847

196
12-14-81
EW

①

I-335

LH. 134

NOVEMBER 1981

PPPL-1847
uc-20c**MASTER**ESTIMATED NEUTRON-ACTIVATION
DATA FOR TFTR

BY

L.P. KU AND J.G. KOLIBAL

**PLASMA PHYSICS
LABORATORY** **PRINCETON UNIVERSITY
PRINCETON, NEW JERSEY**

This work was supported by the U.S. Department of Energy Contract No. DE-AC02-76-CG0 3073. Reproduction, translation, publication, use and disposal, in whole or in part, by or for the United States government is permitted.

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

ESTIMATED NEUTRON ACTIVATION DATA FOR TFTR

Part I. The Specific Radioactivities

Long Poe Ku and J. G. Kolibal

Princeton University, Plasma Physics Laboratory

Princeton, New Jersey 08544

EB

ABSTRACT

A systematic study has been initiated to address the overall neutron activation problem for the TFTR operation. The study consists of a sequence of investigation and calculation on (1) the specific activity for the elements, (2) the activation dose rate from isolated sample materials, (3) the global activation dose rate field, and (4) the streaming of delayed gamma-rays through penetrations during post-operational period. This report summarizes the important data essential to the first part of this sequence.

A formula for calculating the specific activity for a pulsed machine is presented in an explicit form. Effective activation cross sections are tabulated using ten neutron flux distributions typical to the TFTR radiation environment. The specific activities and the delayed gamma-ray intensities for about forty naturally occurring elements are presented for the 5 days per run, 50 pulses per day operation at the TFTR vacuum vessel location. A list of specific activities for the same set of elements five years after a thousand typical TFTR pulses is also given.

Table of Contents

ABSTRACT	ii
LIST OF TABLES	iv
LIST OF FIGURES	v
I. INTRODUCTION	1
II. SPECIFIC ACTIVITY FOR A PULSED MACHINE	4
A. Derivation of the Specific Activity	4
B. Validity of the Assumption	8
III. EFFECTIVE REACTION CROSS SECTIONS	10
IV. IRRADIATION HISTORY FUNCTION	13
V. EXAMPLE OF CALCULATING SPECIFIC ACTIVITY	14
VI. SPECIFIC ACTIVITIES FOR SELECTED ELEMENTS AT THE TFTR VESSEL LOCATION	17
VII. LONG TERM ACTIVITIES	20
ACKNOWLEDGMENTS	21
REFERENCES	22

LIST OF TABLES

List of variables for Table I-V.	23
Table I Effective (n, 2n) reaction cross sections.	24
A. Based on DLC-33/MONTAGE	
B. Based on CASDAR/PPPL	
C. Based on DLC-69/ACTL	
Table II Effective (n, γ) reaction cross sections.	32
Table III Effective (n, p) reaction cross sections.	39
Table IV Effective (n, α) reaction cross sections.	45
Table V All other effective reaction cross sections.	50
Table VI Specific activities for elements at the TFTR vessel location five years after 10^{21} neutron DT operation.	56
Table VII Specific activities for elements at the TFTR vessel location five years after 10^{19} neutron DD operation.	57

LIST OF FIGURES

Figure 1	Schematic representation of a regular pulsing sequence.	58
Figure 2	Neutron flux distributions used to generate effective reaction cross section for D-T.	59
Figure 3	Neutron flux distributions used to generate effective reaction cross section for D-D.	60
Figure 4	Irradiation history function.	61
Figure 5	The specific activities as a function of cooling time for samples at the TFTR vacuum vessel location after 50 pulses/group, 5 groups/run D-T operation.	62
Figure 6	The specific activities as a function of cooling time for samples at the TFTR vacuum vessel location after 50 pulses/group, 5 groups/run D-D operation.	63
Figure 7	The delayed gamma-ray energy intensities as a function of cooling time for samples at the TFTR vacuum vessel location after 50 pulses/group, 5 groups/run D-T operation.	64
Figure 8	The delayed gamma-ray energy intensities as a function of cooling time for samples at the TFTR vacuum vessel location after 50 pulses/group, 5 groups/run D-D operation.	65

I. INTRODUCTION

Information concerning the neutron induced activation is essential to the operation of TFTR. Planning for maintenance and access to the machine depend largely on estimates of the activation levels. The radiation protection, waste disposal and activated material transportation all require a knowledge of the neutron induced activities. The operational scenarios may even be determined by the prescribed activation limits. While many calculations have been carried out previously for TFTR,¹⁻³ the wide range of material requirements makes a systematic study necessary.

The activation analysis is complicated since the activation levels depend on a discrete seven dimensional phase space, that is, upon the local neutron flux distribution, the irradiation history, the cooling time, and the details of the machine component compositions and arrangements. In the literature many activation calculations have been performed for DT neutrons. Most of these analyses, however, were specific for a given reactor design, and in almost all the cases, constant power operation was used.⁴⁻⁵ For a pulsed machine like TFTR, the activity depends on the pulsing scenarios, and direct extrapolation from constant power operations, in most instances, is not adequate. On the other hand, many compilations of activation data are available, yet most of these compilations are either for dosimetry purposes⁶ or for fission reactors.⁷ In many cases, these compilations are not directly applicable to the design of a fusion reactor.

The immense difficulty of obtaining a comprehensive set of activation data for TFTR is that the material inventory is not totally available, indeed the inventory has changed as the design phase moved on. To provide the designers, operators, and physicists of TFTR a useful and convenient set of activation data, we present a more general approach, covering a broader range of applications. Such an approach will also prove useful in the design of other fusion reactors. Indeed, for a long duty cycle or constant power machine, the activation is the direct extension of a pulsed machine, not the other way around.

The compilation and calculation of the estimated neutron activation data can be divided into four parts:

1. The specific activity and decay gamma-ray energy intensity for common elements in fusion design.
2. The activation dose from sample materials.
3. The global activation dose field.
4. The delayed gamma-ray streaming through penetrations.

This report summarizes the data essential to the specific activity estimate.

The specific activity, that is the rate of disintegration of a radioactive isotope per unit mass, unlike the activation "dose," does not depend upon the photon transport. It is independent of the post-operational machine component arrangement. The specific activity, on

the other hand, is the starting point for the activation dose rate calculation. Since the specific activity takes into account all the disintegrations, it is not always the best measure of significance of an isotope, particularly regarding its contribution to the exposure dose rate. A comparatively better measure of the exposure dose rate due to an element is the decay gamma-ray energy intensity which is defined to be the specific activity times the energy of the gamma-rays associated with the decay.

Formulas for calculating the activity for a pulsed machine are given in Section II, in a form suitable for hand calculations. The effective reaction cross sections which are required by these formulas are given in Section III. The cross sections are based on the current version of the nuclear data library maintained by the Radiation Analysis Group at PPPL.¹ The effective cross sections have been created by weighting the reaction cross sections by the neutron flux spectrum at ten representative locations on TFTR. In Section IV, the irradiation history function, that is, the function which takes into account the machine operation history, for a number of pulsing scenarios is presented in graphic form. A sample problem showing how to use the data presented in this report is illustrated in Section V. The specific activity and the decay gamma-ray energy intensity at the TFTR vessel location for a total of nearly 40 naturally occurring elements are then presented graphically in Section VI. The data are given for a representative pulsing scenario as a function of cooling time, covering a range of ~ 15 minutes to ~ 2 years. Finally, the long term activities are given in Section VII for the same set of elements which were selected in Section VI.

II. SPECIFIC ACTIVITY FOR A PULSED MACHINE

A. Derivation of the specific activity

Consider a decay sequence

The concentration of nuclide N_k at time t is determined by the balance equation

$$dN_k/dt = R_k + \lambda_{k-1} N_{k-1} - \lambda_k N_k - D_k. \quad (2)$$

The term $R_k + \lambda_{k-1} N_{k-1}$ gives the rate of production of N_k , and the term $\lambda_k N_k + D_k$ is its rate of destruction. The variables are defined as follows:

$$R_k = \sum_p N_p \int_E \sigma_p(E) \phi(E) dE, \quad (3)$$

where

N_p = concentration of nuclide p ,

σ_p = transmutation cross section of p to k ,

ϕ = instantaneous neutron flux.

Keeping with the standard notation, we define λ_{k-1} to be the decay constant for production of N_k from N_{k-1} ,

and

$$D_k = N_k \int_E \sigma_d(E) \phi(E) dE, \quad (4)$$

where

σ_d = destruction cross section of nuclide N_k ,

λ_k = decay constant for destruction of N_k .

It is understood that in the above equation all of the variables are a function of geometrical location, $\bar{r}$, and N_p , ϕ , R_k , D_k may also be time dependent.

An explicit solution of N_k may be obtained if

- (1) ϕ is piecewise constant with time and periodic,
- (2) N_p is constant with time.

For a machine with a regular pulsing sequence as pictured in Fig. 1, the activity due to the decay of N_k is A_k , which can be shown to be given by

$$A_k \approx \lambda_k N_k \quad (5)$$

$$= \sum_{i=1}^k \left\{ R_i \left[\prod_{j=i}^{k-1} \beta_j \right] \left[\sum_{\ell=i}^k \frac{\Gamma}{\Gamma'} \tau_{\ell} \omega_{\ell} \right] \right\} \quad (6)$$

$$\Gamma = \pi \sum_{m=i, m \neq l}^k \lambda_m \quad (7)$$

$$\Gamma' = \pi \sum_{m=i, m \neq l}^k (\lambda_m - \lambda_l) , \quad (8)$$

where

R_i = production due to neutron interaction of the i^{th} generation nuclide defined in Eq. (3),

β_i = fraction of the i^{th} generation which decays into the $(i+1)^{\text{th}}$ generation,

τ_i = irradiation history function

$$= (1 - e^{-\lambda_i t_p}) \frac{1 - e^{-\lambda_i n t_c}}{1 - e^{-\lambda_i t_c}} \frac{1 - e^{-\lambda_i m t_g}}{1 - e^{-\lambda_i t_g}} , \quad (9)$$

$$\lambda_i' = \text{effective decay constant} \quad (10)$$

$$= \lambda_i + \int_E \sigma_d \phi dE ,$$

$$\omega_i = \text{decay function} \quad (11)$$

$$= e^{-\lambda_i t} .$$

The definitions of t_p , t_c , t_g , m , n are given in Figure 1, and Σ is the summation operator, and π is the multiplication operator. Additionally define

$$\pi_{j=i}^{k-1} \beta_j = 1 \quad \text{if } k-1 > i , \quad (12)$$

$$\frac{\Gamma}{\Gamma'} = 1 \quad \text{if } i = k . \quad (13)$$

The zero initial condition has been used in the above derivation.

Writing the A_k 's out explicitly, we obtain

For the 1st generation, (14)

$$A_1 = R_1 \tau_1 \omega_1.$$

For the 2nd generation,

$$A_2 = R_2 \tau_2 \omega_2 + R_1 \beta_1$$

$$\left\{ \frac{\lambda_1}{\lambda_1 - \lambda_2} \tau_2 \omega_2 + \frac{\lambda_2}{\lambda_2 - \lambda_1} \tau_1 \omega_1 \right\}. \quad (15)$$

For the 3rd generation,

$$\begin{aligned} A_3 = & R_3 \tau_3 \omega_3 + R_2 \beta_1 \left\{ \frac{\lambda_2}{\lambda_2 - \lambda_3} \tau_3 \omega_3 \right. \\ & + \left. \frac{\lambda_3}{\lambda_3 - \lambda_2} \tau_2 \omega_2 \right\} + R_1 \beta_1 \beta_2 \left\{ \frac{\lambda_1 \lambda_2}{(\lambda_1 - \lambda_2)(\lambda_3 - \lambda_2)} \tau_3 \omega_3 \right. \\ & + \frac{\lambda_1 \lambda_3}{(\lambda_1 - \lambda_2)(\lambda_3 - \lambda_2)} \tau_2 \omega_2 \\ & + \left. \frac{\lambda_2 \lambda_3}{(\lambda_2 - \lambda_1)(\lambda_3 - \lambda_1)} \tau_1 \omega_1 \right\}. \quad (16) \end{aligned}$$

The expression of A_k given in Eq. 6 clearly consists of three parts, (1) The production of the nuclide at the beginning of a sequence given by R , (2) the probability of decay through the sequence given by β 's, and (3) the time function to account for the irradiation history and cooling given by τ and ω .

B. Validity of the Assumptions

(1) Piecewise constant assumption for periodic ϕ .

For long pulse machines or steady-state operation with the time constants of both the power rise and the decay short compared to the flat power duration, the assumption can be shown to be valid. For a short pulse machine such as TFTR, if the half life of an isotope is much longer than the pulsing period, the use of the average ϕ for the duration of the pulse is valid regardless of the pulse shape. Since TFTR is expected to run with a half second pulse, the assumption of constant power would be valid for isotopes having half-lives greater than a few seconds.

(2) Constant N_p Assumptions.

The time dependence of N_p is governed by

$$N_p/N_{p0} = e^{-\lambda_p t} , \quad (17)$$

where $\lambda_p = \int \sigma_{dp}(E) \phi(E) dE$,

σ_{dp} = destruction cross section of p,

N_{p0} = initial concentration.

The effective removal half-life of N_p is therefore

$t_{1/2 p} = \ln 2/\lambda_p$. Since generally $\sigma_{dp} \lesssim 100$ barns,

and $\phi \lesssim 10^{12} \text{ cm}^{-2} \text{ sec}^{-1}$, it follows that $t_{1/2 p} \gtrsim 200$ years. In other words, it requires ~ 200 years of equivalent operation to destroy half of the original nuclide. This quantifies the constant N_p assumption.

(3) Simplification of the effective decay constant.

In most of the applications, the destruction of an isotope induced by the neutrons may be ignored. Since from Eq. (10)

$$\lambda_k' = \lambda_k + \int \sigma_d \phi \, dE,$$

and since we observe

$$\int \sigma_d \phi \, dE \lesssim 10^{-10} \text{ sec}^{-1},$$

then if $t_{1/2}$ for isotope $k < 200$ years, the removal of N_k due to neutron interaction is negligible, hence

$$\lambda_k' \approx \lambda_k.$$

III. THE EFFECTIVE REACTION CROSS SECTIONS

Looking at Eq. (3), the R_i 's may be written as

$$R_i = \sum_p N_p \sigma_{\text{eff},p} \phi_t, \quad (18)$$

where $\phi_t = \int \phi(E) dE = \text{total flux}$,

$$\text{and } \sigma_{\text{eff},p} = \int \sigma_p(E) \phi(E) dE / \int \phi(E) dE.$$

Thus σ_{eff} is the spectrum weighted reaction cross section. Clearly, σ_{eff} depends on the weighting function, but if the total flux is known, and the spectrum is close to the one used to obtain the effective cross section, then all that is needed in computing R_i are some simple multiplications.

The following ten weighting functions are considered important:

- (1) Virgin DT neutrons emitted uniformly with $13.5 \leq E \leq 14.9$ MeV.
- (2) The spectrum at the TFTR vessel due to DT neutrons.
- (3) The spectrum at the TFTR test cell center, without igloo shield, due to DT neutrons.
- (4) The spectrum for DT neutrons attenuated by a 0.66m Limestone concrete shield with a borated concrete reflector behind the shield.
- (5) Same as (4) except that the shield thickness has been increased to 0.86m.

- (6) Spectrum for DT neutrons attenuated by 1.83 m of Limestone concrete shield with an ordinary concrete reflector behind the shield.
- (7) Virgin DD neutrons emitted uniformly with $2.23 \leq E \leq 2.73$ MeV.
- (8) Same as (2) except for DD neutrons.
- (9) Same as (3) except for DD neutrons.
- (10) Same as (6) except for DD neutrons.

The distributions of these weighting functions are illustrated in Figs. 2 and 3.

The weighting spectra were obtained by the multigroup discrete ordinates transport calculations. The transport cross sections used were the (25n, 12 γ) data set,⁸ which was collapsed from the DLC41/C⁹ using one-dimensional fine spectra expected at each location.

The σ_{eff} 's weighted by the ten representative spectra for (n, 2n), (n, γ), (n,p), (n, α) as well as some of the other reactions are given in Tables I, II, III, IV, and V for all the reactions available in the PPPL nuclear data library.

There are three activation cross-section libraries maintained at PPPL, DLC-33/MONTAGE,¹⁰ DLC-69/ACTL,¹¹ and PPPL CASDAR in a GAM-II 100 group structure.¹² The collapsed sets weighted by the spectrum of 14 MeV neutrons slowing down in a one-meter thick concrete slab are also maintained and have been used in conjunction with the

neutron flux to derive the effective reaction cross sections given in the tables. The PPPL CASDAR data set is a collection based on the Alley & Lesler,¹³ SAND-II,¹⁴ and ENDF/B data files. Note that the DLC-33 set does not distinguish the energy state of the end product.

In Tables I through V both the target and product nuclide symbols and the atomic mass number are given. For the target, the isotopic abundance is listed. For the product, the energy state is shown if available. The zero state is the ground state, one is the 1st metastable state, etc. The effective cross sections SIG 1 to SIG 10 correspond to the weighting function 1 to 10 discussed above. The cross sections are in units of barns. The (n, n'p) reaction has been included in the (n, d) reaction entry, and the (n, n'd) reaction has been included in the (n,t) reaction entry.

IV. THE IRRADIATION HISTORY FUNCTION, τ

For regular pulsing sequences, the irradiation history function as given in Eq. (9) has already been graphed in Reference (1). For completeness, the data has been reproduced here, along with two additional pulsing scenarios. The graphic representation of the τ function is given in Fig. 4. The n/m designation means m groups run with n pulses per group. The pulse length, cycle time, and group period assumed were

$$t_p \approx \text{pulse length} = 0.5 \text{ seconds.}$$

$$t_c \approx \text{cycle time} = 5 \text{ minutes.}$$

$$t_g \approx \text{group period} = 1 \text{ day.}$$

It is easy to show that for isotopes with long half-lives compared to the pulsing sequence, $\tau \propto m \cdot n$, namely τ is proportional to the number of neutrons generated during the sequence. For isotopes with short half-lives compared to the pulse length, τ is equal to $(1 - e^{-\lambda t_p})$. For isotopes with half-lives shorter than the group period, the τ function is independent of the past group operation history.

V. EXAMPLE OF CALCULATING SPECIFIC ACTIVITY

We illustrate by example a method of using the data presented thus far.

Suppose that the surface of a component near the vessel is galvanized with Zn. One wishes to know the activity of ^{65}Zn for the 10^{18} n/pulse, DT operation at the end of the scenarios:

- (a) 50 pulses/day,
- (b) 5 days/run,
- (c) the sequence is repeated after the 1st weekend.

There are two paths leading to the production of ^{65}Zn :

- (1) $^{66}\text{Zn} (n, 2n) ^{65}\text{Zn}$
- (2) $^{64}\text{Zn} (n, \gamma) ^{65}\text{Zn}$ and $^{65}\text{Zn} \xrightarrow{\beta^+} ^{65}\text{Cu} \text{ (stable)}.$

Taking the vessel spectrum data,

$$\sigma_1 = 0.132 \text{ b} \quad (\text{Table I.B})$$

$$\sigma_2 = 0.02 \text{ b} \quad (\text{Table II.B}),$$

and calculating the atomic density,

$$N(^{66}\text{Zn}) = \frac{\text{Avogadro's number}}{\text{Atomic mass of Zn}} \times \text{weight fraction of } ^{66}\text{Zn}$$

$$= \frac{0.6023}{65.38} \times 0.279 \times 10^{24} \text{ atoms/g}$$

$$= 2.57 \times 10^{21} \text{ atoms/g}$$

and

$$N(^{64}\text{Zn}) = N(^{66}\text{Zn}) \cdot \frac{\text{wt fraction of } ^{64}\text{Zn}}{\text{wt fraction of } ^{66}\text{Zn}}$$

$$= 2.57 \times 10^{21} \times \frac{0.486}{0.279}$$

$$= 4.48 \times 10^{21} \text{ atoms/g.}$$

Given $\phi_t = 8 \times 10^{12} \text{ n/cm}^2\text{-sec}$, one finds that

$$\begin{aligned} R &= R_1 + R_2 \\ &= N(^{66}\text{Zn}) \cdot \sigma_1 \phi + N(^{64}\text{Zn}) \cdot \sigma_2 \phi \\ &= 3.5 \times 10^9 \text{ reactions/sec-g.} \end{aligned}$$

Since $t_{1/2}(^{65}\text{Zn}) = 243.8 \text{ days}$, readings from the τ curve for the 50 pulses/group, 5 group/run case one obtains $\tau = 4 \times 10^{-6}$.

Here we are considering the first generation in the ^{65}Zn decay sequence. The activity A, is from Eq. 14

$$A = R \cdot \tau \cdot \omega ,$$

where $\omega = e^{-\lambda t}$ and t is the cooling time.

According to the scenario, the 50 pulses/group, 5 days/run sequence is repeated twice. The total activity at the end of the operation is the sum of the activities from these two operating sequences.

$$A = A(s1) + A(s2).$$

For the first sequence, the waiting time is 7 days (5 days of second sequence run plus 2 days of weekend).

$$\therefore \omega(s1) = e^{-\lambda t} = e^{-\ln 2 / 243.8 \times 7} = 0.99.$$

For the second sequence, the waiting time is zero.

$$\therefore \omega(s2) = 1.$$

The total activity is therefore

$$\begin{aligned} A &= R \times \tau \times [\omega(s1) + \omega(s2)] \\ &= 3.5 \times 10^9 \times 4 \times 10^{-6} \times (0.99 + 1) \\ &= 2.77 \times 10^4 \text{ disintegration/sec-g} \\ &= 7.5 \times 10^{-4} \text{ curie/kg.} \\ (1 \text{ curie} &= 3.7 \times 10^{10} \text{ disintegration/sec.}) \end{aligned}$$

VI. SPECIFIC ACTIVITIES FOR SELECTED ELEMENTS AT THE TFTR VESSEL LOCATION

The example above shows that one can calculate the specific activity for any element or material under a given pulsing scenario at any given location so long as one can find the total flux. Frequently a designer or experimentalist has an option of choosing different materials. If the activity is of concern, it would be convenient to have a direct comparison of activity levels for the element in which one is interested. The specific activity of a selected set of elements for a typical pulsing scenario for TFTR is given in Figs. 5 and 6 for DT and DD operation respectively at the vessel location. The decay gamma-ray energy intensity is given in Figs. 7 and 8. The activities were calculated using Eq. (4) which has been programmed into the SPAC¹⁵ code. The conditions used are 10^{18} neutron/pulse for DT, 10^{16} neutron/pulse for DD, 50 pulses/day, for 5 days, and the elements occur in their natural isotopic abundances.

The fusion power in TFTR corresponds to an instantaneous neutron wall loading of 0.0376 MW/m^2 and 0.066 kW/m^2 for DT and DD operation respectively. The gamma-ray energy intensity does not include the X rays associated with the internal conversion or electron capture processes, nor does it include the annihilation radiation from β^+ decay.

The primary source of reaction cross sections used in the calculations was the DLC-33/MONTAGE set, with additional sources from the ACTL and the CASDAR sets. Only those reactions listed in

Tables I to V have been considered. For a reaction which leads to two possible product energy states for which the partial cross section is not available and if the half lives of both states are longer than a few minutes, a 50/50 percent allocation has been assumed.

Notice that the curves given in Figs. 5 to 8 have been normalized to a unit weight of one element. For a material, the activity may be derived easily if the composition is known. For instance, the activity of SS-304L (2Mn-19 Cr - 10 Ni - 69 Fe) two weeks after a 50 pulse/day, 5 day/run, DT operation would be (reading from Fig. 5)

$$\begin{aligned}
 A(\text{SS-304}) &= A(\text{Mn}) \times 2\% + A(\text{Cr}) \times 19\% \\
 &\quad + A(\text{Ni}) \times 10\% + A(\text{Fe}) \times 69\% \\
 &= 1.5 \times 10^{-3} \times 2\% + 3.4 \times 10^{-3} \times 19\% + 2.8 \times 10^{-3} \times 10\% \\
 &\quad + 4.3 \times 10^{-4} \times 69\% \\
 &= 1.3 \times 10^{-3} \text{ Ci/kg of SS-304L.}
 \end{aligned}$$

As mentioned, the gamma-ray intensity provides a measure of the relative importance of an element in its contribution to the activation dose. If the dimension of an object containing that element is small so that one can treat the object as a point source, then the simple estimate of the exposure activation dose rate from that element is¹⁶

$$\dot{D} \text{ (mr/hr-g)} = 6 E_{\gamma}/f^2, \quad (19)$$

where E_γ is the gamma-ray energy intensity in units of MeV-Curie/kg and f is the distance in feet from the object. For example, the dose rate from 2 grams of cobalt used the parting joint on the vessel one month after a 50 pulses/day, 5 consecutive days TFTR DT operation is 0.054 mr/hr one foot away.

VII LONG TERM ACTIVITIES

The γ -ray energy, the γ -ray dose rate, the γ -ray intensity, and the specific activities for the various elements are given in Tables VI and VII. 5 years after shutdown the specific activity¹⁹ of neutron operation waste is about 1000 Ci/kg. These dose rates, and the γ -ray energy, are the result of the decay of the loadings, which are the sum of the activities of the various isotopes contributing to long term activities. The specific activity is defined as the number of curies per kilogram of the material. The units of Ci/kg of the element are used. The specific activity has not been calculated.

Since for a given element the specific activity level depends indirectly on the operating sequence, the specific activity of the operating sequence is defined as the specific activity of the element. It is calculated from the specific activity of the element to the actual operating sequence. The specific activity of the operating sequence, the activity of the element, and the specific activity of the element are given in the tables. It is clear that the specific activity of the element is the structural materials, and the specific activity of the element are more serious long term waste disposal problems than the heavier or lighter elements.

ACKNOWLEDGMENTS

We wish to express our sincere thanks to G.V. Sheffield and J.T. Giarrusso for their constant encouragement and administrative help. Discussions with C. Pierce, C. Clifford, and R. Little were also appreciated. This work was supported by the U.S. DOE Contract No. DE-AC02-76-CHO-3073.

REFERENCES

- (1) L-P. Ku, "Nuclear Radiation Analysis for TFTR," PPPL-1211 (1980).
- (2) L-P. Ku, "Global Activation Dose Map for TFTR," PP-M-7322 (1981).
- (3) R.G. Alsmiller, Jr., et al., "Neutron Spectrum Induced Activity in the TFTR Test Cell," Nuclear Technology, 64, 1-10 (1975).
- (4) R.G. Mello, ed., "A Fusion Power Plant," MIT-1170 (1974).
- (5) I. Tuna, "Theory and Use of the Activation Code SPAC," ANL/FPP/TM-122 (1973).
- (6) A.I. Aliev, et al., "Handbook of Nuclear Data for Neutron Activation Analysis," Israel Program for Scientific Translations (1979).
- (7) G.W. Kee, "A Fortran Code for the ORIGEN Code," ORNL-TM-4896 (1975).
- (8) L-P. Ku, "New Working Cross Section Library," PP-M-6160 (1981).
- (9) "MONTAGE-40, 171-Neutron Cross Section Data Cross Section Library in AMPX Interface Format for the MONTAGE-40 Program," BLC-41/C, RSIC (1973).
- (10) "MONTAGE-40, 106-Group Neutron Cross Section Data for Fusion Reactor Structure and Coolant Material," BLC-41/C, RSIC (1974).
- (11) "ACOM, Evaluated Neutron Activation Cross Section Library," BLC-69, RSIC (1965).
- (12) For example, see the following publications on Cross Section Libraries Assembled by the Pacific Northwest Laboratory: PNL-RS1-30, Vol. 1 (1972).
- (13) W.E. Liley and P.W. Smith, "Neutron-Induced Reaction Cross Sections," ANL-114 (1964).
- (14) The preprocessed ENDF-4B data for the TFTR activation in 620 groups and including 34 neutron reactions taken from National Nuclear Data Center, BNL.
- (15) L-P. Ku, "SPAC -- A Special Activation Calculation Code," Unpublished.
- (16) S. Glasstone and A. Sesonske, "Nuclear Reactor Engineering," pp. 525, Van Nostrand (1963).

List of Variables for Table I-V

1. SEQ: sequence number.
2. Z: atomic number
3. A: atomic mass number
4. S: energy state of reaction product
0 is the ground state
1 is the 1st metastable state
5. SIG 1: effective cross section weighted by the virgin DT neutrons emitted uniformly with $13.5 \leq E \leq 14.9$ MeV.
6. SIG 2: effective cross section weighted by the spectrum at the TFTR vessel due to DT neutrons.
7. SIG 3: effective cross section weighted by the spectrum at the TFTR vessel due to DT neutrons.
8. SIG 4: effective cross section weighted by the spectrum for DT neutrons attenuated by a 0.66 m Limestone concrete shield with a borated concrete reflector behind the shield.
9. SIG 5: same as SIG 4 except that the shield thickness has been increased to 0.86 m.
10. SIG 6: effective cross section weighted by the spectrum for DT neutrons attenuated by a 1.83 m Limestone concrete shield with an ordinary concrete reflector behind the shield.
11. SIG 7: effective cross section weighted by virgin DD neutrons emitted uniformly with $2.23 \leq E \leq 2.73$ MeV.
12. SIG 8: same as SIG 2 except for DD neutrons.
13. SIG 9: same as SIG 3 except for DD neutrons.
14. SIG 10: same as SIG 6 except for DD neutrons.

Table 1.A

SEQUENCE WEIGHTED EFFECTIVE POWER SECTION FOR (1,2) SELECTION
DATA BASE: DUC-33/HOMEPAY

PARENT		PRECEDES																	
SPQ	Z	A	ABUNDANCE	REACTION	Z	A	SIG 1	1	10	2	10	3	SIG 4	5	SIG 6	7	SIG 8	9	SIG 10
1	N	15	9.161E-31	(N, 28)	8	12	0.187E-03	1.73E-01	4.83E-04	2.66E-04	1.89E-04	2.58E-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	P	19	1.030E+00	(N, 28)	3	19	0.50E+00	1.13E-02	3.11E-01	1.97E-03	1.47E-03	2.15E+04	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	HA	21	1.001E+06	(N, 28)	NA	22	0.22E+02	1.65E-01	1.50E-01	7.12E-04	4.89E-04	5.19E+05	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	IL	23	1.000E+00	(N, 28)	4	28	0.14E+02	9.44E-01	2.31E-01	1.34E-01	6.51E-04	5.71E+05	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	CL	35	1.577E-01	(N, 28)	4L	34	0.14E+03	1.05E-01	6.09E-04	1.89E-04	1.28E-04	1.31E+05	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	CL	37	2.423E-01	(N, 28)	4L	39	0.49E+01	1.79E-01	3.52E-02	2.27E-02	1.65E-02	2.65E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	K	39	4.126E-01	(N, 28)	4A	38	0.14E+02	7.61E-04	2.66E-04	8.92E-05	4.91E-05	5.18E+06	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	CA	47	6.470E-03	(N, 28)	CA	41	0.11E+02	2.10E-07	8.22E-03	2.44E-03	2.60E-03	2.13E+04	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	CA	48	1.030E-03	(N, 28)	CA	42	0.40E+01	2.63E-01	6.29E-02	4.53E-02	3.32E-02	5.57E+03	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	TI	48	6.253E+02	(N, 28)	11	45	0.14E+02	4.89E-01	1.25E-01	5.54E-04	3.49E-04	3.19E+05	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	V	49	0.1	(N, 28)	9	40	0.49E+01	1.79E-01	2.40E-02	1.17E-02	9.69E-03	1.36E+03	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	V	51	2.503E-03	(N, 28)	3	49	0.73E+01	1.90E-01	4.49E-02	3.94E-02	2.50E-02	5.11E+01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	CR	53	4.150E+02	(N, 28)	4P	41	0.14E+02	2.00E-03	7.57E-04	3.11E-04	2.20E-04	1.91E+05	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	CR	52	8.179E-03	(N, 28)	4P	41	0.51E+01	1.64E+02	1.72E-02	8.64E-03	4.94E-03	6.91E+04	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	PN	53	0.1	(N, 28)	NA	52	0.14E+01	1.87E-02	1.40E-02	7.61E-01	5.30E-03	6.62E+04	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	PN	54	0.1	(N, 28)	NA	53	0.20E+03	1.09E-01	4.20E-02	3.89E-02	2.97E-02	4.54E+01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	PN	54	1.003E+06	(N, 28)	NA	54	0.19E+03	1.09E-01	5.54E-02	1.64E-02	1.64E-02	4.17E+01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	PE	54	5.057E+02	(N, 28)	12	51	0.14E+02	4.59E-01	8.23E-04	3.14E-04	7.32E-05	9.32E+05	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	W	56	0.113E-01	(N, 28)	13	51	0.49E+01	1.43E-01	3.94E-02	2.06E-01	1.12E-02	2.16E+03	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	C	59	0.1	(N, 28)	16	0.14E+01	1.67E-04	3.19E-02	1.60E-01	1.73E-01	4.12E+01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	CO	59	1.100E+00	(N, 28)	13	52	0.12E+02	1.87E-01	4.57E-02	2.99E-02	2.15E-02	1.40E+03	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	NI	58	4.140E-01	(N, 28)	14	52	0.14E+02	1.13E-01	1.13E-01	6.03E-01	1.14E+04	7.65E+05	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	NI	65	2.413E-01	(N, 28)	14	52	0.14E+02	1.13E-01	1.61E-02	1.59E-02	1.25E-02	1.81E+01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	KT	66	9.509E-02	(N, 28)	14	53	0.14E+02	1.13E-01	6.19E-02	6.04E-02	4.17E-02	9.24E+01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	CH	61	6.120E-01	(N, 28)	4L	60	0.14E+02	1.13E-01	1.13E-02	1.00E-04	1.13E-02	2.12E+01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	CH	65	3.240E-01	(N, 28)	4L	60	0.14E+02	1.13E-01	1.13E-02	4.03E-03	1.13E-02	1.13E+01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	C	68	1.013E+00	(N, 28)	4	68	0.14E+01	1.13E-01	1.13E-02	2.54E-01	1.83E-02	1.13E+01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	T	90	0.1	(N, 28)	14	68	0.14E+02	1.13E-01	7.51E-05	1.44E-04	1.04E-05	1.13E+01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	V	91	0.1	(N, 28)	14	68	0.14E+02	1.13E-01	1.13E-01	9.27E-02	5.28E-02	1.13E+01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	ZR	90	5.157E-01	(N, 28)	4P	68	0.14E+02	1.13E-01	6.49E-02	2.40E-02	1.75E-02	2.27E+01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	ZR	91	1.123E+00	(N, 28)	4P	68	0.14E+02	1.13E-01	1.13E-01	4.53E-02	2.62E-02	1.13E+02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	JP	94	1.740E+01	(N, 28)	4P	68	0.14E+02	1.13E-01	1.13E-01	9.33E-04	7.09E-05	1.13E+02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	ZK	96	2.400E-02	(N, 28)	4P	68	0.14E+02	1.13E-01	1.13E-01	1.63E-01	7.91E-04	1.13E+02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34	IO	92	0.1	(N, 28)	4P	68	0.14E+02	1.13E-01	1.13E-01	8.43E-02	4.46E-02	1.13E+02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35	NB	93	1.200E+00	(N, 28)	4P	68	0.14E+02	1.13E-01	1.13E-02	2.64E-02	2.01E-02	3.07E+03	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36	NB	94	0.1	(N, 28)	4P	68	0.14E+02	1.13E-01	1.13E-01	1.13E-01	7.83E-02	1.29E+02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37	PO	100	1.400E+02	(N, 28)	4P	68	0.14E+02	1.13E-01	1.13E-01	1.13E-01	7.06E-02	1.59E+02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38	PO	92	1.400E+02	(N, 28)	4P	68	0.14E+02	1.13E-01	1.13E-01	1.13E-01	7.06E-02	1.59E+02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39	MO	92	1.400E+02	(N, 28)	4P	68	0.14E+02	1.13E-01	1.13E-01	1.13E-01	7.06E-02	1.59E+02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40	TC	97	0.1	(N, 28)	4L	96	0.14E+02	1.13E-01	1.13E-01	7.99E-01	7.99E-02	1.13E+02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41	TC	98	0.1	(N, 28)	4L	96	0.14E+02	1.13E-01	1.13E-01	9.97E-02	1.75E-02	1.13E+02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42	TC	99	0.1	(N, 28)	4L	96	0.14E+02	1.13E-01	1.13E-01	7.92E-01	1.55E-02	1.13E+02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43	AG	107	5.181E-01	(N, 28)	4L	106	0.14E+02	1.13E-01	1.13E-01	1.67E-01	1.67E-02	1.13E+02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44	AG	109	4.817E-01	(N, 28)	4L	106	0.14E+02	1.13E-01	1.13E-01	5.72E-02	1.58E-02	1.13E+02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45	SH	112	1.010E-02	(N, 28)	5W	111	0.14E+02	1.13E-01	9.44E-02	5.90E-04	4.33E-02	6.91E+03	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SELENIUM WEIGHTED EFFECTIVE CROSS SECTION FOR (N,2N) REACTION
DATA BASE: DLG-33/RCMTAGI

PARENT				PRODUCT													
SEQ	Z	A	ABUNDANCE	REACTION	Z	A	S	SIG 1	SIG 2	SIG 3	SIG 4	SIG 5	SIG 6	SIG 7	SIG 8	SIG 9	SIG 10
46	SM	114	6.760E-03	(N, 2N) SM 113	0	1.46E+00	3.63E-01	1.03E-01	7.21E-02	5.28E-02	8.86E-03	0.0	0.0	0.0	0.0	0.0	0.0
47	SR	110	2.410E-01	(N, 2N) SR 117	0	1.74E+00	4.61E-01	1.25E-01	9.52E-02	7.11E-02	1.33E-02	0.0	0.0	0.0	0.0	0.0	0.0
48	SR	120	3.240E-01	(N, 2N) SR 119	0	1.67E+00	4.85E-01	1.37E-01	1.03E-01	7.70E-02	1.51E-02	0.0	0.0	0.0	0.0	0.0	0.0
49	SR	122	4.603E-02	(N, 2N) SR 121	0	1.67E+00	5.05E-01	1.44E-01	1.11E-01	8.37E-02	1.67E-02	0.0	0.0	0.0	0.0	0.0	0.0
50	SM	124	5.653E-02	(N, 2N) SM 123	0	1.98E+00	5.23E-01	1.57E-01	1.19E-01	9.10E-02	1.91E-02	0.0	0.0	0.0	0.0	0.0	0.0
51	CS	133	1.030E+05	(N, 2N) CS 132	0	1.46E+00	4.28E-01	1.21E-01	9.27E-02	6.99E-02	1.38E-02	0.0	0.0	0.0	0.0	0.0	0.0
52	HP	174	1.600E-03	(N, 2N) HP 173	0	2.21E+00	5.96E-01	1.69E-01	1.31E-01	9.90E-02	1.98E-02	0.0	0.0	0.0	0.0	0.0	0.0
53	BP	176	5.230E-02	(N, 2N) BP 175	0	1.54E+00	5.26E-01	1.56E-01	1.35E-01	1.66E-01	2.47E-02	0.0	0.0	0.0	0.0	0.0	0.0
54	TA	181	9.999E-01	(N, 2N) TA 180	0	2.24E+00	6.01E-01	1.73E-01	1.42E-01	1.69E-01	2.39E-02	0.0	0.0	0.0	0.0	0.0	0.0
55	M	182	2.610E-01	(N, 2N) M 181	0	2.27E+00	6.04E-01	1.74E-01	1.42E-01	1.69E-01	2.36E-02	0.0	0.0	0.0	0.0	0.0	0.0
56	M	166	2.86E-01	(N, 2N) M 165	0	2.31E+00	6.38E-01	1.86E-01	1.62E-01	1.27E-01	2.96E-02	0.0	0.0	0.0	0.0	0.0	0.0
57	BE	105	3.743E-01	(N, 2N) BE 104	0	1.62E+00	4.38E-01	1.25E-01	1.01E-01	7.75E-02	1.66E-02	0.0	0.0	0.0	0.0	0.0	0.0
58	PR	187	6.263E-01	(N, 2N) PR 186	0	1.53E+00	4.21E-01	1.22E-01	1.04E-01	8.22E-02	1.87E-02	0.0	0.0	0.0	0.0	0.0	0.0
59	AO	197	1.300E+00	(N, 2N) AO 196	0	2.14E+00	5.70E-01	1.67E-01	1.22E-01	9.23E-02	1.83E-02	0.0	0.0	0.0	0.0	0.0	0.0
60	PD	204	1.470E-02	(N, 2N) PD 203	0	2.49E+00	6.70E-01	1.92E-01	1.52E-01	1.16E-01	2.43E-02	0.0	0.0	0.0	0.0	0.0	0.0
61	PD	206	2.410E-01	(N, 2N) PD 205	0	2.52E+00	6.83E-01	1.96E-01	1.58E-01	1.22E-01	2.61E-02	0.0	0.0	0.0	0.0	0.0	0.0
62	PD	208	5.240E-01	(N, 2N) PD 207	0	2.55E+00	6.98E-01	2.02E-01	1.69E-01	1.31E-01	2.96E-02	0.0	0.0	0.0	0.0	0.0	0.0

SPECTRUM WEIGHTED EFFECTIVE CROSS SECTION FOR (N,2N) REACTION
DATA BASE: CASDAB/SAND-1 OF ALLEY AND LESLER

SEQ	ID	PARENT		REACTION	PRODUCT												
		A	ABUNDANCE		2	3	4	5	SIG 1	SIG 2	SIG 3	SIG 4	SIG 5	SIG 6	SIG 7	SIG 8	SIG 9
1	ZN	64	4.860E-01	(N, 2N)	2N	63	1.170E-01	1.25E-01	6.72E-01	4.21E-03	2.87E-03	1.18E-04	0.0	0.0	0.0	0.0	0.0
2	ZN	66	2.750E-01	(N, 2N)	2N	65	5.19E-01	1.31E-01	3.35E-01	1.07E-01	1.25E-02	1.54E-03	0.0	0.0	0.0	0.0	0.0
3	ZN	70	6.201E-03	(N, 2N)	2N	69	6.54E-03	2.34E-01	6.84E-02	4.29E-02	3.14E-02	5.25E-03	0.0	0.0	0.0	0.0	0.0
4	GA	69	6.012E-01	(N, 2N)	GA	68	9.11E-01	2.35E-01	6.43E-02	3.91E-02	2.81E-02	4.39E-03	0.0	0.0	0.0	0.0	0.0
5	GA	71	1.950E-01	(N, 2N)	GA	70	9.24E-01	2.60E-01	6.61E-02	4.36E-02	3.16E-02	5.35E-03	0.0	0.0	0.0	0.0	0.0
6	GE	70	2.070E-01	(N, 2N)	GE	69	6.44E-01	1.39E-01	7.63E-02	1.31E-02	1.38E-02	1.75E-03	0.0	0.0	0.0	0.0	0.0
7	SE	72	2.450E-01	(N, 2N)	SE	71	6.71E-01	1.42E-01	8.44E-02	1.44E-02	8.64E-03	2.51E-03	0.0	0.0	0.0	0.0	0.0
8	GE	76	7.800E-02	(N, 2N)	GE	75	6.13E-02	1.42E-01	6.46E-02	5.51E-02	4.04E-02	1.61E-03	0.0	0.0	0.0	0.0	0.0
9	AS	75	1.000E+00	(N, 2N)	As	74	1.00E+00	1.00E-01	7.54E-02	4.74E-02	3.43E-02	5.44E-03	0.0	0.0	0.0	0.0	0.0
10	SE	74	3.000E-03	(N, 2N)	SE	73	3.00E-03	7.05E-02	1.20E-02	3.50E-03	6.46E-03	6.94E-04	0.0	0.0	0.0	0.0	0.0
11	SE	76	9.100E-03	(N, 2N)	SE	75	1.35E-02	1.00E-01	2.60E-02	1.27E-03	8.64E-04	9.52E-05	0.0	0.0	0.0	0.0	0.0
12	SE	77	3.000E-02	(N, 2N)	SE	76	3.24E-02	1.30E-01	8.40E-02	4.64E-02	2.72E-02	2.65E-03	0.0	0.0	0.0	0.0	0.0
13	SE	79	1.000E-01	(N, 2N)	SE	78	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	0.0	0.0	0.0	0.0	0.0
14	SE	80	4.980E-01	(N, 2N)	SE	79	1.45E-01	7.02E-01	6.67E-01	1.94E-01	6.17E-02	4.41E-03	0.0	0.0	0.0	0.0	0.0
15	SE	82	3.200E-02	(N, 2N)	SE	81	4.00E-02	3.27E-02	6.65E-03	4.02E-03	2.90E-03	4.29E-04	0.0	0.0	0.0	0.0	0.0
16	SE	82	9.200E-02	(N, 2N)	SE	81	1.00E-02	1.00E-01	6.00E-03	6.00E-03	4.92E-03	8.12E-04	0.0	0.0	0.0	0.0	0.0
17	DR	79	8.500E-01	(N, 2N)	DR	78	6.70E-01	1.00E-01	1.37E-02	1.17E-02	5.21E-03	1.33E-03	0.0	0.0	0.0	0.0	0.0
18	DR	81	4.410E-01	(N, 2N)	DR	80	6.40E-02	1.00E-01	3.24E-02	3.17E-02	1.57E-02	2.32E-03	0.0	0.0	0.0	0.0	0.0
19	DR	85	1.100E-01	(N, 2N)	DR	84	1.00E-01	1.00E-01	1.00E-01	1.33E-02	5.94E-03	7.57E-04	0.0	0.0	0.0	0.0	0.0
20	DR	85	1.100E-01	(N, 2N)	DR	84	1.00E-01	1.00E-01	1.00E-01	1.33E-02	5.94E-03	7.57E-04	0.0	0.0	0.0	0.0	0.0
21	BD	85	5.210E-01	(N, 2N)	BD	84	6.00E-01	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
22	BD	85	7.470E-01	(N, 2N)	BD	84	1.00E-01	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
23	BD	87	2.760E-01	(N, 2N)	BD	86	6.00E-01	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
24	BD	87	2.760E-01	(N, 2N)	BD	86	6.00E-01	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
25	BD	89	4.980E-01	(N, 2N)	BD	88	1.00E-01	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
26	BD	89	4.980E-01	(N, 2N)	BD	88	1.00E-01	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
27	SP	86	8.940E-02	(N, 2N)	SP	85	1.00E-01	1.00E-01	2.25E-02	1.33E-03	7.57E-04	1.33E-04	0.0	0.0	0.0	0.0	0.0
28	SP	86	8.940E-02	(N, 2N)	SP	85	1.00E-01	1.00E-01	2.25E-02	1.33E-03	7.57E-04	1.33E-04	0.0	0.0	0.0	0.0	0.0
29	PU	97	1.000E+00	(N, 2N)	PU	96	1.00E+00	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
30	SD	98	1.000E+00	(N, 2N)	SD	97	1.00E+00	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
31	SD	100	1.000E+00	(N, 2N)	SD	99	1.00E+00	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
32	PU	101	1.000E+00	(N, 2N)	PU	100	1.00E+00	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
33	PU	102	1.000E+00	(N, 2N)	PU	101	1.00E+00	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
34	SD	104	1.000E+00	(N, 2N)	SD	103	1.00E+00	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
35	PH	101	1.000E+00	(N, 2N)	PH	100	1.00E+00	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
36	PH	101	1.000E+00	(N, 2N)	PH	100	1.00E+00	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
37	PU	105	1.000E+00	(N, 2N)	PU	104	1.00E+00	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
38	PU	106	1.000E+00	(N, 2N)	PU	105	1.00E+00	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
39	SD	105	2.250E-01	(N, 2N)	SD	104	1.00E+00	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
40	PD	106	2.700E-01	(N, 2N)	PD	105	1.00E+00	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
41	BD	107	2.00E-01	(N, 2N)	BD	106	1.00E+00	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
42	BD	108	2.600E-01	(N, 2N)	BD	107	1.00E+00	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
43	BD	109	1.000E-01	(N, 2N)	BD	108	1.00E+00	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
44	BD	110	1.000E-01	(N, 2N)	BD	109	1.00E+00	1.00E-01	4.90E-01	1.00E-01	2.25E-02	1.33E-03	0.0	0.0	0.0	0.0	0.0
45	CD	106	1.300E-02	(N, 2N)	CD	105	2.30E-01	1.86E-01	4.91E-02	1.85E-02	1.85E-02	2.28E-03	0.0	0.0	0.0	0.0	0.0

SPECTRUM WEIGHTED EFFECTIVE CROSS SECTION FOR (N,2N) REACTION
DATA BASE: CASDAI/SAND-11 ON ALIPI DAG LESLEA

PARENT				PRODUCT		SIG										SIG		SIG		SIG		SIG		SIG		SIG		SIG		SIG	
SEQ	Z	A	ABUNDANCE	REACTION	Z	A	S	SIG	1	SIG	2	SIG	3	SIG	4	SIG	5	SIG	6	SIG	7	SIG	8	SIG	9	SIG	10				
86	CD	106	8.90E-01	(N, 2N)	CD	107	C	1.22E+00	3.10E-01	8.41E-02	5.13E-02	3.68E-02	5.47E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
87	CD	110	1.250E-01	(N, 2N)	CD	119	C	1.44E+00	3.76E-01	1.03E-01	6.80E-02	4.92E-02	8.18E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
88	CD	112	2.810E-01	(N, 2N)	CD	111	C	8.16E+01	2.15E-01	6.02E-02	4.29E-02	3.16E-02	5.76E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
49	CD	113	1.220E-01	(N, 2N)	CD	112	C	1.40E+00	3.80E-01	1.03E-01	6.80E-02	4.92E-02	8.18E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
50	CD	118	2.870E-01	(N, 2N)	CD	117	C	8.17E+01	2.26E-01	6.37E-02	4.51E-02	3.18E-02	6.25E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
51	CD	116	7.500E-02	(N, 2N)	CD	115	C	6.26E+01	2.20E-01	6.18E-02	4.39E-02	3.45E-02	6.62E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
52	CD	116	7.500E-02	(N, 2N)	CD	115	C	6.26E+01	2.20E-01	6.18E-02	4.39E-02	3.45E-02	6.62E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
53	IN	113	8.107E-02	(N, 2N)	IN	112	C	7.65E+01	2.07E-01	5.79E-02	4.18E-02	2.11E-02	5.68E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
54	IN	113	4.100E-02	(N, 2N)	IN	112	C	1.82E+01	2.07E-01	5.79E-02	4.18E-02	2.11E-02	5.68E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
55	IN	115	9.510E-01	(N, 2N)	IN	114	C	1.37E+00	3.42E-01	9.54E-02	6.61E-02	4.55E-02	8.95E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
56	IN	115	4.530E-01	(N, 2N)	IN	114	C	1.51E+00	3.56E-01	1.09E-01	7.19E-02	4.62E-02	9.29E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
57	SB	121	5.733E-01	(N, 2N)	SB	120	C	1.02E+00	2.68E-01	7.48E-02	5.32E-02	3.94E-02	7.17E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
58	SB	121	5.733E-01	(N, 2N)	SB	120	C	1.02E+00	2.68E-01	7.48E-02	5.32E-02	3.94E-02	7.17E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
59	SB	123	4.273E-01	(N, 2N)	SB	122	C	1.27E+00	3.13E-01	9.17E-02	6.76E-02	4.49E-02	9.21E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
60	SB	123	4.273E-01	(N, 2N)	SB	122	C	1.27E+00	3.13E-01	9.17E-02	6.76E-02	4.49E-02	9.21E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
61	TE	125	9.100E-04	(N, 2N)	TE	119	C	6.02E+01	2.11E-01	5.66E-02	4.07E-02	3.00E-02	5.25E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
62	TE	122	2.500E-02	(N, 2N)	TE	121	C	3.21E+01	8.18E-02	2.28E-02	1.45E-02	1.05E-02	1.67E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
63	TE	122	2.500E-02	(N, 2N)	TE	121	C	1.26E+00	3.33E-01	9.10E-02	5.80E-02	4.20E-02	6.67E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
64	TE	124	4.623E-02	(N, 2N)	TE	123	C	6.70E+01	2.28E-01	6.31E-02	4.33E-02	3.18E-02	5.45E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
65	TE	126	1.610E-01	(N, 2N)	TE	125	C	9.01E+01	2.38E-01	6.68E-02	4.68E-02	3.48E-02	6.22E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
66	TE	128	3.170E-01	(N, 2N)	TE	127	C	7.17E+01	2.09E-01	5.73E-02	4.48E-02	3.21E-02	6.12E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
67	TE	128	3.170E-01	(N, 2N)	TE	127	C	7.17E+01	2.09E-01	5.73E-02	4.48E-02	3.21E-02	6.12E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
68	TE	130	3.450E-01	(N, 2N)	TE	129	C	5.60E+01	1.55E-01	4.30E-02	2.97E-02	2.20E-02	3.92E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
69	TE	130	3.450E-01	(N, 2N)	TE	129	C	5.60E+01	1.55E-01	4.30E-02	2.97E-02	2.20E-02	3.92E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
70	I	127	1.002E+00	(N, 2N)	I	126	C	1.59E+00	3.38E-01	5.35E-02	4.38E-02	3.10E-02	8.17E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
71	I	129	0.0	(N, 2N)	I	128	C	1.30E+00	3.47E-01	9.36E-02	6.29E-02	4.61E-02	7.46E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
72	CS	131	2.120E-01	(N, 2N)	CS	130	C	1.13E+00	3.03E-01	8.02E-02	6.75E-02	5.12E-02	1.34E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
73	CS	133	1.002E-01	(N, 2N)	CS	132	C	1.34E+00	3.47E-01	1.02E-01	7.18E-02	5.33E-02	9.71E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
74	CS	135	0.0	(N, 2N)	CS	134	C	1.51E+00	4.05E-01	1.15E-01	9.01E-02	6.41E-02	1.15E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
75	BA	130	1.100E-03	(N, 2N)	BA	129	C	1.60E+00	8.15E-01	1.13E-01	1.10E-02	5.13E-02	7.39E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
76	BA	132	1.000E-03	(N, 2N)	BA	131	C	0.78E+01	2.30E-01	6.18E-02	4.39E-02	3.24E-02	5.62E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
77	BA	132	1.000E-03	(N, 2N)	BA	131	C	1.67E+01	2.30E-01	6.18E-02	4.39E-02	3.24E-02	5.62E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
78	BA	134	2.400E-02	(N, 2N)	BA	133	C	8.46E+01	2.29E-01	6.19E-02	4.17E-02	3.06E-02	5.27E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
79	BA	134	2.400E-02	(N, 2N)	BA	133	C	8.46E+01	2.29E-01	6.19E-02	4.17E-02	3.06E-02	5.27E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
80	BA	136	7.800E-03	(N, 2N)	BA	135	C	6.73E-01	1.38E-01	4.45E-02	3.24E-02	2.39E-02	4.71E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
81	EA	138	2.172E-01	(N, 2N)	EA	137	C	1.11E+00	3.15E-01	8.60E-02	6.00E-02	4.67E-02	8.56E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
82	LA	138	8.90E-04	(N, 2N)	LA	137	C	1.94E+00	5.26E-01	1.51E-01	1.23E-01	5.44E-02	2.00E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
83	LA	139	7.931E-01	(N, 2N)	LA	136	C	1.50E+00	3.91E-01	1.03E-01	7.16E-02	5.25E-02	8.81E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
84	CS	136	1.900E-03	(N, 2N)	CS	135	C	1.71E+00	4.45E-01	1.22E-01	7.93E-02	5.76E-02	9.47E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
85	CS	138	2.500E-03	(N, 2N)	CS	137	C	5.60E-01	2.38E-01	6.54E-02	4.45E-02	3.27E-02	5.63E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
86	CR	138	2.500E-03	(N, 2N)	CR	137	C	9.00E-01	2.38E-01	6.54E-02	4.45E-02	3.27E-02	5.63E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
87	CE	140	8.840E-01	(N, 2N)	CE	139	C	2.46E+00	6.45E-01	1.79E-01	1.22E-01	8.98E-02	1.58E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
88	CS	142	1.100E-01	(N, 2N)	CS	141	C	0.78E+00	4.86E-01	1.91E-01	1.18E-01	5.12E-02	1.97E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
89	FR	141	1.002E+00	(N, 2N)	FR	140	C	1.74E+00	4.54E-01	1.25E-01	8.02E-02	5.65E-02	9.75E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
90	BD	142	2.120E-																												

SPECTRUM WEIGHTED EFFECTIVE GROSS SECTION FOR (n,2n) REACTION
DATA BASE: CASPAR/SAND-11 ON ALLEY AND LPS16

PARENT				INCEU1													
SEQ	Z	A	ABUNDANCE	REACTION	Z	A	S	SIG 1	SIG 2	SIG 3	SIG 4	SIG 5	SIG 6	SIG 7	SIG 8	SIG 9	SIG 10
91	NO	102	7.723E-01	(# 28)	NO	101		1.47E-01	1.73E-01	4.70E-02	1.09E-02	2.25E-02	3.70E-01	0.0	0.0	0.0	0.0
92	NE	103	1.270E-01	(# 28)	NE	102		1.13E+00	4.39E-01	1.25E-01	1.31E-02	7.59E-02	1.60E-02	0.0	0.0	0.0	0.0
93	NO	144	2.180E-01	(# 28)	NO	143		1.14E+00	4.39E-01	1.25E-01	9.93E-02	2.59E-02	1.63E-02	0.0	0.0	0.0	0.0
94	NO	145	8.102E-02	(# 28)	NO	144		1.63E+00	4.35E-01	1.25E-01	9.93E-02	7.59E-02	1.60E-02	0.0	0.0	0.0	0.0
95	NE	146	1.723E-01	(# 28)	NE	145		1.13E+00	4.35E-01	1.25E-01	9.93E-02	7.59E-02	1.60E-02	0.0	0.0	0.0	0.0
96	NE	148	5.702E-02	(# 28)	NE	147		1.61E+00	4.31E-01	1.25E-01	9.93E-02	7.59E-02	1.60E-02	0.0	0.0	0.0	0.0
97	NO	150	5.600E-02	(# 28)	NO	149		2.17E+00	7.07E-01	2.07E-01	1.93E-01	1.42E-01	3.23E-02	0.0	0.0	0.0	0.0
98	FE	167	3.0	(# 28)	FE	166		1.45E+00	1.85E-01	1.08E-01	4.01E-02	6.07E-02	1.18E-02	0.0	0.0	0.0	0.0
99	X	184	1.107E-02	(# 28)	SM	183		8.76E-01	1.73E-01	4.60E-02	2.55E-02	1.79E-02	2.42E-03	0.0	0.0	0.0	0.0
100	SA	194	1.100E-02	(# 28)	SM	193		1.67E-01	1.73E-01	4.60E-02	2.55E-02	1.75E-02	2.42E-03	0.0	0.0	0.0	0.0
111	SM	147	1.510E-01	(# 28)	SM	146		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
112	SM	148	1.133E-01	(# 28)	SM	147		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
113	SM	149	1.357E-01	(# 28)	SM	148		1.78E+00	4.91E-01	1.43E-01	1.27E-01	1.00E-01	2.43E-02	0.0	0.0	0.0	0.0
114	SM	150	7.402E-02	(# 28)	SM	149		1.43E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
115	SM	151	0.3	(# 28)	SM	150		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
116	SM	152	2.600E-01	(# 28)	SM	151		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
117	SM	154	2.240E-01	(# 28)	SM	153		1.14E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
118	EU	151	4.793E-01	(# 28)	EU	150		1.40E+00	5.03E-01	1.44E-01	1.17E-01	5.00E-02	1.91E-02	0.0	0.0	0.0	0.0
119	EU	151	4.793E-01	(# 28)	EU	150		1.56E-01	1.54E-01	4.96E-02	1.31E-02	2.48E-02	4.75E-03	0.0	0.0	0.0	0.0
110	EU	153	5.230E-01	(# 28)	EU	152		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
111	EU	153	5.230E-01	(# 28)	EU	152		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
112	EU	154	0.3	(# 28)	EU	153		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
113	GD	152	2.003E-01	(# 28)	GD	151		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
114	GD	154	2.10E-01	(# 28)	GD	153		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
115	GD	155	1.480E-01	(# 28)	GD	154		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
116	GD	152	1.573E-01	(# 28)	GD	151		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
117	GD	160	3.18E-01	(# 28)	GD	159		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
118	TD	159	1.37E+00	(# 28)	TD	158		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
119	TD	159	1.37E+00	(# 28)	TD	158		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
120	TD	158	1.37E+00	(# 28)	TD	157		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
121	TD	153	2.190E-02	(# 28)	TD	152		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
122	TD	144	2.813E-01	(# 28)	TD	143		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
123	WD	165	1.002E+00	(# 28)	WD	164		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
124	FE	162	1.473E-01	(# 28)	FE	161		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
125	FE	164	1.540E-02	(# 28)	FE	163		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
126	SM	166	1.107E-01	(# 28)	SM	165		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
127	SM	170	1.490E-01	(# 28)	SM	169		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
128	SM	173	1.303E+00	(# 28)	SM	172		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
129	TD	169	1.450E+00	(# 28)	TD	168		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
130	TD	170	1.160E+00	(# 28)	TD	169		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
131	TD	176	1.260E+00	(# 28)	TD	175		1.47E+00	1.94E-01	1.16E-01	1.26E-01	1.44E-02	2.15E-02	0.0	0.0	0.0	0.0
132	LU	175	9.740E-01	(# 28)	LU	174		2.09E+00	5.67E-01	1.63E-01	1.32E-01	1.01E-01	2.17E-02	0.0	0.0	0.0	0.0
133	LU	175	9.740E-01	(# 28)	LU	174		1.15E+00	4.19E-01	1.18E-01	8.67E-02	6.45E-02	1.27E-02	0.0	0.0	0.0	0.0
134	LU	176	2.600E-02	(# 28)	LU	175		2.14E+00	5.99E-01	1.76E-01	1.64E-01	1.30E-01	3.23E-02	0.0	0.0	0.0	0.0

SPECTRUM WEIGHTED EFFECTIVE CROSS SECTION FOR (N,2N) REACTION
DATA BASE: CASAP/2/AND-11 OR BILLY AND 151515

PARTN		PRODUCT															
SEC	Z	A	ABUNDANCE	REACTION	Z	A	Z	SIG 1	SIG 2	SIG 3	SIG 4	SIG 5	SIG 6	SIG 7	SIG 8	SIG 9	SIG 10
136	HP	173	1.600E-11	(N, 2N)	HP	173	C	1.861E-02	4.271E-01	1.190E-01	8.611E-02	6.431E-02	1.211E-02	0.0	0.0	0.0	0.0
137	HP	176	5.200E-02	(N, 2N)	HP	175	C	2.221E-02	5.941E-01	1.891E-01	1.331E-01	9.921E-02	1.992E-02	0.0	0.0	0.0	0.0
138	TA	181	1.200E-04	(N, 2N)	TA	178	O	2.277E-02	6.291E-01	1.835E-01	1.361E-01	1.128E-01	2.989E-02	0.0	0.0	0.0	0.0
139	TA	181	9.990E-01	(N, 2N)	TA	180	C	1.711E-02	4.671E-01	1.156E-01	1.111E-01	6.701E-02	1.931E-02	0.0	0.0	0.0	0.0
140	TA	161	5.555E-01	(N, 2N)	TA	160	C	1.112E-02	3.111E-01	9.571E-02	6.781E-02	5.191E-02	1.081E-02	0.0	0.0	0.0	0.0
141	OS	184	1.800E-04	(N, 2N)	US	163	C	1.311E-02	1.511E-01	1.016E-01	7.911E-02	6.021E-02	1.252E-02	0.0	0.0	0.0	0.0
142	CS	194	1.600E-04	(N, 2N)	US	193	C	1.171E-02	1.171E-01	2.351E-02	2.621E-02	1.001E-02	4.121E-02	0.0	0.0	0.0	0.0
143	CS	186	1.580E-02	(N, 2N)	US	165	C	2.281E-02	6.111E-01	1.745E-01	1.171E-01	1.141E-01	2.121E-02	0.0	0.0	0.0	0.0
144	CS	150	2.640E-01	(N, 2N)	US	149	C	1.131E-02	3.171E-01	4.111E-02	1.431E-01	1.101E-02	1.211E-02	0.0	0.0	0.0	0.0
145	CS	192	4.100E-01	(N, 2N)	US	191	C	1.131E-02	1.171E-01	9.061E-02	1.281E-02	5.571E-02	1.181E-02	0.0	0.0	0.0	0.0
146	LO	191	3.710E-01	(N, 2N)	LO	190	C	1.951E-02	5.171E-01	1.841E-01	1.171E-01	1.001E-02	1.541E-02	0.0	0.0	0.0	0.0
147	LO	191	3.710E-01	(N, 2N)	LO	190	C	1.166E-02	1.061E-02	2.711E-02	1.194E-02	1.451E-02	2.711E-02	0.0	0.0	0.0	0.0
148	LO	193	6.270E-01	(N, 2N)	LO	192	C	6.501E-01	1.611E-01	4.749E-02	1.811E-01	2.981E-02	6.561E-03	0.0	0.0	0.0	0.0
149	PT	193	1.100E-04	(N, 2N)	PT	119	C	2.271E-02	6.021E-01	1.841E-01	1.141E-01	9.441E-02	1.791E-02	0.0	0.0	0.0	0.0
150	PT	192	7.870E-03	(N, 2N)	PT	191	C	2.361E-02	6.171E-01	1.721E-01	1.201E-01	5.681E-02	1.861E-02	0.0	0.0	0.0	0.0
151	PT	152	7.870E-03	(N, 2N)	PT	151	C	2.711E-02	6.101E-01	1.721E-01	1.241E-01	9.041E-02	1.851E-02	0.0	0.0	0.0	0.0
152	PT	194	3.290E-01	(N, 2N)	PT	193	C	1.161E-02	1.091E-01	8.747E-02	6.611E-02	4.981E-02	9.721E-02	0.0	0.0	0.0	0.0
153	PT	194	3.290E-01	(N, 2N)	PT	193	C	1.171E-02	1.311E-01	6.796E-02	6.631E-02	4.491E-02	9.721E-02	0.0	0.0	0.0	0.0
154	PT	196	2.531E-01	(N, 2N)	PT	195	C	1.161E-02	3.171E-01	5.046E-02	7.111E-02	5.411E-02	1.111E-02	1.861E-02	1.768E-10	1.548E-10	9.66E-11
155	PT	196	7.202E-02	(N, 2N)	PT	197	C	2.081E-02	7.171E-01	2.001E-01	1.561E-01	1.131E-01	2.191E-02	0.0	0.0	0.0	0.0
156	PT	198	7.202E-02	(N, 2N)	PT	197	C	1.201E-02	3.561E-01	1.000E-01	7.521E-02	5.641E-02	1.071E-02	0.0	0.0	0.0	0.0
157	HU	196	1.501E-03	(N, 2N)	HU	195	C	5.800E-01	1.541E-01	4.370E-02	1.221E-02	2.411E-02	4.581E-03	0.0	0.0	0.0	0.0
158	HU	196	1.501E-03	(N, 2N)	HU	195	C	1.141E-02	1.11E-01	1.107E-01	9.651E-02	7.231E-02	1.371E-02	0.0	0.0	0.0	0.0
159	HU	194	1.000E-01	(N, 2N)	HU	193	C	4.481E-01	1.11E-01	1.127E-02	1.951E-02	3.881E-03	0.0	0.0	0.0	0.0	
160	HU	198	1.300E-01	(N, 2N)	HU	197	C	1.661E-02	4.751E-01	1.311E-01	1.061E-01	1.561E-02	1.541E-02	0.0	0.0	0.0	0.0
161	HU	200	2.310E-01	(N, 2N)	HU	195	C	1.191E-02	3.201E-01	9.110E-02	2.181E-02	5.461E-02	1.131E-02	0.0	0.0	0.0	0.0
162	HU	200	6.900E-02	(N, 2N)	HU	203	C	2.941E-02	6.131E-01	1.911E-01	1.571E-01	1.211E-01	2.631E-02	1.881E-10	1.768E-10	1.548E-10	9.66E-11
163	HU	208	6.900E-02	(N, 2N)	HU	203	C	2.441E-02	6.881E-01	1.911E-01	1.621E-01	1.171E-01	2.901E-02	6.131E-11	2.261E-11	1.521E-11	8.621E-12
164	TL	203	2.950E-01	(N, 2N)	TL	202	C	1.131E-02	3.451E-01	1.001E-01	1.461E-01	1.161E-01	1.131E-02	0.0	0.0	0.0	0.0
165	TL	205	7.050E-01	(N, 2N)	TL	204	C	2.481E-02	6.891E-01	1.931E-01	1.631E-01	1.161E-01	2.891E-02	0.0	0.0	0.0	0.0
166	TL	205	7.050E-01	(N, 2N)	TL	204	C	2.491E-02	6.891E-01	1.931E-01	1.631E-01	1.161E-01	2.851E-02	0.0	0.0	0.0	0.0
167	BI	209	1.002E+00	(N, 2N)	BI	208	C	2.471E-02	6.811E-01	1.981E-01	1.691E-01	1.321E-01	3.031E-02	0.0	0.0	0.0	0.0
168	BI	232	1.000E+00	(N, 2N)	TL	211	C	1.171E-02	4.061E-01	1.221E-01	1.261E-01	1.011E-01	2.871E-02	0.0	0.0	0.0	0.0
169	PA	231	0.0	(N, 2N)	PA	230	C	9.771E-01	2.491E-01	6.801E-02	9.941E-02	6.431E-02	2.771E-02	0.0	0.0	0.0	0.0
170	PA	233	0.0	(N, 2N)	PA	232	C	9.771E-01	2.491E-01	6.801E-02	9.941E-02	6.431E-02	2.771E-02	0.0	0.0	0.0	0.0
171	O	232	0.0	(N, 2N)	O	231	C	9.771E-01	2.491E-01	6.801E-02	9.941E-02	6.431E-02	2.771E-02	0.0	0.0	0.0	0.0
172	O	233	0.0	(N, 2N)	O	232	C	4.431E-01	1.161E-01	4.171E-02	4.561E-02	3.751E-02	1.371E-02	0.0	0.0	0.0	0.0
173	O	234	5.800E-05	(N, 2N)	O	233	C	1.131E-01	9.601E-02	2.631E-02	2.631E-02	2.681E-02	4.891E-03	0.0	0.0	0.0	0.0
174	O	235	7.200E-03	(N, 2N)	O	234	C	1.131E-01	5.291E-02	1.981E-02	3.691E-02	7.211E-02	1.091E-02	0.0	0.0	0.0	0.0
175	O	236	0.0	(N, 2N)	O	235	C	4.571E-01	1.511E-01	4.781E-02	5.841E-02	4.611E-02	1.151E-02	0.0	0.0	0.0	0.0
176	O	238	9.972E-01	(N, 2N)	O	237	C	7.811E-01	2.411E-01	7.651E-02	9.491E-02	7.871E-02	2.271E-02	0.0	0.0	0.0	0.0
177	NP	237	0.0	(N, 2N)	NP	236	C	1.831E-01	5.331E-02	1.600E-02	1.891E-02	1.531E-02	4.161E-03	0.0	0.0	0.0	0.0
178	NP	238	0.0	(N, 2N)	NP	237	C	6.501E-02	1.931E-02	5.971E-03	6.621E-03	5.361E-03	1.471E-03	0.0	0.0	0.0	0.0
179	NP	239	0.0	(N, 2N)	NP	238	C	6.501E-02	2.411E-02	6.971E-03	1.11E-02	9.291E-03	2.731E-03	0.0	0.0	0.0	0.0
180	PO	240	0.0	(N, 2N)	NP	239	C	2.711E-02	8.651E-02	2.611E-02	1.791E-02	3.191E-02	9.021E-03	0.0	0.0	0.0	0.0

SPECTRUM WEIGHTED EFFECTIVE CROSS SECTION FOR (W,2N) REACTION
 DATA BASE: CASAPASAND-11 ON ALLEY AND FOLITE

PARENT				FNUOVCS													
SEQ	Z	A	ABUNDANCE	REACTION	Z	A	S	SIG 1	SIG 2	SIG 3	SIG 4	SIG 5	SIG 6	SIG 7	SIG 8	SIG 9	SIG 10
181	PU	241	0.0	(W, 2N) PU 240	C	9.39E-02	4.74E-02	1.97E-02	4.67E-02	4.23E-02	1.66E-02	0.0	0.0	0.0	0.0	0.0	0.0
182	PU	242	0.0	(W, 2N) PU 241	C	1.14E-01	7.24E-02	2.47E-02	3.63E-02	3.05E-02	9.17E-03	0.0	0.0	0.0	0.0	0.0	0.0
183	CM	243	0.0	(W, 2N) CM 243	C	8.50E-02	2.71E-02	8.80E-03	1.15E-02	5.50E-03	2.65E-03	0.0	0.0	0.0	0.0	0.0	0.0

Table 1.C

SPECTRUM WEIGHTED EFFECTIVE CROSS SECTION FOR (n,2n) REACTION
DATA BASE: DLC-85/ACT1

SEQ	E	PARENT		REACTION	PRODUCT		Z	A	S	SIG 1	SIG 2	SIG 3	SIG 4	SIG 5	SIG 6	SIG 7	SIG 8	SIG 9	SIG 10
		A	ABUNDANCE		Z	A													
1	0	15	9.976E-01	(n, 2n)	O	15	0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	P	31	1.000E+00	(n, 2n)	P	30	C	1.18E-02	2.89E-03	7.68E-04	3.88E-04	2.68E-04	3.20E-05	0.0	0.0	0.0	0.0	0.0	0.0
3	S	36	1.700E-04	(n, 2n)	S	35	O	5.89E-02	1.53E-02	8.23E-03	2.89E-03	2.12E-03	3.60E-04	0.0	0.0	0.0	0.0	0.0	0.0
4	AN	38	6.100E-04	(n, 2n)	AN	37	C	1.18E-01	3.62E-02	8.09E-03	4.49E-03	3.13E-03	4.20E-04	0.0	0.0	0.0	0.0	0.0	0.0
5	AB	40	4.93E-01	(n, 2n)	AN	39	C	5.20E-01	1.38E-01	3.82E-02	2.63E-02	1.93E-02	3.29E-03	0.0	0.0	0.0	0.0	0.0	0.0
6	CA	46	3.500E-05	(n, 2n)	CA	45	C	4.61E-01	1.03E-01	2.80E-02	1.67E-02	1.19E-02	1.77E-03	0.0	0.0	0.0	0.0	0.0	0.0

Table 11.3

DATA BASE. 1980-1981

[illegible]

SPECTRUM WEIGHTED EFFECTIVE CROSS SECTION FOR (D,D) REACTION
DATA BASE: DDC-33/RCSTAGE

SPD	Z	PARENT		REACTION	Z	PRODUCT		SIG 1	SIG 2	SIG 3	SIG 4	SIG 5	SIG 6	SIG 7	SIG 8	SIG 9	SIG 10
		A	ABUNDANCE			A	Z										
46	BF	181	1.523E-01	(W, G)	BF	181	C	6.90E+00	1.11E+00	2.92E+00	3.10E+00	8.41E+00	2.46E+02	1.41E+00	1E+00	7.34E+01	
47	TA	181	9.999E-01	(W, G)	TA	182	C	6.44E+00	3.77E+00	1.0E+01	2.34E+01	1.63E+01	1.18E+01	4.11E+02	9.97E+01	CE+01	3.70E+01
48	TA	82	0.0	(W, G)	TA	81	C	4.13E+00	1.77E+00	1.1E+01	6.64E+01	6.72E+01	1.47E+01	1.99E+02	1.16E+00	2.29E+01	1.57E+01
49	W	188	1.067E-01	(W, G)	W	185	C	8.40E+00	9.67E+02	4.4E+00	1.1E+01	7.41E+01	4.66E+01	1.64E+02	9.46E+02	4.42E+01	1.05E+00
50	W	186	2.860E-01	(W, G)	W	187	C	6.93E+00	6.54E+01	7.24E+00	6.7E+01	1.36E+01	2.53E+01	2.38E+02	5.84E+01	7.25E+00	2.94E+01
51	BB	185	1.740E-01	(W, G)	BB	186	C	6.11E+01	1.13E+00	1.42E+01	1.14E+01	1.13E+01	7.10E+01	5.32E+02	1.17E+00	1.42E+01	8.16E+01
52	BB	187	6.260E-01	(W, G)	BB	188	C	1.27E+01	7.06E+01	5.57E+00	1.0E+01	1.15E+01	1.90E+01	4.00E+02	6.32E+01	5.51E+00	2.16E+01
53	AV	197	1.000E+00	(W, G)	AV	198	D	1.01E+02	1.89E+00	2.09E+01	4.7E+01	5.11E+01	7.15E+01	4.25E+02	1.67E+00	2.09E+01	8.30E+01

Table II.5

DECLASSIFICATION AUTHORITY DERIVED FROM: EXECUTIVE ORDER 11652, 3/28/77, AND
 E.O. 11652, 3/28/77, AND E.O. 11652, 3/28/77

[illegible]

SPECTRUM WEIGHTED EFFECTIVE CROSS SECTION FOR (N,G) REACTION
DATA BASE: CASPAR/SANI-13 CB ALIST AND LESLER

PARENT				PRODUCT																								
SEQ	Z	A	ABUNDANCE	REACTION	W	G	CD	S	SIG	1	SIG	2	SIG	3	SIG	4	SIG	5	SIG	6	SIG	7	SIG	8	SIG	9	SIG	10
46	CD	108	8.900E-03	(W, G)	CD	109	C	5.15E-03	8.51E-02	2.55E-01	4.61E-01	4.61E-01	6.46E-01	2.10E-02	8.15E-02	2.59E-01	7.3CE-01											
47	CD	113	1.257E-01	(W, G)	CD	113	C	1.54E-04	2.42E-03	1.02E-02	1.71E-02	1.79E-02	2.69E-02	5.76E-04	1.30E-03	1.07E-02	3.05E-02											
48	CD	112	2.400E-01	(W, G)	CD	113	C	1.54E-04	1.44E-03	3.76E-03	5.14E-03	5.33E-03	9.93E-03	5.05E-04	1.42E-03	3.77E-03	1.11E-02											
49	CD	113	1.220E-01	(W, G)	CD	114	C	1.60E-02	9.41E-01	2.46E+01	7.20E+01	7.43E+01	2.01E+03	4.34E-02	8.84E-01	2.07E+01	2.22E+03											
50	CD	114	2.870E-01	(W, G)	CD	115	C	3.79E-03	3.79E-02	9.12E-02	1.08E-01	1.12E-01	1.19E-01	1.18E-02	3.80E-02	9.17E-02	1.44E-01											
51	CD	114	2.870E-01	(W, G)	CD	115	C	1.73E-03	1.13E-02	2.46E-02	3.27E-02	3.30E-02	4.17E-02	1.27E-01	1.06E-02	2.65E-02	8.45E-02											
52	CD	116	1.500E-02	(W, G)	CD	117	C	4.19E-03	2.56E-02	6.85E-02	9.31E-02	9.69E-02	2.31E-01	1.08E-02	2.56E-02	6.68E-02	2.57E-01											
53	CD	116	7.500E-02	(W, G)	CD	117	C	1.23E-04	7.59E-04	1.99E-03	2.61E-03	2.91E-03	6.95E-03	1.18E-04	7.59E-04	2.00E-03	7.73E-03											
54	W	113	4.300E-02	(W, G)	W	114	C	1.21E-03	7.77E-02	2.79E-01	1.37E-01	1.51E-01	6.29E-01	1.81E-02	7.31E-02	2.30E-01	7.05E-01											
55	W	114	4.300E-02	(W, G)	W	114	C	1.47E-03	2.10E-01	5.47E-01	7.51E-01	7.80E-01	1.54E+00	6.62E-02	2.13E-01	5.51E-01	1.72E+02											
56	W	115	9.570E-01	(W, G)	W	116	C	1.75E-02	1.28E+03	1.44E+01	4.16E+01	4.33E+01	9.91E+01	9.01E-02	1.16E+00	1.48E+01	1.10E+02											
57	W	115	9.570E-01	(W, G)	W	116	C	7.30E-03	1.22E+00	1.63E+01	4.08E+01	4.22E+01	9.42E+01	1.06E-01	1.12E+00	1.43E+01	1.05E+02											
58	SB	121	5.730E-01	(W, G)	SB	122	C	3.15E-03	2.25E-01	8.16E-01	1.23E+00	1.28E+00	1.84E+00	2.49E-02	2.04E-01	8.11E-01	2.07E+00											
59	SB	121	5.730E-01	(W, G)	SB	122	C	3.65E-05	2.25E-03	8.16E-03	1.22E-02	1.27E-02	1.73E-02	2.49E-04	2.04E-03	8.07E-03	1.95E-02											
60	SB	123	4.270E-02	(W, G)	SB	124	C	3.08E-03	4.82E-02	1.56E-01	1.19E-01	1.31E-01	6.45E-01	9.68E-03	4.49E-02	1.96E-01	7.20E-01											
61	SB	123	4.27E-01	(W, G)	SB	124	C	1.819E-04	1.76E-04	5.65E-04	9.43E-04	9.69E-04	2.19E-03	2.47E-05	1.17E-04	5.64E-04	2.40E-03											
62	TE	127	9.103E-04	(W, G)	TE	127	C	2.76E-03	1.57E-01	4.35E-01	5.61E-01	6.03E-01	7.50E-01	2.62E-02	1.46E-01	4.34E+01	8.41E-01											
63	TE	120	9.103E-04	(W, G)	TE	127	C	1.67E-04	2.75E-02	7.67E-02	1.03E-01	1.07E-01	1.13E-01	1.59E-03	2.57E-02	7.65E-02	1.47E-01											
64	TE	122	2.500E-02	(W, G)	TE	127	C	1.74E-03	2.59E-02	8.34E-02	1.17E-01	1.21E-01	1.31E-01	6.59E-03	2.80E-02	8.33E-02	2.38E-01											
65	TE	124	4.623E-02	(W, G)	TE	127	C	1.92E-03	1.07E-01	3.67E-03	5.40E-03	5.71E-03	9.32E-03	2.48E-04	1.01E-03	3.66E-03	1.05E-02											
66	TE	126	1.003E-01	(W, G)	TE	127	C	1.24E-03	1.35E-02	8.19E-02	1.27E-01	1.35E-02	1.48E-02	1.27E-03	1.53E-02	4.70E-03	1.10E-01											
67	TE	126	1.800E-01	(W, G)	TE	127	C	2.74E-04	1.55E-03	4.44E-03	6.25E-03	6.47E-03	1.91E-02	5.67E-04	1.50E-03	4.44E-03	2.15E-02											
68	TE	128	3.110E-01	(W, G)	TE	129	C	1.64E-03	7.57E-03	2.06E-02	2.46E-02	2.96E-02	4.20E-02	3.42E-03	7.46E-03	2.00E-02	4.73E-02											
69	TE	128	3.110E-01	(W, G)	TE	129	C	1.64E-04	7.57E-04	2.05E-03	2.46E-03	2.96E-03	4.07E-03	3.42E-04	7.45E-04	2.00E-03	4.59E-03											
70	TE	130	3.450E-01	(W, G)	TE	131	C	1.31E-01	4.15E+01	1.00E+02	1.55E+02	1.69E+02	3.76E+02	2.73E-03	4.15E-03	1.08E+02	4.12E+02											
71	TE	136	4.450E-01	(W, G)	TE	131	C	1.73E-04	6.44E-04	2.14E-03	3.98E-03	4.19E-03	6.91E-03	4.59E-04	8.42E-04	2.16E-03	7.75E-03											
72	Z	127	1.007E+00	(W, G)	Z	128	C	2.63E-03	2.70E-01	1.52E+00	2.69E+00	2.81E+00	3.25E+00	1.48E-02	2.54E-01	1.52E+00	1.72E+00											
73	Z	129	0.0	(W, G)	Z	132	C	1.133E-03	1.45E-01	6.63E-01	1.51E+00	1.56E+00	4.36E+00	3.44E-02	1.75E-01	8.86E-01	4.88E+00											
74	Z	131	1.213E-01	(W, G)	Z	132	C	7.16E-02	1.13E+00	1.12E+01	2.56E+01	2.65E+01	4.45E+01	4.14E-01	2.92E-07	8.89E-01	1.12E+01	4.70E+01										
75	ZE	135	0.0	(W, G)	ZE	136	C	0.0	7.67E-01	2.76E+03	3.89E+03	4.66E+03	2.63E+05	6.6	6.79E-01	2.78E+03	2.93E+05											
76	CS	133	1.003E-00	(W, G)	CS	134	C	1.52E-04	2.57E-01	1.74E+00	1.51E+00	1.77E-03	6.64E+00	6.56E-01	2.02E-01	1.78E+00	7.58E+00											
77	CS	133	1.000E-00	(W, G)	CS	134	C	1.15E-04	2.25E-02	1.70E-01	3.47E-01	7.2E-01	6.11E-01	6.19E-01	7.78E-01	1.73E-01	7.19E-01											
78	CS	135	0.0	(W, G)	CS	136	C	1.30E-03	1.04E-01	3.76E-01	1.41E+00	1.44E+00	2.23E+00	4.47E-03	9.10E-02	7.50E-01	2.54E+01											
79	BA	130	1.100E-01	(W, G)	BA	131	C	2.13E-03	1.16E-03	6.64E-03	1.03E+00	1.07E+00	4.12E+00	1.64E-02	1.53E-01	6.46E-01	2.38E+00											
80	BA	130	1.103E-01	(W, G)	BA	131	C	1.24E-04	3.61E-03	1.32E-01	2.01E-01	2.11E-01	4.52E-01	1.49E-01	3.49E-02	1.31E-01	5.06E-01											
81	BA	132	1.003E-03	(W, G)	BA	131	C	1.49E-01	1.35E-02	8.19E-02	7.38E-01	7.77E-03	6.64E+00	1.17E-02	2.18E-01	1.41E-01	1.31E+00											
82	BA	132	1.007E-03	(W, G)	BA	131	C	1.47E-01	4.61E-03	1.47E-02	2.24E-02	2.31E-02	4.74E-02	5.73E-04	3.19E-01	1.46E-02	5.11E-02											
83	BA	134	2.400E-02	(W, G)	BA	135	C	5.57E-03	7.84E-03	1.62E-02	4.62E-02	4.42E-02	6.19E-02	1.06E-04	3.72E-01	3.00E-02	7.63E-02											
84	BA	136	7.300E-02	(W, G)	BA	137	C	1.47E-05	1.90E-04	7.10E-04	2.61E-04	2.97E-04	1.46E-01	1.11E-01	1.61E-04	5.22E-04	2.16E-03											
85	BA	137	7.170E-01	(W, G)	BA	137	C	1.62E-06	1.77E-04	2.99E-02	2.60E-02	2.60E-02	8.65E-02	1.11E-01	1.12E-01	7.72E-01	7.22E-02											
86	LA	136	9.945E-01	(W, G)	LA	136	C	2.64E-04	2.41E-02	2.25E-01	4.46E-01	4.61E-01	1.22E+00	1.19E-01	2.31E-02	2.25E-01	1.49E+00											
87	CP	136	1.900E-03	(W, G)	CP	137	C	1.54E-03	1.12E-02	5.44E-02	1.07E-01	1.12E-01	7.53E-01	1.14E-01	1.01E-02	4.44E-02	8.17E-01											
88	CP	136	1.900E-03	(W, G)	CP	137	C	1.27E-04	1.60E-03	8.18E-03	1.61E-02	1.64E-02	1.74E-02	1.13E-03	1.61E-03	6.12E-03	1.17E-01											
89	CP	130	2.500E+01	(W, G)	CP	139	C	1.17E-03	2.09E-02	7.03E-02	1.48E-01	1.54E-01	2.55E-01	1.42E-01	1.94E-02	9.01E-01	1.01E-01											
90	CS	140	8.600E-01	(W, G)	CS	141	C	2.54E-03	1.17E-02	3.37E-02	5.14E-02	5.75E-02	1.12E-01	9.54E-01	1.10E-02	3.36E-01	1.23E-01											

DATA BASE: CATALOG/3360 11-6 4100Y APR 11:38

[illegible]

SPECTRUM WEIGHTED EFFECTIVE CROSS SECTION FOR (n,n') REACTION
DATA BASE: KASTAR/SANT-II ON A151 AND I151F9

PARENT					PRODUCT																					
SFO	Z	A	ABUNDANCE	REACTION	Z	A	SIG	1	SIG	2	SIG	3	SIG	4	SIG	5	SIG	6	SIG	7	SIG	8	SIG	9	SIG	10
116	HP	176	5.250E-02	(n, g)	HP	177	C	2.12E+01	5.54E+01	5.11E+00	1.17E+01	1.27E+01	1.07E+01	1.47E+02	4.99E-01	5.17E+00	1.46E+01									
117	HP	177	1.867E-01	(n, g)	HP	178	C	2.14E+01	5.54E+01	5.55E+01	5.55E+01	6.22E+01	6.13E+01	1.27E+01	2.05E+02	2.55E+01	9.75E+01									
118	HP	178	2.715E-01	(n, g)	HP	179	C	6.13E+01	1.11E+02	5.71E+01	5.77E+01	6.48E+01	6.43E+01	3.44E+02	1.13E+02	2.51E+01	7.88E+01									
119	HP	179	1.131E-01	(n, g)	HP	180	C	1.44E+01	5.25E+01	5.25E+01	5.25E+01	5.78E+01	1.71E+01	1.56E+02	7.02E+01	1.71E+00	4.08E+01									
141	HP	179	1.110E-01	(n, g)	HP	180	C	1.44E+01	5.25E+01	5.25E+01	5.25E+01	5.78E+01	1.71E+01	1.56E+02	7.02E+01	1.71E+00	4.08E+01									
141	HP	185	1.523E-01	(n, g)	HP	184	C	4.40E+01	1.13E+01	2.71E+01	2.71E+01	2.71E+01	1.14E+01	1.14E+01	1.13E+01	7.67E+01	1.55E+00									
142	TA	181	9.597E-01	(n, g)	TA	182	C	2.14E+01	1.17E+01	1.17E+01	1.17E+01	1.21E+01	1.71E+01	1.71E+01	5.40E+01	1.05E+01	1.06E+01									
143	CS	186	1.873E-04	(n, g)	CS	185	C	6.13E+01	5.40E+01	5.40E+01	5.40E+01	5.40E+01	5.40E+01	5.40E+01	5.40E+01	1.14E+01	2.03E+01									
144	CS	188	1.130E-01	(n, g)	CS	185	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
145	CS	189	1.413E-01	(n, g)	CS	186	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
146	CS	190	2.641E-01	(n, g)	CS	186	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
147	CS	191	2.641E-01	(n, g)	CS	186	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
148	CS	192	1.131E-01	(n, g)	CS	187	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
149	IR	191	1.313E-01	(n, g)	IR	190	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
150	IR	191	1.313E-01	(n, g)	IR	190	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
151	IR	192	1.313E-01	(n, g)	IR	190	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
152	PT	192	1.473E-04	(n, g)	PT	191	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
153	PT	192	1.473E-04	(n, g)	PT	191	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
154	PT	192	1.473E-04	(n, g)	PT	191	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
155	PT	192	1.473E-04	(n, g)	PT	191	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
156	PT	192	1.473E-04	(n, g)	PT	191	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
157	PT	192	1.473E-04	(n, g)	PT	191	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
158	PT	192	1.473E-04	(n, g)	PT	191	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
159	HC	196	1.577E-03	(n, g)	HC	195	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
160	HC	196	1.577E-03	(n, g)	HC	195	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
161	HC	198	1.577E-03	(n, g)	HC	195	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
162	HC	202	2.987E-01	(n, g)	HC	201	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
163	HC	204	1.907E-02	(n, g)	HC	203	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
164	TL	203	1.951E-01	(n, g)	TL	202	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
165	TL	205	7.947E-01	(n, g)	TL	204	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
166	PI	209	1.305E+00	(n, g)	PI	208	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
167	TR	212	1.170E+00	(n, g)	TR	211	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
168	PA	211	0.0	(n, g)	PA	210	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
169	PA	211	0.0	(n, g)	PA	210	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
170	U	213	0.0	(n, g)	U	212	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
171	U	214	5.400E-05	(n, g)	U	213	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
172	U	215	1.100E-03	(n, g)	U	214	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
173	U	216	0.0	(n, g)	U	215	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
174	U	218	1.247E-01	(n, g)	U	217	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
175	AP	217	0.0	(n, g)	AP	216	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
176	PU	218	0.0	(n, g)	PU	217	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
177	PU	219	0.0	(n, g)	PU	218	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
178	PU	240	0.0	(n, g)	PU	239	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
179	PU	240	0.0	(n, g)	PU	239	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								
180	PU	242	0.0	(n, g)	PU	241	C	1.56E+01	4.97E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	6.13E+01	1.71E+01	1.47E+01	1.47E+01								

Table II.C

SPECTRON WEIGHTED EFFECTIVE CROSS SECTION σ_{eff} (N,C) REACTION
 DATA BASE: ULL-19/ACT1

PARENT				EFFECTIVE															
SFO	Z	A	ABUNDANCE REACTION	Z	A	S	SIG 1	SIG 2	SIG 3	SIG 4	SIG 5	SIG 6	SIG 7	SIG 8	SIG 9	SIG 10			
1	RG	76	1.101E-01	(N, C) R	76	C	1.101E-01	1.401E-04	1.28E-04	4.98E-04	9.35E-04	6.40E-03	8.88E-05	1.69E-04	6.51E-04	7.31E-03			
2	SI	39	1.139E-02	(N, C) SI	39	C	4.15E-03	1.77E-03	2.73E-03	4.09E-03	6.24E-03	1.94E-02	5.03E-04	9.70E-04	2.71E-03	2.19E-02			
3	SI	31	0.0	(N, C) SI	31	C	2.02E-04	1.50E-04	1.50E-03	2.82E-03	2.92E-03	1.53E-02	1.40E-04	6.56E-04	1.85E-03	1.66E-02			
4	P	31	1.002E+00	(N, C) P	31	C	2.98E-04	1.71E-04	4.18E-03	6.02E-03	6.21E-03	3.42E-02	7.68E-04	1.72E-03	4.20E-03	3.89E-02			
5	S	34	4.21E-02	(N, C) S	34	C	1.44E-05	1.04E-03	7.55E-02	1.45E-02	1.54E-02	5.24E-02	9.13E-05	9.21E-04	7.53E-03	5.86E-02			
6	S	36	1.700E-04	(N, C) S	36	C	1.60E-05	4.41E-04	4.54E-03	4.70E-03	9.12E-03	3.14E-02	9.29E-05	5.77E-04	4.53E-03	3.51E-02			
7	AP	36	1.170E-03	(N, C) AP	36	C	6.51E-04	6.31E-03	3.01E-02	6.40E-02	6.72E-02	6.63E-02	2.94E-03	6.65E-03	3.03E-02	7.35E-01			
8	AR	36	6.30E-04	(N, C) AR	36	C	6.22E-04	1.41E-03	1.55E-02	1.24E-02	3.41E-02	3.32E-03	1.40E-03	3.56E-03	1.54E-02	3.68E-01			
9	AR	40	9.960E-01	(N, C) AR	40	C	5.29E-04	1.49E-03	5.68E-03	1.15E-02	1.20E-02	1.15E-01	6.72E-04	1.50E-03	5.70E-03	1.27E-01			
10	CA	40	1.870E-01	(N, C) CA	40	C	4.53E-04	1.50E-03	5.50E-03	1.14E-02	1.19E-02	1.16E-01	1.27E-03	1.74E-03	5.58E-03	1.29E-01			
11	EL	64	9.000E-03	(N, C) EL	64	C	4.05E-04	4.51E-03	2.02E-02	3.15E-02	3.73E-02	2.58E-01	1.64E-03	4.83E-03	1.02E-02	2.86E-01			
12	CU	65	1.080E-01	(N, C) CU	66	C	1.46E-03	1.39E-02	5.61E-02	9.36E-02	9.64E-02	3.45E-01	4.51E-03	1.36E-02	5.63E-02	3.64E-01			

Table III.A

SPECTRUM WEIGHTED EFFECTIVE CROSS SECTION FOR (N,P) REACTION
DATA BASE: LBL-33/REACTC

PARENT		PRODUCT															
SERIAL	#	ABUNDANCE	REACTION	Z	A	S	SIG 1	SIG 2	SIG 3	SIG 4	SIG 5	SIG 6	SIG 7	SIG 8	SIG 9	SIG 10	
1	88	3	1.403E-36	(N, P)	H	3	C	1.22E-01	1.1E-03	3.36E-01	8.19E-01	8.61E-01	9.74E-02	7.54E-01	2.99E-00	3.37E-01	1.08E-03
2	12	6	7.50E-02	(N, P)	BE	6	O	7.14E-01	2.91E-01	1.17E-03	2.59E-03	2.42E-03	1.24E-03	C.O.	C.O.	C.O.	C.O.
3	88	9	1.037E+00	(N, P)	LI	9	C	2.47E-05	7.07E-06	1.65E-06	8.06E-07	5.30E-07	4.57E-06	C.O.	C.O.	C.O.	C.O.
4	8	10	2.903E-01	(N, P)	BE	10	C	1.25E-02	1.14E-02	4.14E-04	6.38E-03	5.78E-03	2.82E-03	1.13E-02	4.86E-03	1.72E-03	9.21E-04
5	8	11	8.03E-01	(N, P)	BE	11	C	2.77E-01	6.55E-04	1.75E-08	9.22E-05	6.42E-05	8.17E-06	C.O.	C.O.	C.O.	C.O.
6	8	16	9.98E-01	(N, P)	C	14	O	4.85E-02	1.04E-02	2.84E-02	4.51E-02	4.65E-02	3.43E-01	1.93E-02	1.58E-02	2.69E-02	3.75E-01
7	10	16	9.91E-01	(N, P)	H	16	C	4.44E-02	1.15E-02	1.31E-01	1.22E-03	1.71E-03	3.05E-04	C.O.	C.O.	C.O.	C.O.
8	8	19	1.005E+00	(N, P)	O	19	C	1.70E-02	5.5E-03	1.84E-03	2.75E-03	2.65E-03	8.92E-04	C.O.	C.O.	C.O.	C.O.
9	8A	23	1.000E+00	(N, P)	H	23	C	4.40E-02	1.34E-02	6.32E-03	5.12E-03	4.48E-03	1.44E-03	C.O.	C.O.	C.O.	C.O.
10	AL	27	1.302E+00	(N, P)	NG	27	C	7.74E-04	2.33E-02	7.10E-03	4.23E-03	7.01E-03	2.72E-03	5.14E-05	1.65E-05	4.26E-06	1.53E-06
11	SL	28	4.223E-01	(N, P)	AL	28	C	3.28E-01	1.01E-01	1.23E-02	2.36E-02	2.18E-02	1.97E-02	C.O.	C.O.	C.O.	C.O.
12	P	31	1.003E+00	(N, P)	SI	31	O	8.44E-02	3.19E-02	1.24E-02	2.37E-02	2.18E-02	1.97E-02	5.49E-02	1.82E-02	4.55E-03	1.93E-03
13	S	32	9.502E-01	(N, P)	P	32	C	1.47E-01	8.54E-02	1.07E-02	5.23E-02	4.73E-02	2.16E-02	7.69E-02	2.64E-02	7.25E-03	2.86E-03
14	CL	35	7.577E-01	(N, P)	S	35	S	1.07E-01	3.48E-02	1.19E-02	2.24E-02	2.08E-02	9.14E-02	2.43E-02	9.80E-03	5.27E-03	9.50E-02
15	CL	37	2.423E-01	(N, P)	S	37	C	7.55E-02	2.14E-02	6.37E-03	6.50E-03	5.50E-03	1.47E-03	C.O.	C.O.	C.O.	C.O.
16	K	39	3.362E-01	(N, P)	AR	39	C	1.44E-01	1.15E-01	4.15E-02	6.43E-02	5.80E-02	3.56E-02	1.09E-01	4.65E-02	1.28E-02	1.60E-02
17	K	41	6.737E-01	(N, P)	BE	41	C	1.10E-01	1.03E-02	6.11E-03	1.05E-02	8.57E-03	2.78E-03	C.O.	C.O.	C.O.	C.O.
18	TI	46	6.257E-02	(N, P)	SC	46	C	2.68E-01	7.68E-02	2.21E-02	2.64E-02	2.72E-02	7.17E-03	1.47E-04	5.05E-05	1.44E-05	6.01E-06
19	IZ	47	7.453E-02	(N, P)	SC	47	C	1.15E-01	1.74E-02	1.28E-02	1.92E-02	1.7E-02	2.62E-03	3.17E-02	1.17E-02	3.56E-03	1.56E-03
20	TI	48	7.16E-01	(N, P)	SL	48	C	1.51E-02	1.79E-02	4.89E-03	3.70E-03	2.6E-03	5.72E-04	C.O.	C.O.	C.O.	C.O.
21	TI	49	5.957E-02	(N, P)	SC	49	C	4.13E-02	1.20E-02	3.69E-03	4.29E-03	3.62E-03	1.27E-03	3.62E-05	1.17E-05	3.07E-06	1.13E-06
22	TI	50	5.23E-02	(N, P)	SC	50	C	1.59E-02	4.55E-03	1.45E-03	1.11E-03	8.06E-04	1.64E-04	C.O.	C.O.	C.O.	C.O.
23	V	51	9.775E-01	(N, P)	LI	51	C	1.61E-02	1.03E-02	1.05E-03	3.33E-03	2.66E-03	8.75E-04	C.O.	C.O.	C.O.	C.O.
24	CR	50	4.350E-02	(N, P)	V	50	C	3.45E-01	1.03E-01	3.23E-02	4.46E-02	3.48E-02	1.28E-02	6.75E-03	2.25E-03	6.17E-04	2.42E-04
25	CR	52	8.193E-01	(N, P)	V	52	O	1.14E-01	3.33E-02	1.04E-02	1.28E-02	1.05E-02	3.88E-03	C.O.	C.O.	C.O.	C.O.
26	CR	53	9.503E-02	(N, P)	V	53	C	5.52E-02	1.59E-02	4.55E-03	4.25E-03	3.50E-03	9.46E-04	C.O.	C.O.	C.O.	C.O.
27	CR	54	2.380E-02	(N, P)	V	54	O	2.64E-02	6.89E-03	1.95E-03	1.46E-03	9.5E-04	1.93E-04	C.O.	C.O.	C.O.	C.O.
28	FR	55	1.302E+00	(N, P)	CR	55	C	4.10E-02	1.37E-02	1.37E-03	1.89E-02	3.15E-03	9.59E-04	2.98E-06	9.94E-07	7.71E-07	1.07E-07
29	FE	56	5.430E-02	(N, P)	NI	54	C	3.55E-01	1.24E-01	4.35E-02	7.43E-02	6.70E-02	2.95E-02	6.17E-02	2.06E-02	5.64E-03	2.22E-03
30	FE	56	9.160E-01	(N, P)	NI	56	O	1.17E-01	1.07E-02	8.84E-03	1.07E-02	6.36E-03	1.68E-03	C.O.	C.O.	C.O.	C.O.
31	FE	57	2.120E-02	(N, P)	NI	57	C	6.73E-01	2.01E-02	4.03E-03	6.33E-03	4.42E-03	1.47E-03	C.O.	C.O.	C.O.	C.O.
32	FE	58	1.00E-01	(N, P)	NI	58	C	1.74E-02	3.97E-01	2.48E-02	2.70E-03	1.7E-03	1.14E-04	C.O.	C.O.	C.O.	C.O.
33	CO	59	1.003E+00	(N, P)	FE	59	O	8.40E-01	2.37E-02	2.04E-03	7.19E-03	6.65E-03	1.83E-03	7.10E-03	3.66E-04	3.06E-04	1.42E-04
34	CO	60	C.O.	(N, P)	FE	60	C	4.1E-02	1.43E-02	4.46E-03	5.68E-03	4.95E-03	1.33E-03	2.94E-03	1.62E-03	2.92E-04	1.19E-04
35	NI	60	6.39E-02	(N, P)	CO	54	C	3.17E-01	1.35E-01	4.91E-02	8.77E-02	7.97E-02	3.65E-02	1.03E-01	3.57E-02	1.05E-02	4.46E-03
36	NI	62	2.10E-01	(N, P)	CO	62	C	1.26E-01	3.69E-02	1.1E-02	1.40E-02	9.81E-03	2.65E-03	4.2E-04	1.49E-05	3.68E-06	1.36E-06
37	NI	63	1.103E-02	(N, P)	CO	63	O	5.11E-02	2.67E-02	7.95E-03	8.55E-03	7.10E-03	4.47E-03	1.50E-04	6.44E-05	1.71E-05	6.45E-06
38	NI	64	6.67E-02	(N, P)	CO	62	C	4.92E-02	1.32E-02	3.77E-03	2.82E-03	2.16E-03	4.74E-04	C.O.	C.O.	C.O.	C.O.
39	NI	63	C.O.	(N, P)	CO	63	C	3.25E-02	8.09E-03	2.57E-03	2.21E-03	1.73E-03	4.11E-04	C.O.	C.O.	C.O.	C.O.
40	NI	64	9.000E-03	(N, P)	CO	69	C	1.34E-02	3.61E-03	1.00E-03	6.68E-04	4.95E-04	4.19E-05	C.O.	C.O.	C.O.	C.O.
41	CO	63	6.720E-01	(N, P)	NI	63	C	1.55E-02	3.54E-02	1.25E-02	2.12E-02	1.83E-02	8.97E-03	1.55E-02	1.28E-02	3.03E-03	1.09E-03
42	CO	65	3.08CF-01	(N, P)	NI	63	C	2.49E-02	5.89E-03	1.73E-03	1.72E-03	1.40E-03	4.19E-04	C.O.	C.O.	C.O.	C.O.
43	T	69	1.000E+00	(N, P)	SR	69	O	2.38E-02	6.43E-03	1.84E-03	1.50E-03	1.16E-03	2.10E-03	1.51E-07	1.12E-07	2.91E-08	1.04E-08
44	T	90	C.O.	(N, P)	SR	90	O	1.77E-02	4.86E-03	1.41E-03	1.24E-03	9.87E-04	4.20E-04	2.63E-05	6.71E-06	1.31E-06	4.94E-07
45	T	91	C.O.	(N, P)	SR	91	O	1.12E-02	2.44E-03	6.38E-04	6.26E-04	4.76E-04	9.73E-05	C.O.	C.O.	C.O.	C.O.

SPECTRUM WEIGHTED EFFECTIVE CR IS SELECTED FOR (M,P) PLATION
DATA BASE: DCL-10/MONTAGE

PARENT					PRODUCT										
SPG	Z	A	ABUNDANCE	REACTION	1	2	3	4	5	6	7	8	9	10	
96	ZP	9C	5.197E-31	(M)	F	Y	56	0.000000	4.65E-01	1.21E-01	1.99E-01	1.47E-03	1.06E-04	0.0	
97	ZP	51	1.122E-31	(M)	F	Y	51	0.000000	6.47E-03	1.17E-01	1.58E-01	1.21E-01	1.72E-04	1.56E-07	
98	ZP	92	1.710E-31	(M)	F	Y	92	0.000000	1.45E-01	1.41E-01	1.14E-01	1.31E-01	9.31E-04	1.03E-04	
99	ZP	93	0.000000	(M)	F	Y	93	0.000000	0.17E-01	0.20E-01	0.21E-01	0.20E-01	0.16E-01	0.0	
100	ZP	94	1.740E-31	(M)	F	Y	94	0.000000	5.47E-01	1.40E-01	1.34E-01	0.25E-01	1.05E-01	3.25E-05	
101	ZP	95	0.000000	(M)	F	Y	95	0.000000	0.41E-01	1.17E-01	3.19E-01	1.22E-01	1.83E-01	2.04E-05	
102	ZP	96	2.830E-32	(M)	F	Y	96	0.000000	1.12E-03	1.44E-04	5.10E-01	1.69E-01	5.03E-05	6.41E-06	
103	ZP	97	1.000E+00	(M)	F	Y	97	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
104	ZP	98	1.000E+00	(M)	F	Y	98	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
105	PD	52	1.460E-01	(M)	B	W	92	0.000000	1.72E-02	0.16E-01	0.16E-01	0.46E-01	1.14E-04	6.37E-05	
106	MO	91	0.000000	(M)	B	W	91	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
107	MO	94	0.000000	(M)	B	W	94	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
108	MO	95	0.000000	(M)	B	W	95	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
109	MO	96	0.000000	(M)	B	W	96	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
110	MO	97	0.000000	(M)	B	W	97	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
111	MO	98	0.000000	(M)	B	W	98	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
112	MO	99	0.000000	(M)	B	W	99	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
113	MO	100	0.000000	(M)	B	W	100	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
114	MO	101	0.000000	(M)	B	W	101	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
115	MO	102	0.000000	(M)	B	W	102	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
116	MO	103	0.000000	(M)	B	W	103	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
117	MO	104	0.000000	(M)	B	W	104	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
118	MO	105	0.000000	(M)	B	W	105	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
119	MO	106	0.000000	(M)	B	W	106	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
120	MO	107	0.000000	(M)	B	W	107	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
121	MO	108	0.000000	(M)	B	W	108	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
122	MO	109	0.000000	(M)	B	W	109	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
123	MO	110	0.000000	(M)	B	W	110	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
124	MO	111	0.000000	(M)	B	W	111	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
125	MO	112	0.000000	(M)	B	W	112	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
126	MO	113	0.000000	(M)	B	W	113	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
127	MO	114	0.000000	(M)	B	W	114	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
128	MO	115	0.000000	(M)	B	W	115	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
129	MO	116	0.000000	(M)	B	W	116	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
130	MO	117	0.000000	(M)	B	W	117	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
131	MO	118	0.000000	(M)	B	W	118	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
132	MO	119	0.000000	(M)	B	W	119	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
133	MO	120	0.000000	(M)	B	W	120	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
134	MO	121	0.000000	(M)	B	W	121	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
135	MO	122	0.000000	(M)	B	W	122	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
136	MO	123	0.000000	(M)	B	W	123	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
137	MO	124	0.000000	(M)	B	W	124	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
138	MO	125	0.000000	(M)	B	W	125	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
139	MO	126	0.000000	(M)	B	W	126	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
140	MO	127	0.000000	(M)	B	W	127	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
141	MO	128	0.000000	(M)	B	W	128	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
142	MO	129	0.000000	(M)	B	W	129	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
143	MO	130	0.000000	(M)	B	W	130	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
144	MO	131	0.000000	(M)	B	W	131	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
145	MO	132	0.000000	(M)	B	W	132	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
146	MO	133	0.000000	(M)	B	W	133	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
147	MO	134	0.000000	(M)	B	W	134	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
148	MO	135	0.000000	(M)	B	W	135	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
149	MO	136	0.000000	(M)	B	W	136	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
150	MO	137	0.000000	(M)	B	W	137	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
151	MO	138	0.000000	(M)	B	W	138	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
152	MO	139	0.000000	(M)	B	W	139	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
153	MO	140	0.000000	(M)	B	W	140	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
154	MO	141	0.000000	(M)	B	W	141	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
155	MO	142	0.000000	(M)	B	W	142	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
156	MO	143	0.000000	(M)	B	W	143	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
157	MO	144	0.000000	(M)	B	W	144	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
158	MO	145	0.000000	(M)	B	W	145	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
159	MO	146	0.000000	(M)	B	W	146	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
160	MO	147	0.000000	(M)	B	W	147	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
161	MO	148	0.000000	(M)	B	W	148	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
162	MO	149	0.000000	(M)	B	W	149	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
163	MO	150	0.000000	(M)	B	W	150	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
164	MO	151	0.000000	(M)	B	W	151	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
165	MO	152	0.000000	(M)	B	W	152	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
166	MO	153	0.000000	(M)	B	W	153	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
167	MO	154	0.000000	(M)	B	W	154	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
168	MO	155	0.000000	(M)	B	W	155	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
169	MO	156	0.000000	(M)	B	W	156	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
170	MO	157	0.000000	(M)	B	W	157	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
171	MO	158	0.000000	(M)	B	W	158	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
172	MO	159	0.000000	(M)	B	W	159	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
173	MO	160	0.000000	(M)	B	W	160	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
174	MO	161	0.000000	(M)	B	W	161	0.000000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
175	MO	162	0.000000	(M)	B	W									

Table III-B

SPECTRUM WEIGHTED EFFECTIVE CROSS SECTION FOR (N,P) REACTION
DATA BASE: CARFAP/SAND-II ON ALIEN AND LSLFPH

PARENT		PRODUCT																								
SEQ	Z	A	ABUNDANCE	REACTION	Z	A	SIG	1	SIG	2	SIG	3	SIG	4	SIG	5	SIG	6	SIG	7	SIG	8	SIG	9	SIG	10
1	ZH	64	8.8602E-01	(N, P)	CU	64	0	2.00E-01	4.83E-02	2.36E-02	3.76E-02	3.36E-02	1.40E-02	3.53E-02	1.26E-02	1.33E-03	1.36E-03	1.36E-03	1.36E-03	1.36E-03	1.36E-03	1.36E-03	1.36E-03	1.36E-03	1.36E-03	1.36E-03
2	ZH	66	2.7075E-01	(N, P)	CU	66	0	7.59E-02	2.16E-02	6.39E-03	6.49E-03	5.29E-03	1.52E-03	7.12E-04	2.37E-04	6.47E-05	2.58E-05	2.58E-05	2.58E-05	2.58E-05	2.58E-05	2.58E-05	2.58E-05	2.58E-05	2.58E-05	2.58E-05
3	ZH	67	8.1035E-02	(N, P)	CU	67	0	5.72E-02	1.77E-02	4.57E-03	4.19E-03	3.17E-03	4.16E-04	4.37E-04	1.55E-04	4.13E-05	1.88E-05	1.88E-05	1.88E-05	1.88E-05	1.88E-05	1.88E-05	1.88E-05	1.88E-05	1.88E-05	1.88E-05
4	GA	69	6.0131E-01	(N, P)	AM	69	0	4.42E-02	1.28E-02	4.15E-03	4.55E-03	3.85E-03	1.43E-03	2.45E-03	1.47E-03	6.75E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04
5	GA	69	6.0171E-01	(N, P)	AM	69	1	4.42E-02	1.28E-02	4.15E-03	4.55E-03	3.85E-03	1.43E-03	2.45E-03	1.47E-03	6.75E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04
6	GA	71	3.9972E-01	(N, P)	AM	71	0	1.03E-01	6.52E-03	2.45E-03	1.26E-03	1.79E-03	4.47E-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	GA	71	3.9972E-01	(N, P)	AM	71	1	1.03E-01	6.52E-03	2.45E-03	1.26E-03	1.79E-03	4.47E-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	GE	72	2.0731E-01	(N, P)	GA	72	0	4.64E-02	1.29E-02	1.74E-02	1.12E-02	1.52E-02	6.17E-03	1.69E-02	7.30E-03	2.56E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03
9	GE	72	2.1933E-01	(N, P)	GA	72	0	6.43E-02	1.71E-02	4.49E-03	4.47E-03	3.08E-03	6.40E-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	AS	75	1.0052E+02	(N, P)	SE	75	0	1.52E-02	3.74E-03	1.50E-03	1.33E-03	1.63E-03	6.90E-04	2.49E-04	1.51E-03	6.62E-04	2.96E-04	2.96E-04	2.96E-04	2.96E-04	2.96E-04	2.96E-04	2.96E-04	2.96E-04	2.96E-04	2.96E-04
11	SE	74	9.074E-03	(N, P)	AS	74	0	1.61E-03	1.69E-02	1.44E-02	2.20E-02	1.65E-02	4.46E-03	4.63E-02	2.26E-02	8.95E-03	4.12E-02	4.12E-02	4.12E-02	4.12E-02	4.12E-02	4.12E-02	4.12E-02	4.12E-02	4.12E-02	4.12E-02
12	SE	76	9.079E-02	(N, P)	AS	76	0	5.79E-02	1.77E-02	5.36E-03	6.66E-03	5.72E-03	2.17E-03	3.23E-03	1.03E-03	2.66E-04	9.67E-05	9.67E-05	9.67E-05	9.67E-05	9.67E-05	9.67E-05	9.67E-05	9.67E-05	9.67E-05	9.67E-05
13	SE	78	2.3533E-01	(N, P)	AS	78	0	2.64E-02	6.79E-03	1.74E-03	1.66E-03	1.59E-03	5.23E-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	SP	78	2.3537E-01	(N, P)	AS	78	1	2.64E-02	6.79E-03	1.74E-03	1.66E-03	1.59E-03	5.23E-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	BR	81	4.9311E-01	(N, P)	SE	81	0	2.17E-02	6.21E-03	1.42E-03	1.49E-03	1.18E-03	1.17E-04	7.37E-04	3.53E-04	1.32E-04	6.10E-05	6.10E-05	6.10E-05	6.10E-05	6.10E-05	6.10E-05	6.10E-05	6.10E-05	6.10E-05	6.10E-05
16	BR	81	4.9311E-01	(N, P)	SE	81	1	2.17E-02	6.21E-03	1.42E-03	1.49E-03	1.18E-03	1.17E-04	7.37E-04	3.53E-04	1.32E-04	6.10E-05	6.10E-05	6.10E-05	6.10E-05	6.10E-05	6.10E-05	6.10E-05	6.10E-05	6.10E-05	6.10E-05
17	BB	87	2.7813E-01	(N, P)	AR	87	0	4.97E-03	1.40E-03	4.23E-04	4.62E-04	3.87E-04	1.29E-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	SR	86	9.4943E-02	(N, P)	BB	86	0	2.61E-02	5.40E-03	1.43E-03	1.15E-03	8.68E-04	2.21E-04	5.01E-04	2.02E-04	7.02E-05	3.19E-05	3.19E-05	3.19E-05	3.19E-05	3.19E-05	3.19E-05	3.19E-05	3.19E-05	3.19E-05	3.19E-05
19	SR	86	9.4943E-02	(N, P)	BB	86	1	2.61E-02	5.40E-03	1.43E-03	1.15E-03	8.68E-04	2.21E-04	5.01E-04	2.02E-04	7.02E-05	3.19E-05	3.19E-05	3.19E-05	3.19E-05	3.19E-05	3.19E-05	3.19E-05	3.19E-05	3.19E-05	3.19E-05
20	SR	88	4.2632E-01	(N, P)	BB	88	0	1.87E-02	4.80E-03	1.15E-03	1.03E-03	7.84E-04	1.72E-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	PU	96	5.5002E-02	(N, P)	TL	96	0	4.69E-02	2.17E-02	4.41E-03	7.85E-03	7.02E-03	1.94E-03	6.05E-03	5.69E-03	3.00E-03	3.13E-03	3.13E-03	3.13E-03	3.13E-03	3.13E-03	3.13E-03	3.13E-03	3.13E-03	3.13E-03	3.13E-03
22	PU	96	5.5075E-02	(N, P)	TL	96	1	4.69E-02	2.17E-02	4.41E-03	7.85E-03	7.02E-03	1.94E-03	6.05E-03	5.69E-03	3.00E-03	3.13E-03	3.13E-03	3.13E-03	3.13E-03	3.13E-03	3.13E-03	3.13E-03	3.13E-03	3.13E-03	3.13E-03
23	BU	99	1.2128E-01	(N, P)	TL	99	0	1.49E-02	5.16E-04	4.47E-04	2.14E-04	1.59E-04	1.15E-04	1.70E-04	1.59E-04	1.40E-04	8.77E-05	8.77E-05	8.77E-05	8.77E-05	8.77E-05	8.77E-05	8.77E-05	8.77E-05	8.77E-05	8.77E-05
24	BU	99	1.2102E-01	(N, P)	TL	99	1	1.49E-02	5.16E-04	4.47E-04	2.14E-04	1.52E-04	5.54E-04	1.36E-04	5.92E-04	2.09E-04	9.82E-05	9.82E-05	9.82E-05	9.82E-05	9.82E-05	9.82E-05	9.82E-05	9.82E-05	9.82E-05	9.82E-05
25	BU	101	1.7302E-01	(N, P)	TL	101	0	1.49E-02	5.16E-04	4.47E-04	2.14E-04	1.52E-04	5.54E-04	1.36E-04	5.92E-04	2.09E-04	9.82E-05	9.82E-05	9.82E-05	9.82E-05	9.82E-05	9.82E-05	9.82E-05	9.82E-05	9.82E-05	9.82E-05
26	PU	102	3.1602E-01	(N, P)	TL	102	0	5.72E-03	1.54E-03	4.43E-04	3.65E-04	4.86E-04	7.16E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	BU	104	1.8733E-01	(N, P)	TL	104	0	6.43E-02	1.72E-02	4.49E-03	4.47E-03	3.08E-03	6.40E-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	BU	103	1.1502E-01	(N, P)	PU	103	0	1.54E-02	4.73E-03	1.87E-03	1.54E-03	1.24E-03	4.81E-04	9.74E-04	9.10E-04	6.00E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04
29	PD	106	1.1502E-01	(N, P)	PU	106	1	1.54E-02	4.73E-03	1.87E-03	1.54E-03	1.24E-03	4.81E-04	9.74E-04	9.10E-04	6.00E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04
30	PD	105	2.7102E-01	(N, P)	PU	105	0	1.54E-02	4.73E-03	1.87E-03	1.54E-03	1.24E-03	4.81E-04	9.74E-04	9.10E-04	6.00E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04	5.01E-04
31	CD	106	1.1502E-02	(N, P)	AS	106	0	1.61E-03	1.69E-02	1.44E-02	2.20E-02	1.65E-02	4.46E-03	4.63E-02	2.26E-02	8.95E-03	4.12E-02	4.12E-02	4.12E-02	4.12E-02	4.12E-02	4.12E-02	4.12E-02	4.12E-02	4.12E-02	4.12E-02
32	CD	106	1.1507E-02	(N, P)	AS	106	1	1.61E-03	1.69E-02	1.44E-02	2.20E-02	1.65E-02	4.46E-03	4.63E-02	2.26E-02	8.95E-03	4.12E-02	4.12E-02	4.12E-02	4.12E-02	4.12E-02	4.12E-02	4.12E-02	4.12E-02	4.12E-02	4.12E-02
33	CD	110	1.2542E-01	(N, P)	AS	110	0	1.57E-02	5.16E-04	4.47E-04	2.14E-04	1.59E-04	1.15E-04	1.70E-04	1.59E-04	1.40E-04	8.86E-05	8.86E-05	8.86E-05	8.86E-05	8.86E-05	8.86E-05	8.86E-05	8.86E-05	8.86E-05	8.86E-05
34	CD	111	1.2542E-01	(N, P)	AS	111	1	1.57E-02	5.16E-04	4.47E-04	2.14E-04	1.59E-04	1.15E-04	1.70E-04	1.59E-04	1.40E-04	8.86E-05	8.86E-05	8.86E-05	8.86E-05	8.86E-05	8.86E-05	8.86E-05	8.86E-05	8.86E-05	8.86E-05
35	CD	111	1.2983E-01	(N, P)	AS	111	0	1.54E-02	2.12E-03	5.24E-04	6.11E-04	4.46E-04	1.70E-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36	CD	112	2.8132E-01	(N, P)	AG	112	0	8.11E-03	2.27E-03	6.13E-04	6.38E-04	5.22E-04	1.70E-04													

DATA ORG: CASCAH/SAH-II: 41161, 42, 41162

PARENT				PROGENY															
SFC	Z	A	ABUNDANCE	RELATION	Z	A	S	T	1	2	3	4	5	6	7	8	9	10	
4A	I	127	1.573E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
87	I	127	1.001E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
40	CS	133	1.373E-04	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
50	BS	133	1.022E-04	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
50	BS	133	1.022E-04	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
51	TA	124	2.403E-02	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
52	FA	124	1.901E-02	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
51	BA	137	1.121E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
52	BA	137	1.121E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
55	BA	137	1.971E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
55	BA	137	1.971E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
56	CF	140	8.848E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
57	CF	140	1.103E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
58	PD	147	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
58	PD	147	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
62	PD	147	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
61	MO	140	5.720E-02	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
62	SM	147	1.519E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
61	SM	147	1.519E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
61	SM	147	1.519E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
65	SM	147	2.693E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
65	SM	147	2.693E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
66	PI	151	4.731E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
67	PI	151	5.211E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
67	PI	151	5.211E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
65	CS	157	1.489E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1	1	1	0	0	0	0	0	0	0	0	0	0	
70	LO	154	1.921E-03	(P)	P	1													

SPECTRUM WEIGHTED EFFECTIVE CROSS SECTION FOR (N,P) REACTION
 DATA BASE: CASDAB/DAND-11 ON ALLPT AND LYSLEH

SEQ	E	PARENT			PRODUCT											
		Z	A	S	SIG 1	SIG 2	SIG 3	SIG 4	SIG 5	SIG 6	SIG 7	SIG 8	SIG 9	SIG 10	SIG 11	SIG 12
91	PT 195	1.360E-01	(N, P)	IR 195	0	2.45E-03	1.87E-04	1.46E-04	1.16E-04	8.42E-05	1.35E-05	0.0	0.0	0.0	0.0	0.0
92	RG 200	2.310E-01	(N, P)	AU 210	0	1.91E-03	1.27E-03	3.96E-04	5.34E-04	8.70E-04	2.03E-04	8.36E-04	2.94E-04	8.31E-05	3.79E-05	0.0
93	UG 201	1.323E-01	(N, P)	AU 201	0	1.97E-03	6.91E-04	2.55E-04	3.63E-04	3.30E-04	1.64E-04	8.10E-04	3.74E-04	1.39E-04	6.47E-05	0.0
94	TL 203	2.950E-01	(N, P)	HG 203	0	2.64E-02	7.05E-03	1.99E-03	1.54E-03	1.19E-03	2.81E-04	0.0	0.0	0.0	0.0	0.0
95	TL 205	7.050E-01	(N, P)	HG 205	0	2.52E-03	6.93E-04	2.03E-04	1.79E-04	1.45E-04	4.63E-05	1.50E-04	6.21E-05	2.10E-05	9.87E-06	0.0

Table 1333

SILICON RICHNESS EFFECTIVE CHARGE DENSITY AND X/P POSITION
DATA BASE: LTP-PR-ACCT

PARENT			PRODUCT												
SEQ	Z	A	ABUNDANCE	REACTION	Z	A	Z	SEC	SEC	SEC	SEC	SEC	SEC	SEC	SEC
1	PG	20	1.699E-01	(R)	21	BA	24	0	1.00E-01	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
2	SI	29	4.633E-02	(R)	21	K6	24	0	1.00E-01	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
3	SI	29	3.301E-02	(R)	21	AL	27	0	1.00E-01	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
4	P	31	1.307E-01	(R)	21	SI	27	0	1.00E-01	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
5	S	32	5.533E-03	(R)	21	P	34	0	1.00E-01	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
6	S	32	4.233E-02	(R)	21	P	34	0	1.00E-01	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
7	AR	38	6.703E-04	(R)	21	CL	35	0	1.00E-01	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
8	AR	40	9.983E-01	(R)	21	CL	35	0	1.00E-01	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
9	CA	40	6.694E-01	(R)	21	K	40	0	1.00E-01	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
10	CA	41	1.350E-01	(R)	21	K	40	0	1.00E-01	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
11	CA	40	2.990E-02	(R)	21	K	40	0	1.00E-01	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
12	CA	40	3.500E-05	(R)	21	K	40	0	1.00E-01	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
13	RE	58	6.030E-01	(R)	21	CO	28	0	1.00E-01	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
14	RE	58	6.830E-01	(R)	21	CO	28	0	1.00E-01	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02

Table IV.A

SPECTRUM WEIGHTED EFFECTIVE CROSS SECTION FOR (U,A) REACTION
DATA BASE: DUC-33/PCNTAGT

SEQ	1	PARENT		ISRCID1	2	3	4	5	SIG 1	SIG 2	SIG 3	SIG 4	SIG 5	SIG 6	SIG 7	SIG 8	SIG 9	SIG 10
		A	ABUNDANCE															
1	LE	6	7.5CJF-02	(N)	A	B	3	C	2.78F-02	4.17F-02	1.44E+00	1.47F+01	1.54F+01	1.71F+01	1.91E+01	1.82E-01	6.25E+00	1.51E+02
2	EE	9	1.000F+00	(N)	A	BE	6	O	1.00F-02	1.13F-02	1.13F-01	1.43F-01	1.43E-02	1.43F+01	4.27F-02	1.74F-02	9.00E-03	4.24E-03
3	B	11	8.700E-01	(N)	A	LI	8	F	1.27F-02	4.37F-02	2.43F-01	1.47F-01	1.34E-03	1.34F+01	2.07F+00	0.00	0.00	0.00
4	O	17	3.400E-04	(N)	A	CA	14	A	5.21F-02	1.24E-02	7.00E-03	1.13E-02	1.08E-02	5.00F+01	2.10F+01	4.06E-03	1.57E-03	6.70E-02
5	F	19	1.702E+00	(N)	A	A	18	F	2.25E-02	1.17F+02	5.00F+01	1.13E-01	1.13E-02	5.00F+01	6.17F+00	2.13E-04	6.74E-02	2.14E-05
6	VA	23	1.000F+00	(N)	A	CA	24	C	1.19E-03	1.47F-02	1.47F-02	1.47F-02	1.47F-02	1.47F-02	1.47F-02	0.00	0.00	0.00
7	AL	23	1.000F+00	(N)	A	KA	9	O	1.27F-01	1.42E-02	9.96E-03	1.47F-02	1.47F-02	1.47F-02	1.47F-02	0.00	0.00	0.00
8	CL	35	7.577E-01	(N)	A	F	32	C	1.00E+03	4.07F+02	1.57E+02	1.57E+02	5.00F+01	2.50E+01	7.11E-02	7.40E-02	2.45E-06	2.45E-06
9	CA	39	9.32E-01	(N)	A	LI	36	C	1.13E-01	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
10	CR	40	6.698E-01	(N)	A	AL	13	C	1.13E-01	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
11	CA	42	6.470E-01	(N)	A	AL	13	C	1.13E-01	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
12	TI	48	7.170E-01	(N)	A	AL	45	C	4.06E-02	1.13E-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
13	II	50	5.200E-02	(N)	A	AL	47	C	6.75F-03	1.13E-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
14	V	49	0.00	(N)	A	AL	44	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
15	V	50	2.530E-03	(N)	A	AL	47	C	6.75F-03	1.13E-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
16	V	51	9.495E-01	(N)	A	AL	48	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
17	CR	54	2.367E-02	(N)	A	LI	51	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
18	HM	53	0.00	(N)	A	V	50	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
9	RM	55	1.000E+00	(N)	A	V	52	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
20	PT	54	5.800E-02	(N)	A	LI	51	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
21	TE	48	3.000E-03	(N)	A	LI	45	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
22	CO	57	0.00	(N)	A	AL	54	C	6.75F-03	1.13E-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
23	CO	55	1.700E+00	(N)	A	AL	54	C	6.75F-03	1.13E-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
24	CO	60	0.00	(N)	A	AL	54	C	6.75F-03	1.13E-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
25	SI	56	0.830E-01	(N)	A	AL	52	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
26	SI	62	3.600E-02	(N)	A	AL	52	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
27	HE	63	0.00	(N)	A	AL	60	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
28	NI	64	9.300E-03	(N)	A	AL	61	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
29	CO	63	6.920E-01	(N)	A	AL	60	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
30	CU	65	3.080E-01	(N)	A	AL	62	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
31	T	89	1.000E+00	(N)	A	AL	88	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
32	T	90	0.00	(N)	A	AL	88	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
33	T	91	0.00	(N)	A	AL	88	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
34	TR	90	5.150E-01	(N)	A	AL	88	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
35	TR	92	5.110E-01	(N)	A	AL	88	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
36	TR	91	0.00	(N)	A	AL	88	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
37	TM	98	1.740E-01	(N)	A	AL	98	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
38	TR	95	0.00	(N)	A	AL	94	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
39	TR	95	2.817E-02	(N)	A	AL	94	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
40	TR	92	0.00	(N)	A	AL	92	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
41	NO	91	1.000E+00	(N)	A	AL	90	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
42	NO	98	0.00	(N)	A	AL	98	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
43	NO	100	9.600E-01	(N)	A	AL	98	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
44	PO	92	1.480E-01	(N)	A	AL	90	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03
45	NO	93	0.00	(N)	A	AL	90	C	1.13E-02	1.13F-02	1.13E-02	1.13E-02	1.13E-02	7.2E-02	9.40E-03	2.32E-03	6.75F+04	1.14E-03

589 4 4 ABORIGINAL PEOPLES 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

43

Table IV.C

SPECTRON WEIGHTED EFFECTIVE CROSS SECTION FOR (N,A) REACTION
DATA BASE: GLO-69/ACTL

SEQ	Z	PARENT		REACTION	PRODUCT			SIG 1	SIG 2	SIG 3	SIG 4	SIG 5	SIG 6	SIG 7	SIG 8	SIG 9	SIG 10
		A	ABUNDANCE		Z	A	S										
1	SI	28	3.100E-02	(N, A) RC	27	C	8.92E-02	2.27E-02	6.70E-03	5.06E-03	3.00E-03	7.35E-04	0.0	0.0	0.0	0.0	0.0
2	SI	31	0.0	(N, A) RC	28	O	7.99E-02	2.20E-02	6.39E-03	5.54E-03	4.33E-03	1.04E-03	0.0	0.0	0.0	0.0	0.0
3	P	31	1.000E+00	(N, A) AL	28	O	1.16E-01	3.20E-02	9.74E-03	9.57E-03	7.71E-03	2.07E-03	0.0	0.0	0.0	0.0	0.0
4	S	34	4.215E-02	(N, A) SI	31	O	8.11E-02	2.20E-02	6.72E-03	6.27E-03	4.96E-03	1.22E-03	0.0	0.0	0.0	0.0	0.0
5	AB	38	6.303E-04	(N, A) S	35	C	2.00E-01	5.62E-02	3.40E-02	3.87E-02	1.11E-02	2.01E-03	0.0	0.0	0.0	0.0	0.0
6	AB	40	9.960E-01	(N, A) S	37	C	2.00E-01	5.37E-02	3.50E-02	4.22E-02	9.27E-03	1.92E-03	0.0	0.0	0.0	0.0	0.0
7	CA	48	2.090E-02	(N, A) AB	41	O	9.77E-02	2.55E-02	7.04E-03	4.75E-03	3.49E-03	8.04E-04	0.0	0.0	0.0	0.0	0.0

SPECTRUM 1 EIGHTH EFFORTIVE CROSS SECTION FOR OTHER REACTIONS
DATA BASE DEC-1976/1978

PARENT				PRODUCT																						
SEC	Z	A	ABUNDANCE	REACTION	Z	A	SIG	1	SIG	2	SIG	3	SIG	4	SIG	5	SIG	6	SIG	7	SIG	8	SIG	9	SIG	10
46	81	64	4.003E-03	(N, T) LO	82	0	2.31E-01	5.33E-08	1.40E-08	6.63E-09	4.00E-09	1.44E-10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
47	T	89	1.000E+00	(N, T) SB	87	0	1.04E-01	6.52E-08	4.54E-05	1.77E-05	1.13E-05	1.3E-06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
48	T	50	0.0	(N, D) SB	85	0	1.10E-01	4.43E-11	4.03E-10	5.79E-10	4.09E-08	4.49E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
49	T	91	0.0	(N, A) SB	86	0	1.05E-01	1.15E-05	4.03E-10	2.19E-08	2.69E-08	4.19E-07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50	T	91	3.3	(N, D) SB	90	0	1.07E-02	2.20E-05	1.70E-04	4.73E-06	1.00E-04	5.47E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
51	T	91	3.0	(N, A) SB	87	0	1.04E-01	4.40E-05	1.70E-05	6.63E-06	4.76E-06	7.40E-07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52	T	51	0.0	(N, T) SB	84	0	1.07E-01	1.10E-11	1.00E-10	1.00E-10	1.12E-04	1.00E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
53	88	90	5.150E-01	(N, T) T	95	0	1.15E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54	88	90	5.153E-01	(N, T) T	95	0	1.15E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55	88	91	1.120E-01	(N, T) T	90	0	1.07E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56	88	91	1.123E-01	(N, A) SB	87	0	1.04E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57	88	91	1.123E-01	(N, T) T	89	0	1.04E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58	88	92	1.120E-01	(N, D) T	91	0	1.04E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59	88	92	1.121E-01	(N, T) T	90	0	1.04E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60	88	93	0.0	(N, D) T	91	0	1.04E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
61	88	93	0.0	(N, A) SB	89	0	1.06E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
62	88	93	0.0	(N, T) T	91	0	1.06E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
63	88	94	1.120E-01	(N, D) T	93	0	1.04E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
64	88	94	1.120E-01	(N, A) SB	90	0	1.04E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65	88	94	1.120E-01	(N, T) T	92	0	1.04E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66	88	95	0.0	(N, D) T	94	0	1.04E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
67	88	95	0.0	(N, A) SB	91	0	1.04E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68	88	95	0.0	(N, T) T	93	0	1.04E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
69	88	96	2.803E-02	(N, D) T	95	0	0.68E-04	1.73E-04	4.88E-05	2.17E-05	1.43E-05	1.57E-06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70	88	96	2.803E-02	(N, A) SB	92	0	1.08E-05	9.75E-06	2.84E-06	1.57E-06	1.13E-06	1.71E-07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
71	88	96	2.803E-02	(N, T) T	94	0	0.64E-04	1.73E-05	5.63E-06	2.64E-06	1.66E-06	1.97E-07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
72	88	92	0.0	(N, A) SB	88	0	1.04E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
73	88	92	0.0	(N, T) SB	90	0	1.04E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	1.10E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
74	88	92	0.0	(N, D) T	90	0	0.63E-07	1.58E-07	4.16E-08	1.79E-08	1.19E-08	1.2E-09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
75	88	93	1.003E+00	(N, A) SB	93	0	0.75E-02	5.07E-02	3.11E-02	4.53E-02	4.38E-02	2.69E-01	1.26E-01	1.34E-02	3.52E-02	1.53E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
76	88	93	1.003E+00	(N, T) T	99	0	1.00E-03	2.10E-02	3.00E-02	4.20E-02	5.00E-02	9.64E-07	1.20E-07	6.98E-08	3.60E-08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
77	88	93	1.003E+00	(N, D) T	91	0	1.12E-09	4.33E-10	1.10E-10	4.07E-11	1.21E-11	1.70E-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
78	88	94	0.0	(N, D) SB	93	0	1.00E-02	5.10E-01	1.60E-01	8.91E-04	4.72E-04	1.70E-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
79	88	94	0.0	(N, A) SB	90	0	1.07E-04	1.10E-04	4.84E-05	4.51E-05	2.15E-05	1.66E-06	2.10E-07	1.10E-06	1.91E-08	6.93E-09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80	88	94	0.0	(N, D) SB	95	0	1.24E-03	3.17E-04	6.52E-05	4.73E-05	2.33E-05	4.59E-06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
81	88	94	0.0	(N, T) SB	98	0	2.77E-02	6.81E-05	1.79E-05	1.81E-06	5.19E-06	1.48E-07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
82	88	92	1.003E-02	(N, D) SB	91	0	2.77E-02	5.87E-03	1.10E-01	4.01E-04	1.63E-04	1.13E-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
83	88	92	1.003E-01	(N, A) SB	86	0	6.13E-04	4.10E-04	6.72E-05	1.51E-05	2.55E-05	4.70E-06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
84	88	92	1.003E-01	(N, D) SB	90	0	1.70E-06	4.25E-07	1.12E-07	4.85E-08	3.19E-08	2.7E-09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
85	88	93	0.0	(N, D) SB	92	0	1.06E-02	4.85E-03	1.27E-03	1.76E-04	5.03E-04	8.3E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
86	88	93	0.0	(N, A) SB	95	0	3.74E-04	9.86E-05	2.74E-05	1.59E-05	1.53E-05	6.77E-06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
87	88	93	0.0	(N, T) SB	91	0	4.40E-03	1.64E-03	4.43E-04	2.56E-04	1.82E-04	2.61E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
88	88	94	1.003E-02	(N, D) SB	93	0	1.02E-02	2.00E-03	7.13E-04	4.49E-04	3.09E-04	4.70E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
89	88	94	1.003E-02	(N, A) SB	90	0	1.15E-03	3.49E-04	5.45E-05	5.77E-05	4.17E-05	6.70E-06	1.52E-07	1.13E-07	2.52E-07	1.05E-07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
90	88	94	1.003E-02	(N, T) SB	92	0	1.75E-03	4.40E-04	1.16E-04	5.26E-05	3.55E-05	6.50E-06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SPECTRUM WEIGHTED EFFECTIVE CROSS SECTION FOR OTHER REACTIONS
DATA BASE: DUC-33/NCRTAGE

SEQ	Z	PARENT			PRODUCT										SIG 6	SIG 9	SIG 10
		Z	A	S	SIG 1	SIG 2	SIG 3	SIG 4	SIG 5	SIG 6	SIG 7	SIG 8	SIG 9	SIG 10			
116	W	183	1.430E-01	(N, D)	TA 181	0.134E-04	1.81E-04	4.23E-05	2.42E-05	1.38E-05	1.50E-06	0.0	0.0	0.0	0.0	0.0	0.0
117	W	181	1.431E-01	(N, D)	HF 175	0.93E-04	2.64E-04	1.14E-04	5.29E-05	3.97E-05	7.95E-06	0.0	0.0	0.0	0.0	0.0	0.0
118	W	181	1.431E-01	(N, D)	W 181	0.88E-04	1.11E-04	1.22E-05	1.38E-05	9.15E-06	7.84E-07	0.0	0.0	0.0	0.0	0.0	0.0
119	W	184	1.367E-01	(N, D)	JA 183	0.291E-04	7.21E-05	1.08E-04	4.31E-05	1.88E-06	4.01E-07	0.0	0.0	0.0	0.0	0.0	0.0
140	W	184	1.367E-01	(N, D)	JA 180	0.27E-04	1.64E-04	4.11E-05	1.91E-05	2.17E-05	3.78E-06	0.0	0.0	0.0	0.0	0.0	0.0
141	W	194	1.367E-01	(N, D)	TA 182	0.17E-04	6.50E-05	1.11E-05	6.34E-06	4.81E-06	6.25E-07	0.0	0.0	0.0	0.0	0.0	0.0
142	W	186	2.860E-01	(N, D)	TA 185	0.17E-04	1.57E-05	4.11E-06	1.11E-06	4.11E-06	1.75E-07	0.0	0.0	0.0	0.0	0.0	0.0
143	W	186	2.860E-01	(N, D)	HF 182	0.24E-04	6.30E-05	1.14E-05	1.38E-05	6.22E-06	1.92E-06	0.0	0.0	0.0	0.0	0.0	0.0
144	W	186	2.860E-01	(N, D)	TA 184	0.44E-04	7.13E-05	1.14E-05	1.38E-05	1.88E-06	1.88E-07	0.0	0.0	0.0	0.0	0.0	0.0
145	W	185	3.74E-01	(N, D)	JA 183	0.37E-04	9.60E-05	2.04E-05	1.51E-05	1.27E-05	6.22E-06	0.0	0.0	0.0	0.0	0.0	0.0
146	W	214	1.428E-02	(N, D)	TA 202	0.18E-04	2.11E-05	1.21E-05	1.75E-06	1.21E-06	2.75E-07	0.0	0.0	0.0	0.0	0.0	0.0
147	W	206	2.470E-01	(N, D)	TA 204	0.51E-05	1.49E-05	1.51E-06	1.75E-06	1.12E-06	1.10E-07	0.0	0.0	0.0	0.0	0.0	0.0
148	W	207	2.210E-01	(N, D)	TA 206	0.19E-04	3.06E-05	4.21E-06	4.61E-06	3.28E-06	4.94E-07	0.0	0.0	0.0	0.0	0.0	0.0
149	W	207	2.210E-01	(N, D)	HL 203	0.14E-04	2.57E-05	6.14E-06	5.26E-06	3.85E-06	6.54E-07	0.0	0.0	0.0	0.0	0.0	0.0
150	W	208	5.240E-01	(N, D)	TA 207	0.82E-05	1.74E-05	4.46E-06	2.51E-06	1.77E-06	2.34E-07	0.0	0.0	0.0	0.0	0.0	0.0
151	W	208	5.240E-01	(N, D)	TA 208	0.49E-05	1.25E-05	3.25E-06	1.46E-06	9.78E-07	9.16E-08	0.0	0.0	0.0	0.0	0.0	0.0

Table V.C

SPICERON WEIGHTED EFFECTIVE CROSS SECTION FOR OTHER REACTIONS
DATA BASE: DDC-75/ACT1

STO	E	PARENT		PRODUCT										SIG 8	SIG 9	SIG 10
		A	REACT	Z	A	S	SIG 1	SIG 2	SIG 3	SIG 4	SIG 5	SIG 6	SIG 7			
1	SI	23	0.0	(R, D)	AL	26	C 1.67E-03	4.34E-02	1.22E-02	8.46E-03	6.26E-03	1.17E-03	0.0	0.0	0.0	0.0
2	SI	29	4.67E-02	(R, D)	AL	28	C 1.77E-04	4.44E-04	1.16E-05	5.07E-06	3.32E-06	2.46E-07	0.0	0.0	0.0	0.0
3	SI	30	3.10E-02	(R, D)	AL	29	C 0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	SI	31	0.0	(R, P*)	HC	27	C 0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	S	33	7.50E-03	(R, D)	P	32	C 8.69E-02	2.23E-02	5.99E-03	1.39E-03	2.35E-03	1.32E-04	0.0	0.0	0.0	0.0
6	S	34	4.21E-02	(R, D)	P	33	C 8.64E-03	2.07E-03	5.30E-04	2.16E-04	1.56E-04	1.48E-05	0.0	0.0	0.0	0.0
7	CA	40	4.69E-01	(R, T)	N	36	C 1.13E-04	2.82E-05	7.40E-06	3.34E-06	2.11E-06	1.87E-07	0.0	0.0	0.0	0.0
8	CA	41	0.0	(R, P*)	N	37	C 4.94E-02	1.30E-02	3.61E-03	2.57E-03	1.66E-03	3.35E-04	0.0	0.0	0.0	0.0
9	CA	43	1.35E-03	(R, D)	N	42	C 1.14E-03	3.67E-04	8.49E-05	4.27E-05	4.70E-05	8.90E-06	0.0	0.0	0.0	0.0
10	CA	44	2.05E-02	(R, D)	N	43	C 2.68E-03	7.27E-04	1.95E-04	1.09E-04	7.66E-05	1.04E-05	0.0	0.0	0.0	0.0

Table VI

Specific activities for elements at the TFTR vessel location
five years after 10^{21} neutron DT operation

Element	γ (MeV-Curie/kg)	β (Curie/kg)	Total (Curie/kg)	Dominant Isotope
Be	0.0	1.1 - 11	1.1 - 11	^{10}Be
B	0.0	1.9 - 10	1.9 - 10	^{10}Be
C	--	--	--	--
Na	4.6 - 5	3.3 - 5	3.6 - 5	^{22}Na
Al	--	--	--	--
Al	1.2 - 9	5.6 - 10	6.6 - 10	^{26}Al
Si	--	--	--	--
P	--	--	--	--
S	0.0	--	4.1 - 12	4.1 - 12 ^{35}S
S	0.0	2.8 - 9	2.8 - 9	^{35}S , ^{36}Cl
Ar	0.0	1.9 - 5	1.9 - 5	^{39}Ar
Ar	2.3 - 14	1.5 - 5	1.5 - 5	^{39}Ar
Ca	6.7 - 13	4.6 - 8	4.9 - 8	^{39}Ar , ^{45}Ca , ^{40}K
Ca	4.8 - 18	2.6 - 7	2.6 - 7	^{45}Ca
V	1.1 - 14	5.6 - 15	3.3 - 7	^{49}V
V	4.2 - 21	9.4 - 22	7.0 - 7	^{49}V
Mn	9.0 - 5	0.0	1.1 - 4	^{54}Mn
Fe	3.1 - 6	2.0 - 18	3.3 - 4	^{55}Fe , ^{54}Mn
Fe	1.9 - 4	3.2 - 4	3.2 - 4	^{60}Co
Co	6.0 - 5	2.5 - 5	1.1 - 4	^{55}Fe , ^{60}Co , ^{57}Co
Ni	--	--	--	^{63}Ni
Ni	4.0 - 5	2.2 - 5	2.2 - 5	^{60}Co , ^{63}Ni
Zn	4.6 - 6	8.4 - 7	9.1 - 6	^{65}Zn , ^{63}Ni
Se	9.4 - 9	1.5 - 8	3.9 - 8	^{75}Se , ^{29}Se
Y	1.1 - 9	6.1 - 9	6.1 - 9	^{90}Sr , ^{90}Y
Nb	4.7 - 8	3.0 - 8	4.6 - 5	^{93}Nb , ^{94}Nb
Nb	1.4 - 10	3.5 - 9	1.7 - 7	^{93}Nb
Ag	1.6 - 4	4.8 - 5	6.6 - 5	$^{110\text{m}}\text{Ag}$, $^{108\text{m}}\text{Ag}$
In	3.2 - 13	2.4 - 13	5.0 - 13	^{114}In
Sn	4.0 - 5	3.8 - 5	3.9 - 5	$^{119\text{m}}\text{Sn}$, $^{121\text{m}}\text{Sn}$
Sb	--	--	--	^{125}Sb
Sb	1.9 - 12	1.0 - 12	1.0 - 12	^{124}Sb
Ba	4.0 - 6	9.4 - 7	8.8 - 6	^{133}Ba
Hf	3.8 - 8	3.6 - 16	4.5 - 7	^{175}Hf
Ta	5.1 - 7	4.6 - 7	4.6 - 7	^{182}Ta
W	1.7 - 8	4.8 - 10	1.2 - 7	^{181}W , ^{178}Hf
Pt	0.0	0.0	2.9 - 5	^{193}Pt
Au	--	--	--	--
Pb	1.2 - 18	4.0 - 9	4.1 - 9	^{204}Tl
Pb	1.6 - 8	0.0	1.9 - 8	^{208}Bi , ^{210}Po

Table VII

Specific activities for elements at the TFTR vessel location
five years after 10^{19} neutron DD operation

Element	γ (MeV-Curie/kg)	β (Curie/kg)	Total (Curie/kg)	Dominant Isotope
Be	0.0	1.0 - 13	1.0 - 13	^{10}Be
B	0.0	8.0 - 13	8.0 - 13	^{10}Be
F	--	--	--	--
Na	--	--	--	--
Mg	--	--	--	--
Al	--	--	--	--
Si	--	--	--	--
P	--	--	--	--
S	0.0	3.4 - 14	3.4 - 14	^{35}S
Cl	0.0	7.9 - 12	8.0 - 12	^{35}S , ^{36}Cl
Ar	0.0	3.0 - 12	3.0 - 12	^{39}Ar
K	2.0 - 16	5.1 - 8	5.1 - 8	^{39}Ar
Ca	1.4 - 15	2.1 - 10	2.1 - 10	^{45}Ca , ^{41}Ca , ^{40}K
Ti	2.8 - 15	1.4 - 15	1.4 - 15	^{46}Sc
V	--	--	--	--
Cr	8.9 - 25	2.0 - 25	7.2 - 25	^{50}V , ^{51}Cr
Mn	--	--	--	--
Fe	5.1 - 9	1.4 - 20	1.2 - 7	^{55}Fe
Co	6.8 - 6	2.7 - 6	2.7 - 6	^{60}Co
Ni	2.3 - 10	1.1 - 9	1.2 - 9	^{63}Ni , ^{55}Fe , ^{60}Co
Cu	0.0	1.9 - 8	1.9 - 8	^{63}Ni
Zn	9.0 - 9	2.8 - 10	1.7 - 8	^{65}Zn
Se	3.0 - 12	1.0 - 11	1.8 - 11	^{79}Se , ^{75}Se
Zr	3.4 - 15	1.2 - 13	1.2 - 13	^{93}Zr
Nb	4.2 - 10	2.7 - 10	6.5 - 7	$^{93\text{m}}\text{Nb}$
Mo	1.6 - 20	5.4 - 19	5.4 - 19	^{93}Zr
Ag	1.3 - 6	4.1 - 7	5.1 - 7	^{110}Ag
In	1.2 - 17	5.6 - 17	1.2 - 16	^{114}In
Sn	9.8 - 9	4.5 - 8	4.5 - 8	$^{119\text{m}}\text{Sn}$, ^{125}Sb , $^{121\text{m}}\text{Sn}$
Sb	1.7 - 14	9.2 - 15	9.2 - 15	^{124}Sb
Ba	3.7 - 10	3.0 - 14	8.8 - 10	^{133}Ba
Hf	3.0 - 15	3.3 - 18	8.5 - 15	^{175}Hf
Ta	4.4 - 9	4.0 - 9	4.0 - 9	^{182}Ta
W	0.0	5.0 - 13	5.0 - 13	
Pt	0.0	0.0	1.4 - 9	^{193}Pt
Au	--	--	--	--
Pb	--	--	--	--
Bi	4.8 - 16	0.0	5.5 - 11	^{210}Po

Fig. 1 Schematic representation of a regular pulsing sequence.

Fig. 2 Neutron flux distributions used to generate effective reaction cross sections for ^{235}U . The values of flux are arbitrary. Flux for ^{235}U at 10^{-1} MeV is 10^4 neutrons/cm²-sec.

Fig. 3. Neutron flux distribution for different lethargy levels. The curves are calculated for a constant cross section of 10^{-24} cm² and a constant flux distribution of 10^{-5} cm⁻² s⁻¹.

Page 10.

Fig. 4 Irradiation history function. The Designation n/m means m groups run with n pulses per group. The pulse length is 0.5 seconds, the pulse period is 5 minutes and the group period is 1 day.

Fig. 6 The specific activities as a function of cooling time for samples at the TETR vacuum vessel location after 50 pulses/group, 5 groups/run D-2 operation. The fusion power is normalized to a neutron wall loading of 0.66 W/m^2 .

Fig. 7 The delayed gamma-ray energy intensities as a function of cooling time for samples at the TFTR vacuum vessel location after 50 pulses/group, 5 groups/run DT operation. The fusion power is normalized to a neutron wall loading of 0.0376 MW/m^2 .

B1:0099