.23-002	2.23-002	2.22-002	2.20-002	2.19-002

TIME	1.40000	1.50000	1.60000	1.70000	1.80000	1.90000
FLUX= 5.0+015		TARGET=RA226		DATA TYPE=YIELD		
RA226	8.69-001	8.61-001	8.52-001	8.44-001	8.35-001	8.27-001
RA227	3.10-004	3.07-004	3.04-004	3.01-004	2.98-004	2.95-004
AC227	2.14-002	2.12-002	2.10-002	2.08-002	2.06-002	2.04-002
AC228	2.83-003	2.81-003	2.78-003	2.76-003	2.73-003	2.70-003
TH227	2.76-006	2.74-006	2.72-006	2.70-006	2.67-006	2.65-006
TH228	7.54-002	7.95-002	8.33-002	8.68-002	9.00-002	9.30-002
TH229	2.83-002	3.25-002	3.68-002	4.13-002	4.59-002	5.06-002
RA223	6.90-007	7.17-007	7.39-007	7.57-007	7.72-007	7.84-007
RA224	2.68-004	2.94-004	3.18-004	3.41-004	3.63-004	3.84-004
RA225	6.93-006	8.22-006	9.58-006	1.10-005	1.25-005	1.40-005
AC225	1.12-006	1.43-006	1.79-006	2.19-006	2.63-006	3.12-006
COMB1	2.17-002	2.15-002	2.13-002	2.11-002	2.09-002	2.07-002

TIME	2.00000	2.10000	2.20000	2.30000	2.40000	2.50000
FLUX= 5.0+015		TARGET=RA226		DATA TYPE=YIELD		
RA226	8.19-001	8.11-001	8.02-001	7.95-001	7.87-001	7.79-001
RA227	2.92-004	2.89-004	2.86-004	2.83-004	2.81-004	2.78-004
AC227	2.02-002	2.00-002	1.98-002	1.96-002	1.94-002	1.92-002
AC228	2.68-003	2.65-003	2.63-003	2.60-003	2.57-003	2.55-003
TH227	2.62-006	2.59-006	2.57-006	2.54-006	2.52-006	2.49-006
TH228	9.57-002	9.81-002	1.00-001	1.02-001	1.04-001	1.06-001
TH229	5.54-002	6.03-002	6.53-002	7.03-002	7.53-002	8.03-002
RA223	7.93-007	8.01-007	8.06-007	8.09-007	8.11-007	8.12-007
RA224	4.03-004	4.21-004	4.38-004	4.54-004	4.68-004	4.81-004
RA225	1.56-005	1.72-005	1.88-005	2.05-005	2.21-005	2.37-005
AC225	3.65-006	4.23-006	4.84-006	5.49-006	6.18-006	6.90-006
COMB1	2.05-002	2.03-002	2.01-002	1.99-002	1.97-002	1.95-002

TABLE VIII (Contd.)

TIME	2.60000	2.70000	2.80000	2.90000	3.00000	3.10000
FLUX= 5.0+015		TARGET=RA226		DATA TYPE=YIELD		
RA226	7.71-001	7.63-001	7.56-001	7.48-001	7.41-001	7.33-001
RA227	2.75-004	2.72-004	2.70-004	2.67-004	2.64-004	2.62-004
AC227	1.90-002	1.88-002	1.87-002	1.85-002	1.83-002	1.81-002
AC228	2.52-003	2.50-003	2.47-003	2.45-003	2.42-003	2.40-003
TH227	2.47-006	2.44-006	2.42-006	2.40-006	2.37-006	2.35-006
TH228	1.07-001	1.09-001	1.10-001	1.11-001	1.11-001	1.12-001
TH229	8.54-002	9.05-002	9.55-002	1.01-001	1.06-001	1.11-001
RA223	8.12-007	8.10-007	8.08-007	8.05-007	8.02-007	7.98-007
RA224	4.94-004	5.05-004	5.15-004	5.24-004	5.32-004	5.40-004
RA225	2.54-005	2.70-005	2.86-005	3.01-005	3.16-005	3.31-005
AC225	7.65-006	8.42-006	9.22-006	1.00-005	1.09-005	1.17-005
COMB1	1.93-002	1.91-002	1.89-002	1.87-002	1.86-002	1.84-002

TIME	3.20000	3.30000	3.40000	3.50000	3.60000	3.80000
FLUX= 5.0+015		TARGET=RA226		DATA TYPE=YIELD		
RA226	7.26-001	7.19-001	7.12-001	7.05-001	6.98-001	6.84-001
RA227	2.59-004	2.56-004	2.54-004	2.51-004	2.49-004	2.44-004
AC227	1.79-002	1.78-002	1.76-002	1.74-002	1.72-002	1.69-002
AC228	2.38-003	2.35-003	2.33-003	2.31-003	2.28-003	2.24-003
TH227	2.32-006	2.30-006	2.28-006	2.26-006	2.23-006	2.19-006
TH228	1.13-001	1.13-001	1.14-001	1.14-001	1.14-001	1.15-001
TH229	1.16-001	1.20-001	1.25-001	1.30-001	1.35-001	1.44-001
RA223	7.93-007	7.88-007	7.83-007	7.78-007	7.72-007	7.60-007
RA224	5.46-004	5.52-004	5.57-004	5.61-004	5.65-004	5.71-004
RA225	3.46-005	3.60-005	3.74-005	3.87-005	4.00-005	4.24-005
AC225	1.26-005	1.35-005	1.43-005	1.52-005	1.61-005	1.78-005
COMB1	1.82-002	1.80-002	1.78-002	1.77-002	1.75-002	1.71-002

TIME	4.00000	4.20000	4.40000	4.60000	4.80000	5.00000
FLUX= 5.0+015		TARGET=RA226		DATA TYPE=YIELD		
RA226	6.70-001	6.57-001	6.44-001	6.31-001	6.19-001	6.06-001
RA227	2.39-004	2.34-004	2.30-004	2.25-004	2.21-004	2.16-004
AC227	1.66-002	1.62-002	1.59-002	1.56-002	1.53-002	1.50-002
AC228	2.19-003	2.15-003	2.11-003	2.07-003	2.02-003	1.98-003
TH227	2.15-006	2.10-006	2.06-006	2.02-006	1.98-006	1.94-006
TH228	1.14-001	1.14-001	1.14-001	1.13-001	1.12-001	1.11-001
TH229	1.53-001	1.62-001	1.70-001	1.78-001	1.86-001	1.93-001
RA223	7.47-007	7.34-007	7.21-007	7.08-007	6.95-007	6.82-007
RA224	5.75-004	5.77-004	5.77-004	5.77-004	5.74-004	5.71-004
RA225	4.47-005	4.67-005	4.86-005	5.03-005	5.17-005	5.30-005
AC225	1.96-005	2.12-005	2.29-005	2.44-005	2.59-005	2.73-005
COMB1	1.68-002	1.65-002	1.61-002	1.58-002	1.55-002	1.52-002

TABLE IX

TARGET= RA226
DATA TYPE= YIELD-ATOMS PER ATOM TARGET
FLUX= 1.0+016
TIME SPAN= 0- 2

TIME	0.00100	0.00500	0.00800	0.01000	0.05000	0.10000
FLUX= 1.0+016		TARGET=RA226		DATA TYPE=YIELD		
RA226	1.00+000	9.99-001	9.98-001	9.98-001	9.90-001	9.80-001
RA227	1.86-004	5.55-004	6.49-004	6.77-004	7.07-004	7.00-004
AC227	4.00-005	5.15-004	1.02-003	1.37-003	7.74-003	1.32-002
AC228	2.23-007	9.08-006	2.76-005	4.60-005	1.04-003	2.60-003
TH227	2.74-011	1.13-009	3.49-009	5.87-009	1.58-007	4.65-007
TH228	4.42-009	4.96-007	2.28-006	4.70-006	5.99-004	3.39-003
TH229	3.20-012	8.71-010	5.87-009	1.47-008	9.58-006	1.18-004
RA223	7.61-015	8.64-013	4.01-012	8.34-012	1.20-009	7.64-009
RA224	3.07-014	8.33-012	5.61-011	1.41-010	9.00-008	1.08-006
RA225	2.16-018	1.29-015	1.24-014	3.75-014	1.14-010	2.89-009
AC225	6.71-022	8.21-019	1.10-017	3.96-017	5.39-013	2.81-011
COMB1	2.26-004	1.07-003	1.66-003	2.05-003	8.45-003	1.39-002

TABLE IX (Contd.)

TIME	0.15000	0.20000	0.25000	0.30000	0.35000	0.40000
FLUX= 1.0+016		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.70-001	9.61-001	9.51-001	9.42-001	9.32-001	9.23-001
RA227	6.93-004	6.86-004	6.79-004	6.72-004	6.65-004	6.59-004
AC227	1.67-002	1.89-002	2.03-002	2.12-002	2.17-002	2.19-002
AC228	3.79-003	4.60-003	5.12-003	5.44-003	5.63-003	5.74-003
TH227	7.58-007	9.90-007	1.16-006	1.27-006	1.35-006	1.40-006
TH228	8.14-003	1.41-002	2.07-002	2.76-002	3.44-002	4.11-002
TH229	4.53-004	1.11-003	2.13-003	3.53-003	5.32-003	7.49-003
RA223	1.99-008	3.65-008	5.57-008	7.61-008	9.64-008	1.16-007
RA224	4.06-006	9.67-006	1.81-005	2.93-005	4.30-005	5.88-005
RA225	1.70-008	5.62-008	1.36-007	2.72-007	4.79-007	7.68-007
AC225	2.56-010	1.15-009	3.57-009	8.75-009	1.83-008	3.40-008
COMB1	1.74-002	1.96-002	2.10-002	2.18-002	2.23-002	2.26-002

TIME	0.45000	0.50000	0.55000	0.60000	0.65000	0.70000
FLUX= 1.0+016		TARGET=RA226		DATA TYPE=YIELD		
RA226	9.14-001	9.05-001	8.96-001	8.87-001	8.78-001	8.69-001
RA227	6.52-004	6.46-004	6.39-004	6.33-004	6.27-004	6.20-004
AC227	2.20-002	2.20-002	2.19-002	2.17-002	2.16-002	2.14-002
AC228	5.79-003	5.80-003	5.79-003	5.76-003	5.73-003	5.68-003
TH227	1.42-006	1.44-006	1.44-006	1.44-006	1.43-006	1.42-006
TH228	4.74-002	5.35-002	5.92-002	6.45-002	6.95-002	7.41-002
TH229	1.00-002	1.29-002	1.60-002	1.94-002	2.31-002	2.70-002
RA223	1.35-007	1.52-007	1.68-007	1.82-007	1.95-007	2.06-007
RA224	7.65-005	9.55-005	1.16-004	1.37-004	1.58-004	1.80-004
RA225	1.15-006	1.63-006	2.21-006	2.90-006	3.70-006	4.61-006
AC225	5.80-008	9.25-008	1.40-007	2.02-007	2.82-007	3.81-007
COMB1	2.26-002	2.26-002	2.25-002	2.24-002	2.22-002	2.20-002

TIME	0.75000	0.80000	0.85000	0.90000	0.95000	1.00000
FLUX= 1.0+016		TARGET=RA226		DATA TYPE=YIELD		
RA226	8.61-001	8.52-001	8.44-001	8.35-001	8.27-001	8.19-001
RA227	6.14-004	6.08-004	6.02-004	5.96-004	5.90-004	5.84-004
AC227	2.12-002	2.10-002	2.08-002	2.06-002	2.04-002	2.02-002
AC228	5.64-003	5.59-003	5.53-003	5.48-003	5.43-003	5.38-003
TH227	1.41-006	1.40-006	1.39-006	1.37-006	1.36-006	1.35-006
TH228	7.84-002	8.23-002	8.59-002	8.93-002	9.23-002	9.51-002
TH229	3.11-002	3.54-002	3.99-002	4.45-002	4.92-002	5.40-002
RA223	2.16-007	2.25-007	2.33-007	2.40-007	2.45-007	2.50-007
RA224	2.02-004	2.23-004	2.44-004	2.65-004	2.85-004	3.05-004
RA225	5.62-006	6.73-006	7.94-006	9.25-006	1.06-005	1.21-005
AC225	5.02-007	6.47-007	8.16-007	1.01-006	1.24-006	1.49-006
COMB1	2.18-002	2.16-002	2.14-002	2.12-002	2.10-002	2.08-002

TIME	1.05000	1.10000	1.15000	1.20000	1.25000	1.30000
FLUX= 1.0+016		TARGET=RA226		DATA TYPE=YIELD		
RA226	8.11-001	8.02-001	7.95-001	7.87-001	7.79-001	7.71-001
RA227	5.79-004	5.73-004	5.67-004	5.61-004	5.56-004	5.50-004
AC227	2.00-002	1.98-002	1.96-002	1.94-002	1.92-002	1.90-002
AC228	5.32-003	5.27-003	5.22-003	5.17-003	5.12-003	5.06-003
TH227	1.34-006	1.32-006	1.31-006	1.30-006	1.28-006	1.27-006
TH228	9.77-002	1.00-001	1.02-001	1.04-001	1.06-001	1.07-001
TH229	5.89-002	6.38-002	6.88-002	7.39-002	7.89-002	8.40-002
RA223	2.55-007	2.58-007	2.61-007	2.64-007	2.66-007	2.67-007
RA224	3.24-004	3.42-004	3.60-004	3.76-004	3.92-004	4.07-004
RA225	1.37-005	1.53-005	1.70-005	1.87-005	2.05-005	2.23-005
AC225	1.77-006	2.09-006	2.44-006	2.81-006	3.22-006	3.67-006
COMB1	2.06-002	2.04-002	2.02-002	2.00-002	1.98-002	1.96-002

TIME	1.35000	1.40000	1.45000	1.50000	1.55000	1.60000
FLUX= 1.0+016		TARGET=RA226		DATA TYPE=YIELD		
RA226	7.63-001	7.56-001	7.48-001	7.41-001	7.33-001	7.26-001
RA227	5.45-004	5.39-004	5.34-004	5.29-004	5.23-004	5.18-004
AC227	1.89-002	1.87-002	1.85-002	1.83-002	1.81-002	1.79-002
AC228	5.01-003	4.96-003	4.91-003	4.87-003	4.82-003	4.77-003
TH227	1.26-006	1.25-006	1.23-006	1.22-006	1.21-006	1.20-006
TH228	1.09-001	1.10-001	1.11-001	1.12-001	1.13-001	1.13-001
TH229	8.91-002	9.42-002	9.93-002	1.04-001	1.09-001	1.14-001
RA223	2.68-007	2.69-007	2.69-007	2.69-007	2.69-007	2.69-007
RA224	4.21-004	4.34-004	4.46-004	4.58-004	4.69-004	4.79-004
RA225	2.42-005	2.61-005	2.80-005	2.99-005	3.19-005	3.39-005
AC225	4.14-006	4.64-006	5.18-006	5.75-006	6.34-006	6.97-006
COMB1	1.94-002	1.92-002	1.90-002	1.88-002	1.86-002	1.85-002

TABLE IX (Contd.)

TIME	1.65000	1.70000	1.75000	1.80000	1.90000	2.00000
FLUX= 1.0+016		TARGET=RA226		DATA TYPE=YIELD		
RA226	7.19-001	7.12-001	7.05-001	6.98-001	6.84-001	6.70-001
RA227	5.13-004	5.08-004	5.03-004	4.98-004	4.88-004	4.78-004
AC227	1.78-002	1.76-002	1.74-002	1.72-002	1.69-002	1.66-002
AC228	4.72-003	4.67-003	4.63-003	4.58-003	4.49-003	4.40-003
TH227	1.18-006	1.17-006	1.16-006	1.15-006	1.13-006	1.10-006
TH228	1.14-001	1.14-001	1.15-001	1.15-001	1.15-001	1.15-001
TH229	1.19-001	1.24-001	1.29-001	1.34-001	1.43-001	1.52-001
RA223	2.68-007	2.67-007	2.66-007	2.65-007	2.63-007	2.60-007
RA224	4.88-004	4.96-004	5.04-004	5.11-004	5.23-004	5.33-004
RA225	3.58-005	3.78-005	3.98-005	4.17-005	4.56-005	4.94-005
AC225	7.62-006	8.30-006	9.00-006	9.73-006	1.13-005	1.29-005
COMB1	1.83-002	1.81-002	1.79-002	1.77-002	1.74-002	1.70-002

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TABLE IX (cont'd.)

TIME	1.6500	1.7000	1.7500	1.8000	2.0000
FLUX=	1.0000	1.0000	1.0000	1.0000	1.0000
RA225	7.1[illegible]-004	7.1[illegible]-004	7.1[illegible]-004	7.1[illegible]-004	7.1[illegible]-004
RA226	2.0[illegible]-004	2.0[illegible]-004	2.0[illegible]-004	2.0[illegible]-004	2.0[illegible]-004
AC227	1.[illegible]-003	1.[illegible]-003	1.[illegible]-003	1.[illegible]-003	1.[illegible]-003
AC228	1.[illegible]-004	1.[illegible]-004	1.[illegible]-004	1.[illegible]-004	1.[illegible]-004
TH229	4.[illegible]-003	4.[illegible]-003	4.[illegible]-003	4.[illegible]-003	4.[illegible]-003
TH228	1.[illegible]-004	1.[illegible]-004	1.[illegible]-004	1.[illegible]-004	1.[illegible]-004
TH227	1.[illegible]-001	1.[illegible]-001	1.[illegible]-001	1.[illegible]-001	1.[illegible]-001
TH226	1.[illegible]-001	1.[illegible]-001	1.[illegible]-001	1.[illegible]-001	1.[illegible]-001
TH225	2.[illegible]-001	2.[illegible]-001	2.[illegible]-001	2.[illegible]-001	2.[illegible]-001
RA225	4.[illegible]-004	4.[illegible]-004	4.[illegible]-004	4.[illegible]-004	4.[illegible]-004
RA226	3.[illegible]-004	3.[illegible]-004	3.[illegible]-004	3.[illegible]-004	3.[illegible]-004
AC227	7.[illegible]-006	7.[illegible]-006	7.[illegible]-006	7.[illegible]-006	7.[illegible]-006
AC228	3.[illegible]-004	3.[illegible]-004	3.[illegible]-004	3.[illegible]-004	3.[illegible]-004
TH229	1.[illegible]-003	1.[illegible]-003	1.[illegible]-003	1.[illegible]-003	1.[illegible]-003

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