



# EXPERIMENT CATETO II

## Nuclear analysis and activity calculations

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# Abstract

In the irradiation experiment CATETO II different reduced activation (RA) steels will be irradiated up to 2.5 dpa at a temperature of 300°C. In this report the results of the calculation of the nuclear constants, the reactivity effect, and the activity of the steel samples are presented.

This report is part of an ECN Project (Project No.: 1660.01).

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# 1. INTRODUCTION

The irradiation experiment CATETO II concerns different ferritic-martensitic stainless steel materials, that are of the reduced-activation (RA) material type when compared to austenitic stainless steels. The irradiations will be performed at 300°C up to 2.5 dpa (displacements per atom). The irradiations will last 13 reactor cycles in core position D2 or G3 or G5 of the HFR-Petten. The experiment CATETO II consists of a set of three sample carriers loaded with the steel samples. These carriers will be loaded in the three channels of a TRIO-131 facility.

A cross section of one of the CATETO II sample carriers is shown in figure 1.

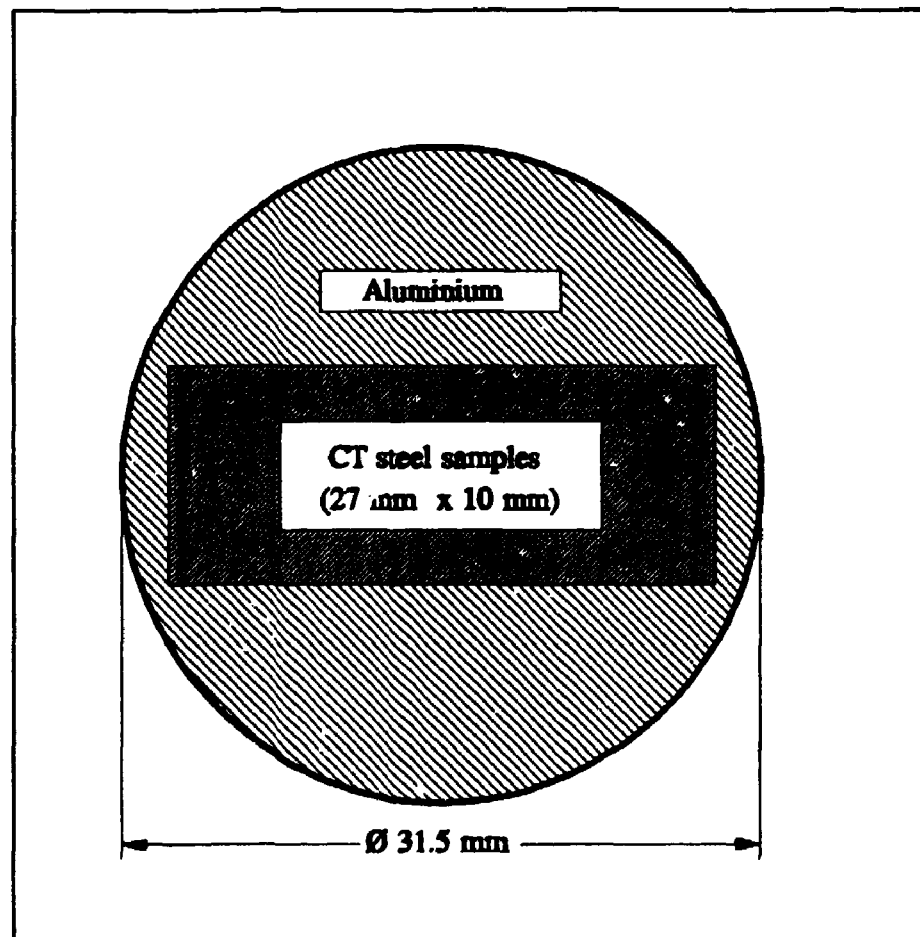


Figure 1 *Horizontal cross section of the CATETO I sample carrier.*

## 2. NUCLEAR CONSTANTS

The broad-group nuclear constants were calculated in the usual HFR-TEDDI [1] groups structure:

group 1	14.9	MeV	>	E	>	1.353	MeV,
group 2	1.353	MeV	>	E	>	67.4	keV,
group 3	67.4	keV	>	E	>	0.683	eV,
group 4	0.683	eV	>	E			

Two sets of homogenized nuclear constants were calculated, one for the outer-core position D2 and one for the inner-core positions G3 and G5 (see table 1). The nuclear constants for groups 1, 2, and 3 were calculated with the zero-dimensional transport code GAM [2]. The "outer core" weighting spectrum was applied for position D2 and the "inner-core" weighting spectrum was applied for the positions G3 and G5. The nuclear constants for group 4 were calculated with the one-dimensional transport code MICROFLUX-2 [3]. Because of the elongated form of the CT sample it cannot be represented well in a 1D-geometry by a single cylinder. Therefore a two-step analysis was applied.

The CT sample is divided into three parts, a central cylindrical part (radius 0.515 cm) and two outer parts covering the remaining CT sample material. In the first step flux-weighted number densities (FLWs) were determined of the outer part of the CT sample, smeared with aluminium of the sample holder. This was done to account for selfshielding effects (see figure 2). These FLWs, indicated as "SS-AL", were fed in the second step calculation which represents the CATETO leg together with the rig, the other two legs, the filler and the surrounding (see figure 3).

Table 1 *Broad-group nuclear constants for the homogenized HFR-TEDDI model. (Diffusion coefficient  $D$  is in cm, macroscopic cross-sections  $\Sigma$  are in  $\text{cm}^{-1}$ . The suffix "a" refers to absorption, and the suffix "ij" refers to scattering from group  $i$  to group  $j$ .)*

	inner-core positions G3 and G5	outer-core position D2
D 1	2.58	2.52
2	1.54	1.51
3	1.26	1.25
4	0.844	0.842
$\Sigma_a$ 1	6.17E-04	5.36E-04
2	1.72E-04	1.76E-04
3	2.31E-03	2.32E-03
4	3.28E-02	3.30E-02
$\Sigma_{12}$	3.56E-02	3.86E-02
$\Sigma_{23}$	1.49E-02	1.59E-02
$\Sigma_{34}$	9.39E-03	9.54E-03

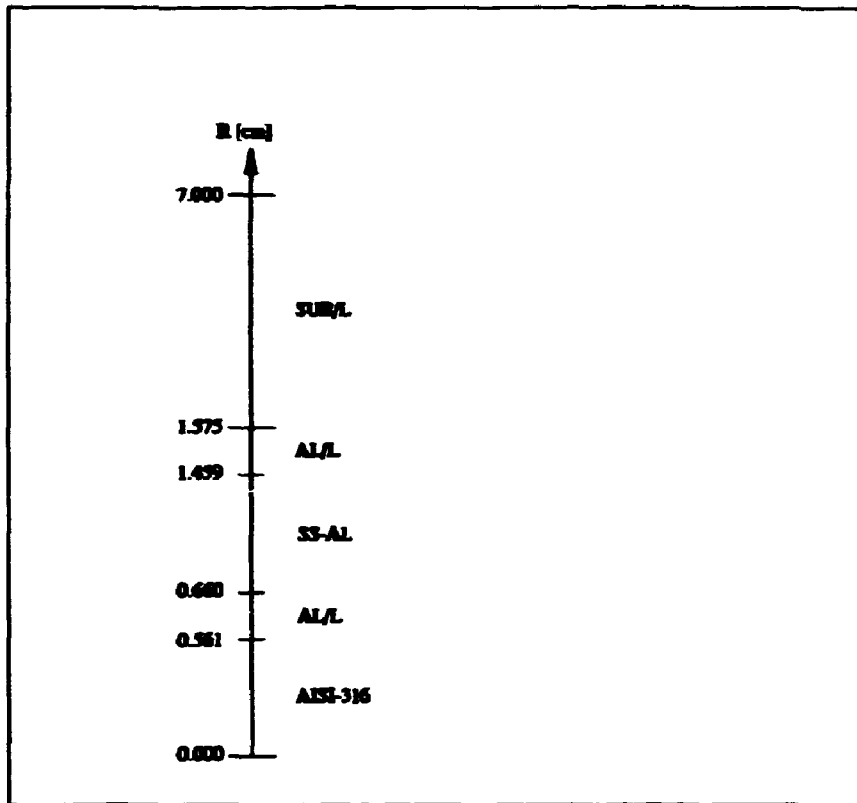


Figure 2 *MICROFLUX geometry for the determination of the selfshielded FLWs (first step). Dimensions are in cm.*

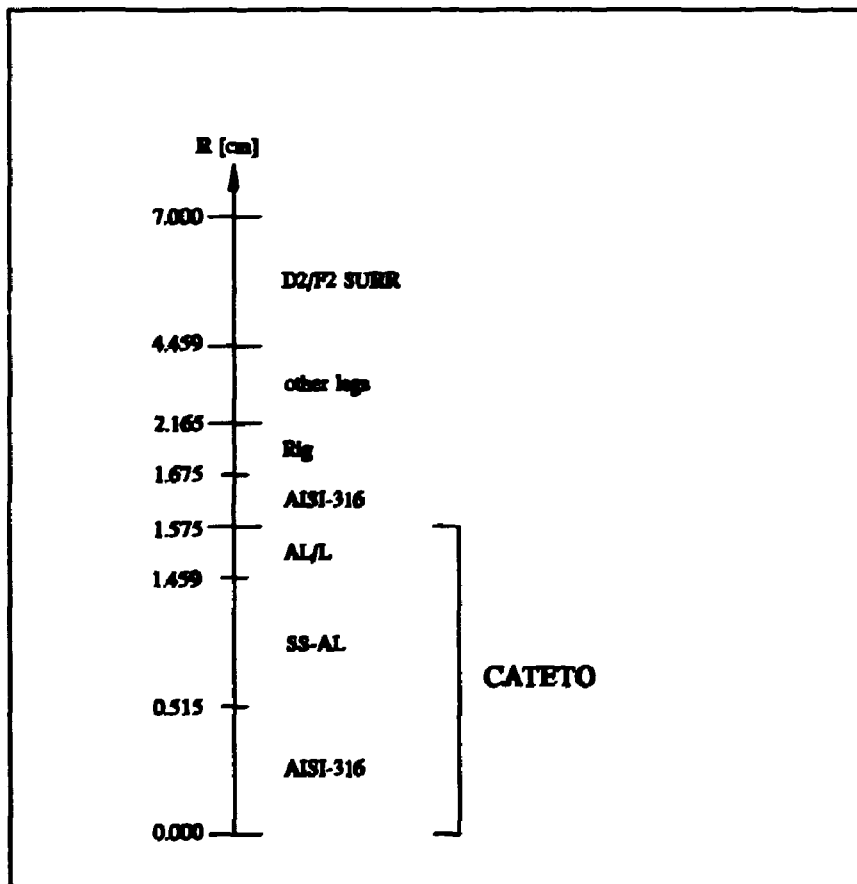


Figure 3 *Final MICROFLUX geometry for CATETO II (second step). Dimensions are in cm.*



### 3. REACTIVITY EFFECT

The reactivity effect of the removal of the TRIO-rig containing the experiments from the actual core position leaving a water hole was calculated in the standard core configuration 21051.01 according to the procedure described in section 3.1 using a homogenized HFR-TEDDI model with the nuclear constants listed in table 2.

The reactivity effects of the removal of the irradiation facility from core position D2 leaving a water hole will be:

	$\rho_{plug}$	$\rho_{exp.}$	$\rho_{water} - \rho_{plug}$ (measured)	$\rho_{plug} - \rho_{exp.}$	$\rho_{water} - \rho_{exp.}$	reactivity effect [pcm]
Initial	0.07284	0.07048	-0.00085	0.00236	0.00151	151
Equil.	0.04669	0.04449	-0.00085	0.00220	0.00135	135
Burnup	0.03086	0.02850	-0.00085	0.00236	0.00151	151

The reactivity effects of the removal of the irradiation facility from core position G3 leaving a water hole will be:

	$\rho_{plug}$	$\rho_{exp.}$	$\rho_{water} - \rho_{plug}$ (measured)	$\rho_{plug} - \rho_{exp.}$	$\rho_{water} - \rho_{exp.}$	reactivity effect [pcm]
Initial	0.07245	0.07107	-0.00010	0.00138	0.00128	128
Equil.	0.04631	0.04501	-0.00010	0.00130	0.00120	120
Burnup	0.03055	0.02897	-0.00010	0.00158	0.00148	148

The reactivity effects of the removal of the irradiation facility from core position G5 leaving a water hole will be:

	$\rho_{plug}$	$\rho_{exp.}$	$\rho_{water} - \rho_{plug}$ (measured)	$\rho_{plug} - \rho_{exp.}$	$\rho_{water} - \rho_{exp.}$	reactivity effect [pcm]
Initial	0.07271	0.07056	-0.00030	0.00215	0.00185	185
Equil.	0.04659	0.04445	-0.00030	0.00214	0.00184	184
Burnup	0.03089	0.02829	-0.00030	0.00260	0.00230	230

### 3.1 Procedure for calculation of reactivity effect

In september of 1993 the group FTO of the HFR defined the procedure how, in general, to calculate and to report the reactivity effect of the removal of an irradiation facility from the HFR-core leaving a water hole. This procedure is described below:

The reactivities are calculated with the program HFR-TEDDI for the standard core 21051.01 without placement of the control rods for the three HFR-states: Initial, Equilibrium (Equil.), and Burnup.

The reactivity effect has to be reported in a table as shown above. The reactivities listed in columns 2 and 3 are calculated as described above for an Al/Al-plug ( $\rho_{plug}$ ) and the experiment ( $\rho_{exp}$ ) in the proposed HFR-core position. The reactivity effect of an water hole with respect to an Al/Al-plug for this core position, listed in column 4, is taken from measurements [4]. Column 6 contains the sum of columns 4 and 5 which is the required reactivity effect of a water hole with respect to the experiment. Column 7 gives this reactivity effect in pcm.

## 4. ACTIVATION

The activity calculations for this experiment were done with the program ORIGEN-S [5]. The sample activities are calculated for an irradiation in core position G3 only, because at this moment it is known that the irradiation will take place in this position. The following set of neutron spectrum parameters were used in the calculations:

THERM = 0.60;  
RES = 0.26;  
FAST = 1.81;  
FLUX =  $0.70 \cdot 10^{14} \text{ cm}^{-2}\text{s}^{-1}$ .

The chemical compositions of a number of different types of steels are given in appendix 1 (as received from the client). Only the steels with numbers 2, 3, 4, and 5 will be irradiated in CATETO II. The activities were calculated for an irradiation time of 13 HFR-cycles and are given for different cooling times: 1, 10, 25, 50, 100, 150, 200, 250, 400 and 500 days. The activities of the samples are listed in appendix 2 and they are valid for a mass of 1 kg of the sample material.

Nuclides with an activity less than  $1 \cdot 10^{-10}$  Ci at the end of the irradiation ("DISCHARGE") are suppressed in the output tables by a cut-off given in the ORIGEN-S input.

# 5. DISCUSSION AND CONCLUSIONS

Because of the large dimensions and the geometric form of the CT samples a two-step calculation was applied to obtain the nuclear constants for the thermal group (group 4) with MICROFLUX-2.

The activity values presented in appendix 2 hold for 1 kg of the sample material and are representative for an average over the whole core position G3.

## REFERENCES

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- [4] P.J.M. Thijsen: *Meting van het Reactiviteitseffect van een Watergat ten Opzichte van een Aluminium Plug in Experimentposities in de HFR*. ECN-89-193.
- [5] O.W. Hermann, R.M. Westfall: *ORIGEN-S - Scale System Module to calculate Fuel Depletion, Actinide Transmutation, Fission Product Buildup and Decay and Associated Radiation Source Terms*. ORNL, October 1981.

# APPENDICES

## Appendix 1: Chemical composition of steels.

Tabel. Chemische samenstellingen in gewichts-procenten (wt-%).

Nummer	1	2	3	4	5	6	7	8	9	10	11
Material	MANET I 12mm	MANET II 20mm	Modified 9%Cr (E)	HT-9	Modified 9%Cr (F)	LA12TJLC	LA7	MANET I staag	MANET II staag	MANET II 8mm	US-1
C	0.14	0.10	0.09	0.20	0.105	0.11	0.16	0.13	0.11	0.10	0.20
Si	0.37	0.14	0.31	0.28	0.43	0.03	0.44	0.37	0.27	0.18	0.13
Mn	0.76	0.75	0.46	0.51	0.38	0.99	0.77	0.82	0.94	0.76	0.47
P	0.005	0.005	0.011	0.002	0.009	<0.005	0.012	0.005	0.005	0.004	0.010
S	0.004	0.0045	0.002	0.005	0.0025	0.005	0.01	0.004	0.004	0.005	0.004
Cr	10.8	10.3	8.68	11.86	8.26	9.10	11.20	10.6	10.3	10.4	11.97
Ni	0.77	0.57	0.92	1.02	0.95			0.77	0.56	0.58	1.04
Ni	0.92	0.65	0.12	0.54				0.80	0.62	0.65	1.14
Al	0.054	0.004	0.008	0.002	<0.003			0.054	0.0034	0.007	0.017
V	0.20	0.19	0.21	0.30	0.075		0.25	0.22	0.20	0.21	0.53
Nb	0.16	0.14	0.09	<0.01	0.20	0.38		0.16	0.15	0.16	0.015
Ti			0.004	<0.01	0.024						0.003
Co	0.01	0.007		0.01	0.13			0.01	0.006	0.005	0.015
Cu	0.015	0.01	0.05	0.01				0.015	0.007	0.01	0.05
B	0.0085	0.0075			0.08			0.0085	0.0089	0.0075	0.001
W				0.54		0.76	2.95				0.53
Zr	0.059	0.028		0.0014	<0.02		0.065	0.053	0.009	0.008	0.001
N	0.02	0.031	0.049	<0.01	0.055	0.07		0.02	0.026	0.032	0.016
Ta											
As		0.01									0.001
Sb		0.001									
Sb		0.0004			0.008						
O											
Fe	bal.	bal.	bal.	bal.	bal.	bal.	bal.	bal.	bal.	bal.	0.007 bal.

Appendix 2: Activities of the samples.

CATETO\_II\_steel\_2

DECAY, FOLLOWING REACTOR IRRADIATION IDENTIFIED BY: POWER= 0.000E+00MW, BURNUP=0.0000E+00MWD, FLUX= 7.00E+13N/CM\*\*2-SEC  
 0 NUCLEIDE RADIOACTIVITY, CURIES

IASIS -CATETO II , 13 cycles in G3 , steel 2

	CHARGE	DISCHARGE	1. D	10. D	25. D	50. D	100. D	150. D	200. D	250. D	400. D	500. D
H003	0.00E+00	3.09E-03	3.09E-03	3.08E-03	3.08E-03	3.07E-03	3.04E-03	3.02E-03	3.00E-03	2.97E-03	2.91E-03	2.86E-03
BE010	0.00E+00	1.49E-08	1.49E-08	1.49E-08	1.49E-08	1.49E-08	1.49E-08	1.49E-08	1.49E-08	1.49E-08	1.49E-08	1.49E-08
CO14	0.00E+00	3.75E-03	3.75E-03	3.75E-03	3.75E-03	3.75E-03	3.75E-03	3.75E-03	3.75E-03	3.75E-03	3.75E-03	3.75E-03
NA024	0.00E+00	1.98E-03	6.54E-04	3.02E-08	1.80E-15	1.64E-27	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SI031	0.00E+00	2.65E-01	4.65E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SI032	0.00E+00	1.40E-10	1.40E-10	1.40E-10	1.40E-10	1.40E-10	1.40E-10	1.40E-10	1.39E-10	1.39E-10	1.39E-10	1.39E-10
PO32	0.00E+00	4.02E-01	3.83E-01	2.47E-01	1.19E-01	3.55E-02	3.14E-03	2.78E-04	2.46E-05	2.18E-06	1.65E-09	1.51E-10
PO33	0.00E+00	1.20E+00	1.17E+00	9.16E-01	6.08E-01	3.07E-01	7.85E-02	2.01E-02	5.13E-03	1.31E-03	2.19E-05	1.43E-06
SO35	0.00E+00	9.01E-03	8.94E-03	8.32E-03	7.39E-03	6.06E-03	4.09E-03	2.74E-03	1.85E-03	1.24E-03	3.78E-04	1.71E-04
Cl036	0.00E+00	3.11E-10	3.11E-10	3.11E-10	3.11E-10	3.11E-10	3.11E-10	3.11E-10	3.11E-10	3.11E-10	3.11E-10	3.11E-10
CA045	0.00E+00	6.02E-10	5.99E-10	5.77E-10	5.41E-10	4.87E-10	3.94E-10	3.19E-10	2.58E-10	2.09E-10	1.11E-10	7.27E-11
CA047	0.00E+00	2.03E-09	1.74E-09	4.41E-10	4.45E-11	9.76E-13	4.69E-16	2.26E-19	1.08E-22	5.21E-26	0.00E+00	0.00E+00
SC047	0.00E+00	9.64E-06	7.35E-06	1.14E-06	5.14E-08	2.95E-10	1.12E-14	1.17E-18	4.25E-22	2.00E-25	0.00E+00	0.00E+00
SC048	0.00E+00	2.82E-04	1.93E-04	6.32E-06	2.12E-08	1.60E-12	9.02E-21	5.10E-29	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CR051	0.00E+00	1.11E-03	1.08E+03	8.65E-02	5.94E-02	3.18E-02	9.10E-01	2.60E+01	7.46E+00	2.13E+00	5.00E-02	4.10E-03
MN054	0.00E+00	6.41E+01	6.40E+01	6.27E-01	6.06E-01	5.74E-01	5.13E+01	4.60E+01	4.11E+01	3.68E+01	2.64E+01	2.11E+01
MN056	0.00E+00	1.79E+03	2.83E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FE055	0.00E+00	3.58E-02	3.58E-02	3.55E-02	3.52E-02	3.46E-02	3.34E-02	3.22E-02	3.11E-02	3.00E-02	2.70E-02	2.52E-02
FE059	0.00E+00	5.23E+01	5.15E+01	4.48E+01	3.55E+01	2.40E+01	1.11E+01	5.08E+00	2.34E+00	1.07E+00	1.04E-01	2.21E-02
CO058	0.00E+00	6.17E+00	6.11E+00	5.60E+00	4.83E+00	3.78E+00	2.32E+00	1.42E+00	8.71E-01	5.34E-01	2.53E-01	4.61E-02
CO060	0.00E+00	6.35E+00	6.34E+00	6.22E+00	6.09E+00	6.02E+00	6.12E+00	6.01E+00	5.91E+00	5.80E+00	5.50E+00	5.30E+00
CO061	0.00E+00	2.52E-01	1.05E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NI059	0.00E+00	2.19E-03	2.19E-03	2.19E-03	2.19E-03	2.19E-03	2.19E-03	2.19E-03	2.19E-03	2.19E-03	2.19E-03	2.19E-03
NI063	0.00E+00	3.00E-01	3.00E-01	2.99E-01	2.99E-01	2.99E-01	2.99E-01	2.99E-01	2.99E-01	2.99E-01	2.99E-01	2.99E-01
NI065	0.00E+00	1.36E+00	1.85E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NI066	0.00E+00	2.17E-05	1.60E-05	1.03E-06	1.07E-08	5.26E-12	1.27E-18	3.08E-25	6.85E-32	0.00E+00	0.00E+00	0.00E+00
CU064	0.00E+00	4.89E+00	1.32E+00	1.00E-05	2.94E-14	1.77E-28	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CU066	0.00E+00	1.06E+00	1.61E-05	1.03E-06	1.07E-08	5.72E-12	1.28E-18	3.05E-25	6.85E-32	0.00E+00	0.00E+00	0.00E+00
CU067	0.00E+00	2.67E-06	2.04E-06	1.91E-07	3.21E-09	3.86E-12	5.58E-18	8.08E-24	1.17E-29	0.00E+00	0.00E+00	0.00E+00
ZN065	0.00E+00	1.09E-03	1.08E-03	1.06E-03	1.01E-03	9.42E-04	8.17E-04	7.09E-04	6.15E-04	5.34E-04	3.40E-04	2.62E-04
ZN069	0.00E+00	1.47E-08	3.17E-10	5.96E-15	7.93E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ZN069M	0.00E+00	9.88E-10	2.95E-10	5.55E-15	7.39E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AS076	0.00E+00	2.66E+01	1.42E+01	4.79E-02	3.66E-06	5.02E-13	9.46E-27	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SE079	0.00E+00	3.70E-10	3.70E-10	3.70E-10	3.70E-10	3.70E-10	3.70E-10	3.70E-10	3.70E-10	3.70E-10	3.70E-10	3.70E-10
SR089	0.00E+00	7.94E-05	7.83E-05	6.92E-05	5.63E-05	4.00E-05	2.01E-05	1.01E-05	5.10E-06	2.57E-06	3.28E-07	8.30E-08
SR090	0.00E+00	6.20E-10	6.20E-10	6.20E-10	6.19E-10	6.18E-10	6.16E-10	6.14E-10	6.12E-10	6.10E-10	6.04E-10	6.00E-10
SR091	0.00E+00	1.54E-05	2.67E-06	3.82E-13	1.50E-24	3.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y089M	0.00E+00	5.63E-04	4.5.2.04	8.76E-05	2.81E-06	1.40E-08	3.46E-13	8.58E-18	2.13E-22	5.27E-27	0.00E+00	0.00E+00
Y090	0.00E+00	4.18E-03	3.23E-03	3.11E-04	6.30E-06	1.01E-08	6.16E-10	6.14E-10	6.12E-10	6.10E-10	6.04E-10	6.00E-10
Y091	0.00E+00	2.09E-04	2.07E-04	1.86E-04	1.56E-04	1.16E-04	6.40E-05	3.54E-05	1.96E-05	1.08E-05	1.83E-06	5.60E-07
Y091h	0.00E+00	8.95E-06	1.70E-06	2.43E-13	9.51E-25	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y092	0.00E+00	1.74E-04	1.58E-06	6.78E-25	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y093	0.00E+00	5.30E-08	1.03E-08	3.77E-15	7.03E-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ZR089	0.00E+00	5.64E-04	4.57E-04	6.77E-05	2.81E-06	1.40E-08	3.47E-13	8.59E-18	2.13E-22	5.28E-27	0.00E+00	0.00E+00
ZR093	0.00E+00	9.82E-08	9.82E-08	9.82E-08	9.82E-08	9.82E-08	9.82E-08	9.82E-08	9.82E-08	9.82E-08	9.82E-08	9.82E-08
ZR095	0.00E+00	6.79E-02	6.72E-02	6.10E-02	5.18E-02	3.95E-02	2.30E-02	1.34E-02	7.78E-03	4.53E-03	8.91E-04	3.02E-04
ZR097	0.00E+00	1.28E-01	4.78E-02	6.79E-06	2.63E-12	5.39E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NB092	0.00E+00	1.12E-01	1.05E-01	5.67E-02	2.04E-02	3.69E-03	1.22E-04	4.00E-06	1.31E-07	4.32E-09	1.54E-13	1.67E-16
NB093M	0.00E+00	6.75E-06	6.79E-06	7.16E-06	7.76E-06	1.07E-05	1.27E-05	1.47E-05	1.66E-05	2.24E-05	2.62E-05	2.79E-05
NB094	0.00E+00	1.49E-03	1.49E-03	1.49E-03	1.49E-03	1.49E-03	1.49E-03	1.49E-03	1.49E-03	1.49E-03	1.49E-03	1.49E-03
NB095	0.00E+00	3.40E+00	3.34E+00	2.81E+00	2.10E+00	1.30E+00	5.04E-01	1.99E-01	8.03E-02	3.36E-02	3.20E-03	8.92E-04
NB095M	0.00E+00	4.75E-04	4.74E-04	4.48E-04	3.84E-04	2.93E-04	1.71E-04	9.92E-05	5.77E-05	3.36E-05	6.61E-06	2.24E-06
NB096	0.00E+00	8.55E-03	4.20E-03	6.89E-06	1.57E-10	2.89E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NB097	0.00E+00	1.29E-01	4.80E-02	7.32E-06	2.83E-12	5.81E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NB097M	0.00E+00	1.21E-01	4.53E-02	6.43E-06	2.49E-12	5.11E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MO093	0.00E+00	2.94E-04	2.94E-04	2.94E-04	2.94E-04	2.94E-04	2.94E-04	2.94E-04	2.94E-04	2.94E-04	2.94E-04	2.94E-04
MO099	0.00E+00	2.76E+01	2.14E+01	2.22E+00	5.06E-02	9.27E-05	3.12E-10	1.05E-15	3.53E-21	1.19E-26	0.00E+00	0.00E+00
TC099	0.00E+00	7.43E-05	7.46E-05	7.53E-05	7.54E-05	7.54E-05	7.54E-05	7.54E-05	7.54E-05	7.54E-05	7.54E-05	7.54E-05
TC099M	0.00E+00	2.41E+01	2.05E+01	2.14E+00	4.87E-02	8.93E-05	3.00E-10	1.01E-15	3.40E-21	1.14E-26	0.00E+00	0.00E+00
TU103	0.00E+00	4.84E-04	4.46E-04	3.80E-04	2.92E-04	1.88E-04	7.77E-05	3.22E-05	1.33E-05	5.51E-06	3.90E-07	6.68E-08
CD115	0.00E+00	8.99E-08	6.59E-08	4.00E-09	3.76E-11	1.57E-14	2.75E-21	4.82E-28	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CD115M	0.00E+00	6.28E-09	6.19E-09	5.38E-09	4.26E-09	2.89E-09	1.33E-09	6.11E-10	2.81E-10	1.29E-10	1.25E-11	2.65E-12
CD117	0.00E+00	1.13E-07	1.41E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IN113M	0.00E+00	4.42E-03	4.39E-03	4.16E-03	3.80E-03	3.27E-03	2.42E-03	1.79E-03	1.22E-03	9.80E-04	3.97E-04	2.17E-04
IN114	0.00E+00	6.35E-04	3.64E-04	3.20E-04	2.60E-04	1.83E-04	9.09E-05	4.51E-05	2.24E-05	1.11E-05	3.36E-06	3.36E-07
IN114M	0.00E+00	3.85E-04	3.80E-04	3.35E-04	2.71E-04	1.91E-04	9.50E-05	4.72E-05	2.34E-05	1.16E-05	1.42E-06	3.51E-07
IN117	0.00E+00	1.27E-06	3.09E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IN117M	0.00E+00	1.05E-07	6.17E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SN113	0.00E+00	4.41E-03	4.39E-03	4.16E-03	3.80E-03	3.27E-03	2.42E-03	1.79E-03	1.22E-03	9.79E-04	3.97E-04	2.17E-04
SN117M	0.00E+00	4.02E-02	3.83E-02	2.45E-02	1.17E-02	3.39E-03	2.85E-04	2.40E-05	2.01E-06	1.69E-07	1.01E-10	7.14E-13
SN119M	0.											

Appendix 2: Continued

CATETO\_II\_steel\_2

DECAY, FOLLOWING REACTOR IRRADIATION IDENTIFIED BY: POWER= 0.000E+00MW, BURNUP=0.0000E+00MW/D, FLUX= 7.00E+13#/CM^2-SEC

ELEMENT RADIOACTIVITY, CURIES	BASIS -CATETO II , 13 cycles in G3 , steel 2											
	CHANGE	DISCHARGE	1. D	10. D	25. D	50. D	100. D	150. D	200. D	250. D	400. D	500. D
H	0.00E+00	3.09E-03	3.09E-03	3.08E-03	3.08E-03	3.07E-03	3.04E-03	3.02E-03	3.00E-03	2.97E-03	2.91E-03	2.86E-03
BE	0.00E+00	3.89E-02	1.49E-08	1.49E-08	1.49E-08	1.49E-08	1.49E-08	1.49E-08	1.49E-08	1.49E-08	1.49E-08	1.49E-08
C	0.00E+00	3.75E-03	3.75E-03	3.75E-03	3.75E-03	3.75E-03	3.75E-03	3.75E-03	3.75E-03	3.75E-03	3.75E-03	3.75E-03
MA	0.00E+00	1.98E-03	6.54E-04	3.02E-08	1.80E-15	1.64E-27	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MG	0.00E+00	9.80E-03	6.08E-12	4.73E-15	3.10E-20	7.14E-29	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AL	0.00E+00	7.04E-01	6.09E-12	4.73E-15	3.11E-20	7.16E-29	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SI	0.00E+00	2.65E-01	4.65E-04	1.40E-10	1.40E-10	1.40E-10	1.40E-10	1.40E-10	1.40E-10	1.39E-10	1.39E-10	1.39E-10
P	0.00E+00	1.0E+00	1.55E+00	1.16E+00	7.27E-01	3.43E-01	8.17E-02	2.03E-02	5.15E-02	1.31E-02	2.19E-05	1.43E-06
S	0.00E+00	9.04E-03	8.94E-03	8.32E-03	7.39E-03	6.06E-03	4.08E-03	2.74E-03	1.85E-03	1.24E-03	3.78E-04	1.71E-04
CL	0.00E+00	1.36E-08	3.11E-10	3.11E-10	3.11E-10	3.11E-10	3.11E-10	3.11E-10	3.11E-10	3.11E-10	3.11E-10	3.11E-10
AR	0.00E+00	5.40E-13	3.85E-13	3.23E-13	2.41E-13	1.49E-13	5.86E-14	2.49E-14	1.24E-14	7.77E-15	5.16E-15	5.03E-15
K	0.00E+00	3.36E-13	2.23E-17	2.13E-21	7.47E-25	7.15E-25	7.15E-25	7.15E-25	7.15E-25	7.15E-25	7.15E-25	7.15E-25
CA	0.00E+00	2.63E-09	2.34E-09	1.02E-09	5.86E-10	4.88E-10	3.94E-10	3.19E-10	2.50E-10	2.09E-10	1.11E-10	7.27E-11
SC	0.00E+00	2.93E-04	2.00E-04	7.46E-06	7.26E-08	2.98E-10	1.03E-12	6.74E-13	4.46E-13	2.95E-13	8.53E-14	3.73E-14
V	8.33E-16	1.63E+02	8.05E-16	8.05E-16	8.05E-16	8.05E-16	8.05E-16	8.05E-16	8.05E-16	8.05E-16	8.05E-16	8.05E-16
CR	0.00E+00	1.13E+03	1.08E+03	8.45E+02	5.94E+02	3.18E+02	9.10E+01	2.60E+01	7.46E+00	2.13E+00	5.00E+02	4.10E+03
MN	0.00E+00	1.86E+03	6.68E+01	4.27E+01	6.06E+01	5.74E+01	5.13E+01	4.60E+01	4.11E+01	3.68E+01	2.64E+01	2.11E+01
FE	0.00E+00	4.10E+02	4.09E+02	4.00E+02	3.87E+02	3.70E+02	3.45E+02	3.27E+02	3.13E+02	3.01E+02	2.70E+02	2.52E+02
CO	0.00E+00	4.32E+01	1.25E+01	1.19E+01	1.11E+01	1.00E+01	8.44E+00	7.43E+00	6.78E+00	6.33E+00	5.62E+00	5.35E+00
NI	0.00E+00	1.66E+00	3.04E-01	3.02E-01	3.02E-01	3.01E-01	3.01E-01	3.01E-01	3.01E-01	3.00E-01	2.99E-01	2.99E-01
CU	0.00E+00	5.95E+00	1.32E+00	1.12E+05	1.39E+08	9.13E-12	6.86E-18	8.39E-24	1.18E-29	0.00E+00	0.00E+00	0.00E+00
ZN	0.00E+00	1.09E-03	1.08E-03	1.06E-03	1.01E-03	9.42E-04	8.17E-04	7.09E-04	6.15E-04	5.34E-04	3.48E-04	2.62E-04
GA	0.00E+00	3.76E-11	2.79E-17	6.83E-22	1.41E-29	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GE	0.00E+00	3.56E-14	3.05E-14	1.80E-14	7.44E-15	1.71E-15	9.11E-17	5.09E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AS	0.00E+00	2.66E+01	1.42E+01	4.79E-02	3.66E-06	5.02E-13	9.46E-27	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SE	0.00E+00	7.52E-01	3.70E-10	3.70E-10	3.70E-10	3.70E-10	3.70E-10	3.70E-10	3.70E-10	3.70E-10	3.70E-10	3.70E-10
BR	0.00E+00	7.53E-12	6.87E-14	5.72E-19	4.87E-22	3.72E-27	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
KR	0.00E+00	1.41E-14	1.88E-20	1.88E-20	1.88E-20	1.88E-20	1.88E-20	1.88E-20	1.88E-20	1.88E-20	1.88E-20	1.88E-20
SR	0.00E+00	9.48E-05	8.10E-05	6.92E-05	5.63E-05	4.00E-05	2.01E-05	1.01E-05	5.10E-06	2.57E-06	3.28E-07	8.36E-08
Y	0.00E+00	5.15E-03	3.89E-03	5.64E-04	1.65E-04	1.16E-04	6.40E-05	3.54E-05	1.96E-05	1.08E-05	1.83E-06	5.60E-07
ZR	0.00E+00	1.96E-01	1.15E-01	6.10E-02	5.18E-02	3.95E-02	2.30E-02	1.34E-02	7.78E-03	4.53E-03	8.91E-04	3.02E-04
NB	0.00E+00	3.78E+00	3.54E+00	2.86E+00	2.12E+00	1.31E+00	5.06E-01	2.00E-01	8.18E-02	3.51E-02	4.72E-03	2.36E-03
MO	0.00E+00	3.47E+01	2.14E+01	2.22E+00	5.08E-02	3.87E-04	2.94E-04	2.94E-04	2.94E-04	2.94E-04	2.94E-04	2.94E-04
TC	0.00E+00	3.63E+01	2.05E+01	2.14E+00	4.88E-02	1.65E-04	7.54E-05	7.54E-05	7.54E-05	7.54E-05	7.54E-05	7.54E-05
RU	0.00E+00	4.54E-04	4.46E-04	3.80E-04	2.92E-04	1.88E-04	7.77E-05	3.22E-05	1.33E-05	5.51E-06	3.90E-07	6.68E-08
RH	0.00E+00	9.25E-06	2.14E-11	3.09E-13	2.67E-16	4.11E-19	3.72E-19	3.71E-19	3.71E-19	3.71E-19	2.79E-19	2.20E-19
PD	0.30E+00	1.43E-16	5.33E-23	5.33E-23	5.33E-23	5.33E-23	5.33E-23	5.33E-23	5.33E-23	5.33E-23	5.33E-23	5.33E-23
CD	0.00E+00	2.13E-07	7.22E-08	9.38E-09	4.30E-09	2.89E-09	1.33E-09	6.11E-10	2.81E-10	1.29E-10	1.25E-11	2.65E-12
IN	0.00E+00	5.44E-03	5.13E-03	4.81E-03	4.33E-03	3.64E-03	2.60E-03	1.88E-03	1.37E-03	1.00E-03	4.00E-04	2.18E-04
SN	0.00E+00	9.86E-02	7.79E-02	5.51E-02	4.07E-02	3.00E-02	2.29E-02	1.93E-02	1.65E-02	1.41E-02	8.92E-03	6.62E-03
SB	0.00E+00	1.66E+00	1.40E+00	5.95E-01	4.34E-01	3.24E-01	1.83E-01	1.04E-01	5.92E-02	3.41E-02	7.43E-03	3.41E-03
TE	0.00E+00	1.12E-02	1.11E-02	1.06E-02	9.75E-03	8.51E-03	6.50E-03	4.99E-03	3.84E-03	2.98E-03	1.48E-03	9.84E-04
I	0.00E+00	3.06E-09	9.71E-17	2.52E-21	1.99E-21	2.00E-21	2.00E-21	2.00E-21	2.00E-21	2.00E-21	3.03E-22	3.03E-22
XE	0.00E+00	4.63E-13	4.24E-13	1.94E-13	5.30E-14	6.08E-15	8.13E-17	1.18E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTALS	8.33E-16	3.72E+03	1.64E+03	1.35E+03	1.06E+03	7.57E+02	4.97E+02	4.07E+02	3.69E+02	3.47E+02	3.03E+02	2.79E+02

Appendix 2: Continued

CATETO\_II\_steel\_3

DECAY, FOLLOWING REACTOR IRRADIATION IDENTIFIED BY: POWER= 0.000E+00MW, BURNUP=0.0000E+00MWD, FLUX= 7.00E+13N/CM\*\*2-SEC

NUCLIDE RADIOACTIVITY, CURIES  
BASIS =CATETO II , 13 cycles in G3 , steel 3

	CHARGE	DISCHARGE	1. D	10. D	25. D	50. D	100. D	150. D	200. D	250. D	400. D	500. D
H003	0.00E+00	2.57E-07	2.57E-07	2.56E-07	2.56E-07	2.56E-07	2.53E-07	2.51E-07	2.49E-07	2.47E-07	2.41E-07	2.38E-07
HE010	0.00E+00	1.77E-09	1.77E-09	1.77E-09	1.77E-09	1.77E-09	1.77E-09	1.77E-09	1.77E-09	1.77E-09	1.77E-09	1.77E-09
C014	0.00E+00	5.93E-03	5.93E-03	5.93E-03	5.93E-03	5.93E-03	5.93E-03	5.93E-03	5.93E-03	5.93E-03	5.93E-03	5.93E-03
MA024	0.00E+00	3.94E-03	1.31E-03	6.05E-08	3.60E-15	3.28E-27	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SI031	0.00E+00	5.85E-01	1.03E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SI032	0.00E+00	3.08E-10	3.08E-10	3.08E-10	3.08E-10	3.08E-10	3.08E-10	3.08E-10	3.08E-10	3.08E-10	3.07E-10	3.07E-10
P032	0.00E+00	5.94E-01	5.66E-01	3.66E-01	1.77E-01	5.26E-02	4.65E-03	4.11E-04	3.64E-05	3.22E-06	2.54E-09	3.25E-10
P033	0.00E+00	5.35E-01	5.20E-01	4.07E-01	2.70E-01	1.37E-01	3.49E-02	8.92E-03	2.28E-03	5.82E-04	9.71E-06	6.34E-07
S035	0.00E+00	4.00E-03	3.97E-03	3.70E-03	3.28E-03	2.69E-03	1.81E-03	1.22E-03	8.20E-04	5.52E-04	1.68E-04	7.61E-05
CL036	0.00E+00	1.38E-10	1.38E-10	1.38E-10	1.38E-10	1.38E-10	1.38E-10	1.38E-10	1.38E-10	1.38E-10	1.38E-10	1.38E-10
R043	0.00E+00	1.16E-09	5.56E-10	7.38E-13	1.18E-17	1.22E-25	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CA045	0.00E+00	1.10E-05	1.10E-05	1.06E-05	9.92E-06	8.93E-06	7.23E-06	5.85E-06	4.74E-06	3.83E-06	2.03E-06	1.33E-06
CA047	0.00E+00	1.18E-07	1.02E-07	2.57E-08	2.60E-09	5.69E-11	2.74E-14	1.31E-17	6.32E-21	3.04E-24	0.00E+00	0.00E+00
SC046	0.00E+00	1.70E-03	1.69E-03	1.57E-03	1.38E-03	1.13E-03	7.45E-04	4.92E-04	3.26E-04	2.15E-04	6.23E-05	2.72E-05
SC047	0.00E+00	2.80E-03	2.30E-03	3.50E-04	1.61E-05	9.15E-08	3.05E-12	1.45E-16	2.72E-20	1.17E-23	0.00E+00	0.00E+00
SC048	0.00E+00	5.72E-04	3.91E-04	1.28E-05	4.30E-08	3.24E-12	1.83E-20	1.04E-28	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CR051	0.00E+00	9.37E+02	9.14E+02	7.30E+02	5.01E+02	2.68E+02	7.68E+01	2.20E+01	6.29E+00	1.80E+00	4.22E-02	3.46E-03
MM054	0.00E+00	6.55E+01	6.54E+01	6.41E+01	6.20E+01	5.88E+01	5.25E+01	4.70E+01	4.20E+01	3.74E+01	2.70E+01	2.16E+01
MM056	0.00E+00	1.11E+03	1.76E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FE055	0.00E+00	3.66E+02	3.66E+02	3.63E+02	3.60E+02	3.53E+02	3.41E+02	3.29E+02	3.18E+02	3.07E+02	2.76E+02	2.58E+02
FE059	0.00E+00	5.34E+01	5.26E+01	4.58E+01	3.62E+01	2.46E+01	1.13E+01	5.19E+00	2.39E+00	1.10E+00	1.07E-01	2.25E-02
CO056	0.00E+00	1.14E+00	1.13E+00	1.03E+00	8.92E-01	6.98E-01	4.28E-01	2.62E-01	1.61E-01	9.85E-02	2.27E-02	8.52E-03
CO060	0.00E+00	1.86E-01	1.86E-01	1.85E-01	1.84E-01	1.83E-01	1.79E-01	1.76E-01	1.73E-01	1.70E-01	1.61E-01	1.55E-01
CO061	0.00E+00	8.13E-03	3.40E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NI059	0.00E+00	4.05E-04	4.05E-04	4.05E-04	4.05E-04	4.05E-04	4.05E-04	4.05E-04	4.05E-04	4.05E-04	4.05E-04	4.05E-04
NI063	0.00E+00	5.59E-02	5.59E-02	5.59E-02	5.59E-02	5.59E-02	5.58E-02	5.58E-02	5.57E-02	5.57E-02	5.55E-02	5.54E-02
NI065	0.00E+00	2.88E-01	3.91E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NI066	0.00E+00	4.60E-06	3.40E-06	2.19E-07	2.27E-09	1.11E-12	2.70E-19	6.53E-26	2.28E-32	0.00E+00	0.00E+00	0.00E+00
CU064	0.00E+00	2.44E+01	6.60E+00	5.01E-05	2.47E-13	8.85E-28	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CU066	0.00E+00	5.29E+00	3.40E-06	2.19E-07	2.77E-09	1.12E-12	2.70E-19	6.54E-26	2.28E-32	0.00E+00	0.00E+00	0.00E+00
CU067	0.00E+00	1.33E-05	1.01E-05	9.01E-07	1.60E-08	1.92E-11	2.78E-17	4.02E-23	5.82E-29	0.00E+00	0.00E+00	0.00E+00
ZN065	0.00E+00	5.43E-03	5.41E-03	5.28E-03	5.06E-03	4.71E-03	4.09E-03	3.55E-03	3.08E-03	2.74E-03	1.74E-03	1.31E-03
ZN069	0.00E+00	7.34E-08	1.58E-09	2.98E-14	3.96E-22	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ZN069M	0.00E+00	4.94E-09	1.47E-09	2.77E-14	3.69E-27	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR089	0.00E+00	6.02E-08	5.94E-08	5.25E-08	4.27E-08	3.03E-08	1.53E-08	7.69E-09	3.87E-09	1.95E-09	2.49E-10	6.30E-11
SR091	0.00E+00	1.30E-09	2.25E-10	3.22E-17	1.26E-28	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y089M	0.00E+00	9.09E-04	7.36E-04	1.09E-04	4.53E-06	2.25E-08	5.59E-13	1.38E-17	3.43E-22	8.51E-27	0.00E+00	0.00E+00
Y090	0.00E+00	8.05E-04	6.21E-04	5.99E-05	1.21E-06	1.92E-09	8.98E-11	8.95E-11	8.92E-11	8.89E-11	8.80E-11	8.75E-11
Y091	0.00E+00	8.19E-08	8.10E-08	7.28E-08	6.09E-08	4.53E-08	2.51E-08	1.39E-08	7.66E-09	4.24E-09	7.17E-10	2.19E-10
Y091M	0.00E+00	7.52E-10	1.43E-10	2.05E-17	8.01E-29	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y092	0.00E+00	1.67E-07	1.52E-09	6.52E-28	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ZR089	0.00E+00	9.11E-04	7.37E-04	1.09E-04	4.53E-06	2.26E-08	5.60E-13	1.39E-17	3.44E-22	8.52E-27	0.00E+00	0.00E+00
ZR093	0.00E+00	1.89E-08	1.89E-08	1.89E-08	1.89E-08	1.89E-08	1.89E-08	1.89E-08	1.89E-08	1.89E-08	1.89E-08	1.89E-08
ZR095	0.00E+00	3.07E-03	3.03E-03	2.75E-03	2.34E-03	1.74E-03	1.04E-03	6.04E-04	3.51E-04	2.04E-04	4.02E-05	1.36E-05
ZR097	0.00E+00	7.20E-05	2.69E-05	3.82E-09	1.48E-15	3.04E-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MB092	0.00E+00	1.81E-01	1.69E-01	9.16E-02	3.29E-02	5.96E-03	1.96E-04	6.45E-06	2.12E-07	6.98E-09	2.48E-13	2.69E-16
MB093M	0.00E+00	1.09E-05	1.10E-05	1.15E-05	1.25E-05	1.41E-05	1.73E-05	2.05E-05	2.37E-05	2.68E-05	3.61E-05	4.22E-05
MB094	0.00E+00	9.57E-04	9.57E-04	9.57E-04	9.57E-04	9.57E-04	9.57E-04	9.57E-04	9.57E-04	9.57E-04	9.57E-04	9.57E-04
MB095	0.00E+00	2.15E+00	2.11E+00	1.77E+00	1.32E+00	8.04E-01	3.01E-01	1.13E-01	4.23E-02	1.60E-02	8.94E-04	1.42E-04
MB095M	0.00E+00	2.14E-05	2.14E-05	2.02E-05	1.73E-05	1.32E-05	7.70E-06	4.48E-06	2.60E-06	1.52E-06	2.98E-07	1.01E-07
MB096	0.00E+00	9.43E-03	4.63E-03	7.60E-06	1.74E-10	3.19E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MB097	0.00E+00	2.57E-03	2.70E-05	4.12E-09	1.59E-15	3.27E-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MB097M	0.00E+00	6.81E-05	2.55E-05	3.52E-09	1.40E-15	2.88E-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MO093	0.00E+00	4.75E-04	4.75E-04	4.75E-04	4.75E-04	4.75E-04	4.75E-04	4.75E-04	4.75E-04	4.75E-04	4.75E-04	4.75E-04
MO099	0.00E+00	4.45E+01	3.46E+01	3.58E+00	8.16E-02	1.50E-04	5.03E-10	1.69E-15	5.69E-21	1.91E-26	0.00E+00	0.00E+00
TC099	0.00E+00	1.20E-04	1.20E-04	1.22E-04	1.22E-04	1.22E-04	1.22E-04	1.22E-04	1.22E-04	1.22E-04	1.22E-04	1.22E-04
TC099M	0.00E+00	3.90E+01	3.31E+01	3.45E+00	7.86E-02	1.44E-04	4.85E-10	1.63E-15	5.48E-21	1.84E-26	0.00E+00	0.00E+00
RU103	0.00E+00	7.33E-04	7.20E-04	6.14E-04	4.71E-04	3.32E-04	1.25E-04	5.19E-05	2.15E-05	8.89E-06	6.30E-07	1.08E-07
TOTAL	9.20E-16	2.88E+03	1.48E+03	1.21E+03	9.62E+02	7.07E+02	4.83E+02	4.04E+02	3.69E+02	3.48E+02	3.04E+02	2.79E+02



Appendix 2: Continued

CATETO\_II\_steel\_3

DECAY, FOLLOWING REACTOR IRRADIATION IDENTIFIED BY: POWER= 0.000E+00MW, BURNUP=0.0000E+00MWD, FLUX= 7.00E+13N/CM\*2-SEC

0

ELEMENT RADIOACTIVITY, CURIES

BASIS =CATETO II , 13 cycles in G3 , steel 3

	CHARGE	DISCHARGE	1. D	10. D	25. D	50. D	100. D	150. D	200. D	250. D	400. D	500. D
H	0.00E+00	2.57E-07	2.57E-07	2.56E-07	2.56E-07	2.55E-07	2.53E-07	2.51E-07	2.49E-07	2.47E-07	2.41E-07	2.38E-07
BE	0.00E+00	5.50E-05	1.77E-09	1.77E-09	1.77E-09	1.77E-09	1.77E-09	1.77E-09	1.77E-09	1.77E-09	1.77E-09	1.77E-09
C	0.00E+00	5.93E-03	5.93E-03	5.93E-03	5.93E-03	5.93E-03	5.93E-03	5.93E-03	5.93E-03	5.93E-03	5.93E-03	5.93E-03
MA	0.00E+00	3.97E-03	1.31E-03	6.05E-08	3.60E-15	3.28E-27	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MG	0.00E+00	1.97E-02	1.22E-11	9.49E-15	6.23E-20	1.43E-28	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AL	0.00E+00	1.49E+00	1.22E-11	9.50E-15	6.24E-20	1.44E-28	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SI	0.00E+00	5.85E-01	1.03E-03	3.08E-10	3.08E-10	3.08E-10	3.08E-10	3.08E-10	3.08E-10	3.08E-10	3.07E-10	3.07E-10
P	0.00E+00	1.13E+00	1.09E+00	7.73E-01	4.47E-01	1.89E-01	3.96E-02	9.33E-03	2.32E-03	5.85E-04	9.72E-06	6.34E-07
S	0.00E+00	4.02E-03	3.97E-03	3.70E-03	3.28E-03	2.69E-03	1.81E-03	1.22E-03	8.20E-04	5.52E-04	1.68E-04	7.61E-05
CL	0.00E+00	6.02E-09	1.38E-10	1.38E-10	1.38E-10	1.38E-10	1.38E-10	1.38E-10	1.38E-10	1.38E-10	1.38E-10	1.38E-10
R	0.00E+00	9.19E-11	1.81E-13	1.44E-13	1.07E-13	5.63E-14	2.60E-14	1.11E-14	5.52E-15	3.45E-15	2.29E-15	2.24E-15
K	0.00E+00	1.37E-09	5.57E-10	7.38E-13	1.20E-17	1.60E-19	1.60E-19	1.60E-19	1.60E-19	1.60E-19	1.59E-19	1.59E-19
CA	0.00E+00	1.11E-05	1.11E-05	1.06E-05	9.93E-06	8.93E-06	7.23E-06	5.85E-06	4.74E-06	3.83E-06	2.83E-06	1.33E-06
SC	0.00E+00	5.36E-03	4.38E-03	1.94E-03	1.40E-03	1.13E-03	7.45E-04	4.92E-04	3.26E-04	2.15E-04	6.23E-05	2.72E-05
V	9.20E-16	1.77E+02	8.72E-16	8.72E-16	8.72E-16	8.72E-16	8.72E-16	8.72E-16	8.72E-16	8.72E-16	8.72E-16	8.72E-16
CR	0.00E+00	9.50E+02	9.14E+02	7.30E+02	5.01E+02	2.68E+02	7.68E+01	2.20E+01	6.29E+00	1.80E+00	4.22E-02	3.46E-03
MN	0.00E+00	1.18E+03	6.71E+01	6.41E+01	6.20E+01	5.86E+01	5.25E+01	4.70E+01	4.20E+01	3.76E+01	2.70E+01	2.16E+01
FE	0.00E+00	4.19E+02	4.18E+02	4.09E+02	3.96E+02	3.78E+02	3.52E+02	3.35E+02	3.20E+02	3.08E+02	2.76E+02	2.58E+02
CO	0.00E+00	3.31E+00	1.31E+00	1.22E+00	1.09E+00	8.81E-01	6.07E-01	4.38E-01	3.34E-01	2.68E-01	1.83E-01	1.64E-01
NI	0.00E+00	3.44E-01	5.67E-02	5.63E-02	5.63E-02	5.63E-02	5.63E-02	5.63E-02	5.63E-02	5.61E-02	5.59E-02	5.58E-02
CU	0.00E+00	2.97E+01	6.60E+00	5.12E-05	1.82E-08	2.03E-11	2.81E-17	4.03E-23	5.82E-29	0.00E+00	0.00E+00	0.00E+00
ZN	0.00E+00	5.43E-03	5.41E-03	5.28E-03	5.06E-03	4.71E-03	4.09E-03	3.55E-03	3.08E-03	2.67E-03	1.74E-03	1.31E-03
GA	0.30E+00	1.88E-10	1.86E-16	4.55E-21	9.78E-29	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GE	0.00E+00	1.78E-13	1.52E-13	8.97E-14	3.72E-14	8.56E-15	4.53E-16	2.37E-17	2.08E-18	6.73E-19	1.00E-22	1.00E-22
SR	0.00E+00	6.16E-08	5.97E-08	5.26E-08	4.28E-08	3.04E-08	1.54E-08	7.78E-09	3.96E-09	2.04E-09	3.37E-10	1.50E-10
Y	0.00E+00	1.72E-03	1.36E-03	1.69E-04	5.80E-06	6.98E-08	2.51E-08	1.39E-08	7.75E-09	4.33E-09	8.05E-10	3.07E-10
ZR	0.00E+00	4.05E-03	3.80E-03	2.86E-03	2.34E-03	1.78E-03	1.04E-03	6.04E-04	3.51E-04	2.04E-04	4.02E-05	1.36E-05
NB	0.00E+00	2.35E+00	2.28E+00	1.86E+00	1.35E+00	8.11E-01	3.02E-01	1.14E-01	4.33E-02	1.69E-02	1.89E-03	1.14E-03
MO	0.00E+00	5.59E+01	3.46E+01	3.58E+00	8.21E-02	6.24E-04	4.75E-04	4.75E-04	4.75E-04	4.75E-04	4.75E-04	4.75E-04
TC	0.00E+00	5.85E+01	3.31E+01	3.45E+00	7.87E-02	2.66E-04	1.22E-04	1.22E-04	1.22E-04	1.22E-04	1.22E-04	1.22E-04
RU	0.00E+00	7.33E-04	7.20E-04	6.14E-04	4.71E-04	3.03E-04	1.25E-04	5.19E-05	2.15E-05	8.89E-06	6.30E-07	1.08E-07
RH	0.00E+00	1.49E-05	3.46E-11	4.99E-13	4.31E-16	7.47E-19	6.77E-19	6.13E-19	5.56E-19	5.03E-19	3.78E-19	2.98E-19
PD	0.00E+00	2.31E-16	8.61E-23	8.61E-23	8.61E-23	8.61E-23	8.61E-23	8.61E-23	8.61E-23	8.61E-23	8.61E-23	8.61E-23
TOTALS	9.20E-16	2.88E+03	1.48E+03	1.21E+03	9.62E+02	7.07E+02	4.83E+02	4.04E+02	3.69E+02	3.48E+02	3.04E+02	2.79E+02



Appendix 2: Continued

CATETO\_II\_steel\_4

DECAY, FOLLOWING REACTOR IRRADIATION IDENTIFIED BY: POWER= 0.000E+00MW, BURNUP=0.0000E+00MWD, FLUX= 7.00E+13E/CM^2-SEC  
 0 ELEMENT RADIOACTIVITY, CURIES

BASIS -CATETO II , 13 cycles in G3 , steel 4

	CHARGE	DISCHARGE	1. D	10. D	25. D	50. D	100. D	150. D	200. D	250. D	400. D	500. D
H	0.00E+00	5.70E-07	5.70E-07	5.69E-07	5.67E-07	5.65E-07	5.61E-07	5.57E-07	5.52E-07	5.48E-07	5.36E-07	5.27E-07
BE	0.00E+00	1.20E-04	3.93E-09	3.93E-09	3.93E-09	3.93E-09	3.93E-09	3.93E-09	3.93E-09	3.93E-09	3.93E-09	3.93E-09
C	0.00E+00	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04
NA	0.00E+00	9.92E-04	3.27E-04	1.51E-08	9.01E-16	8.20E-28	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MG	0.00E+00	5.38E-03	3.34E-12	2.60E-15	1.70E-20	3.92E-29	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AL	0.00E+00	9.40E-01	3.35E-12	2.60E-15	1.71E-20	3.93E-29	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SI	0.00E+00	3.61E-01	6.40E-04	1.92E-10	1.92E-10	1.92E-10	1.92E-10	1.92E-10	1.92E-10	1.92E-10	1.92E-10	1.92E-10
P	0.00E+00	1.61E+00	1.57E+00	1.19E+00	7.58E-01	3.66E-01	8.94E-02	2.25E-02	5.71E-03	1.46E-03	2.43E-05	1.59E-06
S	0.00E+00	1.00E-02	9.93E-03	9.25E-03	8.21E-03	6.74E-03	4.53E-03	3.05E-03	2.05E-03	1.38E-03	4.20E-04	1.90E-04
CL	0.00E+00	1.51E-08	3.46E-10	3.46E-10	3.46E-10	3.46E-10	3.46E-10	3.46E-10	3.46E-10	3.46E-10	3.46E-10	3.46E-10
AR	0.00E+00	2.30E-10	4.54E-13	3.59E-13	2.68E-13	1.66E-13	6.51E-14	2.77E-14	1.38E-14	6.64E-15	5.73E-15	5.59E-15
K	0.00E+00	3.42E-09	1.39E-09	1.85E-12	3.00E-17	4.33E-19	4.32E-19	4.31E-19	4.30E-19	4.28E-19	4.25E-19	4.22E-19
CA	0.00E+00	2.79E-05	2.77E-05	2.65E-05	2.48E-05	2.23E-05	1.81E-05	1.46E-05	1.10E-05	9.59E-06	5.08E-06	3.33E-06
SC	0.00E+00	1.31E-02	1.07E-02	4.84E-03	3.50E-03	2.82E-03	1.86E-03	1.23E-03	8.14E-04	5.38E-04	1.56E-04	6.81E-05
V	1.31E-15	2.53E+02	1.24E-15	1.24E-15	1.24E-15	1.24E-15	1.24E-15	1.24E-15	1.24E-15	1.24E-15	1.24E-15	1.24E-15
CR	0.00E+00	1.30E+03	1.25E+03	9.95E+02	6.84E+02	3.66E+02	1.05E+02	3.00E+01	8.58E+00	2.46E+00	5.76E-02	4.72E-03
MM	0.00E+00	1.29E+03	4.42E+01	6.10E+01	5.90E+01	5.58E+01	5.00E+01	4.47E+01	4.00E+01	3.58E+01	2.57E+01	2.06E+01
FZ	0.00E+00	3.99E+02	3.98E+02	3.89E+02	3.77E+02	3.60E+02	3.35E+02	3.05E+02	2.93E+02	2.93E+02	2.63E+02	2.45E+02
CO	0.00E+00	5.67E+01	1.40E+01	1.36E+01	1.29E+01	1.19E+01	1.06E+01	9.67E+00	9.06E+00	8.63E+00	7.86E+00	7.52E+00
NI	0.00E+00	1.38E+00	2.52E-01	2.51E-01	2.51E-01	2.50E-01	2.50E-01	2.50E-01	2.50E-01	2.49E-01	2.49E-01	2.48E-01
CU	0.00E+00	5.95E+00	1.32E+00	1.11E-05	1.21E-08	8.24E-12	6.64E-18	8.33E-24	1.18E-29	0.00E+00	0.00E+00	0.00E+00
EM	0.00E+00	1.09E-03	1.08E-03	1.06E-03	1.01E-03	9.42E-04	8.17E-04	7.09E-04	6.15E-04	5.34E-04	3.48E-04	2.62E-04
GA	0.00E+00	3.76E-11	2.79E-17	6.83E-22	1.41E-29	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GE	0.00E+00	3.56E-14	3.05E-14	1.80E-14	7.44E-15	1.71E-15	9.11E-17	5.09E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR	0.00E+00	6.82E-08	6.62E-08	5.82E-08	4.74E-08	3.37E-08	1.70E-08	8.55E-09	4.32E-09	2.19E-09	3.05E-10	9.88E-11
Y	0.00E+00	1.10E-03	8.86E-04	1.28E-04	5.17E-06	3.60E-08	5.99E-09	3.32E-09	1.85E-09	1.04E-09	2.00E-10	8.11E-11
ZR	0.00E+00	4.49E-03	4.21E-03	3.17E-03	2.60E-03	1.98E-03	1.15E-03	6.69E-04	3.89E-04	2.26E-04	4.46E-05	1.51E-05
WB	0.00E+00	4.59E-01	4.34E-01	3.05E-01	1.89E-01	1.00E-01	3.62E-02	1.41E-02	5.64E-03	2.37E-03	3.36E-04	2.00E-04
MO	0.00E+00	6.20E+01	3.83E+01	3.97E+00	9.10E-02	6.92E-04	5.26E-04	5.26E-04	5.26E-04	5.26E-04	5.26E-04	5.26E-04
TC	0.00E+00	6.49E+01	3.67E+01	3.82E+00	8.73E-02	2.95E-04	1.35E-04	1.35E-04	1.35E-04	1.35E-04	1.35E-04	1.35E-04
RU	0.00E+00	6.12E-04	7.98E-04	6.81E-04	5.22E-04	3.36E-04	1.39E-04	5.76E-05	2.38E-05	9.86E-06	6.99E-07	1.20E-07
RH	0.00E+00	1.65E-05	3.84E-11	5.54E-13	4.78E-16	8.25E-19	7.47E-19	6.76E-19	6.13E-19	5.55E-19	4.16E-19	3.28E-19
PD	0.00E+00	2.56E-16	9.55E-23	9.55E-23	9.55E-23	9.55E-23	9.55E-23	9.55E-23	9.55E-23	9.55E-23	9.55E-23	9.55E-23
HP	0.00E+00	4.57E-17	4.50E-17	3.88E-17	3.05E-17	2.02E-17	8.99E-18	3.82E-18	1.63E-18	9.41E-19	0.00E+00	0.00E+00
TA	2.37E-15	8.72E+01	7.77E+01	3.19E+01	1.45E+01	1.04E+01	7.64E+00	5.65E+00	4.18E+00	3.09E+00	1.25E+00	6.85E-01
W	0.00E+00	1.13E+03	5.91E+02	5.44E+01	4.65E+01	3.70E+01	2.34E+01	1.48E+01	9.38E+00	5.96E+00	1.55E+00	6.45E-01
RE	0.00E+00	5.68E+02	1.31E+02	1.06E+01	6.00E+00	4.48E+00	2.72E+00	1.65E+00	1.00E+00	6.08E-01	1.36E-01	5.00E-02
OS	0.00E+00	1.86E-02	1.20E-02	6.46E-03	3.29E-03	1.07E-03	1.12E-04	1.18E-05	1.25E-06	1.31E-07	1.59E-10	7.16E-12
IR	0.00E+00	1.32E-03	1.27E-03	1.14E-03	9.94E-04	7.87E-04	4.93E-04	3.08E-04	1.93E-04	1.21E-04	2.98E-05	1.17E-05
PT	0.00E+00	1.57E-06	1.34E-06	3.31E-07	4.68E-08	1.89E-08	1.84E-08	1.84E-08	1.83E-08	1.83E-08	1.82E-08	1.81E-08
AU	0.00E+00	2.75E-14	2.15E-14	2.11E-15	5.48E-17	5.30E-19	2.56E-23	4.57E-28	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MG	0.00E+00	6.51E-19	4.36E-29	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTALS	3.69E-15	5.22E+03	2.60E+03	1.57E+03	1.20E+03	8.46E+02	5.35E+02	4.25E+02	3.77E+02	3.50E+02	3.00E+02	2.75E+02

Appendix 2: Continued

CATETO\_U\_steel\_5

DECAY, FOLLOWING REACTOR IRRADIATION IDENTIFIED BY: POWER= 0.000E+00MW, BURUP=0.0000E+00MWD, FLUX= 7.00E+13M/CM\*\*2-SEC

		NUCLIDE RADIOACTIVITY, CURIES												
		BASIS =CATETO II, 13 cycles in G3, steel 5												
	CHARGE	DISCHARGE	1. D	10. D	25. D	50. D	100. D	150. D	200. D	250. D	400. D	500. D		
MO03	0.00E+00	3.30E-02	3.29E-02	3.29E-02	3.28E-02	3.27E-02	3.26E-02	3.22E-02	3.20E-02	3.17E-02	3.10E-02	3.05E-02		
MO10	0.00E+00	1.40E-07	1.40E-07	1.40E-07	1.40E-07	1.40E-07	1.40E-07	1.40E-07	1.40E-07	1.40E-07	1.40E-07	1.40E-07		
C014	0.00E+00	1.07E-07	1.07E-07	1.07E-07	1.07E-07	1.07E-07	1.07E-07	1.07E-07	1.07E-07	1.07E-07	1.07E-07	1.07E-07		
NA024	0.00E+00	1.49E-03	4.90E-04	2.27E-08	1.35E-15	1.23E-27	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
SI031	0.00E+00	6.82E-01	1.20E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
SI032	0.00E+00	3.59E-10	3.59E-10	3.59E-10	3.59E-10	3.59E-10	3.59E-10	3.59E-10	3.59E-10	3.59E-10	3.59E-10	3.59E-10		
P032	0.00E+00	5.18E-01	4.93E-01	3.19E-01	1.54E-01	4.58E-02	4.05E-03	3.58E-04	3.17E-05	2.81E-06	2.30E-09	3.73E-10		
P033	0.00E+00	6.68E-01	6.50E-01	5.09E-01	3.38E-01	1.71E-01	4.36E-02	1.11E-02	2.85E-03	7.28E-04	1.21E-05	7.93E-07		
S035	0.00E+00	5.01E-03	4.57E-03	4.42E-03	4.11E-03	3.37E-03	2.27E-03	1.52E-03	1.03E-03	6.90E-04	2.10E-04	9.51E-05		
CL036	0.00E+00	1.73E-10	1.73E-10	1.73E-10	1.73E-10	1.73E-10	1.73E-10	1.73E-10	1.73E-10	1.73E-10	1.73E-10	1.73E-10		
K043	0.00E+00	6.67E-09	3.34E-09	4.43E-12	7.10E-17	7.23E-25	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
CA045	0.00E+00	6.92E-05	6.34E-05	6.34E-05	5.95E-05	5.36E-05	4.34E-05	3.51E-05	2.84E-05	2.30E-05	1.22E-05	8.00E-06		
CA047	0.00E+00	7.02E-07	6.02E-07	1.52E-07	1.54E-08	3.37E-10	1.62E-13	7.79E-17	3.74E-20	1.80E-23	0.00E+00	0.00E+00		
SC046	0.00E+00	1.02E-02	1.01E-02	9.41E-03	8.31E-03	6.76E-03	4.47E-03	2.95E-03	1.95E-03	1.29E-03	3.74E-04	1.63E-04		
SC047	0.00E+00	1.69E-02	1.38E-02	2.14E-03	9.63E-05	5.48E-07	1.82E-11	8.66E-16	1.62E-19	6.95E-23	0.00E+00	0.00E+00		
SC048	0.00E+00	1.70E-03	1.16E-03	3.81E-05	1.28E-07	9.60E-12	5.43E-20	3.07E-28	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
CN051	0.00E+00	8.92E-02	8.70E+02	6.95E+02	4.77E+02	2.55E+02	7.31E+01	2.09E+01	5.99E+00	1.71E+00	4.02E-02	3.29E-03		
MN054	0.00E+00	6.57E+01	6.56E+01	6.43E+01	6.22E+01	5.88E+01	5.27E+01	4.71E+01	4.22E+01	3.78E+01	2.71E+01	2.17E+01		
MN056	0.00E+00	9.25E+02	1.46E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
FE055	0.00E+00	3.67E-02	3.67E-02	3.65E-02	3.61E-02	3.54E-02	3.42E-02	3.30E-02	3.19E-02	3.08E-02	2.77E-02	2.58E-02		
FE059	0.00E+00	5.36E+01	5.28E+01	4.59E+01	3.64E+01	2.46E+01	1.13E+01	5.21E+00	2.40E+00	1.10E+00	1.07E-01	2.26E-02		
CO060	0.00E+00	1.14E+02	1.14E+02	1.13E+02	1.13E+02	1.12E+02	1.10E+02	1.08E+02	1.06E+02	1.04E+02	9.86E+01	9.51E+01		
CO062	0.00E+00	4.44E+00	1.85E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
MI063	0.00E+00	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07		
SR089	0.00E+00	5.67E-05	5.60E-05	4.95E-05	4.03E-05	2.86E-05	1.44E-05	7.24E-06	3.64E-06	1.83E-06	2.34E-07	5.93E-08		
SR090	0.00E+00	5.33E-10	5.33E-10	5.33E-10	5.32E-10	5.31E-10	5.29E-10	5.28E-10	5.26E-10	5.24E-10	5.19E-10	5.16E-10		
SR091	0.00E+00	1.10E-05	1.91E-06	2.73E-13	1.07E-24	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
Y089M	0.00E+00	9.39E-04	7.60E-04	1.13E-04	6.68E-06	2.33E-08	5.77E-13	1.43E-17	3.54E-22	8.78E-27	0.00E+00	0.00E+00		
Y090	0.00E+00	3.88E-03	2.99E-03	2.89E-04	5.85E-06	9.34E-09	5.30E-10	5.28E-10	5.26E-10	5.24E-10	5.19E-10	5.16E-10		
Y091	0.00E+00	1.49E-04	1.48E-04	1.33E-04	1.11E-04	6.72E-05	4.57E-05	2.53E-05	1.40E-05	7.73E-06	1.31E-06	4.00E-07		
Y091M	0.00E+00	6.38E-06	1.21E-06	1.74E-13	6.79E-25	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
Y092	0.00E+00	1.24E-04	1.13E-06	4.84E-25	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
Y093	0.00E+00	3.79E-08	7.39E-09	2.70E-15	5.02E-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
ZR089	0.00E+00	9.41E-04	7.61E-04	1.13E-04	4.68E-06	2.33E-08	5.78E-13	1.43E-17	3.55E-22	8.80E-27	0.00E+00	0.00E+00		
ZR093	0.00E+00	8.90E-08	8.90E-08	8.90E-08	8.90E-08	8.90E-08	8.90E-08	8.90E-08	8.90E-08	8.90E-08	8.90E-08	8.90E-08		
ZR095	0.00E+00	5.03E-02	4.98E-02	4.52E-02	3.84E-02	2.93E-02	1.70E-02	9.91E-03	5.77E-03	3.35E-03	6.60E-04	2.24E-04		
ZR097	0.00E+00	9.14E-02	3.42E-02	4.85E-06	1.88E-12	3.85E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
NB092	0.00E+00	1.87E-01	1.75E-01	9.46E-02	3.39E-02	6.16E-03	2.03E-04	6.66E-06	2.19E-07	7.21E-09	2.56E-13	2.78E-16		
NB093M	0.00E+00	1.13E-05	1.13E-05	1.19E-05	1.29E-05	1.46E-05	1.79E-05	2.12E-05	2.44E-05	2.77E-05	3.73E-05	4.35E-05		
NB094	0.00E+00	2.13E-03	2.13E-03	2.13E-03	2.13E-03	2.13E-03	2.13E-03	2.13E-03	2.13E-03	2.13E-03	2.13E-03	2.13E-03		
NB095	0.00E+00	4.82E+00	4.72E+00	3.96E+00	2.96E+00	1.78E+00	6.93E-01	2.66E-01	1.04E-01	4.15E-02	3.23E-03	7.42E-04		
NB095M	0.00E+00	3.52E-04	3.52E-04	3.32E-04	2.85E-04	2.17E-04	1.26E-04	7.35E-05	4.28E-05	2.49E-05	4.90E-06	1.66E-06		
NB096	0.00E+00	1.31E-02	6.44E-03	1.06E-05	2.42E-10	4.45E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
NB097	0.00E+00	9.40E-03	3.43E-02	5.23E-06	2.02E-12	4.15E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
NB097M	0.00E+00	8.65E-02	3.24E-02	4.60E-06	1.78E-12	3.65E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
MO093	0.00E+00	4.90E-04	4.90E-04	4.90E-04	4.90E-04	4.90E-04	4.90E-04	4.90E-04	4.90E-04	4.90E-04	4.90E-04	4.90E-04		
MO099	0.00E+00	4.59E+01	3.57E+01	3.69E+00	8.43E-02	1.55E-04	5.20E-10	1.75E-15	5.88E-21	1.98E-26	0.00E+00	0.00E+00		
TC099	0.00E+00	1.24E-04	1.24E-04	1.26E-04	1.26E-04	1.26E-04	1.26E-04	1.26E-04	1.26E-04	1.26E-04	1.26E-04	1.26E-04		
TC099M	0.00E+00	4.02E+01	3.41E+01	3.56E+00	8.12E-02	1.49E-04	5.01E-10	1.68E-15	5.66E-21	1.90E-26	0.00E+00	0.00E+00		
RU103	0.00E+00	7.56E-04	7.43E-04	6.34E-04	4.87E-04	3.13E-04	1.30E-04	5.36E-05	2.22E-05	9.18E-06	6.51E-07	1.11E-07		
SN123	0.00E+00	1.54E-04	1.53E-04	1.46E-04	1.34E-04	1.18E-04	8.99E-05	6.87E-05	5.26E-05	4.02E-05	1.80E-05	1.05E-05		
SB122	0.00E+00	2.14E+01	1.65E+01	1.64E+00	3.45E-02	5.70E-05	1.52E-10	4.04E-16	1.08E-21	2.86E-27	0.00E+00	0.00E+00		
SB124	0.00E+00	7.15E+01	1.13E+01	1.02E+01	8.59E+00	6.44E+00	3.62E+00	2.04E+00	1.15E+00	6.44E-01	1.15E-01	3.62E-02		
SB125	0.00E+00	3.83E-03	3.83E-03	3.81E-03	3.77E-03	3.70E-03	3.58E-03	3.46E-03	3.34E-03	3.23E-03	2.91E-03	2.72E-03		
SB126	0.00E+00	1.98E-05	1.87E-05	1.13E-05	4.90E-06	1.21E-06	7.40E-08	4.53E-09	2.77E-10	1.69E-11	3.86E-12	1.47E-17		
TE123M	0.00E+00	2.15E-01	2.14E-01	2.03E-01	1.86E-01	1.61E-01	1.21E-01	9.02E-02	6.75E-02	5.06E-02	3.12E-02	1.19E-02		
TE125M	0.00E+00	1.08E-03	1.08E-03	1.06E-03	1.03E-03	9.84E-04	9.18E-04	8.68E-04	8.29E-04	7.95E-04	7.12E-04	6.44E-04		
TE127	0.00E+00	1.06E-06	2.21E-07	4.73E-08	4.30E-08	3.67E-08	2.67E-08	1.94E-08	1.41E-08	1.03E-08	3.96E-09	2.10E-09		
TE127M	0.00E+00	5.15E-08	5.11E-08	4.83E-08	4.39E-08	3.74E-08	2.72E-08	1.98E-08	1.44E-08	1.05E-08	4.04E-09	2.14E-09		
TA182	0.00E+00	7.64E+01	7.60E+01	7.29E+01	6.57E+01	5.65E+01	4.18E+01	3.09E+01	2.29E+01	1.69E+01	6.86E+00	3.75E+00		
TA183	0.00E+00	4.01E+02	3.50E+02	1.93E+02	1.34E+01	4.48E-01	5.02E-04	5.61E-07	6.28E-10	7.02E-13	9.83E-16	1.23E-17		
W185	0.00E+00	1.98E-01	1.96E-01	1.80E-01	1.57E-01	1.25E-01	7.86E-02	4.95E-02	3.12E-02	1.97E-02	4.93E-03	1.96E-03		
W187	0.00E+00	1.70E-04	8.49E-05	1.61E-07	4.72E-12	1.31E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
W188	0.00E+00	4.10E-07	6.06E-07	3.71E-07	3.20E-07	2.49E-07	1.51E-07	9.18E-08	5.57E-08	3.38E-08	7.05E-09	2.78E-09		
RE186	0.00E+00	4.19E-02	3.49E-02	6.68E-03	4.26E-04	4.33E-06	4.48E-10	4.63E-14	4.79E-18	4.96E-22	0.00E+00	0.00E+00		
RE188	0.00E+00	7.12E-06	2.97E-06	3.76E-07	3.23E-07	2.52E-07	1.53E-07	9.27E-08	5.63E-08	3.41E-08	7.63E-09	2.81E-09		
TOTAL	1.34E-14	3.67E+03	2.00E+03	1.48E+03	1.14E+03	8.71E+02	6.35E+02	5.45E+02	5.00E+02	4.70E+02				

Appendix 2: Continued

CATETO\_II\_steel\_5

DECAY, FOLLOWING REACTOR IRRADIATION IDENTIFIED BY: POWER= 0.000E+00MW, BURNDUP=0.0000E+00HMD, FLUX= 7.00E+13N/CM^2-SEC

0	ELEMENT RADIOACTIVITY, CURIES											
	BASIS -CATETO II , 13 cycles in G3 , steel 5											
	CHARGE	DISCHARGE	1. D	10. D	25. D	50. D	100. D	150. D	200. D	250. D	400. D	500. D
N	0.00E+00	3.30E-02	3.29E-02	3.29E-02	3.28E-02	3.27E-02	3.24E-02	3.22E-02	3.20E-02	3.17E-02	3.10E-02	3.05E-02
BE	0.00E+00	4.14E-01	1.40E-07	1.40E-07	1.40E-07	1.40E-07	1.40E-07	1.40E-07	1.40E-07	1.40E-07	1.40E-07	1.40E-07
C	0.00E+00	1.07E-07	1.07E-07	1.07E-07	1.07E-07	1.07E-07	1.07E-07	1.07E-07	1.07E-07	1.07E-07	1.07E-07	1.07E-07
NA	0.00E+00	1.49E-03	4.90E-04	2.27E-08	1.35E-15	1.23E-37	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MC	0.00E+00	8.09E-03	5.02E-12	3.90E-15	2.56E-20	5.90E-29	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AL	0.00E+00	1.44E+00	5.03E-12	3.91E-15	2.57E-20	5.91E-29	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SI	0.00E+00	6.82E-01	1.20E-03	3.59E-10	5.92E-10	3.59E-10	3.59E-10	3.59E-10	3.59E-10	3.59E-10	3.58E-10	3.58E-10
P	0.00E+00	1.19E+00	1.14E+00	8.27E-01	4.92E-07	2.17E-01	4.77E-02	1.15E-02	2.88E-03	7.31E-04	1.21E-05	7.93E-07
S	0.00E+00	5.02E-03	4.97E-03	4.62E-03	4.11E-03	3.37E-03	2.27E-03	1.52E-03	1.03E-03	6.90E-04	2.10E-04	9.51E-05
CL	0.00E+00	7.53E-09	1.73E-10	1.73E-10	1.73E-10	1.73E-10	1.73E-10	1.73E-10	1.73E-10	1.73E-10	1.73E-10	1.73E-10
AR	0.00E+00	5.50E-10	2.75E-13	1.80E-13	1.34E-13	8.29E-14	3.26E-14	1.39E-14	6.90E-15	4.32E-15	2.87E-15	2.80E-15
K	0.00E+00	8.21E-09	3.45E-09	4.43E-12	7.20E-17	1.04E-18	1.04E-18	1.03E-18	1.03E-18	1.03E-18	1.02E-18	1.01E-18
CA	0.00E+00	6.69E-05	6.65E-05	6.36E-05	5.96E-05	5.36E-05	4.34E-05	3.51E-05	2.84E-05	2.30E-05	1.22E-05	8.00E-06
SC	0.00E+00	3.04E-02	2.51E-02	1.14E-02	8.41E-03	6.76E-03	4.47E-03	2.95E-03	1.95E-03	1.29E-03	3.74E-04	1.63E-04
V	3.29E-16	6.83E+01	3.45E-16	3.45E-16	3.45E-16	3.45E-16	3.45E-16	3.45E-16	3.45E-16	3.45E-16	3.45E-16	3.45E-16
CR	0.00E+00	9.04E+02	8.70E+02	6.95E+02	4.77E+02	2.55E+02	7.31E+01	2.09E+01	5.99E+00	1.71E+00	4.02E-02	3.29E-03
MN	0.00E+00	9.91E+C2	6.70E+01	6.43E+01	6.22E+01	5.88E+01	5.27E+01	4.71E+01	4.22E+01	3.78E+01	2.77E+01	2.17E+01
FE	0.00E+00	4.21E+02	4.20E+02	4.10E+02	3.97E+02	3.79E+02	3.54E+02	3.36E+02	3.21E+02	3.09E+02	2.77E+02	2.58E+02
CO	0.00E+00	6.42E+02	1.14E+02	1.13E+02	1.13E+02	1.12E+02	1.10E+02	1.08E+02	1.06E+02	1.04E+02	9.86E+01	9.51E+01
NI	0.00E+00	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.05E-07	1.05E-07	1.05E-07	1.05E-07
CU	0.00E+00	1.71E-10	4.61E-11	5.17E-16	2.08E-18	3.57E-19	5.18E-25	7.53E-31	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ZN	0.00E+00	2.17E-15	2.16E-15	2.11E-15	2.02E-15	1.88E-15	1.63E-15	1.42E-15	1.23E-15	1.07E-15	6.96E-16	5.24E-16
SR	0.00E+00	6.78E-05	5.79E-05	4.95E-05	4.03E-05	2.86E-05	1.44E-05	7.24E-06	3.65E-06	1.84E-06	2.35E-07	5.99E-06
Y	0.00E+00	5.11E-03	3.90E-03	5.34E-04	1.22E-04	8.27E-05	4.57E-05	2.93E-05	1.40E-05	7.73E-06	1.31E-06	4.01E-07
ZR	0.00E+00	1.43E-01	8.47E-02	4.53E-02	3.84E-02	2.93E-02	1.70E-02	9.91E-03	5.77E-03	3.35E-03	6.61E-04	2.24E-04
MO	0.00E+00	5.20E+00	4.97E+00	4.06E+00	3.00E+00	1.83E+00	6.95E-01	2.69E-01	1.06E-01	4.36E-02	5.40E-03	2.91E-03
NO	0.00E+00	5.78E+01	3.57E+01	3.70E+00	8.47E-02	6.45E-04	4.90E-04	4.90E-04	4.90E-04	4.90E-04	4.90E-04	4.90E-04
TC	0.00E+00	6.04E+01	3.41E+01	3.56E+00	8.13E-02	2.74E-04	1.26E-04	1.26E-04	1.26E-04	1.26E-04	1.26E-04	1.26E-04
RU	0.00E+00	7.56E-04	7.43E-04	6.34E-04	4.87E-04	3.13E-04	1.30E-04	5.36E-05	2.22E-05	9.18E-06	6.51E-07	1.11E-07
RH	0.00E+00	1.54E-05	3.57E-11	5.16E-13	4.45E-16	7.36E-19	6.66E-19	6.03E-19	5.47E-19	4.95E-19	3.72E-19	2.93E-19
PD	0.00E+00	2.39E-16	8.89E-23	8.89E-23	8.89E-23	8.89E-23	8.89E-23	8.89E-23	8.89E-23	8.89E-23	8.89E-23	8.89E-23
CD	0.00E+00	7.85E-10	5.21E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IN	0.00E+00	8.24E-10	7.46E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	0.00E+00	1.55E-04	1.53E-04	1.46E-04	1.34E-04	1.18E-04	8.99E-05	6.87E-05	5.26E-05	4.02E-05	1.80E-05	1.05E-05
SB	0.00E+00	3.11E+01	2.79E+01	1.19E+01	8.63E+00	6.45E+00	3.63E+00	2.04E+00	1.15E+00	6.47E-01	1.17E-01	3.89E-02
TE	0.00E+00	2.16E-01	2.15E-01	2.04E-01	1.87E-01	1.62E-01	1.21E-01	9.11E-02	6.84E-02	5.14E-02	2.19E-02	1.26E-02
I	0.00E+00	1.97E-08	3.87E-16	9.87E-21	7.75E-21	7.76E-21	7.78E-21	7.78E-21	7.78E-21	7.78E-21	1.39E-21	1.39E-21
XE	0.00E+00	2.42E-12	2.22E-12	1.02E-12	2.78E-13	3.18E-14	4.17E-16	6.17E-18	1.06E-18	0.00E+00	0.00E+00	0.00E+00
HF	0.00E+00	2.50E-16	2.46E-16	2.12E-16	1.66E-16	1.10E-16	4.86E-17	2.16E-17	9.59E-18	4.08E-18	2.48E-19	1.74E-19
TA	1.30E-14	4.77E+02	4.26E+02	1.75E+02	7.91E+01	5.70E+01	4.18E+01	3.09E+01	2.29E+01	1.69E+01	6.86E+00	3.75E+00
W	0.00E+00	1.98E-01	1.96E-01	1.80E-01	1.57E-01	1.25E-01	7.86E-02	4.95E-02	3.12E-02	1.97E-02	4.93E-03	1.96E-03
RE	0.00E+00	4.19E-02	3.49E-02	6.68E-03	4.26E-04	4.58E-06	1.53E-07	9.27E-08	5.63E-08	3.44E-08	7.63E-09	2.81E-09
OS	0.00E+00	1.65E-11	9.94E-12	5.04E-12	2.57E-12	8.33E-11	8.77E-14	9.24E-15	9.74E-16	1.03E-16	5.21E-19	0.00E+00
IR	0.00E+00	3.51E-13	3.43E-13	3.12E-13	2.71E-13	2.15E-13	1.34E-13	8.41E-14	5.27E-14	3.30E-14	8.10E-15	3.18E-15
PT	0.00E+00	1.99E-16	1.88E-16	3.91E-17	4.05E-18	2.83E-18	1.45E-18	1.44E-18	1.44E-18	1.44E-18	1.43E-18	1.43E-18
TOTALS	1.34E-14	3.67E+03	2.00E+03	1.48E+03	1.14E+03	8.71E+02	6.35E+02	5.45E+02	5.00E+02	4.70E+02	4.10E+02	3.79E+02