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SCINTILLATION SPECTROMETRY

GAMMA-RAY SPECTRUM CATALOGUE

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SCINTILLATION SPECTROMETRY

GAMMA-RAY SPECTRUM CATALOGUE

2ND EDITION
VOLUME 1 OF 2

BY

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PHILLIPS
PETROLEUM
COMPANY

Atomic Energy Division
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U. S. ATOMIC ENERGY COMMISSION

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ABSTRACT

A new edition of the Scintillation Spectrometry Gamma-ray Spectrum Catalogue has been issued. This edition is a complete revision of the original data compilation, which was issued as an AEC R and D Report (IDO-16408) in 1958. As in the original catalogue, this edition contains a collection of spectra representing the response of a scintillation spectrometer to individual radioactive nuclides. In addition to the graphs representing the response of a 3″x 3″ NaI detector in a standard geometrical arrangement, the data are presented in digital form for the preparation of punched-card, perforated tape, or magnetic tape libraries for data analysis. An important edition to the catalogue is data for neutron-deficient isotopes.

The new edition is prepared in two loose-leaf volumes and contains data for almost 300 isotopes. All spectra are normalized to a standard set of gain scales and a text is presented which describes the fundamentals of gamma-ray spectrometry. This includes a discussion of spectrometer design, electronics, instrumental calibration, and data processing.

To facilitate the use of these data, tables of detector efficiency, photopeak efficiency, and other information useful for quantitative data analysis have been included. An extensive index has also been added with separate tables of data listed according to gamma-ray energy, half-life, method of source production, and other specialized categories.

I. ACKNOWLEDGEMENT

The development of techniques and the collection and preparation of all data presented in the Second Edition of the Scintillation Spectrometry Gamma-ray Spectrum Catalogue represent the combined efforts of many people on the laboratory staff. The preparation of this Edition and the original Catalogue has been a part of the program of Radioactivity and level schemes studies supported by the Reactor Development Division of the U. S. Atomic Energy Commission. Work necessary to extend the new Edition to include spectra of accelerator-produced neutron-deficient isotopes is supported by the Division of Isotopes Development.

The author acknowledges with pleasure the support of the individuals listed below who have contributed to the very complex task of preparing data for a compilation of this magnitude. Each individual spectrum is the result of considerable experimental effort in many areas. Among these are source preparation, chemical purification, calibration and maintenance of equipment, experimental measurements, data reduction, and graphic arts. Without the cooperation and understanding of specialists in these fields it would not have been possible to produce the uniformity and quality of the data which have been obtained.

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II. INTRODUCTION

Since the publication of the original edition of the Gamma-ray Spectrum Catalogue,[1] the experimental techniques and electronic apparatus have undergone a significant improvement. To a great extent this has been the result of the use of solid-state circuitry in the design of more reliable and versatile multichannel pulse-height analyzers. The improved stability and linearity of equipment now available has made possible the application of more sophisticated methods to the analysis of data using digital computers.

In view of the expanded application of nuclear spectrometry and the acceptance of the original version of the spectrum catalogue as a useful laboratory reference, it was felt that there would be a need for additional information of this type. The second edition of the catalogue, which has been in preparation for the past three years, is offered as an aid to the experimentalist for the application of the NaI scintillation detector as a gamma-ray spectrometer. The new edition has been completely revised. With few exceptions, all spectra included in the compilation were prepared from new data, using improved equipment, experimental techniques, and methods of data presentation and analysis. Because of the increased use of neutron-deficient nuclides, this addition has been expanded to include a large number of these isotopes. In addition, a number of isotopes produced by (n,p), (n,α), and double neutron capture reactions have been included.

Beginning with the publication of this edition, supplementary material will be made available. To obtain this material as it becomes available, the user should address a request to the author at the address shown below. It should be noted that the spectra included in the first printing of the new edition are only a small fraction of the total number presently on file. Spectra are available of many nuclides measured using detectors of various size, resolution, and source-detector geometry. In the interest of promoting a standard detector geometry for laboratory use, these spectra were not included in the catalogue but are available on special request. The data collection also includes spectra of gross fission products as a function of decay time, spectra of neutron-irradiated chemical elements, and gamma-ray spectra of isotopes measured using germanium semi-conductor detectors.

[1] R. L. Heath, *AEC Report, IDO-16408* (1958).

To make the catalogue more useful as a laboratory tool, special loose-leaf binders are available which permit the removal of individual spectra for use in the interpretation of data. If these binders are desired, arrangements have been made to purchase them from the supplier. Included with the binders are index tabs and page lifters to make the catalogue more durable.

A brief description of the important considerations in the use of the scintillation spectrometer for the quantitative and qualitative measurement of gamma-ray spectra is given in the following sections. This includes a discussion of the factors which influence detector response, the experimental techniques used in the compilation of gamma-ray spectra for the catalogue, and recently developed computer techniques for analysis of gamma-ray spectra.

The text is intended to be a summary of the current state-of-the-art in experimental techniques developed for the application of the scintillation spectrometer to quantitative gamma-ray spectrometry. Numerical tables of detector efficiency, photpeak efficiency, and other experimental variables are presented as appendices. The numerical data used to prepare the graphs of all gamma-ray spectra are also included to permit the user to prepare reference libraries of spectra on perforated tape, punched cards, or magnetic tape for use with pulse analyzers equipped with digital read-in devices. Spectra in this form can be very useful in the interpretation of data by visual comparison and simple subtraction procedures using arithmetic circuitry provided as a feature on many modern pulse-height analyzers.

It is the sincere desire of the author that this compilation will be a useful laboratory reference. Suggestions for improvement of the data collection are invited.

All inquiries concerning the catalogue or the additional services listed above should be directed to:

Gamma-ray Spectrum Catalogue
National Reactor Testing Station
Phillips Petroleum Company, AED
P. O. Box 2067
Idaho Falls, Idaho

ATTN: R. L. Heath

III. DETECTOR RESPONSE

A. Interaction of Gamma Rays with Matter

A knowledge of the basic processes by which a photon interacts with matter is essential to an understanding of the response of a scintillation detector. Although many processes are involved in the chain of events which produce an electrical impulse at the output of the electron multiplier, the major features of the differential pulse-height spectrum resulting from the detection of gamma rays may be interpreted in terms of the basic interactions which occur within the detector. There are three main processes, all continuous functions of photon energy, by which photons may interact with matter giving up all or part of their energy in single events. These are (1) the photoelectric effect, (2) Compton scattering by electrons in the atoms of the material, and (3) the production of a positron-electron pair in the electric field of an atom. Although a detailed treatment of these processes is beyond the scope of this work, a brief discussion of the characteristics essential to an understanding of the response of a NaI scintillation detector is included in this section.

Before proceeding with this discussion it should be stated that a review of the theory of inorganic scintillators will not be included. For this, the reader is referred to the early work of Hofstadter,[2] and to the extensive publications of Van Sciver[3,4,5] who has been responsible for much of the fundamental work on NaI. For a detailed presentation of the present state of the theory of scintillators, an excellent review of this subject has been published by Murray.[6]

1. Photoelectric Effect

In the photoelectric process all of the energy of the incident photon is absorbed by a bound electron of an atom, appearing as kinetic energy of this electron as it is ejected from the atom. The energy of the ejected electron will then be equal to the difference between the energy of the incident photon and the binding energy of the shell from which the electron was ejected. Although some energy is absorbed by recoil of the nucleus of the atom, this is negligible compared with the energy of the gamma ray and photoelectron. If the incident gamma-ray photon exceeds the binding energy of the K shell, interaction will be principally with electrons in that shell of the atom. As a result of this process the atom is left with a vacancy in the shell from which the electron was ejected, resulting in the emission of x-rays or Auger electrons. This series of events occurs within a time short relative to other time-dependent processes in a scintillator. The result is that the x-rays from the initial photoelectric event are generally absorbed by a second photoelectric event and the total energy of the incident photon is absorbed within the detector. The important characteristic of the photoelectric effect in a scintillation detector is that monoenergetic photons which interact by the photo process will produce a monoenergetic electron energy distribution within the volume of the detector. If this were the only process for energy loss, the response of a detector capable of indicating the energy of these individual photoelectrons, would be quite simple.

2. Compton Scattering

In the Compton process incident photons are scattered by the electrons with a partial energy loss. In this process scattering generally occurs with electrons that are considered essentially free and the energy of the incoming photon is shared between the electron and the scattered quantum. At low energies a gamma ray may be scattered from a bound electron with the atom remaining in its initial state. In this case there is negligible energy loss and only a change in direction. Since this process does not result in an energy change it is an important consideration in the calculation of the efficiency of a detector. The cross section for this process (Coherent Scattering) must not be included since events of this type leave no energy in the detector.

In the Compton process the energy of the scattered photon and electron are given by the following relationships:

$$E_\gamma' = \frac{E_\gamma}{1 + E_o\,(1 - \cos\theta)} \qquad (1)$$

$$E_e = E_\gamma - \frac{E_\gamma}{1 + E_o\,(1 - \cos\theta)} \qquad (2)$$

where E_γ is the incident gamma-ray energy, E_e is the scattered electron energy, E_o is E_γ/mc^2 and θ is the angle between the direction of the primary and scattered photons. From these relationships it may be deduced that a Compton electron energy spectrum will result which extends from zero energy ($\theta = 0°$) up to a maximum energy ($\theta = 180°$) which is somewhat less than the energy of the incident photon. The energy of the scattered photon then extends from the original photon energy down to a minimum value which is always less than $mc^2/2$ (0.257 MeV). Fig. 2 shows a Compton electron energy distribution obtained by integrating the differential scattering cross section over all angles from a primary photon energy of 0.5 MeV. A monoenergetic source of gamma radiation will produce such an energy distribution of electrons as a result of interaction by the Compton process.

3. Pair Production

If the incident photon has an energy in excess of the rest mass of a positron-electron pair (1.02 MeV) then pair production is possible. In this process, which occurs in the presence of the Coulomb field of a nucleus, the gamma ray disappears and a positron-electron pair is created. The total energy of the pair of particles will be equal to the energy of the primary photon and their kinetic energy will be equal to the total energy minus the rest energy of the two particles ($2mc^2$). Since the positron is unstable, as it comes to rest in the field of an electron, annihilation of

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[2] R. Hofstadter and J. A. McIntyre, *Phys. Rev.*, 78, 619 (1950), also 74, 100 (1948).

[3] W. J. Van Sciver and R. Hofstadter, *Phys. Rev.*, 87, 522 (1952).

[4] W. J. Van Sciver, HEPL Report No. 38, Stanford University (1955).

[5] W. J. Van Sciver and L. Bogart, *IRE Trans. Nuclear Sci.*, NS-5, 90 (1958).

[6] R. B. Murray, *Nuclear Instruments and their Uses*, Chap. 2, A. H. Snell Ed., (Wiley, New York, 1962).

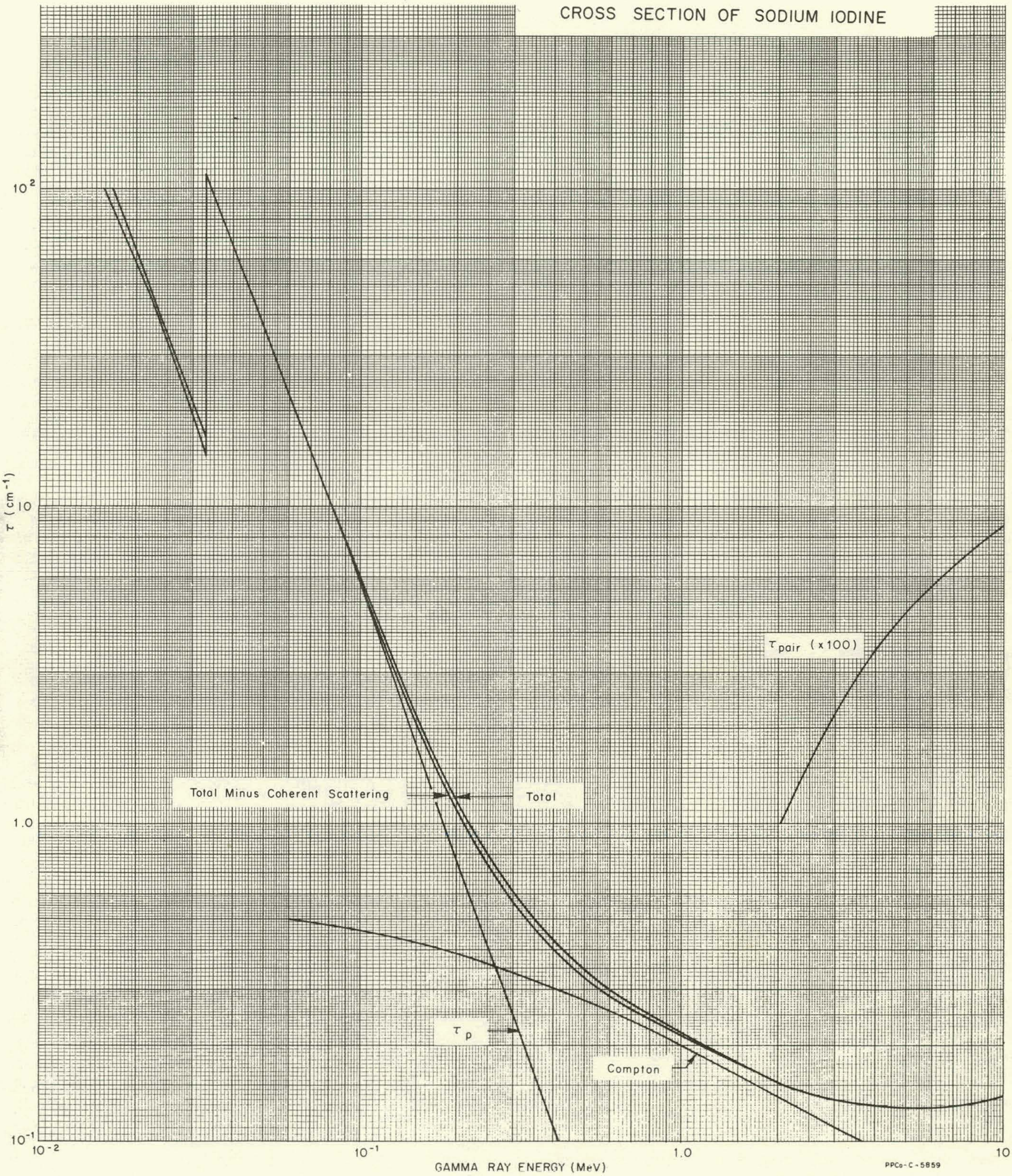


FIG. 1 - Absorption coefficient for NaI(Tl) as a function of gamma-ray energy. Results using the total absorption cross section and the total minus coherent scattering are shown for com parison.

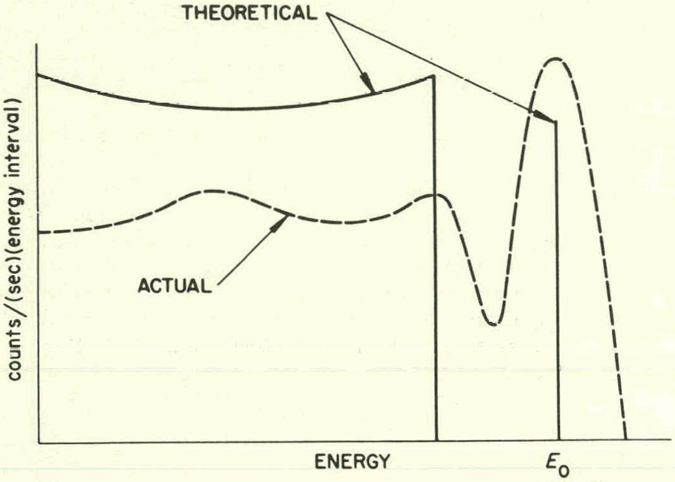


FIG. 2 - Theoretical electron energy distribution (single events) for Compton and photoelectric interaction in a NaI detector compared with an experimental pulse-height distribution obtained on a 3"x3" NaI detector (0.50 MeV).

the two particles occurs with the emission of two photons equal in energy to the rest mass of the particles (0.511 MeV). Interaction by the pair process in a detector will therefore result in an energy loss equal to the primary photon energy minus 1.02 MeV. As will be discussed below, the possibility also exists of detecting one or both of the annihilation quanta by either the photoelectric or Compton process. These alternatives result in a complex electron energy distribution for the pair process. A series of events can result in an energy loss to the detector of any energy from $E_\gamma - 1.02$ MeV up to the full energy of the primary photon.

The total probability for detection of a gamma ray (expressed as the total absorption coefficient) will then be given by:

$$\tau = \tau_{\text{phot}} + \tau_{\text{Compt}} + \tau_{\text{pair}} \tag{3}$$

The total absorption coefficient for NaI(T1) and the contribution from the photoelectric, Compton, and pair processes is shown in Fig. 1. The total absorption coefficient is plotted as a function of incident gamma-ray energy using data from Gladys White Grodstein.[7] Examination of this figure will give an indication of the relative importance of each type of interaction as the energy of the incoming gamma ray is varied. In the energy region up to a few hundred kilovolts, the photoelectric process dominates. At higher energies, Compton scattering dominates while pair production becomes important at higher energies. In the discussion of the detector response which follows, frequent reference will be made to this figure in describing the response of a NaI scintillation detector to monoenergetic gamma radiation.

[7] Gladys White Grodstein, *NBS Circular* 583 (1956).

B. The Pulse-amplitude Spectrum

1. Spectrum Shape vs Gamma-ray Energy

To provide a basis for describing a pulse- amplitude distribution observed at the anode of the electron multiplier tube in terms of the basic processes described above, let us briefly review the succession of events which produce it. Assume that a monoenergetic source of gamma radiation of approximately 0.50 MeV is incident upon the NaI crystal-phototube combination. Inspection of the absorption cross section of NaI shown in Fig. 1 indicates that these gamma rays will interact with the NaI detector by both Compton scattering and the photoelectric effect in the ratio of about 6 : 1. If a sufficient number of gamma rays are detected to give a reasonable statistical sample, an electron energy distribution similar to that portrayed by the solid line in Fig. 2 will be produced within the volume of the NaI detector. We see a monoenergetic line of photoelectrons and a continuous distribution of Compton electrons from zero energy up to a sharp cut-off at an energy somewhat below the photoline. Shown for comparison is the pulse-height distribution from a 3"x 3" NaI detector obtained with a differential pulse-height analyzer. Although the pulse amplitude spectrum is similar in character, we observe that the energy distribution has been smeared by what appears to be a gaussian function. This is due to flunctuations in the light output from the phosphor and to the statistical nature of the processes occurring in the electron multiplier.

The peak resulting from total energy loss (photopeak) is the distinguishing characteristic of all spectra. The amplitude of this peak and its intensity are used to determine the energy and intensity of gamma rays producing a given pulse-height distribution. The width of this peak is a measure of the energy resolution of the detector — a subect which will be treated in more detail in a later section.

In addition to the amplitude smearing of the original electron spectrum it is apparent that a much larger fraction of the total number of events have appeared in the "photopeak" than would be predicted from the ratio of the photoelectric and Compton cross sections. In a detector of this size, the probability that a Compton-scattered gamma ray will escape the volume of the detector is somewhat reduced and many multiple events (e.g., Compton scattering followed by a photo event) can occur resulting in total energy loss. Since this chain of events occurs well within the lifetime of the phosphor, the energy loss from all events will sum to produce a pulse in the full-energy peak. As will be shown later, the relative probability for total energy loss in the detector due to the occurrence of multiple events will increase as the dimensions of the detector are increased.

The complicated pulse-height spectrum produced from monoenergetic photons incident upon a detector presents the basic problem in the interpretation and analysis of data obtained with a scintillation spectrometer. Let us now examine variations in the shape of the pulse-height spectrum as the incident gamma-ray energy is varied. Fig. 3 shows the energy positions of four gamma rays of 0.060, 0.320, 0.830, and 1.92 MeV incident energy, all of equal intensity. Above this are the pulse-amplitude spectra for

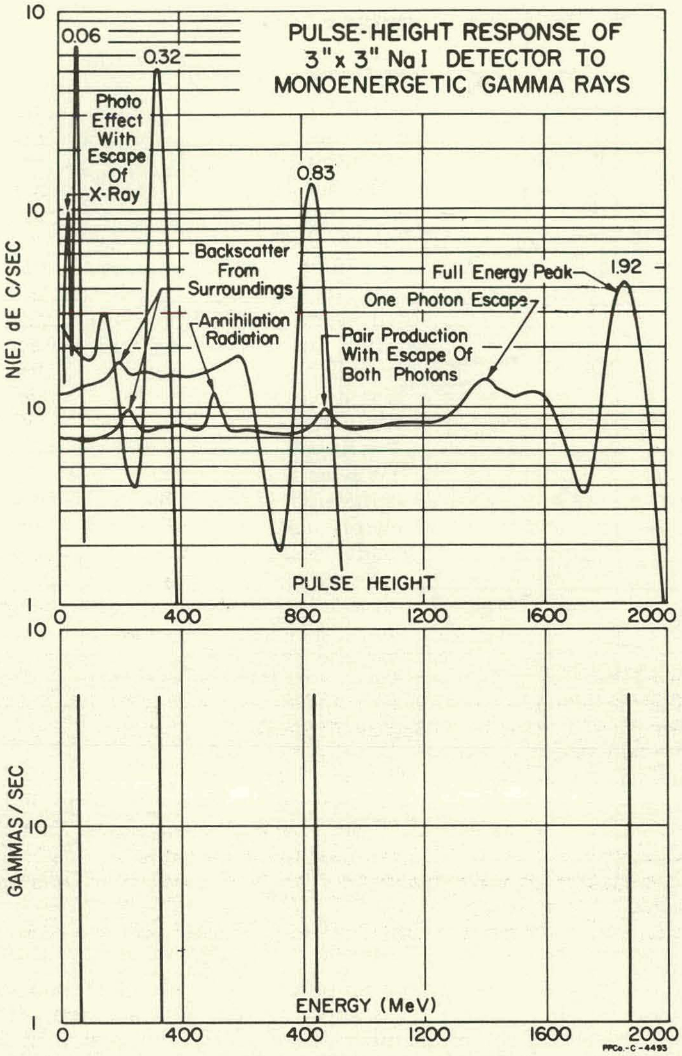


FIG. 3 - Pulse-height distributions obtained with a 3"x3" NaI scintillation detector from monoenergetic gamma-ray sources of 0.060, 0.32, 0.83, and 1.92 MeV. Pertinent features of these spectra are noted.

each of these gamma rays obtained with a 3"x 3" NaI detector. At 0.060 MeV, gamma rays interact with the detector almost entirely by the photo process and the detector response is essentially a single peak — nearly Gaussian in shape. The peak of lesser intensity on the low-energy side of the full-energy peak is attributed to escape of iodine x-rays from the surface of the detector following a photoelectric interaction. This effect will be discussed in more detail in a later section. As the gamma-ray energy increases, the pulse-height distribution becomes more complicated. In addition to the photopeak we see the continuous distribution of pulses resulting from the detection of Compton electrons. As the gamma-ray energy increases, the fraction of pulses in the photopeak is reduced as the Compton cross section becomes more dominant. At 1.92 MeV, the pulse-height distribution becomes more complicated. In addition to the Compton electron distribution and the full-energy peak, several satellite peaks are superimposed upon the Compton distribution as a result of interaction by the pair process. As previously indicated, all energy in excess of the 1.02-MeV threshold for this process, will appear as kinetic energy of the positron-electron pair. This results in the peak which appears at an amplitude equal to the energy of the incident gamma ray minus 1.02 MeV. Subsequent annihilation of the positron will create two 0.511-MeV photons within the volume of the detector. If both of these annihilation quanta escape detection in the crystal, only the energy of the positron-electron pair will be lost to the detector. If one of the annihilation quanta is detected in the crystal by the photo process, or by any combination of multiple processes which result in total energy loss, then a peak will appear at an energy corresponding to 0.511 MeV less than that of the incident photon. If both annihilation quanta are detected with total energy loss, the addition of the energy left in the detector by all processes for one pair event will produce pulses in the full-energy peak. The total result of interaction by the pair process will then be a distribution of pulses ranging from the full-energy peak to 1.02 MeV less than the photopeak, including the three prominent peaks just described. Further examination of the spectrum for the 1.92 MeV gamma ray indicates the presence of a peak with an amplitude corresponding to 0.511 MeV. This peak is due to the detection of annihilation quanta resulting from pair production external to the NaI(Tl) crystal. The escape and subsequent detection of annihilation quanta from these events represents a background effect for gamma rays above the pair threshold. This peak does not result from the detection of primary photons included in the cone of solid angle intercepted by the detector and should not be considered a part of the detector response to gamma rays originating in the source, but is an extraneous effect due to detector environment. Such effects are discussed in detail in Section IV. Further examples of the response of a NaI scintillation detector to monoenergetic radiation are given in Fig. 53.

If we now consider the change in shape of the pulse-amplitude spectrum as the energy of the incident gamma ray increases, it is apparent that the interpretation of spectra containing more than one gamma ray presents many problems. At low energies the pulse spectrum is characterized by a single symmetrical peak which is nearly Gaussian in shape and the response may be said to be quite unique. Information representing both the energy and intensity of the photons incident upon the detector is contained in a relatively few pulse-height channels of the analyzer. As the gamma-ray energy increases, this uniqueness between energy, intensity, and pulse amplitude rapidly disappears. Although the essential information about energy and intensity still exists in the presence of the full-energy peak as a distinct feature of the pulse spectrum, any channel of a given pulse-height distribution may have contributions from gamma rays whose full-energy peaks are above that channel. This is a major source of difficulty in the analysis of complex gamma-ray spectra.

2. Variations in Pulse-height Distribution with Detector Size

As previously mentioned, the pulse-amplitude spectrum results from both primary and secondary events in

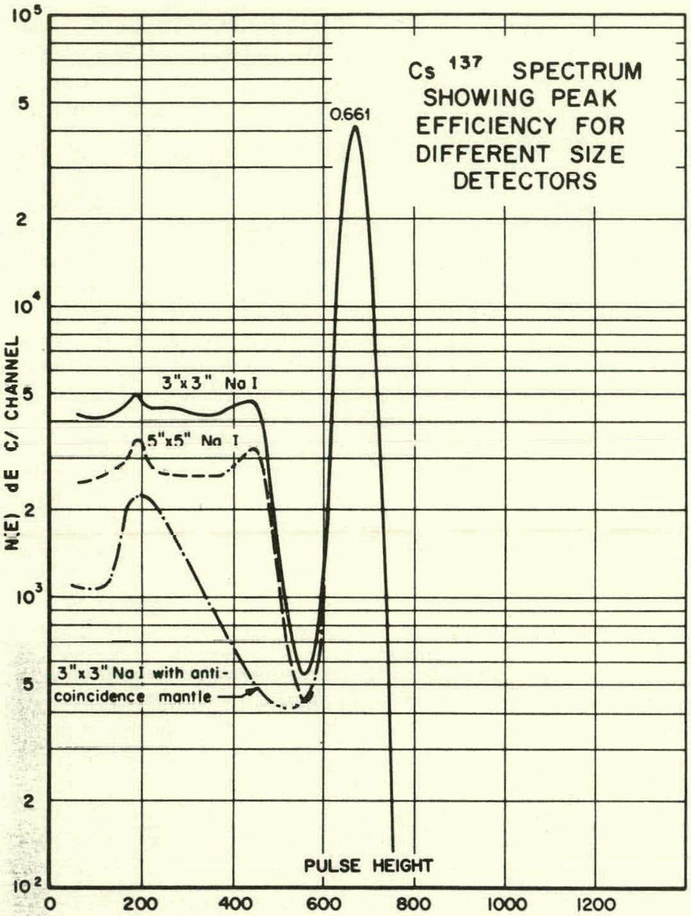


FIG. 4 Comparison of pulse-height spectra of Cs^{137} obtained with different sized NaI detectors. All spectra are normalized in gain and area of photopeak.

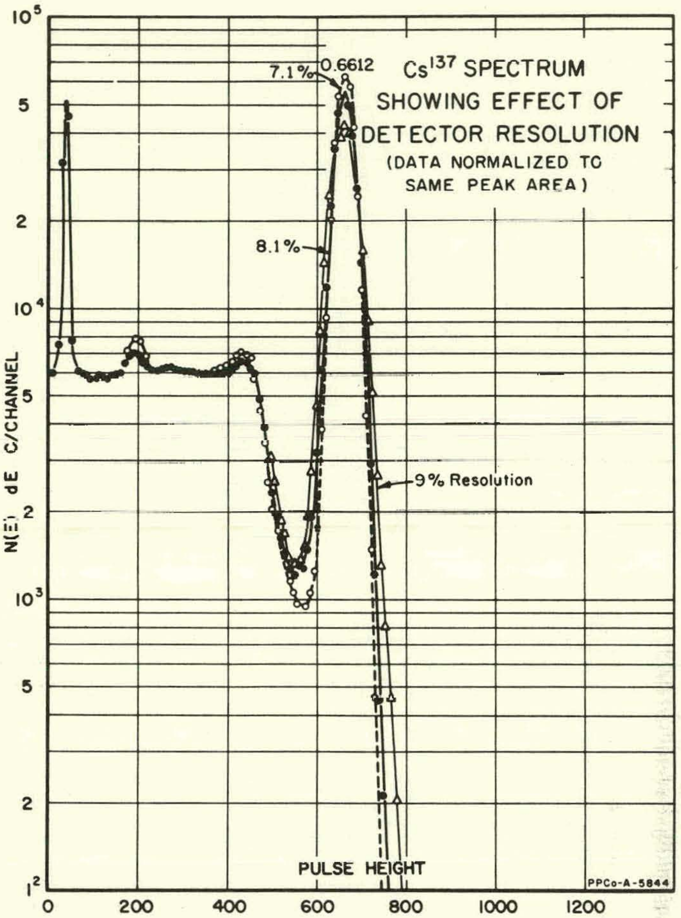


FIG. 5 - Effect of detector resolution on pulse-height spectrum.

the crystal. The result of a series of successive interactions is a single pulse whose amplitude will be proportional to the sum of the energy loss from each interaction. Since the probability for interaction of a photon within the volume of the detector will be proportional to the path length traversed in passing through the detector, the relative number of secondary processes following an initial Compton scattering will increase with the dimensions of the detector. The increase in the fraction of events which result in total energy loss realized by increasing the size of the detector is demonstrated in Fig 4. This figure illustrates the pulse-height distributions obtained from Cs^{137} gamma rays detected with cylindrical crystals of NaI measuring 3″ diameter by 3″ high, and 5″ diameter by 5″ high. Also shown for comparison is the spectrum obtained with a 3″x 3″ detector surrounded by an anti-coincidence mantle such as that described by Raboy and Trail.[8] In a detector arrangement of this type, if a gamma-ray experiences a Compton scattering event in the central crystal and the scattered photon is detected in the surrounding mantle detector, an anticoincidence circuit rejects the pulse from the central detector. In this manner essentially only those events which result in total energy loss in the central counter are recorded by the pulse-height analyzer. Improvement in the relative "photopeak" response (peak-to-total ratio) may also be obtained by using a well-type detector arrangement where the source is mounted in the interior of the detector. These latter detectors, however, have serious disadvantages when coincidence-sum effects are considered. These effects will also be discussed in a later section.

[8] S. Raboy, C. C. Trail, and J. E. Monohan, *Proceedings of the Total Absorption Gamma-ray Spectrometry Symposium*, U. S. Atomic Energy Commission Report TID-7594, (1960).

3. Detector Resolution

The energy resolution of a scintillation spectrometer is a measure of the ability to distinguish the presence of two gamma rays closely spaced in energy. Since the essential information is contained in the "photopeak," the practical measure of resolution is the width of the "photopeak" or "instrumental line width." The convention adopted is to define the resolution as the relative full width of the "photopeak" measured at half the maximum height of the peak. Thus, the resolution will be the full width at half maximum divided by the mean "photopeak" position on the pulse-height scale. As a matter of convenience, the resolution of a NaI scintillation detector is usually reported for the 0.662-MeV gamma ray emitted by Cs^{137}. For 3″x 3″ cylindrical detectors a resolution ranging from 7.5 to 8.5% for the Cs line can be readily achieved with commercially available detectors. Fig. 5 shows the effect of change in resolution on the shape of the pulse-amplitude distribution. Spectra of Cs^{137} taken with three detectors with resolutions of 7.1, 8.1, and 9% are presented — all normalized in intensity to equal "photopeak area."

The photoline width is primarily a result of statistical fluctuations in each step following the initial event which produces ionization in the detector. Among these are the following:

(1) Conversion of the kinetic energy of primary electrons to light.

(2) Efficiency of light collection and transfer of photons to photocathode.

(3) Efficiency of photocathode in the conversion of photons to photoelectrons.

(4) Efficiency of electron optics in phototube for the focusing of electrons on the first secondary-emitting dynode.

(5) Electron multiplication in dynode structure.

All of these steps in the scintillation process will ultimately affect the statistical variance in the pulse amplitude appearing at the anode of the electron multiplier. An excellent treatment of this subject and the contribution of each of these factors has been given by Breitenberger.[9] More recent discussions have been presented by Managan,[10] Prescott,[11] and Iredale.[12]

In addition to the statistical considerations basic to the scintillation process, there exist several instrumental variables which can also contribute to the observed width of

[9] E. Breitenberger, *Prog. in Nuclear Physics*, 4, 56 (1955).

[10] W. W. Managan, *IRE Trans. on Nuclear Science*, Vol. NS-9, No. 3 (1962).

[11] J. R. Prescott and P. S. Takar, *IRE Trans. on Nuclear Science*, Vol. NS-9, No. 3 (1962).

[12] P. Iredale, *Nucl. Instr. and Methods*, 11, 340 (1961).

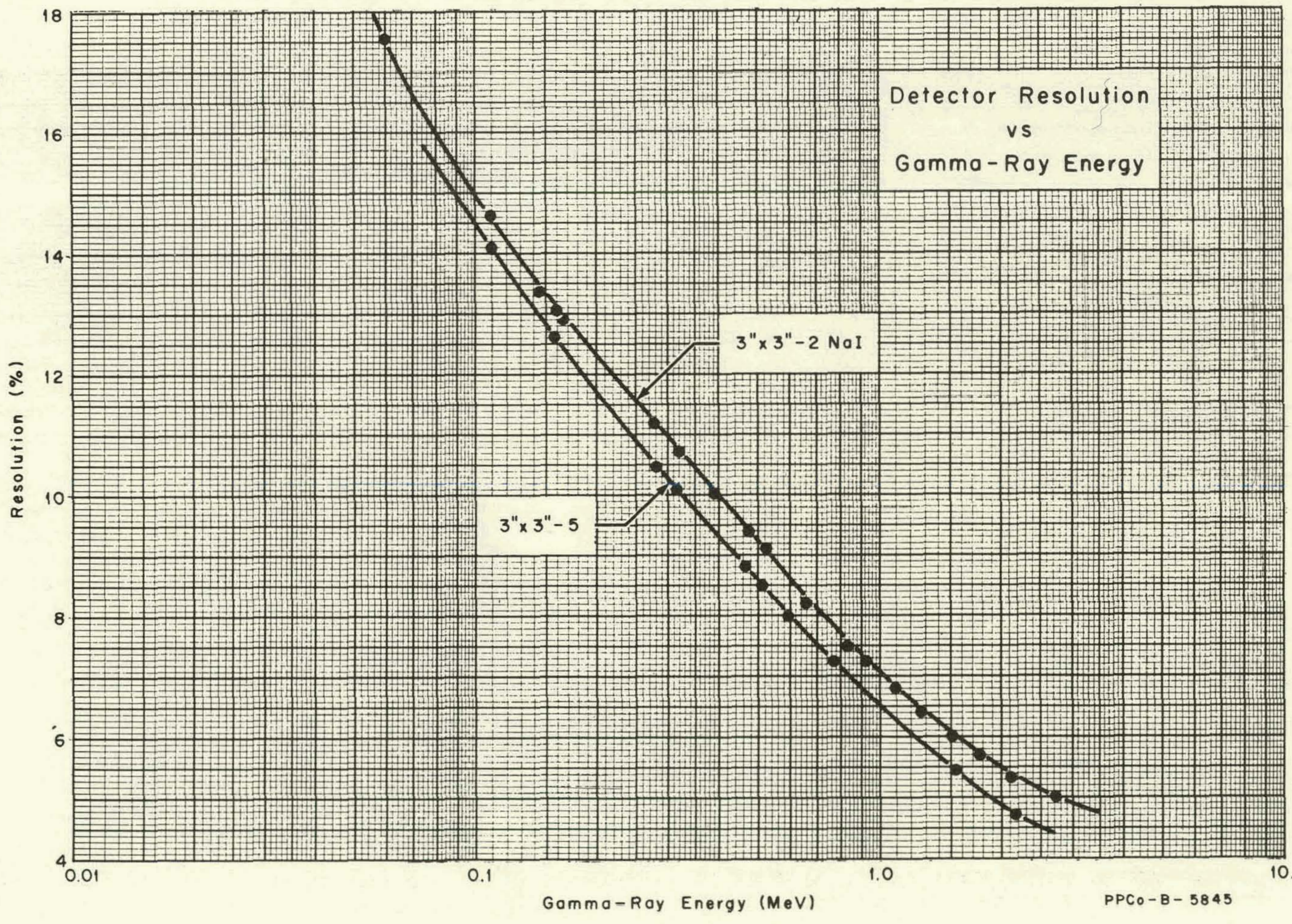


FIG. 6 - Plot of detector resolution (FWHM) as a function of gamma-ray energy for detectors used to measure catalogue spectra.

a "photopeak." The finite width of a pulse-height channel in the pulse analyzer can contribute to the width of a "photopeak." On a linear energy scale this effect is most noticeable in the first few channels of the spectrum where a "photopeak" may only be a few channels wide. An example is illustrated in Fig. 52. Peak width can also be effected by noise modulation when the amplitude of the noise spectrum at the input to the pulse-height analyzer is equal to or exceeds the width of one amplitude channel. Variation in the zero voltage reference in the analyzer, gain in the electronic pulse amplifier or ramp slope in the analogue-to-digital converter of the analyzer during the measurement of a pulse-height spectrum will also result in peak broadening. Since these effects are difficult to separate and interpret it is important that they be reduced to negligible proportions.

A plot of detector resolution for detectors used in the compilation of spectra for the catalogue is shown in Fig. 6. Resolution (FWHM) is plotted as a function of gamma-ray energy.

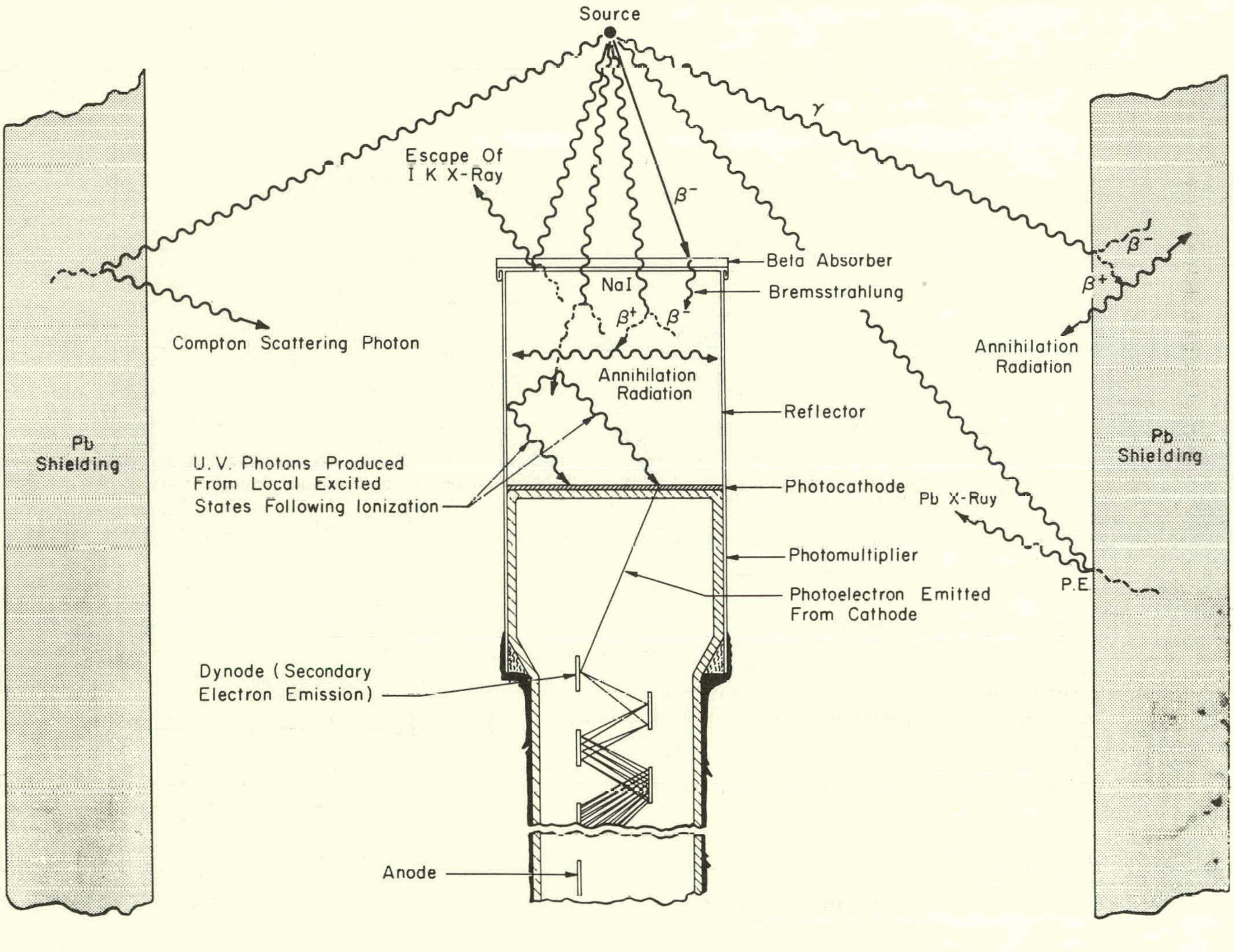


FIG. 7 - Illustration representing a NaI scintillation detector showing sequence of events producing output from electron multiplier and various processes which contribute to response of detector to a gamma-ray source.

IV. EFFECTS DUE TO DETECTOR ENVIRONMENT

If the radioactive source and the scintillation detector could be isolated from all sourrounding material, the shape and magnitude of the observed pulse-amplitude spectrum would be dependent only upon the energy of the gamma ray, the physical properties of the source and detector, and the geometrical relationship between the two. Unfortunately this cannot be achieved in the laboratory. In practice, the shape of the observed pulse-amplitude distribution will be influenced by many factors related to the experimental environment. Since the response of a detector in a practical laboratory environment must be understood prior to any attempt to analyze a pulse-height distribution, let us examine in some detail the many variables which can influence the shape of spectra obtained under practical laboratory conditions.

Fig. 7 is a pictorial representation of a NaI detector in a lead shield. In this figure the different types of interactions which can contribute to an observed pulse-height spectrum are portrayed. Each type of interaction and its contribution to a pulse-height spectrum will be discussed in the following paragraphs.

A. X-Ray Escape

Gamma rays in the energy region below 200 keV are detected almost entirely by the photoelectric process. As previously described, the ejection of a photoelectron from the K shell of an atom is followed by the emission of characteristic x-rays. If the interaction occurs near the surface of the detector, iodine K x-rays may escape without further interaction. When this occurs, the energy of the x-ray (28 keV) will be lost and an additional peak will appear in the spectrum at 28 keV less than the photopeak. The spectrum of a 0.068-MeV gamma ray emitted in the decay of Co^{61} is shown in Fig. 8 as an illustration of this effect. The magnitude of this escape peak will vary as the photoelectric cross section and with source-detector geometry. The escape peak will not be present for energies less than the K-edge of iodine (33.2 keV) and will decrease rapidly in relative intensity with increasing gamma-ray energy.

The probability for x-ray escape may be calculated as a function of energy and geometry or may be determined experimentally. Axel[13] and McGowan[14] have calculated escape peak intensities for various configurations. The results of an experimental determination of the probability for escape from a 3″x 3″ NaI detector in the standard geometry (point source at 10 cm) is shown in Fig. 9. Experimental values, indicated by the open circles, are compared with results of calculations made by McGowan[14] for a 1½″ diameter x 1″ cylinder of NaI in a similar geometry.

B. Scattering from Surrounding Material

To reduce the level of background radiation it is usually necessary to operate a large NaI scintillator inside a shielded enclosure. This shield represents the major source of scattered radiation. Scattering also occurs from the source holder, the material used to prepare the source, beta absorbers, and the packaging material surrounding the NaI crystal. The effect of scattering from this material on the shape of the spectrum will now be examined. Fig. 10 shows an experimental spectrum resulting from the detection of the 0.478-MeV gamma ray emitted in the decay of Be^7. This spectrum was taken under the same laboratory conditions used for the measurement of all spectra in the catalogue. The results of measurements made with and without the presence of a polystyrene beta absorber are shown to illustrate the effect of scattering from the absorber. The distribution of pulses above the photopeak which is labeled "random sum spectrum" will be discussed in a later section. If we examine the region

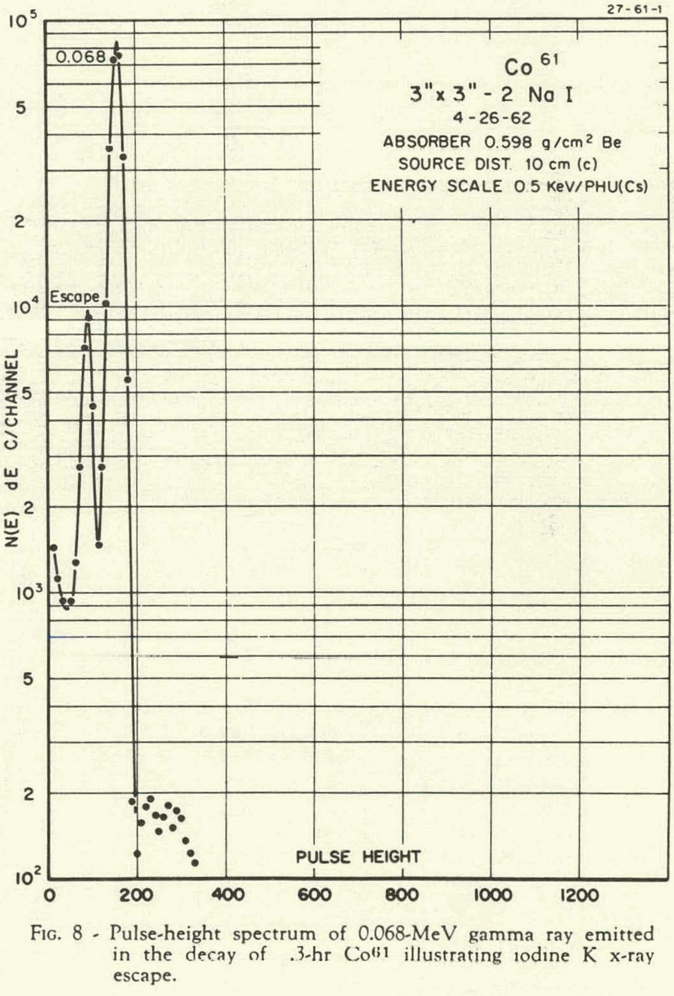


FIG. 8 - Pulse-height spectrum of 0.068-MeV gamma ray emitted in the decay of .3-hr Co^{61} illustrating iodine K x-ray escape.

of the pulse-height spectrum which results from Compton electrons we see a definite peak superimposed upon the otherwise flat energy distribution of electrons. This peak is termed the "backscatter peak" and arises from Compton scattering of gamma rays in the walls of the shield surrounding the detector. The shape and magnitude of this

[13] P. Axel, AEC Report, BNL-271 (1953).
[14] F. McGowan, *Phys. Rev.*, 93, 163 (1954).

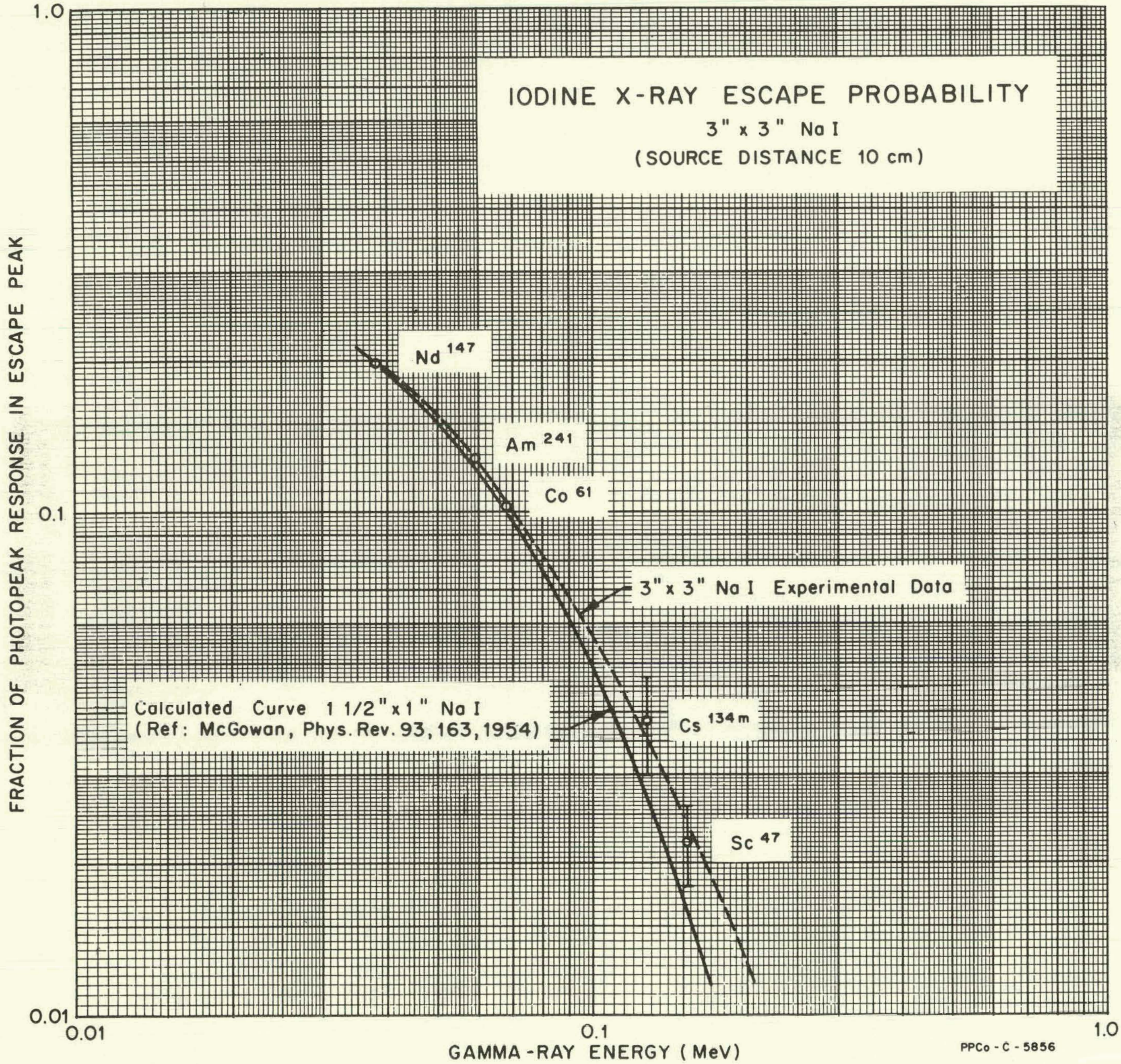


FIG. 9 - Probability for escape of the iodine K x-ray following photoelectric interaction in a 3"x3" NAI detector. Data are plotted as the fraction of the total photoelectric response to a point source at 10 cm as a function of gamma-ray energy. Shown for comparison is the calculated escape fraction for a 1½"x1" detector in a similar geometry.

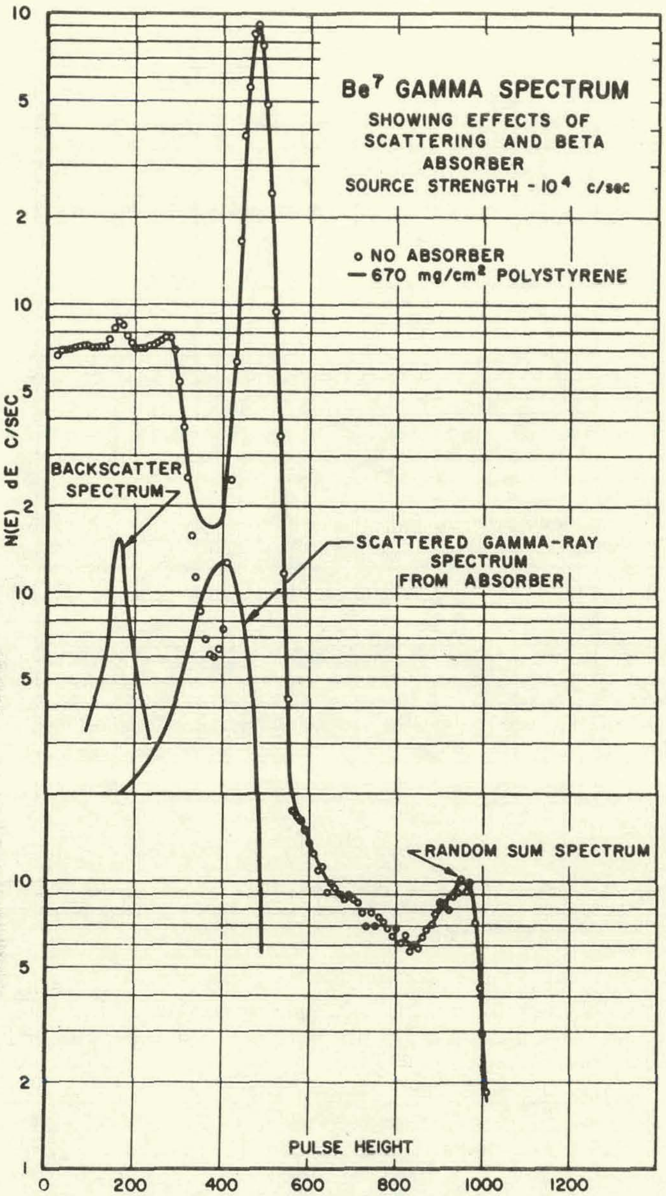


FIG. 10 - The pulse-height spectrum representing the response of a 3"x3" NaI detector to the 0.478-MeV gamma ray emitted in the decay of Be^7. The contribution to the spectrum from photons scattered from the shield and beta absorber and the random sum spectrum are shown.

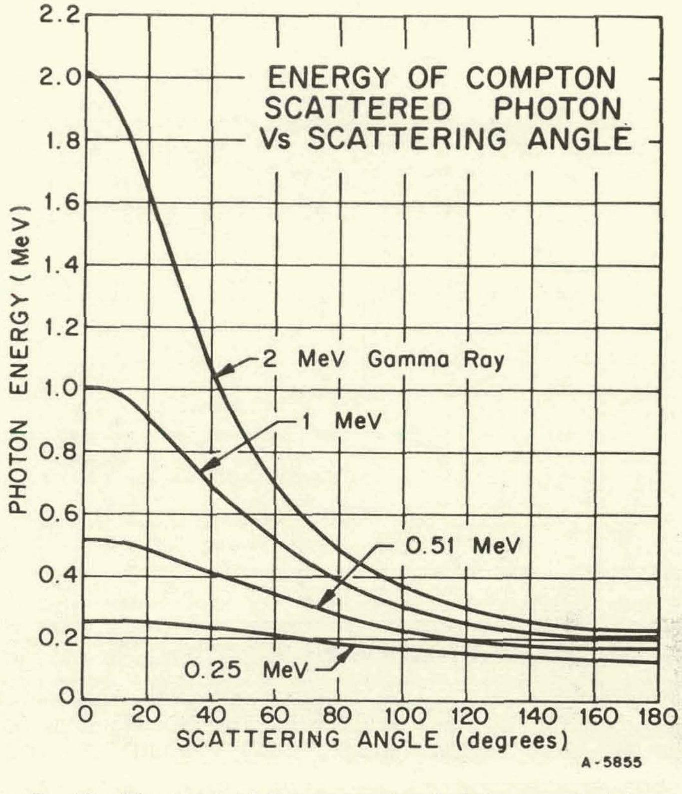


FIG. 11 - The energy of Compton scattered photons as a function of scattering angle for various primary gamma-ray energies.

component of the spectrum is shown below the experimental spectrum. The character of the backscatter spectrum and the scattered component from the absorber will be explained below.

1. Backscatter Spectrum

To understand the shape of this spectrum let us consider the relationship between the energy of the scattered photon and the scattering angle as given by equation (1). A plot of this relationship is shown in Fig. 11 for primary photon energies of 0.25, 0.51, 1.0 and 2.0 MeV. Examining this figure we see that for scattering angles greater than 120°, the energy of the scattered photon is relatively independent of angle and the energy of the primary photon. As a result, the spectrum of scattered gamma rays emerging from the walls of the shield used in the experiment shown in Fig. 10, is nearly monoenergetic.

To illustrate the effect of shield configuration on the shape and magnitude of the scattered component, let us examine the results of a series of measurements made with the different shield geometries shown in Fig. 12.

Three shields were constructed with 4" Pb walls having inside dimensions of 6"x 6"x 18", 12"x 12"x 24", and 32"x 32"x 32". Shield A (6"x 6") was duplicated with Fe to demonstrate the relative effect of the Z of the scattering material on the shape and magnitude of the scattered spectrum. Fig. 13 indicates the response of a 3"x3" cylindrical NaI detector to the 0.835-MeV gamma ray emitted by a source of Mn^{54} in three different shield configurations. In the energy region of the scattered spectrum the top curve was obtained using the 6"x 6" Fe shield. The middle and lower curves show the response obtained using the 6"x 6" Pb shield and the 32"x 32" Pb shield. Comparing the two results for the small shield, identical except for the material of construction, we see a large difference in the magnitude of the scattered spectrum. This is due to the larger photo-electric cross section in Pb. A larger fraction of primary photons entering the lead walls are absorbed by the photo-electric process, either initially, or following a single

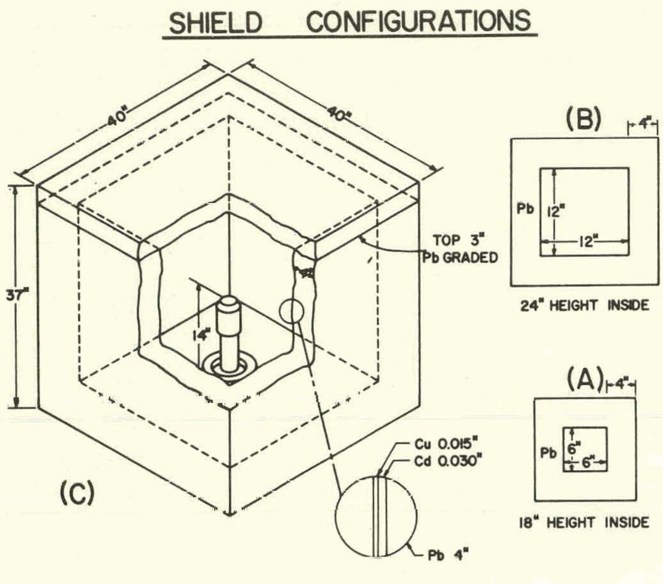


FIG. 12 - Detector shield configurations used to demonstrate effect of Compton scattering on response of detector to mono-energetic gamma radiation.

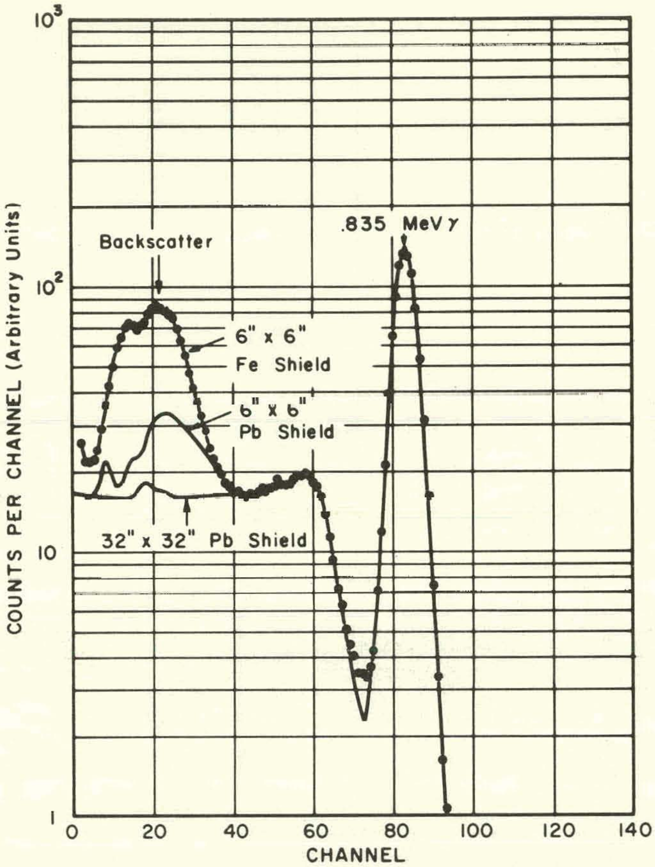


FIG. 13 - Effect of detector shield configuration on scattered component of pulse-height spectrum obtained from mono-energetic source.

Compton scattering event. Comparison of the results obtained in the two Pb shields shows a large reduction in the magnitude of the scattered spectrum as the dimensions of the shield are increased.

It is of interest to compare the features of the scattered spectrum in all three cases. Scattering from the walls of the small shield gives rise to a rather broad peak with evidence of two major components. The high-energy component is attributed to 180° single scattering of photons and the second peak to processes involving two successive Compton events before the scattered photon strikes the detector. As the size of the shield is increased, the backscattered spectrum assumes the shape of a fairly sharp line, indicating that the reduced solid angle subtended by the detector for scattering from a point on the surface of the shield wall has reduced the energy spread. The restriction of the scattered radiation to a very narrow energy region is in agreement with predictions based upon the energy-angle relationship given in Fig. 11. A consideration of these results would lead one to conclude that the detector shield should be as large as cost and space considerations will permit.

It should be noted that the relative magnitude of the scattered spectrum will depend upon the source-detector geometry. In all measurements described above, the source was mounted at 10 cm from the detector face. For most shield configurations the magnitude of the scattered spectrum will be relatively independent of source-detector distance, while the efficiency for the detection of gamma rays from the source will vary approximately as $1/h^2$.

2. X-Ray Production in Shield

Analogous to the escape of iodine x-rays from the surface of the detector following a photoelectric event, a photo event occurring at the surface of the walls of the detector shield can result in the production of characteristic Pb x-rays. The probability of detecting these x-rays can be reduced by the use of critical absorption techniques. To achieve this the shield is lined with one or more materials in decreasing order of Z.

Using the same shield configurations described above, a series of measurements were made to illustrate the use of "graded" shields. Fig. 14 shows the results of these measurements. The spectrum obtained in the 6"x 6" Pb shield shows definite evidence of the Pb K x-ray at 0.072 MeV. The second curve (shown by the solid line in the x-ray energy region) indicates the response following the addition of a 0.030" Cd liner to the shield. The thin Cd sheet is very effective in reducing the intensity of the Pb x-ray. Finally, the lowest line indicates the response in a large shield lined with 0.030" Cd sheet and 0.015" Cu sheet in that order. The combination of reduced solid-angle and the successive "grading" of the shield lining have reduced the fluorescent radiation to a negligible level.

C. Effect of Beta Absorber

Generally speaking, nature does not provide us with sources which emit only photons. The decay of most radioactive source includes the emission of charged particles (either positrons or electrons). Since NaI is an efficient detector of charged particles, it is necessary to prevent their

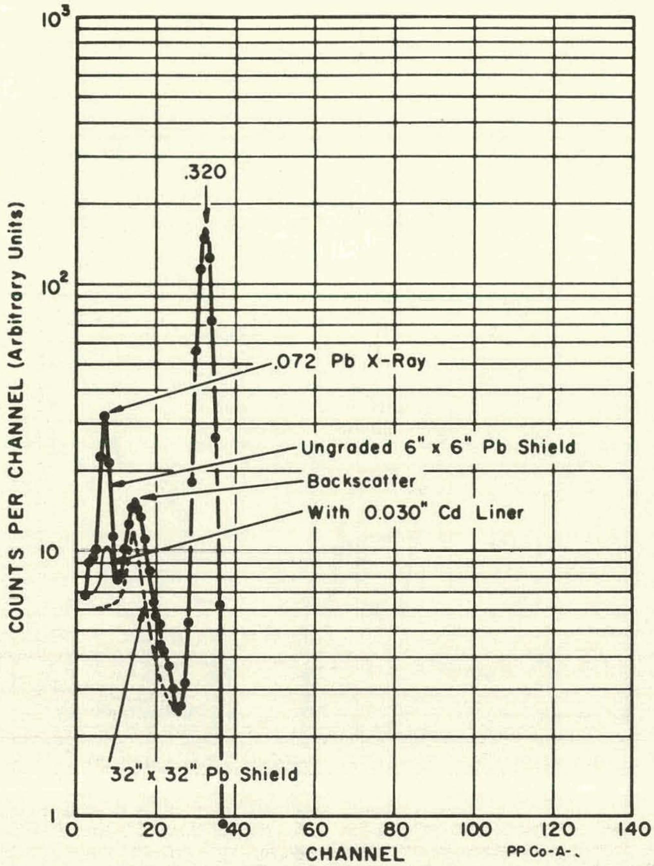


FIG. 14 - Illustration showing the effect of Pb x-rays produced by photoelectric interaction in the shield and the use of critical absorption techniques in "grading" shield to reduce this effect.

entering the detector. The presence of these charged particles introduces several complications. Fig. 15 shows a series of pulse spectra resulting from the measurement of radiations emitted from the decay of 3.6-hr Y^{92}. This isotope, which decays by beta emission, emits very energetic beta particles (3.6 MeV) and a number of gamma rays. The upper curve results from a measurement made with no absorbing material between the source and detector. We see that the gamma-ray spectrum is almost completely obscured by the high energy beta-ray continuum. The second curve represents a measurement taken with a 1.18 g/cm^2 beryllium absorber interposed between the source and detector in the standard source-detector configuration illustrated in Fig. 16. The third curve was obtained by surrounding the sides of the cylindrical detector with a cap made of polystyrene (0.7 g/cm^2) as shown in Fig. 17. The difference observed with the polystyrene cap is the result of the absorption of beta particles scattered from the air and surrounding materials into the sides of the detector. In cases where high energy beta radiation is present, care must be exercised to exclude all electrons from the detector if the pulse-amplitude spectrum is to represent only the response of the detector to gamma rays emitted by the source. This is particularly important for nuclides which have a high-intensity ground-tate beta transition.

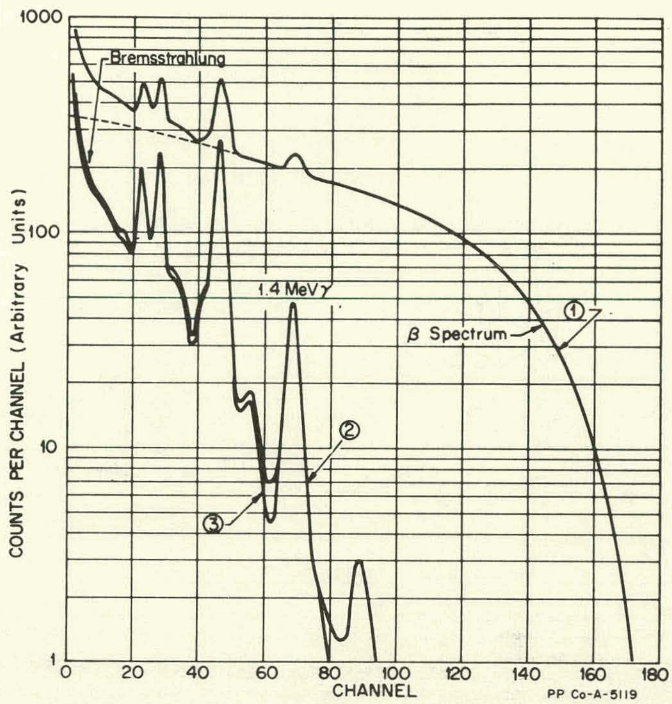


FIG. 15 - Effect of beta absorber on observed spectrum and use of absorber cap over detector to reduce rays scattered into side of detector.

Since absorbing material must be used to eliminate beta particles from the detector, one must be concerned with possible degradation of the spectrum from Compton scattering which occurs within the beta absorber. Fig. 18 shows the effect on the Cs^{137} pulse-height spectrum as increasing thicknesses of absorbing material are interposed be-

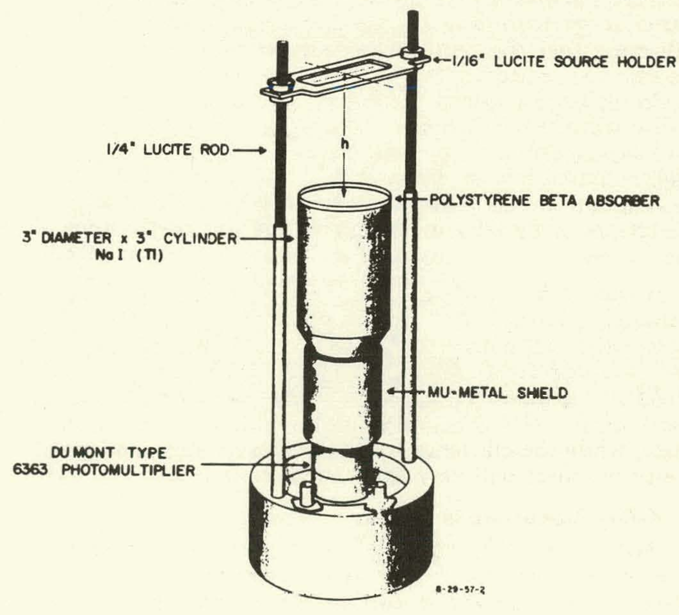


FIG. 16 - Standard laboratory source mounting geometry.

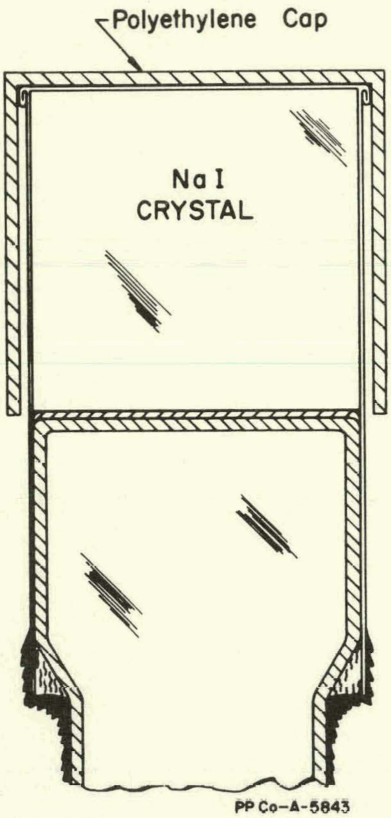


Fig. 17 - Illustration showing absorber cap over detector used to prevent scatter of electrons into side of detector.

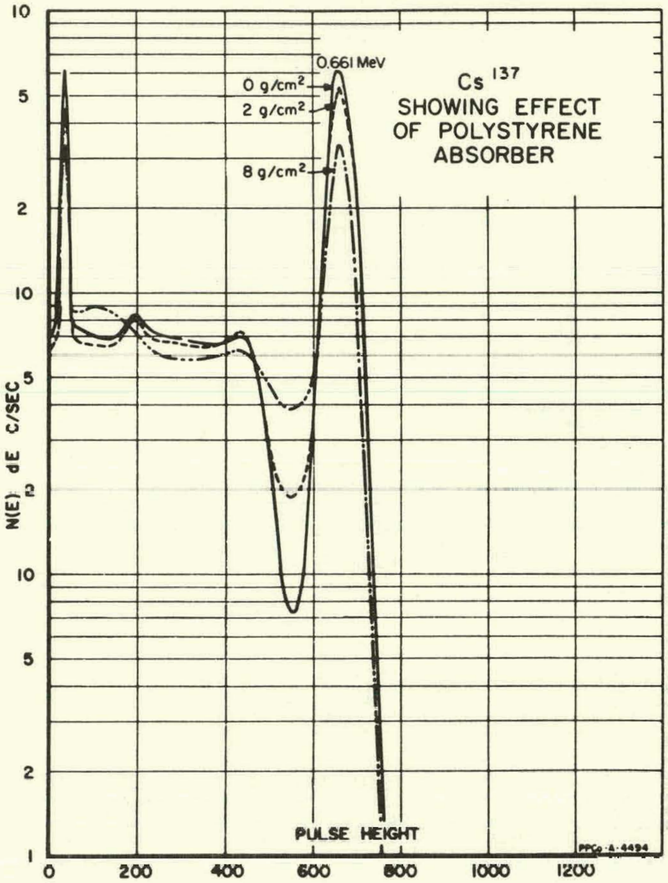


Fig. 18 - Effect of absorber thickness on monoenergetic response of detector.

tween source and detector. In addition to the attenuation of the entire spectrum, the shape of the spectrum is seen to change materially in the region just below the photopeak, with little change in the low-energy region of the Compton distribution. The observed degradation of spectrum shape is the result of detecting photons which have experienced Compton scattering in the forward direction. It should be noted that similar scattering effects can occur in the source if it has sufficient mass.

It is accepted practice to use beryllium as the absorbing material to minimize the production of bremsstrahlung. This subject will be discussed in Section VI.

D. Annihilation Radiation

In the measurement of sources emitting gamma rays whose energy exceeds the threshold for pair production, annihilation radiation will be observed in the pulse-height spectrum. This results from pair interaction in the walls of the detector shield and other material in the vicinity of the detector. Following the initial event, the annihilation of an electron-positron pair creates two (2) 0.511-MeV gamma rays which may interact with the detector. This type of event is illustrated in Fig. 7. It should be restated that annihilation radiation does not appear as a separate feature of the pulse-height distribution when high-energy photons experience a pair interaction within the volume of the detector. If one of the annihilation quanta is detected following the initial event, the energy loss is added to the kinetic energy of the electron-positron pair.

Since the cross section for pair production is highly dependent on the atomic number of the absorber, this source of spurious radiation can be reduced by removing all high-Z material from the immediate vicinity of the detector. Scatter shields and collimators, which are usually made of lead, are likely offenders.

V. SUMMATION EFFECTS

A. Coincidence Sum Spectrum

1. Coincident Gamma Rays

In the decay of most radioactive nuclides, beta emission is frequently followed by the emission of two or more gamma rays in cascade. In this case there is a finite probability that these gamma rays will be detected simultaneously. The light pulse produced in this instance will correspond to the sum of the energies deposited in the detector by the gamma rays. This results in a distribution of pulses extending in energy up to the sum of the energies of the coincident gamma rays — the "coincidence sum spectrum." The intensity of the coincidence sum spectrum for two coincident gamma rays is given by the simplified expression:

$$N_{c.s.s.} = N_o \, \varepsilon_1 \, \varepsilon_2 \, \overline{W}(0^\circ) \qquad (4)$$

where N_o is the number of coincident pairs of gamma rays emitted by the source, ε_1 and ε_2 are the efficiencies for the detection of gamma rays 1 and 2, and $W(0^\circ)$ is a factor included to account for the angular correlation of the two coincident gamma rays.[15] A typical coincidence sum spectrum is illustrated in Fig. 19. This spectrum is characteristic of the radiation emitted by Nb^{94}. In addition to the response of the detector to the two gamma rays individually, we also see the distribution of pulses resulting from coincidence summing. The most prominent feature of this spectrum is the so-called sum peak which results from total energy loss of both coincident gamma rays in the detector. The shape of the coincidence sum spectrum shown in the figure was calculated by convoluting the response of the detector to the two gamma rays. The method used to calculate coincidence sum spectra will be discussed in Section IX.

To demonstrate the effect of geometry on the magnitude of the coincidence sum spectrum, measurements with the source at 0.75 and 10.0 cm from the face of the detector are shown. The relative intensity of the sum spectrum is seen to be highly dependent upon source-detector geometry. As indicated in Eq. (4), the magnitude is proportional to the product of the detection efficiency for the

[15] M. E. Rose, *Phys. Rev.*, 91, 610 (1953).

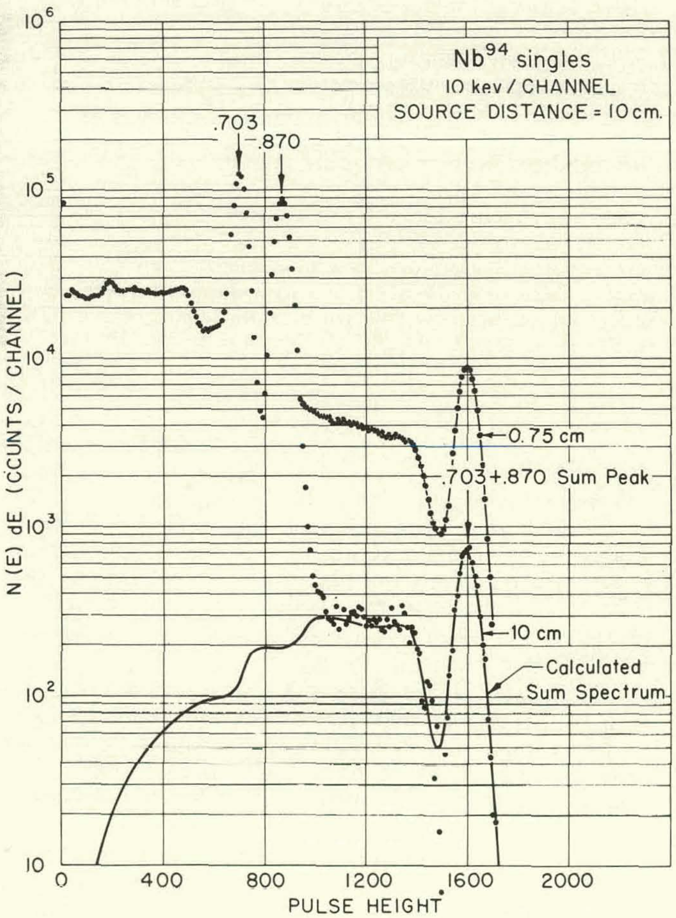


FIG. 19 · Spectrum of Nb^{94} showing coincidence sum spectrum and effect of source-detector geometry on intensity of sum spectrum.

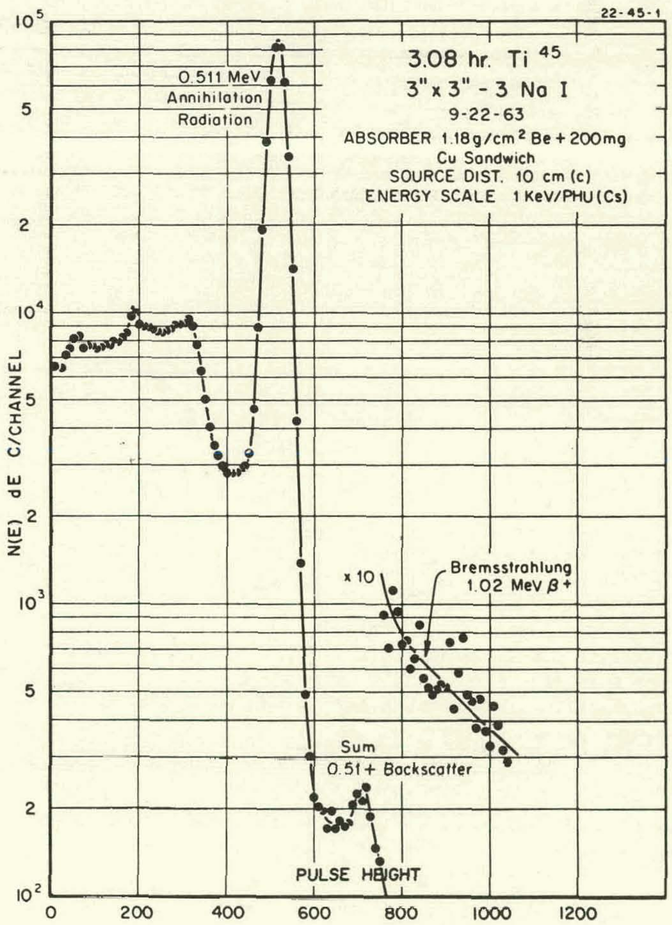


FIG. 20 - Pulse-height spectrum of 3.08-hr Ti^{45} showing coincidence summing of annihilation radiation with 180°-scattered photons from the other annihilation quantum.

two gamma rays. From this it is evident that the analysis of complex spectra will be more complicated if the spectrum is measured under conditions of large solid angle. On the other hand, coincidence summing can be used to confirm coincidence relationships and offers a means of identifying nuclides whose spectra are characterized by prominent cascades. The coincidence sum effect was a major consideration in the adoption of a 10 cm source distance as the standard geometry for all spectra in the catalogue. At this reduced solid angle the sum spectrum can usually be neglected.

2. Annihilation Radiation

Sources which decay by positron emission represent a special case for coincidence summing. It is desirable to annihilate the positrons at the source in order to insure that the annihilation radiation will be detected in the same geometry as the other photons emitted by the source. This is achieved by surrounding the source with an absorber of sufficient thickness to annihilate the positrons. If one of the two annihilation quanta enters the detector, the other, which is emitted in the opposite direction, can be scattered from material surrounding the source. Fig. 20 illustrates the resulting sum of these two events. In this spectrum we see a low intensity peak appearing at approximately 700 keV which is due to the sum of pulses from the photopeak of the 0.511-MeV annihilation quantum and the backscattered radiation from the other member of the pair.

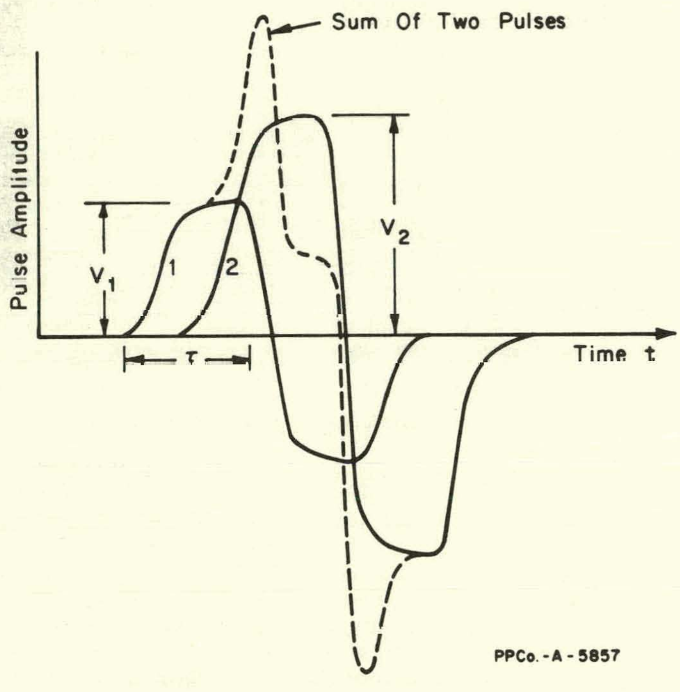


FIG. 21 - Illustration of the effect of superposition of two pulses within the sampling time of the analogue-to-digital converter. Variations in overlap will result in smearing of the random coincidence summation spectrum.

A discussion of the treatment of the coincidence sum effect in quantitative analysis of spectra appears in Section VII.

B. Random Sum Spectrum

If we re-examine the pulse-height spectrum of a monoenergetic source shown in Fig. 10 (Section IV-B) in the region above the amplitude of the "photopeak," we see a continuous distribution of pulses extending to approximately twice the amplitude of the full-energy peak. This feature of the spectrum is due to accidental time-coincidence between events occurring in the detector. Since the processes of radioactive decay are completely random in time, and the resolving time of the electronic system finite, pulses from two events can overlap in time and the two events will sum in amplitude. The probability for accidental summing is given by:

$$I_{r.s.s.} = N^2\,2\tau \qquad (5)$$

where N is the input pulse rate, τ is the resolving time of the electronic system, and I is the total number of pulses appearing in the summation spectrum. Pulses in this sum spectrum represent the detection of photons directly incident upon the detector and are considered as part of the energy response of the detector. Comparing the shapes of the random summation spectrum and the coincidence sum spectrum we see that the characteristic "sum peak" is not so pronounced. The degradation of the shape of the random sum spectrum is a result of variations in the time interval Δt between the leading edges of the two overlapping pulses. Fig. 21 illustrates the superposition of two pulses which occur within the sampling time of the pulse-height analyzer. Two pulses, with amplitudes V_1 and V_2, are shown partially superimposed in time. The sum of these two pulses is shown by the dashed line. Clearly, the shape of the resultant pulse will vary with the time interval between the two pulses and their respective amplitudes. The complex pulse which results can differ markedly from the normal pulse shape presented to the pulse-height analyzer. Depending upon the method used in the analogue-to-digital converter to determine pulse amplitude, the recorded amplitude for such pulses can vary from V_1 to the highest amplitude reached in the region of overlap. The result is the observed "smeared" pulse-height distribution.

As indicated in equation (5), the intensity of the random sum spectrum will vary as the square of the input counting rate. The variation in the intensity of the random sum spectrum with source intensity is indicated by the results of experimental measurements shown in Fig. 22.

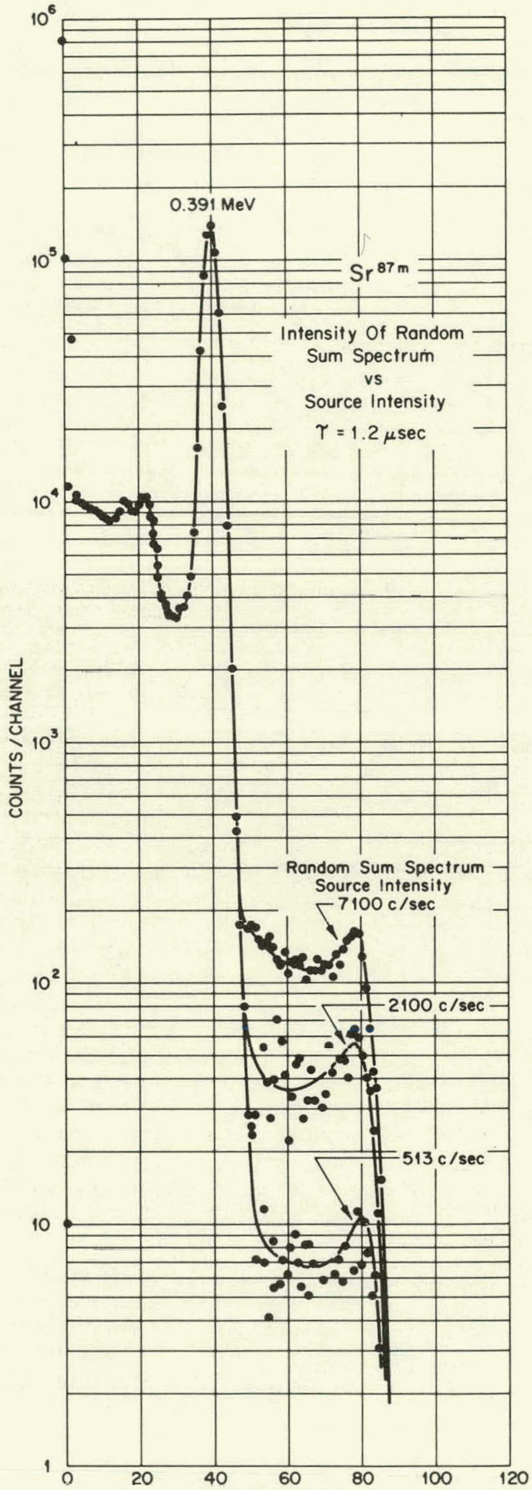


FIG. 22 - Intensity of random sum spectrum *vs* count rate.

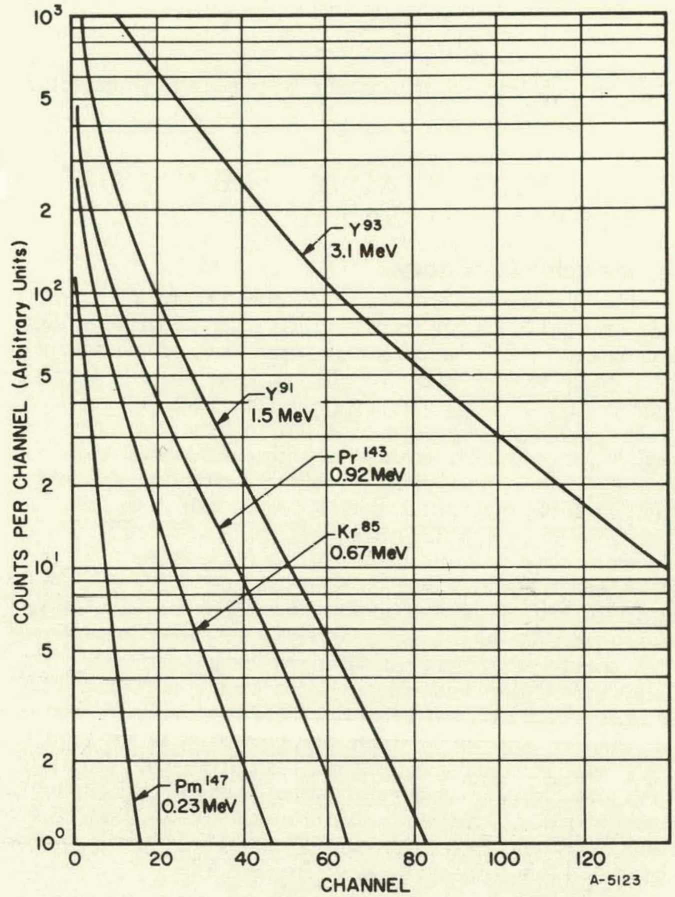


FIG. 23 - Typical bremsstrahlung spectra on 3"x3" NaI detector. All spectra are normalized in intensity to 10^7 disintegrations.

VI. BREMSSTRAHLUNG

As electrons are stopped in an absorbing material, a certain fraction of their energy is radiated as bremsstrahlung. This process, which is the inverse of pair production, results from inelastic collision of electrons with nuclei. A continuous energy distribution of photons results which decreases rapidly in intensity with increasing energy up to the maximum electron energy. The probability for energy loss by radiative collision is proportional to electron energy and varies as the square of the atomic number, Z, of the absorbing material.

A set of typical bremsstrahlung spectra observed with a NaI spectrometer is shown in Fig. 23. A number of nuclides emitting essentially only one beta ray group were measured under the same experimental conditions. The disintegration rates of all sources were determined by 4π beta counting techniques to permit intensity normalization. The resulting bremsstrahlung spectra are normalized to 10^7 disintegrations of the source to provide an indication of the shape and intensity of bremsstrahlung distributions as the energy of the beta ray transition is increased. These data were obtained in the standard geometry using beryllium beta absorbers. As mentioned above, the choice of absorber is based upon the Z dependence for radiative collisions.

Although bremsstrahlung will be present in the spectra of all beta emitters, the intensity is usually almost negligible. Exceptions are nuclides which have a very intense high-energy ground-state beta transition such as Y^{91}. The spectrum of this isotope is shown in Fig. 24. A number of pure bremsstrahlung spectra are included in the catalogue as an aid in the analysis of other spectra.

VII. QUANTITATIVE ANALYSIS OF SCINTILLATION GAMMA-RAY SPECTRA

A. Detector Efficiency

The detection efficiency T(E), the fraction of gamma rays emitted from the source which interact with the detector, can be calculated for known values of the absorption cross section $\tau(E)$ for NaI under a well defined source-detector geometry. Equations are derived for two cases: (A) a point source of radiation located on the extended axis of a right circular cylindrical detector and (B) a disk source whose center is on the extended axis of a right circular cylindrical detector with the plane of the disk parallel to the top surface of the detector. These are shown in Figs. 25 and 26. In these expressions t_o is the thickness of the detector, r_o is the radius of the detector, h_o is the perpendicular distance between the source and the top surface of the detector, and R is the radius of the disk source. Extensive calculations have been made by Vegors, Marsden, and Heath[16] for point, disk, and line sources located on the central axis of the detector. These calculations are for 32 different detector sizes, for values of h from 0 to 100 cm, and for photon energies from 10 keV to 10 MeV. Curves and tables of calculated efficiencies for point, line, and disk sources for 3″ diam. x 3″ thick, 4″ diam. x 4″ thick, and 5″ diam. x 5″ thick cylindrical NaI detectors are given in Appendix II.

The quantity T(E), the absolute detection efficiency, obtained from these relationships, is the probability that a photon emitted from the source will interact in the detector with the loss of a finite amount of energy.

In a solid material such as NaI, which has a density of 2.67, the sensitive volume is very clearly defined. Since the amount of material which a secondary electron produced in the solid phosphor must traverse to leave a measurable amount of energy is negligible, edge effects are insignificant. Any error to be expected will be due to uncertainty in the value of τ used in the calculation. A plot of the percent error in detection efficiency versus percent error in absorption cross section for the detection of 0.32-, 0.66-, and 1.11-MeV gamma rays in a ¼″ thick x 3″ diam. NaI phosphor is shown in Fig. 27. As one might expect, for small values of t, the detector thickness, the error will vary linearly with τ. Fig. 28 shows a similar plot for the 3″ x 3″ detector. In a large phosphor such as this, the error in detection efficiency due to an uncertainty in τ is reduced appreciably. Even at 1.11 MeV a 10% error in τ, which is considerably more than the expected uncertainty in the calculated values, will result in an error of only 5%. For lower energies the error will be considerably reduced since the detector is almost opaque to gamma radiation of energy less than 300 keV.

The effect of varying the radius of a disk source on the detection efficiency for 0.661 MeV gamma rays is shown in Fig. 29.

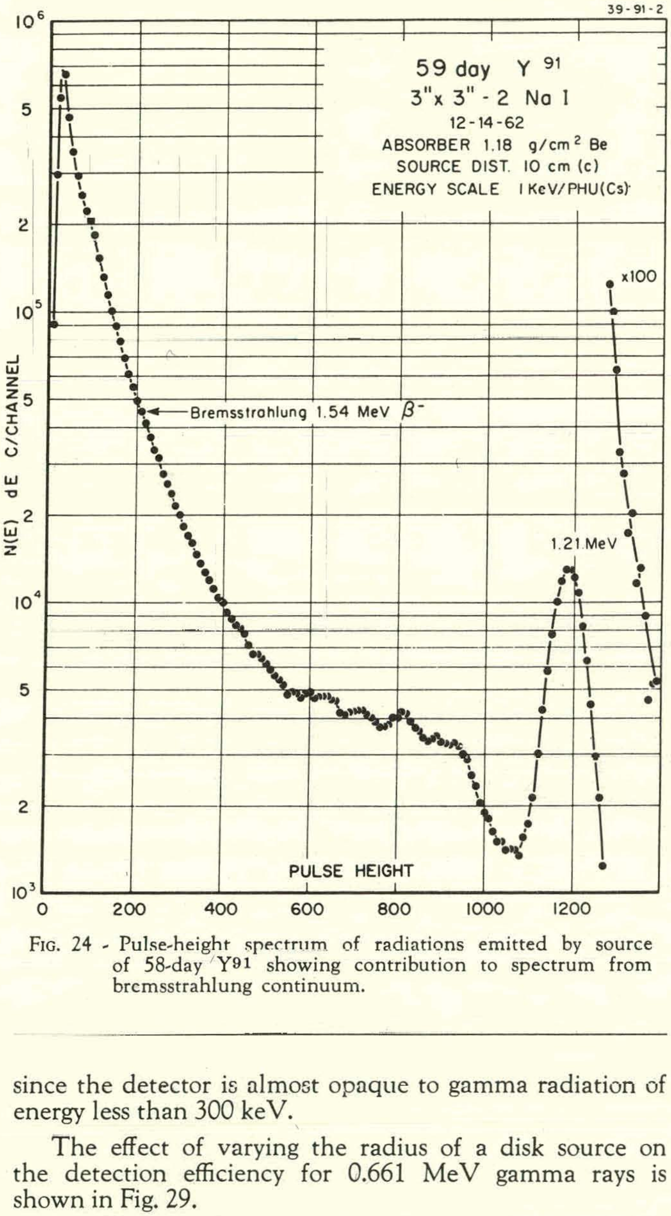
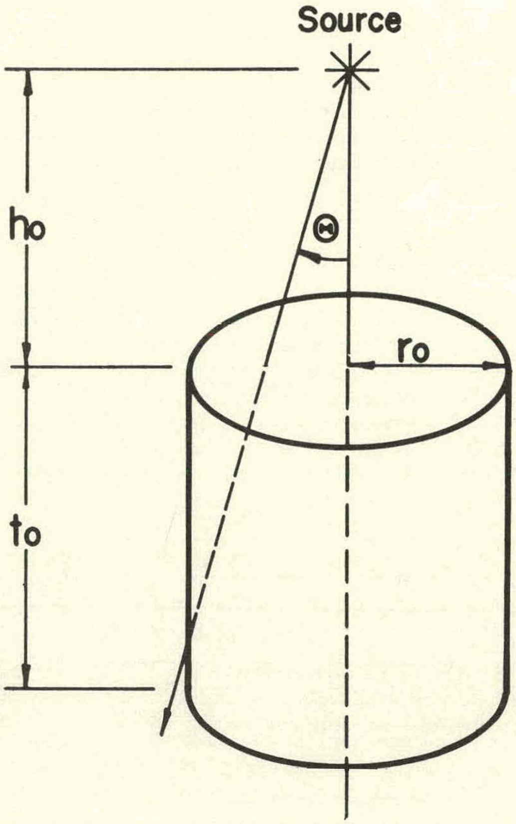


FIG. 24 - Pulse-height spectrum of radiations emitted by source of 58-day Y^{91} showing contribution to spectrum from bremsstrahlung continuum.

B. Photopeak Efficiency

Consider a point source of radiation and a detector of specified size that is isolated from all material which might scatter into the detector gamma rays not originally emitted into the cone of solid angle subtended by the detector. The number of events in the observed pulse-height spectrum will then be related to the emission rate from the source by the expression given in the last section. From the

[16] S. H. Vegors, L. L. Marsden, and R. L. Heath, *Calculated Efficiencies of Cylindrical Radiation Detectors*, AEC Report IDO-16370 (1958).

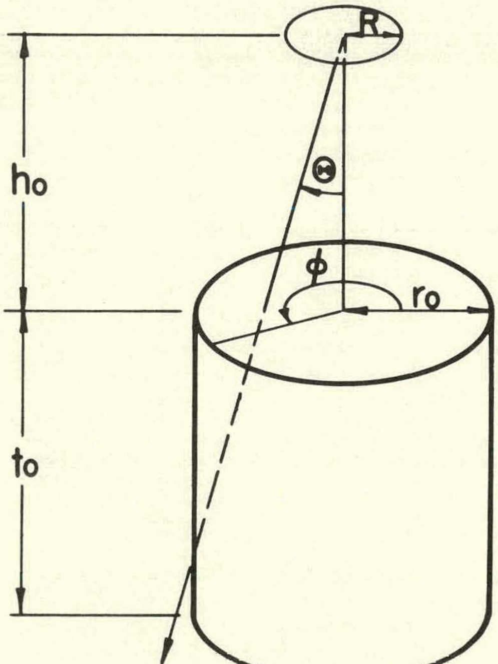


POINT SOURCE

$$T(E) = 1/2 \left\{ \int_{0}^{\tan^{-1}\frac{r_o}{h_o+t_o}} \left[1 - e^{-\tau(E)\frac{t_o}{\cos\theta}}\right] \sin\theta \, d\theta \right.$$

$$\left. + \int_{\tan^{-1}\frac{r_o}{h_o+t_o}}^{\tan^{-1}\frac{r_o}{h_o}} \left[1 - e^{-\tau(E)\left(\frac{r_o}{\sin\theta} - \frac{h_o}{\cos\theta}\right)}\right] \sin\theta \, d\theta \right.$$

FIG. 25 - Expression for calculation of detector efficiency for point source of radiation and cylindrical detector.



EXTENDED SOURCE

$$T(E) = \frac{1}{\pi R^2} \int_{0}^{R} x\,dx \int_{-\pi/2}^{\pi/2} d\phi \left\{ \int_{0}^{\tan^{-1} \frac{-x\sin\phi + \sqrt{x^2\sin^2\phi - (x^2 - r_o^2)}}{h_o+t_o}} \left[1 - e^{-\tau(E)\left(\frac{t_o}{\cos\theta}\right)}\right] \sin\theta \, d\theta \right.$$

$$\left. + \int_{\tan^{-1}\left(\frac{-x\sin\phi + \sqrt{x^2\sin^2\phi - (x^2 - r_o^2)}}{h_o+t_o}\right)}^{\tan^{-1}\left(\frac{-x\sin\phi + \sqrt{x^2\sin^2\phi - (x^2 - r_o^2)}}{h_o}\right)} \left[1 - e^{-\tau(E)\left(\frac{-x\sin\phi + \sqrt{x^2\sin^2\phi - (x^2 - r_o^2)}}{\sin\theta} - \frac{h_o}{\cos\theta}\right)}\right] \sin\theta \, d\theta \right\}$$

FIG. 26 - Expression for calculation of detector efficiency for disk source of radiation and cylindrical detector.

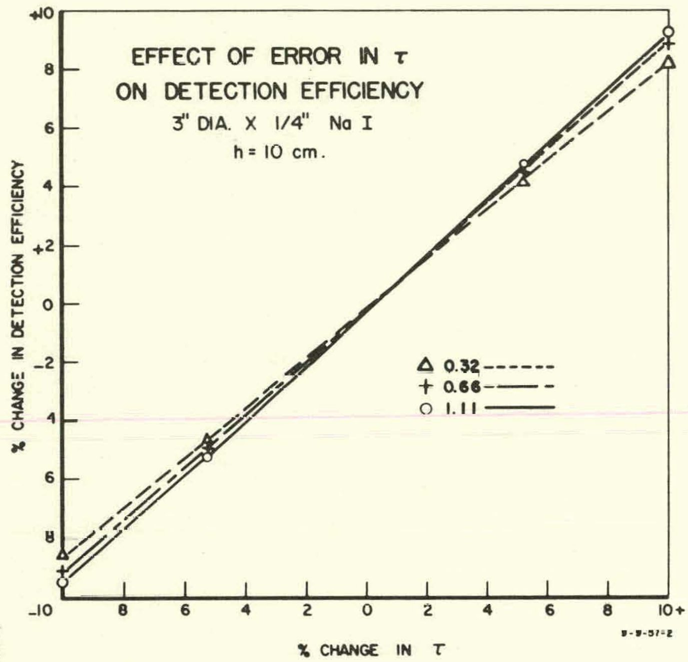


FIG. 27 - Error in detection efficiency *vs* error in absorption coefficient for 3"x¼" NaI detector (h = 10 cm).

preceding discussion of the contribution of scattered radiation to the detector response, it is evident that this relationship will hold only if this contribution can be removed. Since such radiation is of lower energy than the initial gamma-ray energy, it is more convenient and precise to work in terms of the photopeak efficiency. This quantity, ε_p, is defined as the probability that a gamma ray of energy E, emitted from the source, will appear in the photopeak of the observed pulse-height spectrum. The value of this quantity is that most of the spurious contribution to the observed spectrum from scattering has virtually no effect on the photopeak. Thus the photopeak represents a more accurate measure of emission rate.

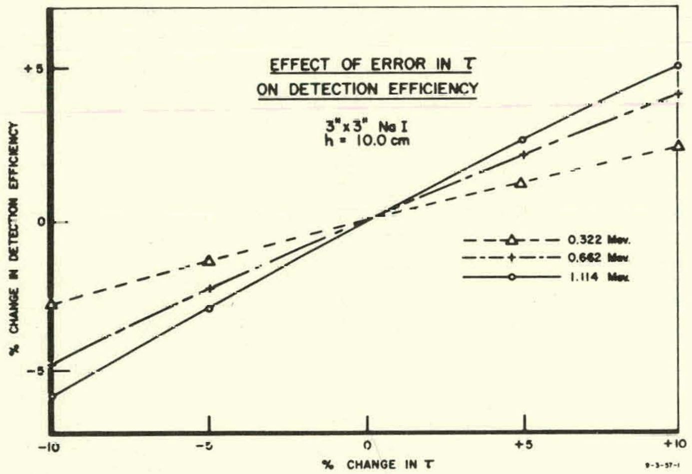


FIG. 28 - Error in detection efficiency *vs* error in absorption coefficient for 3"x3" NaI detector (h = 10 cm).

1. Peak-to-Total Ratio

It would be difficult to calculate ε_p directly because of the large number of multiple processes which occur in a scintillation detector. For this reason it is convenient to use the following expression:

$$\varepsilon_p = T(E)\,P \qquad (6)$$

where T(E) is the calculated value for the absolute efficiency and the quantity P is defined as the fraction of the total number of events in the pulse-height spectrum which appear in the photopeak (the peak-to-total ratio). The peak-to-total ratio has been determined experimentally by careful measurement of selected sources under experimental conditions which reduce scattered radiation to negligible levels. An example is shown in Fig. 30. An alternative method is to determine the distintegration rate for sources using the 4π β-γ coincidence method[17] and to calculate a value for the peak-to-total ratio from the integrated peak area in a spectrum obtained using the NaI detector. A plot of experimental values of the peak-to-total ratio, measured at this laboratory, for a 3" x 3" NaI detector as a function of energy is shown in Fig. 31. These experimental data are tabulated in Appendix III.

2. Absolute Emission Rate Determination

In this notation, the emission rate of a single gamma ray will be given by the following relationship:

$$N_o = \frac{N_p}{T(E)\,P\,A} \qquad (7)$$

where N_o is the number of gamma rays emitted from the source, N_p (as shown in Fig. 30) is the area under the photopeak, T(E) is the total absolute detection efficiency for the source-detector geometry used, P is the appropriate value for the peak-to-total ratio, and A is a correction factor for absorption of the gamma radiation by any beta absorber used in the measurement.

[17] P. J. Campion, *National Academy of Sciences — National Research Council Publication No. 573*, 24, (1958).

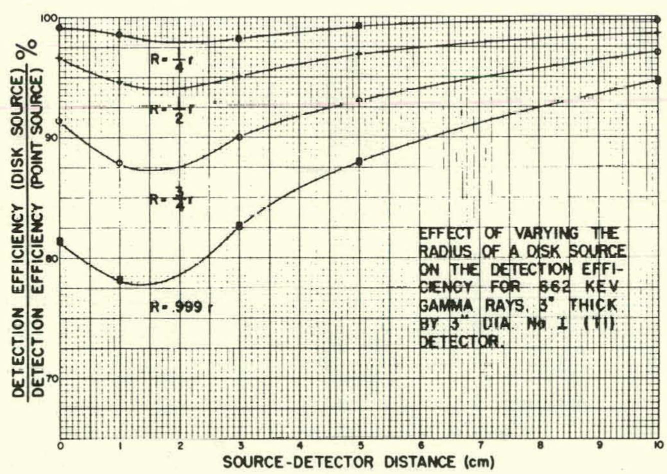


FIG. 29 - Detection efficiency for a 3"x3" detector (662 keV) as a function of source radius and distance from the detector.

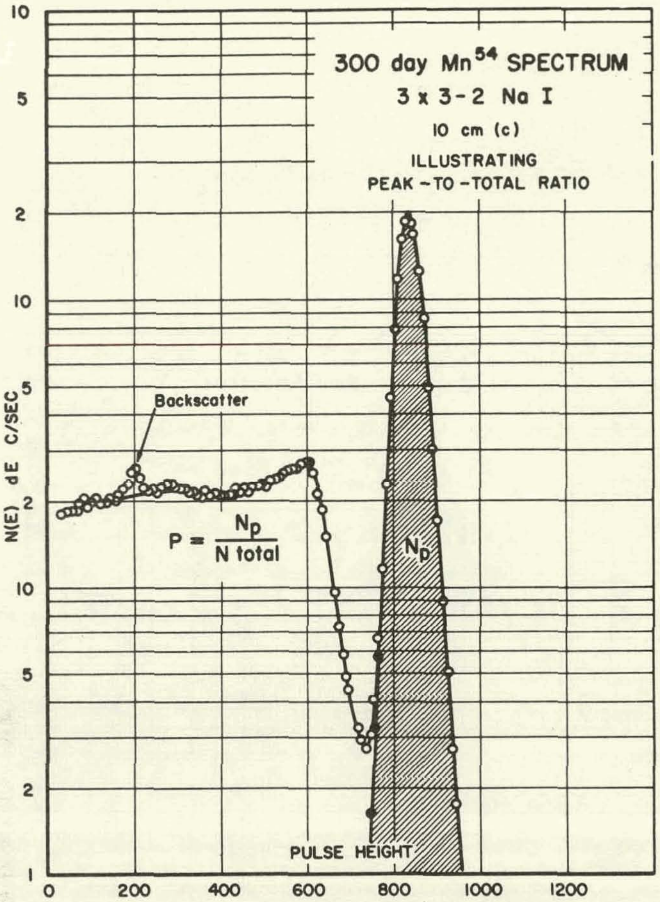


FIG. 30 - Illustration of Peak-to-total Ratio concept for NaI pulse-height spectrum.

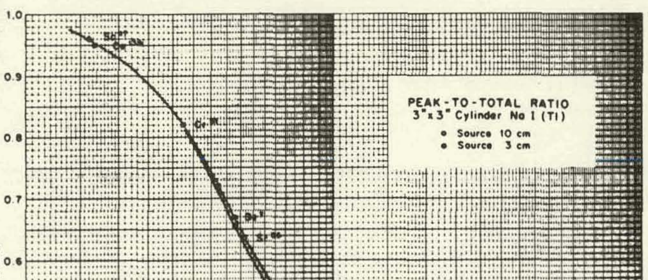


FIG. 31 - Peak-to-total ratio *vs* Energy for a 3"x3" NaI detector.

The absorption correction factor, A, for the standard set of beryllium absorbers used for all measurements is determined experimentally. It is necessary to determine the absorption correction for the particular geometry used rather than use values for the total absorption cross section of beryllium. Values of the total absorption cross section are generally reported for a highly collimated geometry. With the absorber placed directly on the top surface of the detector, the total absorption cross section does not represent the observed reduction in the intensity of the photopeak.

The results of an experimental determination of photopeak attenuation versus gamma-ray energy for a set of beryllium absorbers is shown in Fig. 32. These measurements were made with point sources in the standard geometry, with the absorbers positioned on the top surface of the detector. The absorption curve for a 1.18 g/cm² absorber, calculated from the total absorption cross section, is shown for comparison.

In the determination of the photopeak areas and the experimental measurement of the peak-to-total ratios, the region of the spectrum to be integrated must be well defined. Up to this point we have assumed that the photopeak could be satisfactorily described by a gaussian function

$$y(x) = y_0 e^{-(x-x_0)^2/b_0} \qquad (8)$$

where y is the calculated count in channel x, x_0 is the pulse height at the center of the summetrical distribution, y_0 is the number of counts per channel at x_0, and the full-width at half-maximum of the peak is $w_0 = 2\sqrt{\ln 2}\,\sqrt{b_0}$.

Fig. 33 shows the result of a fit to the photopeak of the Cs^{137} gamma ray with a gaussian function. The solid circles indicate data points used in the fit. From this least-squares fit to the data points, y_0, x_0, and b_0 are determined. Examination of the figure shows considerable deviation from a gaussian shape on the wings of the peak. The residuals are plotted to show deviation. The low-energy tail is expected and is produced largely by multiple processes which do not result in full-energy loss. The residuals on the high-energy side of the peak are not expected and represent a problem in determining the peak area by least-squares fitting techniques. The cause of this deviation from a gaussian shape is not completely understood and is observed to vary in magnitude for different detectors. For this reason it is thought to result from optical problems in the detector.

To account for this effect, an arbitrary functional form has been chosen to represent the photopeak response of the detector as a function of gamma-ray energy. It is given by:

$$y(x) = y_0 e^{-(x-x_0)^2/b_0} [1 + \alpha_1(x-x_0)^4 + \alpha_2(x-x_0)^{12}] \qquad (9)$$

where the powers 4 and 12 were chosen to give the best fit and x_0, y_0, b_0, α_1, and α_2 are the parameters determined in the fit. These five parameters can be calculated in a non-linear least-squares fitting program which has been written at this laboratory[29]. Values for these parameters as a function of gamma-ray energy are deter-

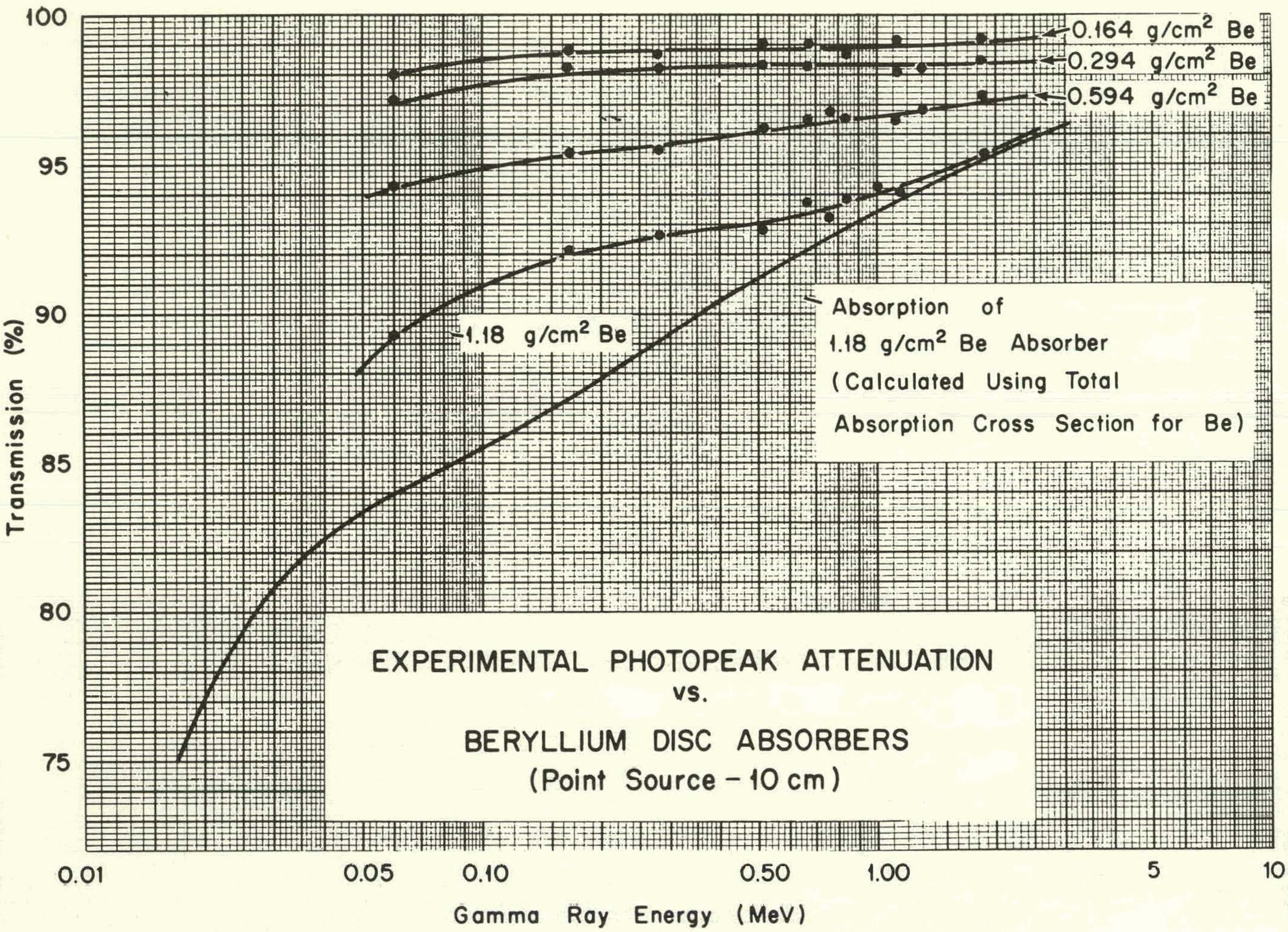


FIG. 32 - Results of experimental determination of photopeak attenuation for Be beta absorbers. These measurements were made for point sources of radiation at 10 cm distance from the detector. Absorbers positioned on top of cylindrical detector.

mined by fitting photopeaks for a number of gamma-ray standards. A plot of α_1 and α_2 for the detector used to accumulate most of the spectra in the Catalogue (3″x 3″ -2) are shown in Figs. 34, 35, and 36 for the 5 keV/channel and 10 keV/channel energy scales.

The photopeak area used is defined as the area obtained by fitting the experimental photopeak with the functional form described above. A simplified practical method for determining the photopeak area may be used which is based upon a symmetry requirement for the low-energy side of the peak. This method involves the construction of a set of parallel lines connecting data points on the high-energy side of the photopeak with corresponding points on the low-energy side. This will result in a family of parallel lines for points near the peak maximum. Once the slope of this set of parallel lines is established, points on the low-energy side may be interpolated by extending the parallel lines down to include all points on the high-energy side of the peak. This procedure establishes the symmetry requirement and will produce results which agree very closely with those obtained from the non-linear least-squares fitting procedure.

For use with Eq. (7) it is convenient to combine the terms in the denominator. A plot of the product of these two quantities as a function of gamma-ray energy is shown in Fig. 37. The solid line represents the result of a least-squares fit of a polynomial to experimental values of the product $\epsilon_p A$ for a number of mono-energetic gamma-ray sources. Note that the curve reaches a maximum at approximately 100 keV and then decreases in value. This is due to iodine x-ray escape from the surface of the detector which reduces the peak-to-total ratio. This is mentioned to stress that the peak-to-total ratio, as we define it, does not include the intensity of the escape peak.

To this point in the discussion we have considered only the case of a source which emits a single gamma ray. If more than one gamma ray is emitted and coincidence summing occurs then the problem is complicated. Although the effect of coincidence summing is somewhat difficult to analyze in every detail, the total area associated with the

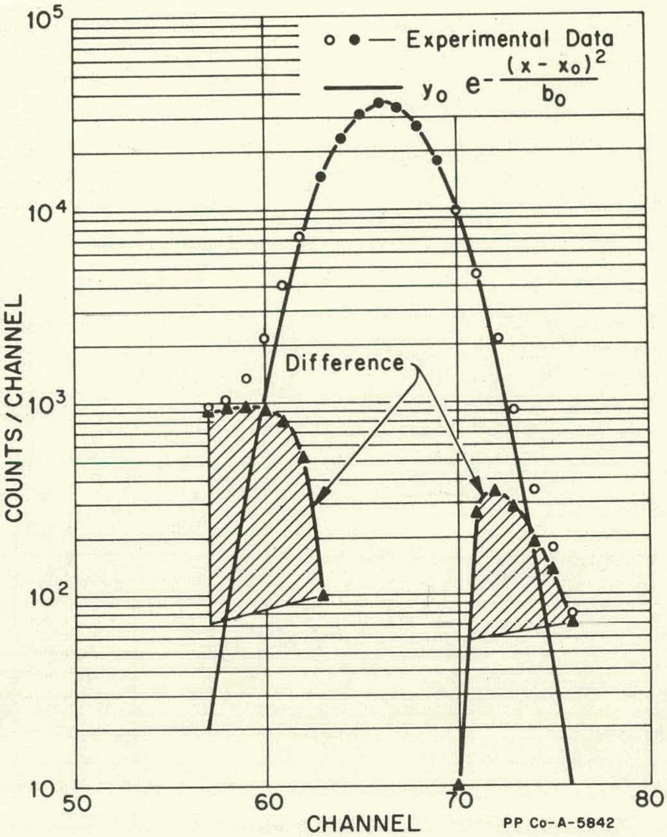


FIG. 33 - Gaussian fit to experimental photopeak of Cs^{137} (0.662 MeV) showing deviation from functional form.

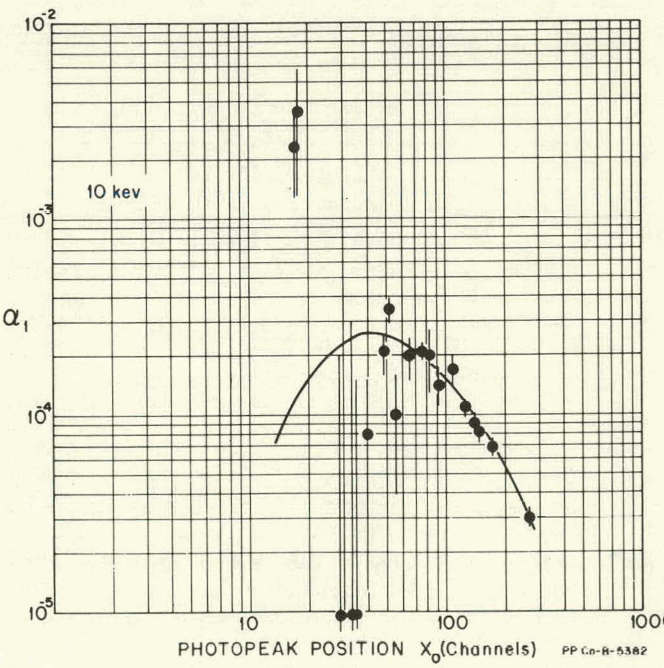


FIG. 34 - Variation of the experimental parameter α_1 with gamma-ray energy for the 10 keV/channel gain scale.

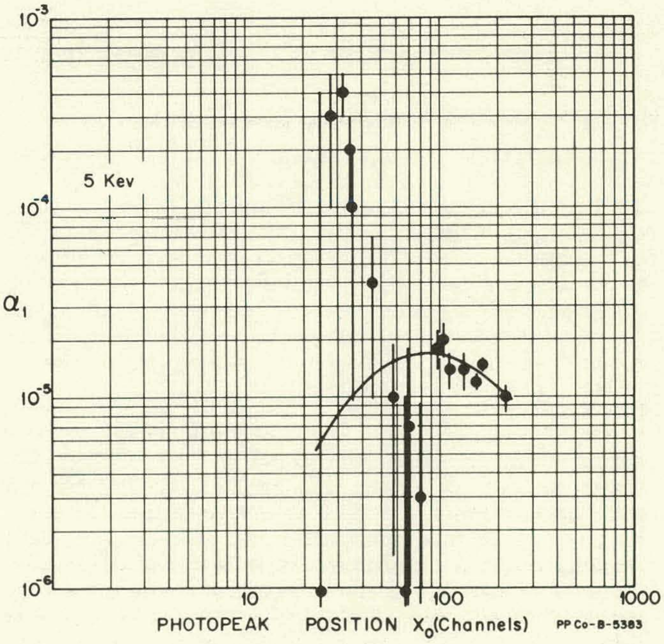


FIG. 35 - Variation of the experimental parameter α_1 with gamma-ray energy for the 5 keV/channel gain scale.

sum spectrum and the "sum spectrum" may be calculated from the known efficiencies and solid angle. Considering a simple scheme characterized by the emission of two cascade gamma rays (e.g., Co^{60}) the emission rate of γ_1 will be given by equation

$$N_1 = \frac{N_{p1}\ \overline{W}(0^\circ)}{A_1\varepsilon_1 P_1\ [1-\varepsilon_2\overline{W}\ (0^\circ)\ A_2]} \tag{10}$$

where N_{p1} is the area under the photopeak of γ_1 (with any contribution due to γ_2 or the sum spectrum subtracted), ε_1 and ε_2 are the total absolute efficiencies for γ_1 and γ_2, P_1 is the peak-to-total ratio for γ_1 (experimental), A_1 and A_2 are the absorption corrections for the two gamma rays, and $W\ (0^\circ)$ is a factor to take into account the angular distribution function of the two gamma rays integrated over the face of the crystal, evaluated by the methods described by Rose.[15] The third term in the denominator accounts for those pulses which would normally appear in the photopeak but, due to simultaneous detection of the other cascade gamma ray, appear in the coincidence sum spectrum. Another convenient expression is that for the area under the coincidence sum spectrum, or the probability that two coincident gamma rays will be detected simultaneously. This is given by equation (11)

$$N_{ss} = \frac{N_{p1}\,\varepsilon_2\,A_2\,\overline{W}\ (0^\circ)}{P_1\ [1-\varepsilon_2\,A_2\,\overline{W}\ (0^\circ)]} \tag{11}$$

VIII. EXPERIMENTAL MEASUREMENTS

A. Laboratory Scintillation Spectrometer

In this section the equipment, calibration procedures, and experimental techniques used to obtain the data for the spectrum catalogue will be described. The experimental conditions adopted as standard for the catalogue spectra represent a reasonable compromise for the majority of routine applications of a scintillation spectrometer. This is with an understanding that the requirements for a specific measurement may require the modification of one or more parameters to achieve an optimum experiment.

1. The Detector

The 3" diameter x 3" thick cylindrical NaI detector was originally chosen as the standard reference detector for the spectrum catalogue. This choice was a compromise based upon the consideration of many factors. This size detector can be readily obtained as a package, integrally coupled to a photomultiplier, from commercial sources. These commercial units can now be obtained with an energy resolution for the 0.662-MeV gamma ray of Cs^{137} of 7.5 to 8.0%. The volume of a 3"x 3" detector is sufficient to give a reasonable photopeak efficiency in the energy region associated with radioactivity. To obtain appreciable improvement in the photofraction, one would have to consider increasing the detector size to a 5" diameter x 5" cylinder or larger. These larger detectors are not only considerably more expensive, but usually exhibit poorer resolution. Although larger detectors are in use in this laboratory and much data has been obtained with 5"x 5" detectors, the 3"x 3" detector is still considered to be the best detector for most applications.

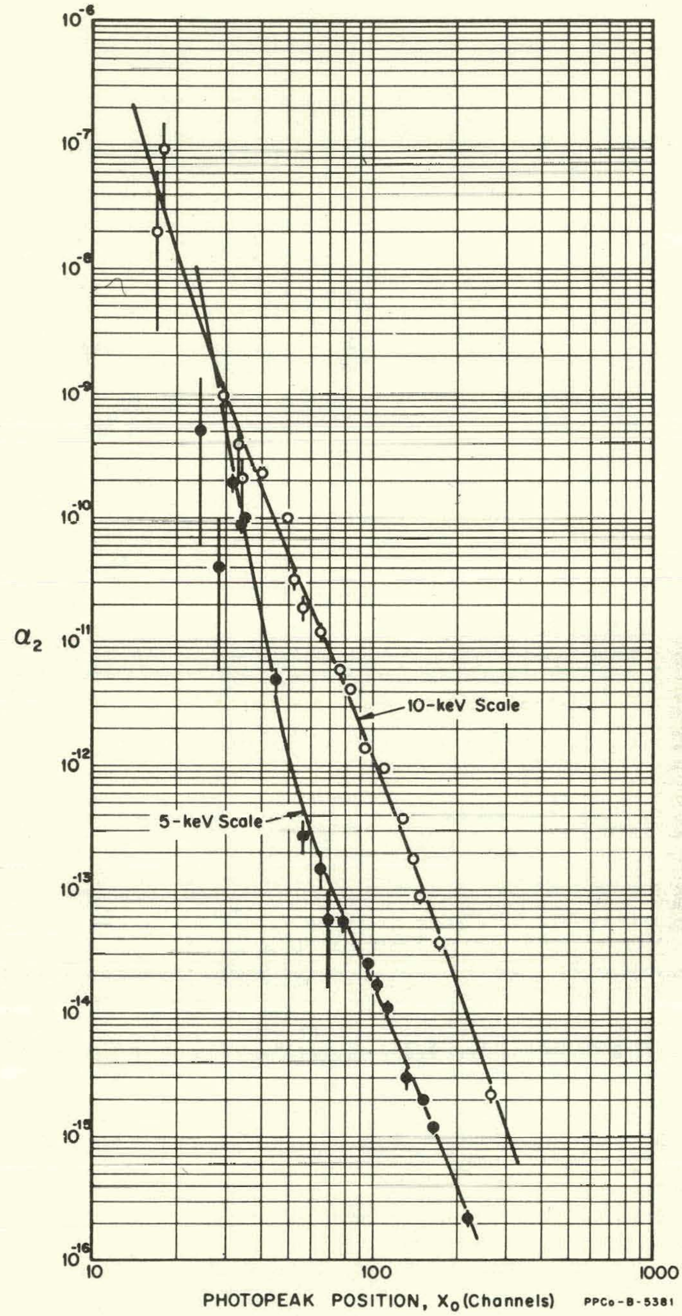


FIG. 36 - Variation of the experimental parameter α_2 with gamma-ray energy for both the 5 and 10 keV/channel gain scales.

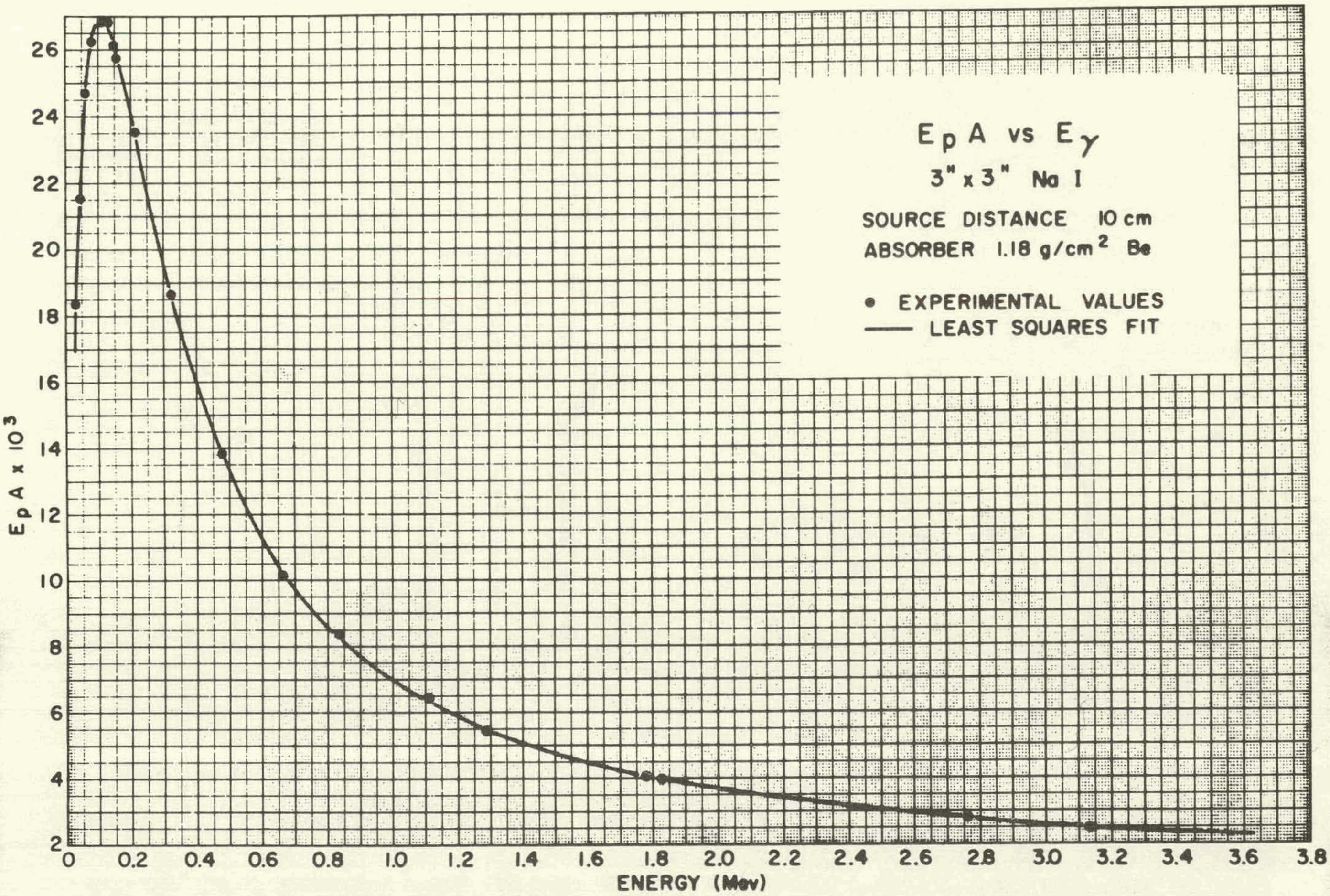


FIG. 37 - Least-squares polynomial fit to experimental values for E_pA for 3"x3" NaI detector.

The detectors used to obtain all spectra included in the catalogue were fabricated in this laboratory using the packaging technique shown in Fig 38. The NaI crystal is contained in a thin-walled aluminum can (0.005" wall thickness) to reduce absorption of low energy photons and to prevent excessive Compton scattering from the packaging material. The optical reflector is a 0.005" thick sprayed coating of α-alumina. The crystal is mounted directly on the face of an RCA 8054 electron multiplier, optically coupled with silicon grease (Dow QC-2-0057), and the entire assembly evacuated. A mu-metal shield surrounds the dynode structure of the phototube to reduce the effect of stray magnetic fields. Energy resolution for detectors used varies from 7.0% to 8.1%. A drawing of a typical commercial detector package is shown in Fig. 39. The major difference between the two packaging techniques is in the quantity of packaging material used. For this reason quantitative application of a commercial detector would require the determination of the following parameters:

(1) this distance from the top of the crystal to the top of the can to establish accurate source-detector geometry, and

(2) the effective absorber thickness for the can and packaging material separating source and detector. This is particularly necessary if the detector is used for quantitative measurements of low-energy photons.

The distance from the top of the crystal to the outside of the package can be determined by radiographing the detector package with an x-ray machine or radioisotope camera. A typical radiograph of a commercial 3"x 3" detector package is shown in Fig. 40. The typical separation between the surface of the detector and the outside surface of the can (4 – 8 mm) has recently been reduced by most manufacturers to approximately 3 mm. Some manufacturers will now supply this information with each detector package if requested.

The scintillation detector is mounted in a photomultiplier base which includes the source holder as shown by a photograph in Fig. 41. For a detailed description and drawings of this detector base and source holder, the reader is referred to a recent report which describes testing and calibration procedures for scintillation spectrometers.[18]

[18]D. F. Crouch and R. L. Heath, *Routine Testing and Calibration Procedures for Multichannel Pulse Analyzers and Gamma-ray Spectrometers*, IDO-16923 (1963).

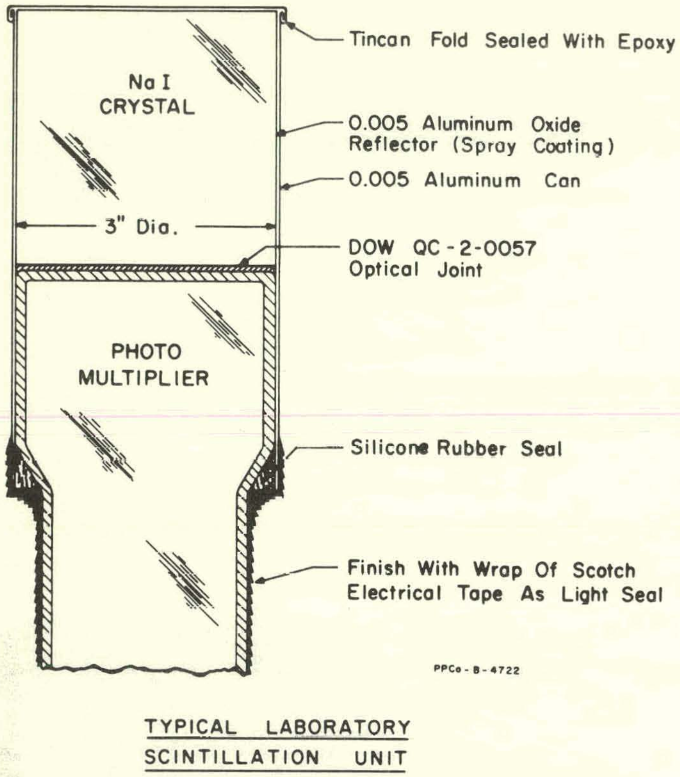


FIG. 38 - Laboratory scintillation detector packaged in 0.005" Al can.

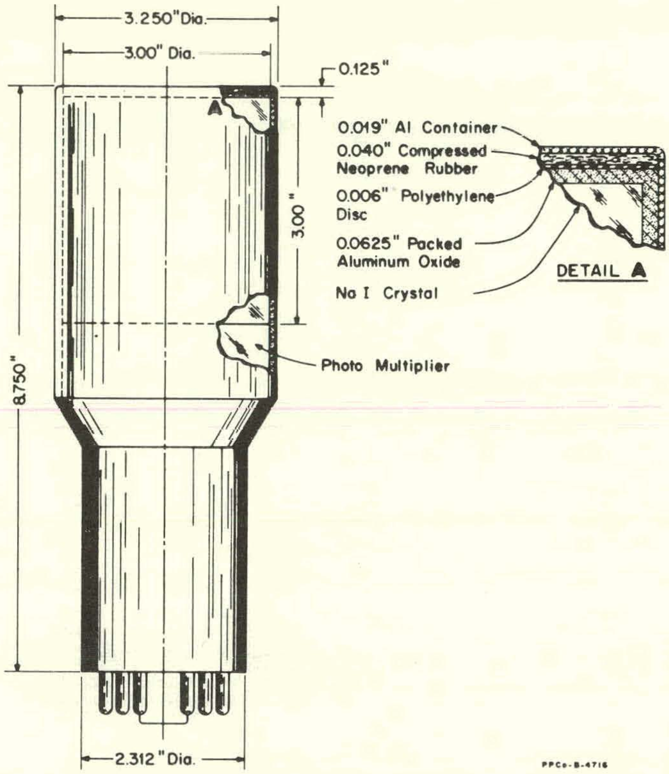


FIG. 39 - Typical commercial scintillation detector (3"x3") showing details of packaging technique. The increased mass of material used in the packaging of these detectors will produce some distortion of the spectrum due to scattering.

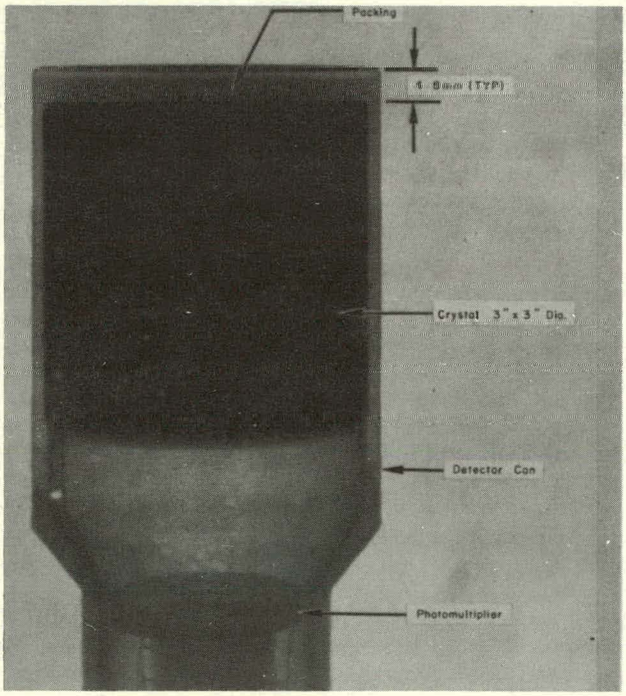


FIG. 40 - X-ray photograph of commercial 3"x3" NaI detector illustrating method used to locate position of crystal inside container.

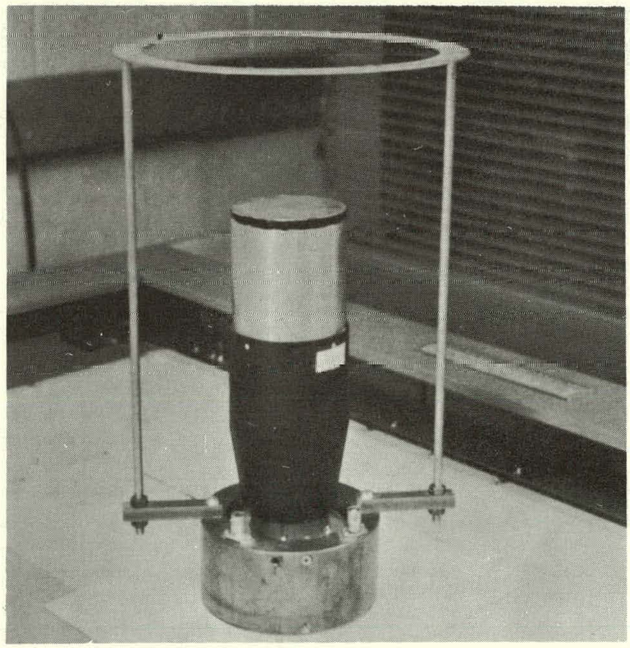


FIG. 41 - Photograph of standard laboratory detector showing source holder used to minimize scattering geometry.

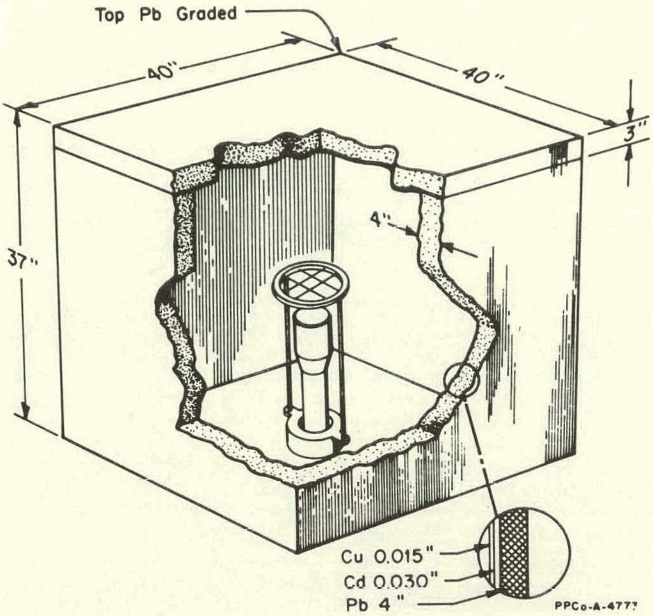


FIG. 42 - Standard laboratory detector shield used for experimental measurement of all spectra in the Spectrum Catalogue.

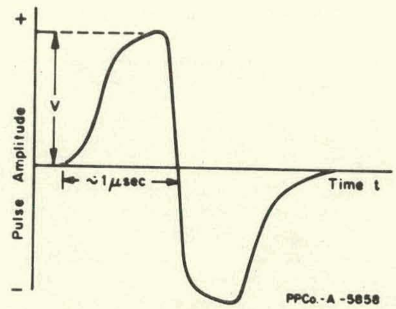


FIG. 43 - Output waveform from double-differentiated linear pulse amplifier.

Unless otherwise stated, all spectra in the catalogue are measured in this geometry (point source at 10 cm).

2. Detector Shield

The standard detector shield enclosure used for the measurement of all spectra in the catalogue is shown in Fig. 42. This shield has inside dimensions of 32"x 32"x 32". As indicated in the figure, the interior of the shield is lined with 0.030" Cd sheet and 0.015" Cu sheet in that order.

3. Electronics

The laboratory scintillation spectrometers used for all experimental measurements utilized the commercial components listed below:[19]

a. Photomultiplier Power Supply — Fluke Model 412A or Power Designs Model HV-1565.

b. Linear Amplifier — An external vacuum tube amplifier (ORNL-type A-8) is used in the analyzer systems in preference to the amplifiers supplied as an integral part of the analyzer. This amplifier employs delay-line double-differentiation to produce a bi-polar output pulse similar to that shown in Fig. 43. The advantage of a double-differentiated amplifier is improved overload characteristics and negligible bias shift at high input counting rates.

c. Multi-channel Pulse-height Analyzer — Nuclear Data Model 130-AT 512-channel analyzers were used for all measurements.

d. Digital Read-in and Read-out Equipment — Tally Model 424 Paper Tape Reader and Tally Model 420 Paper Tape Punch.

A photograph of a typical analyzer system is shown in Fig 44. In addition to the equipment listed above, the system also includes a total count scaler for the determination of input counting rates and protective circuitry for monitoring over-voltage on the power buss[20] and the output of the phototube supply.[21]

For a detailed description of the testing and calibration procedures and performance specifications recommended for gamma-ray spectrometry, the reader should consult reference 18.

4. Source Preparation

To reduce the possibility of scattering, sources are prepared to approximate a weightless point source as nearly as possible. The two types of source mounting arrangement used are shown in Fig. 45. The source mounting card (Type A) is fabricated of paperboard and the source deposited between layers of cellulose tape ($\approx$ 10 mg/cm^2). The source mounting ring (Type B) is used for special sources where bremsstrahlung production or scattering

[19] Note: The listing of the products of manufacturers does not indicate a specific endorsement of a product, but only indicates that these products meet the rigid specifications established for this application.

[20] K. F. Smith, "Overvoltage Protector for High Voltage Power Supplies," *MTR-ETR Technical Branches Quarterly Report, 1st Quarter 1962*, IDO-16781 (1962).

[21] K. F. Smith, "Line Surge Protector," *MTR-ETR Technical Branches Quarterly Report, 4th Quarter 1961*, IDO-16760 (1962).

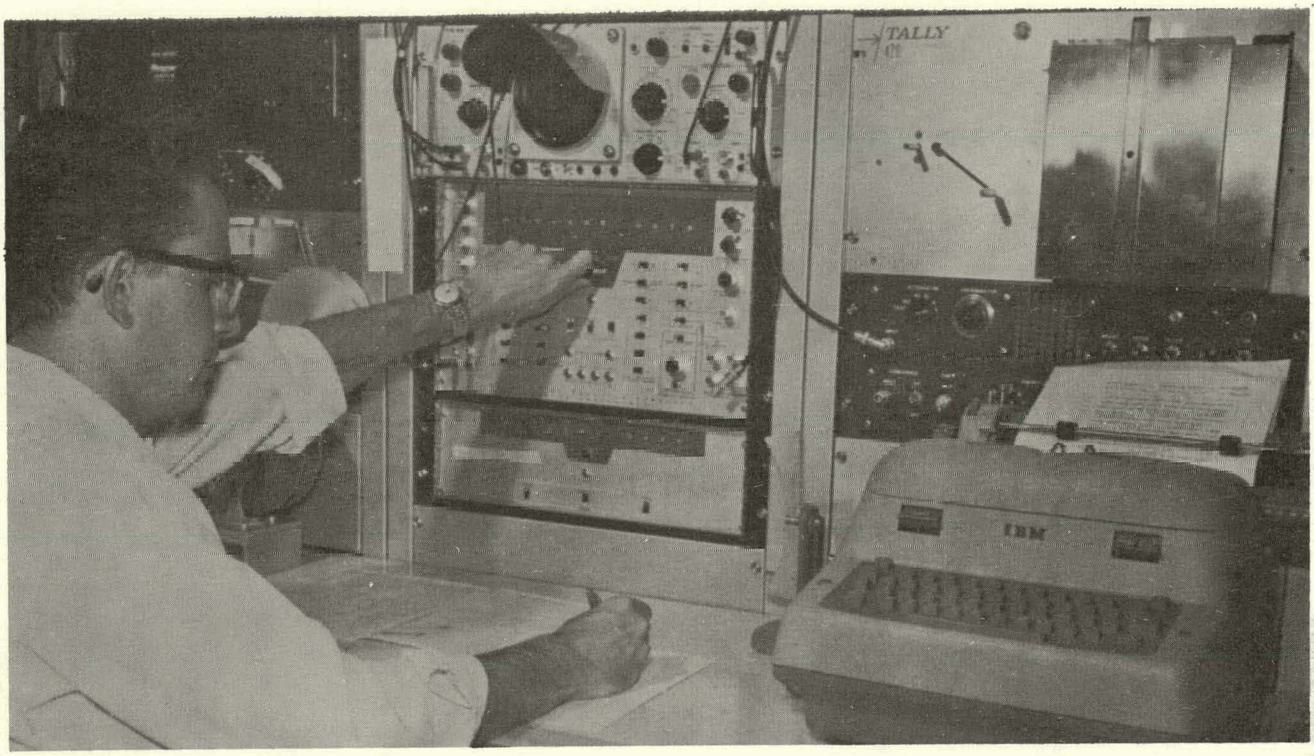


FIG. 44 - Photograph of one of the scintillation spectrometers used to obtain data for the Spectrum Catalogue.

must be reduced as much as possible (e.g., experimental determination of peak-to-total ratios).

To illustrate the importance of scattering from the source mount and source holder a series of measurements were conducted with sources of Ce^{141}. Sources were prepared on the two types of source mounts described above and measurements made on each source on two 3″x 3″ detectors equipped with the two types of source holders shown in Fig. 16 (source holder A) and Fig. 41 (source holder B). The cardboard mounting is referred to as Type 1 and the thin film ring as Type 2. The results of these measurements, which appear in Fig. 46, show that most of the scattering from the source mount and holder assemblies appears as a contribution to the low-energy side of the photopeak. As the mass of scattering material in the immediate vicinity of the source is reduced, the contribution to the spectrum from scattering is likewise reduced. The purpose of these measurements was to illustrate the magnitude of this effect.

In the case of positron emitters, annihilation of positrons is localized to the position of the source by surrounding the source material with a Cu sandwich of sufficient thickness to stop most of the positrons. This is necessary to maintain the standard point source geometry for annihilation radiation. If the positrons are allowed to annihilate throughout the volume of the shield, the detection efficiency will be undefined. The use of the Cu sandwich will result in some deterioration in the quality of the spectrum as a result of Compton scattering.

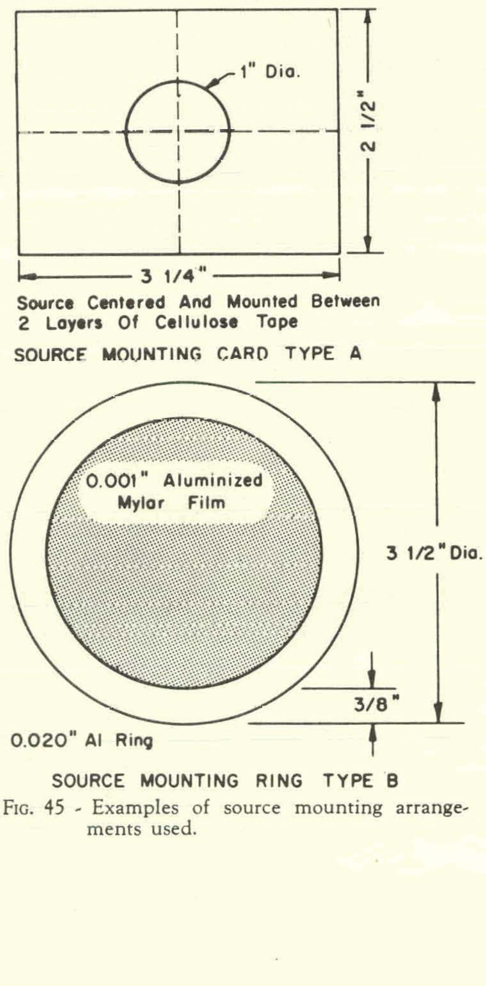


FIG. 45 - Examples of source mounting arrangements used.

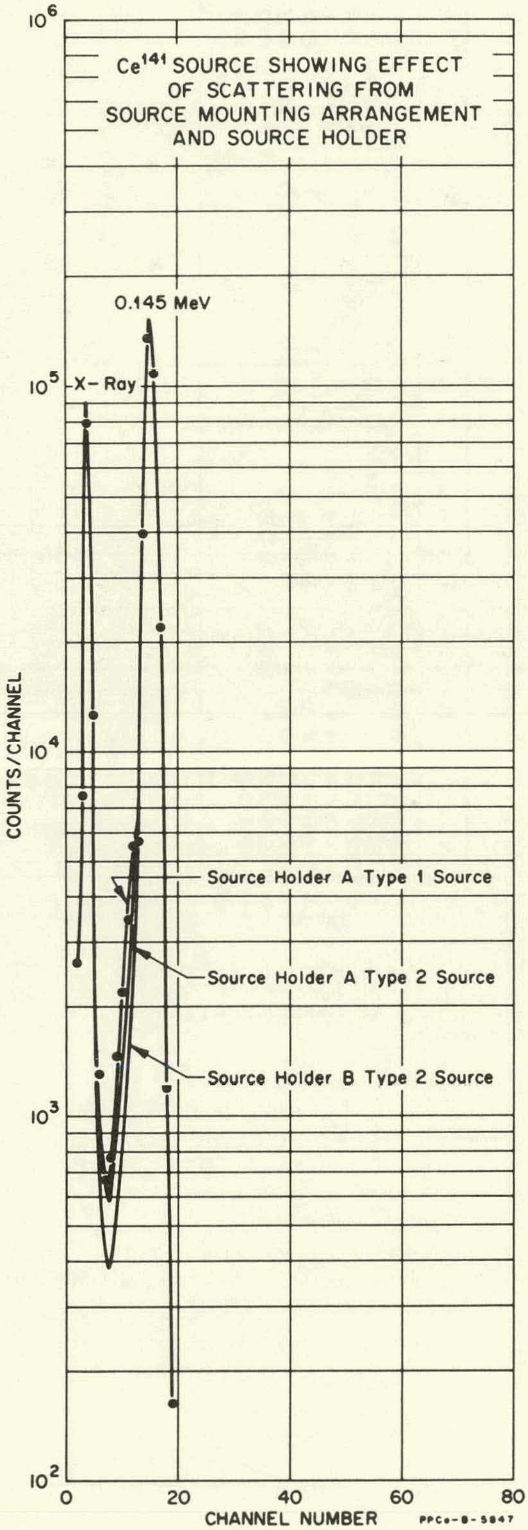


FIG. 46 - Effect of scattering from source mount and source holder.

In the preparation of sources for catalogue spectra, considerable effort is expended to insure isotopic purity of the source. First, the possible methods for producing a given isotope are studied. Factors to be considered include: interference from other isotopes of the same element, half-life, possible elemental contamination of the material being irradiated, and production cross sections for the various nuclear reactions which may occur in the irradiation of a given material. In the production of sources by neutron capture, the choice of flux level and neutron spectrum is made after a consideration of competing processes [e.g. double neutron capture, (n,p) reactions, etc.]. In accelerator irradiations, the energy of the bombarding particle is important since several competing reactions are generally possible which are energy dependent. Operating parameters for the accelerator are chosen to enhance the relative production of the desired nuclide. The chemical form of the target material will depend upon the chemical procedures which are used in the purification of sample material following irradiation.

In many cases, high cross sections for some isotopes require the use of mass-separated material to reduce interference when producing other isotopes which have relatively low cross sections.

The procedure usually followed in the production of sources is to make preliminary irradiations and then observe the energy spectrum of the irradiated sample as a function of time. In many cases obvious elemental contaminants can be removed by chemical separation. From half-life determinations and comparison of the observed energy spectrum with available nuclear data, all isotopes present in a given spectrum can usually be identified. If no interference from other isotopes is indicated, sources can be prepared in final form and the spectrum measured under the standard experimental conditions.

If chemical purification is necessary, solvent-extraction and ion-exchange methods are preferred since the mass of inert material in the source will usually be much less than with wet chemical procedures. In many cases carrier-free samples can be obtained with these techniques.

5. Data Preparation

Data from the scintillation spectrometers are presented in three forms: (1) digital listings of the count accumulated in each channel of the multi-channel analyzer, (2) digital data recorded on perforated paper tape, and (3) data recorded on punched cards.

The card format is shown in Fig. 47. Each card contains digital information for 10 channels of the pulse analyzer. The first two columns are used to indicate the card sequence for ordering. The next 70 columns contain the information from 10 channels (six digits and one space), and the last 8 columns of the card are used for spectrum identification. This format is standard for input to all computer program which are described in Section IX.

The format adopted for the perforated tape systems is the standard 8-level IBM code. An example of this tape format is shown in Fig. 48. This format utilizes a 1-2-4-8 binary-decimal numeric code which occupies the first four levels. The 5th level is used for negative parity and the 6th level for zero. Information from one analyzer channel

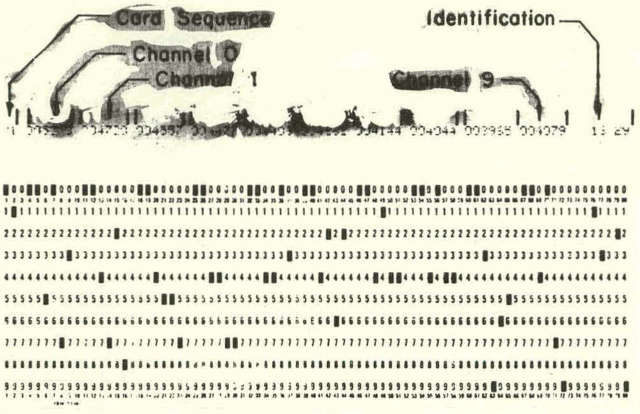


FIG. 47 - Punched-card format for all computer data processing programs.

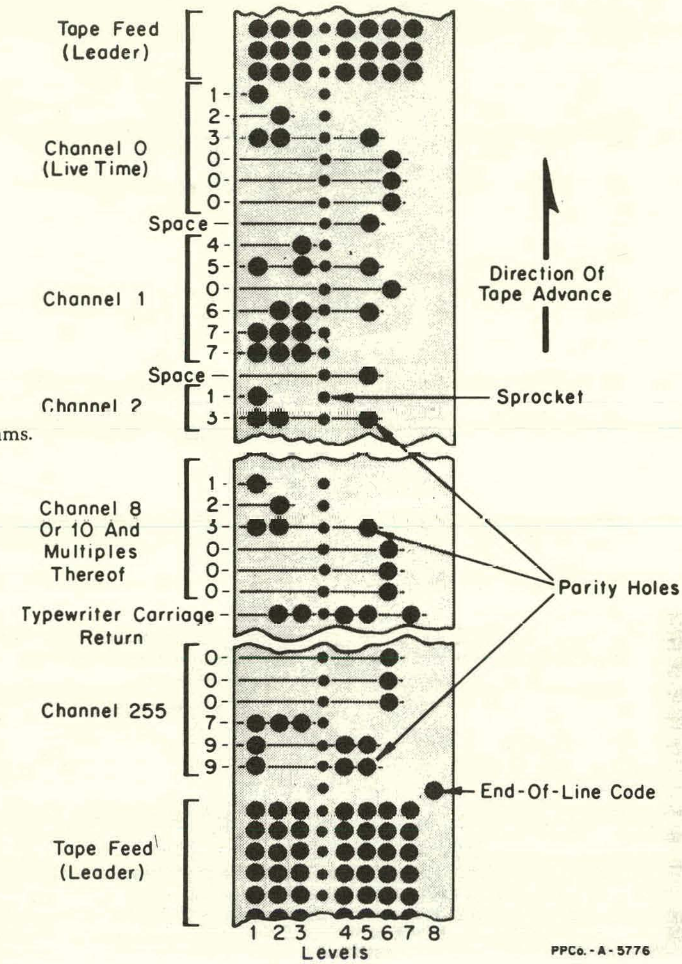


FIG. 48 - 8-level perforated tape code used at this laboratory. This code is one of the standard IBM codes with odd parity in the 5th level. All spectra in the Catalogue are on file in this format.

requires seven characters — six representing the six digits from the magnetic core memory of the analyzer and the 7th typewriter space code. Every ten channels the space code is replaced by a typewriter carriage-return code to correspond to the punched card format. An end-of-line code follows the end of the last channel and the data are preceded and followed by tape-feed characters.

For presentation in the catalogue, spectrometer data are prepared as point plot (semi-log) of the number of counts accumulated in each channel (N(E)dE) *vs* channel number. These graphs are prepared as templates to overlay the standard 8½″ x 11″ or 11″ x 17″ K and E 3-cycle semi-log graph paper. The graphs are then printed on translucent paper to permit removal of spectra from the catalogue for comparison with experimental data plotted in a similar manner. Digital listings of all data used in the preparation of these graphs are included in Appendix IV of Volume I. These data were included to permit the user to plot the data in a different form or to prepare catalogue files of spectra on punched cards, perforated tape or magnetic tape for read-in to pulse analyzers.

Experimental conditions used are listed with the experimental data for each spectrum. Included are the source-detector geometry, energy scale, and the beta absorber used in the measurement. A number of spectra have been analyzed to obtain an intensity normalization. For nuclides emitting a single gamma ray, the "photopeak" is fitted by least-squares methods and the total number of gamma rays emitted are obtained with the quantitative procedures discussed in Sections VII and IX. For nuclides emitting more than one gamma ray, the spectrum is analyzed to obtain the intensity of a prominent gamma ray. Appropriate corrections are made for geometry, photopeak efficiency, absorption, and coincidence summing effects. These results can be used to obtain decay rates when the decay scheme is well established.

B. Energy Calibration

1. Zero Convention for Pulse-height Scale

A well defined pulse-height scale is essential for reproducible precision energy measurements with a scintillation spectrometer. Perhaps the most important consideration in establishing a reproducible pulse-height scale is the convention adopted for setting the position of the zero position of the ADC (analogue-to-digital converter) in the analyzer. The convention adopted in this laboratory is to set electrical zero at – 0.5 channel.

Since a channel represents a band of pulses from V to V + ΔV, the total number of pulses in a given channel i will be

$$N_i = \int_{V}^{V+\Delta V} n(V)dV \qquad (12)$$

where V is the amplitude corresponding to the lower edge of the channel and ΔV is the channel width. If the channels are non-overlapping the average amplitude for a continuous function n(V) will be approximately equal to the point at the center of the channel. This means that an observed channel count rate is considered as a measure

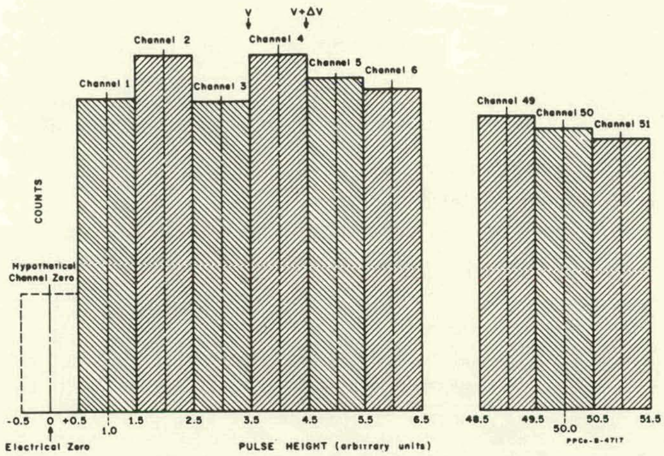


Fig. 49 - Histogram of pulse-height scale illustrating procedure for establishing zero position of pulse analyzer.

of the count rate for pulses corresponding in amplitude to the center of the channel. If the first data channel is called channel 1, it will contain a range of pulse amplitudes from 0.5 to 1.5. Pulses with amplitude less than 0.5 will not be recorded. On this scale, zero pulse amplitude corresponds to − 0.5 channel and channel 50 covers a range from 49.5 to 50.5 on an amplitude scale. The use of this scale makes the relative amplitude of two pulses independent of the zero reference. This scale is illustrated in Fig. 49. If the system is linear, there will be a one-to-one correspondence between channel number and pulse amplitude.

The method of zero alignment is achieved in the following manner: the voltage adjustment on a precision mercury-relay pulser is adjusted to obtain equal numbers of pulses in channels 199 and 200. This corresponds to the upper edge of channel 199. This adjustment is made with the decade potentiometer control on the pulser set at 199.5. The potentiometer control is then adjusted to 19.5. The zero control on the analyzer is then adjusted to obtain equal numbers of pulses in channels 19 and 20. This procedure is repeated until the slope and intercept of the pulse-height scale are determined. If the analyzer circuitry were absolutely linear the zero intercept would then be − 0.5 channel. The upper edge of channel 19 was chosen because serious non-linearity exists in the bottom 10 channels of many analyzers. The linearity check described above can be used to evaluate the actual channel position to be expected for pulses of small amplitude.

2. Non-linear Energy Response of NaI

The non-linear energy response of NaI to gamma radiation has been discussed in detail by several authors.[22,23,24,25]

[22] R. W. Pringle and S. Standhil., *Phys. Rev.*, 80, 762, (1950).

[23] D. Engelkemeir, *Rev. Sci. Instr.*, 27, No. 8, 589, (1956).

[24] P. Iredale, *UKAEA Report*, AERE-R3440.

[25] W. C. Kaiser, S. I. Baker, A. J. McKay, and J. Sherman, *IRE Trans. on Nuclear Science*, Vol. NS-9, No. 3, (1962).

In any systematic treatment of data from NaI spectrometers it is essential that an absolute pulse-height *vs* energy scale be established. For a given experimental arrangement this scale depends on the light output from the detector as a function of E_γ, (dL/dE), and the linearity of the electronic system. A determination was made of the pulse-height *vs* energy scale for the experimental arrangement employed to collect data for the catalogue.

A series of radioactive sources emitting gamma rays of precisely known energies were measured together with the Cs^{137} gamma ray as a reference. The absolute pulse-height scale described above was used for these measurements. Least-squares fitting techniques were used to determine the photopeak positions to an accuracy of $\pm$ 0.03 channels. The zero position and integral linearity of the electronic system were determined with a calibrated pulser. For the system used (A-8 amplifier and ND 130A analyzer), deviations from a straight line passing through the origin (channel zero) did not exceed ± 0.5 channels over a range of channel 5 to channel 250. The results of these measurements are tabulated in Table II. Fig. 50 shows a comparison of the experimental values obtained for L/E *vs* $E\gamma$ with those of Engelkemeir[23] and of Managan.[26] Results for the detector used agree very closely with those of Engelkemeir. Similar measurements, using several commercial detectors, have indicated some variation in response below 100 keV. For this reason, the determination of the pulse-height *vs* energy response for a given detector must include a measurement of the non-linear response for that detector.

For convenience, conversion tables between energy and pulse-height for the standard 10 keV/channel gain scale are presented in Appendix III.

[26] W. W. Managan in *Applied Gamma-ray Spectrometry*, Pergamon Press, New York, (1960).

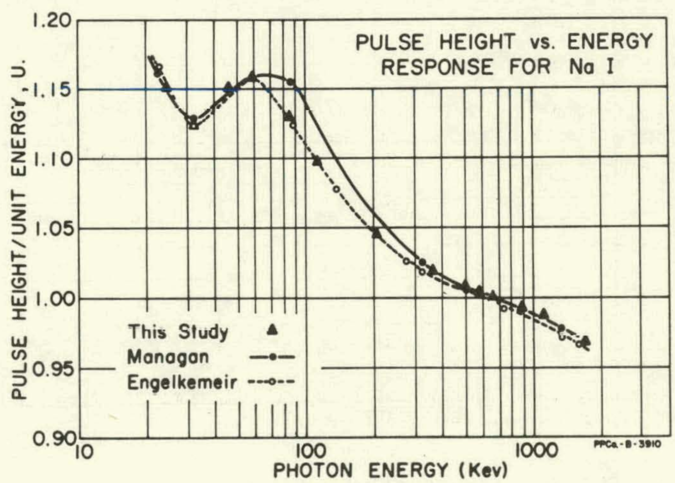


Fig. 50 - Pulse-height *vs* gamma-ray energy response of 3″x3″ NaI detector. To correspond with the energy scale adopted, all data are normalized to unit light output at 0.66162 MeV (Cs^{137}).

TABLE I

Measured values of PH/E as a function of gamma-ray energy

	Gamma-Ray Energy	PH/E
Am^{241}	0.05957	1.158
Lu^{177}	0.11297	1.0943
Lu^{177}	0.20836	1.0435
I^{131}	0.36447	1.019
Be^{7}	0.478	1.011
Bi^{207}	0.5695	1.006
Cs^{137}	0.66162	1.000
Y^{88}	0.8989	0.9893
Bi^{207}	1.0637	0.9854
Zn^{65}	1.114	0.9828
Y^{88}	1.837	0.9677
Na^{24}	2.7535	0.958

3. Method of Energy-Pulse-height Calibration

The convention adopted for the pulse-height-energy scales used for all spectra in the catalogue (2.5, 5.0, 10, and 20 keV/channel) is that all pulse-height values are measured relative to that of the 0.66162-MeV gamma ray of Cs^{137}. For this energy, there will be a one-to-one correspondence between energy and pulse-height (with the appropriate scale factor applied). This convention was adopted to correspond with the results of measurements of the non-linearity of NaI. Thus, the channel position for a peak of a given energy will be related to a gain scale in which the Cs^{137} peak would appear at a multiple of channel 66.162 (10 keV scale). Energy calibration is made by measuring sources simultaneously with a source of Cs^{137} and determining the channel position for each peak by least-squares fits to the data with a gaussian function, as discussed in Section VII. An example of this procedure is shown in Fig. 51. This figure shows the spectrum of Lu^{177} measured simultaneously with Cs^{137} on the 5 keV/channel scale. The Cs^{137} photopeak was fit with a gaussian. For the two lower energy peaks, the contribution from the underlying Compton distribution was approximated by adding a straight line to the non-linear fit. The energy of the two low-energy lines is then determined from the peak positions by normalization of the Cs photopeak to channel 132.32 and applying the appropriate correction to account for the non-linear pulse-height *vs* energy response of the detector. A list of sources for energy calibration is given in Table III.

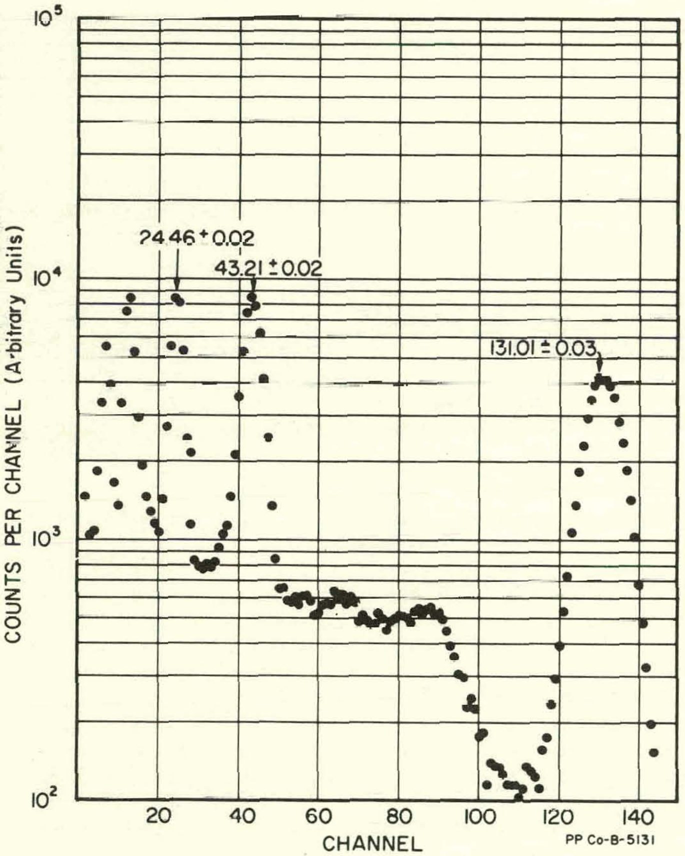


FIG. 51 - Example of energy calibration procedure using Cs^{137} gamma ray. Data were taken on a gain scale approximating 5 keV/channel. Peak channel positions indicated are result of least-squares fit of modified gaussian shape to each photo-line. Figure shows calibration of peaks due to 0.11297- and 0.20836-MeV gamma rays from Lu^{177}.

TABLE II

Energy Calibration Sources

Nuclide	$E\gamma$ (MeV)	Half-Life
Am^{241}	0.05957	458 yr
Lu^{177}	0.11297	6.8 d
Lu^{177}	0.20836	
I^{131}	0.36447	8.066 d
Au^{198}	0.41176	2.70 d
Be^{7}	0.478	53 d
Ann. Rad.	0.51094	
Bi^{207}	0.5695	28 yr
Cs^{137}	0.66162	30 yr
Nb^{95}	0.7657	35 d
Y^{88}	0.8989	105 d
Bi^{207}	1.0637	
Zn^{65}	1.114	244 d
Na^{22}	1.2736	2.58 yr
Na^{24}	1.3679	14.9 hr
Y^{88}	1.837	
Tl^{207} (ThC″)	2.6142	1.91 yr
Na^{24}	2.7535	

4. Gain Shift Program

All spectra in the catalogue are normalized on the pulse-height *vs* energy scale as discussed above. This is accomplished by means of a computer program which allows one to shift either the gain or zero position of the pulse-height scale. Thus, a general linear transformation can be made between two pulse-height scales. This is accomplished by fitting the pulse-height spectrum as a series of polynomial least-squares fits to sets of three successive channel counts. The results of these successive fits around the original channel positions provides a means of interpolating values for the number of counts in a hypothetical channel which lies somewhere between two channels on the original pulse-height scale. The program can either shift a spectrum by a ratio of two arbitrary gain scales or shift a given peak in a spectrum to a certain channel position. This second alternative is accomplished by incorporating a linear least-squares routine for locating the position of a photopeak by assuming a simple gaussian form.

The gain-shift program has been used in conjunction with the energy calibration procedures outlined in the previous section to shift all spectra in the catalogue to the standard pulse-height scales (referred to Cs^{137}). The general procedure adopted is to measure the energy of all prominent gamma rays with this procedure and then make a comparison of these results with literature values. If the precision of reported energies is well established, literature values are used and the spectrum is shifted to the appropriate position on the standard pulse-height scale. If this is not the case the energy values determined from the calibration with Cs^{137} are used.

Although the gain-shift routine is intended for use only with small gain shifts, it can be used to shift the gain of a spectrum by a large factor. Fig. 52 shows two Cs^{137} spectra, one measured at 5 keV/channel and the other at 10 keV/channel and then shifted by a factor of 2 in gain to correspond to the 5 keV scale. The agreement in shape between the two spectra is considered to be excellent, considering the large scale change. It is interesting to note the broadening of the x-ray peak of the shifted spectrum, due to the effect of finite channel width. For a detailed description of the gain-shift program the reader should consult reference 34.

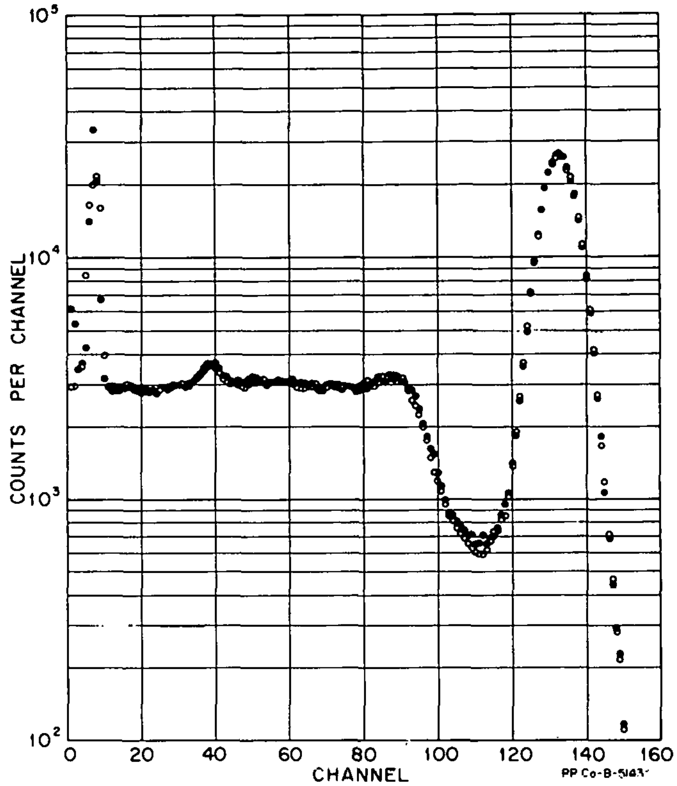


FIG. 52 - Illustration of results of gain shifting program. Closed circles represent Cs^{137} spectrum on 5 keV/channel gain scale. Open circles show spectrum taken on 10 keV/channel gain scale shifted by a factor of two to match 5 keV spectrum.

IX. COMPUTER TECHNIQUES FOR DATA ANALYSIS

One of the most important areas of development in gamma-ray scintillation spectrometry during the past few years has been the perfection and use of computer programs for the analysis of complex pulse-height spectra. In this section a brief description of the techniques presently in use at this laboratory is presented. For a comprehensive survey of the present state of data processing as applied to the analysis of pulse-height spectra, the reader is referred to the proceedings of a conference on this subject held at Gatlinburg, Tennessee in 1962.[27]

A. Computer Program for the Generation of the Detector Response to Monoenergetic Gamma Rays

The basic requirement for analysis of pulse-height spectra is a detailed knowledge of the pulse-height response to monoenergetic radiations. In the preceding sections the various factors influencing this response have been described in detail. To obtain correspondence between the true gamma-ray spectrum emitted by a source and the observed pulse-height distribution, two methods have been employed. One approach has been to attempt to calculate the pulse-height distribution from a knowledge of the basic interactions occurring in the detector. This approach has been developed by the use of Monte Carlo computer programs such as that described by Zerby.[28]

The other approach, which has been developed at this laboratory, is empirical in nature, and may be used to calculate response functions for any detector and experimental geometry. It is basically a systematic extension of the graphical interpolation scheme which has been used by nuclear spectroscopists for some time. First, a number of carefully measured spectra are obtained for single gamma rays as shown in Fig. 53. From these pulse-height distributions one may construct a three-dimensional surface for the response of a NaI scintillation detector to monoenergetic gamma rays. Fig. 54 illustrates such a response function for a 3″x 3″ NaI detector where the single gamma rays are normalized to the same emission rate and are arranged with gamma-ray energy as the third coordinate. A plane perpendicular to the energy axis through a given point will intersect this surface to form a curve which rep-

[27] *Proceedings of a Conference on the Applications of Computers to Nuclear and Radiochemistry*, NAS-NS Publication No. 3107 (1962).

[28] C. D. Zerby and H. S. Moran, *Calculation of the Pulse-height Response of NaI Scintillation Counters*, USAEC Report, ORNL-3169 (1962).

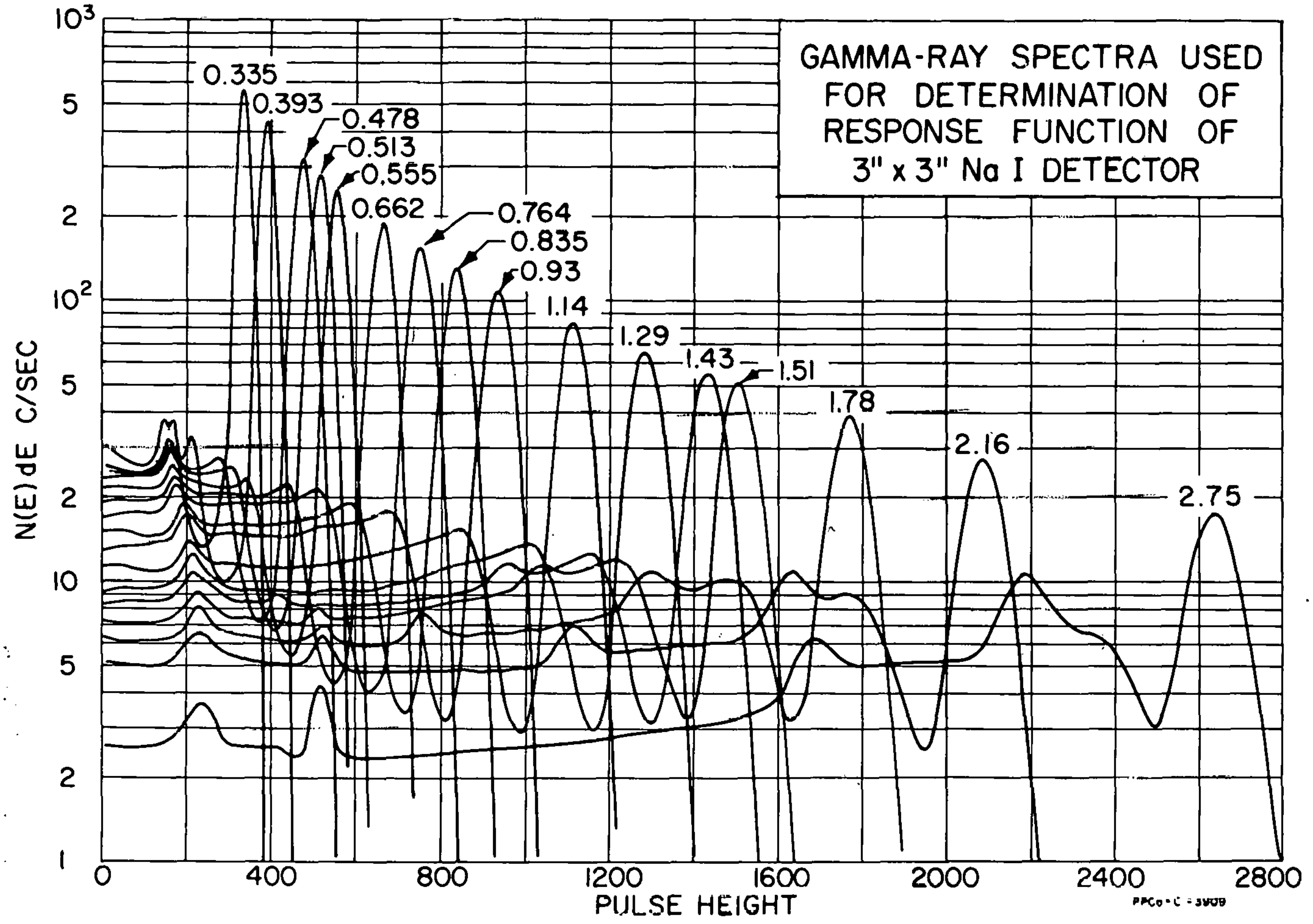


FIG. 53 - The response of a 3"x3" NaI detector to monoenergetic gamma rays from 0.335 to 2.75 MeV. All spectra are for a point source mounted 10 cm from the detector and have been normalized in intensity to 10^7 photons emitted from the source.

resents the detector response to a gamma ray of that energy. The generation of such a surface by means suitable for machine programing requires an analytical representation of the experimentally determined pulse-height spectra.

If the detailed structure of the pulse-height distributions obtained from monoenergetic gamma rays are examined, it is apparent that there are several features which vary in a uniform manner with gamma-ray energy. All features of the spectra can be interpreted from a knowledge of the three basic processes by which a photon interacts with the detector; i.e., photo-electric, Compton, and pair interactions. The most prominent feature, the photopeak, is essentially gaussian in shape with some assymetry on the low energy side due to multiple processes occurring in the detector and small-angle Compton scattering from absorbing materials frequently used to prevent detection of beta radiation emitted by the source. This peak, as described in Section VII, is represented by the "modified gaussian" expression:

$$y(x) = y_o\, e^{-(x-x_o)^2/b_o}\,[1 + \alpha_1(x - x_o)^n + \alpha_2(x - x_o)^m] \qquad (13)$$

where y_o is the maximum amplitude of the peak, x_o is the midpoint of the distribution on a pulse-height scale, and b_o is related to the full width of the gaussian shape at half-maximum (resolution). The convention adopted is to fit the experimental photopeaks and to determine the parameters of the modified gaussian by least-squares techniques.[29] The deviation from a modified-gaussian shape on the low energy side is treated as though it belonged to the Compton distribution. From a knowledge of b_o and the normalized area of the gaussian as a function of pulse-height (energy) it is possible to calculate the shape and magnitude of the photopeak for a gamma ray of any energy. It should be noted that the pulse-height *vs* energy scale must include the effect of nonlinearity in the energy response of NaI.

The remaining portion of the pulse-height distribution is due largely to the Compton process which produces a

[29] R. G. Helmer, R. L. Heath, Marie Putnam, and D. H. Gipson, *A Non-linear Least-Squares Program for the Determination of Parameters of Photopeaks by the Use of a Modified Gaussian Function*, IDO-17015 (1964).

MONOENERGETIC GAMMA-RAY SOURCES
USED TO DETERMINE RESPONSE

Nuclide	Energy (Mev)	Nuclide	Energy (Mev)
Te ^{129m}	0.109	Y ^{91m}	0.555
Sc ^{47}	0.155	Cs ^{137}	0.662
Ru ^{97}	0.213	Nb ^{95}	0.764
Xe ^{135}	0.250	Mn ^{54}	0.835
Hg ^{203}	0.279	Nb ^{92}	0.930
In ^{115m}	0.335	Zn ^{65}	1.114
In ^{113m}	0.393	A ^{41}	1.290
Au ^{198}	0.411	V ^{52}	1.430
Be ^{7}	0.478	K ^{42}	1.510
Sr ^{85}	0.513	Al ^{28}	1.780

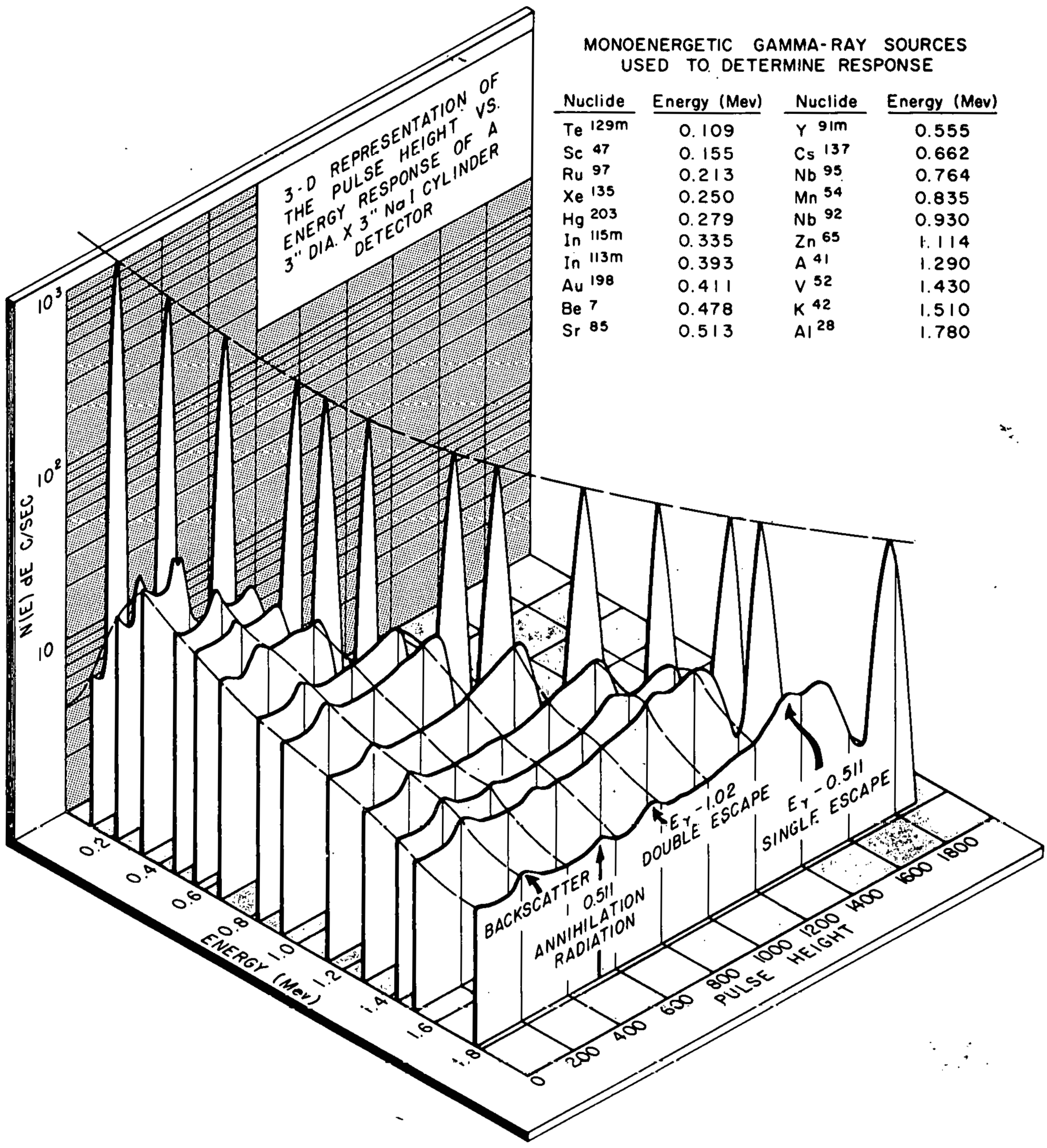


FIG. 54 - Three-dimensional model of the response of a 3"x3" NaI detector to monoenergetic gamma radiation. This model illustrates the interpolation scheme used to obtain the energy response of a given detector.

distribution of pulses from zero amplitude up to a sharp cutoff representing maximum energy transfer between the photon and a recoil electron. This point on the energy spectrum is termed the Compton edge (E_c) and is given by the following relationship:

$$E_c = E_\gamma - \cfrac{E_\gamma}{1 + \cfrac{2E_\gamma}{mc^2}} \tag{14}$$

Other prominent features of the spectrum are the backscatter peak which results mostly from photons Compton-scattered at 180° by material surrounding the detector, the two peaks resulting from the escape of one or both of the annihilation photons from pair production, and the 0.511-MeV peak from annihilation radiation. The portion of the spectrum below the full-energy peak is divided into 5 segments and each segment is fitted to a series of the form:

$$y = a + bx + \sum_{K=1}^{N_k} b_p \sin \frac{K\pi X}{L} \tag{15}$$

In order to insure a smooth fit at the segment end points, a region of overlap is included in the fitting procedure. The number of terms, N_k, in the expansion is chosen to give a certain amount of smoothing to the data points.

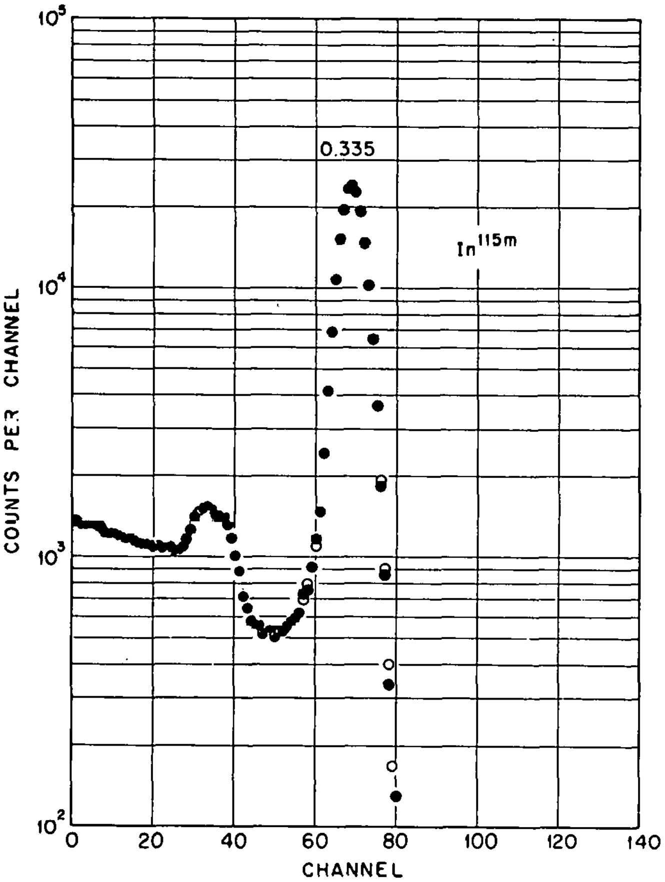


FIG. 55 - Comparison of computed detector response to experimental spectrum (0.335 MeV).

The next step is to determine the number of counts in a given channel as a function of gamma-ray energy. These points, which represent a section through the three-dimensional surface perpendicular to the pulse-height axis, are then fitted to a polynomial in gamma-ray energy. The number of terms in this polynomial is adjustable in order to give the most reasonable fit to the data points. Thus a set of polynomials in energy is obtained, one for each channel on the pulse-height scale. This process is repeated for each segment of the Compton distribution. To simplify this interpolation with a limited number of measured spectra, each group of segments is first stretched so that each segment has the same length for all gamma-ray energies. This preserves fine structure which varies with gamma-rays energy; i.e., backscatter and pair peaks. Since the number of segments required to describe the Compton distribution varies with E_γ, the program is divided into three sections. These sections treat the following ranges of gamma-ray energy: 0.020-0.300, 0.300-1.3, and 1.3-3 MeV.

To obtain the pulse-height distribution for a given gamma ray, channel count-rate values are computed from the set of polynomials representing N(E)dE *vs* E for each channel. These values for each segment are combined with a photopeak calculated from the appropriate values of b_0 and A (area of the gaussian).

Figures 55 and 56 show a comparison between experimental pulse-height distributions for gamma rays of 0.335 and 1.114 MeV and the calculated shapes obtained from the shape generation program. Excellent agreement is indicated, with all details of the spectra reproduced. A detailed description of this program and its use has recently been prepared as an AEC report.[30]

B. Coincidence Sum Spectrum Program

An additional complication in the analysis of gamma-ray spectra occurs when the decay of a radioactive element gives rise to two or more coincident gamma rays. In this

[30] R. L. Heath, R. G. Helmer, L. A. Schmittroth, and G. A. Cazier, *Generation of Detector Response Curves for Gamma-ray Scintillation Spectrometers*, IDO-17017 (1961).

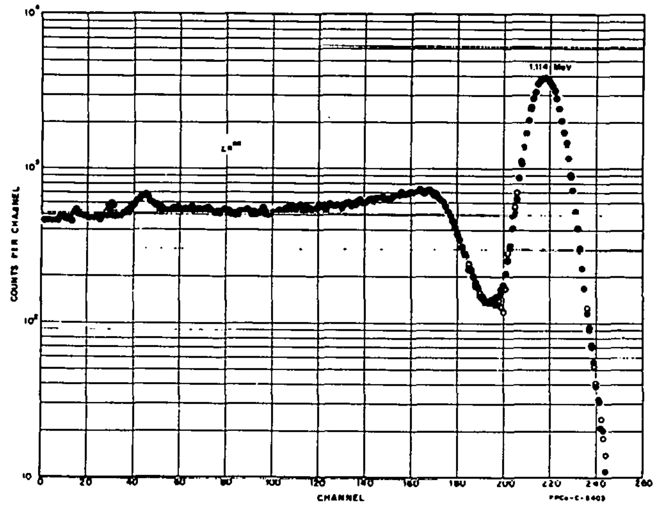


FIG. 56 - Comparison of computed detector response to experimental spectrum (1.114 MeV).

case the pulse spectrum observed in a detector will also include a distribution of pulses known as the coincidence-sum spectrum which results from the simultaneous detection of two coincident gamma rays. This spectrum will contain pulses of all sizes from the minimum detectable height to the sum of the maximum pulse heights obtainable from the individual gamma rays. The most prominent feature of this spectrum is the so-called sum peak which results from coincident detection of pulse from the photopeaks of the two coincident gamma rays.

In principle, it is possible to calculate both the shape and magniture of this sum spectrum. Let us consider a two-gamma-ray cascade. Using the program previously described one may compute the detector response to the individual gamma rays for a given detector and experimental environment. If the computed pulse-height distributions for the two coincident gamma rays are normalized to one disintegration of the source, then the values of N(E)dE represent the probability of detecting the corresponding gamma ray as a count in a given channel of the pulse-height spectrum. Pulse-height spectra for the two coincident gamma rays may be designated as $G_1(X)$ and $G_2(X)$.

The probability of detecting gamma 1 in channel a and gamma 2, from the same disintigration, in channel b is the product $G_1(a)G_2(b)$. This product is then the probability of producing a pulse in the sum spectrum in channel $(a + b)$. The total contribution to any channel, c, of the sum spectrum is then the sum of contributions from all pairs of channels for which $a + b = c$. This may be expressed in the following manner:

$$S(c) = \sum_{n=1}^{c} G_1(n) \cdot G_2(c - n). \qquad (16)$$

A FORTRAN program has been written which performs this summation for two-, three-, or four-gamma-ray cascades, using as input data calculated spectra from the previously described spectrum-generation program.

One further correction is necessary to obtain the correct intensity for the sum spectrum relative to the cascade gamma rays. Each pulse that appears in the sum spectrum represents a count missing from the pulse-height spectrum of each of the summing gamma rays.

As an eample of the results of this program, Fig. 19 shows the experimental spectrum of two coincident gamma rays together with the computed coincidence-sum spectrum. Both the shape and intensity are reproduced with considerable precision. With the addition of this program one now has the capability of computing the pulse-height distribution from gamma rays emitted by any radioactive nuclide. This requires only a knowledge of the decay scheme and may be applied in principle to any detector or experimental arrangement.

Fig. 57 shows a comparison between the experimental pulse-height spectrum of 41-day Pm^{148} and the computed spectrum obtained using the programs described above. The computed spectrum was generated from data on the decay scheme of this nuclide obtained at this laboratory. This is a complicated case involving 17 gamma rays with many double and triple cascades. All features of both the singles and coincidence sum spectra are reproduced with high precision. The two spectra above have been displaced on the vertical axis for comparison. With the exception of two low-energy peaks, which were not included in the calculation, all points on the computed spectrum agree quite well with the experimental data.

C. Linear Least-Squares Program

For the analysis of discrete spectra which exhibit well defined photopeaks the so-called least-squares method of analysis represents an improvement over hand stripping techniques. This method can be programed for computer use and has been proven to be very satisfactory for the analysis of many classes of data.[31,32,33]. It assumes that the pulse spectrum to be analyzed consists of a sum of j gamma rays of known energy, numbered 1-j-c, each represented as a pulse-height spectrum of i channels numbered a-i-n. It is further assumed that standard spectra, representing the response of the detector to gamma rays of these energies, are available for comparison. Then the count rate in channel i from the j^{th} component will be S_{ij} and the total count rate in channel i from the composite is C_i. If the recorded standards are all normalized to a given disintegration rate from the source, then one must include a normalizing factor α_j, which is the ratio of the intensity of component j in the composite to the normalized standards. We may then write:

$$C_i = \sum_{j=1}^{c} \alpha_j S_{ij} + \delta_i \qquad (17)$$

where δ represents the error in the count in channel i.

If we assume that the only error is the random fluctuation in the channel count, the principle of least-squares may be applied. Then the sum of the squares of the residuals δ_i can be minimized over all channels, i.e.,

$$\text{minimize} \sum_{i=a}^{n} (C_i - \sum_{j=1}^{c} \alpha_j S_{ij})^2 w_i \qquad (18)$$

where w_i is the weighting factor.

One then has a set of linear simultaneous equations which may be solved to obtain values for the α_j's. This is most conveniently done by matrix techniques which can be readily programed for machine solution. The advantage of this system is that the method is free from subjective error and it provides a method for estimating the quality of fit. The disadvantage is that it requires a knowledge of the number of components present in the spectrum to be analyzed and their energies. This requirement is not as restrictive as it might seem since the result of initial estimates may be observed and an iterative method applied. In general, results obtained with this method are more satisfactory than those obtained with graphical techniques. A recent version of this program has been written which includes the gain-shift program.[34] With this program it is possible to iterate with gain of the composite spectrum as a variable, thus removing one of the most troublesome problems in analyses of this type.

[31] L. Salmon, *Nucl. Instr. and Meth.* *14*, 193 (1961).
[32] A. J. Ferguson, *AECL-1398* (1961).
[33] R. L. Heath, "*Recent Developments in Scintillation Spectrometry*," Proceedings of the 8th Scintillation and Solid-State Counter Symposium, *IRE Trans. on Nuclear Science*, NS-9, No. 3, 294 (1962).
[34] R. G. Helmer, R. L. Heath, D. D. Metcalf, and G. A. Cazier, *A Linear Least-Squares Fitting Program for the Analysis of Gamma-ray Spectra Including a Gain-shift Routine*, IDO-17015 (1964).

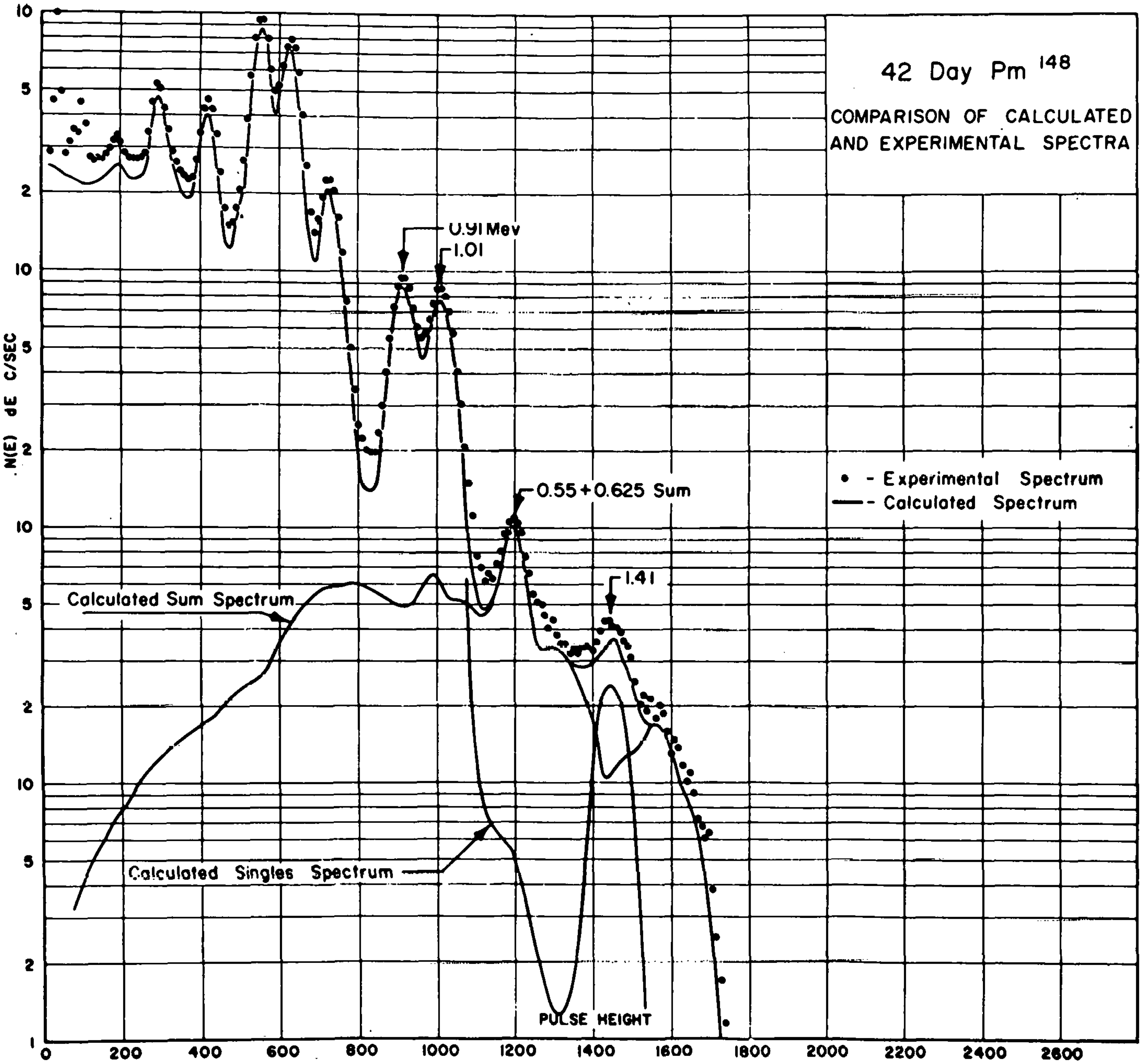


FIG. 57 - Comparison of the experimental spectrum obtained from a source of 42-day Pm^{148} on a 3"x3" detector with a spectrum calculated using the computer programs described for the generation of gamma-ray shapes, summation spectra, and a knowledge of the decay scheme of this nuclide.

As an example of the application of the program, Fig. 58 shows the results from the analysis of a complex spectrum containing five components and a total of ten gamma rays. In order to demonstrate the precision of the method the five standards were measured individually and then measured together to form the composite. The calculated values for the intensity of each component are tabulated on the figure and compared with intensities obtained from the five components measured separately. Deviations are less than 2% in all cases, even though the composite spectrum is quite complex. The residuals resulting from the least-squares analysis, in units of R/σ, are shown — plotted for each channel — at the bottom of the figure. The maximum deviation for any point is seen to be less than 2σ.

As an example of the combined use of these programs, Fig. 59 shows the results of a least-squares analysis of the Nb^{94} spectrum. The procedure followed in this analysis was as follows:

(1) The energies of the two gamma rays were determined by a separate measurement of the Nb source taken simultaneously with a Cs^{137} source. The positions of the Cs peak and the two Nb peaks were then determined with the non-linear least-squares program described in Section VII.

(2) With this information and the known pulse-height *vs* energy relationship for NaI, the energies of the Nb gamma rays were determined. The Nb^{94} spectrum was then gain shifted to place the peaks in the correct position on the standard 10 keV/channel gain scale.

(3) The shape generation program was used to determine the detector response of the detector for gamma rays of the energies determined above.

(4) With the generated shapes, the coincidence sum spectrum was calculated.

(5) With the two gamma-ray shapes and the computed sum spectrum as components for the fit, the experimental Nb^{94} spectrum was analyzed with the linear least-squares program.

From an examination of the residuals, shown at the bottom of Fig. 59, it is concluded that the experimental spectrum is well represented by a linear combination of the three calculated components. Intensities obtained for the two gamma rays agreed to within 1%, in agreement with the published level scheme for this nuclide. This result is considered to be a good demonstration of the capabilities of the analysis techniques described above.

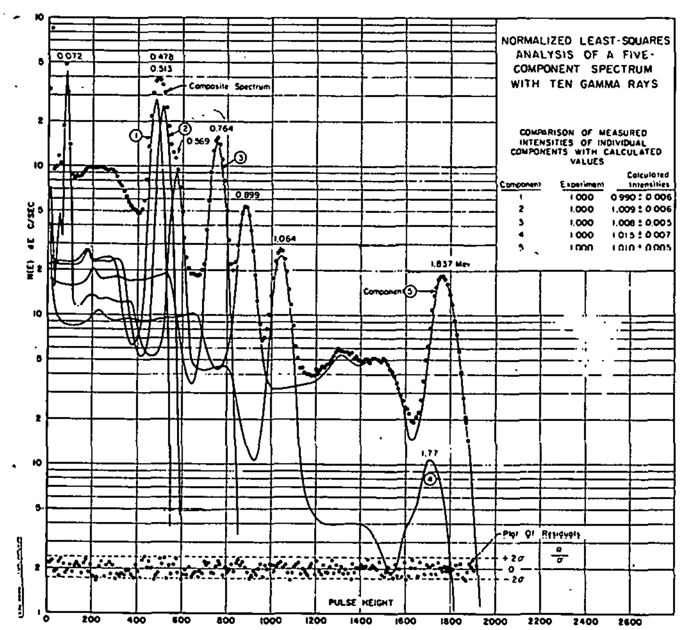


FIG. 58 - Example of least-squares analysis of a five-component pulse-height spectrum containing ten gamma rays. Residuals are shown for each channel.

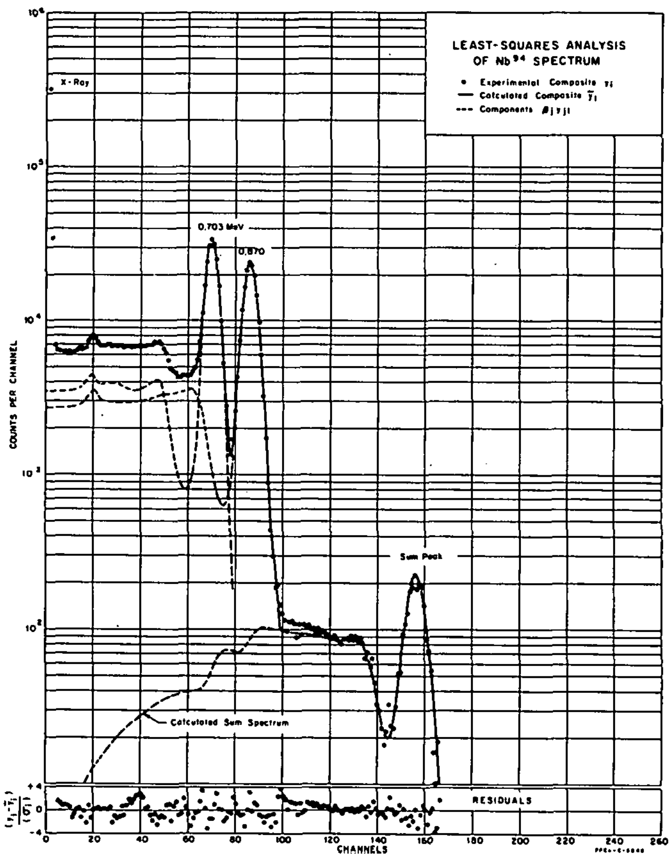


FIG. 59 - Results of least-squares analysis of Nb^{94} spectrum. The Analysis used calculated shapes for the two gamma rays and the coincidence sum spectrum. The residuals are shown plotted at the bottom of the figure.

APPENDIX — I

GAMMA-RAY INDEX

GAMMA RAYS ORDERED BY Z, A, PHOTON ENERGY, METHOD OF PRODUCTION, AND HALF-LIFE

APPENDIX - I

GAMMA RAYS ORDERED BY Z, A, PHOTON ENERGY, METHOD OF PRODUCTION, AND HALF-LIFE

This section is intended to provide information useful for the application of the Spectrum Catalogue to the analysis of gamma-ray spectra. All pulse-height spectra in the compilation have been examined carefully and gamma rays which are distinct features of the spectrum listed in order of increasing gamma-ray energy. To facilitate computer sorting, each gamma ray is represented by one line entry in the tabulation. Along with the energy of a given gamma-ray, one entry includes the following information:

Column 1 - Mode of production used to make the isotope. The convention followed is shown below.

1. Neutron capture
2. Double neutron capture
3. p,n and p,2n reactions
4. γ,n and γ,2n reactions
5. n,p reaction
6. γ,p reaction
7. neutron capture followed by beta decay
8. γ,n reaction followed by beta decay

N radioactive nuclides occuring in nature

F fission product

Although most nuclides can be produced by several possible reactions, the method used for source preparation usually represents the mode which will yield sources with reasonable isotopic purity.

Column 2 - Atomic number

Column 3 - Chemical element

Column 4 - Isotopic mass

Column 5 - Half-life. In this column, half-life is reported in seconds (S), minutes (M), days (D), or years (Y). For the natural activities, machine listing required a modified notation. For example a half-life of 1.27×10^{10} years is listed as 127E10 Y.

Column 6 - Mode of decay. Although format required a phonetic license, all entries should be self-explanatory.

Column 7 - Gamma-ray energy and intensity. Energies are listed in MeV. Gamma-ray intensities are divided into three categories, A, B, and C. This convention is based on practical considerations for the analysis of pulse-height spectra. All gamma rays which produce photopeaks in the same decade of intensity as the most intense photopeak are termed major gamma rays and denoted by intensity "A." All gamma rays producing photopeaks down one decade from the most intense peak are given an intensity "B," and peaks down by two or more decades are given an intensity "C."

Column 8 - General remarks. This column is used to provide additional information about a gamma ray or nuclide which can aid in the identification of the spectrum of a given isotope or permit certain characteristics of a spectrum to be noted. The notation used is as follows:

SINGLE - refers to isotopes which emit only one gamma ray which can be used to determine the response of a detector to monoenergetic radiation.

ANN.RD - indicates annihilation radiation.

SMPEAK - denotes presence of summation spectrum resulting from simultaneous detection of gamma rays emitted in cascade.

BREMS. - indicates presence of bremsstrahlung continuum as significant feature of spectrum.

BREMSP - used to identify isotopes which are pure beta emitters giving rise to a pure bremsstrahlung spectrum.

ISOMER - indicates that particular gamma ray originates from an isomeric level.

AVERAG - indicates that the "gamma-ray energy" listed is only the apparent energy of a photopeak actually containing two or more unresolved gamma rays. The actual energies of the components of a complex peak follow in succession on the same line entry.

DUBLET - this symbol indicates that the gamma ray listed is one of two gamma rays which are major features of the spectrum. Such structure is valuable in visual identification of isotopes.

TRPLT. - this symbol indicates that the gamma ray listed is one of three strong gamma rays which collectively represent the most distinguishing feature of the pulse-height spectrum.

X-RAY. - used to indicate that a peak results from characteristic x-rays.

This column is also used to indicate that a particular gamma ray may be produced by the decay of an isomeric level in the daughter nucleus or emitted in the decay of the daughter in cases where the daughter nucleus is radioactive. If the half-life of delayed states or the radioactive daughter are relatively short, the spectrum used in the Catalogue will generally show this gamma ray in equilibrium with the decay of the parent. This type of entry is intended to point out difficulties in interpretation which can arise from such cases.

INDEX I - This listing contains entries for all gamma rays which are significant features of a given pulse-height spectrum. All entries are ordered by Z, A, and ascending values of gamma-ray energy for a given nuclide. Subsequent indices represent special sorting of all gamma rays in Index I with respect to one or more of the entries associated with a given gamma ray.

INDEX II - Principal gamma rays (A) ordered by gamma-ray energy. This index includes all entries arranged in ascending order of photon energy.

INDEX III - Principal gamma rays emitted by isotopes induced by thermal neutron capture and fission arranged in ascending order of photon energy. This index is a subset of Index II. It should be noted that natural radioactive isotopes also appear in this listing.

INDEX IV - Principal gamma rays produced by accelerator induced reactions ordered by energy. This division was made to simply identification of nuclides by reducing isotopes being considered to possible methods of production.

INDEX V - Principal gamma rays emitted by major fission product isotopes ordered by energy. This is a subset of Index III.

INDEX VI - Lists gamma rays by isotopes in order of ascending value of half-life for neutron induced nuclides.

INDEX VII - List of gamma rays by isotope in order of ascending value of half-life for accelerator produced isotopes.

Note: Values adopted for gamma-ray energy and half-life were either taken from Nuclear Data Sheets compiled by the Nuclear Data Project, from recent literature, or from measurements in our own laboratory.

INDEX — I

GAMMA RAYS ORDERED BY Z, A, AND GAMMA-RAY ENERGY

3	4-BE- 7	53.0 D	E-CAPT	0.478A	SINGLE
3	11-NA- 22	2.6 Y	ECAPB+	0.511A	ANN.RD.
3	11-NA- 22	2.6 Y	ECAPB+	1.274A	
1	11-NA- 24	15.0 H	BETA.-		SMPEAK
1	11-NA- 24	15.0 H	BETA.-	1.368A	
1	11-NA- 24	15.0 H	BETA.-	2.750A	
1	12-MG- 27	9.5 M	BETA.-	0.842A	
1	12-MG- 27	9.5 M	BETA.-	1.01 A	
9	12-MG- 28	21.3 H	BETA.-	0.031A	
9	12-MG- 28	21.3 H	BETA.-	0.40 A	
9	12-MG- 28	21.3 H	BETA.-	0.95 A	
9	12-MG- 28	21.3 H	BETA.-	1.35 A	
9	12-MG- 28	21.3 H	BETA.-	1.78 A	AL-28
1	13-AL- 28	2.3 M	BETA.-		BREMS.
1	13-AL- 28	2.3 M	BETA.-	1.78 A	SINGLE
5	13-AL- 29	6.6 M	BETA.-	1.280A	
5	13-AL- 29	6.6 M	BETA.-	2.03 B	
5	13-AL- 29	6.6 M	BETA.-	2.43 B	
1	14-SI- 31	2.62H	BETA.-	A	BREMS.
1	14-SI- 31	2.62H	BETA.-	1.27 C	
1	15- P- 32	14.3 D	BETA.-		BREMSP
1	16- S- 37	5.1 M		3.13 A	SINGLE
4	17-CL- 34	1.6 S	BETA.+	0.511A	ANN.RD
4	17-CL- 34M	32.4 M	BETA.+	0.139A	ISOMER
4	17-CL- 34M	32.4 M	BETA.+	0.511A	ANN.RD
4	17-CL- 34M	32.4 M	BETA.+	1.16 B	
4	17-CL- 34M	32.4 M	BETA.+	2.13 B	
4	17-CL- 34M	32.4 M	BETA.+	3.30 B	
4	17-CL- 34M	32.4 M	BETA.+	4.10 C	
1	17-CL- 38	38.0 M	BETA.-	1.640A	
1	17-CL- 38	38.0 M	BETA.-	2.160A	
1	18-AR- 41	1.83H	BETA.-	1.29 A	SINGLE
4	19- K- 38	7.7 M	BETA.+		SMPEAK
4	19- K- 38	7.7 M	BETA.+	0.511A	ANN.RD
4	19- K- 38	7.7 M	BETA.+	2.160A	
N	19- K- 40	127E10Y	BETA.-		BREMS.
N	19- K- 40	127E10Y	BETA.-	1.460A	SINGLE
1	19- K- 42	12.4 H	BETA.-		BREMS.
1	19- K- 42	12.4 H	BETA.-	0.30 B	
1	19- K- 42	12.4 H	BETA.-	1.52 A	
1	20-CA- 47	4.5 D	BETA.-	0.489A	
1	20-CA- 47	4.5 D	BETA.-	0.809A	
1	20-CA- 47	4.5 D	BETA.-	1.299A	
1	20-CA- 49	8.7 M	BETA.-	3.09 A	
1	20-CA- 49	8.7 M	BETA.-	4.05 B	
1	20-CA- 49	8.7 M	BETA.-	4.70 C	
4	21-SC- 44	4.0 H	ECAPB+	0.511A	ANN.RD.
4	21-SC- 44	4.0 H	ECAPB+	1.159A	
4	21-SC- 44M	2.4 D	ISOMER	0.270A	ISOMER
1	21-SC- 46	85.0 D	BETA.-	0.887A	
1	21-SC- 46	85.0 D	BETA.-	1.119A	
5	21-SC- 47	3.4 D	BETA.-	0.155A	SINGLE
5	21-SC- 48	44. H	BETA.-	1.01 A	AVERAG 0.990 1.040
5	21-SC- 48	44. H	BETA.-	1.31 A	
3	22-TI- 44	100E03Y	ECAPB+	0.073A	AVERAG 0.069 0.078
3	22-TI- 44	100E03Y	ECAPB+	0.511A	ANN.RD.
3	22-TI- 44	100E03Y	ECAPB+	1.159A	SC-44
4	22-TI- 45	3.08H	ECAPB+	0.511A	ANN.RD.
1	22-TI- 51	5.8 M	BETA.-	0.322A	
1	22-TI- 51	5.8 M	BETA.-	0.620C	
1	22-TI- 51	5.8 M	BETA.-	0.940B	
3	23- V- 48	16. D	ECAPB+	0.511A	ANN.RD.
3	23- V- 48	16. D	ECAPB+	0.990A	DUBLET
3	23- V- 48	16. D	ECAPB+	1.310A	DUBLET
1	23- V- 52	3.77M	BETA.-	1.430A	SINGLE
4	24-CR- 49	42. M	BETA.+	0.089A	
4	24-CR- 49	42. M	BETA.+	0.152A	
4	24-CR- 49	42. M	BETA.+	0.511A	ANN.RD.
1	24-CR- 51	27.8 D	E-CAPT	0.322A	SINGLE
1	24-CR- 55	3.5 M	BETA.-		BREMSP
3	25-MN- 52	5.7 D	ECAPB+	0.511A	ANN.RD.
3	25-MN- 52	5.7 D	ECAPB+	0.743A	TRIPLT
3	25-MN- 52	5.7 D	ECAPB+	0.935A	TRIPLT
3	25-MN- 52	5.7 D	ECAPB+	1.430A	TRIPLT
3	25-MN- 54	314. D	E-CAPT	0.835A	SINGLE
1	25-MN- 56	2.58H	BETA.-	0.845A	
1	25-MN- 56	2.58H	BETA.-	1.81 A	
1	25-MN- 56	2.58H	BETA.-	2.12 A	
4	26-FE- 53	9. M	BETA.+		BREMS.
4	26-FE- 53	9. M	BETA.+	0.380A	
4	26-FE- 53	9. M	BETA.+	0.511A	ANN.RD.
1	26-FE- 59	45. D	BETA.-	0.145B	
1	26-FE- 59	45. D	BETA.-	0.191B	
1	26-FE- 59	45. D	BETA.-	1.097A	DUBLET
1	26-FE- 59	45. D	BETA.-	1.289A	DUBLET
3	27-CO- 57	267. D	E-CAPT	0.014A	
3	27-CO- 57	267. D	E-CAPT	0.122A	
3	27-CO- 57	267. D	E-CAPT	0.136A	
5	27-CO- 58	70. D	ECAPB+	0.511A	ANN.RD.
5	27-CO- 58	70. D	ECAPB+	0.808A	
5	27-CO- 58	70. D	ECAPB+	1.66 C	
1	27-CO- 60	5.27Y	BETA.-		SMPEAK
1	27-CO- 60	5.27Y	BETA.-	1.173A	DUBLET
1	27-CO- 60	5.27Y	BETA.-	1.332A	DUBLET
1	27-CO- 60M	10.5 M	BETA.-	0.059A	ISOMER
1	27-CO- 60M	10.5 M	BETA.-	1.332C	
5	27-CO- 61	3.3 H	BETA.-	0.068A	SINGLE
4	28-NI- 57	36. H	ECAPB+	0.127A	
4	28-NI- 57	36. H	ECAPB+	0.511A	ANN.RD.
4	28-NI- 57	36. H	ECAPB+	1.38 A	

4	28-NI- 57	36. H	ECAPB+	1.75 B	
4	28-NI- 57	36. H	ECAPB+	1.92 B	
1	28-NI- 65	2.65H	BETA.-	0.370A	
1	28-NI- 65	2.65H	BETA.-	1.114A	
1	28-NI- 65	2.65H	BETA.-	1.480A	
3	29-CU- 61	3.3 H	ECAPB+	0.284A	
3	29-CU- 61	3.3 H	ECAPB+	0.511A	ANN.RD
3	29-CU- 61	3.3 H	ECAPB+	0.66 B	
4	29-CU- 62	9.9 M	ECAPB+	0.511A	ANN.RD
1	29-CU- 64	12.9 H	ECBE+-	0.511A	ANN.RD
1	29-CU- 64	12.9 H	ECBE+-	1.34 C	
1	29-CU- 66	5.1 M	BETA.-		BREMS.
1	29-CU- 66	5.1 M	BETA.-	1.040A	
6	29-CU- 67	61. H	BETA.-	0.092A	AVERAG 0.091 0.093
6	29-CU- 67	61. H	BETA.-	0.184A	
4	30-ZN- 63	38. M	ECAPB+	0.511A	ANN.RD
4	30-ZN- 63	38. M	ECAPB+	0.668B	
4	30-ZN- 63	38. M	ECAPB+	0.957B	
1	30-ZN- 65	245. D	ECAPB+	0.511B	ANN.RD
1	30-ZN- 65	245. D	ECAPB+	1.114A	
1	30-ZN- 69M	14. H	ISOMER	0.440A	SINGLE
3	31-GA- 67	78. H	ECAPB+	0.093A	
3	31-GA- 67	78. H	ECAPB+	0.184A	
3	31-GA- 67	78. H	ECAPB+	0.296A	
3	31-GA- 67	78. H	ECAPB+	0.388B	
4	31-GA- 68	68.0 M	ECAPB+	0.511A	ANN.RD
4	31-GA- 68	68.0 M	ECAPB+	1.075C	
4	31-GA- 68	68.0 M	ECAPB+	1.25 C	
4	31-GA- 68	68.0 M	ECAPB+	1.89 C	
1	31-GA- 70	21. M	BETA.-		BREMS.
1	31-GA- 70	21. M	BETA.-	0.17 A	
1	31-GA- 70	21. M	BETA.-	1.04 B	
1	31-GA- 72	14.1 H	BETA.-	0.625A	AVERAG 0.60 0.62 0.63
1	31-GA- 72	14.1 H	BETA.-	0.83 A	AVERAG 0.832 0.81
1	31-GA- 72	14.1 H	BETA.-	2.20 B	
1	31-GA- 72	14.1 H	BETA.-	2.495B	
4	32-GE- 69	40. H	ECAPB+	0.511A	ANN.RD
4	32-GE- 69	40. H	ECAPB+	0.580A	
4	32-GE- 69	40. H	ECAPB+	0.872B	
4	32-GE- 69	40. H	ECAPB+	1.12 A	
4	32-GE- 69	40. H	ECAPB+	1.33 B	
1	32-GE- 75	82. M	BETA.-	0.119A	
1	32-GE- 75	82. M	BETA.-	0.266A	
1	32-GE- 75	82. M	BETA.-	0.422B	
1	32-GE- 75	82. M	BETA.-	0.47 B	
1	32-GE- 77	11. H	BETA.-	0.215A	
1	32-GE- 77	11. H	BETA.-	0.264A	
1	32-GE- 77	11. H	BETA.-	0.367A	
1	32-GE- 77	11. H	BETA.-	0.416A	
1	32-GE- 77	11. H	BETA.-	0.561B	
1	32-GE- 77	11. H	BETA.-	0.631B	
1	32-GE- 77	11. H	BETA.-	0.71 B	
1	32-GE- 77M	54. S	BETA.-	0.162A	ISOMER
1	32-GE- 77M	54. S	BETA.-	0.215A	
3	33-AS- 72	26. H	ECAPB+	0.511A	ANN.RD
3	33-AS- 72	26. H	ECAPB+	0.625B	
3	33-AS- 72	26. H	ECAPB+	0.833A	
4	33-AS- 74	18. D	ECAPB+	0.511A	ANN.RD
4	33-AS- 74	18. D	ECAPB+	0.596A	
1	33-AS- 76	26.5 H	BETA.-	0.559A	
1	33-AS- 76	26.5 H	BETA.-	0.657B	
1	33-AS- 76	26.5 H	BETA.-	1.22 B	
1	33-AS- 76	26.5 H	BETA.-	1.44 C	
1	33-AS- 76	26.5 H	BETA.-	1.78 C	
1	33-AS- 76	26.5 H	BETA.-	2.10 C	
7	33-AS- 77	39. H	BETA.-	0.085B	
7	33-AS- 77	39. H	BETA.-	0.160B	
7	33-AS- 77	39. H	BETA.-	0.246A	
7	33-AS- 77	39. H	BETA.-	0.290B	
7	33-AS- 77	39. H	BETA.-	0.525A	
4	34-SE- 73	7.1 H	BETA.+	0.066A	
4	34-SE- 73	7.1 H	BETA.+	0.359A	
4	34-SE- 73	7.1 H	BETA.+	0.511A	ANN.RD
1	34-SE- 75	120. D	E-CAPT	0.134A	AVERAG 0.121 0.136
1	34-SE- 75	120. D	E-CAPT	0.268A	AVERAG 0.265 0.280
1	34-SE- 75	120. D	E-CAPT	0.402B	
1	34-SE- 81	18. M	BETA.-	0.285A	AVERAG 0.28 0.29
1	34-SE- 81	18. M	BETA.-	0.55 B	
1	34-SE- 81	18. M	BETA.-	0.83 B	
1	34-SE- 81M	61. M	ISOMER	0.103A	ISOMER
3	35-BR- 77	58. H	ECAPB+	0.246A	
3	35-BR- 77	58. H	ECAPB+	0.520A	AVERAG 0.511 0.524
3	35-BR- 77	58. H	ECAPB+	0.580B	
3	35-BR- 77	58. H	ECAPB+	0.800B	AVERAG 0.760 0.820
3	35-BR- 77	58. H	ECAPB+	1.02 B	
1	35-BR- 80	18. M	BETA+-		BREMS.
1	35-BR- 80	18. M	BETA+-	0.511A	ANN.RD
1	35-BR- 80	18. M	BETA+-	0.618A	
1	35-BR- 80	18. M	BETA+-	0.655B	
1	35-BR- 82	36. H	BETA.-	0.028A	X-RAY.
1	35-BR- 82	36. H	BETA.-	0.554A	
1	35-BR- 82	36. H	BETA.-	0.619A	
1	35-BR- 82	36. H	BETA.-	0.777A	
1	35-BR- 82	36. H	BETA.-	0.827B	
1	35-BR- 82	36. H	BETA.-	1.044A	
1	35-BR- 82	36. H	BETA.-	1.317A	
1	35-BR- 82	36. H	BETA.-	1.475B	
F	36-KR- 85	10.4 Y	BETA.-	0.515A	
F	36-KR- 85	10.4 Y	BETA.-	0.515A	BREMS.
1	36-KR- 85M	4.4 H	ISOMER	0.150A	

1	36-KR- 85M	4.4 H	ISOMER	0.305A	I.-.		
4	37-RB- 84M	21. M	ISOMER	0.216A			
4	37-RB- 84M	21. M	ISOMER	0.250A			
4	37-RB- 84M	21. M	ISOMER	0.465A			
1	37-RB- 86	18.7 D	BETA.-		BREMS.		
1	37-RB- 86	18.7 D	BETA.-	1.077A			
1	37-RB- 88	18. M	BETA.-	0.899A			
1	37-RB- 88	18. M	BETA.-	1.837A			
F	37-RB- 89	15. M	BETA.-	0.665A			
F	37-RB- 89	15. M	BETA.-	1.04 A			
F	37-RB- 89	15. M	BETA.-	1.256A			
F	37-RB- 89	15. M	BETA.-	2.21 B			
F	37-RB- 89	15. M	BETA.-	2.58 B			
F	37-RB- 90	2.9 M	BETA.-	0.83 A			
3	38-SR- 85	64. D	E-CAPT	0.015B	X-RAY.		
3	38-SR- 85	64. D	E-CAPT	0.515A	SINGLE		
1	38-SR- 85M	70. M	E-CAPT	0.014A	X-RAY.		
1	38-SR- 85M	70. M	E-CAPT	0.150A			
1	38-SR- 85M	70. M	E-CAPT	0.225A			
1	38-SR- 87M	2.8 H	ISOMER	0.014A	X-RAY.		
1	38-SR- 87M	2.8 H	ISOMER	0.391A	SINGLE		
F	38-SR- 91	9.7 H	BETA.-	0.558A	Y91M		
F	38-SR- 91	9.7 H	BETA.-	0.655A			
F	38-SR- 91	9.7 H	BETA.-	0.76 A			
F	38-SR- 91	9.7 H	BETA.-	1.03 A			
F	38-SR- 92	2.7 H	BETA.-	0.238A			
F	38-SR- 92	2.7 H	BETA.-	0.427A			
F	38-SR- 92	2.7 H	BETA.-	1.38 A			
3	39- Y- 86	15. H	ECAPB+	0.38 A			
3	39- Y- 86	15. H	ECAPB+	0.45 A			
3	39- Y- 86	15. H	ECAPB+	0.511A	ANN.RD		
3	39- Y- 86	15. H	ECAPB+	0.643A			
3	39- Y- 86	15. H	ECAPB+	0.70 B			
3	39- Y- 86	15. H	ECAPB+	0.779B			
3	39- Y- 86	15. H	ECAPB+	1.084A			
3	39- Y- 86	15. H	ECAPB+	1.16 A			
3	39- Y- 86	15. H	ECAPB+	1.807B			
3	39- Y- 86	15. H	ECAPB+	1.937B			
3	39- Y- 86	15. H	ECAPB+	2.62 C			
3	39- Y- 88	105. D	E-CAPT	0.899A			
3	39- Y- 88	105. D	E-CAPT	1.837A			
5	39- Y- 90M	3.14H	ISOMER	0.203A			
5	39- Y- 90M	3.14H	ISOMER	0.482A			
F	39- Y- 91	59. D	BETA.-	A	BREMS.		
F	39- Y- 91	59. D	BETA.-	1.21 B			
F	39- Y- 91M	50. M	ISOMER	0.559A	ISOMER		
F	39- Y- 92	3.6 H	BETA.-	0.45 A			
F	39- Y- 92	3.6 H	BETA.-	0.56 A			
F	39- Y- 92	3.6 H	BETA.-	0.93 A			
F	39- Y- 92	3.6 H	BETA.-	1.40 A			
F	39- Y- 93	10.1 H	BETA.-		BREMS.		
F	39- Y- 93	10.1 H	BETA.-	0.265A			
F	39- Y- 93	10.1 H	BETA.-	0.677B			
F	39- Y- 93	10.1 H	BETA.-	0.942B			
F	39- Y- 93	10.1 H	BETA.-	1.42 B			
F	39- Y- 93	10.1 H	BETA.-	1.91 B			
F	39- Y- 94	17. M	BETA.-	0.24 A			
F	39- Y- 94	17. M	BETA.-	0.36 A			
F	39- Y- 94	17. M	BETA.-	0.560A			
F	39- Y- 94	17. M	BETA.-	0.925A			
F	39- Y- 94	17. M	BETA.-	1.15 A			
F	39- Y- 94	17. M	BETA.-	1.36 B			
F	39- Y- 94	17. M	BETA.-	1.68 B			
F	39- Y- 94	17. M	BETA.-	1.90 B			
F	39- Y- 94	17. M	BETA.-	2.16 B			
F	39- Y- 94	17. M	BETA.-	2.65 C			
F	39- Y- 94	17. M	BETA.-	3.6 C			
4	40-ZR- 89	79. H	ECAPB+	0.511A	ANN.RD		
4	40-ZR- 89	79. H	ECAPB+	0.906A			
4	40-ZR- 89M	4.4 M	ISOMER	0.511B	ANN.RD		
4	40-ZR- 89M	4.4 M	ISOMER	0.589A	ISOMER		
1	40-ZR- 95	65. D	BETA.-	0.73 A	AVERAG	0.726	0.765
1	40-ZR- 97	17. H	BETA.-	0.663A	NB-97	DAWTR	
1	40-ZR- 97	17. H	BETA.-	0.75 A	NB-97M		
4	41-NB- 92	10. D	E-CAPT	0.931A	SINGLE		
1	41-NB- 94	200E04Y	BETA.-		SMPEAK		
1	41-NB- 94	200E04Y	BETA.-	0.702A	DUBLET		
1	41-NB- 94	200E04Y	BETA.-	0.871A	DUBLET		
1	41-NB- 94M	6.6 M	BETA.-	0.871A	SINGLE		
7	41-NB- 95	35. D	BETA.-	0.766A	SINGLE		
7	41-NB- 97	74. M	BETA.-	0.663A			
7	41-NB- 97	74. M	BETA.-	0.663A	SINGLE		
1	41-NB- 97M	60. S	ISOMER	0.75 A			
4	42-MO- 91	16. M	BETA.+	0.511A	ANN.RD		
1	42-MO- 99	66. H	BETA.-	0.142A	TC99M		
1	42-MO- 99	66. H	BETA.-	0.188B			
1	42-MO- 99	66. H	BETA.-	0.372C			
1	42-MO- 99	66. H	BETA.-	0.75 B	AVERAG	0.740	0.780
1	42-MO- 101	14.6 M	BETA.-	0.08 A			
1	42-MO- 101	14.6 M	BETA.-	0.193A			
1	42-MO- 101	14.6 M	BETA.-	0.31 A			
1	42-MO- 101	14.6 M	BETA.-	0.40 B			
1	42-MO- 101	14.6 M	BETA.-	0.51 A			
1	42-MO- 101	14.6 M	BETA.-	0.592A			
1	42-MO- 101	14.6 M	BETA.-	0.705A			
1	42-MO- 101	14.6 M	BETA.-	0.89 B	AVERAG		
1	42-MO- 101	14.6 M	BETA.-	1.024A			
1	42-MO- 101	14.6 M	BETA.-	1.56 B			
1	42-MO- 101	14.6 M	BETA.-	2.03 B			
8	43-TC- 95	20. H	E-CAPT	0.017A	X-RAY.		

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8 43-TC- 95    20.   H E-CAPT 0.768A
8 43-TC- 95    20.   H E-CAPT 0.94 C
8 43-TC- 95    20.   H E-CAPT 1.07 C
8 43-TC- 95M   60.   D ECAPB+ 0.017A X-RAY.
8 43-TC- 95M   60.   D ECAPB+ 0.204A
8 43-TC- 95M   60.   D ECAPB+ 0.511B ANN-RD
8 43-TC- 95M   60.   D ECAPB+ 0.584A
8 43-TC- 95M   60.   D ECAPB+ 0.83 B
8 43-TC- 95M   60.   D ECAPB+ 1.04 C
3 43-TC- 96     4.3 D E-CAPT        SMPEAK
3 43-TC- 96     4.3 D E-CAPT 0.017A X-RAY.
3 43-TC- 96     4.3 D E-CAPT 0.80 A AVERAG 0.770 0.804 0.840
3 43-TC- 96     4.3 D E-CAPT 1.119B
F 43-TC- 99   210E05Y BETA.-       A BREMSP
1 43-TC-101    15.0 M BETA.- 0.128A
1 43-TC-101    15.0 M BETA.- 0.182B
1 43-TC-101    15.0 M BETA.- 0.307A
1 43-TC-101    15.0 M BETA.- 0.547B
1 43-TC-101    15.0 M BETA.- 0.63 B
1 43-TC-101    15.0 M BETA.- 0.72 B
1 43-TC-101    15.0 M BETA.- 0.94 C
4 44-RU- 95     1.7 H ECAPB+ 0.340A
4 44-RU- 95     1.7 H ECAPB+ 0.511A ANN-RD
4 44-RU- 95     1.7 H ECAPB+ 0.625A
4 44-RU- 95     1.7 H ECAPB+ 1.09 B
4 44-RU- 95     1.7 H ECAPB+ 1.42 B
4 44-RU- 95     1.7 H ECAPB+ 2.25 C
1 44-RU- 97     2.9 D E-CAPT 0.018B X-RAY.
1 44-RU- 97     2.9 D E-CAPT 0.215A
1 44-RU- 97     2.9 D E-CAPT 0.323B
1 44-RU-103    40.  D BETA.- 0.020A X-RAY.
1 44-RU-103    40.  D BETA.- 0.498A
1 44-RU-103    40.  D BETA.- 0.611B
1 44-RU-105     4.45H BETA.- 0.020A X-RAY.
1 44-RU-105     4.45H BETA.- 0.13 A RH105M
1 44-RU-105     4.45H BETA.- 0.264A
1 44-RU-105     4.45H BETA.- 0.316A
1 44-RU-105     4.45H BETA.- 0.40 B
1 44-RU-105     4.45H BETA.- 0.472A
1 44-RU-105     4.45H BETA.- 0.670A
1 44-RU-105     4.45H BETA.- 0.723A
1 44-RU-105     4.45H BETA.- 0.873B
1 44-RU-105     4.45H BETA.- 0.962B
F 44-RU-106     1.0 Y BETA.- 0.513A RH106
F 44-RU-106     1.0 Y BETA.- 0.62 A RH106  0.624 0.612
F 44-RU-106     1.0 Y BETA.- 0.88 B RH106  0.87  0.89
F 44-RU-106     1.0 Y BETA.- 1.05 B RH106
F 44-RU-106     1.0 Y BETA.- 1.14 B RH106
3 45-RH-101M    4.7 D E-CAPT 0.019A X-RAY.
3 45-RH-101M    4.7 D E-CAPT 0.307A
3 45-RH-101M    4.7 D E-CAPT 0.545B
1 45-RH-104M    4.4 M ISOMER       B BREMS.
1 45-RH-104M    4.4 M ISOMER 0.02 A X-RAY
1 45-RH-104M    4.4 M ISOMER 0.051A
1 45-RH-104M    4.4 M ISOMER 0.077B
1 45-RH-104M    4.4 M ISOMER 0.10 B
1 45-RH-104M    4.4 M ISOMER 0.555C RH-104
1 45-RH-105M   42.0 S ISOMER 0.020A X-RAY
1 45-RH-105M   42.0 S ISOMER 0.130A SINGLE
1 46-PD-109    13.6 H BETA.- 0.022A X-RAY.
1 46-PD-109    13.6 H BETA.- 0.088A AG109M
3 47-AG-105    40.  D E-CAPT 0.021A X-RAY.
3 47-AG-105    40.  D E-CAPT 0.064A
3 47-AG-105    40.  D E-CAPT 0.281A
3 47-AG-105    40.  D E-CAPT 0.34 A AVERAG 0.331 0.345 0.393
3 47-AG-105    40.  D E-CAPT 0.443B
3 47-AG-105    40.  D E-CAPT 0.65 B
4 47-AG-106    24.  M ECAPB+ 0.512A AVERAG 0.511 0.513
4 47-AG-106    24.  M ECAPB+ 0.62 B
4 47-AG-106    24.  M ECAPB+ 0.87 C
4 47-AG-106    24.  M ECAPB+ 1.05 C
4 47-AG-106M    8.3 D E-CAPT 0.44 A AVERAG 0.41  0.46
4 47-AG-106M    8.3 D E-CAPT 0.513A
4 47-AG-106M    8.3 D E-CAPT 0.62 A
4 47-AG-106M    8.3 D E-CAPT 0.73 A
4 47-AG-106M    8.3 D E-CAPT 0.79 A AVERAG 0.78  0.80  0.81
4 47-AG-106M    8.3 D E-CAPT 1.05 A
4 47-AG-106M    8.3 D E-CAPT 1.13 A
4 47-AG-106M    8.3 D E-CAPT 1.20 A
4 47-AG-106M    8.3 D E-CAPT 1.54 B
1 47-AG-108     2.4 M ECAPB+       A BREMS.
1 47-AG-108     2.4 M ECAPB+ 0.433A
1 47-AG-108     2.4 M ECAPB+ 0.511A ANN.RD
1 47-AG-108     2.4 M ECAPB+ 0.63 A AVERAG 0.617 0.633
1 47-AG-108M    5.  Y E-CAPT 0.021A X-RAY.
1 47-AG-108M    5.  Y E-CAPT 0.081A
1 47-AG-108M    5.  Y E-CAPT 0.434A
1 47-AG-108M    5.  Y E-CAPT 0.615A
1 47-AG-108M    5.  Y E-CAPT 0.724A
1 47-AG-110    24.  S BETA.-       A BREMS.
1 47-AG-110    24.  S BETA.- 0.023A X-RAY.
1 47-AG-110    24.  S BETA.- 0.656A
1 47-AG-110M  250.  D BETA.- 0.66 A AVERAG 0.656 0.677 0.687 0.706
1 47-AG-110M  250.  D BETA.- 0.89 A AVERAG 0.815 0.885 0.937
1 47-AG-110M  250.  D BETA.- 1.384B
1 47-AG-110M  250.  D BETA.- 1.48 B AVERAG 1.47  1.50  1.56
1 47-AG-111     7.5 D BETA.- 0.247A
1 47-AG-111     7.5 D BETA.- 0.342A
1 48-CD-109   470.  D E-CAPT 0.022A X-RAY.
1 48-CD-109   470.  D E-CAPT 0.088B AG109M
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1 48-CD-115     2.3 D BETA.- 0.024A X-RAY.
1 48-CD-115     2.3 D BETA.- 0.335A IN115M
1 48-CD-115     2.3 D BETA.- 0.52 A AVERAG 0.490 0.523
1 48-CD-115M   43.0 D BETA.-       A BREMS.
1 48-CD-115M   43.0 D BETA.- 0.485A
1 48-CD-115M   43.0 D BETA.- 0.935A
1 48-CD-115M   43.0 D BETA.- 1.13 B
1 48-CD-115M   43.0 D BETA.- 1.295A
4 49-IN-111     2.8 D E-CAPT 0.023A X-RAY
4 49-IN-111     2.8 D E-CAPT 0.173A
4 49-IN-111     2.8 D E-CAPT 0.247A
4 49-IN-112    14.0 M ECAPB+ 0.511A ANN.RD
4 49-IN-112    14.0 M ECAPB+ 0.615A
4 49-IN-112    14.0 M ECAPB+ 0.84 C
4 49-IN-112    14.0 M ECAPB+ 1.25 C
4 49-IN-112    14.0 M ECAPB+ 1.45 C
4 49-IN-112M   21.0 M ISOMER 0.155A I.T.
7 49-IN-113M    1.7 H ISOMER 0.024A X-RAY.
7 49-IN-113M    1.7 H ISOMER 0.393A SINGLE
1 49-IN-114M   50.0 D ISOMER 0.024A X-RAY
1 49-IN-114M   50.0 D ISOMER 0.192A I.T.
1 49-IN-114M   50.0 D ISOMER 0.556B IN-114
1 49-IN-114M   50.0 D ISOMER 0.772B IN-114
1 49-IN-114M   50.0 D ISOMER 1.3  C IN-114
7 49-IN-115M    4.5 H ISOMER 0.024A X-RAY.
7 49-IN-115M    4.5 H ISOMER 0.335A SINGLE
1 49-IN-116M   54.0 M BETA.- 0.137A
1 49-IN-116M   54.0 M BETA.- 0.406A
1 49-IN-116M   54.0 M BETA.- 0.81 A
1 49-IN-116M   54.0 M BETA.- 1.085A
1 49-IN-116M   54.0 M BETA.- 1.27 A
1 49-IN-116M   54.0 M BETA.- 1.49 B
1 49-IN-116M   54.0 M BETA.- 1.77 B
1 49-IN-116M   54.0 M BETA.- 2.08 B
1 50-SN-113   118.0 D E-CAPT 0.024A X-RAY
1 50-SN-113   118.0 D E-CAPT 0.253B SN-113
1 50-SN-113   118.0 D E-CAPT 0.393A IN113M
F 50-SN-125     9.4 D BETA.- 0.026A X-RAY
F 50-SN-125     9.4 D BETA.- 0.33 A AVERAG 0.331 0.34
F 50-SN-125     9.4 D BETA.- 0.468A
F 50-SN-125     9.4 D BETA.- 0.815A
F 50-SN-125     9.4 D BETA.- 0.91 A
F 50-SN-125     9.4 D BETA.- 1.068A
F 50-SN-125     9.4 D BETA.- 1.97 B
F 50-SN-125     9.4 D BETA.- 2.2  C
1 50-SN-125M    9.7 M BETA.-       B BREMS.
1 50-SN-125M    9.7 M BETA.- 0.85 C
1 50-SN-125M    9.7 M BETA.- 0.331A
1 50-SN-125M    9.7 M BETA.- 0.593C
1 50-SN-125M    9.7 M BETA.- 0.65 C
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1 50-SN-125M    9.7 M BETA.- 1.04 C
1 50-SN-125M    9.7 M BETA.- 1.42 C
4 51-SB-120    16.  M ECAPB+ 0.511A ANN-RD
4 51-SB-120    16.  M ECAPB+ 1.17 C
4 51-SB-120M    5.8 D E-CAPT 0.025A X-RAY.
4 51-SB-120M    5.8 D E-CAPT 0.087A
4 51-SB-120M    5.8 D E-CAPT 0.197A
4 51-SB-120M    5.8 D E-CAPT 1.03 B
4 51-SB-120M    5.8 D E-CAPT 1.17 B
1 51-SB-122     2.8 D BETA.- 0.561A
1 51-SB-122     2.8 D BETA.- 0.687B
1 51-SB-122     2.8 D BETA.- 1.13 C
1 51-SB-122     2.8 D BETA.- 1.24 C
1 51-SB-122M    3.4 M ISOMER 0.027A X-RAY.
1 51-SB-122M    3.4 M ISOMER 0.061A
1 51-SB-122M    3.4 M ISOMER 0.075A
1 51-SB-124    60.  D BETA.- 0.603A
1 51-SB-124    60.  D BETA.- 0.722A
1 51-SB-124    60.  D BETA.- 1.69 A
1 51-SB-124    60.  D BETA.- 2.09 B
F 51-SB-125     2.7 Y BETA.- 0.027A X-RAY.
F 51-SB-125     2.7 Y BETA.- 0.175A
F 51-SB-125     2.7 Y BETA.- 0.43 A AVERAG 0.427 0.463
F 51-SB-125     2.7 Y BETA.- 0.605A AVERAG 0.60  0.64
1 52-TE-125M   58.  D ISOMER 0.027A X-RAY
1 52-TE-125M   58.  D ISOMER 0.110A
F 52-TE-132    78.  H BETA.- 0.028A X-RAY.
F 52-TE-132    78.  H BETA.- 0.055A
F 52-TE-132    78.  H BETA.- 0.12 B
F 52-TE-132    78.  H BETA.- 0.232A
3 53- I-124     4.2 D ECAPB+ 0.511A ANN.RD
3 53- I-124     4.2 D ECAPB+ 0.603A
3 53- I-124     4.2 D ECAPB+ 0.72 A
3 53- I-124     4.2 D ECAPB+ 0.98 C
3 53- I-124     4.2 D ECAPB+ 1.05 C
3 53- I-124     4.2 D ECAPB+ 1.31 B
3 53- I-124     4.2 D ECAPB+ 1.50 B
3 53- I-124     4.2 D ECAPB+ 1.69 B
3 53- I-124     4.2 D ECAPB+ 2.08 C
3 53- I-124     4.2 D ECAPB+ 2.23 C
3 53- I-126    13.2 D ECAPB+ 0.027A X-RAY.
3 53- I-126    13.2 D ECAPB+ 0.386A
3 53- I-126    13.2 D ECAPB+ 0.665A
3 53- I-126    13.2 D ECAPB+ 0.747B
3 53- I-126    13.2 D ECAPB+ 0.88 C
3 53- I-126    13.2 D ECAPB+ 1.41 C
1 53- I-128    25.  M BETA+- 0.027A X-RAY.
1 53- I-128    25.  M BETA+- 0.445A
1 53- I-128    25.  M BETA+- 0.525B
3 53- I-130    12.5 H BETA.- 0.41 A
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3	53- I-130	12.5	H	BETA.-	0.53	A	TRPLET
3	53- I-130	12.5	H	BETA.-	0.66	A	TRPLET
3	53- I-130	12.5	H	BETA.-	0.74	A	TRPLET
F	53- I-131	8.0	D	BETA.-	0.029	A	X-RAY.
F	53- I-131	8.0	D	BETA.-	0.080	A	
F	53- I-131	8.0	D	BETA.-	0.284	A	
F	53- I-131	8.0	D	BETA.-	0.364	A	
F	53- I-131	8.0	D	BETA.-	0.638	B	
F	53- I-132	2.3	H	BETA.-	0.52	A	
F	53- I-132	2.3	H	BETA.-	0.665	A	
F	53- I-132	2.3	H	BETA.-	0.77	A	
F	53- I-132	2.3	H	BETA.-	0.952	A	
F	53- I-132	2.3	H	BETA.-	1.14	B	
F	53- I-132	2.3	H	BETA.-	1.39	B	
F	53- I-133	20.8	H	BETA.-	0.525	A	
F	53- I-133	20.8	H	BETA.-	0.71	B	
F	53- I-133	20.8	H	BETA.-	0.86	B	
F	53- I-133	20.8	H	BETA.-	1.27	B	
F	53- I-134	53.	M	BETA.-	0.14	B	
F	53- I-134	53.	M	BETA.-	0.41	B	AVERAG 0.41 0.43
F	53- I-134	53.	M	BETA.-	0.54	B	
F	53- I-134	53.	M	BETA.-	0.61	B	
F	53- I-134	53.	M	BETA.-	0.86	A	AVERAG 0.848 0.390
F	53- I-134	53.	M	BETA.-	1.07	B	
F	53- I-134	53.	M	BETA.-	1.15	B	
F	53- I-134	53.	M	BETA.-	1.79	B	
F	53- I-135	6.7	H	BETA.-	0.03	A	X-RAY.
F	53- I-135	6.7	H	BETA.-	0.22	A	
F	53- I-135	6.7	H	BETA.-	0.29	A	
F	53- I-135	6.7	H	BETA.-	0.42	A	
F	53- I-135	6.7	H	BETA.-	0.535	A	XE135M
F	53- I-135	6.7	H	BETA.-	0.84	A	
F	53- I-135	6.7	H	BETA.-	1.14	A	
F	53- I-135	6.7	H	BETA.-	1.265	A	
F	53- I-135	6.7	H	BETA.-	1.46	B	
F	53- I-135	6.7	H	BETA.-	1.70	B	
F	53- I-135	6.7	H	BETA.-	1.79	B	
1	54-XE-125	18.	H	E-CAPT	0.028	A	X-RAY.
1	54-XE-125	18.	H	E-CAPT	0.055	B	
1	54-XE-125	18.	H	E-CAPT	0.075	B	
1	54-XE-125	18.	H	E-CAPT	0.188	A	
1	54-XE-125	18.	H	E-CAPT	0.243	A	
1	54-XE-125	18.	H	E-CAPT	0.46	C	
F	54-XE-133	5.3	D	BETA.-	0.031	A	X-RAY.
F	54-XE-133	5.3	D	BETA.-	0.083	A	
F	54-XE-135	9.2	H	BETA.-	0.250	A	
F	54-XE-135	9.2	H	BETA.-	0.36	C	
F	54-XE-135	9.2	H	BETA.-	0.604	C	
4	55-CS-132	6.5	D	ECAPB+	0.03	A	X-RAY.
4	55-CS-132	6.5	D	ECAPB+	0.45	B	
4	55-CS-132	6.5	D	ECAPB+	0.665	A	
4	55-CS-132	6.5	D	ECAPB+	1.03	C	
4	55-CS-132	6.5	D	ECAPB+	1.13	C	
4	55-CS-132	6.5	D	ECAPB+	1.31	C	
1	55-CS-134	2.1	Y	BETA.-	0.47	B	
1	55-CS-134	2.1	Y	BETA.-	0.60	A	AVERAG 0.563 0.570
1	55-CS-134	2.1	Y	BETA.-	0.80	A	AVERAG 0.796 0.801
1	55-CS-134	2.1	Y	BETA.-	1.04	B	
1	55-CS-134	2.1	Y	BETA.-	1.17	B	
1	55-CS-134	2.1	Y	BETA.-	1.37	B	
1	55-CS-134M	2.9	H	ISOMER	0.031	A	X-RAY.
1	55-CS-134M	2.9	H	ISOMER	0.127	A	SINGLE
F	55-CS-136	13.	D	BETA.-	0.03	A	X-RAY
F	55-CS-136	13.	D	BETA.-	0.067	A	
F	55-CS-136	13.	D	BETA.-	0.087	A	
F	55-CS-136	13.	D	BETA.-	0.16	A	AVERAG
F	55-CS-136	13.	D	BETA.-	0.27	A	
F	55-CS-136	13.	D	BETA.-	0.34	A	
F	55-CS-136	13.	D	BETA.-	0.67	A	
F	55-CS-136	13.	D	BETA.-	0.83	A	
F	55-CS-136	13.	D	BETA.-	1.065	A	
F	55-CS-136	13.	D	BETA.-	1.25	B	
F	55-CS-136	13.	D	BETA.-	1.40	C	
F	55-CS-137	30.	Y	BETA.-	0.032	A	X-RAY.
F	55-CS-137	30.	Y	BETA.-	0.662	A	SINGLE
F	55-CS-138	32.	M	BETA.-	0.462	A	
F	55-CS-138	32.	M	BETA.-	0.545	A	
F	55-CS-138	32.	M	BETA.-	1.01	A	
F	55-CS-138	32.	M	BETA.-	1.43	A	
F	55-CS-138	32.	M	BETA.-	2.20	A	
F	55-CS-138	32.	M	BETA.-	2.61	A	
F	55-CS-139	9.5	M	BETA.-			BREMS.
F	55-CS-139	9.5	M	BETA.-	0.63	A	
F	55-CS-139	9.5	M	BETA.-	1.28	A	
1	56-BA-131	11.5	D	E-CAPT	0.030	A	X-RAY.
1	56-BA-131	11.5	D	E-CAPT	0.126	A	
1	56-BA-131	11.5	D	E-CAPT	0.220	A	
1	56-BA-131	11.5	D	E-CAPT	0.26	B	
1	56-BA-131	11.5	D	E-CAPT	0.375	A	
1	56-BA-131	11.5	D	E-CAPT	0.498	A	
1	56-BA-131	11.5	D	E-CAPT	0.62	B	
1	56-BA-133	7.5	Y	E-CAPT	0.031	A	X-RAY.
1	56-BA-133	7.5	Y	E-CAPT	0.08	A	AVERAG 0.078 0.081
1	56-BA-133	7.5	Y	E-CAPT	0.29	A	AVERAG 0.274 0.302
1	56-BA-133	7.5	Y	E-CAPT	0.36	A	AVERAG 0.355 0.380
1	56-BA-139	83.	M	BETA.-			BREMS.
1	56-BA-139	83.	M	BETA.-	0.033	A	X-RAY.
1	56-BA-139	83.	M	BETA.-	0.166	A	
F	56-BA-140	12.8	D	BETA.-	0.029	A	X-RAY.
F	56-BA-140	12.8	D	BETA.-	0.161	A	

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F 56-BA-140    12.8 D BETA.- 0.304A
F 56-BA-140    12.8 D BETA.- 0.43 A AVERAG 0.422 0.436
F 56-BA-140    12.8 D BETA.- 0.537A
3 57-LA-136     9.5 M ECAPB+ 0.511A ANN.RD
3 57-LA-136     9.5 M ECAPB+ 0.82 B
1 57-LA-140    40.2 H BETA.- 0.327A
1 57-LA-140    40.2 H BETA.- 0.487A
1 57-LA-140    40.2 H BETA.- 0.817A
1 57-LA-140    40.2 H BETA.- 0.92 A
1 57-LA-140    40.2 H BETA.- 1.597A
F 57-LA-142    87.  M BETA.- 0.645A
F 57-LA-142    87.  M BETA.- 0.89 A
F 57-LA-142    87.  M BETA.- 1.03 A
F 57-LA-142    87.  M BETA.- 1.38 B
F 57-LA-142    87.  M BETA.- 1.54 B
F 57-LA-142    87.  M BETA.- 1.74 B
F 57-LA-142    87.  M BETA.- 1.92 B
F 57-LA-142    87.  M BETA.- 2.08 B
F 57-LA-142    87.  M BETA.- 2.42 B
F 57-LA-142    87.  M BETA.- 2.55 B
F 57-LA-142    87.  M BETA.- 3.0  B
F 57-LA-142    87.  M BETA.- 3.3  C
F 57-LA-142    87.  M BETA.- 3.65 C
3 58-CE-139   140.  D E-CAPT 0.033A X-RAY.
3 58-CE-139   140.  D E-CAPT 0.166A SINGLE
1 58-CE-141    32.5 D BETA.- 0.036A X-RAY.
1 58-CE-141    32.5 D BETA.- 0.145A
1 58-CE-143    33.  H BETA.- 0.036A X-RAY.
1 58-CE-143    33.  H BETA.- 0.057A
1 58-CE-143    33.  H BETA.- 0.232A
1 58-CE-143    33.  H BETA.- 0.294A
1 58-CE-143    33.  H BETA.- 0.351B
1 58-CE-143    33.  H BETA.- 0.493B
1 58-CE-143    33.  H BETA.- 0.668B
1 58-CE-143    33.  H BETA.- 0.722B
1 58-CE-143    33.  H BETA.- 0.88 C
1 58-CE-143    33.  H BETA.- 1.10 C
F 58-CE-144   284.  D BETA.- 0.036A X-RAY.
F 58-CE-144   284.  D BETA.- 0.134A
F 58-CE-144   284.  D BETA.- 0.696B PR-144
F 58-CE-144   284.  D BETA.- 1.481C PR-144
F 58-CE-144   284.  D BETA.- 2.18 C PR-144
4 59-PR-139     4.5 H ECAPB+ 0.035A X-RAY.
4 59-PR-139     4.5 H ECAPB+ 0.511A ANN-RD
4 59-PR-139     4.5 H ECAPB+ 1.34 C
4 59-PR-139     4.5 H ECAPB+ 1.60 C
1 59-PR-142    19.2 H BETA.- 1.58 A SINGLE
1 59-PR-142    19.2 H BETA.- 1.58 A BREMS.
1 59-PR-143    13.7 D BETA.-      A BREMSP
F 59-PR-145     5.9 H BETA.-      A BREMS.
F 59-PR-145     5.9 H BETA.- 0.037A X-RAY.
F 59-PR-145     5.9 H BETA.- 0.072A
F 59-PR-145     5.9 H BETA.- 0.67 B
F 59-PR-145     5.9 H BETA.- 0.74 B
F 59-PR-145     5.9 H BETA.- 0.93 B
F 59-PR-145     5.9 H BETA.- 0.97 B
F 59-PR-145     5.9 H BETA.- 1.15 B
4 60-ND-141     2.4 H ECAPB+ 0.036A X-RAY.
4 60-ND-141     2.4 H ECAPB+ 0.145B
4 60-ND-141     2.4 H ECAPB+ 0.511A ANN.RD
4 60-ND-141     2.4 H ECAPB+ 1.13 C
4 60-ND-141     2.4 H ECAPB+ 1.29 C
1 60-ND-147    11.1 D BETA.- 0.038A X-RAY.
1 60-ND-147    11.1 D BETA.- 0.091A
1 60-ND-147    11.1 D BETA.- 0.277B
1 60-ND-147    11.1 D BETA.- 0.32 B
1 60-ND-147    11.1 D BETA.- 0.41 B
1 60-ND-147    11.1 D BETA.- 0.44 B
1 60-ND-147    11.1 D BETA.- 0.532B
1 60-ND-147    11.1 D BETA.- 0.688C
1 60-ND-149     1.9 H BETA.- 0.038A X-RAY.
1 60-ND-149     1.9 H BETA.- 0.08 A
1 60-ND-149     1.9 H BETA.- 0.113A AVERAG 0.112 0.114
1 60-ND-149     1.9 H BETA.- 0.150A
1 60-ND-149     1.9 H BETA.- 0.21 A AVERAG 0.198 0.210
1 60-ND-149     1.9 H BETA.- 0.26 A AVERAG 0.240 0.266
1 60-ND-149     1.9 H BETA.- 0.325B
1 60-ND-149     1.9 H BETA.- 0.423B
1 60-ND-149     1.9 H BETA.- 0.538B
1 60-ND-149     1.9 H BETA.- 0.650B
1 60-ND-151    12.  M BETA.- 0.038A X-RAY.
1 60-ND-151    12.  M BETA.- 0.115A
1 60-ND-151    12.  M BETA.- 0.17 A
1 60-ND-151    12.  M BETA.- 0.254A
1 60-ND-151    12.  M BETA.- 0.41 B AVERAG 0.40  0.43
1 60-ND-151    12.  M BETA.- 0.74 B
1 60-ND-151    12.  M BETA.- 0.79 B
1 60-ND-151    12.  M BETA.- 1.08 B
F 61-PM-147     2.5 Y BETA.-      A BREMS.
F 61-PM-147     2.5 Y BETA.- 0.12 B
5 61-PM-148     5.4 D BETA.- 0.551A
5 61-PM-148     5.4 D BETA.- 0.910A
5 61-PM-148     5.4 D BETA.- 1.46 A
5 61-PM-148M   41.  D BETA.- 0.29 A AVERAG
5 61-PM-148M   41.  D BETA.- 0.42 A AVERAG
5 61-PM-148M   41.  D BETA.- 0.548A
5 61-PM-148M   41.  D BETA.- 0.626A
5 61-PM-148M   41.  D BETA.- 0.723A
5 61-PM-148M   41.  D BETA.- 0.913A
5 61-PM-148M   41.  D BETA.- 1.01 A
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5 61-PM-151    28.4 H BETA.- 0.040A X-RAY.
5 61-PM-151    28.4 H BETA.- 0.065A
5 61-PM-151    28.4 H BETA.- 0.10 A
5 61-PM-151    28.4 H BETA.- 0.163A
5 61-PM-151    28.4 H BETA.- 0.24 A
5 61-PM-151    28.4 H BETA.- 0.340A
5 61-PM-151    28.4 H BETA.- 0.442A
5 61-PM-151    28.4 H BETA.- 0.65 B
5 61-PM-151    28.4 H BETA.- 0.72 B
1 62-SM-153    46.7 H BETA.- 0.041A X-RAY
1 62-SM-153    46.7 H BETA.- 0.070A
1 62-SM-153    46.7 H BETA.- 0.103A
1 62-SM-153    46.7 H BETA.- 0.173C
1 62-SM-155    25.  M BETA.- 0.042A X-RAY.
1 62-SM-155    25.  M BETA.- 0.106A
1 62-SM-155    25.  M BETA.- 0.142B
1 62-SM-155    25.  M BETA.- 0.245B
1 63-EU-152M    9.3 H ECBET- 0.04 A X-RAY.
1 63-EU-152M    9.3 H ECBET- 0.122A
1 63-EU-152M    9.3 H ECBET- 0.344A
1 63-EU-152M    9.3 H ECBET- 0.70 B
1 63-EU-152M    9.3 H ECBET- 0.841A
1 63-EU-152M    9.3 H ECBET- 0.963A
1 63-EU-152M    9.3 H ECBET- 0.975A
1 63-EU-152M    9.3 H ECBET- 1.32 B
1 63-EU-152M    9.3 H ECBET- 1.39 B
F 63-EU-155     1.7 Y BETA.- 0.042A X-RAY.
F 63-EU-155     1.7 Y BETA.- 0.087A
F 63-EU-155     1.7 Y BETA.- 0.105A
F 63-EU-156    15.  D BETA.- 0.042A X-RAY.
F 63-EU-156    15.  D BETA.- 0.089A
F 63-EU-156    15.  D BETA.- 0.199A
F 63-EU-156    15.  D BETA.- 0.646A
F 63-EU-156    15.  D BETA.- 0.724A
F 63-EU-156    15.  D BETA.- 0.812A
F 63-EU-156    15.  D BETA.- 0.96 A
F 63-EU-156    15.  D BETA.- 1.08 A
F 63-EU-156    15.  D BETA.- 1.16 A
F 63-EU-156    15.  D BETA.- 1.23 A
F 63-EU-156    15.  D BETA.- 1.87 B
F 63-EU-156    15.  D BETA.- 1.97 B
F 63-EU-156    15.  D BETA.- 2.03 B
F 63-EU-156    15.  D BETA.- 2.10 B
F 63-EU-156    15.  D BETA.- 2.19 B
F 63-EU-157    15.  H BETA.- 0.042A X-RAY.
F 63-EU-157    15.  H BETA.- 0.064A
F 63-EU-157    15.  H BETA.- 0.4  A AVERAG 0.32   0.38   0.41
F 63-EU-157    15.  H BETA.- 0.62 B
F 63-EU-157    15.  H BETA.- 0.68 B
1 64-GD-153   200.  D E-CAPT      C SMPEAK
1 64-GD-153   200.  D E-CAPT 0.041A X-RAY.
1 64-GD-153   200.  D E-CAPT 0.070B
1 64-GD-153   200.  D E-CAPT 0.103A AVERAG 0.097 0.103
1 64-GD-159    18.  H BETA.- 0.044A X-RAY.
1 64-GD-159    18.  H BETA.- 0.362A
1 64-GD-161     3.7 M BETA.- 0.044A X-RAY.
1 64-GD-161     3.7 M BETA.- 0.102A
1 64-GD-161     3.7 M BETA.- 0.28 B
1 64-GD-161     3.7 M BETA.- 0.316A
1 64-GD-161     3.7 M BETA.- 0.363A
1 64-GD-161     3.7 M BETA.- 0.485B
1 65-TB-160    73.  D BETA.- 0.046A X-RAY.
1 65-TB-160    73.  D BETA.- 0.087A
1 65-TB-160    73.  D BETA.- 0.20 A AVERAG 0.197 0.216
1 65-TB-160    73.  D BETA.- 0.298A
1 65-TB-160    73.  D BETA.- 0.879A
1 65-TB-160    73.  D BETA.- 0.964A AVERAG 0.962 0.966
1 65-TB-160    73.  D BETA.- 1.11 B
1 65-TB-160    73.  D BETA.- 1.20 B
1 65-TB-160    73.  D BETA.- 1.28 B AVERAG 1.27  1.31
1 66-DY-165     2.3 H BETA.- 0.047A X-RAY.
1 66-DY-165     2.3 H BETA.- 0.098A
1 66-DY-165     2.3 H BETA.- 0.277B
1 66-DY-165     2.3 H BETA.- 0.361B
1 66-DY-165     2.3 H BETA.- 0.567B
1 66-DY-165     2.3 H BETA.- 0.637B AVERAG
1 66-DY-165     2.3 H BETA.- 0.719B
1 66-DY-165     2.3 H BETA.- 0.995C
1 66-DY-165     2.3 H BETA.- 1.07 C
1 66-DY-165M   75.  S ISOMER 0.046A X-RAY.
1 66-DY-165M   75.  S ISOMER 0.108A I.T.
1 66-DY-165M   75.  S ISOMER 0.155A
1 66-DY-165M   75.  S ISOMER 0.361B
1 66-DY-165M   75.  S ISOMER 0.515B
4 67-HO-164    37.  M BETA+- 0.045A X-RAY.
4 67-HO-164    37.  M BETA+- 0.073B
4 67-HO-164    37.  M BETA+- 0.091B
1 67-HO-166    27.  H BETA.-      B BREMS.
1 67-HO-166    27.  H BETA.- 0.049A X-RAY.
1 67-HO-166    27.  H BETA.- 0.081A
1 67-HO-166    27.  H BETA.- 1.37 C
1 67-HO-166    27.  H BETA.- 1.57 C
1 67-HO-166    27.  H BETA.- 1.65 C
1 67-HO-166    27.  H BETA.- 1.74 C
1 67-HO-166    27.  H BETA.- 1.83 C
1 67-HO-166M  100.  Y BETA.- 0.049A X-RAY.
1 67-HO-166M  100.  Y BETA.- 0.08 A
1 67-HO-166M  100.  Y BETA.- 0.184A
1 67-HO-166M  100.  Y BETA.- 0.28 A AVERAG 0.263 0.280 0.300
1 67-HO-166M  100.  Y BETA.- 0.71 A
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1 67-HO-166M 100.  Y BETA.- 0.765B
1 67-HO-166M 100.  Y BETA.- 0.810A
1 68-ER-171    7.5 H BETA.- 0.050A X-RAY.
1 68-ER-171    7.5 H BETA.- 0.118A AVERAG 0.112 0.117 0.124
1 68-ER-171    7.5 H BETA.- 0.305A AVERAG 0.296 0.308
4 69-TM-168   85.  D E-CAPT 0.049A X-RAY.
4 69-TM-168   85.  D E-CAPT 0.080A
4 69-TM-168   85.  D E-CAPT 0.19 A AVERAG 0.185 0.198
4 69-TM-168   85.  D E-CAPT 0.448B
4 69-TM-168   85.  D E-CAPT 0.74 B AVERAG 0.732 0.743
4 69-TM-168   85.  D E-CAPT 0.82 B AVERAG 0.817 0.822 0.831
4 69-TM-168   85.  D E-CAPT 1.28 C
1 69-TM-170  127.  D BETA.- 0.052A X-RAY.
1 69-TM-170  127.  D BETA.- 0.084A
8 69-TM-171    1.9 Y BETA.- 0.052A X-RAY.
8 69-TM-171    1.9 Y BETA.- 0.067A
1 70-YB-169   32.  D BETA.- 0.054A X-RAY.
1 70-YB-169   32.  D BETA.- 0.115A AVERAG 0.093 0.110 0.118
1 70-YB-169   32.  D BETA.- 0.130B
1 70-YB-169   32.  D BETA.- 0.19 A AVERAG 0.177 0.198
1 70-YB-169   32.  D BETA.- 0.308B
1 70-YB-175    4.2 D BETA.- 0.054A X-RAY.
1 70-YB-175    4.2 D BETA.- 0.114A
1 70-YB-175    4.2 D BETA.- 0.283A
1 70-YB-175    4.2 D BETA.- 0.396A
1 71-LU-176M   3.7 H BETA.-       B BREMS.
1 71-LU-176M   3.7 H BETA.- 0.055A X-RAY.
1 71-LU-176M   3.7 H BETA.- 0.088A
1 71-LU-177    6.8 D BETA.- 0.056A X-RAY.
1 71-LU-177    6.8 D BETA.- 0.113A
1 71-LU-177    6.8 D BETA.- 0.208A
4 72-HF-173   24.  H E-CAPT 0.054A X-RAY.
4 72-HF-173   24.  H E-CAPT 0.125A
4 72-HF-173   24.  H E-CAPT 0.162B
4 72-HF-173   24.  H E-CAPT 0.297A
1 72-HF-175   70.  D E-CAPT 0.054A X-RAY.
1 72-HF-175   70.  D E-CAPT 0.089B
1 72-HF-175   70.  D E-CAPT 0.343A
1 72-HF-179M  19.  S ISOMER 0.055A X-RAY.
1 72-HF-179M  19.  S ISOMER 0.215A
1 72-HF-180M   5.5 H ISOMER 0.058A
1 72-HF-180M   5.5 H ISOMER 0.093A
1 72-HF-180M   5.5 H ISOMER 0.216A
1 72-HF-180M   5.5 H ISOMER 0.333A
1 72-HF-180M   5.5 H ISOMER 0.444A
1 72-HF-180M   5.5 H ISOMER 0.501B
1 72-HF-181   43.  D BETA.- 0.057A X-RAY.
1 72-HF-181   43.  D BETA.- 0.135A AVERAG 0.133 0.136
1 72-HF-181   43.  D BETA.- 0.346A
1 72-HF-181   43.  D BETA.- 0.482A
1 72-HF-181   43.  D BETA.- 0.615B SMPEAK
4 73-TA-180M   8.1 H ECAPB- 0.055A X-RAY.
4 73-TA-180M   8.1 H ECAPB- 0.096A AVERAG 0.093 0.102
1 73-TA-182  115.  D BETA.- 0.059A X-RAY.
1 73-TA-182  115.  D BETA.- 0.10 A
1 73-TA-182  115.  D BETA.- 0.15 A
1 73-TA-182  115.  D BETA.- 0.22 A
1 73-TA-182  115.  D BETA.- 1.12 B AVERAG
1 73-TA-182  115.  D BETA.- 1.22 B AVERAG
1 73-TA-182M  16.  M ISOMER 0.057A X-RAY.
1 73-TA-182M  16.  M ISOMER 0.146A
1 73-TA-182M  16.  M ISOMER 0.172A
1 73-TA-182M  16.  M ISOMER 0.184A
1 73-TA-182M  16.  M ISOMER 0.318B
2 73-TA-183    5.2 D BETA.- 0.059A X-RAY.
2 73-TA-183    5.2 D BETA.- 0.10 A AVERAG 0.099 0.107
2 73-TA-183    5.2 D BETA.- 0.161A
2 73-TA-183    5.2 D BETA.- 0.245A AVERAG 0.244 0.246
2 73-TA-183    5.2 D BETA.- 0.313B
2 73-TA-183    5.2 D BETA.- 0.354B
1 74- W-187   24.  H BETA.- 0.06 A X-RAY.
1 74- W-187   24.  H BETA.- 0.134A
1 74- W-187   24.  H BETA.- 0.480A
1 74- W-187   24.  H BETA.- 0.55 B
1 74- W-187   24.  H BETA.- 0.619B
1 74- W-187   24.  H BETA.- 0.686A
1 74- W-187   24.  H BETA.- 0.774B
1 74- W-187   24.  H BETA.- 0.866C
1 75-RE-188   17.  H BETA.- 0.063A X-RAY.
1 75-RE-188   17.  H BETA.- 0.155A
1 75-RE-188   17.  H BETA.- 0.478B
1 75-RE-188   17.  H BETA.- 0.633B
1 75-RE-188   17.  H BETA.- 0.825C
1 75-RE-188   17.  H BETA.- 0.93 C
1 75-RE-188M  18.7 M ISOMER 0.060A X-RAY.
1 75-RE-188M  18.7 M ISOMER 0.064A
1 75-RE-188M  18.7 M ISOMER 0.103A AVERAG 0.106 0.092
1 76-OS-185   94.  D E-CAPT 0.061A X-RAY.
1 76-OS-185   94.  D E-CAPT 0.646A
1 76-OS-185   94.  D E-CAPT 0.875B AVERAG 0.872 0.879
1 76-OS-191   15.  D BETA.- 0.064A X-RAY.
1 76-OS-191   15.  D BETA.- 0.129A
1 76-OS-193   32.  H BETA.- 0.066A X-RAY.
1 76-OS-193   32.  H BETA.- 0.139A
1 76-OS-193   32.  H BETA.- 0.281B
1 76-OS-193   32.  H BETA.- 0.32 B
1 76-OS-193   32.  H BETA.- 0.388B
1 76-OS-193   32.  H BETA.- 0.460B
1 76-OS-193   32.  H BETA.- 0.559B
1 77-IR-192   74.  D BETA.- 0.066A X-RAY.
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1 77-IR-192    74.  D BETA.- 0.31 A AVERAG 0.295 0.316 0.308
1 77-IR-192    74.  D BETA.- 0.468A
1 77-IR-192    74.  D BETA.- 0.61 A AVERAG 0.588 0.604 0.613
1 77-IR-194    19.  H BETA.- 0.294B
1 77-IR-194    19.  H BETA.- 0.328A
1 77-IR-194    19.  H BETA.- 0.645B
1 77-IR-194    19.  H BETA.- 0.939B
1 77-IR-194    19.  H BETA.- 1.16 B
1 78-PT-195M    4.1 D ISOMER 0.067A X-RAY.
1 78-PT-195M    4.1 D ISOMER 0.099A
1 78-PT-195M    4.1 D ISOMER 0.130B
1 78-PT-197    20.  H BETA.- 0.077A X-RAY.
1 78-PT-197    20.  H BETA.- 0.191A
1 78-PT-197    20.  H BETA.- 0.269C
1 78-PT-199    30.  M BETA.- 0.074A X-RAY.
1 78-PT-199    30.  M BETA.- 0.189A
1 78-PT-199    30.  M BETA.- 0.247A
1 78-PT-199    30.  M BETA.- 0.320A
1 78-PT-199    30.  M BETA.- 0.475A
1 78-PT-199    30.  M BETA.- 0.540A
1 78-PT-199    30.  M BETA.- 0.715B
1 78-PT-199    30.  M BETA.- 0.785B
1 78-PT-199    30.  M BETA.- 0.960B
4 79-AU-196     6.1 D BETA+- 0.066A X-RAY.
4 79-AU-196     6.1 D BETA+- 0.35 A AVERAG C.331 C.356
4 79-AU-196     6.1 D BETA+- 0.426B
1 79-AU-198    64.8 H BETA.- 0.070A X-RAY.
1 79-AU-198    64.8 H BETA.- 0.412A
1 79-AU-198    64.8 H BETA.- 0.675C
1 79-AU-198    64.8 H BETA.- 1.087C
8 79-AU-199     3.2 D BETA.- 0.070A X-RAY.
8 79-AU-199     3.2 D BETA.- 0.158A
8 79-AU-199     3.2 D BETA.- 0.208A
1 80-HG-197    65.  H E-CAPT 0.072A AVERAG C.069 C.077
1 80-HG-197    65.  H E-CAPT 0.191C
1 80-HG-197M   24.  H E-CAPT 0.069A X-RAY.
1 80-HG-197M   24.  H E-CAPT 0.135B
1 80-HG-197M   24.  H E-CAPT 0.278C
1 80-HG-203    47.  D BETA.- 0.072A X-RAY.
1 80-HG-203    47.  D BETA.- 0.279A
4 81-TL-202    12.  D E-CAPT 0.070A X-RAY.
4 81-TL-202    12.  D E-CAPT 0.438A
1 81-TL-204     3.9 Y ECAPB-       B BREMS.
1 81-TL-204     3.9 Y ECAPB- 0.070A X-RAY.
N 81-TL-208     3.1 M BETA.- 0.075A X-RAY.
N 81-TL-208     3.1 M BETA.- 0.277A
N 81-TL-208     3.1 M BETA.- 0.51 A
N 81-TL-208     3.1 M BETA.- 0.563A
N 81-TL-208     3.1 M BETA.- 0.860A
N 81-TL-208     3.1 M BETA.- 2.615A
3 82-PB-203    52.  H E-CAPT 0.073A X-RAY.
3 82-PB-203    52.  H E-CAPT 0.279A
3 82-PB-203    52.  H E-CAPT 0.40 B
3 82-PB-204M   67.  M ISOMER 0.075A X-RAY.
3 82-PB-204M   67.  M ISOMER 0.375A TRPLET
3 82-PB-204M   67.  M ISOMER 0.905A AVERAG 0.899 0.912
N 82-PB-212    10.6 H BETA.- 0.077A X-RAY.
N 82-PB-212    10.6 H BETA.- 0.239A
N 82-PB-212    10.6 H BETA.- 0.300B
3 83-BI-205    15.  D ECAPB+ 0.075A X-RAY.
3 83-BI-205    15.  D ECAPB+ 0.275A AVERAG 0.261 0.284
3 83-BI-205    15.  D ECAPB+ 0.52 A AVERAG 0.516 0.526
3 83-BI-205    15.  D ECAPB+ 0.56 A AVERAG 0.550 0.570
3 83-BI-205    15.  D ECAPB+ 0.703A
3 83-BI-205    15.  D ECAPB+ 0.988A
3 83-BI-205    15.  D ECAPB+ 1.04 B
3 83-BI-205    15.  D ECAPB+ 1.766B
3 83-BI-205    15.  D ECAPB+ 1.905B
3 83-BI-207    28.  Y E-CAPT 0.075A X-RAY.
3 83-BI-207    28.  Y E-CAPT 0.569A
3 83-BI-207    28.  Y E-CAPT 1.064A
3 83-BI-207    28.  Y E-CAPT 1.77 C
N 83-BI-212    60.  M BETA.- 0.040A
N 83-BI-212    60.  M BETA.- 0.08 A
N 83-BI-212    60.  M BETA.- 0.285A
N 83-BI-212    60.  M BETA.- 0.45 B
N 83-BI-212    60.  M BETA.- 0.727A
N 83-BI-212    60.  M BETA.- 0.785B
N 83-BI-212    60.  M BETA.- 0.893B
N 83-BI-212    60.  M BETA.- 1.07 B
N 83-BI-212    60.  M BETA.- 1.51 B
N 83-BI-212    60.  M BETA.- 1.62 B
N 88-RA-226   162E03Y ALPHA. 0.060A
N 88-RA-226   162E03Y ALPHA. 0.18 A
N 88-RA-226   162E03Y ALPHA. 0.30 A PB-214
N 88-RA-226   162E03Y ALPHA. 0.35 A PB-214
N 88-RA-226   162E03Y ALPHA. 0.78 B TL-210
N 88-RA-226   162E03Y ALPHA. 1.76 B BI-214
N 88-RA-226   162E03Y ALPHA. 2.19 B AVERAG
N 88-RA-226   162E03Y ALPHA. 2.43 C BI-214
N 90-TH-228     1.9 Y ALPHA. 0.077A X-RAY.
N 90-TH-228     1.9 Y ALPHA. 0.239A PB-212
N 90-TH-228     1.9 Y ALPHA. 0.300A PB-212
N 90-TH-228     1.9 Y ALPHA. 0.511A
N 90-TH-228     1.9 Y ALPHA. 0.583A TL-208
N 90-TH-228     1.9 Y ALPHA. 0.727B BI-212
N 90-TH-228     1.9 Y ALPHA. 0.785B BI-212
N 90-TH-228     1.9 Y ALPHA. 0.860B TL-208
N 90-TH-228     1.9 Y ALPHA. 2.615B TL-208
N 90-TH-232   140E10Y ALPHA. 0.09 A X-RAY.
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N	90-TH-232	140E10Y	ALPHA.	0.239A	PB-212			
N	90-TH-232	140E10Y	ALPHA.	0.34 A	AC-228			
N	90-TH-232	140E10Y	ALPHA.	0.583A	TL-208			
N	90-TH-232	140E10Y	ALPHA.	0.908A	AC-228			
N	90-TH-232	140E10Y	ALPHA.	0.966A	AC-228			
N	90-TH-232	140E10Y	ALPHA.	1.6 B	AC-228			
N	90-TH-232	140E10Y	ALPHA.	2.615B	TL-208			
N	91-PA-231	340E04Y	ALPHA.	0.090A	X-RAY.			
N	91-PA-231	340E04Y	ALPHA.	0.155A				
N	91-PA-231	340E04Y	ALPHA.	0.30 A	AVERAG	0.260	0.300	0.330
N	91-PA-231	340E04Y	ALPHA.	0.39 B				
7	91-PA-233	27. D	BETA.-	0.015A	X-RAY.			
7	91-PA-233	27. D	BETA.-	0.103A	X-RAY.			
7	91-PA-233	27. D	BETA.-	0.32 A	AVERAG	0.300	0.312	0.340
N	92- U-235	110E08Y	ALPHA.	0.015A	X-RAY.			
N	92- U-235	110E08Y	ALPHA.	0.110A	X-RAY.			
N	92- U-235	110E08Y	ALPHA.	0.145A				
N	92- U-235	110E08Y	ALPHA.	0.18 A	AVERAG	0.165	0.185	0.200
4	92- U-237	6.7 D	BETA.-	0.060A				
4	92- U-237	6.7 D	BETA.-	0.102A	X-RAY.			
4	92- U-237	6.7 D	BETA.-	0.165B				
4	92- U-237	6.7 D	BETA.-	0.208A				
4	92- U-237	6.7 D	BETA.-	0.270B				
4	92- U-237	6.7 D	BETA.-	0.33 B	AVERAG	0.332	0.335	
4	92- U-237	6.7 D	BETA.-	0.37 C				
1	92- U-239	23.5 M	BETA.-	0.074A				
1	92- U-239	23.5 M	BETA.-	0.375C				
1	92- U-239	23.5 M	BETA.-	0.46 C				
1	92- U-239	23.5 M	BETA.-	0.488C				
1	92- U-239	23.5 M	BETA.-	0.663C				
1	92- U-239	23.5 M	BETA.-	0.82 C	CMPLEX			
1	92- U-239	23.5 M	BETA.-	0.94 C	CMPLEX			
1	93-NP-239	2.35D	BETA.-	0.018A	X-RAY.			
1	93-NP-239	2.35D	BETA.-	0.106A	X-RAY.			
1	93-NP-239	2.35D	BETA.-	0.228A				
1	93-NP-239	2.35D	BETA.-	0.278A				
1	93-NP-239	2.35D	BETA.-	0.32 B	AVERAG	0.315	0.334	

INDEX — II

ALL MAJOR GAMMA RAYS ORDERED BY GAMMA-RAY ENERGY

F	39- Y- 91	59. D	BETA.-	A	BREMS.
1	47-AG-108	2.4 M	ECAPB+	A	BREMS.
1	47-AG-110	24. S	BETA.-	A	BREMS.
F	59-PR-146	5.9 H	BETA.-	A	BREMS.
1	14-SI- 31	2.62H	BETA.-	A	BREMS.
F	43-TC- 99	210E05Y	BETA.-	A	BREMSP
1	48-CD-115M	43.0 D	BETA.-	A	BREMS.
1	59-PR-143	13.7 D	BETA.-	A	BREMSP
F	61-PM-147	2.5 Y	BETA.-	A	BREMS.
1	38-SR- 85M	70. M	E-CAPT	0.014A	X-RAY.
1	38-SR- 87M	2.8 H	ISOMER	0.014A	X-RAY.
3	27-CO- 57	267. D	E-CAPT	0.014A	
7	91-PA-233	27. D	BETA.-	0.015A	X-RAY.
N	92- U-235	110E08Y	ALPHA.	0.015A	X-RAY.
8	43-TC- 95	20. H	E-CAPT	0.017A	X-RAY.
8	43-TC- 95M	60. D	ECAPB+	0.017A	X-RAY.
3	43-TC- 96	4.3 D	E-CAPT	0.017A	X-RAY.
1	93-NP-239	2.35D	BETA.-	0.018A	X-RAY.
3	45-RH-101M	4.7 D	E-CAPT	0.019A	X-RAY.
1	45-RH-104M	4.4 M	ISOMER	0.02 A	X-RAY
1	44-RU-103	40. D	BETA.-	0.020A	X-RAY.
1	44-RU-105	4.45H	BETA.-	0.020A	X-RAY.
1	45-RH-105M	42.0 S	ISOMER	0.020A	X-RAY
3	47-AG-105	40. D	E-CAPT	0.021A	X-RAY.
1	47-AG-108M	5. Y	E-CAPT	0.021A	X-RAY.
1	46-PD-109	13.6 H	BETA.-	0.022A	X-RAY.
1	48-CD-109	470. D	E-CAPT	0.022A	X-RAY.
1	47-AG-110	24. S	BETA.-	0.023A	X-RAY.
4	49-IN-111	2.8 D	E-CAPT	0.023A	X-RAY
1	48-CD-115	2.3 D	BETA.-	0.024A	X-RAY.
7	49-IN-113M	1.7 H	ISOMER	0.024A	X-RAY.
7	49-IN-115M	4.5 H	ISOMER	0.024A	X-RAY.
1	49-IN-114M	50.0 D	ISOMER	0.024A	X-RAY
1	50-SN-113	118.0 D	E-CAPT	0.024A	X-RAY
4	51-SB-120M	5.8 D	E-CAPT	0.025A	X-RAY.
F	50-SN-125	9.4 D	BETA.-	0.026A	X-RAY
1	51-SB-122M	3.4 M	ISOMER	0.027A	X-RAY.
F	51-SB-125	2.7 Y	BETA.-	0.027A	X-RAY.
3	53- I-126	13.2 D	ECAPB+	0.027A	X-RAY.
1	53- I-128	25. M	BETA+-	0.027A	X-RAY.
1	52-TE-125M	58. D	ISOMER	0.027A	X-RAY
1	35-BR- 82	36. H	BETA.-	0.028A	X-RAY.
1	54-XE-125	18. H	E-CAPT	0.028A	X-RAY.
F	52-TE-132	78. H	BETA.-	0.028A	X-RAY.
F	53- I-131	8.0 D	BETA.-	0.029A	X-RAY.
F	56-BA-140	12.8 D	BETA.-	0.029A	X-RAY.
F	53- I-135	6.7 H	BETA.-	0.03 A	X-RAY.
4	55-CS-132	6.5 D	ECAPB+	0.03 A	X-RAY.
F	55-CS-136	13. D	BETA.-	0.03 A	X-RAY
1	56-BA-131	11.5 D	E-CAPT	0.030A	X-RAY.
1	55-CS-134M	2.9 H	ISOMER	0.031A	X-RAY.
1	56-BA-133	7.5 Y	E-CAPT	0.031A	X-RAY.
9	12-MG- 28	21.3 H	BETA.-	0.031A	
F	54-XE-133	5.3 D	BETA.-	0.031A	X-RAY.
F	55-CS-137	30. Y	BETA.-	0.032A	X-RAY.
1	56-BA-139	83. M	BETA.-	0.033A	X-RAY.
3	58-CE-139	140. D	E-CAPT	0.033A	X-RAY.
4	59-PR-139	4.5 H	ECAPB+	0.035A	X-RAY.
1	58-CE-141	32.5 D	BETA.-	0.036A	X-RAY.
1	58-CE-143	33. H	BETA.-	0.036A	X-RAY.
F	58-CE-144	284. D	BETA.-	0.036A	X-RAY.
4	60-ND-141	2.4 H	ECAPB+	0.036A	X-RAY.
F	59-PR-145	5.9 H	BETA.-	0.037A	X-RAY.
1	60-ND-147	11.1 D	BETA.-	0.038A	X-RAY.
1	60-ND-149	1.9 H	BETA.-	0.038A	X-RAY.
1	60-ND-151	12. M	BETA.-	0.038A	X-RAY.
1	63-EU-152M	9.3 H	ECBET-	0.04 A	X-RAY.
N	83-BI-212	60. M	BETA.-	0.040A	
5	61-PM-151	28.4 H	BETA.-	0.040A	X-RAY.
1	62-SM-153	46.7 H	BETA.-	0.041A	X-RAY
1	64-GD-153	200. D	E-CAPT	0.041A	X-RAY.
F	63-EU-155	1.7 Y	BETA.-	0.042A	X-RAY.
F	63-EU-156	15. D	BETA.-	0.042A	X-RAY.
F	63-EU-157	15. H	BETA.-	0.042A	X-RAY.
1	62-SM-155	25. M	BETA.-	0.042A	X-RAY.
1	64-GD-159	18. H	BETA.-	0.044A	X-RAY.
1	64-GD-161	3.7 M	BETA.-	0.044A	X-RAY.
4	67-HO-164	37. M	BETA+-	0.045A	X-RAY.
1	65-TB-160	73. D	BETA.-	0.046A	X-RAY.
1	66-DY-165M	75. S	ISOMER	0.046A	X-RAY.
1	66-DY-165	2.3 H	BETA.-	0.047A	X-RAY.
1	67-HO-166M	100. Y	BETA.-	0.049A	X-RAY.
4	69-TM-168	85. D	E-CAPT	0.049A	X-RAY.
1	67-HO-166	27. H	BETA.-	0.049A	X-RAY.
1	68-ER-171	7.5 H	BETA.-	0.050A	X-RAY.
1	45-RH-104M	4.4 M	ISOMER	0.051A	
1	69-TM-170	127. D	BETA.-	0.052A	X-RAY.
8	69-TM-171	1.9 Y	BETA.-	0.052A	X-RAY.
1	70-YB-169	32. D	BETA.-	0.054A	X-RAY.
1	70-YB-175	4.2 D	BETA.-	0.054A	X-RAY.
4	72-HF-173	24. H	E-CAPT	0.054A	X-RAY.
1	72-HF-175	70. D	E-CAPT	0.054A	X-RAY.
1	72-HF-179M	19. S	ISOMER	0.055A	X-RAY.
F	52-TE-132	78. H	BETA.-	0.055A	
1	71-LU-176M	3.7 H	BETA.-	0.055A	X-RAY.
4	73-TA-180M	8.1 H	ECAPB-	0.055A	X-RAY.
1	71-LU-177	6.8 D	BETA.-	0.056A	X-RAY.
1	58-CE-143	33. H	BETA.-	0.057A	
1	72-HF-181	43. D	BETA.-	0.057A	X-RAY.
1	73-TA-182M	16. M	ISOMER	0.057A	X-RAY.

1	72-HF-180M	5.5	H	ISOMER	0.058A	
1	27-CO- 60M	10.5	M	BETA.-	0.059A	ISOMER
1	73-TA-182	115.	D	BETA.-	0.059A	X-RAY.
2	73-TA-183	5.2	D	BETA.-	0.059A	X-RAY.
1	74- W-187	24.	H	BETA.-	0.06 A	X-RAY.
1	75-RE-188M	18.7	M	ISOMER	0.060A	X-RAY.
N	88-RA-226	162E03	Y	ALPHA.	0.060A	
4	92- U-237	6.7	D	BETA.-	0.060A	
1	51-SB-122M	3.4	M	ISOMER	0.061A	
1	76-OS-185	94.	D	E-CAPT	0.061A	X-RAY.
1	75-RE-188	17.	H	BETA.-	0.063A	X-RAY.
3	47-AG-105	40.	D	E-CAPT	0.064A	
F	63-EU-157	15.	H	BETA.-	0.064A	
1	75-RE-188M	18.7	M	ISOMER	0.064A	
1	76-OS-191	15.	D	BETA.-	0.064A	X-RAY.
5	61-PM-151	28.4	H	BETA.-	0.065A	
4	34-SE- 73	7.1	H	BETA.+	0.066A	
1	76-OS-193	32.	H	BETA.-	0.066A	X-RAY.
1	77-IR-192	74.	D	BETA.-	0.066A	X-RAY.
4	79-AU-196	6.1	D	BETA+-	0.066A	X-RAY.
F	55-CS-136	13.	D	BETA.-	0.067A	
8	69-TM-171	1.9	Y	BETA.-	0.067A	
1	78-PT-195M	4.1	D	ISOMER	0.067A	X-RAY.
5	27-CO- 61	3.3	H	BETA.-	0.068A	SINGLE
1	80-HG-197M	24.	H	E-CAPT	0.069A	X-RAY.
8	79-AU-199	3.2	D	BETA.-	0.070A	X-RAY.
4	81-TL-202	12.	D	E-CAPT	0.070A	X-RAY.
1	62-SM-153	46.7	H	BETA.-	0.070A	
1	79-AU-198	64.8	H	BETA.-	0.070A	X-RAY.
1	81-TL-204	3.9	Y	ECAPB-	0.070A	X-RAY.
F	59-PR-145	5.9	H	BETA.-	0.072A	
1	80-HG-197	65.	H	E-CAPT	0.072A	AVERAG 0.069 0.077
1	80-HG-203	47.	D	BETA.-	0.072A	X-RAY.
3	82-PB-203	52.	H	E-CAPT	0.073A	X-RAY.
3	22-TI- 44	100E03	Y	ECAPB+	0.073A	AVERAG 0.069 0.078
1	78-PT-199	30.	M	BETA.-	0.074A	X-RAY.
1	92- U-239	23.5	M	BETA.-	0.074A	
1	51-SB-122M	3.4	M	ISOMER	0.075A	
N	81-TL-208	3.1	M	BETA.-	0.075A	X-RAY.
3	82-PB-204M	67.	M	ISOMER	0.075A	X-RAY.
3	83-BI-205	15.	D	ECAPB+	0.075A	X-RAY.
3	83-BI-207	28.	Y	E-CAPT	0.075A	X-RAY.
1	78-PT-197	20.	H	BETA.-	0.077A	X-RAY.
N	82-PB-212	10.6	H	BETA.-	0.077A	X-RAY.
N	90-TH-228	1.9	Y	ALPHA.	0.077A	X-RAY.
1	56-BA-133	7.5	Y	E-CAPT	0.08 A	AVERAG 0.078 0.081
1	60-ND-149	1.9	H	BETA.-	0.08 A	
1	67-HO-166M	100.	Y	BETA.-	0.08 A	
N	83-BI-212	60.	M	BETA.-	0.08 A	
1	42-MO- 101	14.6	M	BETA.-	0.08 A	

F	53- I-131	8.0	D	BETA.-	0.080A	
4	69-TM-168	85.	D	E-CAPT	0.080A	
1	47-AG-108M	5.	Y	E-CAPT	0.081A	
1	67-HO-166	27.	H	BETA.-	0.081A	
F	54-XE-133	5.3	D	BETA.-	0.083A	
1	69-TM-170	127.	D	BETA.-	0.084A	
4	51-SB-120M	5.8	D	E-CAPT	0.087A	
F	63-EU-155	1.7	Y	BETA.-	0.087A	
1	65-TB-160	73.	D	BETA.-	0.087A	
F	55-CS-136	13.	D	BETA.-	0.087A	
1	46-PD-109	13.6	H	BETA.-	0.088A	AG109M
1	71-LU-176M	3.7	H	BETA.-	0.088A	
4	24-CR- 49	42.	M	BETA.+	0.089A	
F	63-EU-156	15.	D	BETA.-	0.089A	
N	90-TH-232	140E10	Y	ALPHA.	0.09 A	X-RAY.
N	91-PA-231	340E04	Y	ALPHA.	0.090A	X-RAY.
1	60-ND-147	11.1	D	BETA.-	0.091A	
6	29-CU- 67	61.	H	BETA.-	0.092A	AVERAG 0.091 0.093
3	31-GA- 67	78.	H	ECAPB+	0.093A	
1	72-HF-180M	5.5	H	ISOMER	0.093A	
4	73-TA-180M	8.1	H	ECAPB-	0.096A	AVERAG 0.093 0.102
1	66-DY-165	2.3	H	BETA.-	0.098A	
1	78-PT-195M	4.1	D	ISOMER	0.099A	
1	73-TA-182	115.	D	BETA.-	0.10 A	
5	61-PM-151	28.4	H	BETA.-	0.10 A	
2	73-TA-183	5.2	D	BETA.-	0.10 A	AVERAG 0.099 0.107
1	64-GD-161	3.7	M	BETA.-	0.102A	
4	92- U-237	6.7	D	BETA.-	0.102A	X-RAY.
1	34-SE- 81M	61.	M	ISOMER	0.103A	ISOMER
1	75-RE-188M	18.7	M	ISOMER	0.103A	AVERAG 0.106 0.092
7	91-PA-233	27.	D	BETA.-	0.103A	X-RAY.
1	62-SM-153	46.7	H	BETA.-	0.103A	
1	64-GD-153	200.	D	E-CAPT	0.103A	AVERAG 0.097 0.103
F	63-EU-155	1.7	Y	BETA.-	0.105A	
1	93-NP-239	2.35	D	BETA.-	0.106A	X-RAY.
1	62-SM-155	25.	M	BETA.-	0.106A	
1	66-DY-165M	75.	S	ISOMER	0.108A	I.T.
N	92- U-235	110E08	Y	ALPHA.	0.110A	X-RAY.
1	52-TE-125M	58.	D	ISOMER	0.110A	
1	60-ND-149	1.9	H	BETA.-	0.113A	AVERAG 0.112 0.114
1	71-LU-177	6.8	D	BETA.-	0.113A	
1	70-YB-175	4.2	D	BETA.-	0.114A	
1	60-ND-151	12.	M	BETA.-	0.115A	
1	70-YB-169	32.	D	BETA.-	0.115A	AVERAG 0.093 0.110 0.118
1	68-ER-171	7.5	H	BETA.-	0.118A	AVERAG 0.112 0.117 0.124
1	32-GE- 75	82.	M	BETA.-	0.119A	
3	27-CO- 57	267.	D	E-CAPT	0.122A	
1	63-EU-152M	9.3	H	ECBET-	0.122A	
4	72-HF-173	24.	H	E-CAPT	0.125A	
1	56-BA-131	11.5	D	E-CAPT	0.126A	

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4 28-NI- 57    36.  H ECAPB+ 0.127A
1 55-CS-134M    2.9 H ISOMER 0.127A SINGLE
1 43-TC-101    15.0 M BETA.- 0.128A
1 76-OS-191    15.  D BETA.- 0.129A
1 44-RU-105     4.45H BETA.- 0.13 A RH105M
1 45-RH-105M   42.0 S ISOMER 0.130A SINGLE
F 58-CE-144   284.  D BETA.- 0.134A
1 34-SE- 75   120.  D E-CAPT 0.134A AVERAG 0.121 0.136
1 74- W-187    24.  H BETA.- 0.134A
1 72-HF-181    43.  D BETA.- 0.135A AVERAG 0.133 0.136
3 27-CO- 57   267.  D E-CAPT 0.136A
1 49-IN-116M   54.0 M BETA.- 0.137A
4 17-CL- 34M   32.4 M BETA.+ 0.139A ISOMER
1 76-OS-193    32.  H BETA.- 0.139A
1 42-MO- 99    66.  H BETA.- 0.142A TC99M
1 58-CE-141    32.5 D BETA.- 0.145A
N 92- U-235   110E08Y ALPHA. 0.145A
1 73-TA-182M   16.  M ISOMER 0.146A
1 73-TA-182   115.  D BETA.- 0.15 A
1 38-SR- 85M   70.  M E-CAPT 0.150A
1 60-ND-149     1.9 H BETA.- 0.150A
1 36-KR- 85M    4.4 H ISOMER 0.150A
4 24-CR- 49    42.  M BETA.+ 0.152A
5 21-SC- 47     3.4 D BETA.- 0.155A SINGLE
1 75-RE-188    17.  H BETA.- 0.155A
4 49-IN-112M   21.0 M ISOMER 0.155A I.T.
1 66-DY-165M   75.  S ISOMER 0.155A
N 91-PA-231   340E04Y ALPHA. 0.155A
8 79-AU-199     3.2 D BETA.- 0.158A
F 55-CS-136    13.  D BETA.- 0.16 A AVERAG
F 56-BA-140    12.8 D BETA.- 0.161A
2 73-TA-183     5.2 D BETA.- 0.161A
1 32-GE- 77M   54.  S BETA.- 0.162A ISOMER
5 61-PM-151    28.4 H BETA.- 0.163A
1 56-BA-139    83.  M BETA.- 0.166A
3 58-CE-139   140.  D E-CAPT 0.166A SINGLE
1 31-GA- 70    21.  M BETA.- 0.17 A
1 60-ND-151    12.  M BETA.- 0.17 A
1 73-TA-182M   16.  M ISOMER 0.172A
4 49-IN-111     2.8 D E-CAPT 0.173A
F 51-SB-125     2.7 Y BETA.- 0.175A
N 92- U-235   110E08Y ALPHA. 0.18 A AVERAG 0.165 0.185 0.200
N 88-RA-226   162E03Y ALPHA. 0.18 A
6 29-CU- 67    61.  H BETA.- 0.184A
3 31-GA- 67    78.  H ECAPB+ 0.184A
1 67-HO-166M  100.  Y BETA.- 0.184A
1 73-TA-182M   16.  M ISOMER 0.184A
1 54-XE-125    18.  H E-CAPT 0.188A
1 78-PT-199    30.  M BETA.- 0.189A
4 69-TM-168    85.  D E-CAPT 0.19 A AVERAG 0.185 0.198
1 70-YB-169    32.  D BETA.- 0.19 A AVERAG 0.177 0.198
1 78-PT-197    20.  H BETA.- 0.191A
1 49-IN-114M   50.0 D ISOMER 0.192A I.T.
1 42-MO- 101   14.6 M BETA.- 0.193A
4 51-SB-120M    5.8 D E-CAPT 0.197A
F 63-EU-156    15.  D BETA.- 0.199A
1 65-TB-160    73.  D BETA.- 0.20 A AVERAG 0.197 0.216
5 39- Y- 90M    3.14H ISOMER 0.203A
8 43-TC- 95M   60.  D ECAPB+ 0.204A
1 71-LU-177     6.8 D BETA.- 0.208A
8 79-AU-199     3.2 D BETA.- 0.208A
4 92- U-237     6.7 D BETA.- 0.208A
1 60-ND-149     1.9 H BETA.- 0.21 A AVERAG 0.198 0.210
1 32-GE- 77M   54.  S BETA.- 0.215A
1 32-GE- 77    11.  H BETA.- 0.215A
1 44-RU- 97     2.9 D E-CAPT 0.215A
1 72-HF-179M   19.  S ISOMER 0.215A
4 37-RB- 84M   21.  M ISOMER 0.216A
1 72-HF-180M    5.5 H ISOMER 0.216A
F 53- I-135     6.7 H BETA.- 0.22 A
1 73-TA-182   115.  D BETA.- 0.22 A
1 56-BA-131    11.5 D E-CAPT 0.220A
1 38-SR- 85M   70.  M E-CAPT 0.225A
1 93-NP-239     2.35D BETA.- 0.228A
1 58-CE-143    33.  H BETA.- 0.232A
F 52-TE-132    78.  H BETA.- 0.232A
F 38-SR- 92     2.7 H BETA.- 0.238A
N 82-PB-212    10.6 H BETA.- 0.239A
N 90-TH-232   140E10Y ALPHA. 0.239A PB-212
N 90-TH-228     1.9 Y ALPHA. 0.239A PB-212
F 39- Y- 94    17.  M BETA.- 0.24 A
5 61-PM-151    28.4 H BETA.- 0.24 A
1 54-XE-125    18.  H E-CAPT 0.243A
2 73-TA-183     5.2 D BETA.- 0.245A AVERAG 0.244 0.246
7 33-AS- 77    39.  H BETA.- 0.246A
3 35-BR- 77    58.  H ECAPB+ 0.246A
1 78-PT-199    30.  M BETA.- 0.247A
1 47-AG-111     7.5 D BETA.- 0.247A
4 49-IN-111     2.8 D E-CAPT 0.247A
4 37-RB- 84M   21.  M ISOMER 0.250A
F 54-XE-135     9.2 H BETA.- 0.250A
1 60-ND-151    12.  M BETA.- 0.254A
1 60-ND-149     1.9 H BETA.- 0.26 A AVERAG 0.240 0.266
1 32-GE- 77    11.  H BETA.- 0.264A
1 44-RU-105     4.45H BETA.- 0.264A
F 39- Y- 93    10.1 H BETA.- 0.265A
1 32-GE- 75    82.  M BETA.- 0.266A
1 34-SE- 75   120.  D E-CAPT 0.268A AVERAG 0.265 0.280
F 55-CS-136    13.  D BETA.- 0.27 A
4 21-SC- 44M    2.4 D ISOMER 0.270A ISOMER
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3 83-BI-205    15.   D ECAPB+ 0.275A AVERAG 0.261 0.284
N 81-TL-208     3.1 M BETA.- 0.277A
1 93-NP-239     2.35D BETA.- 0.278A
3 82-PB-203    52.   H E-CAPT 0.279A
1 80-HG-203    47.   D BETA.- 0.279A
1 67-HO-166M  100.   Y BETA.- 0.28 A AVERAG 0.263 0.280 0.300
3 47-AG-105    40.   D E-CAPT 0.281A
1 70-YB-175     4.2 D BETA.- 0.283A
3 29-CU- 61     3.3 H ECAPB+ 0.284A
F 53- I-131     8.0 D BETA.- 0.284A
1 34-SE- 81    18.   M BETA.- 0.285A AVERAG 0.28  0.29
N 83-BI-212    60.   M BETA.- 0.285A
F 53- I-135     6.7 H BETA.- 0.29 A
1 56-BA-133     7.5 Y E-CAPT 0.29 A AVERAG 0.274 0.302
5 61-PM-148M   41.   D BETA.- 0.29 A AVERAG
1 58-CE-143    33.   H BETA.- 0.294A
3 31-GA- 67    78.   H ECAPB+ 0.296A
4 72-HF-173    24.   H E-CAPT 0.297A
1 65-TB-160    73.   D BETA.- 0.298A
N 88-RA-226   162E03Y ALPHA. 0.30 A PB-214
N 91-PA-231   340E04Y ALPHA. 0.30 A AVERAG 0.260 0.300 0.330
N 90-TH-228     1.9 Y ALPHA. 0.300A PB-212
F 56-BA-140    12.8 D BETA.- 0.304A
1 68-ER-171     7.5 H BETA.- 0.305A AVERAG 0.296 0.308
1 36-KR- 85M    4.4 H ISOMER 0.305A I.T.
3 45-RH-101M    4.7 D E-CAPT 0.307A
1 43-TC-101    15.0 M BETA.- 0.307A
1 77-IR-192    74.   D BETA.- 0.31 A AVERAG 0.295 0.316 0.308
1 42-MO- 101   14.6 M BETA.- 0.31 A
1 44-RU-105     4.45H BETA.- 0.316A
1 64-GD-161     3.7 M BETA.- 0.316A
7 91-PA-233    27.   D BETA.- 0.32 A AVERAG 0.300 0.312 0.340
1 78-PT-199    30.   M BETA.- 0.320A
1 22-TI- 51     5.8 M BETA.- 0.322A
1 24-CR- 51    27.8 D E-CAPT 0.322A SINGLE
1 57-LA-140    40.2 H BETA.- 0.327A
1 77-IR-194    19.   H BETA.- 0.328A
F 50-SN-125     9.4 D BETA.- 0.33 A AVERAG 0.331 0.34
1 50-SN-125M    9.7 M BETA.- 0.331A
1 72-HF-180M    5.5 H ISOMER 0.333A
1 48-CD-115     2.3 D BETA.- 0.335A IN115M
7 49-IN-115M    4.5 H ISOMER 0.335A SINGLE
3 47-AG-105    40.   D E-CAPT 0.34 A AVERAG 0.331 0.345 0.393
N 90-TH-232   140E10Y ALPHA. 0.34 A AC-228
F 55-CS-136    13.   D BETA.- 0.34 A
4 44-RU- 95     1.7 H ECAPB+ 0.340A
5 61-PM-151    28.4 H BETA.- 0.340A
1 47-AG-111     7.5 D BETA.- 0.342A
1 72-HF-175    70.   D E-CAPT 0.343A
1 63-EU-152M    9.3 H ECBET- 0.344A
1 72-HF-181    43.   D BETA.- 0.346A
4 79-AU-196     6.1 D BETA+- 0.35 A AVERAG 0.331 0.356
N 88-RA-226   162E03Y ALPHA. 0.35 A PB-214
4 34-SE- 73     7.1 H BETA.+ 0.359A
1 56-BA-133     7.5 Y E-CAPT 0.36 A AVERAG 0.355 0.380
F 39- Y- 94    17.   M BETA.- 0.36 A
1 64-GD-159    18.   H BETA.- 0.362A
1 64-GD-161     3.7 M BETA.- 0.363A
F 53- I-131     8.0 D BETA.- 0.364A
1 32-GE- 77    11.   H BETA.- 0.367A
1 28-NI- 65     2.65H BETA.- 0.370A
3 82-PB-204M   67.   M ISOMER 0.375A TRPLET
1 56-BA-131    11.5 D E-CAPT 0.375A
3 39- Y- 86    15.   H ECAPB+ 0.38 A
4 26-FE- 53     9.   M BETA.+ 0.380A
3 53- I-126    13.2 D ECAPB+ 0.386A
1 38-SR- 87M    2.8 H ISOMER 0.391A SINGLE
7 49-IN-113M    1.7 H ISOMER 0.393A SINGLE
1 50-SN-113   118.0 D E-CAPT 0.393A IN113M
1 70-YB-175     4.2 D BETA.- 0.396A
F 63-EU-157    15.   H BETA.- 0.4  A AVERAG 0.32  0.38  0.41  0.48
9 12-MG- 28    21.3 H BETA.- 0.40 A
1 49-IN-116M   54.0 M BETA.- 0.406A
3 53- I-130    12.5 H BETA.- 0.41 A
1 79-AU-198    64.8 H BETA.- 0.412A
1 32-GE- 77    11.   H BETA.- 0.416A
F 53- I-135     6.7 H BETA.- 0.42 A
5 61-PM-148M   41.   D BETA.- 0.42 A AVERAG
F 38-SR- 92     2.7 H BETA.- 0.427A
F 51-SB-125     2.7 Y BETA.- 0.43 A AVERAG 0.427 0.463
F 56-BA-140    12.8 D BETA.- 0.43 A AVERAG 0.422 0.436
1 47-AG-108     2.4 M ECAPB+ 0.433A
1 47-AG-108M    5.   Y E-CAPT 0.434A
4 81-TL-202    12.   D E-CAPT 0.438A
4 47-AG-106M    8.3 D E-CAPT 0.44 A AVERAG 0.41  0.46
1 30-ZN- 69M   14.   H ISOMER 0.440A SINGLE
5 61-PM-151    28.4 H BETA.- 0.442A
1 72-HF-180M    5.5 H ISOMER 0.444A
1 53- I-128    25.   M BETA+- 0.445A
F 39- Y- 92     3.6 H BETA.- 0.45 A
3 39- Y- 86    15.   H ECAPB+ 0.45 A
F 55-CS-138    32.   M BETA.- 0.462A
4 37-RB- 84M   21.   M ISOMER 0.465A
1 77-IR-192    74.   D BETA.- 0.468A
F 50-SN-125     9.4 D BETA.- 0.468A
1 44-RU-105     4.45H BETA.- 0.472A
1 78-PT-199    30.   M BETA.- 0.475A
3  4-BE-  7    53.0 D E-CAPT 0.478A SINGLE
1 74- W-187    24.   H BETA.- 0.480A
5 39- Y- 90M    3.14H ISOMER 0.482A
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1	72-HF-181	43.	D	BETA.-	0.482A	
1	48-CD-115M	43.0	D	BETA.-	0.485A	
1	57-LA-140	40.2	H	BETA.-	0.487A	
1	20-CA- 47	4.5	D	BETA.-	0.489A	
1	44-RU-103	40.	D	BETA.-	0.498A	
1	56-BA-131	11.5	D	E-CAPT	0.498A	
N	81-TL-208	3.1	M	BETA.-	0.51 A	
1	42-MO- 101	14.6	M	BETA.-	0.51 A	
3	11-NA- 22	2.6	Y	ECAPB+	0.511A	ANN.RD
4	17-CL- 34M	32.4	M	BETA.+	0.511A	ANN.RD
4	17-CL- 34	1.6	S	BETA.+	0.511A	ANN.RD
4	19- K- 38	7.7	M	BETA.+	0.511A	ANN.RD
4	21-SC- 44	4.0	H	ECAPB+	0.511A	ANN.RD
3	22-TI- 44	100E03	Y	ECAPB+	0.511A	ANN.RD
4	22-TI- 45	3.08	H	ECAPB+	0.511A	ANN.RD
3	23- V- 48	16.	D	ECAPB+	0.511A	ANN.RD
4	24-CR- 49	42.	M	BETA.+	0.511A	ANN.RD
3	25-MN- 52	5.7	D	ECAPB+	0.511A	ANN.RD
4	26-FE- 53	9.	M	BETA.+	0.511A	ANN.RD
5	27-CO- 58	70.	D	ECAPB+	0.511A	ANN.RD
4	28-NI- 57	36.	H	ECAPB+	0.511A	ANN.RD
3	29-CU- 61	3.3	H	ECAPB+	0.511A	ANN.RD
4	29-CU- 62	9.9	M	ECAPB+	0.511A	ANN.RD
1	29-CU- 64	12.9	H	ECBE+-	0.511A	ANN.RD
4	30-ZN- 63	38.	M	ECAPB+	0.511A	ANN.RD
4	31-GA- 68	68.0	M	ECAPB+	0.511A	ANN.RD
4	32-GE- 69	40.	H	ECAPB+	0.511A	ANN.RD
3	33-AS- 72	26.	H	ECAPB+	0.511A	ANN.RD
4	33-AS- 74	18.	D	ECAPB+	0.511A	ANN.RD
4	34-SE- 73	7.1	H	BETA.+	0.511A	ANN.RD
1	35-BR- 80	18.	M	BETA+-	0.511A	ANN.RD
3	39- Y- 86	15.	H	ECAPB+	0.511A	ANN.RD
4	40-ZR- 89	79.	H	ECAPB+	0.511A	ANN.RD
4	42-MO- 91	16.	M	BETA.+	0.511A	ANN.RD
4	44-RU- 95	1.7	H	ECAPB+	0.511A	ANN-RD
1	47-AG-108	2.4	M	ECAPB+	0.511A	ANN.RD
4	49-IN-112	14.0	M	ECAPB+	0.511A	ANN.RD
4	51-SB-120	16.	M	ECAPB+	0.511A	ANN-RD
3	53- I-124	4.2	D	ECAPB+	0.511A	ANN.RD
3	57-LA-136	9.5	M	ECAPB+	0.511A	ANN.RD
4	59-PR-139	4.5	H	ECAPB+	0.511A	ANN-RD
4	60-ND-141	2.4	H	ECAPB+	0.511A	ANN.RD
N	90-TH-228	1.9	Y	ALPHA.	0.511A	
4	47-AG-106	24.	M	ECAPB+	0.512A	AVERAG 0.511 0.513
F	44-RU-106	1.0	Y	BETA.-	0.513A	RH106
4	47-AG-106M	8.3	D	E-CAPT	0.513A	
F	36-KR- 85	10.4	Y	BETA.-	0.515A	
F	36-KR- 85	10.4	Y	BETA.-	0.515A	BREMS.
3	38-SR- 85	64.	D	E-CAPT	0.515A	SINGLE
1	48-CD-115	2.3	D	BETA.-	0.52 A	AVERAG 0.490 0.523

F	53- I-132	2.3	H	BETA.-	0.52 A	
3	83-BI-205	15.	D	ECAPB+	0.52 A	AVERAG 0.516 0.526
3	35-BR- 77	58.	H	ECAPB+	0.520A	AVERAG 0.511 0.524
7	33-AS- 77	39.	H	BETA.-	0.525A	
F	53- I-133	20.8	H	BETA.-	0.525A	
3	53- I-130	12.5	H	BETA.-	0.53 A	TRPLET
F	53- I-135	6.7	H	BETA.-	0.535A	XE135M
F	56-BA-140	12.8	D	BETA.-	0.537A	
1	78-PT-199	30.	M	BETA.-	0.540A	
F	55-CS-138	32.	M	BETA.-	0.545A	
5	61-PM-148M	41.	D	BETA.-	0.548A	
5	61-PM-148	5.4	D	BETA.-	0.551A	
1	35-BR- 82	36.	H	BETA.-	0.554A	
F	38-SR- 91	9.7	H	BETA.-	0.558A	Y91M
1	33-AS- 76	26.5	H	BETA.-	0.559A	
F	39- Y- 91M	50.	M	ISOMER	0.559A	ISOMER
F	39- Y- 92	3.6	H	BETA.-	0.56 A	
3	83-BI-205	15.	D	ECAPB+	0.56 A	AVERAG 0.550 0.570
F	39- Y- 94	17.	M	BETA.-	0.560A	
1	51-SB-122	2.8	D	BETA.-	0.561A	
N	81-TL-208	3.1	M	BETA.-	0.563A	
3	83-BI-207	28.	Y	E-CAPT	0.569A	
4	32-GE- 69	40.	H	ECAPB+	0.580A	
N	90-TH-232	140E10	Y	ALPHA.	0.583A	TL-208
N	90-TH-228	1.9	Y	ALPHA.	0.583A	TL-208
8	43-TC- 95M	60.	D	ECAPB+	0.584A	
4	40-ZR- 89M	4.4	M	ISOMER	0.589A	ISOMER
1	42-MO- 101	14.6	M	BETA.-	0.592A	
4	33-AS- 74	18.	D	ECAPB+	0.596A	
1	55-CS-134	2.1	Y	BETA.-	0.60 A	AVERAG 0.563 0.570
1	51-SB-124	60.	D	BETA.-	0.603A	
3	53- I-124	4.2	D	ECAPB+	0.603A	
F	51-SB-125	2.7	Y	BETA.-	0.605A	AVERAG 0.60 0.64
1	77-IR-192	74.	D	BETA.-	0.61 A	AVERAG 0.588 0.604 0.613
N	88-RA-226	162E03	Y	ALPHA.	0.61 A	BI-214
1	47-AG-108M	5.	Y	E-CAPT	0.615A	
4	49-IN-112	14.0	M	ECAPB+	0.615A	
1	35-BR- 80	18.	M	BETA+-	0.618A	
1	35-BR- 82	36.	H	BETA.-	0.619A	
F	44-RU-106	1.0	Y	BETA.-	0.62 A	RH106 0.624 0.612
4	47-AG-106M	8.3	D	E-CAPT	0.62 A	
1	31-GA- 72	14.1	H	BETA.-	0.625A	AVERAG 0.60 0.62 0.63
4	44-RU- 95	1.7	H	ECAPB+	0.625A	
5	61-PM-148M	41.	D	BETA.-	0.626A	
1	47-AG-108	2.4	M	ECAPB+	0.63 A	AVERAG 0.617 0.633
F	55-CS-139	9.5	M	BETA.-	0.63 A	
3	39- Y- 86	15.	H	ECAPB+	0.643A	
F	57-LA-142	87.	M	BETA.-	0.645A	
F	63-EU-156	15.	D	BETA.-	0.646A	
1	76-OS-185	94.	D	E-CAPT	0.646A	

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F 38-SR- 91     9.7 H BETA.- 0.655A
1 47-AG-110    24.  S BETA.- 0.656A
1 47-AG-110M 250.   D BETA.- 0.66 A AVERAG 0.656 0.677 0.687
3 53- I-130    12.5 H BETA.- 0.66 A TRPLET
F 55-CS-137    30.  Y BETA.- 0.662A SINGLE
1 40-ZR- 97    17.  H BETA.- 0.663A NB-97  DAWTR
7 41-NB- 97    74.  M BETA.- 0.663A
7 41-NB- 97    74.  M BETA.- 0.663A SINGLE
F 37-RB- 89    15.  M BETA.- 0.665A
3 53- I-126    13.2 D ECAPB+ 0.665A
F 53- I-132     2.3 H BETA.- 0.665A
4 55-CS-132     6.5 D ECAPB+ 0.665A
F 55-CS-136    13.  D BETA.- 0.67A
1 44-RU-105     4.45H BETA.- 0.670A
1 74- W-187    24.  H BETA.- 0.686A
1 41-NB- 94   200E04Y BETA.- 0.702A DUBLET
3 83-BI-205    15.  D ECAPB+ 0.703A
1 42-MO- 101   14.6 M BETA.- 0.705A
1 67-HO-166M 100.   Y BETA.- 0.71 A
3 53- I-124     4.2 D ECAPB+ 0.72 A
1 51-SB-124    60.  D BETA.- 0.722A
1 44-RU-105     4.45H BETA.- 0.723A
5 61-PM-148M   41.  D BETA.- 0.723A
1 47-AG-108M    5.  Y E-CAPT 0.724A
F 63-EU-156    15.  D BETA.- 0.724A
N 83-BI-212    60.  M BETA.- 0.727A
1 40-ZR- 95    65.  D BETA.- 0.73 A AVERAG 0.726 0.765
4 47-AG-106M    8.3 D E-CAPT 0.73 A
3 53- I-130    12.5 H BETA.- 0.74 A TRPLET
3 25-MN- 52     5.7 D ECAPB+ 0.743A TRIPLT
1 40-ZR- 97    17.  H BETA.- 0.75 A NB-97M
1 41-NB- 97M   60.  S ISOMER 0.75 A
F 38-SR- 91     9.7 H BETA.- 0.76 A
7 41-NB- 95    35.  D BETA.- 0.766A SINGLE
8 43-TC- 95    20.  H E-CAPT 0.768A
F 53- I-132     2.3 H BETA.- 0.77 A
1 35-BR- 82    36.  H BETA.- 0.777A
4 47-AG-106M    8.3 D E-CAPT 0.79 A AVERAG 0.78  0.80  0.81
3 43-TC- 96     4.3 D E-CAPT 0.80 A AVERAG 0.770 0.804 0.840
1 55-CS-134     2.1 Y BETA.- 0.80 A AVERAG 0.796 0.801
5 27-CO- 58    70.  D ECAPB+ 0.808A
1 20-CA- 47     4.5 D BETA.- 0.809A
1 49-IN-116M   54.0 M BETA.- 0.81 A
1 67-HO-166M 100.   Y BETA.- 0.810A
F 63-EU-156    15.  D BETA.- 0.812A
F 50-SN-125     9.4 D BETA.- 0.815A
1 57-LA-140    40.2 H BETA.- 0.817A
1 31-GA- 72    14.1 H BETA.- 0.83 A AVERAG 0.832 0.81
F 37-RB- 90     2.9 M BETA.- 0.83 A
F 55-CS-136    13.  D BETA.- 0.83 A
3 33-AS- 72    26.  H ECAPB+ 0.833A
3 25-MN- 54   314.  D E-CAPT 0.835A SINGLE
F 53- I-135     6.7 H BETA.- 0.84 A
1 63-EU-152M    9.3 H ECBET- 0.841A
1 12-MG- 27     9.5 M BETA.- 0.842A
1 25-MN- 56     2.58H BETA.- 0.845A
F 53- I-134    53.  M BETA.- 0.86 A AVERAG 0.848 0.890
N 81-TL-208     3.1 M BETA.- 0.860A
1 41-NB- 94   200E04Y BETA.- 0.871A DUBLET
1 41-NB- 94M    6.6 M BETA.- 0.871A SINGLE
1 65-TB-160    73.  D BETA.- 0.879A
1 21-SC- 46    85.0 D BETA.- 0.887A
1 47-AG-110M 250.   D BETA.- 0.89 A AVERAG 0.815 0.885 0.937
F 57-LA-142    87.  M BETA.- 0.89 A
1 37-RB- 88    18.  M BETA.- 0.899A
3 39- Y- 88   105.  D E-CAPT 0.899A
3 82-PB-204M   67.  M ISOMER 0.905A AVERAG 0.899 0.912
4 40-ZR- 89    79.  H ECAPB+ 0.906A
N 90-TH-232   140E10Y ALPHA. 0.908A AC-228
F 50-SN-125     9.4 D BETA.- 0.91 A
5 61-PM-148     5.4 D BETA.- 0.910A
5 61-PM-148M   41.  D BETA.- 0.913A
1 57-LA-140    40.2 H BETA.- 0.92 A
F 39- Y- 94    17.  M BETA.- 0.925A
F 39- Y- 92     3.6 H BETA.- 0.93 A
4 41-NB- 92    10.  D E-CAPT 0.931A SINGLE
3 25-MN- 52     5.7 D ECAPB+ 0.935A TRIPLT
1 48-CD-115M   43.0 D BETA.- 0.935A
9 12-MG- 28    21.3 H BETA.- 0.95 A
9 12-MG- 28    21.3 H BETA.- 0.95 A
F 53- I-132     2.3 H BETA.- 0.952A
F 63-EU-156    15.  D BETA.- 0.96 A
1 63-EU-152M    9.3 H ECBET- 0.963A
1 65-TB-160    73.  D BETA.- 0.964A AVERAG 0.962 0.966
N 90-TH-232   140E10Y ALPHA. 0.966A AC-228
1 63-EU-152M    9.3 H ECBET- 0.975A
3 83-BI-205    15.  D ECAPB+ 0.988A
3 23- V- 48    16.  D ECAPB+ 0.990A DUBLET
1 12-MG- 27     9.5 M BETA.- 1.01 A
5 21-SC- 48    44.  H BETA.- 1.01 A AVERAG 0.990 1.040
F 55-CS-138    32.  M BETA.- 1.01 A
5 61-PM-148M   41.  D BETA.- 1.01 A
1 42-MO- 101   14.6 M BETA.- 1.024A
F 38-SR- 91     9.7 H BETA.- 1.03 A
F 57-LA-142    87.  M BETA.- 1.03 A
F 37-RB- 89    15.  M BETA.- 1.04 A
1 29-CU- 66     5.1 M BETA.- 1.040A
1 35-BR- 82    36.  H BETA.- 1.044A
4 47-AG-106M    8.3 D E-CAPT 1.05 A
3 83-BI-207    28.  Y E-CAPT 1.064A
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F	55-CS-136	13. D	BETA.-	1.065A	
F	50-SN-125	9.4 D	BETA.-	1.068A	
1	37-RB- 86	18.7 D	BETA.-	1.077A	
F	63-EU-156	15. D	BETA.-	1.08 A	
3	39- Y- 86	15. H	ECAPB+	1.084A	
1	49-IN-116M	54.0 M	BETA.-	1.085A	
1	26-FE- 59	45. D	BETA.-	1.097A	DUBLET
1	28-NI- 65	2.65H	BETA.-	1.114A	
1	30-ZN- 65	245. D	ECAPB+	1.114A	
1	21-SC- 46	85.0 D	BETA.-	1.119A	
4	32-GE- 69	40. H	ECAPB+	1.12 A	
4	47-AG-106M	8.3 D	E-CAPT	1.13 A	
F	53- I-135	6.7 H	BETA.-	1.14 A	
F	39- Y- 94	17. M	BETA.-	1.15 A	
4	21-SC- 44	4.0 H	ECAPB+	1.159A	
3	22-TI- 44	100E03Y	ECAPB+	1.159A	SC-44
F	63-EU-156	15. D	BETA.-	1.16 A	
3	39- Y- 86	15. H	ECAPB+	1.16 A	
1	27-CO- 60	5.27Y	BETA.-	1.173A	DUBLET
4	47-AG-106M	8.3 D	E-CAPT	1.20 A	
F	63-EU-156	15. D	BETA.-	1.23 A	
F	37-RB- 89	15. M	BETA.-	1.256A	
F	53- I-135	6.7 H	BETA.-	1.265A	
1	49-IN-116M	54.0 M	BETA.-	1.27 A	
3	11-NA- 22	2.6 Y	ECAPB+	1.274A	
F	55-CS-139	9.5 M	BETA.-	1.28 A	
5	13-AL- 29	6.6 M	BETA.-	1.280A	
1	26-FE- 59	45. D	BETA.-	1.289A	DUBLET
1	18-AR- 41	1.83H	BETA.-	1.29 A	SINGLE
1	48-CD-115M	43.0 D	BETA.-	1.295A	
1	20-CA- 47	4.5 D	BETA.-	1.299A	
5	21-SC- 48	44. H	BETA.-	1.31 A	
3	23- V- 48	16. D	ECAPB+	1.310A	DUBLET
1	35-BR- 82	36. H	BETA.-	1.317A	
1	27-CO- 60	5.27Y	BETA.-	1.332A	DUBLET
9	12-MG- 28	21.3 H	BETA.-	1.35 A	
1	11-NA- 24	15.0 H	BETA.-	1.368A	
4	28-NI- 57	36. H	ECAPB+	1.38 A	
F	38-SR- 92	2.7 H	BETA.-	1.38 A	
F	39- Y- 92	3.6 H	BETA.-	1.40 A	
F	55-CS-138	32. M	BETA.-	1.43 A	
1	23- V- 52	3.77M	BETA.-	1.430A	SINGLE
3	25-MN- 52	5.7 D	ECAPB+	1.430A	TRIPLT
5	61-PM-148	5.4 D	BETA.-	1.46 A	
N	19- K- 40	127E10Y	BETA.-	1.460A	SINGLE
1	28-NI- 65	2.65H	BETA.-	1.480A	
1	19- K- 42	12.4 H	BETA.-	1.52 A	
1	59-PR-142	19.2 H	BETA.-	1.58 A	SINGLE
1	59-PR-142	19.2 H	BETA.-	1.58 A	BREMS.
1	57-LA-140	40.2 H	BETA.-	1.597A	
1	17-CL- 38	38.0 M	BETA.-	1.640A	
1	51-SB-124	60. D	BETA.-	1.69 A	
1	13-AL- 28	2.3 M	BETA.-	1.78 A	SINGLE
9	12-MG- 28	21.3 H	BETA.-	1.78 A	AL-28
1	25-MN- 56	2.58H	BETA.-	1.81 A	
1	37-RB- 88	18. M	BETA.-	1.837A	
3	39- Y- 88	105. D	E-CAPT	1.837A	
1	25-MN- 56	2.58H	BETA.-	2.12 A	
1	17-CL- 38	38.0 M	BETA.-	2.160A	
4	19- K- 38	7.7 M	BETA.+	2.160A	
F	55-CS-138	32. M	BETA.-	2.20 A	
F	55-CS-138	32. M	BETA.-	2.61 A	
N	81-TL-208	3.1 M	BETA.-	2.615A	
1	11-NA- 24	15.0 H	BETA.-	2.750A	
1	20-CA- 49	8.7 M	BETA.-	3.09 A	
1	16- S- 37	5.1 M		3.13 A	SINGLE

MAJOR GAMMA RAYS

NEUTRON PRODUCED ISOTOPES ORDERED BY GAMMA-RAY ENERGY

1	47-AG-108	2.4 M	ECAPB+	A	BREMS.
1	47-AG-110	24. S	BETA.-	A	BREMS.
F	39- Y- 91	59. D	BETA.-	A	BREMS.
F	59-PR-145	5.9 H	BETA.-	A	BREMS.
1	14-SI- 31	2.62H	BETA.-	A	BREMS.
1	48-CD-I15M	43.0 D	BETA.-	A	BREMS.
1	59-PR-143	13.7 D	BETA.-	A	BREMSP
F	43-TC- 99	210E05Y	BETA.-	A	BREMSP
F	61-PM-147	2.5 Y	BETA.-	A	BREMS.
1	38-SR- 85M	70. M	E-CAPT	0.014A	X-RAY.
1	38-SR- 87M	2.8 H	ISOMER	0.014A	X-RAY.
7	91-PA-233	27. D	BETA.-	0.015A	X-RAY.
N	92- U-235	110E08Y	ALPHA.	0.015A	X-RAY.
1	93-NP-239	2.35D	BETA.-	0.018A	X-RAY.
1	45-RH-104M	4.4 M	ISOMER	0.02 A	X-RAY
1	44-RU-105	4.45H	BETA.-	0.020A	X-RAY.
1	44-RU-103	40. D	BETA.-	0.020A	X-RAY.
1	45-RH-105M	42.0 S	ISOMER	0.020A	X-RAY
1	47-AG-108M	5. Y	E-CAPT	0.021A	X-RAY.
1	46-PD-109	13.6 H	BETA.-	0.022A	X-RAY.
1	48-CD-109	470. D	E-CAPT	0.022A	X-RAY.
1	47-AG-110	24. S	BETA.-	0.023A	X-RAY.
1	48-CD-115	2.3 D	BETA.-	0.024A	X-RAY.
7	49-IN-113M	1.7 H	ISOMER	0.024A	X-RAY.
7	49-IN-115M	4.5 H	ISOMER	0.024A	X-RAY.
1	49-IN-114M	50.0 D	ISOMER	0.024A	X-RAY
1	50-SN-113	118.0 D	E-CAPT	0.024A	X-RAY
F	50-SN-125	9.4 D	BETA.-	0.026A	X-RAY
1	51-SB-122M	3.4 M	ISOMER	0.027A	X-RAY.
1	53- I-128	25. M	BETA+-	0.027A	X-RAY.
F	51-SB-125	2.7 Y	BETA.-	0.027A	X-RAY.
1	52-TE-125M	58. D	ISOMER	0.027A	X-RAY
1	35-BR- 82	36. H	BETA.-	0.028A	X-RAY.
1	54-XE-125	18. H	E-CAPT	0.028A	X-RAY.
F	52-TE-132	78. H	BETA.-	0.028A	X-RAY.
F	53- I-131	8.0 D	BETA.-	0.029A	X-RAY.
F	56-BA-140	12.3 D	BETA.-	0.029A	X-RAY.
F	53- I-135	6.7 H	BETA.-	0.03 A	X-RAY.
F	55-CS-136	13. D	BETA.-	0.03 A	X-RAY
1	56-BA-131	11.5 D	E-CAPT	0.030A	X-RAY.
1	55-CS-134M	2.9 H	ISOMER	0.031A	X-RAY.
1	56-BA-133	7.5 Y	E-CAPT	0.031A	X-RAY.
F	54-XE-133	5.3 D	BETA.-	0.031A	X-RAY.
F	55-CS-137	30. Y	BETA.-	0.032A	X-RAY.
1	56-BA-139	83. M	BETA.-	0.033A	X-RAY.
1	58-CE-141	32.5 D	BETA.-	0.036A	X-RAY.
1	58-CE-143	33. H	BETA.-	0.036A	X-RAY.
F	58-CE-144	284. D	BETA.-	0.036A	X-RAY.
F	59-PR-145	5.9 H	BETA.-	0.037A	X-RAY.
1	60-ND-147	11.1 D	BETA.-	0.038A	X-RAY.
1	60-ND-149	1.9 H	BETA.-	0.038A	X-RAY.
1	60-ND-151	12. M	BETA.-	0.038A	X-RAY.
1	63-EU-152M	9.3 H	ECBET-	0.04 A	X-RAY.
N	83-BI-212	60. M	BETA.-	0.040A	
5	61-PM-151	28.4 H	BETA.-	0.040A	X-RAY.
1	62-SM-153	46.7 H	BETA.-	0.041A	X-RAY
1	64-GD-153	200. D	E-CAPT	0.041A	X-RAY.
F	63-EU-155	1.7 Y	BETA.-	0.042A	X-RAY.
F	63-EU-156	15. D	BETA.-	0.042A	X-RAY.
F	63-EU-157	15. H	BETA.-	0.042A	X-RAY.
1	62-SM-155	25. M	BETA.-	0.042A	X-RAY.
1	64-GD-159	18. H	BETA.-	0.044A	X-RAY.
1	64-GD-161	3.7 M	BETA.-	0.044A	X-RAY.
1	65-TB-160	73. D	BETA.-	0.046A	X-RAY.
1	66-DY-165M	75. S	ISOMER	0.046A	X-RAY.
1	66-DY-165	2.3 H	BETA.-	0.047A	X-RAY.
1	67-HO-166M	100. Y	BETA.-	0.049A	X-RAY.
1	67-HO-166	27. H	BETA.-	0.049A	X-RAY.
1	68-ER-171	7.5 H	BETA.-	0.050A	X-RAY.
1	45-RH-104M	4.4 M	ISOMER	0.051A	
1	69-TM-170	127. D	BETA.-	0.052A	X-RAY.
1	70-YB-169	32. D	BETA.-	0.054A	X-RAY.
1	70-YB-175	4.2 D	BETA.-	0.054A	X-RAY.
1	72-HF-175	70. D	E-CAPT	0.054A	X-RAY.
1	72-HF-179M	19. S	ISOMER	0.055A	X-RAY.
1	71-LU-176M	3.7 H	BETA.-	0.055A	X-RAY.
F	52-TE-132	78. H	BETA.-	0.055A	
1	71-LU-177	6.8 D	BETA.-	0.056A	X-RAY.
1	58-CE-143	33. H	BETA.-	0.057A	
1	72-HF-181	43. D	BETA.-	0.057A	X-RAY.
1	73-TA-182M	16. M	ISOMER	0.057A	X-RAY.
1	72-HF-180M	5.5 H	ISOMER	0.058A	
1	27-CO- 60M	10.5 M	BETA.-	0.059A	ISOMER
1	73-TA-182	115. D	BETA.-	0.059A	X-RAY.
1	74- W-187	24. H	BETA.-	0.06 A	X-RAY.
1	75-RE-188M	18.7 M	ISOMER	0.060A	X-RAY.
N	88-RA-226	162E03Y	ALPHA.	0.060A	
1	51-SB-122M	3.4 M	ISOMER	0.061A	
1	76-OS-185	94. D	E-CAPT	0.061A	X-RAY.
1	75-RE-188	17. H	BETA.-	0.063A	X-RAY.
1	75-RE-188M	18.7 M	ISOMER	0.064A	
1	76-OS-191	15. D	BETA.-	0.064A	X-RAY.
F	63-EU-157	15. H	BETA.-	0.064A	
5	61-PM-151	28.4 H	BETA.-	0.065A	
1	76-OS-193	32. H	BETA.-	0.066A	X-RAY.
1	77-IR-192	74. D	BETA.-	0.066A	X-RAY.
F	55-CS-136	13. D	BETA.-	0.067A	
1	78-PT-195M	4.1 D	ISOMER	0.067A	X-RAY.
5	27-CO- 61	3.3 H	BETA.-	0.068A	SINGLE
1	80-HG-197M	24. H	E-CAPT	0.069A	X-RAY.

1	62-SM-153	46.7 H	BETA.-	0.070A	
1	79-AU-198	64.8 H	BETA.-	0.070A	X-RAY.
1	81-TL-204	3.9 Y	ECAPB-	0.070A	X-RAY.
1	80-HG-197	65. H	E-CAPT	0.072A	AVERAG 0.069 0.077
F	59-PR-145	5.9 H	BETA.-	0.072A	
1	80-HG-203	47. D	BETA.-	0.072A	X-RAY.
1	78-PT-199	30. M	BETA.-	0.074A	X-RAY.
1	92- U-239	23.5 M	BETA.-	0.074A	
1	51-SB-122M	3.4 M	ISOMER	0.075A	
N	81-TL-208	3.1 M	BETA.-	0.075A	X-RAY.
1	78-PT-197	20. H	BETA.-	0.077A	X-RAY.
N	82-PB-212	10.6 H	BETA.-	0.077A	X-RAY.
N	90-TH-228	1.9 Y	ALPHA.	0.077A	X-RAY.
1	56-BA-133	7.5 Y	E-CAPT	0.08 A	AVERAG 0.078 0.081
1	60-ND-149	1.9 H	BETA.-	0.08 A	
1	67-HO-166M	100. Y	BETA.-	0.08 A	
N	83-BI-212	60. M	BETA.-	0.08 A	
1	42-MO- 101	14.6 M	BETA.-	0.08 A	
F	53- I-131	8.0 D	BETA.-	0.080A	
1	47-AG-108M	5. Y	E-CAPT	0.081A	
1	67-HO-166	27. H	BETA.-	0.081A	
F	54-XE-133	5.3 D	BETA.-	0.083A	
1	69-TM-170	127. D	BETA.-	0.084A	
1	65-TB-160	73. D	BETA.-	0.087A	
F	63-EU-155	1.7 Y	BETA.-	0.087A	
F	55-CS-136	13. D	BETA.-	0.087A	
1	46-PD-109	13.6 H	BETA.-	0.088A	AG109M
1	71-LU-176M	3.7 H	BETA.-	0.088A	
F	63-EU-156	15. D	BETA.-	0.089A	
N	90-TH-232	140E10Y	ALPHA.	0.09 A	X-RAY.
N	91-PA-231	340E04Y	ALPHA.	0.090A	X-RAY.
1	60-ND-147	11.1 D	BETA.-	0.091A	
1	72-HF-180M	5.5 H	ISOMER	0.093A	
1	66-DY-165	2.3 H	BETA.-	0.098A	
1	78-PT-195M	4.1 D	ISOMER	0.099A	
1	73-TA-182	115. D	BETA.-	0.10 A	
5	61-PM-151	28.4 H	BETA.-	0.10 A	
1	64-GD-161	3.7 M	BETA.-	0.102A	
1	34-SE- 81M	61. M	ISOMER	0.103A	ISOMER
1	75-RE-188M	18.7 M	ISOMER	0.103A	AVERAG 0.106 0.092
7	91-PA-233	27. D	BETA.-	0.103A	X-RAY.
1	62-SM-153	46.7 H	BETA.-	0.103A	
1	64-GD-153	200. D	E-CAPT	0.103A	AVERAG 0.097 0.103
F	63-EU-155	1.7 Y	BETA.-	0.105A	
1	93-NP-239	2.35D	BETA.-	0.106A	X-RAY.
1	62-SM-155	25. M	BETA.-	0.106A	
1	66-DY-165M	75. S	ISOMER	0.108A	I.T.
N	92- U-235	110E08Y	ALPHA.	0.110A	X-RAY.
1	52-TE-125M	58. D	ISOMER	0.110A	
1	60-ND-149	1.9 H	BETA.-	0.113A	AVERAG 0.112 0.114
1	71-LU-177	6.8 D	BETA.-	0.113A	
1	70-YB-175	4.2 D	BETA.-	0.114A	
1	60-ND-151	12. M	BETA.-	0.115A	
1	70-YB-169	32. D	BETA.-	0.115A	AVERAG 0.093 0.110 0.118
1	68-ER-171	7.5 H	BETA.-	0.118A	AVERAG 0.112 0.117 0.124
1	32-GE- 75	82. M	BETA.-	0.119A	
1	63-EU-152M	9.3 H	ECBET-	0.122A	
1	56-BA-131	11.5 D	E-CAPT	0.126A	
1	55-CS-134M	2.9 H	ISOMER	0.127A	SINGLE
1	43-TC-101	15.0 M	BETA.-	0.128A	
1	76-OS-191	15. D	BETA.-	0.129A	
1	45-RH-105M	42.0 S	ISOMER	0.130A	SINGLE
1	44-RU-105	4.45H	BETA.-	0.13 A	RH105M
F	58-CE-144	284. D	BETA.-	0.134A	
1	34-SE- 75	120. D	E-CAPT	0.134A	AVERAG 0.121 0.136
1	74- W-187	24. H	BETA.-	0.134A	
1	72-HF-181	43. D	BETA.-	0.135A	AVERAG 0.133 0.136
1	49-IN-116M	54.0 M	BETA.-	0.137A	
1	76-OS-193	32. H	BETA.-	0.139A	
1	42-MO- 99	66. H	BETA.-	0.142A	TC99M
1	58-CE-141	32.5 D	BETA.-	0.145A	
N	92- U-235	110E08Y	ALPHA.	0.145A	
1	73-TA-182M	16. M	ISOMER	0.146A	
1	73-TA-182	115. D	BETA.-	0.15 A	
1	38-SR- 85M	70. M	E-CAPT	0.150A	
1	60-ND-149	1.9 H	BETA.-	0.150A	
1	36-KR- 85M	4.4 H	ISOMER	0.150A	
1	75-RE-188	17. H	BETA.-	0.155A	
5	21-SC- 47	3.4 D	BETA.-	0.155A	SINGLE
1	66-DY-165M	75. S	ISOMER	0.155A	
N	91-PA-231	340E04Y	ALPHA.	0.155A	
F	55-CS-136	13. D	BETA.-	0.16 A	AVERAG
F	56-BA-140	12.8 D	BETA.-	0.161A	
1	32-GE- 77M	54. S	BETA.-	0.162A	ISOMER
5	61-PM-151	28.4 H	BETA.-	0.163A	
1	56-BA-139	83. M	BETA.-	0.166A	
1	31-GA- 70	21. M	BETA.-	0.17 A	
1	60-ND-151	12. M	BETA.-	0.17 A	
1	73-TA-182M	16. M	ISOMER	0.172A	
F	51-SB-125	2.7 Y	BETA.-	0.175A	
N	92- U-235	110E08Y	ALPHA.	0.18 A	AVERAG 0.165 0.185 0.200
N	88-RA-226	162E03Y	ALPHA.	0.18 A	
1	67-HO-166M	100. Y	BETA.-	0.184A	
1	73-TA-182M	16. M	ISOMER	0.184A	
1	54-XE-125	18. H	E-CAPT	0.188A	
1	78-PT-199	30. M	BETA.-	0.189A	
1	70-YB-169	32. D	BETA.-	0.19 A	AVERAG 0.177 0.198
1	78-PT-197	20. H	BETA.-	0.191A	
1	49-IN-114M	50.0 D	ISOMER	0.192A	I.T.
1	42-MO- 101	14.6 M	BETA.-	0.193A	

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F 63-EU-156    15.   D BETA.- 0.199A
1 65-TB-160    73.   D BETA.- 0.20 A AVERAG 0.197 0.216
5 39- Y- 90M    3.14H ISOMER 0.203A
1 71-LU-177     6.8 D BETA.- 0.208A
1 60-ND-149     1.9 H BETA.- 0.21 A AVERAG 0.198 0.210
1 32-GE- 77M   54.   S BETA.- 0.215A
1 32-GE- 77    11.   H BETA.- 0.215A
1 44-RU- 97     2.9 D E-CAPT 0.215A
1 72-HF-179M   19.   S ISOMER 0.215A
1 72-HF-180M    5.5 H ISOMER 0.216A
1 73-TA-182   115.   D BETA.- 0.22 A
F 53- I-135     6.7 H BETA.- 0.22 A
1 56-BA-131    11.5 D E-CAPT 0.220A
1 38-SR- 85M   70.   M E-CAPT 0.225A
1 93-NP-239     2.35D BETA.- 0.228A
1 58-CE-143    33.   H BETA.- 0.232A
F 52-TE-132    78.   H BETA.- 0.232A
F 38-SR- 92     2.7 H BETA.- 0.238A
N 82-PB-212    10.6 H BETA.- 0.239A
N 90-TH-232   140E10Y ALPHA. 0.239A PB-212
N 90-TH-228     1.9 Y ALPHA. 0.239A PB-212
F 39- Y- 94    17.   M BETA.- 0.24 A
5 61-PM-151    28.4 H BETA.- 0.24 A
1 54-XE-125    18.   H E-CAPT 0.243A
7 33-AS- 77    39.   H BETA.- 0.246A
1 78-PT-199    30.   M BETA.- 0.247A
1 47-AG-111     7.5 D BETA.- 0.247A
F 54-XE-135     9.2 H BETA.- 0.250A
1 60-ND-151    12.   M BETA.- 0.254A
1 60-ND-149     1.9 H BETA.- 0.26 A AVERAG 0.240 0.266
1 32-GE- 77    11.   H BETA.- 0.264A
1 44-RU-105     4.45H BETA.- 0.264A
F 39- Y- 93    10.1 H BETA.- 0.265A
1 32-GE- 75    82.   M BETA.- 0.266A
1 34-SE- 75   120.   D E-CAPT 0.268A AVERAG 0.265 0.280
F 55-CS-136    13.   D BETA.- 0.27 A
N 81-TL-208     3.1 M BETA.- 0.277A
1 93-NP-239     2.35D BETA.- 0.278A
1 80-HG-203    47.   D BETA.- 0.279A
1 67-HO-166M  100.   Y BETA.- 0.28 A AVERAG 0.263 0.280 0.300
1 70-YB-175     4.2 D BETA.- 0.283A
F 53- I-131     8.0 D BETA.- 0.284A
1 34-SE- 81    18.   M BETA.- 0.285A AVERAG 0.28  0.29
N 83-BI-212    60.   M BETA.- 0.285A
1 56-BA-133     7.5 Y E-CAPT 0.29 A AVERAG 0.274 0.302
F 53- I-135     6.7 H BETA.- 0.29 A
5 61-PM-148M   41.   D BETA.- 0.29 A AVERAG
1 58-CE-143    33.   H BETA.- 0.294A
1 65-TB-160    73.   D BETA.- 0.298A
N 88-RA-226   162E03Y ALPHA. 0.30 A PB-214
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N 91-PA-231   340E04Y ALPHA. 0.30 A AVERAG 0.260 0.300 0.330
N 90-TH-228     1.9 Y ALPHA. 0.300A PB-212
F 56-BA-140    12.8 D BETA.- 0.304A
1 68-ER-171     7.5 H BETA.- 0.305A AVERAG 0.296 0.308
1 36-KR- 85M    4.4 H ISOMER 0.305A I.T.
1 43-TC-101    15.0 M BETA.- 0.307A
1 77-IR-192    74.   D BETA.- 0.31 A AVERAG 0.295 0.316 0.308
1 42-MO- 101   14.6 M BETA.- 0.31 A
1 44-RU-105     4.45H BETA.- 0.316A
1 64-GD-161     3.7 M BETA.- 0.316A
7 91-PA-233    27.   D BETA.- 0.32 A AVERAG 0.300 0.312 0.340
1 78-PT-199    30.   M BETA.- 0.320A
1 22-TI- 51     5.8 M BETA.- 0.322A
1 24-CR- 51    27.8 D E-CAPT 0.322A SINGLE
1 57-LA-140    40.2 H BETA.- 0.327A
1 77-IR-194    19.   H BETA.- 0.328A
F 50-SN-125     9.4 D BETA.- 0.33 A AVERAG 0.331 0.34
1 50-SN-125M    9.7 M BETA.- 0.331A
1 72-HF-180M    5.5 H ISOMER 0.333A
1 48-CD-115     2.3 D BETA.- 0.335A IN115M
7 49-IN-115M    4.5 H ISOMER 0.335A SINGLE
N 90-TH-232   140E10Y ALPHA. 0.34 A AC-228
F 55-CS-136    13.   D BETA.- 0.34 A
5 61-PM-151    28.4 H BETA.- 0.340A
1 47-AG-111     7.5 D BETA.- 0.342A
1 72-HF-175    70.   D E-CAPT 0.343A
1 63-EU-152M    9.3 H ECBET- 0.344A
1 72-HF-181    43.   D BETA.- 0.346A
N 88-RA-226   162E03Y ALPHA. 0.35 A PB-214
1 56-BA-133     7.5 Y E-CAPT 0.36 A AVERAG 0.355 0.380
F 39- Y- 94    17.   M BETA.- 0.36 A
1 64-GD-159    18.   H BETA.- 0.362A
1 64-GD-161     3.7 M BETA.- 0.363A
F 53- I-131     8.0 D BETA.- 0.364A
1 32-GE- 77    11.   H BETA.- 0.367A
1 28-NI- 65     2.65H BETA.- 0.370A
1 56-BA-131    11.5 D E-CAPT 0.375A
1 38-SR- 87M    2.8 H ISOMER 0.391A SINGLE
7 49-IN-113M    1.7 H ISOMER 0.393A SINGLE
1 50-SN-113   118.0 D E-CAPT 0.393A IN113M
1 70-YB-175     4.2 D BETA.- 0.396A
F 63-EU-157    15.   H BETA.- 0.4  A AVERAG 0.32  0.38  0.41  0.48
1 49-IN-116M   54.0 M BETA.- 0.406A
1 79-AU-198    64.8 H BETA.- 0.412A
1 32-GE- 77    11.   H BETA.- 0.416A
F 53- I-135     6.7 H BETA.- 0.42 A
5 61-PM-148M   41.   D BETA.- 0.42 A AVERAG
F 38-SR- 92     2.7 H BETA.- 0.427A
F 51-SB-125     2.7 Y BETA.- 0.43 A AVERAG 0.427 0.463
F 56-BA-140    12.8 D BETA.- 0.43 A AVERAG 0.422 0.436
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1	47-AG-108	2.4 M	ECAPB+	0.433A	
1	47-AG-108M	5. Y	E-CAPT	0.434A	
1	30-ZN- 69M	14. H	ISOMER	0.440A	SINGLE
5	61-PM-151	28.4 H	BETA.-	0.442A	
1	72-HF-180M	5.5 H	ISOMER	0.444A	
1	53- I-128	25. M	BETA+-	0.445A	
F	39- Y- 92	3.6 H	BETA.-	0.45 A	
F	55-CS-138	32. M	BETA.-	0.462A	
1	77-IR-192	74. D	BETA.-	0.468A	
F	50-SN-125	9.4 D	BETA.-	0.468A	
1	44-RU-105	4.45H	BETA.-	0.472A	
1	78-PT-199	30. M	BETA.-	0.475A	
1	74- W-187	24. H	BETA.-	0.480A	
5	39- Y- 90M	3.14H	ISOMER	0.482A	
1	72-HF-181	43. D	BETA.-	0.482A	
1	48-CD-115M	43.0 D	BETA.-	0.485A	
1	57-LA-140	40.2 H	BETA.-	0.487A	
1	20-CA- 47	4.5 D	BETA.-	0.489A	
1	44-RU-103	40. D	BETA.-	0.498A	
1	56-BA-131	11.5 D	E-CAPT	0.498A	
N	81-TL-208	3.1 M	BETA.-	0.51 A	
1	42-MO- 101	14.6 M	BETA.-	0.51 A	
1	29-CU- 64	12.9 H	ECBE+-	0.511A	ANN.RD
1	35-BR- 80	18. M	BETA+-	0.511A	ANN.RD
1	47-AG-108	2.4 M	ECAPB+	0.511A	ANN.RD
5	27-CO- 58	70. D	ECAPB+	0.511A	ANN.RD
N	90-TH-228	1.9 Y	ALPHA.	0.511A	
F	44-RU-106	1.0 Y	BETA.-	0.513A	RH106
F	36-KR- 85	10.4 Y	BETA.-	0.515A	
F	36-KR- 85	10.4 Y	BETA.-	0.515A	BREMS.
1	48-CD-115	2.3 D	BETA.-	0.52 A	AVERAG 0.490 0.523
F	53- I-132	2.3 H	BETA.-	0.52 A	
7	33-AS- 77	39. H	BETA.-	0.525A	
F	53- I-133	20.8 H	BETA.-	0.525A	
F	53- I-135	6.7 H	BETA.-	0.535A	XE135M
F	56-BA-140	12.8 D	BETA.-	0.537A	
1	78-PT-199	30. M	BETA.-	0.540A	
F	55-CS-138	32. M	BETA.-	0.545A	
5	61-PM-148M	41. D	BETA.-	0.548A	
5	61-PM-148	5.4 D	BETA.-	0.551A	
1	35-BR- 82	36. H	BETA.-	0.554A	
F	38-SR- 91	9.7 H	BETA.-	0.558A	Y91M
1	33-AS- 76	26.5 H	BETA.-	0.559A	
F	39- Y- 91M	50. M	ISOMER	0.559A	ISOMER
F	39- Y- 92	3.6 H	BETA.-	0.56 A	
F	39- Y- 94	17. M	BETA.-	0.560A	
1	51-SB-122	2.8 D	BETA.-	0.561A	
N	81-TL-208	3.1 M	BETA.-	0.563A	
N	90-TH-232	140E10Y	ALPHA.	0.583A	TL-208
N	90-TH-228	1.9 Y	ALPHA.	0.583A	TL-208

1	42-MO- 101	14.6 M	BETA.-	0.592A	
1	55-CS-134	2.1 Y	BETA.-	0.60 A	AVERAG 0.563 0.570
1	51-SB-124	60. D	BETA.-	0.603A	
F	51-SB-125	2.7 Y	BETA.-	0.605A	AVERAG 0.60 0.64
1	77-IR-192	74. D	BETA.-	0.61 A	AVERAG 0.588 0.604 0.613
N	88-RA-226	162E03Y	ALPHA.	0.61 A	BI-214
1	47-AG-108M	5. Y	E-CAPT	0.615A	
1	35-BR- 80	18. M	BETA+-	0.618A	
1	35-BR- 82	36. H	BETA.-	0.619A	
F	44-RU-106	1.0 Y	BETA.-	0.62 A	RH106 0.624 0.612
1	31-GA- 72	14.1 H	BETA.-	0.625A	AVERAG 0.60 0.62 0.63
5	61-PM-148M	41. D	BETA.-	0.626A	
1	47-AG-108	2.4 M	ECAPB+	0.63 A	AVERAG 0.617 0.633
F	55-CS-139	9.5 M	BETA.-	0.63 A	
F	57-LA-142	87. M	BETA.-	0.645A	
1	76-OS-185	94. D	E-CAPT	0.646A	
F	63-EU-156	15. D	BETA.-	0.646A	
F	38-SR- 91	9.7 H	BETA.-	0.655A	
1	47-AG-110	24. S	BETA.-	0.656A	
1	47-AG-110M	250. D	BETA.-	0.66 A	AVERAG 0.656 0.677 0.687 0.706
F	55-CS-137	30. Y	BETA.-	0.662A	SINGLE
1	40-ZR- 97	17. H	BETA.-	0.663A	NB-97 DAWTR
7	41-NB- 97	74. M	BETA.-	0.663A	
7	41-NB- 97	74. M	BETA.-	0.663A	SINGLE
F	37-RB- 89	15. M	BETA.-	0.665A	
F	53- I-132	2.3 H	BETA.-	0.665A	
F	55-CS-136	13. D	BETA.-	0.67A	
1	44-RU-105	4.45H	BETA.-	0.670A	
1	74- W-187	24. H	BETA.-	0.686A	
1	41-NB- 94	200E04Y	BETA.-	0.702A	DUBLET
1	42-MO- 101	14.6 M	BETA.-	0.705A	
1	67-HO-166M	100. Y	BETA.-	0.71 A	
1	51-SB-124	60. D	BETA.-	0.722A	
1	44-RU-105	4.45H	BETA.-	0.723A	
5	61-PM-148M	41. D	BETA.-	0.723A	
1	47-AG-108M	5. Y	E-CAPT	0.724A	
F	63-EU-156	15. D	BETA.-	0.724A	
N	83-BI-212	60. M	BETA.-	0.727A	
1	40-ZR- 95	65. D	BETA.-	0.73 A	AVERAG 0.726 0.765
1	40-ZR- 97	17. H	BETA.-	0.75 A	NB-97M
1	41-NB- 97M	60. S	ISOMER	0.75 A	
F	38-SR- 91	9.7 H	BETA.-	0.76 A	
7	41-NB- 95	35. D	BETA.-	0.766A	SINGLE
F	53- I-132	2.3 H	BETA.-	0.77 A	
1	35-BR- 82	36. H	BETA.-	0.777A	
1	55-CS-134	2.1 Y	BETA.-	0.80 A	AVERAG 0.796 0.801
5	27-CO- 58	70. D	ECAPB+	0.808A	
1	20-CA- 47	4.5 D	BETA.-	0.809A	
1	49-IN-115M	54.0 M	BETA.-	0.81 A	
1	67-HO-166M	100. Y	BETA.-	0.810A	

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F 63-EU-156   15.  D BETA.- 0.812A
F 50-SN-125    9.4 D BETA.- 0.815A
1 57-LA-140   40.2 H BETA.- 0.817A
1 31-GA- 72   14.1 H BETA.- 0.83 A AVERAG 0.832 0.81
F 37-RB- 90    2.9 M BETA.- 0.83 A
F 55-CS-136   13.  D BETA.- 0.83 A
F 53- I-135    6.7 H BETA.- 0.84 A
1 63-EU-152M   9.3 H ECBET- 0.841A
1 12-MG- 27    9.5 M BETA.- 0.842A
1 25-MN- 56    2.58H BETA.- 0.845A
F 53- I-134   53.  M BETA.- 0.86 A AVERAG 0.848 0.890
N 81-TL-208    3.1 M BETA.- 0.860A
1 41-NB- 94  200E04Y BETA.- 0.871A DUBLET
1 41-NB- 94M   6.6 M BETA.- 0.871A SINGLE
1 65-TB-160   73.  D BETA.- 0.879A
1 21-SC- 46   85.0 D BETA.- 0.887A
1 47-AG-110M 250.  D BETA.- 0.89 A AVERAG 0.815 0.885 0.937
F 57-LA-142   87.  M BETA.- 0.89 A
1 37-RB- 88   18.  M BETA.- 0.899A
N 90-TH-232  140E10Y ALPHA. 0.908A AC-228
F 50-SN-125    9.4 D BETA.- 0.91 A
5 61-PM-148    5.4 D BETA.- 0.910A
5 61-PM-148M  41.  D BETA.- 0.913A
1 57-LA-140   40.2 H BETA.- 0.92 A
F 39- Y- 94   17.  M BETA.- 0.925A
F 39- Y- 92    3.6 H BETA.- 0.93 A
1 48-CD-115M  43.0 D BETA.- 0.935A
F 53- I-132    2.3 H BETA.- 0.952A
F 63-EU-156   15.  D BETA.- 0.96 A
1 63-EU-152M   9.3 H ECBET- 0.963A
1 65-TB-160   73.  D BETA.- 0.964A AVERAG 0.962 0.966
N 90-TH-232  140E10Y ALPHA. 0.966A AC-228
1 63-EU-152M   9.3 H ECBET- 0.975A
1 12-MG- 27    9.5 M BETA.- 1.01 A
5 21-SC- 48   44.  H BETA.- 1.01 A AVERAG 0.990 1.040
F 55-CS-138   32.  M BETA.- 1.01 A
5 61-PM-148M  41.  D BETA.- 1.01 A
1 42-MO- 101  14.6 M BETA.- 1.024A
F 38-SR- 91    9.7 H BETA.- 1.03 A
F 57-LA-142   87.  M BETA.- 1.03 A
F 37-RB- 89   15.  M BETA.- 1.04 A
1 29-CU- 66    5.1 M BETA.- 1.040A
1 35-BR- 82   36.  H BETA.- 1.044A
F 55-CS-136   13.  D BETA.- 1.065A
F 50-SN-125    9.4 D BETA.- 1.068A
1 37-RB- 86   18.7 D BETA.- 1.077A
F 63-EU-156   15.  D BETA.- 1.08 A
1 49-IN-116M  54.0 M BETA.- 1.085A
1 26-FE- 59   45.  D BETA.- 1.097A DUBLET
1 28-NI- 65    2.65H BETA.- 1.114A
1 30-ZN- 65  245.  D ECAPB+ 1.114A
1 21-SC- 46   85.0 D BETA.- 1.119A
F 53- I-135    6.7 H BETA.- 1.14 A
F 39- Y- 94   17.  M BETA.- 1.15 A
F 63-EU-156   15.  D BETA.- 1.16 A
1 27-CO- 60    5.27Y BETA.- 1.173A DUBLET
F 63-EU-156   15.  D BETA.- 1.23 A
F 37-RB- 89   15.  M BETA.- 1.256A
F 53- I-135    6.7 H BETA.- 1.265A
1 49-IN-116M  54.0 M BETA.- 1.27 A
F 55-CS-139    9.5 M BETA.- 1.28 A
5 13-AL- 29    6.6 M BETA.- 1.280A
1 26-FE- 59   45.  D BETA.- 1.289A DUBLET
1 18-AR- 41    1.83H BETA.- 1.29 A SINGLE
1 48-CD-115M  43.0 D BETA.- 1.295A
1 20-CA- 47    4.5 D BETA.- 1.299A
5 21-SC- 48   44.  H BETA.- 1.31 A
1 35-BR- 82   36.  H BETA.- 1.317A
1 27-CO- 60    5.27Y BETA.- 1.332A DUBLET
1 11-NA- 24   15.0 H BETA.- 1.368A
F 38-SR- 92    2.7 H BETA.- 1.38 A
F 39- Y- 92    3.6 H BETA.- 1.40 A
F 55-CS-138   32.  M BETA.- 1.43 A
1 23- V- 52    3.77M BETA.- 1.430A SINGLE
5 61-PM-148    5.4 D BETA.- 1.46 A
N 19- K- 40  127E10Y BETA.- 1.460A SINGLE
1 28-NI- 65    2.65H BETA.- 1.480A
1 19- K- 42   12.4 H BETA.- 1.52 A
1 59-PR-142   19.2 H BETA.- 1.58 A SINGLE
1 59-PR-142   19.2 H BETA.- 1.58 A BREMS.
1 57-LA-140   40.2 H BETA.- 1.597A
1 17-CL- 38   38.0 M BETA.- 1.640A
1 51-SB-124   60.  D BETA.- 1.69 A
1 13-AL- 28    2.3 M BETA.- 1.78 A SINGLE
1 25-MN- 56    2.58H BETA.- 1.81 A
1 37-RB- 88   18.  M BETA.- 1.837A
1 25-MN- 56    2.58H BETA.- 2.12 A
1 17-CL- 38   38.0 M BETA.- 2.160A
F 55-CS-138   32.  M BETA.- 2.20 A
F 55-CS-138   32.  M BETA.- 2.61 A
N 81-TL-208    3.1 M BETA.- 2.615A
1 11-NA- 24   15.0 H BETA.- 2.750A
1 20-CA- 49    8.7 M BETA.- 3.09 A
1 16- S- 37    5.1 M        3.13 A SINGLE
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MAJOR GAMMA RAYS

ACCELERATOR PRODUCED ISCTOPES

ORDERED BY GAMMA-RAY ENERGY

3	27-CO- 57	267.	D	E-CAPT	0.014A	
3	43-TC- 96	4.3	D	E-CAPT	0.017A	X-RAY.
8	43-TC- 95	20.	H	E-CAPT	0.017A	X-RAY.
8	43-TC- 95M	60.	D	ECAPB+	0.017A	X-RAY.
3	45-RH-101M	4.7	D	E-CAPT	0.019A	X-RAY.
3	47-AG-105	40.	D	E-CAPT	0.021A	X-RAY.
4	49-IN-111	2.8	D	E-CAPT	0.023A	X-RAY
4	51-SB-120M	5.8	D	E-CAPT	0.025A	X-RAY.
3	53- I-126	13.2	D	ECAPB+	0.027A	X-RAY.
4	55-CS-132	6.5	D	ECAPB+	0.03 A	X-RAY.
3	58-CE-139	140.	D	E-CAPT	0.033A	X-RAY.
4	59-PR-139	4.5	H	ECAPB+	0.035A	X-RAY.
4	60-ND-141	2.4	H	ECAPB+	0.036A	X-RAY.
4	67-HO-164	37.	M	BETA+-	0.045A	X-RAY.
4	69-TM-168	85.	D	E-CAPT	0.049A	X-RAY.
8	69-TM-171	1.9	Y	BETA.-	0.052A	X-RAY.
4	72-HF-173	24.	H	E-CAPT	0.054A	X-RAY.
4	73-TA-180M	8.1	H	ECAPB-	0.055A	X-RAY.
4	92- U-237	6.7	D	BETA.-	0.060A	
3	47-AG-105	40.	D	E-CAPT	0.064A	
4	34-SE- 73	7.1	H	BETA.+	0.066A	
4	79-AU-196	6.1	D	BETA+-	0.066A	X-RAY.
8	69-TM-171	1.9	Y	BETA.-	0.067A	
4	81-TL-202	12.	D	E-CAPT	0.070A	X-RAY.
8	79-AU-199	3.2	D	BETA.-	0.070A	X-RAY.
3	82-PB-203	52.	H	E-CAPT	0.073A	X-RAY.
3	22-TI- 44	100E03	Y	ECAPB+	0.073A	AVERAG 0.069 0.078
3	82-PB-204M	67.	M	ISOMER	0.075A	X-RAY.
3	83-BI-205	15.	D	ECAPB+	0.075A	X-RAY.
3	83-BI-207	28.	Y	E-CAPT	0.075A	X-RAY.
4	69-TM-168	85.	D	E-CAPT	0.080A	
4	51-SB-120M	5.8	D	E-CAPT	0.087A	
4	24-CR- 49	42.	M	BETA.+	0.089A	
6	29-CU- 67	61.	H	BETA.-	0.092A	AVERAG 0.091 0.093
3	31-GA- 67	78.	H	ECAPB+	0.093A	
4	73-TA-180M	8.1	H	ECAPB-	0.096A	AVERAG 0.093 0.102
4	92- U-237	6.7	D	BETA.-	0.102A	X-RAY.
3	27-CO- 57	267.	D	E-CAPT	0.122A	
4	72-HF-173	24.	H	E-CAPT	0.125A	
4	28-NI- 57	36.	H	ECAPB+	0.127A	
3	27-CO- 57	267.	D	E-CAPT	0.136A	
4	17-CL- 34M	32.4	M	BETA.+	0.139A	ISOMER
4	24-CR- 49	42.	M	BETA.+	0.152A	
4	49-IN-112M	21.0	M	ISOMER	0.155A	I.T.
8	79-AU-199	3.2	D	BETA.-	0.158A	
3	58-CE-139	140.	D	E-CAPT	0.166A	SINGLE
4	49-IN-111	2.8	D	E-CAPT	0.173A	
3	31-GA- 67	78.	H	ECAPB+	0.184A	
6	29-CU- 67	61.	H	BETA.-	0.184A	
4	69-TM-168	85.	D	E-CAPT	0.19 A	AVERAG 0.185 0.198
4	51-SB-120M	5.8	D	E-CAPT	0.197A	
8	43-TC- 95M	60.	D	ECAPB+	0.204A	
8	79-AU-199	3.2	D	BETA.-	0.208A	
4	92- U-237	6.7	D	BETA.-	0.208A	
4	37-RB- 84M	21.	M	ISOMER	0.216A	
3	35-BR- 77	58.	H	ECAPB+	0.246A	
4	49-IN-111	2.8	D	E-CAPT	0.247A	
4	37-RB- 84M	21.	M	ISOMER	0.250A	
4	21-SC- 44M	2.4	D	ISOMER	0.270A	ISOMER
3	83-BI-205	15.	D	ECAPB+	0.275A	AVERAG 0.261 0.284
3	82-PB-203	52.	H	E-CAPT	0.279A	
3	47-AG-105	40.	D	E-CAPT	0.281A	
3	29-CU- 61	3.3	H	ECAPB+	0.284A	
3	31-GA- 67	78.	H	ECAPB+	0.296A	
4	72-HF-173	24.	H	E-CAPT	0.297A	
3	45-RH-101M	4.7	D	E-CAPT	0.307A	
3	47-AG-105	40.	D	E-CAPT	0.34 A	AVERAG 0.331 0.345 0.393
4	44-RU- 95	1.7	H	ECAPB+	0.340A	
4	79-AU-196	6.1	D	BETA+-	0.35 A	AVERAG 0.331 0.356
4	34-SE- 73	7.1	H	BETA.+	0.359A	
3	82-PB-204M	67.	M	ISOMER	0.375A	TRPLET
3	39- Y- 86	15.	H	ECAPB+	0.38 A	
4	26-FE- 53	9.	M	BETA.+	0.380A	
3	53- I-126	13.2	D	ECAPB+	0.386A	
3	53- I-130	12.5	H	BETA.-	0.41 A	
4	81-TL-202	12.	D	E-CAPT	0.438A	
4	47-AG-106M	8.3	D	E-CAPT	0.44 A	AVERAG 0.41 0.46
3	39- Y- 86	15.	H	ECAPB+	0.45 A	
4	37-RB- 84M	21.	M	ISOMER	0.465A	
3	4-BE- 7	53.0	D	E-CAPT	0.478A	SINGLE
3	11-NA- 22	2.6	Y	ECAPB+	0.511A	ANN.RD
4	17-CL- 34M	32.4	M	BETA.+	0.511A	ANN.RD
4	17-CL- 34	1.6	S	BETA.+	0.511A	ANN.RD
4	19- K- 38	7.7	M	BETA.+	0.511A	ANN.RD
4	21-SC- 44	4.0	H	ECAPB+	0.511A	ANN.RD
3	22-TI- 44	100E03	Y	ECAPB+	0.511A	ANN.RD
4	22-TI- 45	3.08	H	ECAPB+	0.511A	ANN.RD
3	23- V- 48	16.	D	ECAPB+	0.511A	ANN.RD
4	24-CR- 49	42.	M	BETA.+	0.511A	ANN.RD
3	25-MN- 52	5.7	D	ECAPB+	0.511A	ANN.RD
4	26-FE- 53	9.	M	BETA.+	0.511A	ANN.RD
4	28-NI- 57	36.	H	ECAPB+	0.511A	ANN.RD
3	29-CU- 61	3.3	H	ECAPB+	0.511A	ANN.RD
4	29-CU- 62	9.9	M	ECAPB+	0.511A	ANN.RD
4	30-ZN- 63	38.	M	ECAPB+	0.511A	ANN.RD
4	31-GA- 68	68.0	M	ECAPB+	0.511A	ANN.RD
4	32-GE- 69	40.	H	ECAPB+	0.511A	ANN.RD
3	33-AS- 72	26.	H	ECAPB+	0.511A	ANN.RD
4	33-AS- 74	18.	D	ECAPB+	0.511A	ANN.RD
4	34-SE- 73	7.1	H	BETA.+	0.511A	ANN.RD

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3 39- Y- 86    15.   H ECAPB+ 0.511A ANN.RD
4 40-ZR- 89    79.   H ECAPB+ 0.511A ANN.RD
4 42-MO- 91    16.   M BETA.+ 0.511A ANN.RD
4 44-RU- 95     1.7 H ECAPB+ 0.511A ANN-RD
4 49-IN-112    14.C M ECAPB+ 0.511A ANN.RD
4 51-SB-120    16.   M ECAPB+ 0.511A ANN-RD
3 53- I-124     4.2 D ECAPB+ 0.511A ANN.RD
3 57-LA-136     9.5 M ECAPB+ 0.511A ANN.RD
4 59-PR-139     4.5 H ECAPB+ 0.511A ANN-RD
4 60-ND-141     2.4 H ECAPB+ 0.511A ANN.RD
4 47-AG-106    24.   M ECAPB+ 0.512A AVERAG 0.511 0.513
4 47-AG-106M    8.3 D E-CAPT 0.513A
3 38-SR- 85    64.   D E-CAPT 0.515A SINGLE
3 83-BI-205    15.   D ECAPB+ 0.52 A AVERAG 0.516 0.526
3 35-BR- 77    58.   H ECAPB+ 0.520A AVERAG 0.511 0.524
3 53- I-130    12.5 H BETA.- 0.53 A TRPLET
3 83-BI-205    15.   D ECAPB+ 0.56 A AVERAG 0.550 0.570
3 83-BI-207    28.   Y E-CAPT 0.569A
4 32-GE- 69    40.   H ECAPB+ 0.580A
8 43-TC- 95M   60.   D ECAPB+ 0.584A
4 40-ZR- 89M    4.4 M ISOMER 0.589A ISOMER
4 33-AS- 74    18.   D ECAPB+ 0.596A
3 53- I-124     4.2 D ECAPB+ 0.603A
4 49-IN-112    14.0 M ECAPB+ 0.615A
4 47-AG-106M    8.3 D E-CAPT 0.62 A
4 44-RU- 95     1.7 H ECAPB+ 0.625A
3 39- Y- 86    15.   H ECAPB+ 0.643A
3 53- I-130    12.5 H BETA.- 0.66 A TRPLET
3 53- I-126    13.2 D ECAPB+ 0.665A
4 55-CS-132     6.5 D ECAPB+ 0.665A
3 83-BI-205    15.   D ECAPB+ 0.703A
3 53- I-124     4.2 D ECAPB+ 0.72 A
4 47-AG-106M    8.3 D E-CAPT 0.73 A
3 53- I-130    12.5 H BETA.- 0.74 A TRPLET
3 25-MN- 52     5.7 D ECAPB+ 0.743A TRIPLT
8 43-TC- 95    20.   H E-CAPT 0.768A
4 47-AG-106M    8.3 D E-CAPT 0.79 A AVERAG 0.78  0.80  0.81
3 43-TC- 96     4.3 D E-CAPT 0.80 A AVERAG 0.770 0.804 0.840
3 33-AS- 72    26.   H ECAPB+ 0.833A
3 25-MN- 54   314.   D E-CAPT 0.835A SINGLE
3 39- Y- 88   105.   D E-CAPT 0.899A
3 82-PB-204M   67.   M ISOMER 0.905A AVERAG 0.899 0.912
4 40-ZR- 89    79.   H ECAPB+ 0.906A
4 41-NB- 92    10.   D E-CAPT 0.931A SINGLE
3 25-MN- 52     5.7 D ECAPB+ 0.935A TRIPLT
3 83-BI-205    15.   D ECAPB+ 0.988A
3 23- V- 48    16.   D ECAPB+ 0.990A DUBLET
4 47-AG-106M    8.3 D E-CAPT 1.05 A
3 83-BI-207    28.   Y E-CAPT 1.064A
3 39- Y- 86    15.   H ECAPB+ 1.084A
4 32-GE- 69    40.   H ECAPB+ 1.12 A
4 47-AG-106M    8.3 D E-CAPT 1.13 A
4 21-SC- 44     4.0 H ECAPB+ 1.159A
3 22-TI- 44   100E03Y ECAPB+ 1.159A SC-44
3 39- Y- 86    15.   H ECAPB+ 1.16 A
4 47-AG-106M    8.3 D E-CAPT 1.20 A
3 11-NA- 22     2.6 Y ECAPB+ 1.274A
3 23- V- 48    16.   D ECAPB+ 1.310A DUBLET
4 28-NI- 57    36.   H ECAPB+ 1.38 A
3 25-MN- 52     5.7 D ECAPB+ 1.430A TRIPLT
3 39- Y- 88   105.   D E-CAPT 1.837A
4 19- K- 38     7.7 M BETA.+ 2.160A
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MAJOR GAMMA RAYS

FISSION PRODUCT ISOTOPES

ORDERED BY GAMMA-RAY ENERGY

F	39- Y- 91	59. D	BETA.-	A	BREMS.
F	59-PR-145	5.9 H	BETA.-	A	BREMS.
F	43-TC- 99	210E05Y	BETA.-	A	BREMSP
1	44-RU-103	40. D	BETA.-	0.020A	X-RAY.
1	48-CD-115	2.3 D	BETA.-	0.024A	X-RAY.
F	50-SN-125	9.4 D	BETA.-	0.026A	X-RAY
F	51-SB-125	2.7 Y	BETA.-	0.027A	X-RAY.
F	52-TE-132	78. H	BETA.-	0.028A	X-RAY.
F	53- I-131	8.0 D	BETA.-	0.029A	X-RAY.
F	56-BA-140	12.8 D	BETA.-	0.029A	X-RAY.
F	53- I-135	6.7 H	BETA.-	0.03 A	X-RAY.
F	55-CS-136	13. D	BETA.-	0.03 A	X-RAY
F	54-XE-133	5.3 D	BETA.-	0.031A	X-RAY.
F	55-CS-137	30. Y	BETA.-	0.032A	X-RAY.
1	56-BA-139	83. M	BETA.-	0.033A	X-RAY.
1	58-CE-141	32.5 D	BETA.-	0.036A	X-RAY.
1	58-CE-143	33. H	BETA.-	0.036A	X-RAY.
F	58-CE-144	284. D	BETA.-	0.036A	X-RAY.
F	59-PR-145	5.9 H	BETA.-	0.037A	X-RAY.
1	60-ND-147	11.1 D	BETA.-	0.038A	X-RAY.
1	60-ND-149	1.9 H	BETA.-	0.038A	X-RAY.
1	60-ND-151	12. M	BETA.-	0.038A	X-RAY.
F	63-EU-155	1.7 Y	BETA.-	0.042A	X-RAY.
F	63-EU-156	15. D	BETA.-	0.042A	X-RAY.
F	52-TE-132	78. H	BETA.-	0.055A	
1	58-CE-143	33. H	BETA.-	0.057A	
F	55-CS-136	13. D	BETA.-	0.067A	
F	59-PR-145	5.9 H	BETA.-	0.072A	
1	60-ND-149	1.9 H	BETA.-	0.0E A	
F	53- I-131	8.0 D	BETA.-	0.080A	
F	54-XE-133	5.3 D	BETA.-	0.083A	
F	63-EU-155	1.7 Y	BETA.-	0.087A	
F	55-CS-136	13. D	BETA.-	0.087A	
F	63-EU-156	15. D	BETA.-	0.089A	
1	60-ND-147	11.1 D	BETA.-	0.091A	
F	63-EU-155	1.7 Y	BETA.-	0.105A	
1	60-ND-149	1.9 H	BETA.-	0.113A	AVERAG C.112 0.114
1	60-ND-151	12. M	BETA.-	0.115A	
F	58-CE-144	284. D	BETA.-	0.134A	
1	42-MO- 99	66. H	BETA.-	0.142A	TC99M
1	58-CE-141	32.5 D	BETA.-	0.145A	
1	60-ND-149	1.9 H	BETA.-	0.150A	
F	55-CS-136	13. D	BETA.-	0.16 A	AVERAG
F	56-BA-140	12.8 D	BETA.-	0.161A	
1	56-BA-139	83. M	BETA.-	0.166A	
1	60-ND-151	12. M	BETA.-	0.17 A	
F	51-SB-125	2.7 Y	BETA.-	0.175A	
F	63-EU-156	15. D	BETA.-	0.199A	
1	60-ND-149	1.9 H	BETA.-	0.21 A	AVERAG 0.198 0.210
F	53- I-135	6.7 H	BETA.-	0.22 A	
1	58-CE-143	33. H	BETA.-	0.232A	
F	52-TE-132	78. H	BETA.-	0.232A	
F	38-SR- 92	2.7 H	BETA.-	0.238A	
F	39- Y- 94	17. M	BETA.-	0.24 A	
F	54-XE-135	9.2 H	BETA.-	0.250A	
1	60-ND-151	12. M	BETA.-	0.254A	
1	60-ND-149	1.9 H	BETA.-	0.26 A	AVERAG 0.240 0.266
F	39- Y- 93	10.1 H	BETA.-	0.265A	
F	55-CS-136	13. D	BETA.-	0.27 A	
F	53- I-131	8.0 D	BETA.-	0.284A	
F	53- I-135	6.7 H	BETA.-	0.29 A	
1	58-CE-143	33. H	BETA.-	0.294A	
F	56-BA-140	12.8 D	BETA.-	0.304A	
1	57-LA-140	40.2 H	BETA.-	0.327A	
F	50-SN-125	9.4 D	BETA.-	0.33 A	AVERAG 0.331 0.34
1	48-CD-115	2.3 D	BETA.-	0.335A	IN115M
F	55-CS-136	13. D	BETA.-	0.34 A	
F	39- Y- 94	17. M	BETA.-	0.36 A	
F	53- I-131	8.0 D	BETA.-	0.364A	
F	53- I-135	6.7 H	BETA.-	0.42 A	
F	38-SR- 92	2.7 H	BETA.-	0.427A	
F	51-SB-125	2.7 Y	BETA.-	0.43 A	AVERAG 0.427 0.463
F	56-BA-140	12.8 D	BETA.-	0.43 A	AVERAG 0.422 0.436
F	39- Y- 92	3.6 H	BETA.-	0.45 A	
F	55-CS-138	32. M	BETA.-	0.462A	
F	50-SN-125	9.4 D	BETA.-	0.468A	
1	57-LA-140	40.2 H	BETA.-	0.487A	
1	44-RU-103	40. D	BETA.-	0.498A	
F	44-RU-106	1.0 Y	BETA.-	0.513A	RH106
F	36-KR- 85	10.4 Y	BETA.-	0.515A	
F	36-KR- 85	10.4 Y	BETA.-	0.515A	BREMS.
1	48-CD-115	2.3 D	BETA.-	0.52 A	AVERAG 0.490 0.523
F	53- I-132	2.3 H	BETA.-	0.52 A	
F	53- I-133	20.8 H	BETA.-	0.525A	
F	53- I-135	6.7 H	BETA.-	0.535A	XE135M
F	56-BA-140	12.8 D	BETA.-	0.537A	
F	55-CS-138	32. M	BETA.-	0.545A	
F	38-SR- 91	9.7 H	BETA.-	0.558A	Y91M
F	39- Y- 91M	50. M	ISOMER	0.559A	ISOMER
F	39- Y- 92	3.6 H	BETA.-	0.56 A	
F	39- Y- 94	17. M	BETA.-	0.560A	
F	51-SB-125	2.7 Y	BETA.-	0.605A	AVERAG 0.60 0.64
F	44-RU-106	1.0 Y	BETA.-	0.62 A	RH106 0.624 0.612
F	55-CS-139	9.5 M	BETA.-	0.63 A	
F	57-LA-142	87. M	BETA.-	0.645A	
F	63-EU-156	15. D	BETA.-	0.646A	
F	38-SR- 91	9.7 H	BETA.-	0.655A	
F	55-CS-137	30. Y	BETA.-	0.662A	SINGLE
1	40-ZR- 97	17. H	BETA.-	0.663A	NB-97 DAWTR
7	41-NB- 97	74. M	BETA.-	0.663A	SINGLE

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F 37-RB- 89   15.  M BETA.- 0.665A
F 53- I-132    2.3 H BETA.- 0.665A
F 63-EU-156   15.  D BETA.- 0.724A
1 40-ZR- 95   65.  D BETA.- 0.73 A AVERAG 0.726 0.765
1 40-ZR- 97   17.  H BETA.- 0.75 A NB-97M
F 38-SR- 91    9.7 H BETA.- 0.76 A
7 41-NB- 95   35.  D BETA.- 0.766A SINGLE
F 53- I-132    2.3 H BETA.- 0.77 A
F 63-EU-156   15.  D BETA.- 0.812A
F 50-SN-125    9.4 D BETA.- 0.815A
1 57-LA-140   40.2 H BETA.- 0.817A
F 37-RB- 90    2.9 M BETA.- 0.83 A
F 55-CS-136   13.  D BETA.- 0.83 A
F 53- I-135    6.7 H BETA.- 0.84 A
F 53- I-134   53.  M BETA.- 0.86 A AVERAG 0.848 0.890
F 57-LA-142   87.  M BETA.- 0.89 A
1 37-RB- 88   18.  M BETA.- 0.899A
F 50-SN-125    9.4 D BETA.- 0.91 A
1 57-LA-140   40.2 H BETA.- 0.92 A
F 39- Y- 94   17.  M BETA.- 0.925A
F 39- Y- 92    3.6 H BETA.- 0.93 A
F 53- I-132    2.3 H BETA.- 0.952A
F 63-EU-156   15.  D BETA.- 0.96 A
F 55-CS-138   32.  M BETA.- 1.01 A
F 38-SR- 91    9.7 H BETA.- 1.03 A
F 57-LA-142   87.  M BETA.- 1.03 A
F 37-RB- 89   15.  M BETA.- 1.04 A
F 55-CS-136   13.  D BETA.- 1.065A
F 50-SN-125    9.4 D BETA.- 1.068A
F 63-EU-156   15.  D BETA.- 1.08 A
F 53- I-135    6.7 H BETA.- 1.14 A
F 39- Y- 94   17.  M BETA.- 1.15 A
F 63-EU-156   15.  D BETA.- 1.16 A
F 63-EU-156   15.  D BETA.- 1.23 A
F 37-RB- 89   15.  M BETA.- 1.256A
F 53- I-135    6.7 H BETA.- 1.265A
F 55-CS-139    9.5 M BETA.- 1.28 A
F 38-SR- 92    2.7 H BETA.- 1.38 A
F 39- Y- 92    3.6 H BETA.- 1.40 A
F 55-CS-138   32.  M BETA.- 1.43 A
1 57-LA-140   40.2 H BETA.- 1.597A
1 37-RB- 88   18.  M BETA.- 1.837A
F 55-CS-138   32.  M BETA.- 2.20 A
F 55-CS-138   32.  M BETA.- 2.61 A
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MAJOR GAMMA RAYS

NEUTRON PRODUCED ISOTOPES ORDERED BY HALF-LIFE

1	72-HF-179M	19.	S	ISOMER	0.055A	X-RAY.		
1	72-HF-179M	19.	S	ISOMER	0.215A			
1	47-AG-110	24.	S	BETA.-	A	BREMS.		
1	47-AG-110	24.	S	BETA.-	0.023A	X-RAY.		
1	47-AG-110	24.	S	BETA.-	0.656A			
1	45-RH-105M	42.0	S	ISOMER	0.020A	X-RAY		
1	45-RH-105M	42.0	S	ISOMER	0.130A	SINGLE		
1	32-GE- 77M	54.	S	BETA.-	0.162A	ISOMER		
1	32-GE- 77M	54.	S	BETA.-	0.215A			
1	41-NB- 97M	60.	S	ISOMER	0.75 A			
1	66-DY-165M	75.	S	ISOMER	0.046A	X-RAY.		
1	66-DY-165M	75.	S	ISOMER	0.108A	I.T.		
1	66-DY-165M	75.	S	ISOMER	0.155A			
1	13-AL- 28	2.3	M	BETA.-	1.78 A	SINGLE		
1	47-AG-108	2.4	M	ECAPB+	A	BREMS.		
1	47-AG-108	2.4	M	ECAPB+	0.433A			
1	47-AG-108	2.4	M	ECAPB+	0.511A	ANN.RD		
1	47-AG-108	2.4	M	ECAPB+	0.63 A	AVERAG	0.617	0.633
F	37-RB- 90	2.9	M	BETA.-	0.83 A			
N	81-TL-208	3.1	M	BETA.-	0.075A	X-RAY.		
N	81-TL-208	3.1	M	BETA.-	0.277A			
N	81-TL-208	3.1	M	BETA.-	0.51 A			
N	81-TL-208	3.1	M	BETA.-	0.563A			
N	81-TL-208	3.1	M	BETA.-	0.860A			
N	81-TL-208	3.1	M	BETA.-	2.615A			
1	51-SB-122M	3.4	M	ISOMER	0.027A	X-RAY.		
1	51-SB-122M	3.4	M	ISOMER	0.061A			
1	51-SB-122M	3.4	M	ISOMER	0.075A			
1	64-GD-161	3.7	M	BETA.-	0.044A	X-RAY.		
1	64-GD-161	3.7	M	BETA.-	0.102A			
1	64-GD-161	3.7	M	BETA.-	0.316A			
1	64-GD-161	3.7	M	BETA.-	0.363A			
1	23- V- 52	3.77	M	BETA.-	1.430A	SINGLE		
1	45-RH-104M	4.4	M	ISOMER	0.02 A	X-RAY		
1	45-RH-104M	4.4	M	ISOMER	0.051A			
1	29-CU- 66	5.1	M	BETA.-	1.040A			
1	16- S- 37	5.1	M		3.13 A	SINGLE		
1	22-TI- 51	5.8	M	BETA.-	0.322A			
1	41-NB- 94M	6.6	M	BETA.-	0.871A	SINGLE		
5	13-AL- 29	6.6	M	BETA.-	1.280A			
1	20-CA- 49	8.7	M	BETA.-	3.09 A			
1	12-MG- 27	9.5	M	BETA.-	0.842A			
1	12-MG- 27	9.5	M	BETA.-	1.01 A			
F	55-CS-139	9.5	M	BETA.-	0.63 A			
F	55-CS-139	9.5	M	BETA.-	1.28 A			
1	50-SN-125M	9.7	M	BETA.-	0.331A			
1	27-CO- 60M	10.5	M	BETA.-	0.059A	ISOMER		
1	60-ND-151	12.	M	BETA.-	0.038A	X-RAY.		
1	60-ND-151	12.	M	BETA.-	0.115A			
1	60-ND-151	12.	M	BETA.-	0.17 A			
1	60-ND-151	12.	M	BETA.-	0.254A			
1	42-MO- 101	14.6	M	BETA.-	0.08 A			
1	42-MO- 101	14.6	M	BETA.-	0.193A			
1	42-MO- 101	14.6	M	BETA.-	0.31 A			
1	42-MO- 101	14.6	M	BETA.-	0.51 A			
1	42-MO- 101	14.6	M	BETA.-	0.592A			
1	42-MO- 101	14.6	M	BETA.-	0.705A			
1	42-MO- 101	14.6	M	BETA.-	1.024A			
F	37-RB- 89	15.	M	BETA.-	0.665A			
F	37-RB- 89	15.	M	BETA.-	1.04 A			
F	37-RB- 89	15.	M	BETA.-	1.256A			
1	43-TC-101	15.0	M	BETA.-	0.128A			
1	43-TC-101	15.0	M	BETA.-	0.307A			
1	73-TA-182M	16.	M	ISOMER	0.057A	X-RAY.		
1	73-TA-182M	16.	M	ISOMER	0.146A			
1	73-TA-182M	16.	M	ISOMER	0.172A			
1	73-TA-182M	16.	M	ISOMER	0.184A			
F	39- Y- 94	17.	M	BETA.-	0.24 A			
F	39- Y- 94	17.	M	BETA.-	0.36 A			
F	39- Y- 94	17.	M	BETA.-	0.560A			
F	39- Y- 94	17.	M	BETA.-	0.925A			
F	39- Y- 94	17.	M	BETA.-	1.15 A			
1	34-SE- 81	18.	M	BETA.-	0.285A	AVERAG	0.28	0.29
1	35-BR- 80	18.	M	BETA+-	0.511A	ANN.RD		
1	35-BR- 80	18.	M	BETA+-	0.618A			
1	37-RB- 88	18.	M	BETA.-	0.899A			
1	37-RB- 88	18.	M	BETA.-	1.837A			
1	75-RE-188M	18.7	M	ISOMER	0.060A	X-RAY.		
1	75-RE-188M	18.7	M	ISOMER	0.064A			
1	75-RE-188M	18.7	M	ISOMER	0.103A	AVERAG	0.106	0.092
1	31-GA- 70	21.	M	BETA.-	0.17 A			
1	92- U-239	23.5	M	BETA.-	0.074A			
1	53- I-128	25.	M	BETA+-	0.027A	X-RAY.		
1	53- I-128	25.	M	BETA+-	0.445A			
1	62-SM-155	25.	M	BETA.-	0.042A	X-RAY.		
1	62-SM-155	25.	M	BETA.-	0.106A			
1	78-PT-199	30.	M	BETA.-	0.074A	X-RAY.		
1	78-PT-199	30.	M	BETA.-	0.189A			
1	78-PT-199	30.	M	BETA.-	0.247A			
1	78-PT-199	30.	M	BETA.-	0.320A			
1	78-PT-199	30.	M	BETA.-	0.475A			
1	78-PT-199	30.	M	BETA.-	0.540A			
F	55-CS-138	32.	M	BETA.-	0.462A			
F	55-CS-138	32.	M	BETA.-	0.545A			
F	55-CS-138	32.	M	BETA.-	1.01 A			
F	55-CS-138	32.	M	BETA.-	1.43 A			
F	55-CS-138	32.	M	BETA.-	2.20 A			
F	55-CS-138	32.	M	BETA.-	2.61 A			
1	17-CL- 38	38.0	M	BETA.-	1.640A			
1	17-CL- 38	38.0	M	BETA.-	2.160A			

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F 39- Y- 91M  50.  M ISOMER 0.559A ISOMER
F 53- I-134   53.  M BETA.- 0.86 A AVERAG 0.848 0.890
1 49-IN-116M  54.0 M BETA.- 0.137A
1 49-IN-116M  54.0 M BETA.- 0.406A
1 49-IN-116M  54.0 M BETA.- 0.81 A
1 49-IN-116M  54.0 M BETA.- 1.085A
1 49-IN-116M  54.0 M BETA.- 1.27 A
N 83-BI-212   60.  M BETA.- 0.040A
N 83-BI-212   60.  M BETA.- 0.08 A
N 83-BI-212   60.  M BETA.- 0.285A
N 83-BI-212   60.  M BETA.- 0.727A
1 34-SE- 81M  61.  M ISOMER 0.103A ISOMER
1 38-SR- 85M  70.  M E-CAPT 0.014A X-RAY.
1 38-SR- 85M  70.  M E-CAPT 0.150A
1 38-SR- 85M  70.  M E-CAPT 0.225A
7 41-NB- 97   74.  M BETA.- 0.663A
7 41-NB- 97   74.  M BETA.- 0.663A SINGLE
1 32-GE- 75   82.  M BETA.- 0.119A
1 32-GE- 75   82.  M BETA.- 0.266A
1 56-BA-139   83.  M BETA.- 0.033A X-RAY.
1 56-BA-139   83.  M BETA.- 0.166A
F 57-LA-142   87.  M BETA.- 0.645A
F 57-LA-142   87.  M BETA.- 0.89 A
F 57-LA-142   87.  M BETA.- 1.03 A
7 49-IN-113M   1.7 H ISOMER 0.024A X-RAY.
7 49-IN-113M   1.7 H ISOMER 0.393A SINGLE
1 18-AR- 41    1.83H BETA.- 1.29 A SINGLE
1 60-ND-149    1.9 H BETA.- 0.038A X-RAY.
1 60-ND-149    1.9 H BETA.- 0.08 A
1 60-ND-149    1.9 H BETA.- 0.113A AVERAG 0.112 0.114
1 60-ND-149    1.9 H BETA.- 0.150A
1 60-ND-149    1.9 H BETA.- 0.21 A AVERAG 0.198 0.210
1 60-ND-149    1.9 H BETA.- 0.26 A AVERAG 0.240 0.266
F 53- I-132    2.3 H BETA.- 0.52 A
F 53- I-132    2.3 H BETA.- 0.665A
F 53- I-132    2.3 H BETA.- 0.77 A
F 53- I-132    2.3 H BETA.- 0.952A
1 66-DY-165    2.3 H BETA.- 0.047A X-RAY.
1 66-DY-165    2.3 H BETA.- 0.098A
1 25-MN- 56    2.58H BETA.- 0.845A
1 25-MN- 56    2.58H BETA.- 1.81 A
1 25-MN- 56    2.58H BETA.- 2.12 A
1 14-SI- 31    2.62H BETA.-       A BREMS.
1 28-NI- 65    2.65H BETA.- 0.370A
1 28-NI- 65    2.65H BETA.- 1.114A
1 28-NI- 65    2.65H BETA.- 1.480A
F 38-SR- 92    2.7 H BETA.- 0.238A
F 38-SR- 92    2.7 H BETA.- 0.427A
F 38-SR- 92    2.7 H BETA.- 1.38 A
1 38-SR- 87M   2.8 H ISOMER 0.014A X-RAY.
1 38-SR- 87M   2.8 H ISOMER 0.391A SINGLE
1 55-CS-134M   2.9 H ISOMER 0.031A X-RAY.
1 55-CS-134M   2.9 H ISOMER 0.127A SINGLE
5 39- Y- 90M   3.14H ISOMER 0.203A
5 39- Y- 90M   3.14H ISOMER 0.482A
5 27-CO- 61    3.3 H BETA.- 0.068A SINGLE
F 39- Y- 92    3.6 H BETA.- 0.45 A
F 39- Y- 92    3.6 H BETA.- 0.56 A
F 39- Y- 92    3.6 H BETA.- 0.93 A
F 39- Y- 92    3.6 H BETA.- 1.40 A
1 71-LU-176M   3.7 H BETA.- 0.055A X-RAY.
1 71-LU-176M   3.7 H BETA.- 0.088A
1 36-KR- 85M   4.4 H ISOMER 0.150A
1 36-KR- 85M   4.4 H ISOMER 0.305A I.T.
1 44-RU-105    4.45H BETA.- 0.020A X-RAY.
1 44-RU-105    4.45H BETA.- 0.13 A RH105M
1 44-RU-105    4.45H BETA.- 0.264A
1 44-RU-105    4.45H BETA.- 0.316A
1 44-RU-105    4.45H BETA.- 0.472A
1 44-RU-105    4.45H BETA.- 0.670A
1 44-RU-105    4.45H BETA.- 0.723A
7 49-IN-115M   4.5 H ISOMER 0.024A X-RAY.
7 49-IN-115M   4.5 H ISOMER 0.335A SINGLE
1 72-HF-180M   5.5 H ISOMER 0.058A
1 72-HF-180M   5.5 H ISOMER 0.093A
1 72-HF-180M   5.5 H ISOMER 0.216A
1 72-HF-180M   5.5 H ISOMER 0.333A
1 72-HF-180M   5.5 H ISOMER 0.444A
F 59-PR-145    5.9 H BETA.-       A BREMS.
F 59-PR-145    5.9 H BETA.- 0.037A X-RAY.
F 59-PR-145    5.9 H BETA.- 0.072A
F 53- I-135    6.7 H BETA.- 0.03 A X-RAY.
F 53- I-135    6.7 H BETA.- 0.22 A
F 53- I-135    6.7 H BETA.- 0.29 A
F 53- I-135    6.7 H BETA.- 0.42 A
F 53- I-135    6.7 H BETA.- 0.535A XE135M
F 53- I-135    6.7 H BETA.- 0.84 A
F 53- I-135    6.7 H BETA.- 1.14 A
F 53- I-135    6.7 H BETA.- 1.265A
1 68-ER-171    7.5 H BETA.- 0.050A X-RAY.
1 68-ER-171    7.5 H BETA.- 0.118A AVERAG 0.112 0.117 0.124
1 68-ER-171    7.5 H BETA.- 0.305A AVERAG 0.296 0.308
F 54-XE-135    9.2 H BETA.- 0.250A
1 63-EU-152M   9.3 H ECBET- 0.04 A X-RAY.
1 63-EU-152M   9.3 H ECBET- 0.122A
1 63-EU-152M   9.3 H ECBET- 0.344A
1 63-EU-152M   9.3 H ECBET- 0.841A
1 63-EU-152M   9.3 H ECBET- 0.963A
1 63-EU-152M   9.3 H ECBET- 0.975A
F 38-SR- 91    9.7 H BETA.- 0.558A Y91M
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F	38-SR- 91	9.7	H	BETA.-	0.655A				
F	38-SR- 91	9.7	H	BETA.-	0.76 A				
F	38-SR- 91	9.7	H	BETA.-	1.03 A				
F	39- Y- 93	10.1	H	BETA.-	0.265A				
N	82-PB-212	10.6	H	BETA.-	0.077A	X-RAY.			
N	82-PB-212	10.6	H	BETA.-	0.239A				
1	32-GE- 77	11.	H	BETA.-	0.215A				
1	32-GE- 77	11.	H	BETA.-	0.264A				
1	32-GE- 77	11.	H	BETA.-	0.367A				
1	32-GE- 77	11.	H	BETA.-	0.416A				
1	19- K- 42	12.4	H	BETA.-	1.52 A				
1	29-CU- 64	12.9	H	ECBE+-	0.511A	ANN.RD			
1	46-PD-109	13.6	H	BETA.-	0.022A	X-RAY.			
1	46-PD-109	13.6	H	BETA.-	0.088A	AG109M			
1	30-ZN- 69M	14.	H	ISOMER	0.440A	SINGLE			
1	31-GA- 72	14.1	H	BETA.-	0.625A	AVERAG	0.60	0.62	0.63
1	31-GA- 72	14.1	H	BETA.-	0.83 A	AVERAG	0.832	0.81	
F	63-EU-157	15.	H	BETA.-	0.042A	X-RAY.			
F	63-EU-157	15.	H	BETA.-	0.064A				
F	63-EU-157	15.	H	BETA.-	0.4 A	AVERAG	0.32	0.38	0.41
1	11-NA- 24	15.0	H	BETA.-	1.368A				
1	11-NA- 24	15.0	H	BETA.-	2.750A				
1	75-RE-188	17.	H	BETA.-	0.063A	X-RAY.			
1	75-RE-188	17.	H	BETA.-	0.155A				
1	40-ZR- 97	17.	H	BETA.-	0.663A	NB-97	DAWTR		
1	40-ZR- 97	17.	H	BETA.-	0.75 A	NB-97M			
1	54-XE-125	18.	H	E-CAPT	0.028A	X-RAY.			
1	64-GD-159	18.	H	BETA.-	0.044A	X-RAY.			
1	54-XE-125	18.	H	E-CAPT	0.188A				
1	54-XE-125	18.	H	E-CAPT	0.243A				
1	64-GD-159	18.	H	BETA.-	0.362A				
1	77-IR-194	19.	H	BETA.-	0.328A				
1	59-PR-142	19.2	H	BETA.-	1.58 A	SINGLE			
1	59-PR-142	19.2	H	BETA.-	1.58 A	BREMS.			
1	78-PT-197	20.	H	BETA.-	0.077A	X-RAY.			
1	78-PT-197	20.	H	BETA.-	0.191A				
F	53- I-133	20.8	H	BETA.-	0.525A				
9	12-MG- 28	21.3	H	BETA.-	0.031A				
9	12-MG- 28	21.3	H	BETA.-	0.40 A				
9	12-MG- 28	21.3	H	BETA.-	0.95 A				
9	12-MG- 28	21.3	H	BETA.-	1.35 A				
9	12-MG- 28	21.3	H	BETA.-	1.78 A	AL-28			
1	80-HG-197M	24.	H	E-CAPT	0.069A	X-RAY.			
1	74- W-187	24.	H	BETA.-	0.06 A	X-RAY.			
1	74- W-187	24.	H	BETA.-	0.134A				
1	74- W-187	24.	H	BETA.-	0.480A				
1	74- W-187	24.	H	BETA.-	0.686A				
1	33-AS- 76	26.5	H	BETA.-	0.559A				
1	67-HO-166	27.	H	BETA.-	0.049A	X-RAY.			
1	67-HO-166	27.	H	BETA.-	0.081A				
5	61-PM-151	28.4	H	BETA.-	0.040A	X-RAY.			
5	61-PM-151	28.4	H	BETA.-	0.065A				
5	61-PM-151	28.4	H	BETA.-	0.10 A				
5	61-PM-151	28.4	H	BETA.-	0.163A				
5	61-PM-151	28.4	H	BETA.-	0.24 A				
5	61-PM-151	28.4	H	BETA.-	0.340A				
5	61-PM-151	28.4	H	BETA.-	0.442A				
1	76-OS-193	32.	H	BETA.-	0.066A	X-RAY.			
1	76-OS-193	32.	H	BETA.-	0.139A				
1	58-CE-143	33.	H	BETA.-	0.036A	X-RAY.			
1	58-CE-143	33.	H	BETA.-	0.294A				
1	58-CE-143	33.	H	BETA.-	0.232A				
1	58-CE-143	33.	H	BETA.-	0.057A				
1	35-BR- 82	36.	H	BETA.-	0.028A	X-RAY.			
1	35-BR- 82	36.	H	BETA.-	0.554A				
1	35-BR- 82	36.	H	BETA.-	0.619A				
1	35-BR- 82	36.	H	BETA.-	0.777A				
1	35-BR- 82	36.	H	BETA.-	1.044A				
1	35-BR- 82	36.	H	BETA.-	1.317A				
7	33-AS- 77	39.	H	BETA.-	0.246A				
7	33-AS- 77	39.	H	BETA.-	0.525A				
1	57-LA-140	40.2	H	BETA.-	0.327A				
1	57-LA-140	40.2	H	BETA.-	0.487A				
1	57-LA-140	40.2	H	BETA.-	0.817A				
1	57-LA-140	40.2	H	BETA.-	0.92 A				
1	57-LA-140	40.2	H	BETA.-	1.597A				
5	21-SC- 48	44.	H	BETA.-	1.01 A	AVERAG	0.990	1.040	
5	21-SC- 48	44.	H	BETA.-	1.31 A				
1	62-SM-153	46.7	H	BETA.-	0.041A	X-RAY			
1	62-SM-153	46.7	H	BETA.-	0.070A				
1	62-SM-153	46.7	H	BETA.-	0.103A				
1	79-AU-198	64.8	H	BETA.-	0.070A	X-RAY.			
1	79-AU-198	64.8	H	BETA.-	0.412A				
1	80-HG-197	65.	H	E-CAPT	0.072A	AVERAG	0.069	0.077	
1	42-MO- 99	66.	H	BETA.-	0.142A	TC99M			
F	52-TE-132	78.	H	BETA.-	0.028A	X-RAY.			
F	52-TE-132	78.	H	BETA.-	0.055A				
F	52-TE-132	78.	H	BETA.-	0.232A				
1	48-CD-115	2.3	D	BETA.-	0.024A	X-RAY.			
1	48-CD-115	2.3	D	BETA.-	0.335A	IN115M			
1	48-CD-115	2.3	D	BETA.-	0.52 A	AVERAG	0.490	0.523	
1	93-NP-239	2.35	D	BETA.-	0.018A	X-RAY.			
1	93-NP-239	2.35	D	BETA.-	0.106A	X-RAY.			
1	93-NP-239	2.35	D	BETA.-	0.228A				
1	93-NP-239	2.35	D	BETA.-	0.278A				
1	51-SB-122	2.8	D	BETA.-	0.561A				
1	44-RU- 97	2.9	D	E-CAPT	0.215A				
5	21-SC- 47	3.4	D	BETA.-	0.155A	SINGLE			
1	78-PT-195M	4.1	D	ISOMER	0.067A	X-RAY.			
1	78-PT-195M	4.1	D	ISOMER	0.099A				

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1 70-YB-175     4.2 D BETA.- 0.054A X-RAY.
1 70-YB-175     4.2 D BETA.- 0.114A
1 70-YB-175     4.2 D BETA.- 0.283A
1 70-YB-175     4.2 D BETA.- 0.396A
1 20-CA- 47     4.5 D BETA.- 0.489A
1 20-CA- 47     4.5 D BETA.- 0.809A
1 20-CA- 47     4.5 D BETA.- 1.299A
2 73-TA-183     5.2 D BETA.- 0.059A X-RAY.
2 73-TA-183     5.2 D BETA.- 0.10 A AVERAG 0.099 0.107
2 73-TA-183     5.2 D BETA.- 0.161A
2 73-TA-183     5.2 D BETA.- 0.245A AVERAG 0.244 0.246
F 54-XE-133     5.3 D BETA.- 0.031A X-RAY.
F 54-XE-133     5.3 D BETA.- 0.083A
5 61-PM-148     5.4 D BETA.- 0.551A
5 61-PM-148     5.4 D BETA.- 0.910A
5 61-PM-148     5.4 D BETA.- 1.46 A
1 71-LU-177     6.8 D BETA.- 0.056A X-RAY.
1 71-LU-177     6.8 D BETA.- 0.113A
1 71-LU-177     6.8 D BETA.- 0.208A
1 47-AG-111     7.5 D BETA.- 0.247A
1 47-AG-111     7.5 D BETA.- 0.342A
F 53- I-131     8.0 D BETA.- 0.029A X-RAY.
F 53- I-131     8.0 D BETA.- 0.080A
F 53- I-131     8.0 D BETA.- 0.284A
F 53- I-131     8.0 D BETA.- 0.364A
F 50-SN-125     9.4 D BETA.- 0.026A X-RAY
F 50-SN-125     9.4 D BETA.- 0.33 A AVERAG 0.331 0.34
F 50-SN-125     9.4 D BETA.- 0.468A
F 50-SN-125     9.4 D BETA.- 0.815A
F 50-SN-125     9.4 D BETA.- 0.91 A
F 50-SN-125     9.4 D BETA.- 1.068A
1 60-ND-147    11.1 D BETA.- 0.038A X-RAY.
1 60-ND-147    11.1 D BETA.- 0.091A
1 56-BA-131    11.5 D E-CAPT 0.030A X-RAY.
1 56-BA-131    11.5 D E-CAPT 0.126A
1 56-BA-131    11.5 D E-CAPT 0.220A
1 56-BA-131    11.5 D E-CAPT 0.375A
1 56-BA-131    11.5 D E-CAPT 0.498A
F 56-BA-140    12.8 D BETA.- 0.029A X-RAY.
F 56-BA-140    12.8 D BETA.- 0.161A
F 56-BA-140    12.8 D BETA.- 0.304A
F 56-BA-140    12.8 D BETA.- 0.43 A AVERAG 0.422 0.436
F 56-BA-140    12.8 D BETA.- 0.537A
F 55-CS-136    13.  D BETA.- 0.03 A X-RAY
F 55-CS-136    13.  D BETA.- 0.067A
F 55-CS-136    13.  D BETA.- 0.087A
F 55-CS-136    13.  D BETA.- 0.16 A AVERAG
F 55-CS-136    13.  D BETA.- 0.27 A
F 55-CS-136    13.  D BETA.- 0.34 A
F 55-CS-136    13.  D BETA.- 0.83 A
F 55-CS-136    13.  D BETA.- 1.065A
1 59-PR-143    13.7 D BETA.-       A BREMSP
1 76-OS-191    15.  D BETA.- 0.064A X-RAY.
1 76-OS-191    15.  D BETA.- 0.129A
F 63-EU-156    15.  D BETA.- 0.042A X-RAY.
F 63-EU-156    15.  D BETA.- 0.089A
F 63-EU-156    15.  D BETA.- 0.199A
F 63-EU-156    15.  D BETA.- 0.646A
F 63-EU-156    15.  D BETA.- 0.724A
F 63-EU-156    15.  D BETA.- 0.812A
F 63-EU-156    15.  D BETA.- 0.96 A
F 63-EU-156    15.  D BETA.- 1.08 A
F 63-EU-156    15.  D BETA.- 1.16 A
F 63-EU-156    15.  D BETA.- 1.23 A
1 37-RB- 86    18.7 D BETA.- 1.077A
7 91-PA-233    27.  D BETA.- 0.015A X-RAY.
7 91-PA-233    27.  D BETA.- 0.103A X-RAY.
7 91-PA-233    27.  D BETA.- 0.32 A AVERAG 0.300 0.312 0.340
1 24-CR- 51    27.8 D E-CAPT 0.322A SINGLE
1 70-YB-169    32.  D BETA.- 0.054A X-RAY.
1 70-YB-169    32.  D BETA.- 0.115A AVERAG 0.093 0.110 0.118
1 70-YB-169    32.  D BETA.- 0.19 A AVERAG 0.177 0.198
1 58-CE-141    32.5 D BETA.- 0.036A X-RAY.
1 58-CE-141    32.5 D BETA.- 0.145A
7 41-NB- 95    35.  D BETA.- 0.766A SINGLE
1 44-RU-103    40.  D BETA.- 0.020A X-RAY.
1 44-RU-103    40.  D BETA.- 0.498A
5 61-PM-148M   41.  D BETA.- 0.29 A AVERAG
5 61-PM-148M   41.  D BETA.- 0.42 A AVERAG
5 61-PM-148M   41.  D BETA.- 0.548A
5 61-PM-148M   41.  D BETA.- 0.626A
5 61-PM-148M   41.  D BETA.- 0.723A
5 61-PM-148M   41.  D BETA.- 0.913A
5 61-PM-148M   41.  D BETA.- 1.01 A
1 72-HF-181    43.  D BETA.- 0.057A X-RAY.
1 72-HF-181    43.  D BETA.- 0.135A AVERAG 0.133 0.136
1 72-HF-181    43.  D BETA.- 0.346A
1 72-HF-181    43.  D BETA.- 0.482A
1 48-CD-115M   43.0 D BETA.-       A BREMS.
1 48-CD-115M   43.0 D BETA.- 0.485A
1 48-CD-115M   43.0 D BETA.- 0.935A
1 48-CD-115M   43.0 D BETA.- 1.295A
1 26-FE- 59    45.  D BETA.- 1.097A DUBLET
1 26-FE- 59    45.  D BETA.- 1.289A DUBLET
1 80-HG-203    47.  D BETA.- 0.072A X-RAY.
1 80-HG-203    47.  D BETA.- 0.279A
1 49-IN-114M   50.0 D ISOMER 0.024A X-RAY
1 49-IN-114M   50.0 D ISOMER 0.192A I.T.
1 52-TE-125M   58.  D ISOMER 0.027A X-RAY
1 52-TE-125M   58.  D ISOMER 0.110A
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F	39- Y- 91	59.	D	BETA.-	A	BREMS.			
1	51-SB-124	60.	D	BETA.-	0.603A				
1	51-SB-124	60.	D	BETA.-	0.722A				
1	51-SB-124	60.	D	BETA.-	1.69 A				
1	40-ZR- 95	65.	D	BETA.-	0.73 A	AVERAG	0.726	0.765	
1	72-HF-175	70.	D	E-CAPT	0.054A	X-RAY.			
1	72-HF-175	70.	D	E-CAPT	0.343A				
5	27-CO- 58	70.	D	ECAPB+	0.511A	ANN.RD			
5	27-CO- 58	70.	D	ECAPB+	0.808A				
1	65-TB-160	73.	D	BETA.-	0.046A	X-RAY.			
1	65-TB-160	73.	D	BETA.-	0.087A				
1	65-TB-160	73.	D	BETA.-	0.20 A	AVERAG	0.197	0.216	
1	65-TB-160	73.	D	BETA.-	0.298A				
1	65-TB-160	73.	D	BETA.-	0.879A				
1	65-TB-160	73.	D	BETA.-	0.964A	AVERAG	0.962	0.966	
1	77-IR-192	74.	D	BETA.-	0.066A	X-RAY.			
1	77-IR-192	74.	D	BETA.-	0.31 A	AVERAG	0.295	0.316	0.308
1	77-IR-192	74.	D	BETA.-	0.468A				
1	77-IR-192	74.	D	BETA.-	0.61 A	AVERAG	0.588	0.604	0.613
1	21-SC- 46	85.0	D	BETA.-	0.887A				
1	21-SC- 46	85.0	D	BETA.-	1.119A				
1	76-OS-185	94.	D	E-CAPT	0.061A	X-RAY.			
1	76-OS-185	94.	D	E-CAPT	0.646A				
1	73-TA-182	115.	D	BETA.-	0.059A	X-RAY.			
1	73-TA-182	115.	D	BETA.-	0.10 A				
1	73-TA-182	115.	D	BETA.-	0.15 A				
1	73-TA-182	115.	D	BETA.-	0.22 A				
1	50-SN-113	118.0	D	E-CAPT	0.024A	X-RAY			
1	50-SN-113	118.0	D	E-CAPT	0.393A	IN113M			
1	34-SE- 75	120.	D	E-CAPT	0.134A	AVERAG	0.121	0.136	
1	34-SE- 75	120.	D	E-CAPT	0.268A	AVERAG	0.265	0.280	
1	69-TM-170	127.	D	BETA.-	0.052A	X-RAY.			
1	69-TM-170	127.	D	BETA.-	0.084A				
1	64-GD-153	200.	D	E-CAPT	0.041A	X-RAY.			
1	64-GD-153	200.	D	E-CAPT	0.103A	AVERAG	0.097	0.103	
1	30-ZN- 65	245.	D	ECAPB+	1.114A				
1	47-AG-110M	250.	D	BETA.-	0.66 A	AVERAG	0.656	0.677	0.687
1	47-AG-110M	250.	D	BETA.-	0.89 A	AVERAG	0.815	0.885	0.937
F	58-CE-144	284.	D	BETA.-	0.036A	X-RAY.			
F	58-CE-144	284.	D	BETA.-	0.134A				
1	48-CD-109	470.	D	E-CAPT	0.022A	X-RAY.			
F	44-RU-106	1.0	Y	BETA.-	0.513A	RH106			
F	44-RU-106	1.0	Y	BETA.-	0.62 A	RH106	0.624	0.612	
F	63-EU-155	1.7	Y	BETA.-	0.042A	X-RAY.			
F	63-EU-155	1.7	Y	BETA.-	0.087A				
F	63-EU-155	1.7	Y	BETA.-	0.105A				
N	90-TH-228	1.9	Y	ALPHA.	0.239A	PB-212			
N	90-TH-228	1.9	Y	ALPHA.	0.077A	X-RAY.			
N	90-TH-228	1.9	Y	ALPHA.	0.300A	PB-212			
N	90-TH-228	1.9	Y	ALPHA.	0.511A				
N	90-TH-228	1.9	Y	ALPHA.	0.583A	TL-208			
1	55-CS-134	2.1	Y	BETA.-	0.60 A	AVERAG	0.563	0.570	
1	55-CS-134	2.1	Y	BETA.-	0.80 A	AVERAG	0.796	0.801	
F	61-PM-147	2.5	Y	BETA.-	A	BREMS.			
F	51-SB-125	2.7	Y	BETA.-	0.027A	X-RAY.			
F	51-SB-125	2.7	Y	BETA.-	0.175A				
F	51-SB-125	2.7	Y	BETA.-	0.43 A	AVERAG	0.427	0.463	
F	51-SB-125	2.7	Y	BETA.-	0.605A	AVERAG	0.60	0.64	
1	81-TL-204	3.9	Y	ECAPB-	0.070A	X-RAY.			
1	47-AG-108M	5.	Y	E-CAPT	0.021A	X-RAY.			
1	47-AG-108M	5.	Y	E-CAPT	0.081A				
1	47-AG-108M	5.	Y	E-CAPT	0.434A				
1	47-AG-108M	5.	Y	E-CAPT	0.615A				
1	47-AG-108M	5.	Y	E-CAPT	0.724A				
1	27-CO- 60	5.27	Y	BETA.-	1.173A	DUBLET			
1	27-CO- 60	5.27	Y	BETA.-	1.332A	DUBLET			
1	56-BA-133	7.5	Y	E-CAPT	0.031A	X-RAY.			
1	56-BA-133	7.5	Y	E-CAPT	0.08 A	AVERAG	0.078	0.081	
1	56-BA-133	7.5	Y	E-CAPT	0.29 A	AVERAG	0.274	0.302	
1	56-BA-133	7.5	Y	E-CAPT	0.36 A	AVERAG	0.355	0.380	
F	36-KR- 85	10.4	Y	BETA.-	0.515A				
F	36-KR- 85	10.4	Y	BETA.-	0.515A	BREMS.			
F	55-CS-137	30.	Y	BETA.-	0.032A	X-RAY.			
F	55-CS-137	30.	Y	BETA.-	0.662A	SINGLE			
1	67-HO-166M	100.	Y	BETA.-	0.049A	X-RAY.			
1	67-HO-166M	100.	Y	BETA.-	0.08 A				
1	67-HO-166M	100.	Y	BETA.-	0.184A				
1	67-HO-166M	100.	Y	BETA.-	0.28 A	AVERAG	0.263	0.280	0.300
1	67-HO-166M	100.	Y	BETA.-	0.71 A				
1	67-HO-166M	100.	Y	BETA.-	0.810A				
N	88-RA-226	162E03	Y	ALPHA.	0.060A				
N	88-RA-226	162E03	Y	ALPHA.	0.61 A	BI-214			
N	88-RA-226	162E03	Y	ALPHA.	0.18 A				
N	88-RA-226	162E03	Y	ALPHA.	0.30 A	PB-214			
N	88-RA-226	162E03	Y	ALPHA.	0.35 A	PB-214			
1	41-NB- 94	200E04	Y	BETA.-	0.702A	DUBLET			
1	41-NB- 94	200E04	Y	BETA.-	0.871A	DUBLET			
N	91-PA-231	340E04	Y	ALPHA.	0.090A	X-RAY.			
N	91-PA-231	340E04	Y	ALPHA.	0.155A				
N	91-PA-231	340E04	Y	ALPHA.	0.30 A	AVERAG	0.260	0.300	0.330
F	43-TC- 99	210E05	Y	BETA.-	A	BREMSP			
N	92- U-235	110E08	Y	ALPHA.	0.015A	X-RAY.			
N	92- U-235	110E08	Y	ALPHA.	0.110A	X-RAY.			
N	92- U-235	110E08	Y	ALPHA.	0.145A				
N	92- U-235	110E08	Y	ALPHA.	0.18 A	AVERAG	0.165	0.185	0.200
N	19- K- 40	127E10	Y	BETA.-	1.460A	SINGLE			
N	90-TH-232	140E10	Y	ALPHA.	0.09 A	X-RAY.			
N	90-TH-232	140E10	Y	ALPHA.	0.239A	PB-212			
N	90-TH-232	140E10	Y	ALPHA.	0.34 A	AC-228			
N	90-TH-232	140E10	Y	ALPHA.	0.583A	TL-208			

MAJOR GAMMA RAYS

ACCELERATOR PRODUCED ISOTOPES

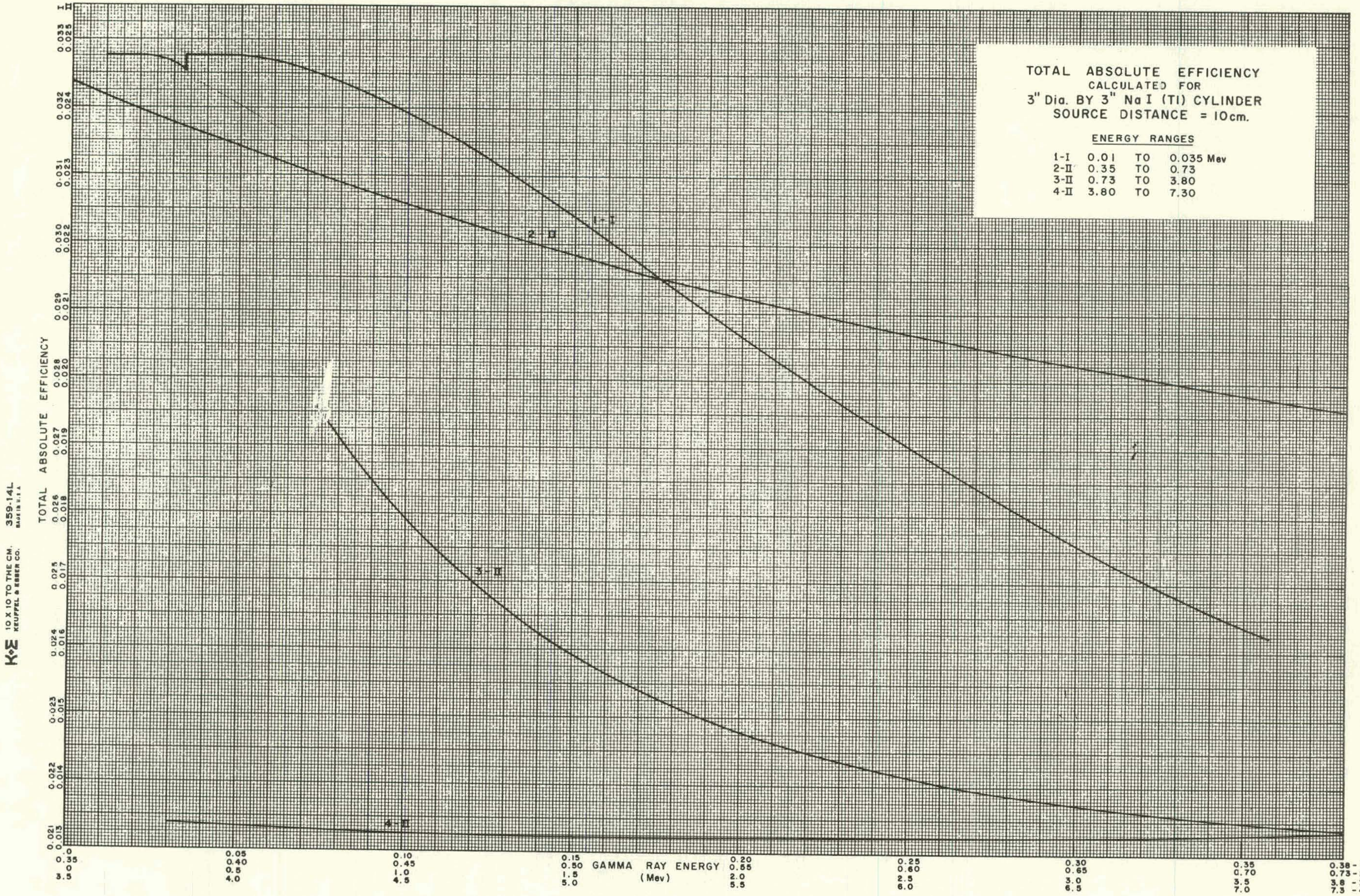
ORDERED BY HALF-LIFE

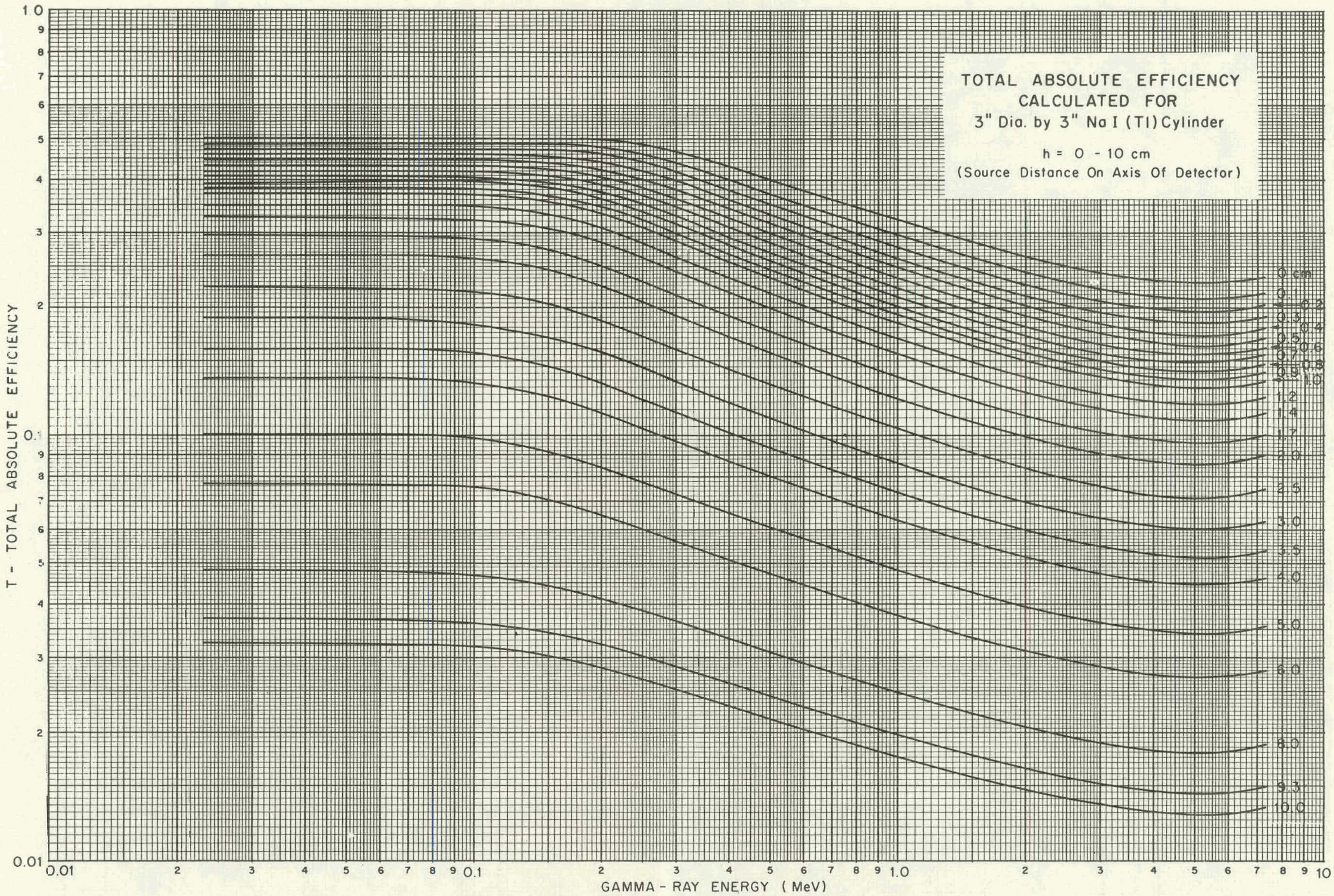
4	17-CL- 34	1.6	S	BETA.+	0.511A	ANN.RD	
4	40-ZR- 89M	4.4	M	ISOMER	0.589A	ISOMER	
4	19- K- 38	7.7	M	BETA.+	0.511A	ANN.RD	
4	19- K- 38	7.7	M	BETA.+	2.160A		
4	26-FE- 53	9.	M	BETA.+	0.380A		
4	26-FE- 53	9.	M	BETA.+	0.511A	ANN.RD	
3	57-LA-136	9.5	M	ECAPB+	0.511A	ANN.RD	
4	29-CU- 62	9.9	M	ECAPB+	0.511A	ANN.RD	
4	49-IN-112	14.0	M	ECAPB+	0.511A	ANN.RD	
4	49-IN-112	14.0	M	ECAPB+	0.615A		
4	42-MO- 91	16.	M	BETA.+	0.511A	ANN.RD	
4	51-SB-120	16.	M	ECAPB+	0.511A	ANN-RD	
4	37-RB- 84M	21.	M	ISOMER	0.216A		
4	37-RB- 84M	21.	M	ISOMER	0.250A		
4	37-RB- 84M	21.	M	ISOMER	0.465A		
4	49-IN-112M	21.0	M	ISOMER	0.155A	I.T.	
4	47-AG-106	24.	M	ECAPB+	0.512A	AVERAG	0.511 0.513
4	17-CL- 34M	32.4	M	BETA.+	0.139A	ISOMER	
4	17-CL- 34M	32.4	M	BETA.+	0.511A	ANN.RD	
4	67-HO-164	37.	M	BETA+-	0.045A	X-RAY.	
4	30-ZN- 63	38.	M	ECAPB+	0.511A	ANN.RD	
4	24-CR- 49	42.	M	BETA.+	0.089A		
4	24-CR- 49	42.	M	BETA.+	0.152A		
4	24-CR- 49	42.	M	BETA.+	0.511A	ANN.RD	
3	82-PB-204M	67.	M	ISOMER	0.075A	X-RAY.	
3	82-PB-204M	67.	M	ISOMER	0.375A	TRPLET	
3	82-PB-204M	67.	M	ISOMER	0.905A	AVERAG	0.899 0.912
4	31-GA- 68	68.0	M	ECAPB+	0.511A	ANN.RD	
4	44-RU- 95	1.7	H	ECAPB+	0.340A		
4	44-RU- 95	1.7	H	ECAPB+	0.511A	ANN-RD	
4	44-RU- 95	1.7	H	ECAPB+	0.625A		
4	60-ND-141	2.4	H	ECAPB+	0.036A	X-RAY.	
4	60-ND-141	2.4	H	ECAPB+	0.511A	ANN.RD	
4	22-TI- 45	3.08	H	ECAPB+	0.511A	ANN.RD	
3	29-CU- 61	3.3	H	ECAPB+	0.284A		
3	29-CU- 61	3.3	H	ECAPB+	0.511A	ANN.RD	
4	21-SC- 44	4.0	H	ECAPB+	0.511A	ANN.RD	
4	21-SC- 44	4.0	H	ECAPB+	1.159A		
4	59-PR-139	4.5	H	ECAPB+	0.035A	X-RAY.	
4	59-PR-139	4.5	H	ECAPB+	0.511A	ANN-RD	
4	34-SE- 73	7.1	H	BETA.+	0.066A		
4	34-SE- 73	7.1	H	BETA.+	0.359A		
4	34-SE- 73	7.1	H	BETA.+	0.511A	ANN.RD	
4	73-TA-180M	8.1	H	ECAPB-	0.055A	X-RAY.	
4	73-TA-180M	8.1	H	ECAPB-	0.096A	AVERAG	0.093 0.102
3	53- I-130	12.5	H	BETA.-	0.41 A		
3	53- I-130	12.5	H	BETA.-	0.53 A	TRPLET	
3	53- I-130	12.5	H	BETA.-	0.66 A	TRPLET	
3	53- I-130	12.5	H	BETA.-	0.74 A	TRPLET	
3	39- Y- 86	15.	H	ECAPB+	0.38 A		
3	39- Y- 86	15.	H	ECAPB+	0.45 A		
3	39- Y- 86	15.	H	ECAPB+	0.511A	ANN.RD	
3	39- Y- 86	15.	H	ECAPB+	0.643A		
3	39- Y- 86	15.	H	ECAPB+	1.084A		
3	39- Y- 86	15.	H	ECAPB+	1.16 A		
8	43-TC- 95	20.	H	E-CAPT	0.017A	X-RAY.	
8	43-TC- 95	20.	H	E-CAPT	0.768A		
4	72-HF-173	24.	H	E-CAPT	0.054A	X-RAY.	
4	72-HF-173	24.	H	E-CAPT	0.125A		
4	72-HF-173	24.	H	E-CAPT	0.297A		
3	33-AS- 72	26.	H	ECAPB+	0.511A	ANN.RD	
3	33-AS- 72	26.	H	ECAPB+	0.833A		
4	28-NI- 57	36.	H	ECAPB+	0.127A		
4	28-NI- 57	36.	H	ECAPB+	0.511A	ANN.RD	
4	28-NI- 57	36.	H	ECAPB+	1.38 A		
4	32-GE- 69	40.	H	ECAPB+	0.511A	ANN.RD	
4	32-GE- 69	40.	H	ECAPB+	0.580A		
4	32-GE- 69	40.	H	ECAPB+	1.12 A		
3	82-PB-203	52.	H	E-CAPT	0.073A	X-RAY.	
3	82-PB-203	52.	H	E-CAPT	0.279A		
3	35-BR- 77	58.	H	ECAPB+	0.246A		
3	35-BR- 77	58.	H	ECAPB+	0.520A	AVERAG	0.511 0.524
6	29-CU- 67	61.	H	BETA.-	0.092A	AVERAG	0.091 0.093
6	29-CU- 67	61.	H	BETA.-	0.184A		
3	31-GA- 67	78.	H	ECAPB+	0.093A		
3	31-GA- 67	78.	H	ECAPB+	0.184A		
3	31-GA- 67	78.	H	ECAPB+	0.296A		
4	40-ZR- 89	79.	H	ECAPB+	0.511A	ANN.RD	
4	40-ZR- 89	79.	H	ECAPB+	0.906A		
4	21-SC- 44M	2.4	D	ISOMER	0.270A	ISOMER	
4	49-IN-111	2.8	D	E-CAPT	0.023A	X-RAY	
4	49-IN-111	2.8	D	E-CAPT	0.173A		
4	49-IN-111	2.8	D	E-CAPT	0.247A		
8	79-AU-199	3.2	D	BETA.-	0.070A	X-RAY.	
8	79-AU-199	3.2	D	BETA.-	0.158A		
8	79-AU-199	3.2	D	BETA.-	0.208A		
3	53- I-124	4.2	D	ECAPB+	0.511A	ANN.RD	
3	53- I-124	4.2	D	ECAPB+	0.603A		
3	53- I-124	4.2	D	ECAPB+	0.72 A		
3	43-TC- 96	4.3	D	E-CAPT	0.017A	X-RAY.	
3	43-TC- 96	4.3	D	E-CAPT	0.80 A	AVERAG	0.770 0.804 0.840
3	45-RH-101M	4.7	D	E-CAPT	0.019A	X-RAY.	
3	45-RH-101M	4.7	D	E-CAPT	0.307A		
3	25-MN- 52	5.7	D	ECAPB+	0.511A	ANN.RD	
3	25-MN- 52	5.7	D	ECAPB+	0.743A	TRIPLT	
3	25-MN- 52	5.7	D	ECAPB+	0.935A	TRIPLT	
3	25-MN- 52	5.7	D	ECAPB+	1.430A	TRIPLT	
4	51-SB-120M	5.8	D	E-CAPT	0.025A	X-RAY.	
4	51-SB-120M	5.8	D	E-CAPT	0.087A		
4	51-SB-120M	5.8	D	E-CAPT	0.197A		

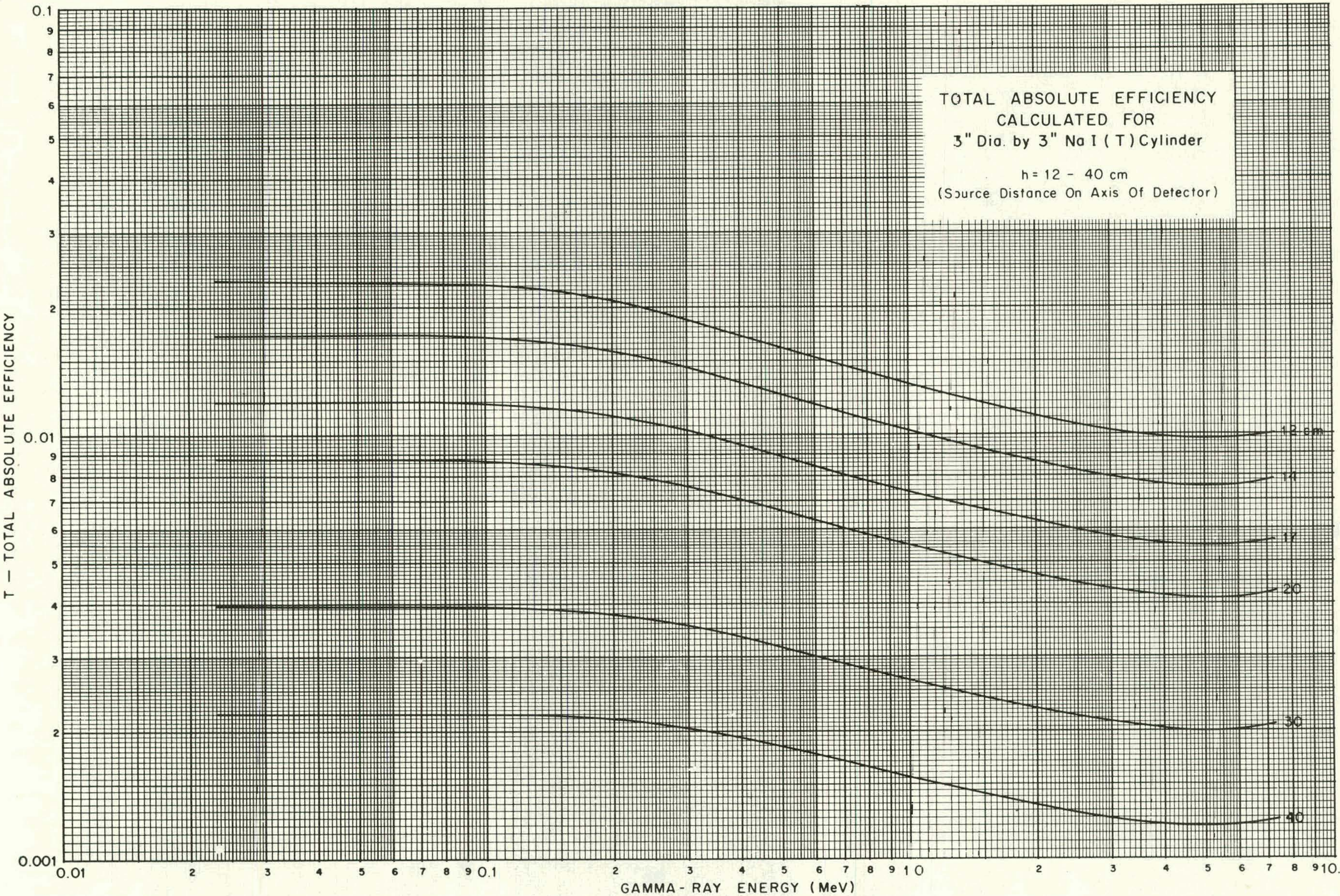
4	79-AU-196	6.1	D	BETA+-	0.066A	X-RAY.			
4	79-AU-196	6.1	D	BETA+-	0.35 A	AVERAG	0.331	0.356	
4	55-CS-132	6.5	D	ECAPB+	0.03 A	X-RAY.			
4	55-CS-132	6.5	D	ECAPB+	0.665A				
4	92- U-237	6.7	D	BETA.-	0.060A				
4	92- U-237	6.7	D	BETA.-	0.102A	X-RAY.			
4	92- U-237	6.7	D	BETA.-	0.208A				
4	47-AG-106M	8.3	D	E-CAPT	0.44 A	AVERAG	0.41	0.46	
4	47-AG-106M	8.3	D	E-CAPT	0.513A				
4	47-AG-106M	8.3	D	E-CAPT	0.62 A				
4	47-AG-106M	8.3	D	E-CAPT	0.73 A				
4	47-AG-106M	8.3	D	E-CAPT	0.79 A	AVERAG	0.78	0.80	0.81
4	47-AG-106M	8.3	D	E-CAPT	1.05 A				
4	47-AG-106M	8.3	D	E-CAPT	1.13 A				
4	47-AG-106M	8.3	D	E-CAPT	1.20 A				
4	41-NB- 92	10.	D	E-CAPT	0.931A	SINGLE			
4	81-TL-202	12.	D	E-CAPT	0.070A	X-RAY.			
4	81-TL-202	12.	D	E-CAPT	0.438A				
3	53- I-126	13.2	D	ECAPB+	0.027A	X-RAY.			
3	53- I-126	13.2	D	ECAPB+	0.386A				
3	53- I-126	13.2	D	ECAPB+	0.665A				
3	83-BI-205	15.	D	ECAPB+	0.075A	X-RAY.			
3	83-BI-205	15.	D	ECAPB+	0.275A	AVERAG	0.261	0.284	
3	83-BI-205	15.	D	ECAPB+	0.52 A	AVERAG	0.516	0.526	
3	83-BI-205	15.	D	ECAPB+	0.56 A	AVERAG	0.550	0.570	
3	83-BI-205	15.	D	ECAPB+	0.703A				
3	83-BI-205	15.	D	ECAPB+	0.988A				
3	23- V- 48	16.	D	ECAPB+	0.511A	ANN.RD			
3	23- V- 48	16.	D	ECAPB+	0.990A	DUBLET			
3	23- V- 48	16.	D	ECAPB+	1.310A	DUBLET			
4	33-AS- 74	18.	D	ECAPB+	0.511A	ANN.RD			
4	33-AS- 74	18.	D	ECAPB+	0.596A				
3	47-AG-105	40.	D	E-CAPT	0.021A	X-RAY.			
3	47-AG-105	40.	D	E-CAPT	0.064A				
3	47-AG-105	40.	D	E-CAPT	0.281A				
3	47-AG-105	40.	D	E-CAPT	0.34 A	AVERAG	0.331	0.345	0.393
3	4-BE- 7	53.	D	E-CAPT	0.478A	SINGLE			
8	43-TC- 95M	60.	D	ECAPB+	0.017A	X-RAY.			
8	43-TC- 95M	60.	D	ECAPB+	0.204A				
8	43-TC- 95M	60.	D	ECAPB+	0.584A				
3	38-SR- 85	64.	D	E-CAPT	0.515A	SINGLE			
4	69-TM-168	85.	D	E-CAPT	0.049A	X-RAY.			
4	69-TM-168	85.	D	E-CAPT	0.080A				
4	69-TM-168	85.	D	E-CAPT	0.19 A	AVERAG	0.185	0.198	
3	39- Y- 88	105.	D	E-CAPT	0.899A				
3	39- Y- 88	105.	D	E-CAPT	1.837A				
3	58-CE-139	140.	D	E-CAPT	0.033A	X-RAY.			
3	58-CE-139	140.	D	E-CAPT	0.166A	SINGLE			
3	27-CO- 57	267.	D	E-CAPT	0.014A				
3	27-CO- 57	267.	D	E-CAPT	0.122A				
3	27-CO- 57	267.	D	E-CAPT	0.136A				
3	25-MN- 54	314.	D	E-CAPT	0.835A	SINGLE			
8	69-TM-171	1.9	Y	BETA.-	0.052A	X-RAY.			
8	69-TM-171	1.9	Y	BETA.-	0.067A				
3	11-NA- 22	2.6	Y	ECAPB+	0.511A	ANN.RD			
3	11-NA- 22	2.6	Y	ECAPB+	1.274A				
3	83-BI-207	28.	Y	E-CAPT	0.075A	X-RAY.			
3	83-BI-207	28.	Y	E-CAPT	0.569A				
3	83-BI-207	28.	Y	E-CAPT	1.064A				
3	22-TI- 44	100EC3	Y	ECAPB+	0.073A	AVERAG	0.069	0.078	
3	22-TI- 44	100EC3	Y	ECAPB+	0.511A	ANN.RD			
3	22-TI- 44	100EC3	Y	ECAPB+	1.159A	SC-44			

APPENDIX — II

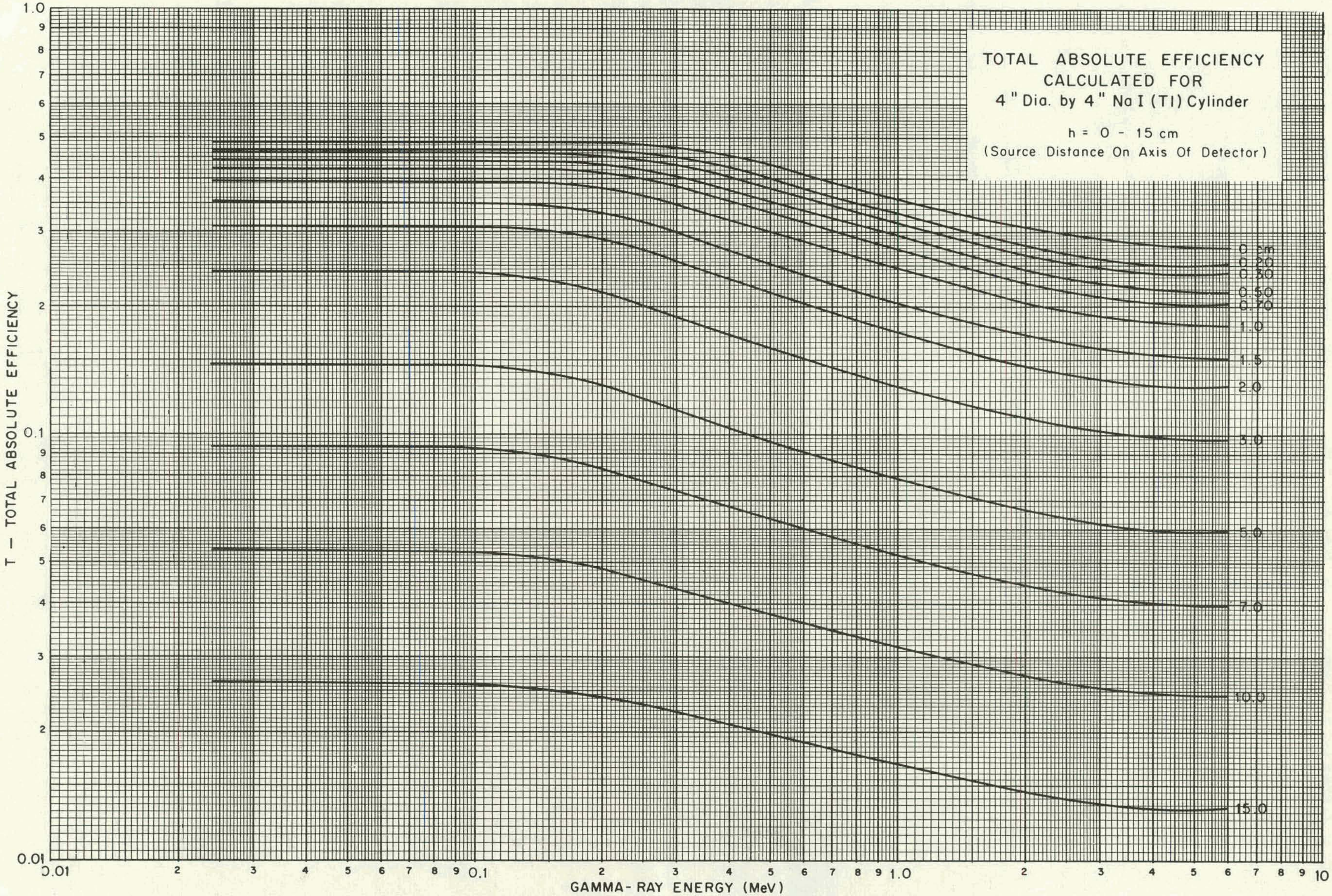
INTRINSIC EFFICIENCIES FOR NaI DETECTORS


TOTAL ABSOLUTE EFFICIENCY
CALCULATED FOR
3" Dia. BY 3" Na I (TI) CYLINDER
SOURCE DISTANCE = 10cm.
ENERGY RANGES
1-I 0.01 TO 0.035 Mev
2-II 0.35 TO 0.73
3-II 0.73 TO 3.80
4-II 3.80 TO 7.30
1-I
2-II
3-II
4-II
TOTAL ABSOLUTE EFFICIENCY
GAMMA RAY ENERGY
(Mev)
K+E 10 X 10 TO THE CM. 359-14L
KEUFFEL & ESSER CO.

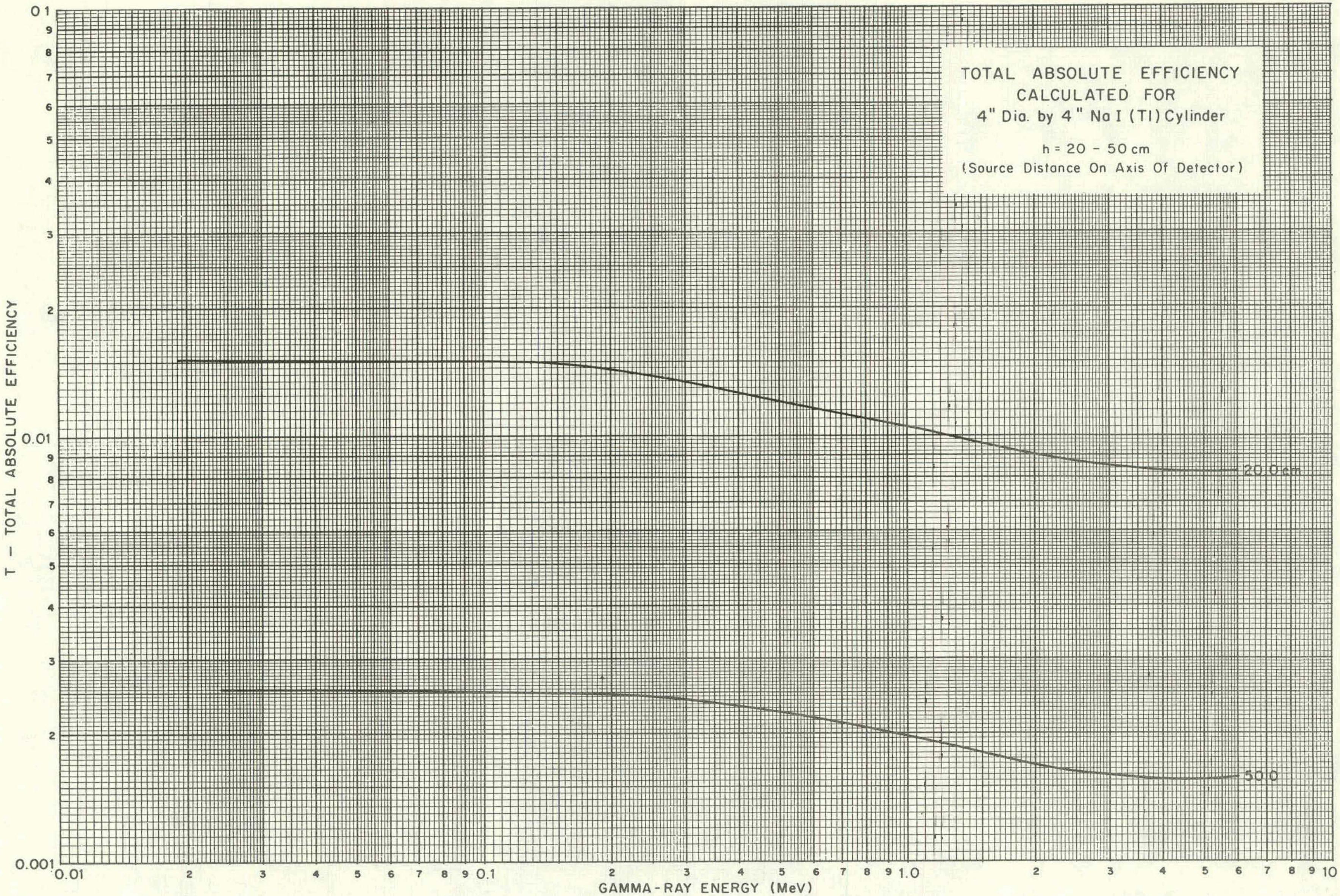

TOTAL ABSOLUTE EFFICIENCY
CALCULATED FOR
3" Dia. by 3" Na I (Tl) Cylinder
h = 0 - 10 cm
(Source Distance On Axis Of Detector)
T - TOTAL ABSOLUTE EFFICIENCY
GAMMA - RAY ENERGY (MeV)
0 cm
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.2
1.4
1.7
2.0
2.5
3.0
3.5
4.0
5.0
6.0
8.0
9.3
10.0

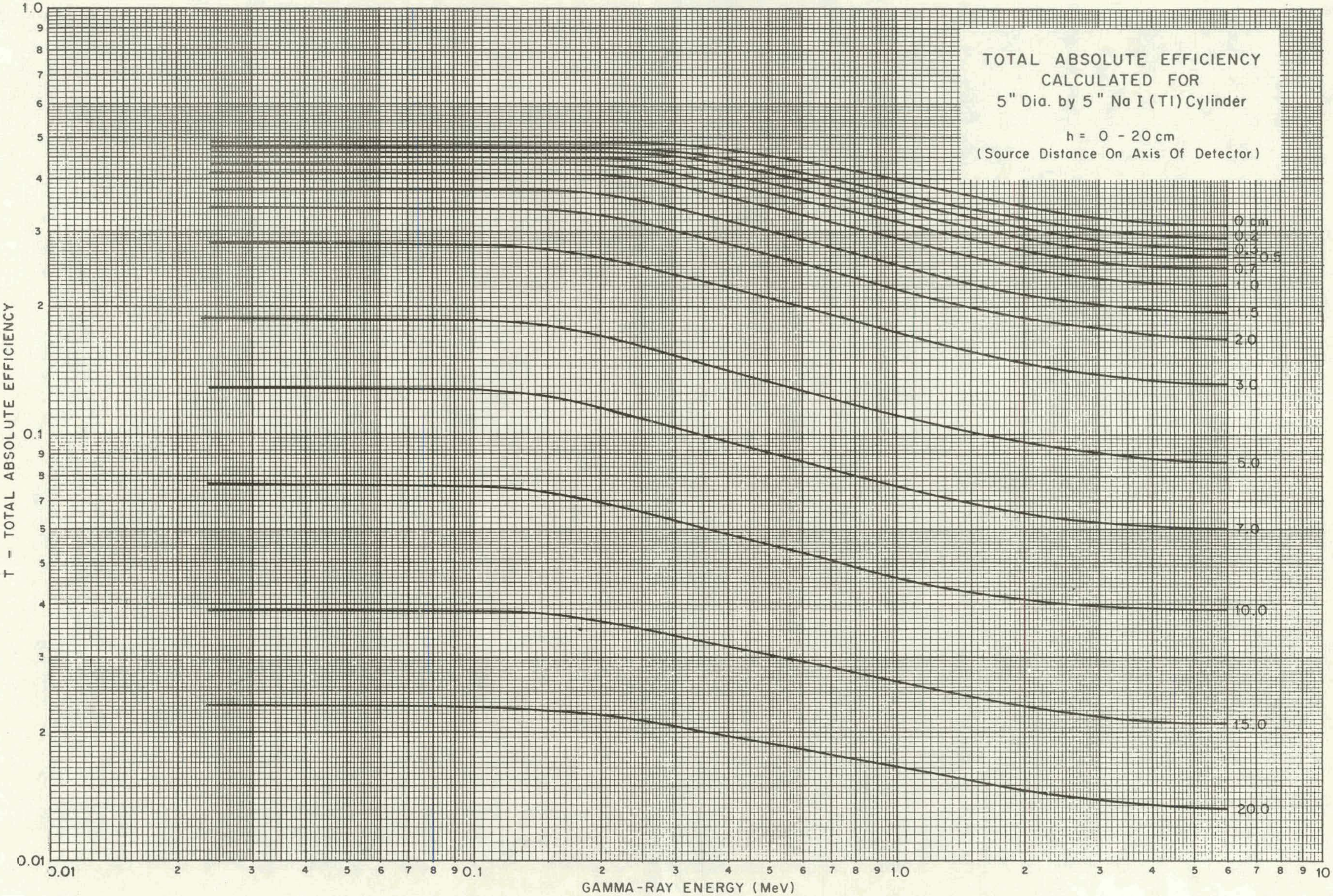


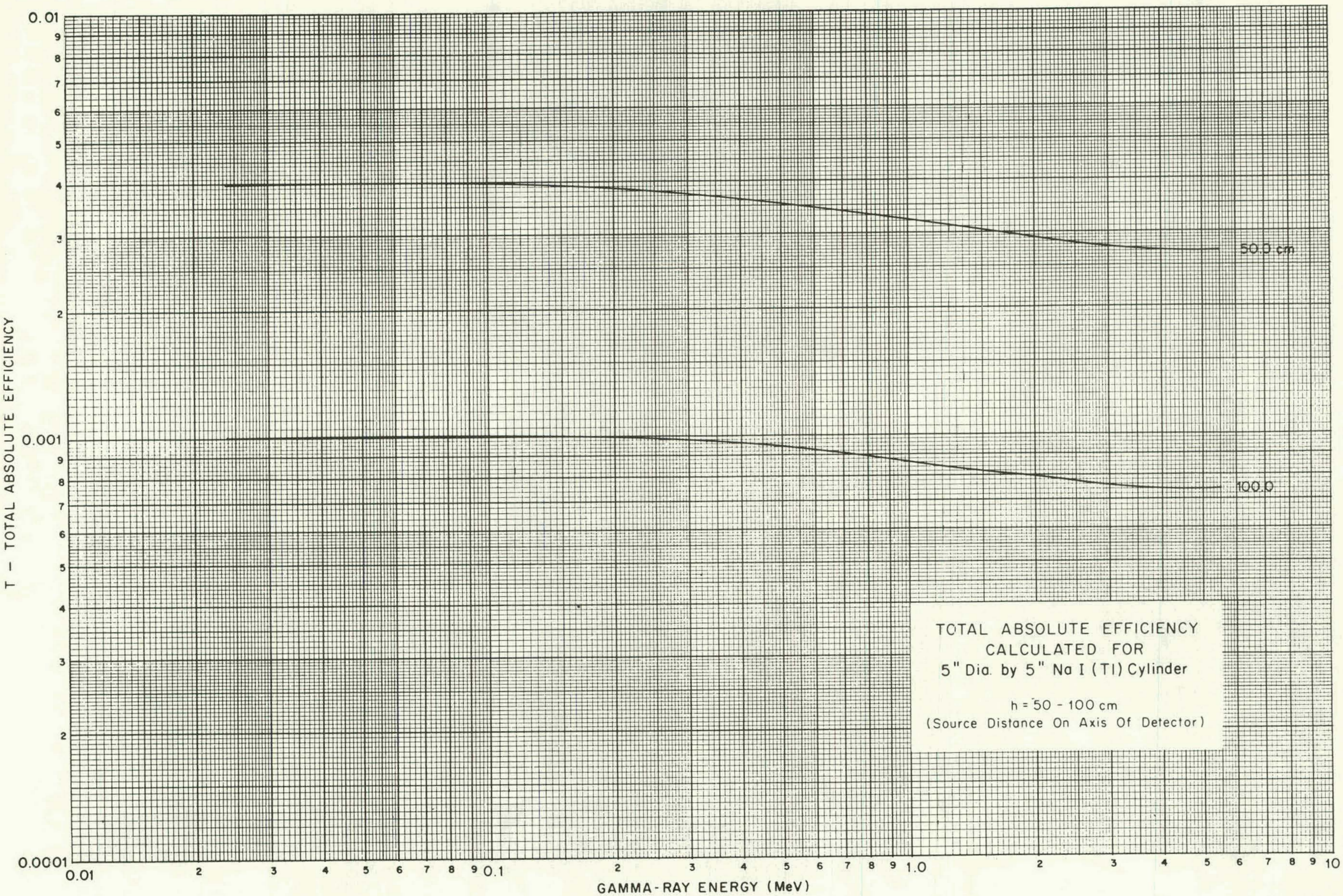
TOTAL ABSOLUTE EFFICIENCY
CALCULATED FOR
3" Dia. by 3" Na I (T) Cylinder
h = 12 - 40 cm
(Source Distance On Axis Of Detector)
12 cm
14
17
20
30
40
T — TOTAL ABSOLUTE EFFICIENCY
GAMMA-RAY ENERGY (MeV)
0.1
0.01
0.001
1.0
10.0



TOTAL ABSOLUTE EFFICIENCY
CALCULATED FOR
4" Dia. by 4" Na I (Tl) Cylinder
h = 0 - 15 cm
(Source Distance On Axis Of Detector)
0 cm
0.20
0.30
0.50
0.70
1.0
1.5
2.0
3.0
5.0
7.0
10.0
15.0
T — TOTAL ABSOLUTE EFFICIENCY
GAMMA-RAY ENERGY (MeV)
1.0
0.1
0.01
0.01
0.1
1.0
10


TOTAL ABSOLUTE EFFICIENCY
CALCULATED FOR
4" Dia. by 4" Na I (Tl) Cylinder
h = 20 - 50 cm
(Source Distance On Axis Of Detector)
20.0 cm
50.0
T - TOTAL ABSOLUTE EFFICIENCY
GAMMA-RAY ENERGY (MeV)
0.1
0.01
0.001
1.0
10


TOTAL ABSOLUTE EFFICIENCY
CALCULATED FOR
5" Dia. by 5" Na I (Tl) Cylinder
h = 0 - 20 cm
(Source Distance On Axis Of Detector)
0 cm
0.2
0.3
0.5
0.7
1.0
1.5
2.0
3.0
5.0
7.0
10.0
15.0
20.0
T - TOTAL ABSOLUTE EFFICIENCY
GAMMA-RAY ENERGY (MeV)
1.0
0.1
0.01
10


0.01
9
8
7
6
5
4
3
2
0.001
9
8
7
6
5
4
3
2
0.0001
T - TOTAL ABSOLUTE EFFICIENCY
0.01
2
3
4
5
6
7
8
9
0.1
2
3
4
5
6
7
8
9
1.0
2
3
4
5
6
7
8
9
10
GAMMA-RAY ENERGY (MeV)
50.0 cm
100.0
TOTAL ABSOLUTE EFFICIENCY
CALCULATED FOR
5" Dia. by 5" Na I (Tl) Cylinder
h = 50 - 100 cm
(Source Distance On Axis Of Detector)

CALCULATED DETECTOR EFFICIENCY
3" x 3" NaI
POINT SOURCE

E (MeV)	5.5	3.8 7.9	2.04	1.10	.566	.332	.212
h(cm) $\tau(E)$ cm^{-1}	.127	.130	.150	.200	.300	.500	1.000
.001	.23290	.23673	.26082	.31131	.38131	.45143	.49412
.200	.20047	.20383	.22502	.26995	.33410	.40335	.45634
.300	.18863	.19180	.21184	.25446	.31575	.38318	.43780
.500	.16887	.17173	.18979	.22837	.28442	.34775	.40318
.700	.15256	.15515	.17154	.20664	.25797	.31704	.37155
1.000	.13244	.13470	.14898	.17961	.22471	.27756	.32904
1.500	.10676	.10858	.12009	.14482	.18140	.22492	.26962
2.000	.08769	.08918	.09861	.11884	.14876	.18453	.22227
3.000	.06181	.06285	.06942	.08345	.10405	.12854	.15473
5.000	.03500	.03558	.03919	.04683	.05779	.07035	.08336
7.000	.02238	.02274	.02500	.02971	.03631	.04358	.05071
10.000	.01322	.01342	.01471	.01738	.02101	.02480	.02823
20.000	.00422	.00428	.00467	.00546	.00547	.00740	.00809
50.000	.000796	.000808	.000878	.00102	.00118	.00132	.00139
100.000	.000211	.000214	.000233	.000268	.000311	.000342	.000355

E (MeV)	.152	.129	.105	.081	.0295 .0622	.0237 .0484	.0089
h(cm) $\tau(E)$ cm^{-1}	2.0	3.0	5.0	10.0	20.0	40.0	600
.001	.49993	.49993	.49993	.49993	.49993	.49993	.49993
.200	.47131	.47325	.47380	.47384	.47384	.47384	.47384
.300	.45600	.45924	.46058	.46080	.46080	.46080	.46080
.500	.42556	.43080	.43390	.43494	.43498	.43498	.43498
.700	.39629	.40285	.40730	.40946	.40968	.40968	.40968
1.000	.35526	.36300	.36873	.37233	.37307	.37309	.37309
1.500	.29517	.30356	.31015	.31498	.31667	.31685	.31685
2.000	.24530	.25336	.25991	.26499	.26720	.26760	.26762
3.000	.17171	.17806	.18344	.18778	.19000	.19064	.19069
5.000	.09190	.09521	.09809	.10048	.10179	.10225	.10230
7.000	.05527	.05703	.05857	.05985	.06055	.06081	.06084
10.000	.03030	.03109	.03177	.03234	.03265	.03275	.03276
20.000	.00844	.00857	.00868	.00877	.00882	.00883	.00883
50.000	.00142	.00143	.00144	.00144	.00144	.00145	.00145
100.000	.000360	.000360	.000361	.000362	.000362	.000363	.000363

CALCULATED DETECTOR EFFICIENCY
3" x 3" NaI
DISC SOURCE

r = 1 1/2" t = 3"

E (Mev)	5.5	3.8	2.04	1.1	.566	.332	.212	.129	.081	.048
h(cm) \ $\tau(E)$ cm^{-1}	.127	.130	.150	.200	.300	.500	1.00	3.00	10.0	40.0
					R = 3/4r					
.001	.21173	.21522	.23716	.28341	.34887	.41944	.47632	.49811	.49885	.49885
1.000	.11757	.11954	.13198	.15850	.19721	.24239	.28803	.32354	.33574	.33931
3.000	.05637	.05730	.06316	.07559	.09355	.11433	.13585	.15466	.16229	.16486
5.000	.03290	.03343	.03677	.04379	.05372	.06186	.07599	.08575	.08982	.09123
10.000	.01287	.01307	.01432	.01689	.02036	.02395	.02712	.02970	.03076	.03113
15.000	.00679	.00689	.00753	.00883	.01053	.01217	.01348	.01446	.01485	.01498
20.000	.00418	.00424	.00463	.00540	.00640	.00732	.00798	.00845	.00863	.00869
					R = 0.999r					
.001	.19034	.19343	.21283	.25361	.31126	.37461	.43219	.46969	.47686	.48070
1.000	.10586	.10760	.11855	.14172	.17501	.21300	.25067	.28087	.29234	.29600
3.000	.05262	.05347	.05885	.07018	.08632	.10459	.12289	.13843	.14468	.14677
5.000	.03143	.03193	.03508	.04167	.05092	.06109	.07100	.07944	.08290	.08409
10.000	.01262	.01281	.01403	.01653	.01989	.02333	.02633	.02874	.02972	.03005
15.000	.00671	.00681	.00744	.00872	.01040	.01200	.01327	.01421	.01458	.01471
20.000	.00415	.00421	.00460	.00536	.00635	.00726	.00791	.00836	.00853	.00859
					R = 1/4r					
.001	.23041	.23420	.25804	.30805	.37756	.44782	.49206	.49889	.49890	.49890
1.000	.13077	.13299	.14705	.17721	.22159	.27358	.32440	.35798	.36706	.36945
3.000	.06117	.06219	.06867	.08251	.10278	.12682	.15241	.17502	.18397	.18693
5.000	.03475	.03532	.03890	.04646	.05729	.06968	.08244	.09394	.09880	.10049
10.000	.01318	.01338	.01467	.01732	.02094	.02470	.02809	.03089	.03205	.03245
15.000	.00687	.00698	.00763	.00895	.01069	.01238	.01373	.01475	.01516	.01530
20.000	.00421	.00427	.00466	.00545	.00646	.00739	.00807	.00855	.00874	.00880
					R = 1/2r					
.001	.22386	.22755	.25075	.29953	.36787	.43876	.48798	.49883	.49888	.49888
1.000	.12590	.12803	.14150	.17034	.21269	.26237	.31181	.34694	.35730	.36011
3.000	.05931	.06030	.06654	.07983	.09921	.12199	.14602	.16724	.17576	.17860
5.000	.03404	.03459	.03808	.04543	.05591	.06780	.07993	.09075	.09530	.09688
10.000	.01306	.01326	.01453	.01716	.02072	.02441	.02772	.03043	.03155	.03194
15.000	.00684	.00694	.00759	.00890	.01063	.01230	.01363	.01464	.01504	.01518
20.000	.00420	.00426	.00465	.00543	.00644	.00737	.00804	.00851	.00869	.00876

CALCULATED DETECTOR EFFICIENCY
4" x 4" NaI
POINT SOURCE

E (MeV)	5.5	3.8	2.04	1.10	.566	.332	.212
h(cm) \ τ(E) cm^{-1}	.127	.130	.150	.200	.300	.500	1.000
.001	.28144	.28553	.31081	.36106	.42367	.47543	.49746
.200	.25084	.25457	.27773	.32444	.38489	.43998	.47151
.300	.23935	.24293	.26519	.31029	.36927	.42449	.45860
.500	.21963	.22295	.24360	.28569	.34162	.39612	.43362
.700	.20284	.20592	.22514	.26448	.31735	.37039	.40976
1.000	.18142	.18419	.20151	.23712	.28557	.33571	.37606
1.500	.15274	.15509	.16975	.20004	.24175	.28636	.32551
2.000	.13022	.13223	.14474	.17063	.20650	.24559	.28177
3.000	.09742	.09891	.10821	.12743	.15412	.18362	.21248
5.000	.05956	.06045	.06599	.07734	.09287	.10984	.12681
7.000	.03980	.04038	.04398	.05126	.06102	.07137	.08152
10.000	.02441	.02476	.02688	.03111	.03660	.04214	.04731
15.000	.01314	.01332	.01441	.01654	.01918	.02164	.02375
20.000	.00820	.00831	.00896	.01023	.01174	.01307	.01413
50.000	.00161	.00163	.00174	.00196	.00220	.00237	.00247
100.000	.00043	.00044	.00047	.00052	.00058	.00062	.00063

E (MeV)	.152	.129	.105	.081	.029	.024	.009
h(cm) \ τ(E) cm^{-1}	2.0	3.0	5.0	10.0	20.0	40.0	600
.001	.49893	.49893	.49893	.49893	.49893	.49893	.49893
.200	.47776	.47872	.47923	.47939	.47940	.47940	.47940
.300	.46676	.46824	.46915	.46957	.46961	.46961	.46961
.500	.44492	.44734	.44892	.44988	.45013	.45015	.45015
.700	.42348	.42671	.42890	.43032	.43083	.43091	.43091
1.000	.39233	.39657	.39955	.40154	.40239	.40263	.40265
1.500	.34388	.34922	.35315	.35586	.35712	.35762	.35772
2.000	.30045	.30626	.31069	.31385	.31535	.31602	.31623
3.000	.22906	.23468	.23916	.24251	.24414	.24492	.24529
5.000	.13731	.14113	.14429	.14677	.14802	.14863	.14900
7.000	.08785	.09020	.09217	.09373	.09453	.09493	.09517
10.000	.05048	.05165	.05263	.05342	.05382	.05402	.05414
15.000	.02499	.02544	.02582	.02612	.02627	.02634	.02639
20.000	.01472	.01493	.01511	.01525	.01532	.01535	.01537
50.000	.00251	.00253	.00254	.00255	.00256	.00256	.00256
100.000	.00064	.00064	.00064	.00064	.00064	.00064	.00064

x

CALCULATED DETECTOR EFFICIENCY
4" x 4" NaI DETECTOR
DISC SOURCE

$r = 2"$ $t = 4"$

E (Mev)	5.5	3.8	2.04	1.1	.566	.332	.212	.129	.081	.048
h(cm) \ $\tau(E)$ cm^{-1}	.127	.310	.150	.200	.300	.500	1.00	3.00	10.0	40.0
R = 3/4r										
.001	.25648	.26023	.28350	.33036	.39124	.44889	.48763	.49871	.49889	.49889
1.000	.16078	.16320	.17827	.20915	.25121	.29586	.33617	.36380	.37239	.37469
3.000	.08736	.08866	.09676	.11335	.13597	.16044	.18419	.20328	.21055	.21289
5.000	.05482	.05562	.06058	.07067	.08421	.09861	.11260	.12423	.12884	.13038
10.000	.02343	.02376	.02576	.02975	.03485	.03990	.04451	.04829	.04981	.05032
15.000	.01284	.01301	.01407	.01612	.01865	.02099	.02296	.02451	.02513	.02533
20.000	.00808	.00818	.00883	.01006	.01154	.01282	.01383	.01459	.01489	.01499
R = 0.999r										
.001	.22991	.23323	.25373	.29497	.34899	.40276	.44726	.47318	.47772	.48240
1.000	.14351	.14562	.15868	.18522	.22079	.25797	.29109	.31752	.32665	.32951
3.000	.08026	.08143	.08869	.10340	.12311	.14388	.16348	.17905	.18501	.18695
5.000	.05154	.05228	.05686	.06608	.07828	.09095	.10291	.11262	.11644	.11770
10.000	.02272	.02304	.02496	.02877	.03360	.03831	.04254	.04595	.04730	.04776
15.000	.01262	.01278	.01381	.01581	.01826	.02050	.02237	.02383	.02441	.02460
20.000	.00798	.00809	.00872	.00994	.01138	.01263	.01360	.01434	.01462	.01472
R = 1/4r										
.001	.27896	.28303	.30813	.35812	.42072	.47334	.49701	.49895	.49893	.49895
1.000	.17924	.18198	.19907	.23421	.28207	.33182	.37253	.39398	.39926	.40045
3.000	.09626	.09773	.10689	.12582	.15204	.18100	.20934	.23133	.23917	.24160
5.000	.05901	.05988	.06536	.07656	.09185	.10852	.12514	.13916	.14469	.14653
10.000	.02430	.02464	.02675	.03096	.03640	.04188	.04698	.05125	.05299	.05358
15.000	.01311	.01329	.01437	.01649	.01912	.02157	.02366	.02533	.02600	.02623
20.000	.00818	.00829	.00895	.01021	.01172	.01304	.01409	.01489	.01521	.01531
R = 1/2r										
.001	.27114	.27511	.29962	.34866	.41103	.46599	.49499	.49891	.49892	.49892
1.000	.17253	.17516	.19153	.22519	.27109	.31938	.36070	.38491	.39128	.39281
3.000	.09285	.09425	.10301	.12104	.14590	.17517	.19987	.22100	.22877	.23122
5.000	.05738	.05823	.06350	.07427	.08888	.10467	.12027	.13338	.13858	.14031
10.000	.02397	.02430	.02637	.03049	.03580	.04112	.04602	.05011	.05176	.05232
15.000	.01301	.01318	.01426	.01635	.01894	.02135	.02339	.02502	.02567	.02589
20.000	.00814	.00825	.00890	.01015	.01165	.01296	.01399	.01478	.01509	.01519

CALCULATED DETECTOR EFFICIENCY
5" x 5" NaI
POINT SOURCE

E (Mev)	5.5	3.8	2.04	1.10	.566	.332	.212
h(cm) \ τ(E) cm^{-1}	.127	.130	.150	.200	.300	.500	1.000
.001	.32090	.32502	.35006	.39737	.45063	.48737	.49857
.200	.29261	.29648	.32010	.36555	.41922	.46108	.47969
.300	.28164	.28540	.30835	.35277	.40595	.44891	.46994
.500	.26250	.26605	.28776	.33013	.38193	.42602	.45073
.700	.24589	.24924	.26980	.31016	.36031	.40466	.43198
1.000	.22425	.22733	.24630	.28380	.33121	.37499	.40481
1.500	.19435	.19705	.21368	.24681	.28952	.33093	.36244
2.000	.17001	.17238	.18700	.21627	.25447	.29267	.32394
3.000	.13278	.13463	.14606	.16900	.19928	.23063	.25859
5.000	.08627	.08745	.09473	.10929	.12846	.14863	.16783
7.000	.05989	.06069	.06560	.07533	.08795	.10106	.11367
10.000	.03802	.03851	.04149	.04731	.05464	.06200	.06893
15.000	.02109	.02135	.02290	.02587	.02944	.03278	.03578
20.000	.01337	.01352	.01447	.01623	.01826	.02006	.02158
50.000	.00270	.00273	.00290	.00320	.00349	.00370	.00384
100.000	.00074	.00074	.00079	.00086	.00093	.00097	.00099

E (Mev)	.152	.129	.105	.081	.029	.024	.009
h(cm) \ τ(E) cm^{-1}	2.0	3.0	5.0	10.0	20.0	40.0	600
.001	.49895	.49895	.49895	.49895	.49895	.49895	.49895
.200	.48264	.48310	.48329	.48332	.48332	.48332	.48332
.300	.47411	.47490	.47535	.47548	.47548	.47548	.47548
.500	.45704	.45843	.45934	.45980	.45986	.45986	.45986
.700	.44011	.44204	.44336	.44416	.44434	.44435	.44435
1.000	.41518	.41782	.41969	.42092	.42135	.42140	.42141
1.500	.37531	.37890	.38152	.38331	.38409	.38430	.38431
2.000	.33812	.34232	.34548	.34768	.34870	.34907	.34913
3.000	.27301	.27763	.28126	.28389	.28515	.28571	.28588
5.000	.17891	.18276	.18591	.18831	.18949	.19007	.19033
7.000	.12121	.12391	.12616	.12791	.12879	.12922	.12944
10.000	.07311	.07462	.07589	.07689	.07740	.07765	.07778
15.000	.03754	.03818	.03871	.03913	.03935	.03945	.03950
20.000	.02246	.02277	.02303	.02324	.02334	.02339	.02341
50.000	.00391	.00393	.00395	.00397	.00398	.00398	.00398
100.000	.00100	.00100	.00100	.00100	.00100	.00100	.00100

CALCULATED DETECTOR EFFICIENCY
5" x 5" NaI
DISC SOURCE

r = 2 1/2" t = 5"

E (Mev)	5.5	3.8	2.04	1.1	.566	.332	.212	.129	.081	.048
h(cm) \ $\tau(E)$ cm^{-1}	.127	.130	.150	.200	.300	.500	1.00	3.00	10.0	40.0
					R = 3/4r					
.001	.29284	.29667	.32001	.36514	.41961	.46598	.49288	.49887	.49892	.49892
1.000	.19873	.20142	.21798	.25078	.29290	.33436	.36863	.38998	.39613	.39763
3.000	.11781	.11940	.12921	.14869	.17405	.20010	.22398	.24194	.24847	.25049
5.000	.07810	.07914	.08551	.09809	.11433	.13100	.14662	.15894	.16366	.16518
10.000	.03595	.03640	.03916	.04449	.05109	.05757	.06352	.06831	.07020	.07082
15.000	.02039	.02064	.02212	.02493	.02807	.03136	.03407	.03621	.03705	.03755
20.000	.01307	.01322	.01414	.01584	.01779	.01949	.02091	.02201	.02244	.02258
					R = 0.999r					
.001	.26197	.26534	.28589	.32573	.37485	.42050	.45606	.47486	.47844	.48388
1.000	.17654	.17866	.19281	.22075	.25612	.29088	.32094	.34265	.35042	.35270
3.000	.10695	.10835	.11695	.13386	.15544	.17707	.19655	.21131	.21681	.21853
5.000	.07245	.07339	.07913	.09036	.10459	.11882	.13183	.14194	.14580	.14703
10.000	.03449	.03492	.03752	.04251	.04862	.05449	.05980	.06399	.06562	.06616
15.000	.01988	.02012	.02155	.02425	.02743	.03033	.03285	.03481	.03558	.03583
20.000	.01286	.01300	.01390	.01555	.01743	.01906	.02042	.02146	.02186	.02199
					R = 1/4r					
.001	.31815	.32225	.34716	.39435	.44794	.48586	.49839	.49895	.49895	.49895
1.000	.22160	.22465	.24338	.28045	.32745	.37126	.40188	.41573	.41904	.41960
3.000	.13110	.13292	.14417	.16672	.19648	.22730	.25495	.27407	.28042	.28228
5.000	.08532	.08648	.09366	.10798	.12682	.14658	.16539	.18007	.18556	.18730
10.000	.03778	.03826	.04122	.04698	.05423	.06148	.06830	.07388	.07610	.07684
15.000	.02101	.02126	.02281	.02576	.02950	.03262	.03558	.03795	.03889	.03920
20.000	.01333	.01349	.01443	.01618	.01821	.01999	.02151	.02268	.02315	.02330
					R = 1/2r					
.001	.30943	.31344	.33788	.38457	.43891	.48029	.49743	.49894	.49894	.49894
1.000	.21340	.21632	.23431	.26995	.31547	.35898	.39166	.40830	.41242	.41325
3.000	.12606	.12779	.13850	.15991	.18804	.21717	.24365	.26272	.26930	.27126
5.000	.08253	.08364	.09050	.10415	.12199	.14056	.15818	.17204	.17728	.17896
10.000	.03707	.03754	.04042	.04602	.05301	.05996	.06644	.07171	.07380	.07450
15.000	.02077	.02102	.02255	.02544	.02891	.03213	.03500	.03728	.03818	.03848
20.000	.01323	.01339	.01432	.01605	.01805	.01980	.02128	.02243	.02288	.02302

APPENDIX — III

PHOTOPEAK EFFICIENCY AND OTHER DATA FOR ANALYSIS OF GAMMA-RAY SPECTRA

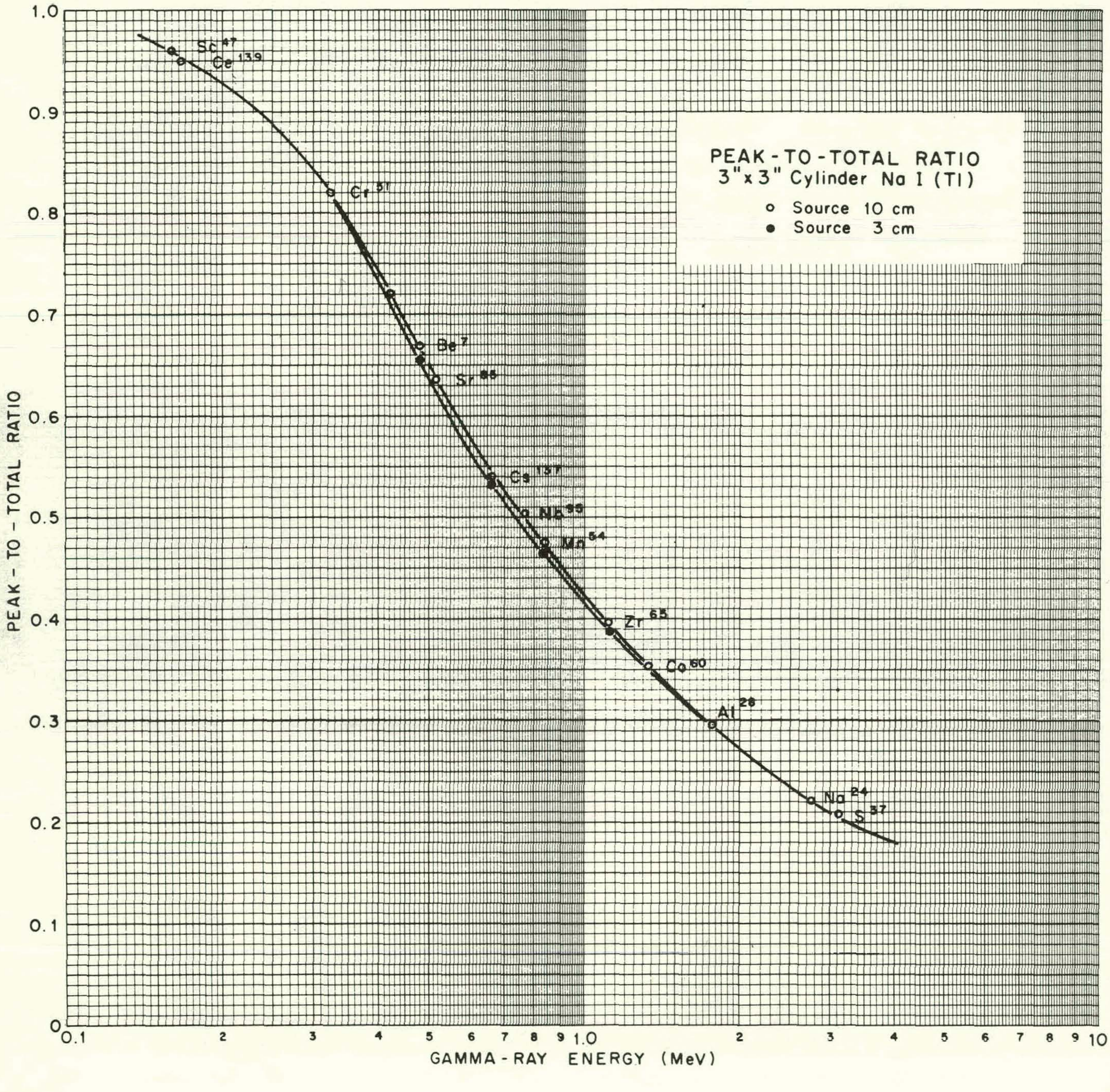

PEAK-TO-TOTAL RATIO
3"x3" Cylinder Na I (Tl)
Source 10 cm
Source 3 cm
Sc 47
Ce 139
Cr 51
Be 7
Sr 85
Cs 137
Nb 95
Mn 54
Zr 65
Co 60
Al 28
Na 24
S 37
PEAK-TO-TOTAL RATIO
GAMMA-RAY ENERGY (MeV)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.1
2
3
4
5
6
7
8
9
1.0
2
3
4
5
6
7
8
9
10

TABLE I

Experimental Peak-to-Total Ratios for 3"x 3" NaI Detector

Isotope	E_γ (MeV)	Point Source		
		10 cm source distance		3 cm source distance
		integration	$4\pi\beta$-γ	integration
Sc^{47}	0.155	0.960		0.962
Ce^{139}	0.166	0.950		
Cr^{51}	0.323	0.820		0.813
Au^{198}	0.4117		0.737	
Be^{7}	0.478	0.668		0.657
Cs^{137}	0.6616	0.536		0.532
Nb^{95}	0.766	0.500	0.504	
Mn^{54}	0.835	0.474		0.464
Zn^{65}	1.114	0.395		0.388
Co^{60}	1.382		0.357	
Al^{28}	1.78	0.290	0.295	
Y^{88}	1.837	0.280		
Na^{24}	2.753		0.225	
S^{37}	3.13		0.207	

ENERGY TO PULSE HEIGHT

The values of the polynomial PH(E) are given in channels for equally-spaced energy values from 0.01 to 3.0 MeV. The channel numbers are for the 10-keV scale.

	0	1	2	3	4	5	6	7	8	9
0		2.29	3.27	4.25	5.22	6.20	7.18	8.16	9.14	10.12
1	11.10	12.08	13.07	14.05	15.03	16.01	17.00	17.98	18.97	19.95
2	20.93	21.92	22.90	23.89	24.87	25.86	26.84	27.82	28.81	29.79
3	30.78	31.76	32.75	33.73	34.71	35.70	36.68	37.66	38.65	39.63
4	40.61	41.59	42.58	43.56	44.54	45.52	46.50	47.48	48.46	49.44
5	50.42	51.40	52.38	53.35	54.33	55.31	56.29	57.26	58.24	59.21
6	60.19	61.16	62.14	63.11	64.08	65.05	66.03	67.00	67.97	68.94
7	69.91	70.88	71.84	72.81	73.78	74.75	75.71	76.68	77.64	78.61
8	79.57	80.54	81.50	82.46	83.42	84.39	85.35	86.31	87.27	88.23
9	89.19	90.14	91.10	92.06	93.02	93.97	94.93	95.88	96.84	97.79
10	98.75	99.70	100.65	101.61	102.56	103.51	104.46	105.41	106.36	107.31
11	108.26	109.21	110.16	111.11	112.06	113.01	113.95	114.90	115.85	116.79
12	117.74	118.69	119.63	120.58	121.52	122.47	123.41	124.35	125.30	126.24
13	127.19	128.13	129.07	130.02	130.96	131.90	132.84	133.79	134.73	135.67
14	136.61	137.55	138.49	139.44	140.38	141.32	142.26	143.20	144.14	145.09
15	146.03	146.97	147.91	148.85	149.79	150.73	151.68	152.62	153.56	154.50
16	155.44	156.39	157.33	158.27	159.21	160.16	161.10	162.04	162.99	163.93
17	164.87	165.82	166.76	167.71	168.65	169.59	170.54	171.49	172.43	173.38
18	174.32	175.27	176.22	177.16	178.11	179.06	180.01	180.96	181.91	182.86
19	183.81	184.76	185.71	186.66	187.61	188.56	189.51	190.46	191.42	192.37
20	193.33	194.28	195.23	196.19	197.15	198.10	199.06	200.02	200.97	201.93
21	202.89	203.85	204.81	205.77	206.73	207.69	208.65	209.61	210.57	211.54
22	212.50	213.46	214.43	215.39	216.36	217.32	218.29	219.26	220.22	221.19
23	222.16	223.13	224.09	225.06	226.03	227.00	227.97	228.94	229.91	230.89
24	231.86	232.83	233.80	234.77	235.75	236.72	237.69	238.67	239.64	240.62
25	241.59	242.57	243.54	244.52	245.49	246.47	247.45	248.42	249.40	250.37
26	251.35	252.33	253.30	254.28	255.26	256.23	257.21	258.19	259.16	260.14
27	261.12	262.09	263.07	264.04	265.02	265.99	266.97	267.94	268.92	269.89
28	270.86	271.84	272.81	273.78	274.75	275.72	276.69	277.66	278.63	279.60
29	280.57	281.54	282.50	283.47	284.43	285.40	286.36	287.32	288.28	289.24
30	290.20									

PULSE HEIGHT TO ENERGY

The values of the polynomial E(PH) are given in MeV for channels from 1 to 300. This is for the 10-keV scale. (Only good above 0.1 MeV)

	0	1	2	3	4	5	6	7	8	9
0		.0035	.0067	.0169	.0272	.0374	.0477	.0579	.0682	.0784
1	.0886	.0988	.1090	.1192	.1294	.1396	.1498	.1599	.1701	.1803
2	.1905	.2006	.2108	.2209	.2311	.2413	.2514	.2616	.2717	.2819
3	.2921	.3022	.3124	.3225	.3327	.3429	.3530	.3632	.3734	.3835
4	.3937	.4039	.4141	.4242	.4344	.4446	.4548	.4650	.4752	.4854
5	.4956	.5058	.5160	.5263	.5365	.5467	.5570	.5672	.5774	.5877
6	.5979	.6082	.6185	.6288	.6390	.6493	.6596	.6699	.6802	.6905
7	.7008	.7111	.7215	.7318	.7421	.7525	.7628	.7732	.7836	.7939
8	.8043	.8147	.8251	.8355	.8459	.8563	.8667	.8771	.8875	.8979
9	.9084	.9188	.9293	.9397	.9502	.9606	.9711	.9816	.9921	1.0026
10	1.0130	1.0235	1.0340	1.0445	1.0551	1.0656	1.0761	1.0866	1.0971	1.1077
11	1.1182	1.1288	1.1393	1.1499	1.1604	1.1710	1.1815	1.1921	1.2027	1.2132
12	1.2238	1.2344	1.2450	1.2556	1.2662	1.2768	1.2873	1.2979	1.3085	1.3191
13	1.3297	1.3404	1.3510	1.3616	1.3722	1.3828	1.3934	1.4040	1.4146	1.4253
14	1.4359	1.4465	1.4571	1.4677	1.4783	1.4890	1.4996	1.5102	1.5208	1.5314
15	1.5421	1.5527	1.5633	1.5739	1.5845	1.5951	1.6058	1.6164	1.6270	1.6376
16	1.6482	1.6588	1.6694	1.6800	1.6906	1.7012	1.7118	1.7224	1.7330	1.7436
17	1.7541	1.7647	1.7753	1.7859	1.7964	1.8070	1.8176	1.8281	1.8387	1.8492
18	1.8598	1.8703	1.8809	1.8914	1.9019	1.9125	1.9230	1.9335	1.9440	1.9545
19	1.9650	1.9755	1.9860	1.9965	2.0070	2.0175	2.0279	2.0384	2.0489	2.0593
20	2.0698	2.0802	2.0907	2.1011	2.1115	2.1220	2.1324	2.1428	2.1532	2.1636
21	2.1740	2.1844	2.1948	2.2052	2.2155	2.2259	2.2363	2.2466	2.2570	2.2673
22	2.2777	2.2880	2.2984	2.3087	2.3190	2.3293	2.3397	2.3500	2.3603	2.3706
23	2.3809	2.3912	2.4015	2.4117	2.4220	2.4323	2.4426	2.4529	2.4631	2.4734
24	2.4836	2.4939	2.5042	2.5144	2.5247	2.5349	2.5451	2.5554	2.5656	2.5759
25	2.5861	2.5964	2.6066	2.6168	2.6271	2.6373	2.6475	2.6578	2.6680	2.6783
26	2.6885	2.6987	2.7090	2.7192	2.7295	2.7397	2.7500	2.7602	2.7705	2.7808
27	2.7910	2.8013	2.8116	2.8219	2.8322	2.8425	2.8528	2.8631	2.8734	2.8837
28	2.8941	2.9044	2.9148	2.9251	2.9355	2.9459	2.9563	2.9667	2.9771	2.9876
29	2.9980	3.0085	3.0190	3.0295	3.0400	3.0505	3.0610	3.0716	3.0822	3.0928
30	3.1034									

APPENDIX — IV

NUMERICAL DATA USED IN COMPILATION OF GAMMA-RAY SPECTRA

53 DAY BERYLLIUM 7

1 DETECTOR 3X3-2 DATE 1-26-62

PLATE NO. 4-7-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

3.05×10^6 (0.478 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	006900	007186	007244	007298	007307	007222	007141	007182	007238
010	007031	007039	007008	007029	007276	007327	007811	008478	008327	007728
020	007146	007224	007226	007186	007029	006977	007271	007439	007816	007826
030	007064	005984	004471	003342	002694	002328	002221	002044	001970	002027
040	002152	002396	002841	004327	009304	021453	043169	069315	086164	082107
050	059808	033610	014575	005027	001595	000482	000199	000068	000028	000040
060	000016	000020	000036	000035	000040	000024	000036	000009	000012	000000

4-7-1

2.6 YR. SODIUM 22

DETECTOR 3X3-2 | DATE 8-3-63

PLATE NO. 11-22-2 | SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU | ABSORBER 1.18 G/CM SQ. + 0.1 G CU SW.

2.276×10^7 (1.27 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	007446	012031	011162	011388	010851	010731	010707	010727	010677
010	010532	010515	010588	010605	010826	011002	011242	012212	012728	012364
020	011934	012210	012296	012379	012388	011963	012084	011618	011678	011890
030	012006	012258	011953	010974	009390	007950	006445	005766	005160	004980
040	004789	004959	004835	004962	005207	005794	007546	012871	025920	048787
050	076669	095685	094159	073330	045019	022777	010335	004884	003021	002516
060	002354	002230	002268	002265	002292	002270	002243	002290	002272	002309
070	002329	002264	002301	002326	002470	002454	002505	002453	002530	002466
080	002572	002537	002537	002557	002559	002685	002672	002726	002721	002701
090	002645	002782	002734	002719	002849	002854	002805	002900	002958	002912
100	002745	002654	002376	002177	001928	001667	001410	001160	000977	000832
110	000771	000720	000700	000674	000764	000931	001197	001814	002936	004419
120	006396	008771	011227	012890	013851	013458	012255	010299	007988	005978
130	004140	002589	001671	001041	000711	000476	000329	000246	000203	000165
140	000165	000144	000156	000149	000144	000133	000136	000128	000112	000112
150	000131	000132	000124	000132	000101	000110	000108	000081	000080	000074
160	000063	000054	000044	000046	000047	000053	000043	000054	000063	000098
170	000124	000177	000203	000262	000300	000283	000295	000292	000232	000185
180	000161	000124	000092	000063	000031	000021	*	*	*	*

11-22-2

15 HR. SODIUM 24

3 DETECTOR 3X3-2 DATE 7-26-61

PLATE NO. 11-24-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 2.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	009496	012947	013722	012008	011063	010261	009691	009832	010399
010	011505	011441	010501	009646	009449	009197	009481	009549	008967	008828
020	008665	008586	008646	008863	009950	009763	009048	008510	008150	008219
030	008314	008336	008335	008477	008393	008404	008502	008752	008755	008995
040	009082	009338	009855	010043	009980	010237	010201	010259	010296	010545
050	010771	011125	011109	011175	010674	009486	008255	006493	005522	880046
060	680004	263004	443005	763010	254019	348032	281042	748042	330032	191019
070	444501	062600	595300	394800	311600	293400	289300	283000	276800	279400
080	301500	343200	400900	461200	493700	506300	481600	454900	425100	414500
090	395400	395500	394000	408200	406400	409200	418800	402700	423000	424200
100	422700	412800	412500	423500	438800	464100	524800	593700	725000	800100
110	861700	845900	789900	730200	647200	604700	589000	568800	552200	539000
120	511300	491200	429200	391800	330300	280300	250900	250200	296000	441700
130	657900	966001	221001	399501	390301	241401	022000	756300	524000	348300
140	214300	133500	074800	053800	035200	028800	021200	017200	017000	015300
150	016700	014200	013500	012700	014300	012600	010400	011400	012300	012700
160	013900	011700	010200	012000	009400	012100	009800	009200	010500	009900
170	008200	009400	009100	010000	010500	009500	010700	012300	011100	009900
180	009800	009100	008800	008700	008300	009000	009600	007500	006300	006100
190	006200	005700	004300	003500	003900	004800	005500	006900	007800	010500
200	009800	008300	009100	006300	005300	003900	002900	002200	001100	001200
210	000700	001000	000800	000600	000400	000800	000400	000300	001100	000800
220	000200	000600	000400	000700	000000	000000	000000	000000	0000	*

11-24-1

15 HR. SODIUM 24

DETECTOR 3X3-2 DATE 2-12-64

PLATE NO. 11-24-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	008960	013499	012202	010384	009339	008798	008337	008207	007998
010	007799	007510	007463	007364	007279	007200	007227	007104	007285	007531
020	007618	008332	008712	009109	008702	008431	007650	007407	007146	007044
030	007009	006986	007019	007067	007026	007055	006983	006791	006613	006521
040	006497	006497	006417	006387	006472	006349	006410	006511	006614	006953
050	007347	007534	007400	007063	006789	006353	006233	006219	006089	006136
060	006162	005970	005999	006144	006169	006226	006158	006220	006208	006168
070	006219	006249	006411	006343	006443	006438	006469	006591	006475	006615
080	006690	006783	006848	007142	007266	007408	007353	007438	007481	007410
090	007383	007522	007609	007745	007697	007646	007688	007697	008017	008005
100	008032	008115	008238	008161	008227	008278	008404	008175	008306	007908
110	007784	007323	006659	006084	005444	004967	004479	003962	003634	003444
120	003337	003252	003226	003462	003767	004620	006111	008173	011513	015896
130	020725	025959	030283	032949	032855	030699	026741	022299	017296	013085
140	009573	006824	004886	003808	002985	002585	002349	002239	002158	002016
150	002100	002121	001963	002057	002049	002071	002140	002182	002271	002280
160	002397	002631	002941	003098	003391	003548	003719	003745	003741	003713
170	003682	003526	003388	003418	003259	003211	002992	003055	003043	002976
180	002882	003025	002952	002939	003022	003000	003074	003028	003104	003059
190	003147	003063	003117	003141	003114	003207	003145	003183	003105	003138
200	003146	003214	003072	003122	003116	003209	003263	003301	003524	003628
210	004149	004339	004737	005307	005517	005908	006247	006462	006585	006438
220	006202	006111	005651	005298	005153	005103	004700	004602	004437	004259
230	004187	004150	004111	004126	004067	004128	003938	003769	003767	003579
240	003373	003252	002969	002867	002641	002436	002225	002056	001999	001864
250	001923	001979	002167	002516	003018	003679	004516	005483	006598	007715
260	008693	009679	010165	010653	010392	010248	009706	008958	007832	006852
270	005882	005024	004225	003366	002662	002122	001685	001251	000935	000782
280	000580	000443	000344	000267	000260	000205	000182	000143	000142	000139
290	000154	000123	000097	000097	000099	000105	000090	000086	000088	000099
300	000103	000000	000000	000000	000000	000000	000000	000000	000000	000000

4

11-24-2

5

9.5 MIN. MAGNESIUM 27

DETECTOR 3X3-2 DATE 7-21-61

PLATE NO. 12-27-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	005593	006819	006831	006275	006265	006146	005829	005512	005202
010	005106	005049	004966	004933	005047	005139	006142	007581	007220	006361
020	006114	005697	005411	005135	005047	004964	005112	004894	004962	005153
030	004935	004799	004855	004921	004857	004757	004924	004766	004755	004634
040	004676	004562	004799	004795	004773	004811	004785	004872	004688	004827
050	004873	005132	005164	004953	004983	005038	005130	005258	005497	005496
060	005393	005132	004758	004576	003969	003392	003052	002747	002497	002283
070	002255	002163	002259	002185	002347	002412	002702	003295	004723	007468
080	012147	017616	023593	027814	027876	025435	019672	013550	008335	004838
090	002560	001472	001023	000989	001399	002177	003370	004930	006507	007994
100	008309	007864	006928	005277	003645	002361	001416	000783	000404	000256
110	000176	000094	000097	000062	000031	000030	000014	000005	000010	000028

12-27-1

2.3 MIN. ALUMINUM 28

DETECTOR 3X3-2 DATE 8-2-61

PLATE NO. 13-28-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

4.33×10^{7} (1.78 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	007664	009792	009528	008028	007473	007002	005439	006110	005570
010	005073	004728	004557	004477	004403	004262	004144	004044	003965	004079
020	004129	004345	004549	004421	004163	003956	003713	003572	003488	003439
030	003385	003256	003282	003221	003251	003150	003126	003116	003025	002996
040	002883	002862	002812	002841	002851	002829	002822	002818	002824	002896
050	003036	002968	002901	002788	002678	002620	002664	002640	002594	002580
060	002649	002544	002573	002511	002558	002574	002585	002548	002635	002629
070	002705	002874	003085	003257	003204	003133	002987	002809	002774	002791
080	002682	002736	002606	002659	002640	002672	002641	002707	002788	002757
090	002807	002740	002699	002728	002777	002847	002824	002914	002881	002821
100	002835	002852	002861	002894	002908	002853	002862	002895	003044	002959
110	003035	003037	002963	003108	003045	003080	003241	003159	003269	003292
120	003522	003670	003846	004207	004254	004484	004511	004418	004481	004327
130	004174	004036	004020	004053	004016	003953	003969	003981	004010	004095
140	004144	004173	004276	004244	004229	004119	004116	003933	003820	003617
150	003295	003004	002619	002280	001987	001839	001578	001391	001299	001178
160	001281	001356	001513	001961	002659	003763	005241	007252	009396	011552
170	013539	015053	015890	015604	014418	013012	011070	008940	006843	005121
180	003750	002715	001852	001213	000871	000535	000405	000252	000195	000145
190	000107	000093	000076	000049	000052	000037	000036	000034	000019	000015
200	000018	000027	000017	000013	000016	000019	000022	000026	000017	000017
210	000020	000018	000009	000015	000021	000016	000011	000010	000012	000010

13-28-2

6.6 MIN. ALUMINUM 29

7 DETECTOR 3X3-2 DATE 5-4-63

PLATE NO. 13-29-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE + POLY CAP

5.28 X 10^7 (1.28 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	096301	073163	015754	010249	008663	007894	007711	007481	007291
010	006729	006490	006442	006518	006331	006228	005905	005938	006351	006569
020	006688	006865	007499	007825	007653	007090	006760	006516	006370	006157
030	006094	006056	006056	005839	005849	005707	005643	005576	005543	005569
040	005633	005554	005507	005464	005303	005341	005341	005217	005437	005278
050	005249	005221	005389	005264	005329	005385	005137	005131	005248	005254
060	005337	005257	005399	005394	005450	005436	005228	005406	005480	005427
070	005605	005653	005816	005857	005781	005869	005962	006106	005978	006035
080	006069	006042	006085	006250	006352	006480	006531	006786	006843	006785
090	006780	006677	006543	006694	006675	006674	006931	006900	006743	006916
100	006970	006715	006343	005840	005361	004729	003962	003444	003066	002583
110	002407	002347	002188	002209	002242	002345	002632	003313	004753	007293
120	010775	015637	021104	026761	030662	032886	031789	029231	023895	018545
130	013660	009511	006336	004083	002729	001788	001213	000916	000731	000603
140	000569	000495	000508	000464	000411	000436	000431	000456	000436	000475
150	000526	000460	000466	000454	000455	000476	000472	000445	000476	000437
160	000438	000425	000416	000398	000377	000359	000370	000341	000330	000301
170	000351	000367	000346	000379	000382	000358	000337	000353	000297	000278
180	000302	000359	000350	000382	000413	000425	000456	000501	000567	000558
190	000625	000657	000731	000858	000927	000969	000938	000924	000856	000840
200	000787	000731	000611	000554	000551	000484	000413	000374	000327	000305
210	000314	000286	000296	000209	000229	000226	000166	000156	000146	000157
220	000144	000130	000139	000147	000170	000221	000276	000378	000457	000509
230	000586	000664	000735	000768	000785	000756	000684	000650	000576	000570
240	000419	000337	000292	000245	000192	000153	000117	000091	000074	000061
250	000056	000055	*	*	*	*	*	*	*	*

13-29-1

2.62 HR. SILICON 31

DETECTOR 3X3-2 — DATE 1-22-64

PLATE NO. 14-31-1 — SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHL — ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE.

	0	1	2	3	4	5	6	7	8	9
000	099995	027192	118080	139377	089605	065962	056767	048690	041156	035568
010	030474	025724	023030	020120	017792	015833	014179	012823	011257	009999
020	009020	008143	007269	006759	006110	005558	005059	004653	004146	003787
030	003511	003221	002856	002739	002584	002285	002194	001948	001963	001844
040	001774	001498	001448	001385	001231	001225	001084	000930	000949	000875
050	000894	000758	000717	000693	000595	000621	000499	000495	000416	000364
060	000373	000341	000318	000303	000313	000290	000290	000297	000255	000216
070	000184	000209	000194	000200	000175	000165	000144	000141	000130	000121
080	000129	000176	000174	000160	000155	000139	000127	000136	000084	000130
090	000151	000141	000106	000100	000080	000035	000083	000090	000067	000074
100	000111	000089	000071	000071	000068	000031	000063	000040	000000	000014
110	000050	000004	000050	000039	000048	000050	000061	000079	000080	000121
120	000149	000220	000283	000309	000348	000375	000365	000291	000220	000167
130	000115	000100	000085	000056	000048	000044	000041	000043	000037	000007
140	000020	000003	000026	000011	000006	000037	000016	000003	000005	000024

14-31-1

14.3 DAY PHOSPHORUS 32

9 DETECTOR 3X3-2 DATE 5-15-62

PLATE NO. 15-32-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	048208	054985	041310	032205	028227	024477	021864	019173	017697
010	016015	013931	012979	011895	011119	010059	009349	008567	008232	007607
020	007121	006402	006659	006003	005608	004983	005007	004801	004693	004028
030	004191	003919	003587	003548	003343	003219	002814	003056	003020	002914
040	002844	002645	002437	002144	002379	002204	002065	001884	002089	001839
050	001839	001673	001709	001624	001543	001473	001053	001300	001240	001050
060	000918	000667	000924	000676	000983	000703	000561	000582	000625	000709
070	000594	000402	000600	000413	000534	000474	000341	000232	000347	000214
080	000196	000268	000193	000138	000187	000196	000190	000108	000205	000175
090	000099	000105	000066	000060	000060	000078	000084	000072	000078	000090
100	000075	000045	000050	000050	000057	000066	000027	000051	000030	000048
110	000003	000010	000024	000012	000015	000025	000045	000030	000030	000027
120	000036	000030	000025	000025	000020	000020	000015	000014	000011	000000

15-32-1

5.1 MIN. SULFUR 37

DETECTOR 3X3-2 DATE 7-8-60

PLATE NO. 16-37-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 2.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	084200	079300	073500	066800	063600	060000	056500	053000	048949
010	046502	045677	045652	040275	036198	032661	032397	031013	029813	028533
020	027402	026074	026986	029265	037187	040288	033303	024825	021728	021158
030	021272	021114	020145	018834	019419	019695	018603	019451	018803	019284
040	019885	019442	019724	019061	019380	018790	018722	018260	019490	017687
050	017988	018743	018233	018641	018937	018200	018393	018961	017999	018141
060	017612	018175	018002	019554	020249	018921	019856	019295	019283	018968
070	018934	020009	019212	019667	019810	019331	019849	019674	019443	019579
080	020828	019894	02050C	021543	021356	022171	022370	022615	021778	021939
090	021733	021683	021822	022745	023583	025087	028446	034452	040419	043856
100	046178	045934	043272	039863	039276	037337	035919	034730	035362	035789
110	035715	035041	037392	037068	035751	036437	035047	035327	035815	037491
120	038842	045012	053369	060574	072956	081225	078786	071822	064557	057936
130	053432	049187	049106	046949	045086	042747	039382	035422	031305	027736
140	023852	020912	021996	025783	036575	054287	072594	094368	102991	107343
150	095659	081264	062735	043752	029752	019327	011974	007461	004413	003098
160	002146	001448	000990	0C0958	000522	000514	000443	000410	000302	000259
170	000213	000131	000146	0C0229	000159	000173	000245	000220	000283	000315
180	000279	000230	000196	0C0172	000173	000115	000084	000104	000094	000117

16-37-2

11

32 MIN. CHLORINE 34M-1.6 SEC. CHLORINE 34

DETECTOR 3X3-3 DATE 6-20-63

PLATE NO. 17-34M(17-34)-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 2.0 KEV/PHU ABSORBER 1 G/CM SQ BE + 200 MG CU SW.

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	009528	026714	031718	034851	039239	050840	097735	190477	045875
010	034390	033297	032839	031880	031044	030803	029304	022017	015642	012640
020	011343	010491	010836	013204	044683	148233	209953	111020	025432	006320
030	004529	004152	003953	003844	003909	003835	003678	003543	003366	003268
040	003368	003248	003113	003163	003180	003075	002879	002601	002400	002302
050	002298	002169	002376	002514	002747	002981	004484	006165	006971	005692
060	003810	002710	002089	002042	002020	001932	001900	001946	001921	001990
070	002002	001901	001939	001920	001947	001995	002021	002188	002632	002813
080	002908	002670	002511	002468	002343	002418	002391	002394	002416	002262
090	002111	001739	001459	001287	001049	000934	000861	000836	001065	001655
100	002850	004650	006317	007215	006194	004505	002797	001631	001134	000840
110	000712	000631	000596	000521	000517	000496	000506	000479	000455	000469
120	000425	000424	000427	000404	000424	000447	000470	000451	000488	000551
130	000511	000539	000610	000681	000753	000782	000777	000680	000558	000485
140	000461	000428	000463	000432	000408	000372	000354	000312	000251	000237
150	000188	000190	000185	000223	000287	000428	000663	000913	001005	001012
160	000896	000680	000511	000300	000170	000109	000068	000050	000042	000035
170	000044	000040	000040	000036	000049	000038	000017	000021	000025	000022
180	000022	000024	000035	000037	000034	000033	000027	000028	000017	000017
190	000010	000010	000011	000010	000014	000014	000017	000020	000018	000014
200	000010	000000	000000	000000	000000	000000	000000	000000	000000	000000

17-34M(17-34)-1

38 MIN. CHLORINE 38

DETECTOR 3X3-2 DATE 7-31-61

PLATE NO. 17-38-2 SOURCE-DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

2.06×10^7 (2.16 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	008523	009661	008694	007790	007035	006330	006080	005578	005068
010	004742	004508	004461	004208	004105	003808	003658	003671	003610	003515
020	003649	003698	004012	003783	003496	003173	003146	002978	002914	002862
030	002786	002685	002656	002632	002613	002502	002381	002404	002344	002400
040	002286	002299	002290	002224	002266	002202	002252	002273	002402	002448
050	002480	002521	002428	002336	002133	002030	002034	002125	002103	002135
060	002162	002139	002230	002115	002080	002070	002097	002104	002014	002058
070	002015	002007	001996	001951	002014	001969	002011	001927	001983	002041
080	002050	002129	002007	002034	002041	002035	002038	002172	002027	002037
090	002087	001963	002133	002091	002069	002021	002081	002091	002138	002078
100	002068	002177	002176	002215	002221	002236	002302	002423	002522	002647
110	002784	002927	003005	002889	002971	002896	002753	002633	002583	002611
120	002500	002550	002569	002524	002720	002610	002654	002670	002862	002806
130	002791	002830	002767	002767	002672	002692	002613	002458	002354	002195
140	002161	002096	001839	001852	001765	001707	001699	001652	001741	001798
150	001927	002108	002644	003133	003924	004684	005195	006519	007382	008032
160	008151	008001	007262	006634	005736	004855	004066	003396	002850	002489
170	002234	002212	002257	001770	001792	001805	001784	001742	001743	001675
180	001684	001751	001711	001613	001552	001445	001384	001318	001157	001015
190	000958	000877	000817	000750	000622	000588	000665	000659	000702	000942
200	001106	001534	002021	002559	003299	003885	004543	005104	005424	005502
210	005348	005027	004380	003834	003203	002687	002150	001593	001299	000945
220	000689	000479	000348	000255	000206	000150	000119	000093	000071	000060
230	000061	000040	000041	000031	000035	000040	000025	000035	000036	000026
240	000016	000024	000028	000004	000000	000000	*	*	*	*

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1.83 HR. ARGON 41

13 DETECTOR 3X3-2 DATE 11-23-6

PLATE NO. 18-41-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	012000	012735	015079	014798	016886	014047	012447	011130	010432
010	009673	009274	009099	009080	008782	008802	008983	008946	009266	009547
020	010457	011296	011077	010329	009442	009018	008942	008785	008598	008375
030	008314	008213	008190	008161	008133	008085	008198	008011	007968	007969
040	008198	008150	007911	008018	008011	008053	008048	007959	007917	007900
050	008027	008105	008148	008025	008092	007991	008005	008341	008010	008087
060	008240	008278	008270	008335	008528	008516	008444	008414	008640	008684
070	008538	008725	008870	008813	009205	009277	009351	009647	009685	009879
080	009903	009985	009933	010002	010059	010361	010357	010621	010432	010651
090	010814	010829	010985	011185	011232	011528	011526	011932	011962	011838
100	011748	011489	010894	010006	009138	008019	006972	006031	005024	004237
110	003476	003030	002932	002543	002456	002603	003005	003810	005127	008212
120	012630	019207	028111	038032	047628	054148	056900	055161	049739	041269
130	031509	022749	015573	010108	006310	003899	002478	001545	001025	000711
140	000505	000394	000322	000269	000227	000193	000161	000108	000130	000119
150	000099	000111	000121	000087	000101	000100	000107	000107	000106	000080
160	000100	000102	000098	000082	000109	000095	000094	000087	000084	000077
170	000092	000071	000084	000090	000075	000097	000084	000077	000069	000062
180	000059	000068	000061	000076	000068	000047	000053	000060	000050	000061
190	000059	000044	000066	000059	000071	000040	000066	000000	*	*

18-41-1

7.7 MIN. POTASSIUM 38

DETECTOR 3X3-3 DATE 6-20-63

PLATE NO. 19-38-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ + 0.2 G CU SW

2.36 X 10^7 (2.16 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	009020	009020	009110	008920	009180	009120	009050	009130	009290
010	009320	009510	009589	009587	009456	009422	009627	009900	010152	010354
020	010489	010395	010254	009949	009919	009537	009382	009211	009140	008804
030	008836	008882	008566	007547	006444	005310	004686	004502	004077	003957
040	003677	003612	003549	003607	003666	003772	004702	007179	014077	026651
050	043829	057872	059855	046583	027555	012929	005182	002453	001744	001560
060	001553	001516	001446	001397	001419	001384	001413	001337	001444	001410
070	001447	001464	001380	001423	001343	001276	001277	001248	001243	001285
080	001223	001227	001176	001174	001206	001188	001165	001119	001146	001130
090	001117	001171	001150	001147	001193	001155	001206	001195	001181	001144
100	001133	001151	001154	001180	001270	001187	001302	001316	001556	001655
110	001660	001727	001754	001612	001551	001485	001405	001354	001303	001339
120	001328	001263	001330	001378	001273	001338	001371	001370	001392	001370
130	001387	001396	001366	001378	001396	001388	001427	001426	001413	001400
140	001433	001329	001443	001453	001429	001494	001410	001353	001432	001447
150	001476	001450	001580	001573	001543	001701	001708	001883	002075	002265
160	002493	002594	002720	002701	002617	002481	002393	002150	002064	002088
170	002050	002090	002018	002064	002125	002117	002165	002092	002172	002072
180	002035	001925	001863	001710	001587	001494	001324	001175	001051	000972
190	000832	000739	000630	000554	000552	000575	000502	000541	000671	000815
200	001098	001489	002104	002905	004029	004993	006021	006698	007334	007337
210	006945	006431	005370	004358	003344	002455	001684	001120	000719	000529
220	000352	000235	000179	000180	000131	000127	000105	000112	000100	000108

7.7 MIN. POTASSIUM 38

15 DETECTOR 3X3-3 DATE 6-20-63

PLATE NO. 19-38-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 2.0 KEV/PHU ABSORBER 1.18 G/CM SQ + 0.2 G CU SW

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	007620	007622	007623	007971	007557	007800	007786	007512	008530
010	009189	008987	008647	008286	007698	007700	007184	005578	004212	003492
020	003204	003075	003138	004282	013010	037438	046865	022409	004667	001525
030	001265	001293	001253	001147	001231	001233	001175	001196	001089	001077
040	001005	001012	000989	000954	001028	000997	000940	000998	000961	000970
050	000977	000989	001030	001059	001227	001377	001438	001231	001230	001098
060	001155	001088	001100	001038	001181	001126	001144	001164	001139	001137
070	001229	001156	001227	001223	001191	001160	001233	001299	001489	001717
080	002054	002163	002150	001929	001675	001740	001696	001665	001743	001778
090	001721	001635	001394	001109	000870	000673	000561	000447	000440	000519
100	000973	001802	003249	004797	006106	005665	004556	002710	001343	000604
110	000287	000171	000110	000093	000075	000079	000048	000053	000061	000037
120	000045	000024	000026	000028	000020	000032	000033	000044	000071	000093
130	000081	000058	000054	000033	000017	000017	000011	000013	000007	000013
140	000007	000010	000004	000005	000006	000001	000004	000003	000005	000003

19-38-2

1,270,000,000 YEAR POTASSIUM 40

DETECTOR 3X3-2 DATE 5-4-61

PLATE NO. 19-40-1 SOURCE DISTANCE 1 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 0.598 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	002567	004660	007819	009742	010673	010872	010410	009572	008635
010	007914	007181	006476	006003	005709	005216	004693	004396	004042	003779
020	003586	003612	003583	003553	003572	003544	003298	003265	003097	002928
030	002611	002594	002486	002421	002362	002208	002136	002203	002050	002013
040	001896	001969	001949	001946	001901	001860	001872	001675	001606	001554
050	001573	001640	001589	001482	001369	001518	001432	001414	001409	001506
060	001441	001412	001433	001310	001360	001327	001295	001368	001343	001322
070	001357	001301	001332	001268	001288	001323	001338	001364	001318	001274
080	001306	001341	001347	001313	001337	001373	001385	001330	001369	001352
090	001415	001435	001500	001579	001552	001639	001595	001668	001648	001580
100	001540	001594	001596	001557	001587	001610	001620	001680	001677	001720
110	001780	001815	001819	001872	001820	001834	001810	001666	001585	001473
120	001295	001212	001027	000941	000767	000653	000572	000537	000477	000438
130	000449	000431	000483	000632	000821	001081	001724	002482	003550	004523
140	005857	006830	007435	007398	006976	006089	005164	003978	002933	002076
150	001281	000797	000491	000294	000178	000110	000089	000054	000026	000014

19-40-1

12.4 HR. POTASSIUM 42

17 DETECTOR 3X3-2 DATE 8-3-61

PLATE NO. 19-42-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

5.17×10^7 (1.52 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	043131	053006	049594	040160	035607	031896	029228	027060	024507
010	022388	020355	019215	017616	016567	015405	014396	013789	012925	012016
020	011732	011607	011292	010715	009983	009385	008804	008545	008555	009245
030	010277	010874	010191	008355	007257	006440	006244	005920	005711	005578
040	005429	005420	005298	005231	005170	005274	005099	005202	005312	005478
050	005360	005292	005188	004935	004799	004709	004561	004655	004663	004538
060	004507	004339	004364	004392	004453	004340	004324	004240	004337	004336
070	004262	004163	004241	004305	004334	004225	004227	004223	004413	004325
080	004370	004382	004377	004380	004349	004507	004508	004526	004599	004641
090	004569	004569	004504	004533	004551	004683	004631	004939	005025	005232
100	005359	005461	005597	005513	005586	005501	005394	005354	005295	005357
110	005309	005354	005325	005500	005436	005539	005713	005680	005632	005820
120	005842	005666	005541	005592	005275	004930	004398	004006	003673	003226
130	002950	002524	002335	002067	001913	001774	001765	001708	001915	002232
140	002778	004002	005989	008722	011852	015456	019193	021810	023562	023859
150	022509	019674	016449	013103	009673	007002	004800	003223	002103	001396
160	000933	000575	000420	000296	000218	000192	000155	000122	000091	000101
170	000087	000075	000066	000058	000060	000074	000055	000061	000054	000072
180	000074	000078	000057	000057	000103	000095	000095	000094	000074	000072
190	000061	000051	000057	000053	000049	000045	000052	000036	000029	000048
200	000024	000041	000030	000022	000046	000031	000035	000035	000047	000045
210	000044	000044	000037	000040	000045	000050	000040	000033	000050	000038
220	000038	000041	000033	000029	000039	000051	000041	000036	000035	000031
230	000041	000036	000036	000042	000042	000028	000032	000026	000032	000045
240	000031	000032	000026	000017	000021	000026	000026	000018	000013	000015

19-42-2

4.5 DAY CALCIUM 47

DETECTOR 3X3-2 DATE 4-2-64

PLATE NO. 20-47-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

9.661×10^{7} (1.300 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	100000	025000	023000	021500	020292	019835	019465	018556	017400	016968
010	016112	016054	015048	015041	014831	014698	013900	013822	013609	013236
020	013489	014102	014570	014279	013222	012635	012255	012624	012417	012586
030	012406	012211	011781	011363	010844	010444	010455	010545	010252	010112
040	010039	009943	010170	010103	010721	012047	015430	020838	027500	031769
050	031142	025819	019352	014334	011635	010365	009892	009780	009722	009687
060	009511	009423	009174	009058	009013	008991	008854	008789	008935	008975
070	009066	009286	009392	009798	010260	011090	012572	014628	017153	019338
080	020597	020785	019141	016777	014545	012715	011534	011011	010625	010906
090	010670	010950	011124	011138	011261	011334	011311	011658	011833	011874
100	011881	011705	011528	010967	010298	009337	008317	007279	006186	005220
110	004352	003859	003292	002360	002623	002491	002709	003150	003808	005515
120	008640	013201	020067	028846	038513	047503	054335	056805	054533	049447
130	041022	031937	023162	016022	010418	006404	003922	002271	001386	000847
140	000534	000296	000252	000158	000122	000070	000049	000056	000049	000028
150	000029	000030	000027	000016	000032	000037	000022	000025	000021	000030
160	000026	000000	000000	000000	000000	000000	000000	000000	000000	000000

20-47-1

8.7 MIN. CALCIUM 49

19 DETECTOR 3X3-2 DATE 9-15-61

PLATE NO. 20-49-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 2.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE + CAP

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	023770	033959	034630	028566	023557	022103	018321	014933	013166
010	012615	012579	011840	010593	009142	008792	008146	007818	007447	007394
020	007440	006966	006721	006600	007500	009700	009900	007900	005416	005088
030	005040	005044	004946	004790	004734	004719	004623	004629	004643	004600
040	004700	004600	005386	004700	004500	004482	004466	004641	004594	004579
050	004569	004662	004694	004671	004795	004695	004495	004481	004359	004450
060	004400	004460	004410	004440	004500	004620	004800	005106	005119	004867
070	004732	004493	004490	004296	004544	004602	004521	004627	004821	004868
080	004804	004748	004825	004887	004826	005008	005031	005025	005064	005052
090	005197	005211	005346	005453	005782	006292	007637	008717	009362	009514
100	009705	009346	008865	008486	008071	007947	007888	007973	008097	008083
110	008222	008197	008248	008099	008086	008021	008052	007981	008206	008850
120	009790	011512	013714	015525	016511	016101	015244	014079	012711	011694
130	011081	010599	010242	009803	009405	008578	007993	007143	006193	005697
140	005243	005364	006338	008845	012409	016802	020405	022322	022656	020355
150	017235	013339	009715	006932	004731	003121	002162	001609	001211	000971
160	000942	000859	000805	000741	000817	000829	000922	001046	001235	001365
170	001403	001422	001440	001248	001173	001120	001052	000876	000821	000787
180	000748	000690	000661	000583	000497	000498	000490	000508	000590	000764
190	000977	001175	001344	001429	001335	001235	001075	000835	000681	000501
200	000363	000264	000191	000128	000096	000088	000056	000052	000051	000043
210	000045	000034	000037	000029	000036	000032	000041	000036	000044	000037
220	000050	000055	000058	000040	000036	000024	000020	000016	000021	000023
230	000011	000006	000003	000009	000007	000012	000008	000007	000004	000000

20-49-1

2.4 DAY SCANDIUM 44M - 4.0 HR. SCANDIUM 44

DETECTOR 3X3-2 | DATE 9-24-63

PLATE NO. 21-44M(21-44)-1 | SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU | ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	017859	022310	023640	022312	021686	021205	021030	020744	020220
010	020516	021031	022402	024048	024238	023590	023015	023973	024550	024234
020	024047	024476	024858	025383	026937	038939	078181	134585	148199	103943
030	051424	025474	018050	015911	013386	011580	009868	008739	008046	007829
040	007394	007431	007337	007789	007968	008806	011321	019046	036652	066425
050	102480	127065	124932	097293	060179	030737	014206	007277	004824	004155
060	003818	003773	003796	003759	003605	003806	003854	003897	003922	003880
070	004048	003961	003957	003976	003939	003935	003943	003983	004005	004124
080	003954	003943	003968	004050	004205	004135	004301	004247	004231	004235
090	004068	003580	003200	002876	002498	002255	001912	001717	001563	001597
100	001380	001257	001270	001241	001391	001688	002352	003709	005737	008605
110	012190	015698	018642	020301	019891	018541	014949	011461	008162	005419
120	003375	002125	001332	000896	000573	000483	000383	000333	000288	000311
130	000281	000242	000252	000267	000253	000260	000253	000273	000266	000257
140	000237	000254	000262	000285	000305	000304	000259	000263	000202	000220
150	000159	000117	000135	000106	000107	000092	000113	000101	000131	000199
160	000219	000263	000374	000430	000408	000401	000445	000386	000320	000292
170	000177	000159	000099	000063	000047	000041	000017	000010	000008	000015
180	000021	000000	000000	000000	000000	00000	*	*	*	*

21-44m(21-44)-1

2.4 DAY SCANDIUM 44M - 4.0 HR. SCANDIUM 44

21 DETECTOR 3X3-3 DATE 9-22-63

PLATE NO. 21-44M(21-44)-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 2.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	017311	017935	019954	020899	021932	023278	024352	024159	026028
010	027062	027818	028060	052243	112628	064582	026897	017043	012770	010717
020	009674	009533	009376	010197	029532	097415	135612	078623	023652	006670
030	004631	004406	004448	004583	004609	004629	004654	004754	004836	004882
040	004901	004895	005261	005424	005248	004668	003530	002651	002045	001655
050	001429	001300	001289	001953	004842	011418	020679	026155	020666	010689
060	003654	001129	000520	000344	000301	000273	000302	000276	000314	000282
070	000295	000330	000338	000335	000286	000203	000139	000092	000118	000147
080	000181	000339	000432	000503	000399	000202	000090	000043	000024	000018
090	000015	000010	000013	000011	000014	000011	000009	000011	000006	000010
100	000011	000005	000007	000010	000010	000009	000011	000014	000014	000009
110	000007	000011	000014	000007	000009	000011	000010	000007	000006	000003
120	000003	000003	000003	000003	000003	000004	000005	000007	000010	000011
130	000010	000007	000004	000002	000001	*	*	*	*	*

21-44m(21-44)-2

85 DAY SCANDIUM 46

DETECTOR 3X3-2 DATE 7-30-63

PLATE NO. 21-46-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

3.14×10^7 (1.119 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	005923	008177	007652	007233	007053	006962	006939	006838	007027
010	005788	006664	006731	006811	007014	006867	006948	007042	007522	007875
020	008439	009037	008642	008066	007765	007550	007418	007475	007542	007678
030	007463	007631	007394	007357	007431	007195	007393	007390	007272	007421
040	007318	007462	007351	007512	007531	007449	007492	007573	007717	007728
050	007813	007908	007742	007942	007710	007993	008030	008219	008255	008246
060	008510	008625	008667	008720	008633	008616	008257	007766	007161	006533
070	005133	005782	005374	005105	004923	005090	004980	004948	004992	005330
080	005791	006721	008582	011732	016648	023317	030265	035148	036500	033994
090	028220	020642	014014	008531	005053	002922	001906	001454	001121	001038
100	001180	001373	001859	002838	004460	007369	011249	015248	019482	022561
110	023541	022563	019506	015339	011074	007492	004639	002671	001561	000920
120	000569	000327	000237	000190	000163	000142	000128	000108	000127	000107
130	000092	000092	000103	000100	000094	000103	000076	000097	000100	000091
140	000105	000071	000101	000106	000098	000077	000097	000073	000087	000100
150	000084	000085	000077	000068	000073	000048	000092	000102	000095	000092
160	000078	000074	000087	000087	000062	000063	000087	000096	000075	000062
170	000084	000081	000076	000081	000088	000071	000074	000088	000042	000041
180	000066	000054	000038	000029	000021	000034	000035	000037	000028	000048
190	000044	000075	000091	000135	000127	000146	000174	000163	000191	000174
200	000146	000117	000105	000071	000047	000040	000025	000019	000000	000000

21-46-1

3.4 DAY SCANDIUM 47

23 DETECTOR 3X3-2 DATE 5-4-62

PLATE NO. 21-47-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000150	002445	002566	002526	003081	003959	002708	002186	002726
010	003796	004677	005532	008730	010528	024742	116150	209184	130260	033496
020	004140	000378	000188	000144	000149	000147	000144	000131	000133	000136
030	000144	000143	000169	000179	000163	000124	000098	000049	000040	000000

21-47-1

3.4 DAY SCANDIUM 47

DETECTOR 3X3-2 DATE 5-4-62

PLATE NO. 21-47-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

3.99×10^{7} (0.153 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	002400	002931	002462	002549	002496	002393	002403	002462	002678
010	002995	003569	003994	003506	002590	002027	002130	002456	002614	003050
020	003744	004401	004763	004831	005366	006711	008723	010131	011268	013264
030	022412	051692	109256	180884	221180	200640	137077	071152	028357	008747
040	002203	000587	000268	000201	000159	000139	000168	000142	000145	000138
050	000153	000150	000149	000168	000174	000165	000173	000161	000144	000159
060	000141	000155	000144	000163	000144	000180	000184	000176	000154	000151
070	000139	000091	000094	000077	000054	000050	000061	000036	000030	000051
080	000055	000044	000000	000000	*	*	*	*	*	*

21-47-2

14 HR. SCANDIUM 48

25 DETECTOR 3X3-2 DATE 7-21-61

PLATE NO. 21-48-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	288203	134752	020905	006903	006862	006735	006633	006638	006634
010	006553	006525	006641	006758	006760	006754	006837	006996	007261	007737
020	008208	008309	008318	008855	008286	008234	007970	008086	008042	008093
030	008133	008022	007851	007883	007707	007369	007301	007254	007268	007204
040	007270	007244	007251	007447	007270	007451	007446	007382	007465	007486
050	007612	007660	007593	007580	007675	007666	007767	007969	007900	007886
060	007873	008051	007983	008040	008307	008051	008514	008473	008540	008578
070	008710	008950	008831	008896	008634	008438	008056	007589	007286	006617
080	006142	005491	004792	003897	003436	002992	002951	003391	003955	005031
090	006253	008215	011493	015473	020346	024947	028337	030697	030790	030481
100	029667	027847	024672	020810	016149	011604	007663	004893	003042	002098
110	001654	001503	001439	001365	001353	001361	001386	001397	001615	001903
120	002465	003393	004917	007190	009344	011511	013235	013794	013689	012328
130	010109	008008	005857	004059	002622	001805	001141	000784	000615	000420
140	000358	000314	000310	000304	000264	000284	000259	000256	000246	000221
150	000211	000203	000192	000186	000181	000178	000187	000186	000169	000160
160	000163	000168	000163	000152	000168	000167	000151	000174	000150	000165
170	000179	000142	000159	000167	000172	000170	000139	000164	000138	000155
180	000119	000130	000121	000092	000109	000134	000113	000141	000131	000123
190	000107	000133	000165	000180	000150	000199	000221	000207	000191	000186
200	000178	000177	000130	000129	000116	000093	000075	000080	000068	000045
210	000052	000043	000049	000047	000054	000066	000074	000071	000085	000102
220	000114	000129	000127	000145	000146	000156	000158	000144	000141	000107
230	000086	000096	000076	000051	000048	000040	000027	000018	000013	000008

21-48-2

1000 YR. TITANIUM 44 - 4.0 HR SCANDIUM 44

DETECTOR 3X3-2 DATE 11-15-63

PLATE NO. 22-44(21-44)-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	004533	007637	008493	019255	021667	023257	103613	184637	125178
010	020752	006347	006172	006348	006228	006845	007412	007354	006783	006531
020	006449	006538	006490	006393	006209	006186	005917	005879	006001	006184
030	006120	006291	005911	005433	004946	004154	003604	003192	002934	003171
040	002901	002817	002921	002907	003027	003318	004111	006572	012802	022560
050	035186	042938	042029	032864	020231	010709	005121	002718	001921	001681
060	001625	001665	001569	001528	001580	001535	001549	001638	001590	001595
070	001632	001647	001681	001651	001699	001629	001588	001647	001560	001684
080	001742	001692	001736	001749	001718	001698	001805	001836	001764	001699
090	001605	001534	001370	001217	001016	000842	000761	000625	000599	000497
100	000447	000447	000492	000472	000585	000720	000988	001587	002454	003633
110	005148	006648	007862	008679	008595	007794	006453	004941	003457	002404
120	001513	000910	000558	000346	000223	000166	000123	000097	000112	000097
130	000096	000088	000081	000106	000069	000095	000092	000078	000081	000076
140	000093	000090	000091	000107	000121	000109	000105	000108	000073	000063
150	000059	000048	000031	000037	000039	000051	000032	000033	000043	000052
160	000074	000093	000108	000132	000137	000152	000147	000149	000104	000082
170	000077	000049	000051	000023	000033	000021	000025	000030	000026	000006
180	000025	000007	000000	000000	000000	000000	*	*	*	*

22-44(21-44)-1

3.08 HR. TITANIUM 45

27 DETECTOR 3X3-3 DATE 9-22-63

PLATE NO. 22-45-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G BE + 200 MG CU SW

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	006400	006417	007170	007597	008205	008290	007553	007614	007667
010	007525	007559	007735	007700	007951	007909	008243	008487	009665	009845
020	009160	008998	008914	008810	008685	008655	008660	008685	009060	009070
030	009200	009434	008960	007768	006293	005003	004043	003492	003245	002971
040	002823	002801	002804	002879	002962	003279	004635	008840	019247	038592
050	063445	081749	081637	061690	034306	014160	004238	001393	000492	000302
060	000220	000204	000199	000173	000197	000172	000182	000175	000179	000208
070	000224	000214	000239	000190	000148	000134	000092	000071	000112	000095
080	000073	000075	000060	000065	000085	000056	000052	000049	000051	000053
090	000052	000074	000044	000058	000077	000049	000047	000038	000048	000037
100	000033	000045	000039	000032	000029	000000	000000	000000	*	*

22-45-1

5.8 MIN. TITANIUM 51

DETECTOR 3X3-2 DATE 10-27-61

PLATE NO. 22-51-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000673	000644	000603	000609	000601	000529	000523	000533	000517
010	000499	000482	000462	000477	000529	000641	000653	000546	000425	000360
020	000289	000239	000227	000260	000224	000252	000252	000371	000395	000661
030	001616	003966	007598	009086	007179	003770	001328	000318	000063	000071
040	000067	000059	000049	000054	000045	000045	000038	000034	000039	000025
050	000030	000024	000020	000029	000019	000022	000026	000031	000047	000049
060	000074	000082	000075	000080	000055	000038	000031	000025	000020	000030
070	000029	000022	000018	000024	000022	000016	000021	000018	000021	000016
080	000019	000023	000018	000020	000024	000024	000028	000030	000040	000051
090	000056	000072	000121	000147	000166	000153	000138	000109	000067	000042
100	000026	000020	000015	000009	000010	000000	000000	000000	*	*

22-51-1

16 DAY VANADIUM 48

29 DETECTOR 3X3-2 DATE 3-22-62

PLATE NO. 23-48-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

2.63×10^7 (1.31 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	012200	012185	012237	012000	011602	011358	011503	011141	011366
010	011219	010896	011166	011318	011437	011433	011616	012060	012747	012847
020	013384	013660	013911	013673	012912	012584	012620	012485	012401	012658
030	012419	012736	012352	011767	011024	009852	009029	008365	008097	007973
040	007820	007852	007724	007890	007963	008390	009522	013011	020439	034000
050	051449	062527	062598	049660	032527	018693	010852	007771	006892	006582
060	006281	006374	006564	006513	006440	006555	006643	006693	006776	006908
070	006929	006761	007004	006844	006497	006204	005807	005200	004863	004496
080	004250	003963	004095	003884	003741	003800	003805	004181	004629	005681
090	007169	009562	013060	017627	022057	025853	027873	027414	024156	019555
100	015042	010528	007652	005586	004232	003511	002874	002416	002091	001752
110	001484	001322	001164	001027	000974	000931	000953	001041	001265	001673
120	002237	003437	005133	007506	010303	012532	014576	015421	014990	013460
130	011302	008811	006312	004472	002964	001983	001221	000839	000592	000493
140	000401	000355	000380	000373	000408	000402	000437	000464	000432	000398
150	000368	000372	000303	000278	000245	000202	000222	000213	000155	000140
160	000181	000171	000152	000138	000158	000152	000180	000162	000145	000150
170	000186	000191	000177	000218	000219	000235	000276	000292	000285	000272
180	000271	000266	000215	000208	000200	000171	000125	000152	000124	000119
190	000115	000122	000094	000102	000096	000085	000090	000069	000057	000060
200	000078	000062	000051	000055	000063	000075	000083	000075	000101	000149
210	000119	000157	000186	000204	000212	000192	000178	000179	000193	000171
220	000180	000145	000155	000131	000116	000100	000102	000048	000052	000041
230	000033	000025	000000	000000	*	*	*	*	*	*

23-48-1

3.77 MIN. VANADIUM 52

DETECTOR 3X3-2 DATE 7-31-61

PLATE NO. 23-52-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ BE

5.76×10^7 (1.43 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	009751	011534	010967	011046	010386	008840	008140	007472	007166
010	006718	006441	006221	006319	005951	005762	005718	005813	005806	005943
020	006133	006425	006850	006193	005987	005584	005349	005293	005357	005309
030	005115	005023	004894	004914	004899	004748	004830	004618	004670	004935
040	005026	004930	004864	004610	004598	004607	004580	004411	004523	004543
050	004721	004613	004635	004467	004628	004421	004529	004519	004304	004562
060	004296	004466	004610	004426	004560	004432	004530	004579	004479	004475
070	004607	004621	004624	004710	004669	004729	004756	004636	004673	004763
080	004779	004779	004833	004947	004911	004957	005030	005166	005380	005282
090	005617	005791	006078	006025	006017	005860	005928	006017	005846	005846
100	005938	005919	006014	006000	006263	006170	006189	006272	006360	006425
110	006608	006646	006752	006500	006500	006133	005821	005314	004773	004180
120	003718	003319	002722	002309	002123	001910	001768	001739	001792	001972
130	002274	002984	004071	005972	008966	012735	017204	021940	025956	028533
140	029287	028036	025015	020520	016184	012120	008366	005648	003732	002384
150	001568	001032	000619	000447	000318	000236	000170	000161	000113	000086
160	000076	000076	000079	000064	000043	000054	000045	000049	000065	000052
170	000061	000050	000044	000054	000050	000043	000042	000041	000039	000031
180	000032	000032	000030	000026	000023	000025	000031	000021	000033	000019
190	000022	000026	000028	000027	000025	000033	000017	000028	000030	000021
200	000018	000018	000025	000022	000028	000023	000012	000017	000021	000024

23-52-2

42 MIN. CHROMIUM 49

31 DETECTOR 3X3-24 DATE 4-3-63

PLATE NO. 24-49-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18G/CM SQ. BE + CU SAND

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	004032	004032	004033	004090	004100	007396	018997	011846	022530
010	049667	022305	004760	004371	005145	010641	021706	017899	006650	003555
020	003272	003185	003210	003221	003273	003266	003218	003169	003115	003097
030	003129	003092	003062	002664	002372	001806	001427	001228	001110	000963
040	000877	000933	000902	000954	000952	001089	001413	002729	006061	012520
050	020882	027696	027261	019780	010811	004346	001387	000508	000346	000433
060	000526	000537	000472	000370	000276	000248	000248	000271	000277	000206
070	000144	000110	000078	000068	000070	000045	000051	000061	000035	000059
080	000046	000047	000038	000040	000055	000038	000038	000026	000036	000045
090	000043	000029	000036	000013	000026	000025	000022	000020	000028	000028
100	000022	000026	000016	000010	000031	000016	000020	000012	000028	000014

24-49-1

27.3 DAY CHROMIUM 51

DETECTOR 3X3-2 DATE 7-9-63

PLATE NO. 24-51-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

5.735 X 10^6 (0.323 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	000759	001425	001474	001351	001397	001188	001199	001178	001179
010	001172	001096	001101	001212	001379	001595	001736	001567	001441	001070
020	000896	000890	000791	000652	000695	000734	000872	000887	001137	001949
030	005130	012619	022763	027544	021252	010976	003589	000647	000107	000009
040	000058	000031	000013	000035	000015	000060	000043	000039	000028	000000

24-51-1

3.5 MIN. CHROMIUM 55

33 DETECTOR 3X3-2 DATE 7-22-63

PLATE NO. 24-55-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	001419	004781	006586	004881	003867	003500	003137	002634	002571
010	002156	001970	001799	001650	001552	001403	001290	001119	001030	000900
020	000934	000774	000770	000733	000695	000630	000578	000518	000494	000536
030	000505	000493	000407	000421	000428	000327	000358	000334	000329	000375
040	000267	000290	000246	000260	000291	000249	000226	000252	000256	000215
050	000196	000198	000183	000198	000149	000170	000165	000162	000182	000162
060	000127	000150	000130	000155	000122	000135	000116	000081	000064	000104
070	000091	000082	000102	000082	000072	000059	000090	000086	000051	000064
080	000056	000050	000044	000050	000069	000050	000058	000076	000037	000070
090	000058	000043	000045	000058	000036	000026	000069	000032	000022	000050
100	000030	000030	000060	000046	000029	000029	000022	000028	000041	000020
110	000017	000028	000023	000005	000020	000022	000033	000020	000019	000013
120	000021	000020	000004	000012	000021	000011	000020	000008	000012	000021
130	000025	000011	000020	000001	000006	000011	000020	000018	000020	000022
140	000008	000010	000015	000017	000016	000017	000008	000007	000015	000021

24-55-1

5.7 DAY MANGANESE 52

DETECTOR 3X3-2 DATE 9-5-63

PLATE NO. 25-52-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	007210	008659	008523	008241	007919	007810	007915	008222	007878
010	007809	007797	007904	008134	008045	008159	008436	008749	009214	009580
020	009728	010069	009649	009310	009119	008904	008805	008731	008747	008885
030	008878	008888	008535	008657	008660	008195	007861	007597	007280	007100
040	007253	007307	007105	007159	007095	007266	007908	009014	012239	017232
050	023684	028320	028157	023621	016881	010944	007462	005932	005202	005055
060	004784	004750	004603	004631	004775	004812	004785	005259	005823	007062
070	009663	013578	017926	022068	023773	022426	018351	013388	009153	005976
080	004200	003519	003185	003299	003429	003575	004104	005176	007029	009681
090	012716	015841	017686	017504	016068	013013	009915	007008	004943	003643
100	002961	002533	002375	002237	002268	002234	002234	002221	002157	002253
110	002228	002248	002221	002188	002117	002113	002066	002043	001919	001916
120	001884	001721	001649	001550	001437	001401	001333	001293	001211	001271
130	001439	001478	001808	002256	003111	004145	005380	006692	007986	008765
140	008864	008566	007607	006561	005182	003870	002713	001909	001355	000884
150	000600	000438	000309	000243	000223	000172	000155	000161	000149	000160
160	000170	000177	000189	000179	000224	000244	000241	000229	000204	000193
170	000206	000176	000146	000116	000114	000109	000103	000102	000106	000085
180	000078	000089	000092	000095	000097	000102	000109	000105	000123	000128
190	000137	000140	000128	000094	000097	000108	000068	000080	000061	000065
200	000051	000059	000069	000060	000048	000059	000054	000063	000065	000082
210	000086	000094	000088	000079	000085	000094	000067	000071	000070	000048
220	000042	000038	000041	000033	000030	000033	000044	000055	000052	000044
230	000071	000074	000071	000057	000058	000044	000030	000030	000024	000018
240	000021	000024	000000	000000	000000	000000	000000	000000	000000	000000

25-52-1

314 DAY MANGANESE 54

35 DETECTOR 3X3-2 DATE 1-26-62

PLATE NO. 25-54-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

5.533×10^{7} (0.835 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	007429	007508	007713	007813	007657	007455	007500	007809	007655
010	007583	007642	007543	007568	007772	007824	007811	008160	008466	009011
020	009778	009765	009298	008658	008404	008471	008473	008418	008454	008363
030	008298	008426	008382	008321	008306	008286	008279	008230	008264	008394
040	008442	008461	008540	008591	008418	008581	008586	008771	008883	008792
050	008636	008921	008964	009042	008955	009305	009350	009739	009746	009888
060	009388	009120	007985	006785	005493	004369	003443	002897	002311	002091
070	001820	001752	001757	001838	002145	002768	004202	007526	014116	024360
080	038581	053712	063654	066293	060614	048188	033099	020629	011199	005757
090	002736	001381	000651	000360	000178	000082	000069	000037	000033	000032
100	000021	000015	000021	000023	000025	000032	000006	000009	000006	000001

25-54-2

2.58 HR. MANGANESE 56

DETECTOR 3X3-2 DATE 7-19-61

PLATE NO. 25-56-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

3.44×10^7 (0.845 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	007462	010709	009571	009001	008543	008059	007942	007536	007244
010	006952	007019	007051	006913	006893	007013	006909	007409	007627	008318
020	008524	007914	007556	007192	006857	006474	006556	006578	006347	006470
030	006485	006497	006397	006457	006540	006557	006498	006386	006367	006427
040	006389	006301	006371	006399	006411	006540	006508	006521	006569	006517
050	006644	006741	006849	006658	006827	006797	006700	006755	006982	006921
060	006860	006804	006230	005734	005052	004385	003657	003150	002760	002506
070	002353	002137	002182	002246	002313	002512	002925	003728	005387	009069
080	014670	022544	031372	038405	041537	038765	031893	023458	015482	009194
090	005442	003094	001974	001551	001219	001071	000989	000942	001000	000950
100	000953	001018	001001	000973	001051	001077	001049	001054	001092	001074
110	001031	001115	001010	001031	001052	001068	001046	001058	001032	001100
120	001083	001056	001122	001120	001206	001241	001238	001285	001348	001420
130	001432	001403	001415	001403	001326	001302	001349	001339	001306	001332
140	001326	001314	001284	001265	001303	001351	001405	001353	001342	001378
150	001367	001287	001264	001253	001220	001219	001107	001129	001036	001003
160	000907	000926	000869	000792	000794	000863	000904	000979	001143	001467
170	001759	002228	002684	003185	003624	003854	003973	003964	003704	003208
180	002753	002311	001940	001570	001178	000946	000667	000570	000419	000349
190	000311	000297	000278	000265	000296	000367	000421	000520	000658	000814
200	000991	001237	001341	001434	001588	001517	001411	001381	001343	001102
210	000900	000755	000608	000492	000372	000290	000227	000188	000168	000135
220	000104	000099	000110	000096	000084	000091	000061	000058	000058	000072
230	000068	000065	000060	000068	000079	000086	000094	000102	000096	000112
240	000111	000142	000111	000126	000124	000104	000112	000125	000000	000000

25-56-2

9 MIN. IRON 53

37 DETECTOR 3X3-3 DATE 6-20-63

PLATE NO. 26-53-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.1G/CM SQ. BE + 0.3G CU SW.

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	005400	005420	005370	005450	005500	005520	005480	005530	005600
010	005620	005640	005700	005740	005784	006129	006124	006493	006963	007070
020	006872	006855	006637	006391	006156	006131	006009	005834	006008	006006
030	005955	005975	005845	005264	004670	004808	007164	011793	015821	015198
040	010531	005455	002746	001894	001715	001864	002546	004670	010192	020287
050	033450	043548	043990	032944	018761	007933	002703	000949	000545	000444
060	000431	000418	000406	000347	000332	000317	000303	000295	000287	000297
070	000309	000290	000282	000227	000207	000213	000210	000203	000187	000180
080	000156	000160	000162	000205	000180	000178	000183	000212	000279	000282
090	000276	000265	000190	000153	000127	000105	000091	000084	000079	000103
100	000083	000081	000083	000087	000072	000071	000055	000060	000068	000060
110	000057	000049	000057	000060	000040	000042	000042	000047	000040	000046
120	000034	000033	000023	000026	000031	000035	000039	000029	000027	000040
130	000033	000028	000035	000024	000045	000027	000019	000022	000022	000025
140	000029	000028	000024	000024	000022	000031	000017	000015	000019	000018
150	000018	000023	000024	000013	000007	000018	000010	000015	000014	000012
160	000014	000014	000015	000022	000009	000013	000010	000009	000006	000007

26-53-1

45 DAY IRON 59

DETECTOR 3X3-2 DATE 3-21-62

PLATE NO. 26-59-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

2.56×10^{7} (1.29 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	001656	007246	006671	006326	006037	005914	005880	006000	005893
010	005753	005876	005829	006218	008447	011871	009960	007057	008275	014682
020	020051	016330	009567	007008	006349	006107	005755	005932	005854	005756
030	005983	005907	006001	006312	006426	006302	005894	005741	005613	005619
040	005666	005583	005513	005377	005602	005673	005624	005620	005813	005807
050	005793	005814	005839	005787	005692	005787	005772	005871	005799	005902
060	005983	006165	005925	006179	005199	006335	006365	006445	006440	006604
070	006532	006540	006649	006752	005648	006871	007028	007068	007095	007251
080	007354	007450	007298	007275	007195	007046	006603	006104	005554	005239
090	004767	004598	004327	004128	003999	003885	004007	004133	004111	004412
100	005024	006167	008120	011038	015092	019824	024065	026746	027235	025272
110	021120	016366	011610	007872	005044	003135	002296	001945	001936	002508
120	003731	005566	007947	010815	013514	014759	015414	014677	012992	010662
130	007934	005857	004009	002527	001536	000914	000563	000324	000240	000175
140	000128	000101	000060	000051	000034	000047	000034	000026	000017	000017

26-59-2

267 DAY COBALT 57

39 DETECTOR 3X3-2 DATE 3-27-64

PLATE NO. 27-57-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	030707	000807	004158	002348	000289	000274	000450	000444	000386
010	000239	000146	000151	000173	000239	000448	000618	000945	001298	001915
020	002004	001940	002278	004555	011243	024083	036345	036445	025448	013589
030	006553	003130	001232	000409	000103	000018	000013	000009	000001	000002

27-57-1

267 DAY COBALT 57

DETECTOR 3X3-2 DATE 12-27-6

PLATE NO. 27-57-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.25 KEV/PHU ABSORBER NONE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000128	000315	000568	000782	002414	005141	004063	001215	000299
010	000156	000172	000214	000258	000306	000307	000315	000293	000233	000183
020	000118	000110	000103	000078	000124	000075	000062	000115	000063	000114
030	000142	000174	000227	000302	000402	000536	000683	000879	001055	001272
040	001248	001157	001051	000892	000921	001102	001633	002955	005252	008821
050	013620	018873	023204	025966	026309	023941	019735	014791	010659	007525
060	005303	003748	002609	001717	001075	000643	000369	000181	000108	000000

27-57-2

70 DAY COBALT 58

41 DETECTOR 3X3-2 DATE 3-27-64

PLATE NO. 27-58-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	069999	014736	018827	019028	018774	018333	018376	018126	018116	017777
010	017947	018247	019722	020684	019304	018796	019063	019994	020926	022172
020	022067	021794	020588	019938	019848	019449	019721	019654	019754	020125
030	020354	020020	019574	018877	017958	016874	016313	015847	015531	015116
040	014905	015336	015489	015479	016005	016342	017931	021913	030825	045781
050	063033	074187	072744	059261	041935	028033	020320	016916	015274	013856
060	011968	010093	008273	006498	005107	004436	003810	003440	003069	003078
070	003085	003314	003916	005301	008515	015412	027464	046728	069470	091053
080	102420	101836	087284	065314	043333	024802	013324	006850	003304	001748
090	001042	000617	000424	000376	000307	000224	000221	000245	000196	000187
100	000195	000205	000210	000224	000209	000215	000225	000185	000174	000195
110	000141	000145	000103	000085	000085	000084	000084	000091	000081	000076
120	000124	000087	000110	000115	000105	000124	000152	000122	000209	000226
130	000288	000363	000360	000353	000375	000266	000232	000189	000144	000099
140	000083	000078	000037	000075	000032	000069	000042	000022	000045	000026
150	000029	000036	000039	000031	000043	000063	000070	000093	000137	000150
160	000166	000220	000198	000221	000170	000173	000138	000114	000093	000060
170	000050	000033	000017	000020	000007	000002	000008	000005	000003	000004

27-58-1

5.27 YR. COBALT 60

DETECTOR 3X3-2 DATE 7-18-61

PLATE NO. 27-60-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

1.055 X 10^8 (1.33 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	016300	016400	016912	016378	016285	015760	016040	016056	015671
010	015563	015495	015680	015492	015681	015814	015825	016191	016464	017165
020	019137	020645	021034	019904	018353	017505	017053	017033	017066	016858
030	017328	017137	016807	016643	016391	016316	016273	016231	016004	015931
040	015991	016035	016002	016081	016166	016001	016397	016484	016622	016300
050	016839	016741	017093	016919	016817	017027	017148	017019	017449	017269
060	017476	017605	017800	018177	018277	018329	018707	019038	018869	018890
070	018999	019395	019737	019922	020114	020507	020675	021032	020996	021140
080	022030	021965	022886	023300	023386	023747	023709	024021	024225	024218
090	024086	023536	022758	022009	020521	019252	018180	017254	016303	015754
100	015206	014883	014979	014935	014882	014765	014824	016080	018319	022786
110	030478	041686	053931	065896	073834	075932	071762	061383	049003	036471
120	025877	018613	014390	014189	017087	023448	032190	042605	051209	058744
130	060310	057082	051182	042199	032521	023620	016118	010545	006394	004043
140	002562	001607	001082	000710	000591	000434	000388	000354	000300	000278
150	000253	000217	000242	000181	000213	000218	000201	000197	000200	000230
160	000208	000206	000215	000200	000168	000229	000202	000209	000158	000186
170	000213	000172	000186	000203	000183	000185	000185	000184	000203	000186
180	000193	000185	000157	000193	000172	000189	000198	000167	000190	000175
190	000175	000187	000191	000169	000199	000166	000187	000181	000187	000206
200	000176	000179	000214	000185	000147	000192	000190	000176	000207	000171
210	000205	000188	000201	000196	000168	000196	000188	000169	000182	000175
220	000171	000143	000135	000142	000115	000090	000079	000072	000081	000058
230	000031	000067	000050	000067	000064	000085	000097	000149	000179	000230
240	000280	000327	000336	000310	000292	000300	000267	000217	000215	000175
250	000117	000097	000089	000059	000028	000010	000009	000000	*	*

27-60-1

10.5 MIN. COBALT 60M

43 DETECTOR 3X3-2 DATE 7-3-61

PLATE NO. 27-60M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000752	003541	014856	006280	006110	075261	057151	009336	000373
010	000140	000101	000117	000136	000120	000102	000101	000092	000078	000063
020	000091	000088	000087	000085	000083	000086	000101	000079	000082	000103
030	000073	000065	000087	000065	000073	000067	000068	000088	000076	000061
040	000069	000070	000077	000072	000091	000078	000073	000076	000071	000074
050	000078	000073	000078	000088	000085	000076	000080	000085	000062	000088
060	000087	000081	000079	000060	000077	000090	000073	000081	000084	000071
070	000081	000074	000089	000075	000078	000080	000096	000081	000086	000078
080	000098	000118	000124	000104	000107	000118	000103	000110	000079	000097
090	000103	000077	000088	000108	000088	000080	000082	000085	000074	000112
100	000100	000091	000082	000080	000089	000078	000082	000072	000085	000089
110	000062	000066	000059	000062	000057	000046	000054	000034	000032	000022
120	000042	000040	000049	000068	000118	000155	000240	000329	000369	000444
130	000443	000435	000370	000321	000245	000154	000120	000080	000035	000000

27-60m-1

3.3 HR. COBALT 61

DETECTOR 3X3-2

DATE 4-26-62

PLATE NO. 27-61-1

SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU

ABSORBER 0.598 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	001416	001109	000935	000883	000937	001270	002739	007097	009186
010	004412	001472	002731	010094	035215	073307	074147	033308	005588	000186
020	000123	000156	000177	000190	000166	000146	000155	000180	000150	000173
030	000163	000135	000121	000114	000077	000076	*	*	*	*

27-61-1

36 HR. NICKEL 57

45 DETECTOR 3X3-2 DATE 2-15-63

PLATE NO. 28-57-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G BE + 0.1 G CU SANDW

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	005267	010692	008614	009259	008852	008435	008696	009527	011047
010	013277	015094	029954	074117	070508	024722	009766	009497	009173	008999
020	008700	008868	009315	009261	009193	008937	008813	008662	008457	008890
030	008875	008721	008537	008201	006976	006157	005459	004946	004578	004423
040	004276	004249	004009	004184	004506	004783	006046	009572	017473	031219
050	047238	058781	058142	045980	028802	015188	007422	003914	002896	002593
060	002472	002446	002457	002547	002684	002631	002633	002605	002589	002531
070	002568	002609	002548	002496	002529	002614	002577	002610	002643	002652
080	002656	002796	002761	002764	002777	002887	002926	003039	003053	002895
090	002986	002913	002898	002964	002942	002844	002989	002983	003089	003006
100	003066	003092	003148	003158	003209	003198	003257	003276	003243	003186
110	003033	002927	002798	002583	002312	002063	001782	001611	001454	001346
120	001272	001225	001217	001262	001267	001430	001694	002343	003228	004474
130	006191	008370	010711	011969	013119	013257	012438	010978	009223	007229
140	005385	004046	002894	002084	001552	001267	000995	000925	000817	000713
150	000704	000671	000606	000585	000604	000562	000546	000529	000518	000553
160	000512	000532	000522	000511	000569	000640	000692	000740	000811	000877
170	000867	000886	000810	000761	000680	000642	000582	000556	000523	000623
180	000675	000854	001032	001242	001385	001470	001505	001543	001440	001251
190	001122	000881	000706	000541	000422	000308	000238	000159	000099	000087
200	000069	000060	000047	000035	000029	000028	000024	000016	000014	000019
210	000021	000013	000015	000006	000014	000017	000015	000013	000009	000006

28-57-1

2.56 HR. NICKEL 65

DETECTOR 3X3-2 DATE 8-17-61

PLATE NO. 28-65-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	047573	055740	051445	044967	041376	039144	037113	034986	032680
010	031051	030266	028991	028333	028408	028385	028191	027759	027694	028473
020	029528	029363	028179	026736	024891	023740	022939	022647	022800	023095
030	022658	023179	024269	028484	041630	065493	090122	095550	077259	048893
040	028362	020274	017750	017409	017294	017382	017549	017692	018366	018880
050	019919	020093	019795	018448	017533	017359	016707	017191	017160	017651
060	017683	018240	017847	017693	017419	017306	017315	017509	017305	017378
070	017720	017781	017855	017971	018149	018362	018792	018834	018811	019053
080	018932	019212	019638	019780	019592	019356	018813	017919	017220	016395
090	015380	014580	014098	013734	013384	013612	013704	013680	014126	014279
100	014347	015102	016446	019052	024019	031122	040886	050298	059131	063684
110	063853	059175	050999	041794	032942	025313	020502	017132	015146	013598
120	012511	011443	010330	009433	008149	007151	006209	005486	004789	004254
130	004050	003743	003551	003756	004121	005103	006996	009894	014623	020510
140	028352	036914	045178	051209	053812	053260	048399	042098	033779	026103
150	019154	013552	009249	006127	004314	003132	002391	001965	001768	001478
160	001298	001148	001078	000956	000871	000891	000859	000835	000781	000766
170	000621	000460	000436	000348	000264	000175	000147	000104	000084	000049
180	000056	000029	000027	000037	000018	000000	*	*	*	*

28-65-2

3.3 HR. COPPER 61

DETECTOR 3X3-3 DATE 9-21-63

PLATE NO. 29-61-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G BE + 200 MG CU SW

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	002267	001086	001255	001430	001533	001639	002442	002424	001404
010	001399	001407	001427	001436	001559	001586	001561	001647	001762	001840
020	001814	001748	001706	001734	001662	001685	001810	002310	003358	003931
030	003531	002400	001744	001406	001156	000983	000900	000916	000945	000859
040	000701	000585	000624	000587	000568	000616	000792	001330	002800	005794
050	009437	012110	012030	008823	004982	002173	000796	000304	000238	000184
060	000195	000218	000305	000361	000558	000637	000653	000517	000367	000215
070	000127	000091	000046	000054	000055	000046	000056	000044	000045	000054
080	000065	000081	000065	000075	000063	000032	000044	000066	000076	000069
090	000070	000064	000072	000050	000024	000025	000027	000016	000020	000018
100	000020	000015	000018	000026	000008	000007	000016	000008	000025	000035
110	000035	000029	000064	000093	000091	000115	000101	000086	000076	000062
120	000047	000024	000020	000007	000002	000000	*	*	*	*

29-61-1

9.9 MIN. COPPER 62

DETECTOR 3X3-3 DATE 9-21-62

PLATE NO. 29-62-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G BE + 400 MG CU SW

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	006050	006027	006047	006053	006264	006497	006485	006795	006828
010	006617	006630	006562	006731	006634	006600	006550	006904	007582	007698
020	007577	007315	007207	007295	007128	006859	006801	006824	006920	006951
030	007042	006853	006533	005861	004959	004125	003438	003123	003001	002684
040	002669	002605	002634	002544	002668	002892	003599	006043	012454	023767
050	038412	049606	049525	037268	020939	008681	003010	001045	000577	000423
060	000410	000387	000400	000356	000385	000321	000336	000316	000347	000314
070	000291	000283	000261	000252	000247	000236	000199	000209	000193	000207
080	000186	000185	000185	000170	000188	000168	000175	000179	000168	000162
090	000155	000146	000130	000128	000122	000132	000144	000107	000108	000102
100	000117	000107	000100	000106	000092	000089	000078	000072	000073	000062
110	000075	000069	000090	000096	000080	000081	000076	000080	000070	000069
120	000058	000033	000043	000040	000045	000033	000038	000052	000035	000023
130	000041	000029	000040	000029	000026	000035	000047	000040	000027	000019
140	000027	000028	000022	000025	000029	000020	000025	000020	000020	000023
150	000025	000021	000015	000024	000016	000017	000021	000017	000016	000011
160	000018	000011	000019	000018	000013	000018	000010	000019	000011	000010
170	000012	000017	000014	000006	000007	000009	000008	000008	000010	000006
180	000016	000009	000008	000011	000009	000009	000007	000006	000005	000006

29-62-1

49

12.9 HR. COPPER 64

DETECTOR 3X3-2

DATE 7-22-63

PLATE NO. 29-64-1

SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU

ABSORBER 1.18 G/CM SQ. BE + 0.1 CU SW

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	007994	011287	010507	011163	010613	010077	010106	009992	009622
010	009456	009313	009316	009355	009531	009501	009865	010912	011488	011319
020	011157	010669	010649	010528	010211	010388	010058	009881	009760	009838
030	010022	010035	009960	008825	007331	005703	004537	003671	003307	003124
040	002998	002954	003049	003090	003389	004045	005959	011565	024559	047218
050	074040	092495	090950	070504	043155	021212	008762	003216	001248	000639
060	000415	000319	000293	000285	000293	000265	000267	000291	000293	000287
070	000263	000242	000238	000204	000197	000183	000177	000142	000145	000164
080	000141	000150	000148	000135	000146	000159	000156	000128	000142	000116
090	000134	000145	000134	000098	000131	000112	000123	000136	000122	000136
100	000117	000112	000127	000130	000107	000111	000096	000076	000076	000075
110	000047	000036	000041	000041	000036	000023	000028	000021	000026	000023
120	000023	000022	000030	000032	000058	000101	000106	000180	000248	000270
130	000287	000295	000306	000254	000225	000170	000117	000090	000058	000038
140	000028	000007	000007	000005	000016	000000	000000	000000	000000	000000

29-64-1

5.1 MIN. COPPER 66

DETECTOR 3X3-2 — DATE 8-11-61

PLATE NO. 29-66-1 — SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU — ABSORBER 1.18 G/CM SQ. BE + POLY CAP

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	159674	110854	077555	063448	055358	048585	043372	039100	034686
010	030933	027935	026240	024169	022523	020627	019121	018126	017389	017000
020	017286	016460	015560	014546	013380	012775	012421	011589	011291	010934
030	010745	010366	010020	009879	009898	009775	009418	009252	009050	008837
040	008920	008697	008481	008432	008419	008672	008456	008337	008357	008342
050	007890	008234	007807	007989	008215	008147	008338	008426	008460	008124
060	008287	008157	008420	008120	008242	008108	008209	008207	008226	008304
070	008421	008458	008518	008538	008621	008877	008897	008869	008832	008667
080	008584	008114	007277	006471	005551	004635	003854	003120	002765	002472
090	002261	002157	002220	002558	003002	003971	006251	010028	015842	023694
100	032173	040307	045078	045568	041429	034275	025707	017738	011388	006893
110	004202	002439	001451	000947	000659	000503	000396	000311	000284	000251
120	000245	000250	000226	000208	000205	000199	000167	000216	000208	000162
130	000112	000142	000180	000142	000088	000162	000117	000125	000098	000105
140	000119	000105	000090	000114	000106	000111	000099	000084	000131	000091
150	000089	000101	000098	000120	000074	000073	000071	000054	000083	000087
160	000050	000059	000052	000063	000058	000042	000033	000045	000050	000033
170	000051	000040	000049	000037	000047	000043	000041	000052	000030	000047
180	000042	000031	000040	000032	000029	000041	000041	000034	000025	000028
190	000027	000026	000023	000018	000025	000019	000024	000023	000026	000020
200	000018	000023	000016	000013	000032	000029	000016	000022	000015	000017
210	000015	000004	000002	000003	000005	000008	*	*	*	*

29-66-1

61 HR. COPPER 67

51 DETECTOR 3X3-2 DATE 4-5-63

PLATE NO. 29-67-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	007540	000264	000144	000094	000069	000086	000097	000064	000079
010	000065	000112	000191	000252	000292	000265	000203	000303	000759	001877
020	002995	002674	001525	000549	000183	000078	000100	000095	000114	000103
030	000130	000154	000180	000227	000303	000623	001377	002499	003332	003577
040	003103	002093	001127	000423	000171	000053	000030	000000	*	*

29-67-1

38 MIN. ZINC 63

DETECTOR 3X3-3 DATE 9-21-63

PLATE NO. 30-63-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G BE + 200 MG CU SAND

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	010480	010510	010576	011092	011970	013167	012532	012411	012181
010	011970	011862	011925	011921	012282	012047	012436	012981	014635	015090
020	014802	014496	014142	014015	013782	013584	013630	013473	013743	013718
030	013877	013477	012975	011263	009671	007600	006553	005911	005425	005229
040	005052	005005	004895	005020	005247	005631	007388	012195	024886	048383
050	078700	101239	100605	075027	042174	018012	006249	002463	001463	001182
060	001169	001216	001379	001822	002598	003603	004486	004632	004210	003210
070	002127	001344	001047	000760	000665	000624	000579	000514	000517	000430
080	000425	000379	000331	000360	000386	000387	000361	000393	000392	000541
090	000688	000963	001234	001644	001902	001941	001793	001469	001039	000759
100	000487	000359	000235	000237	000217	000201	000195	000174	000209	000213
110	000154	000189	000158	000138	000171	000163	000148	000148	000151	000154
120	000140	000128	000094	000101	000093	000079	000074	000072	000079	000098
130	000103	000093	000110	000117	000139	000183	000177	000195	000186	000157
140	000124	000115	000093	000088	000089	000067	000090	000079	000069	000068
150	000071	000060	000050	000053	000031	000030	000029	000038	000032	000026
160	000022	000037	000030	000020	000016	000028	000021	000013	000022	000018
170	000025	000017	000014	000015	000017	000029	000018	000023	000020	000020
180	000020	000023	000015	000017	000013	000016	000017	000020	000016	000016
190	000015	000014	000018	000017	000015	000021	000021	000021	000020	000023
200	000016	000013	000022	000011	000008	000013	000011	000008	000009	000011
210	000006	000005	000009	000009	000004	000005	000005	000004	000005	000009
220	000010	000013	000008	000010	000013	000011	000013	000009	000008	000008
230	000005	000004	000002	000003	000002	000007	000004	000005	000006	000010
240	000007	000006	000006	000009	000008	000006	000005	000004	000005	000004

30-63-1

245 DAY ZINC 65

53 DETECTOR 3X3-2 DATE 4-5-62

PLATE NO. 30-65-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

6.33×10^7 (1.114 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	137785	009502	007483	007385	007282	007336	007099	007373	007363
010	007261	007180	007168	007092	007256	007361	007543	007602	007789	008145
020	008716	009448	009474	008739	008195	007931	007687	007812	007552	007537
030	007740	007742	007627	007611	007294	007174	006894	006833	006845	006831
040	006721	006723	006710	006733	006840	006986	007217	007733	008997	011212
050	013791	015762	015454	013472	010875	008753	007517	007179	006995	007069
060	006960	007082	007220	007211	007171	007356	007484	007614	007596	007738
070	007788	007728	007847	008042	008135	008150	008281	008403	008426	008484
080	008564	008641	008768	008942	008896	008718	008401	007526	006865	005850
090	005094	004096	003425	002909	002387	002139	001842	001744	001701	001780
100	002183	002837	004188	006798	011237	017652	026211	035309	043028	047779
110	047920	043332	035669	027226	018818	012191	007287	004114	002350	001289
120	000719	000429	000286	000168	000109	000066	000061	000055	000041	000020

30-65-2

14 HR. ZINC 69M - 55 MIN. ZINC 69

DETECTOR 3X3-2 DATE 10-29-63

PLATE NO. 30-69M(30-69)-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	007848	009463	010054	009117	008458	007848	007708	007726	007502
010	007303	007188	007185	007189	007059	007365	007902	008327	007837	007054
020	006848	006987	007135	007283	007513	007892	007695	006834	005516	004129
030	002992	002599	002388	002181	002155	002114	002237	002426	002702	003624
040	006720	016498	036505	065282	087400	088533	067065	033529	016493	005650
050	001683	000455	000191	000067	000049	000031	000049	000066	000069	000036
060	000045	000046	000042	000029	000039	000042	000031	000025	000009	000012
070	000021	000021	000035	000031	000000	000000	000000	000000	*	*

14 HR. ZINC 69M - 55 MIN. ZINC 69

DETECTOR 3X3-2 DATE 10-29-63

PLATE NO. 30-69M(30-69)-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	005892	005193	004227	004311	004427	004400	004136	003981	003893
010	003766	003669	003708	003676	003568	003681	003606	003621	003569	003581
020	003375	003375	003493	003502	003381	003450	003430	003456	003385	003430
030	003491	003514	003784	003906	004001	003902	003851	003550	003438	003273
040	003317	003238	003339	003283	003389	003431	003520	003473	003761	003685
050	003833	003799	003802	003668	003405	003170	002805	002404	002014	001803
060	001567	001447	001271	001193	001202	001043	001060	001022	000991	001049
070	001048	001097	001177	001105	001147	001322	001348	001494	001733	002124
080	003170	004654	007440	011166	016634	023389	030686	037666	042585	045417
090	044288	040310	033565	026872	019144	012839	007897	004725	002468	001390
100	000681	000345	000214	000112	000062	000076	000036	000021	000029	000013
110	000009	000025	000024	000035	000025	000026	000026	000043	000023	000025
120	000017	000021	000026	000015	000016	000008	000015	000016	000015	000010
130	000007	000010	000005	000010	000000	000000	000000	000000	*	*

30-69m(30-69)-2

78 HR. GALLIUM 67

DETECTOR 3X3-2 DATE 6-24-63

PLATE NO. 31-67-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	014099	010764	009673	008520	011092	027655	036183	044872	228813
010	462855	138160	007150	008082	010354	012623	015293	035575	106191	162463
020	106344	038295	016238	007668	003533	002974	003649	007178	019581	044022
030	064709	060723	034730	012567	002831	001234	002077	004768	008791	012161
040	012443	009198	004815	001741	000576	000276	000160	000156	000188	000218
050	000255	000221	000184	000162	000094	000090	000077	000073	000078	000085
060	000086	000070	000088	000119	000094	000105	000072	000038	000058	000031
070	000028	000027	000011	000000	000016	000041	000075	000068	000134	000148
080	000213	000225	000244	000233	000246	000200	000203	000180	000170	000140
090	000117	000069	000074	000030	000027	000016	*	*	*	*

31-67-1

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78 HR. GALLIUM 67

DETECTOR 3X3-2 DATE 4-8-63

PLATE NO. 31-67-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	030302	003708	001877	001555	001588	001389	001277	001269	001399
010	001471	001844	003019	005249	006200	005362	004704	007153	016754	041850
020	073441	076485	044842	015316	003524	001467	001264	001439	001541	001778
030	001885	002030	002211	002367	003134	005258	010077	017306	024109	026399
040	022828	016331	009822	006001	003841	002622	001836	001256	000840	000605
050	000528	000498	000491	000554	000685	001081	001807	002950	004921	007153
060	009301	010791	010827	009985	007853	005743	003535	001931	001024	000493
070	000291	000179	000197	000287	000473	000748	001082	001477	001778	002062
080	002074	002008	001782	001426	001078	000758	000517	000274	000157	000090
090	000056	000035	000025	000032	000032	000041	000047	000022	000026	000048
100	000036	000028	000026	000040	000039	000025	000027	000013	000020	000016
110	000030	000028	000015	000008	*	*	*	*	*	*

31-67-2

68 MIN GALLIUM 68

DETECTOR 3X3-2 | DATE 4-2-64

PLATE NO. 31-68-1 | SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU | ABSORBER 1.18 G/CM SQ BE + 0.4 G CU SW

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	990000	030136	024124	023381	021495	020314	019465	019455	019393	018808
010	018373	018215	018541	018759	019033	018774	019630	021181	022095	023132
020	022903	022245	022320	021592	020964	020929	020519	020299	020118	019865
030	019910	019967	019079	017150	014228	011329	009391	008199	007388	007046
040	006693	006630	006727	006387	007550	008542	012069	022354	044807	083852
050	129444	161360	160470	125349	077807	038662	016098	006437	002924	001838
060	001496	001314	001249	001148	001091	001156	001033	001075	001106	001161
070	001157	001062	001048	001031	000945	000909	000916	000823	000816	000849
080	000797	000778	000737	000706	000623	000604	000560	000453	000468	000389
090	000372	000353	000320	000313	000352	000331	000341	000304	000328	000402
100	000497	000621	000731	001064	001318	001452	001406	001332	001232	000952
110	000714	000477	000393	000299	000169	000199	000153	000168	000124	000116
120	000140	000142	000110	000137	000147	000110	000137	000119	000062	000096
130	000083	000064	000097	000069	000059	000077	000050	000063	000041	000035
140	000087	000003	000043	000028	000031	000038	000044	000051	000044	000039
150	000044	000044	000071	000036	000030	000069	000038	000027	000036	000055
160	000041	000040	000022	000011	000037	000027	000004	000023	000014	000015
170	000014	000012	000022	000019	000020	000019	000008	000027	000022	000030
180	000015	000032	000021	000035	000032	000015	000030	000026	000023	000026
190	000011	000000	000006	000005	000005	000007	000013	000002	000016	000013

31-68-1

21 MIN. GALLIUM 70

59 DETECTOR 3X3-2 DATE 10-28-63

PLATE NO. 31-70-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	050583	143567	157700	109969	082591	072607	064625	056689	050332
010	045026	040490	036783	034144	031821	030207	029863	042517	066899	061472
020	034753	021456	018015	017046	015999	015362	014503	013912	013319	012777
030	012229	011710	011256	010928	010282	009583	009622	009012	008640	008490
040	008167	007738	007514	007111	007059	006835	006374	006339	005910	005812
050	005676	005443	005213	004988	004768	004602	004448	004280	004279	004235
060	003985	003810	003617	003467	003351	003221	003205	003241	003101	002923
070	003011	002975	002847	002799	002766	002706	002679	002695	002604	002610
080	002373	002213	001867	001493	001294	001001	000866	000634	000768	000730
090	000591	000647	000630	000640	000736	001038	001587	002461	003846	005713
100	007508	009267	010482	010724	009605	007764	005909	003857	002481	001479
110	000903	000556	000299	000222	000170	000070	000138	000159	000170	000242
120	000313	000273	000231	000162	000192	000178	000084	000100	000088	000062
130	000075	000051	000000	000031	000015	000019	000006	000000	*	*

31-70-1

14.1 HR. GALLIUM 72

DETECTOR 3X3-2 DATE 10-29-63

PLATE NO. 31-72-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	033472	043019	026974	025034	023697	022964	022452	022355	022030
010	021444	021687	022084	021801	021575	021709	021596	022340	023335	024416
020	025572	025423	024366	023645	023464	022961	022889	022523	022821	022990
030	022785	022765	022598	022181	022202	022311	022030	022189	022661	022737
040	022657	022441	022077	021807	021025	020545	020004	019429	019370	019326
050	019480	019574	019381	019381	019353	020032	021122	023667	027657	033900
060	040631	049289	053431	053590	047286	036728	026036	017511	012085	009378
070	008282	007638	007664	008086	008904	010433	013568	019282	028768	042725
080	060146	078428	091538	093571	085159	069875	052398	037195	026343	019407
090	014532	011061	009121	007428	006525	005892	005546	005633	005748	006183
100	006432	007189	007898	008059	007735	007452	006517	005687	004973	004364
110	004045	003829	003857	003910	004035	004350	004324	004639	004797	005054
120	005153	005396	005500	005350	005194	005076	004755	004412	004109	003991
130	003623	003492	003365	003437	003381	003466	003522	003710	003870	004214
140	004328	004640	004970	004980	004919	004810	004622	004456	004361	004345
150	004388	004429	004668	004855	004886	004986	004762	004749	004691	004646
160	004327	004272	004229	004337	004250	004275	004238	004220	003979	004002
170	003787	003628	003648	003743	003734	003814	003946	004276	004413	004608
180	004745	004496	004476	004343	004266	004021	003881	003739	003561	003587
190	003327	003411	003236	003238	003287	003153	002930	002828	002732	002684
200	002540	002677	002776	002890	003270	003716	004088	004893	005443	006042
210	006657	007147	007151	007000	006879	006478	005639	005078	004296	003695
220	003142	002387	002176	001702	001359	001218	001016	000981	000890	000941
230	001015	001099	001397	001731	002039	002402	002795	003068	003502	003747
240	003944	003816	003719	003548	003077	002733	002371	002005	001656	001498
250	001137	000930	000693	000545	000405	000362	000305	000235	000222	000195
260	000174	000162	000168	000160	000166	000146	000163	000154	000150	000178
270	000154	000137	000156	000123	000116	000137	000126	000124	000115	000100
280	000084	000076	000077	000087	000063	000088	000091	000072	000106	000108
290	000101	000120	000092	000105	000093	000078	000067	000083	000059	000042
300	000043	000035	000031	000034	000026	000017	000015	000015	000020	000026
310	000021	000018	000038	000033	000036	000047	000033	000040	000037	000026

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40 HR. GERMANIUM 69

61 DETECTOR 3X3-2 DATE 2-15-63

PLATE NO. 32-69-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 0.9 G/CM SQ BE + 200 MG CU SW

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	007111	012793	010118	010554	010519	010358	010471	010541	010618
010	010018	010103	009967	010311	010386	010499	010940	011808	012195	012187
020	012097	012154	012249	012482	013106	012963	012286	011820	011782	011804
030	012227	013266	014051	013314	011316	008820	007381	006387	005929	005509
040	005202	005033	004915	004770	004918	005173	006570	010193	018780	034752
050	054863	069933	072338	059750	041252	025891	017816	015260	014221	012119
060	009147	006239	004301	003077	002690	002559	002301	002259	002123	002171
070	002094	002034	001998	002035	002079	002124	002144	002327	002340	002329
080	002450	002685	003328	004173	004973	005882	006291	006554	005833	004684
090	003623	002513	001754	001225	000947	000757	000610	000617	000623	000635
100	000760	000912	001254	001820	002868	004152	005583	007344	008497	008995
110	008618	007684	006192	004662	003272	002079	001299	000860	000528	000368
120	000298	000245	000189	000196	000237	000291	000335	000444	000550	000703
130	000752	000837	000887	000766	000627	000563	000381	000335	000227	000149
140	000128	000105	000097	000083	000070	000072	000078	000101	000101	000084
150	000095	000088	000088	000059	000076	000069	000067	000055	000053	000051
160	000049	000046	000046	000039	000043	000031	000027	000025	000030	000026
170	000033	000037	000037	000037	000036	000035	000039	000033	000027	000040
180	000041	000045	000056	000062	000065	000064	000064	000055	000049	000035
190	000037	000039	000038	000044	000051	000054	000052	000051	000043	000039
200	000037	000033	000022	000028	000019	000025	000013	000012	000004	000001

32-69-1

82 MIN. GERMANIUM 75

DETECTOR 3X3-2 DATE 10-28-63

PLATE NO. 32-75-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	027026	057033	058258	044653	034196	032014	041196	035529	024601
010	022439	022244	023476	025122	022061	017028	014932	015030	016463	026508
020	051782	062454	042760	025340	025645	073701	199202	320554	299628	170611
030	061427	015503	004410	002802	002612	002679	002691	002524	002303	002289
040	002784	003852	005092	005549	005085	004213	003941	004211	004298	003670
050	002643	001607	001068	000782	000682	000589	000533	000468	000445	000556
060	000716	000920	001090	001050	000913	000661	000448	000277	000152	000137
070	000123	000121	000103	000107	000057	000061	000057	000061	000057	000046
080	000058	000062	000067	000063	000079	000038	000073	000057	000053	000026
090	000038	000023	000026	000029	000023	000028	000018	000036	000013	000016
100	000028	000000	*	*	*	*	*	*	*	*

32-75-1

82 MIN. GERMANIUM 75

63

DETECTOR 3X3-2	DATE 10-28-63
PLATE NO. 32-75-2	SOURCE DISTANCE 10 CM.
ENERGY SCALE 0.5 KEV/PHU	ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	016400	020961	020274	020471	020873	019906	017848	015014	013129
010	011844	011471	011491	012204	014662	016540	013681	010176	008975	008557
020	008270	008230	008204	008496	008821	008974	009105	009258	008415	007427
030	006629	005728	005434	005596	005660	005853	006153	006860	008949	013057
040	018440	023014	024527	021865	017122	012455	009588	008571	009467	014400
050	024758	044001	070427	100081	121973	128956	117962	093860	065085	039362
060	020889	010093	004525	002167	001389	001083	000960	000961	000945	000997
070	001058	000990	001009	000955	000943	000854	000850	000727	000842	000827
080	001090	001269	001474	001706	001881	002095	002060	001960	001802	001646
090	001554	001496	001538	001590	001577	001624	001587	001428	001263	001102
100	000810	000698	000480	000393	000365	000292	000246	000242	000236	000166
110	000186	000183	000197	000206	000151	000169	000165	000199	000221	000276
120	000320	000344	000358	000398	000408	000391	000383	000338	000320	000261
130	000241	000191	000142	000148	000071	000074	000067	000049	000051	000046
140	000045	000000	000000	000000	*	*	*	*	*	*

32-75-2

54 SEC. GERMANIUM 77M

DETECTOR 3X3-2 DATE 3-5-63

PLATE NO. 32-77M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000517	000870	000958	000674	000715	000686	000544	000487	000509
010	000435	000400	000455	000387	000423	000402	000352	000402	000363	000407
020	000396	000354	000349	000355	000356	000426	000504	000638	001037	001583
030	002010	002488	003496	004508	004929	004055	002740	001558	000917	000703
040	000991	001696	003031	004810	006223	006711	006022	004545	002743	001429
050	000657	000277	000079	000075	000082	000113	000054	000046	000030	000044
060	000058	000035	000061	000049	000048	000027	000042	000032	000040	000037
070	000026	000030	000047	000059	000052	000040	000046	000050	000032	000017
080	000042	000050	000047	000041	000020	000068	000061	000033	000042	000046
090	000031	000042	000059	000042	000040	000033	000023	000013	000017	000000

32-77m-1

11 HR. GERMANIUM 77

65 DETECTOR 3X3-2 DATE 10-29-63

PLATE NO. 32-77-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	004721	005209	005714	005093	004605	004294	004422	004653	004996
010	004677	004404	004632	004864	004370	004561	004966	005343	005430	006742
020	014291	033417	045877	033752	017081	014999	025547	033406	027496	014427
030	005662	002576	002037	002226	002945	004157	005967	007463	007228	006547
040	006698	008007	009142	008579	006349	003989	002556	001978	001872	001722
050	001616	001625	001795	002239	003075	003940	004397	004358	003583	002777
060	002144	002046	002333	002583	002616	002378	001900	001578	001496	001539
070	001783	001911	002050	001805	001650	001413	001339	001225	001183	001186
080	001153	001033	000957	000797	000770	000598	000592	000620	000623	000656
090	000719	000760	000666	000656	000584	000482	000416	000357	000308	000301
100	000312	000337	000364	000469	000557	000626	000694	000683	000714	000686
110	000526	000475	000388	000309	000306	000342	000301	000322	000332	000353
120	000274	000314	000267	000246	000257	000274	000220	000236	000248	000255
130	000284	000279	000316	000302	000316	000281	000258	000202	000189	000148
140	000136	000152	000139	000125	000147	000132	000125	000135	000087	000111
150	000112	000109	000100	000093	000090	000078	000068	000073	000074	000065
160	000068	000047	000043	000048	000052	000064	000067	000063	000074	000069
170	000063	000070	000056	000048	000045	000027	000028	000045	000032	000033
180	000037	000044	000037	000024	000024	000022	000032	000036	000018	000034
190	000021	000025	000036	000040	000050	000039	000041	000051	000033	000036
200	000037	000028	000020	000047	000047	000029	000029	000029	000018	000024
210	000017	000023	000022	000006	000014	000013	000012	000019	000020	000007
220	000019	000016	000009	000022	000026	000023	000025	000015	000026	000021
230	000011	000010	000009	000010	000013	000010	000016	000007	000008	000009

32-77-1

26 HR. ARSENIC 72

DETECTOR 3X3-2 DATE 12-14-63

PLATE NO. 33-72-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM BE + 400 MG CU SW

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000618	001272	001273	001284	001275	001303	001287	001340	001276
010	001211	001167	001261	001212	001142	001142	001259	001303	001284	001330
020	001354	001456	001442	001278	001305	001289	001309	001210	001272	001277
030	001281	001174	001213	001047	000949	000838	000792	000780	000615	000627
040	000612	000611	000665	000537	000644	000688	000881	001368	002431	003939
050	006151	007289	007081	005829	003744	002032	001044	000652	000485	000456
060	000521	000547	000598	000559	000501	000437	000313	000192	000154	000158
070	000164	000125	000146	000128	000119	000198	000249	000378	000567	000894
080	001206	001590	001830	001942	001730	001300	000999	000658	000407	000251
090	000161	000117	000079	000050	000033	000062	000046	000036	000039	000050
100	000049	000061	000047	000057	000039	000033	000042	000045	000025	000043
110	000027	000022	000011	000047	000041	000034	000024	000027	000019	000040
120	000037	000041	000027	000030	000028	000017	000027	000019	000006	000013
130	000027	000049	000063	000044	000033	000023	000051	000055	000047	000041
140	000049	000032	000031	000036	000043	000031	000038	000026	000025	000018
150	000018	000028	000018	000015	000011	000007	000010	000014	000005	000007

33-72-1

18 DAY ARSENIC 74

67 DETECTOR 3X3-2 DATE 2-18-63

PLATE NO. 33-74-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 0.9 G/CM SQ + 0.2 G CU SW

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	012780	012822	012828	013265	013536	014403	013624	013328	013141
010	012845	012546	012617	012689	012778	012916	013283	014164	015093	015455
020	014895	014582	014518	014792	014831	014995	014412	014676	014614	014308
030	014111	013885	013528	012797	011793	010778	010264	009873	009566	009239
040	008740	008017	006985	006042	005440	005092	005527	008572	015559	029315
050	045275	058145	058385	047867	032526	021022	018717	025912	038556	050512
060	056085	052482	042702	031892	021959	014508	009181	005209	002696	001393
070	000704	000476	000396	000320	000299	000280	000271	000264	000269	000221
080	000252	000245	000237	000213	000227	000239	000236	000214	000221	000218
090	000216	000193	000182	000170	000164	000145	000120	000107	000088	000106
100	000122	000074	000062	000087	000079	000113	000121	000152	000222	000275
110	000341	000427	000394	000421	000367	000323	000246	000175	000145	000118
120	000104	000090	000058	000050	000043	000036	000024	000028	000008	000009

33-74-1

26.5 HR. ARSENIC 76

DETECTOR 3X3-2 DATE 7-22-63

PLATE NO. 33-76-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	017831	030777	031759	026213	022434	021051	019855	019253	018188
010	016899	016599	015985	015594	015534	015472	015238	015879	016547	016080
020	015271	014575	014061	014064	014023	013866	013388	013370	013032	012965
030	012906	012810	012741	012996	013169	013242	012996	012180	010679	008948
040	007600	006821	006100	005752	005451	005494	005263	005227	005125	005465
050	006442	009570	018005	033986	057041	080902	093442	087924	066726	041637
060	022556	011632	007845	008041	009685	011434	011829	010292	008104	005722
070	003771	002593	002036	001814	001705	001696	001687	001591	001489	001539
080	001440	001359	001409	001495	001475	001394	001477	001490	001358	001345
090	001344	001300	001327	001271	001180	001163	001130	001036	000951	000875
100	000791	000679	000700	000658	000600	000524	000544	000529	000555	000610
110	000673	000773	000878	001140	001478	002097	002684	003230	003670	004059
120	003941	003606	003177	002490	001885	001394	000984	000639	000408	000335
130	000251	000220	000186	000185	000201	000238	000232	000257	000281	000311
140	000300	000301	000314	000295	000262	000224	000208	000210	000182	000165
150	000169	000193	000154	000150	000154	000154	000131	000128	000133	000130
160	000141	000136	000108	000114	000126	000106	000136	000151	000146	000167
170	000163	000132	000203	000214	000236	000219	000186	000190	000171	000160
180	000144	000138	000116	000094	000071	000068	000064	000066	000058	000047
190	000056	000044	000046	000071	000064	000084	000112	000145	000185	000217
200	000220	000255	000247	000250	000261	000201	000223	000189	000131	000150
210	000111	000078	000067	000036	000042	000035	000017	000018	000018	000023
220	000012	000005	000013	000013	000012	000011	000006	000011	000014	000007
230	000015	000010	000000	000000	*	*	*	*	*	*

33-76-2

39 HR. ARSENIC 77

69 DETECTOR 3X3-2 DATE 11-22-62

PLATE NO. 33-77-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	009320	009774	009892	007000	004931	004720	004229	004059	005878
010	007016	003674	002589	002281	002016	002036	002964	003724	002979	001925
020	001619	001820	002606	006916	016016	020515	015801	007662	003004	001596
030	001242	001212	001169	001033	000682	000515	000422	000384	000328	000291
040	000197	000137	000147	000148	000163	000175	000218	000272	000387	000596
050	001065	001645	002187	002434	002045	001389	000775	000404	000211	000119
060	000067	000067	000074	000044	000054	000077	000028	000019	000036	000029

33-77-2

7.1 HR. SELENIUM 73

DETECTOR 3X3-21 DATE 4-2-63

PLATE NO. 34-73-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18G/CM SQ BE +0.1G CU SANDW.

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	003400	003300	003425	006662	005678	005992	033464	039094	007034
010	003191	003331	003344	003336	003614	003710	003815	003984	004291	004467
020	004481	004354	004000	003701	003360	003355	003154	002850	002680	002710
030	002709	002815	003085	003452	005927	012273	020074	022752	017731	009121
040	003623	001440	000917	000908	000892	001062	001073	001643	003776	007943
050	013948	018179	018610	013749	007531	003214	001124	000373	000192	000145
060	000134	000105	000101	000078	000085	000082	000061	000073	000073	000067
070	000066	000074	000065	000064	000051	000044	000049	000042	000055	000083
080	000060	000053	000065	000079	000085	000074	000074	000061	000077	000045
090	000039	000019	000018	000023	000022	000017	000013	000017	000021	000014
100	000016	000014	000004	000012	000012	000011	000027	000014	000021	000010
110	000009	000000	000000	000000	*	*	*	*	*	*

34-73-1

120 DAY SELENIUM 75

71 DETECTOR 3X3-2 DATE 4-22-64

PLATE NO. 34-75-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

		1	2	3	4	5	6	7	8	9
000	999999	035670	023780	007988	009070	007985	007248	011981	011770	014184
010	026634	032071	055575	125940	202069	148198	035498	006269	004457	005314
020	007228	007930	006900	006932	011737	033244	079059	118475	113343	074060
030	034147	012634	004005	001427	000800	000740	000980	001969	004243	008092
040	012019	013075	010634	006506	003016	000975	000281	000058	000010	000031
050	000035	000039	000063	000049	000055	000016	000014	000027	000044	000038
060	000035	000033	*	*	*	*	*	*	*	*

34-75-1

120 DAY SELENIUM 75

DETECTOR 3X3-2 DATE 4-22-64

PLATE NO. 34-75-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	C	1	2	3	4	5	6	7	8	9
000	999999	044980	032084	024202	003739	003515	003731	004048	004367	004428
010	003933	003387	003294	004051	005693	006637	005808	005437	006182	008269
020	011766	015361	015588	015604	021760	035579	053594	074120	097131	108551
030	091361	055356	024523	003830	003547	002285	002193	002251	002576	002952
040	003437	004006	004100	003718	003504	003366	003328	003722	004612	007052
050	012122	020941	033035	046444	057769	062845	061113	053976	042652	031114
060	020762	013202	007844	004435	002457	001478	000915	000596	000437	000362
070	000350	000424	000444	000587	000792	001216	001891	002755	003767	004839
080	005780	006491	006742	006442	005654	004687	003553	002573	001692	001034
090	000527	000285	000173	000081	000046	000029	000004	000032	000013	000015
100	000000	000006	000013	000014	000003	000030	000042	000026	000038	000007
110	000034	000004	000044	000011	000026	000019	000005	000005	000019	000017

34-75-2

61 MIN. SELENIUM 81M (18 MIN. SELENIUM 81)

73 DETECTOR 3X3-2 DATE 10-30-63

PLATE NO. 34-81M(34-81)-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	047331	089671	038657	026391	021515	032807	029243	025662	031346
010	081780	175341	086399	013614	006581	005852	005103	004475	004189	004034
020	003946	004121	003928	003377	003193	003703	006552	012763	020000	021696
030	016654	009430	003996	001766	001190	001057	000963	000934	000910	000776
040	000718	000663	000643	000578	000566	000536	000531	000528	000510	000518
050	000600	000737	000963	001409	001998	002496	002745	002658	002108	001495
060	001005	000607	000415	000371	000339	000329	000285	000192	000182	000183
070	000139	000136	000135	000132	000121	000147	000196	000250	000456	000674
080	000987	001155	001328	001267	001060	000735	000482	000286	000171	000136
090	000059	000038	000030	000020	000007	000034	000018	000014	000025	000010
100	000016	000044	000032	000002	000014	000024	000026	000029	000026	000001
110	000019	000027	000009	000008	000003	000020	000014	000000	000017	000005
120	000019	000014	000010	000003	000023	000008	000006	000014	000021	000020
130	000029	000042	000026	000031	000044	000041	000034	000028	000022	000016
140	000013	000009	000009	000010	000012	000015	000008	000014	000001	000013
150	000007	000024	000016	000006	000010	000006	000003	000015	000008	000009
160	000006	000009	000016	000008	000003	000009	000016	000008	000006	000012
170	000003	000010	000014	000017	000009	000016	000011	000013	000003	000012

34-81m(34-81)-1

58 HR. BROMINE 77

DETECTOR 3X3-2 DATE 4-5-63

PLATE NO. 35-77-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSCRBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	C	1	2	3	4	5	6	7	8	9
000	999999	001280	001299	001234	001476	001292	001345	001270	001519	002335
010	002557	001659	001531	001619	001705	001892	002283	002705	002466	002371
020	002561	002712	003266	006098	011171	013062	009097	004568	003002	003132
030	003449	003201	002263	001456	000993	000765	000615	000694	000740	000712
040	000691	000606	000558	000640	000742	000733	000758	000810	001021	001687
050	002679	003994	004848	004847	004099	002954	002211	001720	001424	001243
060	000922	000696	000497	000349	000227	000164	000132	000118	000111	000114
070	000148	000172	000135	000237	000311	000324	000387	000405	000420	000403
080	000357	000345	000235	000294	000229	000151	000103	000067	000041	000035
090	000028	000001	000018	000043	000040	000047	000044	000083	000074	000100
100	000071	000094	000099	000078	000059	000059	000051	000026	000038	000012

35-77-1

18 MIN. BROMINE 80

75 DETECTOR 3X3-2 DATE 8-17-61

PLATE NO. 35-80-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	009525	018192	024164	024474	025357	025033	023966	022386	020253
010	018890	017076	015882	014609	013763	012967	012333	011871	011414	010855
020	010278	009821	009327	008819	008507	008137	007764	007747	007418	007259
030	007029	006702	006438	006145	005796	005348	005044	005039	004689	004604
040	004743	004574	004212	003858	003536	003488	003423	004298	006620	010616
050	015872	019347	019221	015099	009707	005703	003540	003531	005386	009288
060	014223	018774	020169	018494	014810	011039	007575	005451	003968	002999
070	002066	001318	000899	000575	000438	000242	000192	000225	000174	000284
080	000234	000190	000159	000183	000153	000183	000101	000112	000139	000073
090	000063	000066	000060	000054	000049	000057	000049	000057	000027	000048
100	000054	000041	000038	000060	000035	000040	000034	000033	000021	000072
110	000046	000020	000010	000025	000038	000047	000000	000000	000000	000000

35-80-1

36 HR. BROMINE 82

DETECTOR 3X3-2 DATE 8-18-61

PLATE NO. 35-82-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 0.598 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	023620	044341	172327	054602	026565	025128	024923	025815	028486
010	026394	023826	023713	024240	024563	024596	024827	026336	027736	028167
020	029096	031164	033125	032094	028230	026295	026228	027232	026948	026443
030	025191	024625	024585	024546	024501	023991	023948	022805	021542	020844
040	019860	019503	018459	017810	017217	016831	016375	016270	016863	018176
050	020479	025152	034363	049123	066992	080489	082032	072055	057444	046984
060	044723	047099	048571	043654	034835	025855	020567	019881	022239	024996
070	026142	024776	023468	024812	030434	039869	049253	055624	055982	050393
080	042517	034601	027648	022051	017081	012506	009043	006622	004851	003956
090	003501	003317	003322	003409	003403	003705	004079	004903	005974	007692
100	009698	011585	013252	013772	013220	011887	009902	007803	005975	004503
110	003574	002786	002342	002122	002012	001907	001944	001967	001906	001873
120	001844	001976	002186	002621	003447	004482	005620	006820	007630	008200
130	008055	007484	006550	005484	004341	003445	002572	002131	002055	002205
140	002576	002968	003578	003879	004120	004018	003732	003349	002827	002123
150	001752	001291	000942	000731	000593	000462	000450	000411	000432	000480
160	000472	000479	000387	000394	000331	000290	000268	000211	000200	000201
170	000138	000141	000138	000131	000160	000140	000159	000175	000192	000233
180	000236	000245	000263	000255	000262	000268	000252	000239	000195	000174
190	000130	000102	000087	000075	000061	000087	000056	000068	000066	000061
200	000077	000086	000100	000111	000132	000113	000119	000104	000092	000090
210	000081	000064	000050	000044	000032	000028	000022	000019	000014	000000

35-82-1

4.4 HR. KRYPTON 85M

77 DETECTOR 3X3-2 DATE 7-3-57

PLATE NO. 36-85M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 750 MG/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	001485	002031	001937	000984	000785	000579	000513	000850	001127
010	001547	002140	002915	004539	013357	035038	040637	015712	001330	000600
020	000163	000172	000176	000158	000141	000166	000229	000333	000533	001354
030	002714	004005	003661	002135	000809	000299	000127	000000	000000	000000

36-85M-1

10.4 YR. KRYPTON 85

DETECTOR 3X3-2 | DATE 9-3-57

PLATE NO. 36-85-1 | SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU | ABSORBER 300 MG/CM SQ. POLY

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	057308	046552	033408	029247	029168	023432	020794	016560	015528
010	011998	010870	009371	008285	007141	006115	005767	005125	004747	004126
020	003640	003300	003045	002961	002632	002334	002225	001972	001940	001936
030	001945	001935	001957	001879	001412	001103	000863	000632	000507	000432
040	000337	000316	000283	000293	000304	000338	000353	000838	001942	004957
050	008902	013778	014861	012845	008826	004723	002071	000806	000290	000125
060	000050	000024	000000	000000	000000	000000	*	*	*	*

106

36-85-1

21 MIN. RUBIDIUM 84M

79 DETECTOR 3X3-3 DATE 9-22-63

PLATE NO. 37-84M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

2.44 X 10^7 (0.465 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	004440	005068	005600	005761	006680	007318	007306	008432	009424
010	010133	010568	010981	011151	011148	011049	011846	012857	014749	016965
020	021850	034720	052831	052191	048511	067956	075050	044954	015024	003622
030	001592	001123	000969	000867	000856	000767	000744	000741	000831	000817
040	000899	001009	001358	002688	005898	011695	018214	021147	018576	011732
050	005420	001853	000567	000218	000112	000035	000024	000000	000000	000000

37-84M-1

18.7 DAY RUBIDIUM 86

DETECTOR 3X3-2 DATE 10-29-63

PLATE NO. 37-36-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

2.37×10^7 (1.08 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	019675	072622	043951	033335	027604	023835	021192	018873	017090
010	015183	013818	012542	011704	010789	009818	009168	008718	008127	007932
020	007613	007594	007291	006897	006411	006010	005831	005523	005489	005194
030	005196	005067	004921	004755	004690	004616	004492	004343	004329	004066
040	004006	003863	003933	003920	003649	003749	003718	003652	003538	003581
050	003581	003480	003523	003406	003426	003483	003353	003468	003465	003469
060	003386	003215	003254	003433	003458	003402	003395	003387	003249	003384
070	003346	003320	003399	003447	003522	003572	003577	003689	003773	003654
080	003594	003579	003411	003284	003113	002684	002303	001851	001575	001381
090	001043	000973	000845	000829	000768	000801	000890	001000	001395	002213
100	003679	005845	008832	012642	015932	018228	018763	017669	014970	011951
110	008195	005320	003253	001880	001044	000643	000336	000189	000130	000083
120	000068	000032	000021	000000	000000	000000	*	*	*	*

37-86-1

18 MIN RUBIDIUM 88

DETECTOR 3X3-2 DATE 7-20-61

PLATE NO. 37-88-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.5 G/CM SQ BE + POLY CAP

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	015593	015593	015840	017576	018108	016875	015885	014980	014042
010	013003	012200	011664	011033	010312	009781	009405	009082	008820	008698
020	008751	008605	008342	008067	007751	007395	006990	006747	006604	006359
030	006184	006103	006042	006046	005963	005753	005600	005485	005401	005380
040	005294	005115	005060	005122	005144	005169	005140	005034	005085	005271
050	005314	005281	005228	005142	004994	004788	004725	004742	004767	004776
060	004758	004751	004771	004754	004727	004618	004424	004191	003885	003622
070	003375	003178	003030	002897	002765	002763	002885	002956	002985	003263
080	003703	004398	005312	006613	008250	010677	012849	015309	016243	015450
090	013827	010768	008249	005956	004324	003401	002749	002529	002333	002259
100	002194	002165	002139	002122	002121	002132	002182	002281	002268	002179
110	002129	002083	002097	002152	002132	002106	002055	002037	002066	002089
120	002113	002130	002134	002153	002166	002238	002371	002506	002654	002815
130	003004	003126	003212	003209	003118	003038	002939	002857	002781	002718
140	002666	002545	002477	002496	002494	002459	002441	002442	002441	002450
150	002433	002396	002334	002241	002150	002052	001963	001893	001777	001613
160	001494	001402	001298	001183	001123	001098	001133	001221	001389	001629
170	002207	002895	003690	004600	005777	006692	007421	007844	008027	007764
180	006961	006121	005102	004177	003270	002518	001889	001408	001083	000824
190	000662	000529	000445	000393	000379	000362	000354	000356	000366	000379
200	000411	000479	000526	000552	000567	000564	000568	000578	000583	000596
210	000574	000511	000477	000463	000444	000432	000396	000332	000318	000340
220	000334	000316	C00300	000280	000284	000305	000257	000229	000226	000230
230	000248	000256	C00256	000248	000226	000213	000204	000202	000211	000205
240	000182	000177	C00188	000193	000198	000200	000197	000203	000209	000251
250	000323	000351	000355	000385	000425	000452	000479	000515	000526	000507
260	000481	000441	000407	000383	000342	000276	000236	000220	000198	000173
270	000151	000000	000000	000000	000000	000000	*	*	*	*

37-88-1

18 MIN RUBIDIUM 88

DETECTOR 3X3-2 DATE 7-20-61

PLATE NO. 37-88-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 2.0 KEV/PHU ABSORBER 1.5 G/CM SQ BE + POLY CAP

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
010	000000	031185	035153	033750	029959	026007	023328	020623	018810	017639
020	017503	016685	015502	013980	013208	012368	012083	011926	011199	010802
030	010588	010121	010288	010281	010169	010629	010456	009989	009450	009535
040	009517	009541	009454	008849	007769	006750	006060	005531	005770	005970
050	007406	010624	016501	025697	032486	027655	016498	008648	005499	004667
060	004387	004279	004243	004364	004536	004258	004193	004265	004109	004132
070	004225	004269	004331	004742	005309	006007	006425	006235	005879	005562
08	005332	004953	004988	004382	004882	004865	004668	004300	003926	003554
090	002988	002596	002246	002256	002777	004413	007380	011552	014842	016056
100	013922	010205	006539	003778	002166	001324	000891	000758	000709	000732
110	000822	001053	001135	001136	001167	001149	000954	000888	000792	000635
120	000658	000599	000568	000515	000452	000496	000512	000453	000408	000422
130	000363	000376	000397	000395	000418	000646	000710	000849	000958	001051
140	000961	000813	000685	000471	000395	000302	000240	000238	000190	000135
150	000114	000161	000151	000187	000207	000154	000181	000155	000131	000114
160	000087	000117	000109	000125	000097	000114	000116	000094	000077	000065
170	000074	000050	000048	000056	000068	000078	000072	000066	000053	000045
180	000049	000050	000049	000059	000034	000033	000042	000044	000045	000036
190	000041	000040	000051	000032	000040	000041	000027	000040	000035	000041
200	000026	000041	000039	000047	000033	000026	000024	000049	000039	000043
210	000053	000054	000057	000049	000056	000055	000054	000046	000031	000032
220	000044	000025	000038	000027	000022	000036	000025	000025	000026	000021
230	000025	000031	000027	000039	000040	000040	000032	000037	000034	000022
240	000023	000028	000019	000000	*	*	*	*	*	*

37-88-2

15 MIN. RUBIDIUM 89

83 DETECTOR 3X3-2 DATE 10-30-63

PLATE NO. 37-89-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE + POLY CAP

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	006579	011494	009692	008516	007501	007234	006954	006710	006534
010	006303	006188	006020	006109	006204	006026	006115	006075	006221	006197
020	006535	006955	007129	007020	006665	006519	006819	007750	008798	008767
030	007988	007284	006774	006269	005842	005661	005421	005382	005330	005323
040	005295	005346	005327	005382	005182	005299	005287	005335	005215	005070
050	005120	005286	005049	005044	005012	004928	004858	004989	004889	004865
060	005155	005399	005954	007057	008248	009497	010082	010047	008850	007806
070	006469	005528	005244	005148	005186	005218	005155	005064	005023	004914
080	004611	004298	004046	003807	003544	003338	003278	003272	003438	003605
090	003947	004519	005078	005632	006136	006488	006822	007722	009339	011690
100	014197	016036	017125	016702	014691	012047	008908	006209	004317	002922
110	001994	001568	001375	001306	001450	001635	001960	002738	003786	004965
120	006411	007909	008737	008967	008820	007619	006316	005070	003861	002847
130	001972	001412	001091	000907	000756	000739	000682	000630	000656	000632
140	000649	000713	000675	000735	000789	000813	000857	000924	001009	001076
150	001050	001102	001007	000986	000912	000909	000785	000776	000805	000722
160	000704	000763	000726	000718	000840	000788	000845	000812	000800	000808
170	000780	000752	000764	000769	000740	000746	000733	000770	000785	000712
180	000746	000784	000755	000763	000704	000712	000718	000734	000715	000700
190	000746	000750	000715	000723	000774	000776	000741	000731	000758	000720
200	000704	000690	000709	000731	000749	000762	000798	000907	001013	001218
210	001302	001362	001445	001471	001481	001377	001292	001196	001082	000939
220	000821	000710	000647	000556	000522	000461	000365	000334	000288	000283
230	000285	000243	000205	000201	000206	000229	000222	000218	000239	000252
240	000317	000373	000382	000490	000571	000592	000700	000728	000700	000663
250	000648	000625	000562	000550	000496	000414	000423	000360	000303	000302
260	000303	000266	000190	000205	000178	000168	000151	000127	000105	000097
270	000075	000059	000062	000057	000053	000044	000058	000053	000040	000036
280	000037	000053	000051	000044	000067	000062	000051	000061	000065	000053
290	000060	000062	000064	000049	000052	000052	000042	000047	000047	000042
300	000036	000049	000000	000000	000000	000000	*	*	*	*

37-89-1

15 MIN. RUBIDIUM 89

DETECTOR 3X3-2 DATE 10-30-63

PLATE NO. 37-89-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 2.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE + POLY CAP

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	003850	007410	006105	005661	005259	005181	005033	004994	005183
010	005341	005609	005123	005823	006816	006137	004977	004544	004260	004172
020	004213	004165	004182	004210	004140	004032	003978	003919	003895	003821
030	004124	005048	006566	007724	006765	004827	004047	004057	003939	003765
040	003493	003154	002788	002542	002761	003242	004176	004890	005722	007615
050	011191	013314	011144	006749	003244	001461	001057	001112	001671	002978
060	005088	006702	006743	005020	002971	001588	000905	000636	000519	000481
070	000520	000545	000518	000640	000788	000823	000797	000767	000648	000575
080	000582	000562	000531	000642	000680	000631	000568	000615	000574	000564
090	000601	000559	000584	000577	000545	000542	000574	000566	000585	000532
100	000569	000508	000568	000639	000775	000905	001097	001064	001109	000944
110	000742	000537	000420	000343	000274	000213	000195	000162	000140	000149
120	000198	000257	000333	000406	000527	000510	000509	000435	000356	000300
130	000248	000191	000173	000138	000111	000074	000066	000038	000050	000035
140	000035	000034	000034	000039	000042	000040	000042	000041	000039	000042
150	000024	000029	000031	000021	000024	000029	000027	000028	000026	000034
160	000025	000014	000017	000024	000016	000012	000022	000023	000023	000047
170	000049	000041	000025	000029	000020	000024	000015	000005	000009	000007

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70 MIN. STRONTIUM 85M

85 DETECTOR 3X3-2 DATE 5-1-62

PLATE NO. 38-85M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 160 MG/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	930000	001480	005014	014173	010867	001738	001322	001202	001144	001273
010	001227	001247	001125	001077	000966	001032	001208	001292	001418	001678
020	001905	001897	001938	001845	001730	001651	001756	001730	001740	002826
030	005584	009780	013087	013176	009784	005559	002413	001171	000873	000842
040	000968	001267	002014	004223	009534	019161	032491	046223	054136	053248
050	044162	030776	017664	008775	003493	001233	000282	000027	000000	000000

38-85m-1

64 DAY STRONTIUM 85

DETECTOR 3X3-2 — DATE 3-28-62

PLATE NO. 38-85-2 — SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU — ABSORBER 1.18 G/CM SQ. BE

2.02 X 10^7 (0.515 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	050281	095863	C42220	004921	004360	004539	004475	004463	004483
010	004452	004427	004373	C04480	004436	004473	004647	005088	005410	005251
020	004789	004622	004642	004665	004510	004537	004473	004345	004454	004631
030	004741	004848	004935	004667	003950	003121	002349	001764	001516	001369
040	001205	001145	001144	001169	001272	001486	001965	003675	008041	017956
050	031894	045588	050801	C44593	030737	016826	007498	002743	000894	000275
060	000061	000000	000000	000000	000000	000000	*	*	*	*

38-85-2

2.8 HR. STRONTIUM 87M

87 DETECTOR 3X3-2 DATE 10-28-63

PLATE NO. 38-87M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

3.69 X 10^8 (0.391 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	008093	041350	010563	009691	009527	009305	009256	009158	008964
010	008653	008267	008228	008314	008187	008912	009900	009602	008957	008917
020	009494	010237	010268	009296	007209	005280	004092	003669	003391	003268
030	003220	003537	003587	003994	004772	006967	015735	040963	083198	125769
040	135165	104847	053730	023976	007383	001827	000422	000171	000092	000078
050	000025	000028	000060	000053	000038	000027	000039	000069	000056	000041
060	000022	000033	000045	000048	000027	000032	000043	000032	000004	000030
070	000034	000054	000042	000035	000047	000047	000040	000060	000063	000058
080	000049	000040	000035	000024	000011	000010	000000	000000	000000	000000

38-87m-1

2.8 HR. STRONTIUM 87M

DETECTOR 3X3-2 DATE 10-28-63

PLATE NO. 38-87M-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	018827	018413	038211	032689	008699	007926	007944	007674	007742
010	007505	007492	007718	007783	007523	007476	007582	007429	007569	007321
020	007207	007171	007092	007079	006993	007042	006923	007213	007171	007221
030	007537	008089	008179	008630	008343	008008	007731	007535	007657	007987
040	008060	008420	008699	008762	008908	008582	008124	007463	006439	005506
050	004668	004039	003627	003332	003115	002949	002974	002846	002880	002798
060	002834	002871	002939	002987	003107	003216	003385	003737	004061	004602
070	005009	008230	013046	020864	033410	050345	070028	090150	107044	117421
080	117768	108467	091339	070353	049925	032390	019242	010688	005330	002605
090	001271	000651	000330	000204	000152	000119	000102	000091	000102	000096
100	000068	000053	000071	000077	000071	000082	000065	000045	000066	000071
110	000080	000049	000060	000061	000073	000068	000051	000042	000037	000062
120	000051	000059	000064	000043	000039	000060	000059	000050	000043	000037
130	000056	000043	000046	000035	000052	000050	000038	000027	000040	000040
140	000048	000062	000043	000049	000052	000046	000055	000053	000063	000064
150	000066	000066	000079	000067	000064	000072	000077	000064	000059	000059
160	000048	000045	000042	000029	000021	000024	000013	000021	000030	000029
170	000022	000021	000012	000003	000001	000000	000000	000000	000000	000000

38-87m-2

89

9.7 HR. STRONTIUM 91 (YTTRIUM 91M)

DETECTOR 3X3-2 DATE 10-12-62

PLATE NO. 38-91-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000000	000000	020922	018586	017235	016331	016440	015737	015557
010	015347	014890	015294	015384	015030	015031	014881	015969	016696	016974
020	016747	016015	015566	015371	015278	015761	017140	019074	019636	018445
030	016194	015016	014426	014589	014616	014774	014606	014043	012808	011657
040	010630	009698	009089	009008	008672	008474	008415	008307	008354	008374
050	009373	012257	013767	031216	049298	068003	078243	073757	057323	037229
060	021843	014047	011664	012994	014996	016299	016205	014339	011712	009273
070	008544	009496	012660	016669	020627	022710	021702	018310	013694	009515
080	006339	004169	003137	002291	001952	001661	001512	001691	001910	002350
090	002778	003235	003346	003448	003428	003659	004487	006127	008656	011913
100	014719	016136	016861	015300	012644	009746	006593	004298	002673	001621
110	000967	000665	000454	000372	000317	000307	000255	000209	000213	000204
120	000193	000236	000267	000315	000372	000431	000449	000446	000431	000409
130	000348	000348	000295	000273	000315	000361	000370	000384	000431	000454
140	000389	000369	000340	000289	000214	000196	000169	000125	000103	000094
150	000087	000098	000053	000059	000074	000059	000088	000086	000088	000097
160	000093	000086	000082	000088	000083	000091	000063	000067	000051	000067
170	000051	000036	000035	000040	000019	000015	000017	000022	000000	000000

38-91-2

2.7 HR. STRONTIUM 92

DETECTOR 3X3-2 DATE 10-30-63

PLATE NO. 38-92-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	010063	007854	004459	004173	003956	003909	004016	003939	003612
010	004018	004003	004054	004176	003766	003917	004172	004472	004215	004384
020	004597	005294	006174	009384	013961	015639	010865	006455	004590	004107
030	004174	003979	004057	004141	004134	004322	004137	004467	004119	004101
040	004859	006141	007840	009350	008886	007232	005338	004439	003948	003996
050	004107	003972	003945	003997	004029	004042	004060	004156	004021	004196
060	004080	004095	003962	004041	004161	004175	004236	004209	004184	004182
070	003967	004186	004033	004102	004198	004123	004267	004295	004252	004213
080	004285	004205	004397	004451	004497	004552	004613	004968	004931	005039
090	005120	005073	005108	005486	005554	005639	005507	005473	005620	005219
100	005357	005575	005484	005243	005281	005446	005643	005776	005768	006113
110	006026	005836	005591	005107	004564	003842	003143	002571	002171	001854
120	001566	001421	001346	001348	001423	001652	002124	003069	004588	006812
130	010170	014062	018154	021470	023835	024157	023043	020506	016753	013090
140	009766	006628	004406	002854	001709	001102	000687	000409	000295	000212
150	000145	000127	000130	000103	000078	000066	000057	000054	000042	000037
160	000038	000042	000050	000064	000063	000048	000026	000021	000050	000059
170	000055	000046	000045	000045	000039	000038	000049	000032	000036	000036
180	000027	000031	000036	000029	000037	000028	000030	000029	000030	000023
190	000023	000022	000017	000020	000023	000026	000020	000017	000022	000017
200	000016	000017	000000	000000	000000	000000	000000	000000	000000	000000

38-92-1

15 HR. YTTRIUM 86

91 DETECTOR 3X3-2 DATE 12-16-63

PLATE NO. 39-86-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	007027	028897	007706	007185	006631	006567	006653	006590	006581
010	006330	006483	006733	007265	007111	007056	006948	007363	007875	009180
020	009756	008667	008065	007664	007511	007748	007496	007344	007245	007360
030	007817	008195	008099	007432	006641	006181	006500	007695	009568	011197
040	010918	009783	008664	008741	009522	010318	010513	010489	011136	013644
050	016325	018057	017459	014592	010783	007552	005246	004453	004468	005028
060	006345	007784	009266	010216	010182	009096	007603	006322	005588	005406
070	005427	005431	005267	004992	004907	005085	005395	005726	005822	005579
080	005160	004784	004187	003825	003603	003217	002888	002515	002227	001933
090	001896	001603	001487	001457	001293	001302	001289	001347	001411	001681
100	002004	002559	003375	004459	005875	006886	007545	007586	007300	006589
110	005655	004965	004446	003812	003430	003081	002782	002326	001901	001474
120	001119	001021	000854	000829	000842	000808	000739	000771	000737	000775
130	000852	000848	000816	000843	000851	000801	000828	000782	000726	000674
140	000794	000694	000691	000687	000614	000679	000578	000625	000641	000599
150	000628	000613	000588	000620	000615	000578	000526	000617	000533	000550
160	000534	000512	000481	000432	000468	000406	000383	000394	000368	000381
170	000394	000416	000438	000442	000500	000560	000644	000734	000844	000864
180	001008	001089	001019	001206	001197	001147	001118	001058	001065	000990
190	000867	000725	000599	000510	000407	000327	000254	000241	000214	000156
200	000124	000122	000133	000132	000100	000113	000113	000100	000092	000088
210	000084	000090	000090	000085	000086	000078	000074	000070	000058	000076
220	000076	000063	000071	000074	000082	000076	000055	000065	000063	000058
230	000059	000045	000043	000046	000046	000046	000039	000051	000065	000067
240	000074	000065	000063	000062	000069	000094	000081	000097	000090	000103
250	000106	000101	000084	000083	000082	000099	000074	000064	000051	000053
260	000048	000055	000035	000034	000016	000015	000022	000020	000022	000021
270	000013	000028	000019	000018	000028	000021	000018	000018	000019	000020
280	000014	000019	000009	000000	000000	000000	000000	000000	000000	000000

39-86-1

105 DAY YTTRIUM 88

DETECTOR 3X3-2 DATE 8-8-60

PLATE NO. 39-88-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 2.0 KEV/PHU ABSORBER NONE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	016300	016900	017200	017407	017786	017560	017020	016941	017727
010	020107	019942	018688	017906	017440	017179	016591	016752	016640	015951
020	015812	015978	015855	016160	016964	017851	017818	017235	017186	017549
030	018073	018395	018333	016446	013144	009971	007864	006950	006973	007649
040	009579	017600	041257	077780	097318	075646	039811	015843	008166	006169
050	005718	005762	005812	005666	005823	005970	006021	006097	006066	006288
060	006498	006554	006831	007790	008940	009689	009675	009388	008667	008576
070	008500	008660	008902	009040	009305	008934	008540	007599	006308	005157
080	003933	002987	002464	002494	003533	006755	013289	022391	030412	033131
090	029361	021380	013877	007631	004052	002016	001124	000693	000477	000352
100	000308	000278	000259	000245	000237	000219	000205	000214	000227	000245
110	000234	000239	000202	000245	000216	000195	000215	000189	000220	000180
120	000177	000176	000142	000130	000123	000105	000104	000085	000117	000143
130	000195	000256	000306	000336	000314	000250	000229	000144	000099	000053
140	000040	000030	000014	000017	000012	000009	000008	000010	000018	000013
150	000010	000008	000009	000006	000009	000007	000012	000018	000011	000008
160	000012	000013	000010	000008	000008	000000	000000	000000	*	*

39-88-1

93

105 DAY YTTRIUM 88

DETECTOR 3X3-2 — DATE 8-20-63

PLATE NO. 39-88-2 — SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU — ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	046344	263990	013648	008517	008106	007780	007995	008015	007817
010	007781	007682	007678	007943	007999	008002	008165	008302	008494	008897
020	009761	009911	009719	009674	009233	009204	008993	008752	008797	008865
030	008606	008707	008760	008787	008538	008622	008625	008503	008426	008611
040	008437	008450	008376	008505	008363	008436	008654	008487	008837	008935
050	009239	009413	009312	009016	008991	009060	008578	008914	009015	008953
060	009100	009211	009380	009401	009351	009312	009392	008965	008030	007259
070	006300	005679	004906	004520	004274	004085	004039	003999	004151	004612
080	004724	005288	006576	008642	013150	020271	029039	038569	045145	047737
090	044424	036908	027985	018971	012461	008120	005335	004088	003463	003275
100	002986	003061	002955	003009	003005	003019	002967	003068	003013	003119
110	003032	003132	003193	003152	003067	003099	003118	003227	003263	003281
120	003318	003394	003341	003467	003481	003540	003836	004073	004336	004613
130	004794	004874	004996	005010	004814	004762	004583	004535	004271	004279
140	004377	004308	004273	004324	004440	004453	004473	004513	004430	004556
150	004504	004553	004353	004120	003776	003565	003298	003020	002625	002339
160	002076	001842	001658	001497	001416	001409	001393	001635	002059	002765
170	003722	005200	007193	009291	011443	013697	015109	016108	016332	015402
180	014138	012393	010267	008170	006457	004807	003459	002471	001796	001208
190	000899	000591	000440	000359	000252	000235	000210	000184	000155	000136
200	000156	000133	000131	000137	000112	000104	000115	000118	000107	000100
210	000117	000100	000113	000116	000112	000097	000107	000111	000117	000108
220	000099	000116	000121	000108	000086	000090	000109	000092	000093	000093
230	000090	000080	000096	000099	000104	000095	000083	000099	000092	000091
240	000085	000078	000074	000071	000078	000073	000059	000060	000039	000043
250	000042	000053	000046	000046	000067	000056	000000	000000	*	*

39-88-2

3.14 HR. YTTRIUM 90M

DETECTOR 3X3-2 DATE 11-21-60

PLATE NO. 39-90M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.1B G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	001680	001690	001707	001778	001740	001746	001724	001781	001641
010	001511	001477	001653	001584	001684	001910	002173	002552	003914	009867
020	022915	029842	018071	005082	001009	000815	000856	000906	000914	000860
030	000799	000693	000601	000459	000364	000358	000329	000317	000281	000298
040	000288	000336	000404	000494	000859	001849	003683	006196	008360	008823
050	007207	004503	002271	000832	000275	000098	000051	000018	000025	000020
060	000030	000023	000046	000036	000030	000057	000066	000096	000116	000172
070	000191	000185	000127	000084	000064	000023	000008	000000	*	*

39-90m-1

50 MIN. YTTRIUM 91M

95 DETECTOR 3X3-2 DATE 10-5-62

PLATE NO. 39-91M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	005273	016078	006392	006474	006453	006252	006271	006233	006207
010	006201	006191	006233	006382	006294	006433	006764	007239	007561	007590
020	007196	006764	006575	006690	006651	006663	006676	006668	006648	006609
030	006639	006429	006478	006787	006883	006959	006800	006110	004951	003925
040	002963	002270	001973	001759	001592	001559	001494	001643	001838	002021
050	002745	005266	011395	022766	039660	056783	066259	062251	046398	028109
060	014068	005686	002103	000784	000291	000132	000076	000047	000037	000021
070	000026	000052	000026	000040	000048	000026	000039	000043	000050	000049
080	000014	000040	000005	000027	000027	000039	000033	000021	000038	000016
090	000048	000045	000005	000014	000054	000042	000045	000026	000018	000038
100	000038	000022	000023	000015	000008	000027	000032	000022	000006	000018
110	000017	000031	000038	000000	*	*	*	*	*	*

39-91m-1

59 DAY YTTRIUM 91

DETECTOR 3X3-2 DATE 12-14-62

PLATE NO. 39-91-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	091000	054200	653581	462954	353226	292978	251124	221634	205095
010	183969	152334	130950	115507	101010	089727	079397	069428	061625	055484
020	049843	045957	041645	037018	033338	031635	027923	025739	023907	021665
030	020084	018438	017089	016126	014702	013873	012900	012034	011273	010491
040	010162	009373	008866	008445	008233	007879	007222	006755	006719	006503
050	006200	005971	005664	005480	005308	004876	004978	004916	004776	004882
060	004941	004741	004791	004795	004806	004692	004642	004223	004173	004252
070	004231	004306	004315	004195	004032	003946	003782	003732	003824	004082
080	004047	004244	004202	003937	003760	003661	003484	003374	003417	003507
090	003354	003350	003296	003332	003265	003058	002917	002535	002374	002072
100	001925	001837	001658	001512	001514	001437	001440	001435	001364	001587
110	001753	002153	003049	004329	005873	007831	010134	011931	013041	013010
120	012342	010815	008390	006379	004487	002997	002169	001246	000992	000632
130	000330	000279	000175	000204	000117	000132	000090	000046	000053	000054
140	000011	000002	000000	000000	000000	000000	000000	000000	000000	000000

39-91-2

3.6 HR. YTTRIUM 92

97 DETECTOR 3X3-2 DATE 11-11-62

PLATE NO. 39-92-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	989999	018157	030870	033564	024792	021532	019532	018158	017258	015966
010	014955	013642	013036	012637	011924	011644	011141	010959	010791	010702
020	010588	010374	010148	009510	009528	008849	008598	008625	008316	007713
030	007619	007452	007135	006921	006998	006847	006803	006690	006499	006345
040	006357	006703	003069	010499	013768	015848	014995	012614	010074	008385
050	007513	007384	007688	009134	011303	013876	015532	014624	011998	009280
060	006918	005657	004988	004764	004926	004679	004760	004689	004609	004336
070	004292	003943	003537	003092	002842	002518	002266	002189	002190	002350
080	002641	003111	003473	003966	004248	004543	005091	006650	009316	012923
090	016898	020313	022080	021232	018098	014236	010135	006806	004337	002803
100	001914	001462	001276	001160	001168	001106	001106	001114	001216	001150
110	001204	001208	001186	001150	001016	000892	000843	000731	000615	000504
120	000499	000432	000404	000297	000371	000341	000354	000338	000465	000576
130	000784	001112	001538	002146	002812	003338	003627	003809	003504	003163
140	002837	002118	001617	001192	000860	000587	000423	000308	000278	000266
150	000175	000152	000131	000114	000113	000114	000134	000081	000102	000072
160	000092	000075	000076	000063	000036	000059	000050	000064	000048	000058
170	000049	000072	000107	000116	000131	000155	000101	000180	000185	000231
180	000197	000183	000182	000176	000146	000126	000077	000070	000046	000047
190	000038	000021	000034	000024	000019	000028	000022	000029	000009	000023
200	000026	000025	000038	000030	000026	000021	000027	000018	000001	000027
210	000009	000006	000014	000019	000007	000050	000000	000007	000007	000014
220	000006	000015	000014	000018	000033	000032	000023	000036	000000	999999

39-92-1

10.1 HR. YTTRIUM 93

DETECTOR 3X3-2 | DATE 9-10-63

PLATE NO. 39-93-1 | SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU | ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	016169	049286	047622	033250	026997	024106	022048	020530	018887
010	017399	016601	016106	015769	014367	012329	011436	010904	010362	010206
020	009982	010083	009913	010074	012392	024369	054033	083132	076317	043282
030	017788	007781	005663	005348	005171	004944	004785	004759	004532	004505
040	004395	004348	004376	004409	004244	004372	004288	004206	003993	003890
050	003928	003594	003670	003648	003358	003416	003369	003203	003355	003115
060	003080	003106	003164	003117	003369	003827	004326	004819	004933	004587
070	004049	003453	002945	002483	002292	002080	001905	001823	001756	001723
080	001604	001590	001620	001540	001450	001531	001633	001767	002164	002683
090	003380	004251	005000	005535	005358	004800	004093	003015	002274	001796
100	001369	001091	000937	000889	000817	000792	000760	000733	000754	000756
110	000783	000794	000784	000842	000839	000870	000913	000832	000845	000845
120	000778	000680	000604	000596	000600	000551	000499	000466	000447	000462
130	000482	000520	000514	000582	000633	000758	000878	000985	001116	001146
140	001098	001080	001048	000948	000836	000783	000675	000589	000572	000505
150	000457	000425	000413	000388	000390	000433	000433	000432	000445	000442
160	000421	000395	000390	000360	000325	000320	000311	000280	000247	000226
170	000215	000195	000176	000196	000196	000232	000279	000315	000364	000478
180	000569	000723	000860	000992	001063	001069	001061	000953	000868	000793
190	000674	000534	000398	000335	000266	000175	000136	000075	000078	000075
200	000078	000068	000065	000074	000095	000111	000128	000160	000155	000183
210	000217	000187	000169	000176	000175	000151	000099	000096	000077	000076
220	000047	000041	000033	000035	000012	000004	000009	000007	000006	000007
230	000005	000010	000000	000000	000000	000000	000000	000000	000000	00000

39-93-1

4.4 MIN. ZIRCONIUM 89M

99 DETECTOR 3X3-3 DATE 9-22-63

PLATE NO. 40-89M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G BE + 200 MG CU SAND

1.73 X 10^{8} (0.590 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	630000	003073	004501	005004	005040	005517	005472	005423	005444	005478
010	005254	005504	005557	005592	005683	005769	005955	006197	006824	007607
020	007761	007486	007286	007052	006988	006743	006638	006268	006248	006128
030	005955	006000	005963	006047	006194	006386	006580	006348	006479	005974
040	005053	004057	003220	002631	002311	002127	001979	001917	002151	002536
050	003244	003675	004213	004277	005322	009209	017841	031307	045969	053743
060	050472	036386	020864	009215	003417	001111	000418	000260	000193	000177
070	000151	000177	000167	000194	000170	000174	000191	000156	000162	000138
080	000167	000162	000186	000154	000171	000186	000160	000211	000172	000195
090	000183	000207	000183	000179	000191	000180	000193	000187	000200	000184
100	000193	000221	000195	000188	000180	000201	000195	000179	000179	000216
110	000213	000194	000226	000209	000227	000202	000211	000243	000238	000237
120	000218	000210	000196	000182	000130	000119	000128	000093	000093	000067
130	000070	000065	000039	000045	000033	000026	000029	000055	000061	000080
140	000119	000197	000327	000478	000640	000752	000894	000969	000905	000774
150	000649	000469	000317	000204	000120	000068	000037	000011	000014	000016

40-89M-1

79 HR. ZIRCONIUM 89

DETECTOR 3X3-3 DATE 9-23-63

PLATE NO. 40-89-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G BE + 200 MG CU SAND

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	002500	003017	002474	002354	002661	002980	002550	002556	002575
010	002520	002495	002643	002720	002749	002721	002813	002934	003026	003237
020	003285	003445	003472	003342	003241	003235	003244	003232	003076	003179
030	003109	003132	003082	002892	002658	002467	002291	002226	002267	002247
040	002168	002182	002152	002124	002140	002166	002274	002823	004283	007021
050	010413	013058	013096	010179	006571	003774	002452	002011	001920	001923
060	002103	001991	002056	002077	001995	002081	001998	001300	001692	001348
070	001102	000885	000737	000684	000563	000481	000448	000359	000356	000345
080	000348	000320	000473	000778	001429	002567	004658	007231	010100	012063
090	012561	011302	008621	005547	003121	001491	000657	000291	000148	000060
100	000036	000029	000023	000035	000026	000023	000021	000019	000018	000017
110	000017	000018	000015	000012	000013	000012	000013	000013	000013	000017
120	000021	000018	000012	000011	000014	000011	000014	000016	000018	000018
130	000013	000027	000011	000009	000006	000022	000015	000018	000007	000009
140	000015	000003	000021	000013	000015	000017	000007	000011	000014	000007
150	000003	000006	000003	000004	000005	000014	000009	000014	000016	000018
160	000025	000022	000027	000036	000049	000039	000037	000050	000027	000031
170	000031	000025	000013	000007	000005	000005	000004	000003	000001	000001
180	000002	000000	000000	000000	000000	000000	*	*	*	*

40-89-1

65 DAY ZIRCONIUM 95

101 DETECTOR 3X3-2 DATE 10-31-62

PLATE NO. 40-95-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	012500	011833	010478	010102	009645	009353	009252	009453	009438
010	009188	009201	009144	009329	009385	009612	009715	010013	010767	011641
020	011852	011438	010627	010196	010203	010383	010346	010522	010580	010291
030	010215	010348	010076	010131	010173	010013	010005	009975	010045	010004
040	010090	010169	010036	010141	010168	010443	010485	010575	010706	010832
050	011039	010933	010504	009893	008661	007584	006150	004955	004117	003346
060	002756	002402	002268	002233	002282	002556	003441	005395	009441	016705
070	026936	039891	053267	062623	068258	067456	060212	048693	035246	022388
080	012793	006598	003000	001337	000648	000322	000181	000100	000092	000052
090	000047	000063	000051	000050	000049	000040	000049	000020	000039	000043
100	000035	000033	000027	000045	000037	000030	000040	000015	000021	000036

40-95-2

65 DAY ZIRCONIUM 95 - NIOBIUM 95

DETECTOR 3X3-2

DATE 6-13-63

PLATE NO. 40-95(41-95)-2

SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU

ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	003220	003197	002642	002416	002504	002335	002333	002396	002400
010	002347	002296	002307	002276	002381	002424	002493	002568	002724	002835
020	003098	002903	002753	002678	002660	002765	002715	002727	002685	002685
030	002643	002641	002630	002526	002541	002562	002576	002628	002578	002657
040	002582	002632	002578	002553	002643	002660	002620	002568	002625	002680
050	002800	002851	002790	002643	002477	002222	001964	001509	001281	000975
060	000848	000681	000591	000556	000601	000613	000807	001167	001751	002913
070	004638	006923	009924	013396	016376	018375	018014	015636	011723	007774
080	004293	002158	000991	000427	000192	000077	000041	000058	000000	000000

40-95(41-95)-2

17 HR. ZIRCONIUM 97 - 60 SEC. NIOBIUM 97M (EQUILIBRIUM)

103 DETECTOR 3X3-2 DATE 5-19-61

PLATE NO. 40-97-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000000	000000	011839	011855	011423	011115	010299	009814	009630
010	009301	009503	009478	009355	009543	009305	009260	009569	010155	010927
020	010987	010939	010796	010214	010812	012119	013087	012814	011269	010405
030	009993	009774	009526	009845	010638	011919	012314	011771	010347	009200
040	008889	008567	008271	007931	007837	007998	008074	008404	009506	011081
050	013063	013882	013730	012176	009577	007114	005457	004316	003695	003541
060	003532	003263	003075	002412	002067	001973	002159	002455	003736	006502
070	011979	020263	031648	043491	052660	053934	047704	036649	024165	014249
080	007770	004167	002350	001513	001088	000848	000721	000598	000527	000476
090	000421	000352	000358	000370	000395	000413	000404	000472	000538	000583
100	000633	000645	000647	000585	000495	000460	000398	000394	000389	000428
110	000542	000722	000775	000916	000969	000901	000822	000625	000506	000398
120	000311	000283	000282	000289	000290	000358	000394	000376	000322	000397
130	000352	000351	000333	000373	000361	000372	000344	000321	000266	000207
140	000182	000170	000136	000120	000106	000090	000073	000080	000096	000067
150	000069	000065	000055	000058	000044	000033	000051	000042	000037	000034
160	000044	000029	000023	000023	000047	000058	000092	000085	000113	000140
170	000174	000162	C00177	000161	000171	000148	000125	000119	000115	000072

40-97-2

17 HR. ZIRCONIUM 97 - 74 MIN. NIOBIUM 97 (EQUILIBRIUM)

DETECTOR 3X3-2 DATE 5-19-61

PLATE NO. 40-97(41-97)-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	011500	011600	012340	013679	013317	012842	012463	011948	011494
010	011375	011533	011561	011684	011817	011850	011971	012582	013727	015201
020	015471	014988	014238	013828	013934	014516	014943	014261	013247	012665
030	012459	012091	012060	012036	012609	013136	013456	013131	012332	011649
040	011323	011304	011240	011314	011361	011022	010388	010064	009736	010143
050	010765	010966	010457	009213	007669	006187	005105	004500	004255	004404
060	005100	007043	011286	018818	028561	038857	044415	043213	036178	027262
070	020990	019651	023260	029140	033882	034580	030140	022989	015262	008977
080	004939	002641	001574	001017	000732	000597	000491	000421	000363	000340
090	000291	000295	000281	000249	000252	000284	000299	000371	000431	000466
100	000573	000665	000622	000564	000530	000492	000400	000330	000313	000341
110	000377	000443	000546	000566	000559	000556	000512	000414	000329	000263
120	000217	000201	000185	000196	000222	000233	000246	000257	000269	000245
130	000223	000245	000231	000249	000254	000221	000208	000181	000154	000140
140	000114	000084	000070	000044	000059	000054	000067	000067	000055	000062
150	000059	000048	000042	000051	000038	000027	000017	000018	000021	000019
160	000016	000020	000024	000024	000028	000024	000038	000069	000089	000102
170	000115	000100	000122	000108	000118	000102	000098	000088	000053	000041
180	000046	000041	000045	000034	000029	000024	000016	000009	000016	000011
190	000006	000006	000008	000003	000004	000007	000000	000000	*	*

40-97(41-97)-1

10 DAY NIOBIUM 92

105 DETECTOR 3X3-2 DATE 7-31-61

PLATE NO. 41-92-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

3.74×10^{7} (0.931 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	004443	004453	004454	004475	004507	004532	004545	004555	004557
010	004631	004662	004601	004716	004830	004774	004801	005014	005394	005778
020	006048	005965	005546	005090	005048	005039	005056	005073	005044	005125
030	005011	004994	004976	005000	004893	004971	004950	004882	004896	004842
040	004889	004967	004986	004939	004941	004904	005020	005030	005281	005267
050	005316	005437	005348	005437	005407	005451	005285	005368	005526	005545
060	005618	005629	005730	005687	005855	005940	006048	006093	005882	005727
070	005243	004804	004067	003362	002760	002267	001879	001518	001335	001227
080	001117	001154	001156	001386	001728	002530	004353	007536	012732	019434
090	027126	033479	036655	036412	031409	024681	017228	011006	006361	003446
100	001836	000891	000497	000266	000182	000062	000082	000063	000033	000035
110	000020	000017	000010	000027	000039	000000	000000	000000	000000	000000

41-92-1

6.6 MIN. NIOBIUM 94M

DETECTOR 3X3-2 | DATE 6-30-61

PLATE NO. 41-94M-1 | SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU | ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	018158	007931	004173	006137	004015	003029	003076	002972	002836
010	002896	002777	002693	002749	002706	002854	002783	002841	003069	003077
020	003377	003165	003011	002786	002772	002713	002767	002845	002877	002738
030	002735	002680	002572	002677	002781	002507	002571	002660	002710	002606
040	002489	002647	002661	002654	002596	002688	002658	002642	002736	002771
050	002753	002597	002655	002725	002685	002774	002785	002941	002882	002867
060	002941	002969	003138	002957	002752	002583	002252	001913	001585	001361
070	001181	000987	000807	000664	000610	000568	000555	000593	000746	001082
080	001850	003442	006007	009828	014019	017765	019819	019352	016571	012303
090	008058	004315	002612	001250	000652	000330	000157	000110	000112	000081
100	000048	000039	000032	000018	000000	000000	000000	000000	*	*

41-94M-1

20,000 YEAR NIOBIUM 94

107 DETECTOR 3X3-2 DATE 8-20-63

PLATE NO. 41-94-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	016787	319137	034649	006934	006420	006409	006373	006370	006371
010	006337	006173	006231	006361	006484	006419	006583	006653	007382	007719
020	008040	007784	007327	006984	006913	006953	006996	007053	006824	006897
030	006856	006841	006913	006754	006824	006876	006785	006793	006836	006831
040	006853	006854	006807	006945	006953	007029	007290	007212	007286	007088
050	006621	006191	005588	004918	004784	004610	004327	004279	004438	004394
060	004401	004397	004645	004948	005582	007385	011220	016993	024089	030912
070	033563	031434	025147	016819	010037	005304	002816	001708	001359	001708
080	002577	004320	007446	011896	016691	021376	023949	022922	019749	014859
090	009835	005949	003248	001732	000889	000442	000298	000185	000195	000144
100	000127	000115	000098	000112	000114	000109	000089	000108	000093	000108
110	000105	000107	000101	000102	000097	000102	000095	000099	000095	000093
120	000089	000088	000092	000086	000085	000080	000087	000087	000085	000091
130	000085	000090	000084	000088	000082	000065	000071	000057	000065	000045
140	000033	000030	000023	000018	000022	000033	000024	000023	000032	000052
150	000053	000094	000108	000127	000177	000188	000228	000183	000196	000187
160	000143	000086	000073	000054	000016	000010	000019	000008	000011	000001
170	000000	000000	000000	000000	*	*	*	*	*	*

41-94-2

35 DAY NIOBIUM 95

DETECTOR 3X3-2 DATE 1-29-62

PLATE NO. 41-95-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

4.67×10^{7} (0.766 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	007600	007609	007835	007454	007312	007249	007322	007375	007209
010	007157	007198	007186	007175	007437	007389	007464	007897	008167	008927
020	009301	009027	008460	007978	007855	007983	007908	008036	008054	007928
030	007898	008027	007820	008154	007817	007843	007785	007914	007969	007754
040	008062	008169	007982	008057	007914	008187	008199	008185	008408	008383
050	008639	008795	008999	008887	008659	008188	006964	005689	004671	003608
060	002885	002346	002011	001807	001630	001608	001609	001775	002210	002999
070	004922	009707	017467	030622	045666	058657	064738	061358	049453	034831
080	021116	011282	005478	002496	001111	000521	000244	000144	000067	000044

41-95-2

60 SEC. NIOBIUM 97M

109 DETECTOR 3X3-2 DATE 5-19-61

PLATE NO. 41-97M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000750	000790	000800	000822	000823	000805	000840	000800	000776
010	000745	000746	000788	000813	000732	000747	000794	000752	000778	000838
020	000925	000893	000879	000878	000935	000906	000811	000863	000898	000885
030	000800	000758	000782	000850	000800	000746	000757	000819	000748	000766
040	000794	000796	000716	000751	000747	000772	000812	000769	000835	000826
050	000836	000821	000840	000821	000704	000539	000487	000353	000285	000240
060	000187	000116	000131	000114	000100	000124	000116	000183	000185	000572
070	001344	002415	003846	005155	005955	005807	004890	003547	002131	001195
080	000553	000216	000094	000044	000018	000000	000000	000000	000000	000000

41-97m-1

74 MIN. NIOBIUM 97

DETECTOR 3X3-2 — DATE 5-18-61

PLATE NO. 41-97-1 — SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU — ABSORBER 0.598 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	005080	004888	004997	005088	005387	005055	005058	004580	004444
010	004522	004261	004048	003954	004134	004089	004187	004484	004973	004853
020	004697	004406	004270	004255	004256	004196	004144	004088	004151	004158
030	004100	004080	004037	003900	003870	003785	003772	003814	003750	003915
040	003981	004027	004091	004096	004207	003916	003581	002947	002382	001813
050	001469	001169	000946	000813	000769	000666	000715	000800	000849	001091
060	001712	003522	007243	013536	021778	030367	034346	032974	026920	018696
070	010640	005330	002315	001023	000534	000322	000218	000167	000129	000116
080	000098	000080	000089	000108	000115	000122	000125	000146	000150	000144
090	000124	000100	000113	000110	000131	000140	000145	000160	000167	000192
100	000229	000221	000231	000215	000203	000133	000137	000092	000067	000071

41-97-1

16 MIN. MOLYBDENUM 91

DETECTOR 3X3-2 | DATE 9-22-63

PLATE NO. 42-91-1 | SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU | ABSORBER 1.18 G BE + 400 MG CU SW

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	0C0000	005150	005250	005213	005249	005668	006387	006016	006275	005982
010	0C5955	005833	005867	005843	005698	005711	005767	006116	006593	006776
020	006375	006561	006443	006385	006333	006313	006156	006041	006028	006015
030	006129	005895	005643	005055	004078	003223	002835	002464	002299	002229
040	001963	001929	001956	001930	002019	002077	002729	004865	010685	021101
050	034425	044086	043463	032285	018277	008069	002852	001086	000635	000491
060	000437	000407	000398	000381	000352	000341	000324	000307	000319	000332
070	000336	000285	000314	000229	000240	000263	000225	000213	000183	000219
080	000173	000192	000184	000161	000161	000150	000130	000138	000150	000119
090	000135	000118	000147	000115	000119	000131	000124	000118	000105	000111
100	000118	000108	000109	000104	000102	000114	000095	000080	000083	000081
110	000086	000088	000073	000079	000072	000065	000066	000058	000076	000053
120	000072	000046	000064	000061	000061	000048	000060	000050	000057	000061
130	000039	000059	000042	000038	000044	000042	000048	000055	000041	000033
140	000036	000026	000035	000035	000027	000040	000037	000028	000035	000046
150	000045	000039	000040	000036	000056	000058	000049	000038	000046	000050
160	000044	000041	000035	000028	000025	000023	000021	000024	000027	000026
170	000028	000019	000017	000017	000014	000016	000012	000014	000016	000017
180	000019	000018	000009	000013	000011	000014	000012	000014	000009	000013
190	000010	000010	000013	000009	000010	000007	000008	000009	000007	000011
200	000007	000016	000000	000000	*	*	*	*	*	*

42-91-1

66 HR. MOLYBDENUM 99 - WITH 6 HR. TECHNETIUM 99M

DETECTOR 3X3-2 DATE 5-16-61

PLATE NO. 42-99 (43-99M)-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	004270	003590	007649	001776	003468	001549	001133	001672	002240
010	002046	004401	006298	016280	054208	090434	051768	013800	003117	005608
020	004073	001386	000469	000470	000486	000442	000419	000431	000459	000485
030	000471	000438	000361	000322	000376	000497	000598	000723	000751	000588
040	000479	000346	000310	000297	000297	000306	000308	000301	000299	000318
050	000295	000324	000339	000340	000295	000273	000209	000186	000157	000151
060	000144	000111	000082	000072	000074	000094	000068	000092	000115	000183
070	000354	000587	000926	001314	001681	001842	001842	001536	001296	001026
080	000716	000505	000338	000188	000129	000076	000000	000000	000000	000000

42-99(43-99m)-1

14.6 MIN. MOLYBDENUM 101

113 DETECTOR 3X3-2 DATE 11-6-63

PLATE NO. 42-101-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	670000	014768	035573	020934	010207	009664	009809	009628	017483	027380
010	013269	010161	010630	010768	007851	007505	007765	011308	017891	042041
020	063758	048446	021938	011197	008665	008112	008082	007901	009682	014762
030	028440	040001	041029	029017	015662	009408	007122	006785	006769	007391
040	007984	007955	007482	006897	005981	005425	005576	006156	007621	010628
050	013570	015578	015195	012805	010299	008721	009018	011043	013937	015881
060	015763	013851	010784	007874	005963	005197	005128	005585	006231	007110
070	007405	007134	006042	004945	004229	003381	002982	002955	002981	003011
080	003168	003111	003120	003265	003572	003837	004111	004361	004411	004332
090	004055	003930	003831	003727	003673	003753	004098	004700	005542	005964
100	006098	005949	005361	004577	003685	002931	002352	001961	001761	001709
110	001734	001860	002010	002189	002373	002448	002581	002659	002575	002508
120	002458	002395	002359	002302	002402	002350	002301	002206	002230	002121
130	002033	002027	001965	001889	001878	001880	001737	001567	001462	001352
140	001238	001142	001151	001076	001122	001202	001343	001442	001593	001594
150	001714	001656	001603	001568	001399	001260	001239	001173	001007	000976
160	000929	000930	000883	000825	000838	000799	000774	000731	000751	000698
170	000657	000592	000656	000597	000608	000523	000522	000489	000460	000441
180	000386	000344	000349	000311	000277	000249	000242	000243	000257	000327
190	000353	000398	000572	000644	000794	000847	000890	000903	000923	000876
200	000930	000734	000720	000590	000481	000440	000340	000252	000212	000152
210	000156	000107	000087	000075	000074	000049	000038	000038	000031	000021
220	000031	000022	000021	000022	000006	000001	000012	000008	000008	000017
230	000011	000011	000004	000005	000006	000006	000007	000006	000007	000009

42-101-1

20 HR. TECHNETIUM 95

DETECTOR 3X3-3 DATE 6-20-63

PLATE NO. 43-95-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

9.86 X 10^7 (0.768 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	027788	118810	093942	016300	016200	016200	016800	016500	016700
010	016600	016400	016500	016400	017888	017687	017268	018200	019100	020500
020	020000	019100	018500	018200	018000	018103	018097	018551	018353	018347
030	018671	018757	018354	018191	018367	018117	018194	017940	017919	018086
040	017918	017934	018036	017978	018207	018232	018662	019007	019648	020084
050	021264	021789	022023	021590	020128	017805	015224	012227	010218	008484
060	007339	006479	005526	004734	004212	003999	003923	003878	004462	005684
070	009309	017450	033986	050898	096485	130076	147752	139792	110077	071813
080	038926	018129	007819	003760	002370	002076	001916	001696	001527	001561
090	001650	001927	002309	002559	002478	002194	001684	001162	000898	000759
100	000955	001311	001957	002804	003424	003915	003949	003364	002596	001832
110	001105	000630	000354	000219	000197	000128	000120	000116	000105	000107
120	000108	000089	000095	000106	000094	000078	000083	000076	000089	000080
130	000069	000068	000058	000059	000084	000077	000066	000069	000068	000069
140	000068	000067	000071	000069	000085	000094	000092	000101	000115	000101
150	000108	000107	000093	000084	000055	000057	000038	000026	000023	000019
160	000018	000013	000014	000019	000016	000015	000011	000008	000005	000008

43-95-1

60 DAY TECHNETIUM 95M - 20 HR. TECHNETIUM 95

DETECTOR 3X3-2 DATE 7-9-63

PLATE NO. 43-95M (43-95)-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000942	014945	003447	000966	000969	000999	001054	001229	001133
010	000993	000971	001125	001168	001164	001220	001437	001697	001986	004237
020	012816	020773	016091	006361	001864	000934	000812	000817	000735	000704
030	000667	000608	000636	000649	000666	000674	000661	000642	000637	000593
040	000575	000493	000486	000451	000436	000423	000493	000543	000704	000870
050	000966	001001	000839	000753	000827	001126	001639	002396	002784	002786
060	002244	001692	001089	000629	000412	000252	000151	000122	000117	000075
070	000085	000095	000136	000217	000349	000478	000656	000820	000986	001185
080	001336	001468	001707	001608	001465	001136	000816	000521	000301	000145
090	000064	000037	000025	000014	000018	000018	000023	000026	000046	000063
100	000080	000100	000120	000092	000122	000100	000070	000050	000031	000021
110	000013	*	*	*	*	*	*	*	*	*

43-95m(43-95)-1

4.3 DAY TECHNETIUM 96

DETECTOR 3X3-2 DATE 9-5-63

PLATE NO. 43-96-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	016530	221640	040538	010930	009940	009875	010084	010074	009909
010	009858	009840	010136	010397	010419	010470	010662	011022	011570	012454
020	013763	013883	012411	011637	011240	011235	010882	011146	011202	011744
030	013057	014873	015698	014884	012971	011827	011212	011100	010988	010932
040	010923	011040	011375	011514	011699	011799	011518	011631	011236	011563
050	011719	011462	011797	011991	012406	012504	012047	011601	011005	010219
060	009144	008333	007225	006343	005402	004691	004025	003564	003352	003350
070	003856	005061	007420	012025	019135	027455	036271	043797	048856	050200
080	049799	048512	046118	042379	037561	030777	023519	016109	009959	005832
090	003288	001915	001117	000748	000642	000582	000471	000462	000408	000474
100	000492	000449	000606	000651	000887	001216	001666	002177	002666	003003
110	003099	003012	002797	002149	001686	001305	000929	000712	000539	000418
120	000372	000309	000297	000249	000277	000245	000250	000264	000250	000286
130	000231	000238	000255	000241	000236	000263	000187	000243	000215	000206
140	000216	000168	000159	000169	000132	000120	000119	000134	000100	000110
150	000119	000121	000154	000184	000217	000270	000295	000376	000388	000400
160	000420	000455	000422	000377	000345	000276	000247	000196	000155	000106
170	000094	000065	000043	000026	000040	000015	000033	000040	000019	000027
180	000023	000024	000023	000031	000021	000032	000032	000033	000035	000035
190	000031	000030	000037	000034	000040	000032	000018	000017	000010	000015
200	000009	000007	000000	000000	000000	000000	000000	000000	000000	000000

43-96-1

2.10E05 YR. TECHNETIUM 99

117 DETECTOR 3X3-2 DATE 8-30-61

PLATE NO. 43-99-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZED TO 10^5 DIS/SEC (COUNT PERIOD 1000 SEC)

	0	1	2	3	4	5	6	7	8	9
000	000000	000346	000480	000166	000092	000069	000053	000041	000031	000025
010	000019	000014	000010	000008	000006	000004	000003	000002	000002	000001
020	000001	000000	000000	000000	000000	000000	000000	000000	000000	000000

43-99-1

15 MIN. TECHNETIUM 101

DETECTOR 3X3-2 DATE 8-31-60

PLATE NO. 43-101-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 598 MG/CM SQ BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	005210	005180	005200	005145	005497	005001	004992	004986	004739
010	004365	004597	006518	010399	011327	008396	005924	004622	004952	005463
020	004334	002698	002269	002548	002893	002932	003073	003850	007736	021198
030	047466	073058	074327	049633	021539	006146	001449	000570	000466	000408
040	000381	000394	000355	000298	000275	000233	000235	000225	000223	000259
050	000355	000537	000897	001487	002244	002745	002782	002478	001683	000995
060	000626	000353	000336	000307	000316	000289	000228	000181	000141	000161
070	000194	000229	000270	000328	000274	000208	000183	000122	000075	000056
080	000038	000044	000054	000059	000068	000065	000075	000069	000059	000041
090	000035	000037	000037	000049	000051	000055	000040	000034	000036	000034
100	000030	000023	000012	000013	000011	000011	000005	000008	000008	000008
110	000010	000011	000009	000004	000010	000009	000009	000007	000008	000009
120	000008	000008	000000	000000	000000	000000	000000	000000	000000	000000

43-101-1

1.7 HR. RUTHENIUM 95

119 DETECTOR 3X3-3 DATE 6-20-63

PLATE NO. 44-95-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18G/CM SQ BE +0.1G CU SANDW.

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	035000	034400	034000	033500	034000	034500	034800	035000	035200
010	035000	035500	035500	035392	034689	036718	039748	040141	040729	038677
020	035038	032555	032223	030894	029681	029522	029672	031393	036752	046654
030	056901	068855	111434	198836	277748	260226	162090	069369	026103	014782
040	012903	012234	012028	011436	011187	010625	011324	013877	021531	036004
050	054555	068659	068061	054179	034841	021018	014264	012388	013115	016098
060	021327	027996	033478	033993	029413	021860	014681	009517	007127	006113
070	006269	006671	007264	007856	008579	008777	009056	009363	009757	010327
080	010611	010152	009611	009033	008064	007620	007281	006604	006033	005266
090	004378	003821	003198	002895	002915	002873	003124	003154	003432	003558
100	004192	005050	006263	008215	010603	012909	014946	016039	015542	013693
110	011497	009140	007393	006266	005806	005274	004669	003916	003023	002381
120	001821	001404	001223	001049	001018	000997	001056	001036	001151	001306
130	001513	001714	001809	001947	002082	002173	002406	002481	002576	002544
140	002470	002305	002001	001808	001494	001205	000960	000806	000684	000579
150	000553	000521	000468	000462	000440	000408	000400	000399	000403	000357
160	000411	000409	000409	000379	000379	000387	000382	000434	000446	000425
170	000495	000515	000485	000501	000509	000462	000430	000409	000398	000342
180	000299	000302	000284	000301	000318	000299	000315	000316	000334	000368
190	000390	000389	000400	000373	000309	000333	000275	000241	000209	000194
200	000166	00Y124	000126	000101	000083	000091	000072	000072	000068	000087
210	000122	000113	000126	000133	000167	000186	000226	000282	000275	000280
220	000283	000342	000352	000324	000294	000265	000194	000147	000124	000098
230	000065	000044	000041	000031	000019	000026	000009	000008	000007	000005

44-95-1

2.9 DAY RUTHENIUM 97

DETECTOR 3X3-2 DATE 8-21-61

PLATE NO. 44-97-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	006900	034364	039104	002500	001911	001898	002222	002754	003059
010	002714	002170	002359	002159	002121	002485	002810	003208	003741	005202
020	012692	043156	081395	079939	043359	014284	003277	000758	000373	000364
030	000765	001824	003791	006000	006692	005194	002981	001107	000330	000104
040	000071	000074	000059	000065	000039	000058	000052	000038	000044	000034
050	000038	000029	000024	000041	000041	000066	000120	000211	000253	000256
060	000240	000204	000139	000068	000033	000020	000052	000027	000000	000000

44-97-1

40 DAY RUTHENIUM 103

121 DETECTOR 3X3-2 DATE 3-23-62

PLATE NO. 44-103-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	002823	011963	028036	013311	005461	006102	005645	004966	004867
010	004742	004721	004835	004724	004755	004774	005028	005505	005708	005460
020	005056	004896	004770	004735	004755	004717	004779	004930	004958	005244
030	005342	005320	004771	003960	002970	002341	001996	001806	001608	001521
040	001564	001569	001648	001855	002211	003232	006679	014253	027603	042275
050	050668	047388	034252	019370	008932	003618	001561	001162	001360	001772
060	002246	002684	002397	001945	001272	000714	000294	000141	000100	000049
070	000071	000030	000039	000080	000069	000066	000089	000057	000060	000058

44-103-1

4.45 HR. RUTHENIUM 105

DETECTOR 3X3-2

DATE 1 -30-63

PLATE NO. 44-105-1

SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU

ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	008277	053791	047497	013270	012167	012077	012070	012489	012957
010	012538	011964	014311	027102	035658	026004	020319	016170	014048	013784
020	013719	012571	011217	011041	011277	014448	021139	024662	021477	016065
030	017148	025057	032406	031995	024168	016054	011269	009941	010352	012057
040	013770	013738	012529	011548	012100	015929	021319	025947	026514	022955
050	017055	011672	008154	005648	004259	003426	003033	003038	002822	002795
060	002706	002675	003256	004290	006194	009002	012152	015268	018185	021571
070	025029	028549	030254	023164	022910	016430	010387	005665	003012	001638
080	000990	000949	001002	001218	001449	001678	001846	001955	001758	001517
090	001224	001064	000883	000829	000984	000987	000975	000916	000796	000648
100	000494	000368	000253	000207	000165	000114	000074	000090	000066	000064
110	000055	000046	000036	000014	000015	000027	000022	000036	000050	000032
120	000027	000046	000042	000046	000055	000038	000058	000067	000058	000077
130	000080	000079	000087	000093	000070	000050	000044	000036	*	*

44-105-1

1.0 YR. RUTHENIUM 106 - 30 SEC. RHODIUM 106

123 DETECTOR 3X3-2 DATE 4-4-62

PLATE NO. 44-106 (45-106)-3 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000000	000000	295184	222900	183022	170398	161981	153408	144743
010	136012	129459	124639	121074	117223	114486	113268	116568	119690	115948
020	108952	102681	098715	096537	094407	092579	090194	088758	087475	087726
030	088356	088413	087299	084203	076401	068160	061505	057024	054631	053198
040	052558	052424	051837	050441	048007	046249	048770	065280	113514	210853
050	343202	461196	493519	419940	285393	159751	080075	046431	045693	069444
060	110003	156058	188604	189940	159208	113245	068787	037898	020503	012805
070	009435	008129	008019	007370	007013	006971	006900	006903	006761	006606
080	006518	006704	006909	007436	007907	008650	009267	009028	008602	007675
090	006592	005394	004815	004297	003911	003565	003631	004107	004753	005771
100	007877	010321	012453	014025	014439	013942	012570	010977	009214	008226
110	007540	007453	007386	007371	007222	006963	006042	005056	004018	003145
120	002403	001886	001527	001298	001201	001121	001041	001014	000982	000945
130	000936	000913	000838	000852	000846	000817	000751	000721	000711	000680
140	000708	000639	000643	000712	000736	000756	000775	000864	001028	001121
150	001147	001167	001242	001300	001185	001155	001009	000893	000756	000596
160	000495	000450	000420	000366	000347	000355	000347	000353	000358	000371
170	000407	000447	000439	000406	000353	000385	000402	000349	000328	000311
180	000274	000218	000224	000270	000239	000277	000230	000233	000243	000227
190	000228	000236	000234	000221	000216	000222	000197	000188	000212	000181
200	000198	000200	000207	000220	000195	000190	000160	000178	000155	000157
210	000140	000131	000086	000085	000104	000082	000100	000095	000089	000098
220	000077	000098	000099	000107	000135	000128	000136	000133	000145	000138
230	000147	000150	000116	000136	000124	000105	000077	000076	000072	000046
240	000063	000063	000040	000032	000035	000029	000029	000016	000023	000020
250	000034	000013	000030	000006	000031	000023	000016	000000	000000	000000

44-106(45-106)-3

4.7 DAY RHODIUM 101M

DETECTOR 3X3-2

DATE 2-10-64

PLATE NO. 45-101M-1

SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU

ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	003142	108475	055344	003668	002820	002800	002640	002511	002449
010	002381	002411	002753	003851	004494	004060	003863	003344	002937	002615
020	002134	001777	001742	001729	001963	002209	002187	002759	005298	016280
030	038158	057558	055007	035102	015301	004707	001168	000351	000136	000049
040	000053	000042	000042	000048	000031	000060	000078	000062	000027	000056
050	000129	000239	000502	000823	001196	001259	001116	000859	000494	000264
060	000096	000037	000000	000000	000000	000000	000000	000000	000000	000000

45-101M-1

13.6 HR. PALLADIUM 109

125 DETECTOR 3X3-2 DATE 11-5-63

PLATE NO. 45-109-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	001570	002986	008295	077456	233455	078903	007211	002672	002375
010	002307	002336	002794	002840	002349	001994	002301	004377	010357	017967
020	017809	009990	003388	001114	000742	000669	000638	000625	000582	000541
030	000494	000490	000440	000428	000467	000472	000428	000386	000328	000335
040	000296	000289	000252	000266	000224	000230	000273	000218	000191	000189
050	000182	000199	000136	000136	000131	000131	000146	000114	000156	000137
060	000123	000144	000168	000156	000167	000154	000141	000140	000112	000080
070	000106	000087	000062	000077	000092	000096	000041	000056	000079	000079
080	000081	000060	000060	000078	000063	000066	000067	000047	000038	000031
090	000041	000042	000040	000016	000049	000037	000020	000010	000032	000019
100	000010	000023	000034	000010	000009	000010	000017	000016	000018	000020

46-109-1

40 DAY SILVER 105

DETECTOR 3X3-2 DATE 6-10-63

PLATE NO. 47-105-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	001717	032727	049935	002399	001912	003626	010501	004360	001443
010	001294	001318	001334	001391	001472	001540	001628	001612	001517	001352
020	001296	001046	001020	000945	001022	001247	002103	004820	008682	009746
030	007643	004735	004471	006771	009666	011362	009483	005798	002901	001481
040	000996	000953	001081	001362	001796	001921	001729	001036	000601	000202
050	000127	000100	000070	000082	000119	000139	000104	000143	000193	000229
060	000310	000541	000849	001035	001326	001321	001059	000870	000679	000348
070	000223	000147	000144	000116	000100	000083	000066	000112	000084	000077
080	000089	000089	000113	000060	000073	000086	000017	000058	000034	000015

47-105-1

8.3 DAY SILVER 106M

127 DETECTOR 3X3-2 DATE 6-24-63

PLATE NO. 47-106M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	008738	106447	098178	010007	009235	010288	013930	010170	008909
010	008793	008717	008701	008781	709003	009423	009703	010175	010499	010606
020	010823	012312	015715	017527	014723	011420	010206	011231	013108	013365
030	011757	010519	010343	011912	013229	013126	011407	009821	009520	010937
040	013395	015681	017617	018989	020606	020994	018972	016610	016044	019071
050	025754	030929	031002	025143	016869	009908	006064	004803	004840	005999
060	007106	008283	008385	007843	006618	005515	004900	005026	005764	007166
070	008564	009982	010407	010402	009660	008652	007744	007421	007271	007723
080	007702	007736	007115	005995	005026	003766	002926	002326	001736	001486
090	001393	001182	001309	001270	001259	001312	001401	001548	001883	002391
100	002854	003532	004092	004201	004229	003597	003306	002802	002524	002346
110	002265	002147	002057	002125	002064	002158	002199	002219	002290	002120
120	002018	001843	001504	001345	001181	000945	000749	000651	000545	000498
130	000480	000411	000423	000407	000417	000390	000392	000362	000354	000315
140	000376	000371	000431	000523	000686	000807	001009	001171	001255	001440
150	001445	001390	001300	001195	001034	000815	000626	000504	000381	000297
160	000251	000208	000166	000142	000145	000148	000147	000147	000136	000137
170	000126	000120	000118	000113	000131	000122	000154	000162	000167	000147
180	000124	000136	000134	000097	000087	000062	000065	000037	000043	000037
190	000031	000023	000022	000008	000019	000018	000024	000028	000020	000026
200	000023	000027	000018	000016	000028	000019	000009	000017	000015	000016
210	000019	000008	000018	000003	000011	000002	000006	000009	000011	000011
220	000010	000004	000017	000012	000003	000012	000006	000005	000013	000009

47-106m-1

24 MIN. SILVER 106

DETECTOR 3X3-3 DATE 6-20-63

PLATE NO. 47-106-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1 G/CM SQ BE + 200 MG CU SW.

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	017500	017400	017200	017000	016800	016500	016400	016500	016700
010	016800	016900	017000	017250	017300	017167	017368	018171	019730	021578
020	021521	021079	020643	020103	019516	019265	019109	018807	018911	018775
030	019021	019050	018002	015940	013221	010445	008663	007553	006828	006281
040	006099	005882	005842	005703	005851	006309	008498	015134	032859	065791
050	111546	148044	152791	119040	069712	030926	011208	004344	002831	002794
060	003447	004030	004328	004078	003271	002327	001676	001352	001221	001175
070	001217	001159	001120	000955	000909	000879	000765	000755	000716	000727
080	000744	000735	000835	000887	001049	001194	001224	001142	001115	000894
090	000672	000517	000458	000413	000399	000397	000391	000428	000493	000561
100	000679	000782	000861	000877	000823	000727	000643	000502	000504	000463
110	000394	000420	000433	000397	000370	000362	000298	000271	000249	000239
120	000189	000159	000147	000119	000099	000089	000099	000097	000086	000093
130	000093	000095	000080	000070	000080	000082	000083	000082	000072	000065
140	000086	000063	000054	000055	000065	000059	000068	000078	000075	000086
150	000088	000088	000082	000069	000068	000072	000054	000048	000035	000042
160	000041	000027	000029	000026	000023	000035	000030	000035	000027	000028
170	000034	000028	000034	000020	000024	000028	000024	000027	000022	000019
180	000012	000021	000013	000010	000010	000015	000016	000013	000012	000011
190	000012	000006	000012	000014	000017	000008	000004	000012	000008	000006

47-106-1

5 YR. SILVER 108M

129 DETECTOR 3X3-2 DATE 7-23-63

PLATE NO. 47-108M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	920008	090909	880964	369381	093921	092978	089322	092300	165762	205227
010	098998	080831	078648	079015	082055	082375	087674	091812	093495	093779
020	093760	089662	087229	087960	088708	090131	087419	084174	081516	076444
030	071500	066100	064048	064120	064678	063562	064936	065803	068831	077114
040	105326	173642	289202	410978	466201	406652	275698	155125	080359	051172
050	038623	033597	031145	028181	024738	024655	029017	046370	081915	138889
060	203792	252603	261537	223978	161579	104893	068295	058128	070290	105229
070	146046	186307	206227	195845	158663	111312	067035	037949	020896	010917
080	006715	004795	003988	003068	003620	002936	004785	005764	005413	005223
090	006511	006015	004528	003947	004959	003269	003024	002534	002404	001960
100	001913	001969	002795	002803	003673	004177	004329	004510	003308	002821
110	002649	002061	002509	002768	002921	002818	002867	003209	002928	002150
120	001715	001384	000938	000720	000577	000509	000342	000420	000762	000709
130	000894	001828	002102	002655	002154	002253	002368	002380	001048	001078
140	000842	000731	000392	000231	000595	000578	000282	000166	000041	*

47-108m-1

2.4 MIN. SILVER 108

DETECTOR 3X3-2 DATE 3-4-63

PLATE NO. 47-108-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	809689	003672	010756	018284	016571	014679	014037	013147	011391	010001
010	008610	007884	007102	006491	005492	005207	004839	004419	003946	003868
020	003461	002979	003044	002697	002563	002413	002199	002222	001909	001930
030	001773	001712	001643	001512	001424	001405	001313	001243	001174	001296
040	001240	001718	002048	002405	002659	002214	001660	001070	001039	001300
050	001638	001992	001960	001461	001116	000675	000495	000491	000689	001137
060	002008	003075	004150	004469	004032	003357	002126	001115	000533	000281
070	000144	000108	000084	000062	000041	000085	000041	000043	000041	000046
080	000033	000050	000035	000032	000030	000037	000025	000041	000017	000034
090	000022	000031	000029	000026	000018	000020	000019	000031	000022	000034
100	000030	000027	000014	000025	000030	000033	000027	000025	000009	000027
110	000013	000003	000006	000019	000002	000008	*	*	*	*

47-108-1

250 DAY SILVER 110M

131 DETECTOR 3X3-2 DATE 7-16-63

PLATE NO. 47-110M-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	014340	015288	016396	010631	010366	010348	010221	010473	010293
010	010267	010169	010713	010610	010680	010812	010795	011195	011766	012705
020	012737	012561	012224	011829	011694	011541	011570	011294	011330	011231
030	011237	010964	011103	010819	010814	011038	011000	011271	011229	011220
040	011293	011599	012064	012861	013295	013736	013176	011766	010499	009212
050	008675	008209	007679	007390	007323	007131	007091	007076	007166	007773
060	009049	012029	017434	025659	035117	043623	046927	044428	037713	029114
070	022042	017114	013828	012388	011687	011388	011305	010163	008566	007366
080	006464	006116	006527	008177	010671	014291	017760	020414	021596	021155
090	019092	016847	014682	012454	009973	007980	005950	004332	003146	002401
100	001937	001735	001500	001540	001484	001489	001512	001441	001530	001501
110	001470	001499	001397	001303	001273	001273	001209	001066	000968	000971
120	000891	000856	000817	000793	000772	000777	000794	000886	000988	001268
130	001683	002049	002583	003092	003497	003633	003554	003284	003052	002652
140	002319	002092	002046	002153	002118	002210	002251	002193	002074	001869
150	001519	001329	001111	000890	000769	000654	000523	000489	000375	000307
160	000233	000200	000151	000116	000100	000080	000058	000054	000062	000062
170	000048	000053	000025	000044	000065	000048	000078	000083	000087	000093
180	000090	000092	000063	000070	000064	000050	000054	000040	000030	000051
190	000043	000023	000028	000045	000028	000044	000027	000027	000040	000045
200	000036	000041	000036	000038	000017	000031	000024	000017	000018	000022
210	000016	000025	000007	000015	000020	000028	000041	000029	000022	000025
220	000040	000034	000021	000025	000046	000020	000010	000020	000009	000023
230	000008	000008	000012	000005	000002	000000	000000	000000	000000	000000

47-110m-2

24 SEC. SILVER 110

DETECTOR 3X3-2 | DATE 4-25-61

PLATE NO. 47-110-1 | SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU | ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	025643	044160	029259	017856	017965	018608	018559	017887	016915
010	015884	014728	013557	012540	011457	010459	009837	009188	008564	008057
020	007335	006925	006281	005926	005591	005339	005027	004799	004576	004363
030	004105	003810	003716	003449	003413	003311	003260	003100	002833	002775
040	002828	002745	002607	002584	002536	002454	002208	002057	001763	001562
050	001461	001370	001250	001201	001176	001115	001140	001130	001108	001239
060	001474	002210	003557	005373	007673	009190	009201	008267	006012	003840
070	002179	001289	000808	000547	000524	000473	000449	000403	000393	000403
080	000407	000423	000373	000351	000344	000342	000310	000259	000268	000267
090	000271	000222	000211	000220	000215	000180	000180	000173	000165	000155
100	000147	000159	000148	000147	000135	000135	000132	000125	000128	000115
110	000106	000112	000118	000104	000104	000087	000091	000076	000076	000085
120	000071	000055	000055	000061	000046	000070	000052	000040	000054	000050
130	000061	000048	000029	000039	000045	000039	000039	000025	000047	000022
140	000033	000045	000033	000025	000029	000042	000031	000022	000024	000030
160	000029	000028	000016	000015	000023	000015	000019	000014	000021	000013
170	000013	000019	000013	000011	000012	000021	000014	000021	000016	000000

47-110-1

470 DAY CADMIUM 109

133 DETECTOR 3X3-2 DATE 11-4-63

PLATE NO. 48-109-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	000845	001212	004569	060930	203479	079945	006062	000290	000198
010	000245	000236	000416	000431	000284	000259	000352	000947	002805	004845
020	004846	002551	000750	000117	000072	000029	000023	000004	000003	000006

48-109-1

43 DAY CADMIUM 115M

DETECTOR 3X3-6 | DATE 3-19-63

PLATE NO. 48-115M-1 | SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU | ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	040000	034548	035420	037520	036105	034250	031825	027540	023950	020490
010	018210	016750	015220	014134	012694	011751	011842	011145	009295	008598
020	008212	007924	007077	006525	005875	005488	005155	005003	004720	004431
030	004207	003980	003892	003730	003569	003427	003220	003134	003010	002892
040	002814	002908	002720	002588	002747	003197	003902	005067	006450	006849
050	005867	004441	003288	002730	002380	002282	002349	002376	002302	002385
060	002451	002536	002585	002665	002822	002956	002959	002789	002724	002510
070	002231	001970	001709	001467	001314	001186	001075	001127	001011	000985
080	000843	000871	000838	000869	001008	001187	001526	002378	003665	005677
090	008270	010389	011811	011486	010269	007817	005302	003458	002170	001374
100	001050	000854	000664	000592	000529	000493	000423	000393	000441	000488
110	000522	000512	000517	000501	000404	000301	000215	000222	000223	000291
120	000408	000687	001066	001587	002162	002612	003003	003045	002812	002363
130	001847	001254	000858	000558	000380	000267	000178	000120	000115	000124
140	000095	000088	000100	000105	000074	000066	000055	000053	000038	000025
150	000030	000017	000016	000015	000004	000010	000009	000009	000004	000004
160	000012	000005	000007	000022	000025	000014	000015	000022	000018	000016
170	000011	000011	000004	000008	000004	000007	000002	000005	000002	000003

48-115M-1

2.3 DAY CADMIUM 115 - 4.5 HR. INDIUM 115M

135 DETECTOR 3X3-2 DATE 7-7-62

PLATE NO. 48-115(49-115M)-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	002830	026382	198234	022539	007192	007252	006900	006593	006387
010	005975	005986	005829	005980	006250	006853	007057	007245	007068	006429
020	005458	004690	004727	005399	005841	006320	007202	007514	006536	005560
030	006370	011931	026475	048426	062725	055624	033358	013359	004262	001443
040	000828	000689	000660	000629	000794	001199	002084	003835	006257	009326
050	013063	016698	019771	019642	016347	011112	005948	002514	000991	000349
060	000121	000065	000036	000000	000000	000000	*	*	*	*

48-115(49-115m)-2

2.8 DAY INDIUM 111

DETECTOR 3X3-2 DATE 9-24-63

PLATE NO. 49-111-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000313	000329	000540	002894	014717	010862	001513	000288	000285
010	000321	000285	000312	000404	000328	000269	000255	000213	000287	000308
020	000273	000372	000489	000545	000515	000484	000549	000581	000571	000725
030	000709	000782	001114	001946	003870	006652	008546	008792	007011	004390
040	002267	001060	000667	000491	000454	000528	000882	001564	002662	004096
050	005505	006170	005935	004984	003527	002188	001160	000568	000310	000116
060	000028	000000	000000	000000	000000	000000	000000	000000	000000	000000

49-111-1

137

21 MIN. INDIUM 112M - 14 MIN. INDIUM 112 (EQUILIBRIUM)

DETECTOR 3X3-3 DATE 9-22-63

PLATE NO. 49-112M (49-112)-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G BE + 200 MG CU SAND

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	600000	021330	019685	065415	024253	017611	017670	016350	015980	015947
010	016345	017258	018611	019263	019985	033091	073303	074621	036975	020349
020	017778	017419	017075	016795	016547	016089	016100	015940	015853	015770
030	015899	015945	015287	013296	010872	008915	007586	006951	006473	006021
040	005867	005219	005211	005125	005225	005397	007232	013485	029601	058459
050	095565	120496	118050	087586	050031	022120	007594	003579	003808	005925
060	008511	010637	010693	008785	006046	003467	001683	000965	000663	000639
070	000580	000522	000465	000443	000481	000415	000395	000388	000358	000372
080	000433	000445	000461	000493	000502	000437	000407	000365	000318	000277
090	000262	000242	000245	000217	000274	000260	000238	000231	000222	000232
100	000179	000204	000206	000189	000185	000200	000193	000173	000182	000164
110	000188	000138	000127	000137	000078	000107	000102	000121	000156	000150
120	000204	000242	000296	000271	000259	000246	000216	000191	000153	000120
130	000098	000046	000044	000034	000011	000024	000043	000034	000050	000049
140	000059	000072	000060	000072	000083	000082	000058	000049	000034	000036
150	000026	000012	000023	000017	000014	000015	000017	000021	000018	000007
160	000009	000023	000019	000014	000014	000010	000012	000004	000013	000017
170	000009	000010	000006	000009	000005	000010	000009	000011	000000	000000

49-112m(49-112)-1

1.7 HR. INDIUM 113M

DETECTOR 3X3-2 DATE 6-8-61

PLATE NO. 49-113M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	007517	005748	008088	005519	003960	003683	003583	003393	003360
010	003247	003196	003244	003207	003218	003643	003818	003531	003395	003429
020	003638	003970	003932	003318	002576	001945	001539	001378	001257	001223
030	001247	001217	001302	001424	001779	002478	005279	012843	026522	042289
040	049345	042863	026797	012133	004007	001115	000260	000063	000045	000021
050	000018	000023	000015	000017	000018	000014	000020	000004	000011	000007
060	000008	000009	000012	000004	000021	000013	000010	000015	000008	000006
070	000015	000017	*	*	*	*	*	*	*	*

49-113m-1

50 DAY INDIUM 114M - 72 SEC INDIUM 114

139 DETECTOR 3X3-2 DATE 4-30-64

PLATE NO. 49-114M(49-114)-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 0.594 G/CM SQ BE + POLY CAP

INTENSITY NORMALIZATION NONE

		1	2	3	4	5	6	7	8	9
000	000000	008415	075578	908432	123521	013107	011458	011125	011267	009568
010	008031	008493	009000	008854	009409	010670	012774	017071	046437	131462
020	169868	095591	026077	005730	003028	002837	002668	002621	002660	002616
030	002490	002515	002509	002417	002387	002435	002430	002291	002106	001826
040	001742	001514	001494	001440	001332	001463	001318	001503	001471	001514
050	001767	002051	003109	005016	007759	010193	011158	009904	007230	004338
060	002217	001076	000570	000418	000356	000441	000688	001168	002169	003576
070	005277	006720	007452	006899	005332	003722	002230	001181	000641	000307
080	000155	000100	000096	000076	000086	000076	000089	000046	000087	000070
090	000037	000084	000044	000058	000066	000072	000063	000075	000060	000068
100	000070	000061	000072	000050	000094	000062	000036	000039	000040	000020
110	000033	000018	000036	000044	000043	000027	000035	000005	000022	000043
120	000047	000058	000081	000134	000149	000156	000193	000191	000194	000183
130	000130	000095	000090	000060	000029	000000	000000	000000	000000	000000

49-114M(49-114)-1

4.5 HR. INDIUM 115M

DETECTOR 3X3-2 DATE 1-20-63

PLATE NO. 49-115M-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 0.160 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	001594	001159	002252	007885	066112	079257	016983	001831	001188
010	001180	001162	001084	001006	001038	001001	001025	000931	000867	000839
020	000910	000897	000877	000864	000820	000902	000843	000885	000941	001023
030	001105	001157	001242	001214	001297	001202	001139	001153	001074	000950
040	000754	000661	000468	000382	000362	000287	000255	000230	000243	000174
050	000165	000195	000155	000187	000162	000215	000188	000212	000267	000380
060	000559	000914	001730	003247	005803	009350	013325	017330	020220	021131
070	019715	016865	012847	009047	005467	003053	001539	000729	000304	000123

49-115m-2

54 MIN. INDIUM 116M

141 DETECTOR 3X3-2 DATE 3-24-64

PLATE NO. 49-116M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	015957	006438	010567	005660	004748	005083	004960	004906	005002
010	004970	005017	005272	007173	012327	011572	006247	004997	004986	005055
020	005323	005692	005624	005503	005271	005126	004779	004593	004350	004288
030	004131	004003	004011	004127	004295	004574	004816	004993	006689	010368
040	015692	020160	020419	016231	010418	006400	004527	004083	003794	003624
050	003562	003485	003518	003552	003554	003537	003605	003570	003492	003579
060	003559	003501	003446	003509	003480	003444	003436	003609	003684	003628
070	003698	003698	003684	003683	003975	004336	004807	005362	006137	006706
080	006896	006651	006038	005151	004537	004131	003645	003439	003195	003093
090	002965	002849	002857	002920	002912	002872	002978	003060	003262	003539
100	004164	004905	006035	007849	009548	010445	010820	010280	008995	007098
110	005204	003816	002718	001951	001576	001358	001550	001924	002630	003793
120	005154	006773	008748	010172	010725	010590	009763	008226	006410	004716
130	003389	002348	001567	001077	000799	000658	000587	000557	000646	000724
140	000827	001027	001154	001259	001337	001261	001180	001017	000930	000768
150	000681	000604	000513	000493	000463	000472	000456	000437	000419	000416
160	000426	000410	000420	000451	000495	000485	000525	000522	000528	000517
170	000445	000405	000380	000413	000345	000326	000289	000289	000258	000233
180	000229	000187	000163	000172	000143	000118	000133	000120	000133	000149
190	000161	000191	000255	000317	000386	000523	000626	000761	000840	000965
200	000930	000952	000853	000807	000697	000576	000462	000362	000275	000223
210	000176	000124	000095	000059	000079	000061	000042	000027	000024	000037
220	000024	000031	000021	000037	000031	000023	000044	000050	000045	000051
230	000055	000053	000053	000040	000042	000040	000026	000024	000026	000028
240	000023	000024	000020	000015	000020	000018	000024	000014	000007	000013
250	000002	000007	000000	000000	000000	000000	00000	*	*	*

49-116M-1

9.4 DAY TIN 125

DETECTOR 3X3-2 DATE 2-7-64

PLATE NO. 50-125-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	904915	021829	046557	021943	016885	016365	013375	012863	011596
010	010750	009636	009184	008707	008414	008357	008376	008260	007926	007693
020	007920	007790	007380	007339	006924	006842	006889	006993	006930	006806
030	006570	007328	009471	012450	012905	011363	008694	006538	005412	004857
040	004889	004688	004983	005340	005872	007049	008398	009297	008784	007519
050	006107	005275	004729	004684	004473	004596	004575	004698	004568	004577
060	004509	004390	004272	004236	004027	004053	004098	004021	003968	003775
070	003759	003701	003690	003749	003863	004269	005090	006267	007553	009048
080	010071	010489	009760	008492	007050	005792	005507	005598	006010	006586
090	006642	006357	005453	004407	003406	002445	001947	002010	002328	003158
100	004510	006519	008633	011040	013089	013998	013440	012228	010117	007872
110	005576	003900	002578	001809	001230	001032	000838	000755	000687	000594
120	000535	000524	000489	000421	000359	000324	000333	000305	000299	000331
130	000338	000385	000371	000417	000474	000531	000602	000594	000582	000577
140	000583	000550	000454	000433	000422	000371	000395	000399	000412	000348
150	000302	000330	000302	000315	000306	000298	000286	000281	000307	000284
160	000283	000275	000282	000300	000308	000295	000291	000276	000271	000294
170	000258	000291	000267	000243	000240	000235	000236	000213	000201	000169
180	000169	000189	000180	000233	000271	000289	000378	000471	000560	000640
190	000727	000732	000797	000834	000735	000657	000588	000524	000422	000311
200	000249	000178	000139	000079	000080	000051	000051	000044	000033	000054
210	000045	000043	000053	000049	000047	000069	000079	000057	000068	000075
220	000067	000046	000059	000052	000041	000029	000031	000020	000016	000014

50-125-1

9.7 MIN. TIN 125M

DETECTOR 3X3-2 — DATE 11-6-63

PLATE NO. 50-125M-1 — SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU — ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	011315	018407	037122	018721	013823	013029	012407	011904	011336
010	010650	010210	010221	010310	011397	013221	014467	014881	013436	010269
020	007660	006094	005318	005179	005262	005257	005554	005993	006702	008317
030	014054	037670	093342	164770	192652	151356	079110	027549	007134	001892
040	000982	000759	000627	000599	000579	000555	000527	000496	000469	000491
050	000429	000439	000389	000409	000419	000409	000403	000447	000534	000561
060	000535	000561	000489	000489	000450	000461	000493	000392	000363	000283
070	000248	000203	000186	000176	000152	000155	000142	000143	000124	000134
080	000142	000144	000140	000145	000161	000144	000126	000110	000118	000114
090	000098	000114	000084	000078	000091	000092	000094	000110	000121	000102
100	000129	000105	000125	000100	000099	000099	000104	000107	000096	000105
110	000090	000074	000093	000075	000089	000061	000065	000040	000059	000057
120	000041	000044	000037	000035	000054	000043	000036	000057	000034	000052
130	000081	000097	000115	000120	000157	000177	000188	000214	000208	000174
140	000149	000117	000125	000101	000080	000073	000063	000035	000051	000047
150	000028	000027	000042	000036	000024	000044	000032	000037	000024	000030
160	000025	000022	000018	000023	000023	000013	000009	000008	000005	000019
170	000013	000015	000006	000011	000011	000004	000002	000007	000008	000005
180	000005	000011	000006	000003	000008	000009	000007	000006	000005	000006

50-125m-1

5.8 DAY ANTIMONY 120M

DETECTOR 3X3-2 DATE 4-8-63

PLATE NO. 51-120M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	970000	001225	003653	023003	003068	001075	002200	002361	003149	014895
010	020756	004470	001017	001018	000970	001160	001223	001475	002661	007991
020	015870	014319	006147	001688	000828	000636	000578	000623	000686	000764
030	000873	000746	000679	000542	000569	000651	000561	000485	000504	000568
040	000511	000572	000553	000499	000535	000508	000502	000540	000565	000519
050	000577	000521	000528	000474	000532	000481	000540	000560	000580	000611
060	000581	000626	000651	000685	000724	000677	000642	000587	000633	000570
070	000538	000630	000640	000650	000640	000630	000610	000573	000563	000529
080	000551	000490	000504	000489	000484	000449	000372	000433	000370	000400
090	000426	000479	000409	000358	000443	000584	000786	001069	001435	001793
100	002019	001928	001862	001418	001203	000843	000579	000453	000481	000527
110	000706	000934	001166	001464	001615	001647	001492	001300	001020	000800
120	000531	000292	000317	000166	000125	000078	000062	000043	000051	000039
130	000080	000050	000040	000005	000036	000053	000062	000035	000030	000040

51-120m-1

16 MIN. ANTIMONY 120

145 DETECTOR 3X3-24 DATE 4-4-63

PLATE NO. 51-120-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	019078	005300	005200	005300	005287	005409	005650	006232	006175	005734
010	005663	005863	005912	005878	005812	005706	006079	006711	007161	006803
020	006615	006608	005715	006465	006395	006426	006249	006231	006212	006199
030	006159	006456	005007	005593	004792	003686	002927	002425	002203	001991
040	001865	001891	001812	001893	001970	002229	002922	005385	012057	025500
050	043286	056375	056125	041117	022785	009195	002964	001025	000505	000309
060	000348	000309	000298	000281	000293	000307	000322	000327	000355	000350
070	000339	000344	000281	000275	000212	000215	000184	000200	000207	000185
080	000180	000203	000192	000150	000156	000164	000143	000173	000168	000148
090	000138	000130	000151	000117	000114	000119	000118	000162	000122	000104
100	000106	000063	000056	000015	000039	000039	000056	000064	000097	000173
110	000237	000321	000360	000433	000481	000460	000381	000262	000175	000111
120	000053	000030	000010	000021	000025	000016	000013	000019	000012	000022
130	000020	000010	000021	000011	000012	000025	000013	000021	000014	000012

51-120-1

3.4 MIN. ANTIMCNY 122M

DETECTOR 3X3-2 DATE 3-4-63

PLATE NO. 51-122M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000300	000364	000467	002009	016109	043515	021903	003831	000814
010	001250	001987	005361	015893	023005	015353	008083	007227	005562	001967
020	000369	000090	000004	000022	000012	000013	000038	000002	000007	000015
030	000032	000000	000000	000000	000000	000000	000000	000000	000000	000000

51-122m-1

2.8 DAY ANTIMONY 122

147 DETECTOR 3X3-2 DATE 3-5-63

PLATE NO. 51-122-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	009455	018985	048350	017973	013315	012788	012268	012176	011746
010	011424	011040	011136	011048	010837	010829	011118	012054	012195	012161
020	011150	010892	010475	010368	010337	010358	010190	009946	009897	009779
030	009880	009865	010232	010178	010585	010615	010499	009898	008549	006823
040	005414	004265	003588	003215	003024	003001	002940	002892	003195	003429
050	004241	006682	013604	027687	049411	075202	091337	090405	071084	044730
060	023133	010147	004011	001803	001270	001421	002142	003020	003690	003941
070	003451	002729	001805	001085	000604	000384	000268	000243	000262	000236
080	000201	000210	000207	000220	000212	000195	000168	000197	000181	000174
090	000146	000173	000147	000150	000160	000165	000138	000105	000135	000105
100	000095	000128	000103	000104	000097	000127	000151	000183	000263	000309
110	000370	000431	000388	000378	000271	000271	000215	000194	000199	000241
120	000296	000306	000342	000325	000303	000265	000194	000174	000134	000108

51-122-2

60 DAY ANTIMONY 124

DETECTOR 3X3-2 DATE 12-13-62

PLATE NO. 51-124-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	025100	028300	043057	034382	026522	026057	025751	025321	025669
010	024520	024905	024436	024854	025313	025556	026266	027775	029393	029764
020	028543	027500	026890	027192	027062	027036	026172	026086	025708	025420
030	024929	024799	024798	024955	025072	025193	025618	025982	026422	026668
040	025811	024487	021688	018555	016218	014676	013250	012161	011742	011190
050	011346	011204	011334	011755	013506	019068	032835	060980	100886	143929
060	169146	166341	135619	095599	060016	037109	023937	017333	016065	017221
070	020080	022186	022694	020273	016413	012493	009402	007194	006143	005674
080	005300	005038	004744	004692	004589	004397	004441	004434	004424	004625
090	004789	004915	005228	005655	005963	006175	006065	006097	005891	005923
100	005946	006074	006180	006123	005893	005822	005570	005463	005021	004934
110	004942	004971	004995	005124	005273	005501	005495	005510	005493	005516
120	005300	005223	005238	005166	005337	005629	005807	006077	006377	007024
130	007343	007681	007872	007948	007630	007468	007107	007012	006500	005974
140	005721	005226	004959	004393	004066	003499	003244	002916	002627	002350
150	002180	002085	002009	002211	002473	002995	003758	005040	006974	008917
160	011739	013966	016041	017558	017871	017310	015874	013934	011667	009480
170	007347	005462	004062	003014	002215	001701	001314	001028	000835	000726
180	000623	000537	000493	000495	000423	000373	000379	000338	000328	000313
190	000310	000366	000422	000448	000549	000706	000864	001043	001216	001337
200	001493	001555	001540	001553	001399	001192	001090	000936	000736	000601
210	000497	000384	000300	000236	000167	000151	000157	000151	000148	000152
220	000157	000174	000191	000199	000193	000188	000171	000152	000129	000115
230	000106	000088	000076	000056	000034	000030	000044	000023	000033	000016
240	000011	000015	000016	000013	000008	000009	000009	000006	000007	000012

51-124-2

149

2.7 YR. ANTIMONY 125 - 58 DAY TELLURIUM 125M

DETECTOR 3X3-2 DATE 10-30-62

PLATE NO. 51-125 (52-125M)-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	003744	011609	219529	072543	003951	003168	002988	002610	002550
010	002632	002879	003164	003205	003019	003152	003969	007698	012485	010312
020	005279	003568	003111	002946	002814	002706	002641	002276	002157	001801
030	001824	001789	001856	001853	001776	001736	001837	002311	002827	003791
040	005720	009521	013624	015997	014755	011213	008298	005939	003822	002194
050	001038	000540	000348	000349	000501	000863	001667	003093	005047	006763
060	007602	007577	006684	005453	004315	003124	002054	001319	000731	000430
070	000257	000074	000022	000000	000000	000000	000000	000000	*	*

51-125(52-125m)-1

2.7 YR. ANTIMONY 125 (WITH TELLURIUM 125M SEPARATED)

DETECTOR 3X3-2 — DATE 8-4-61

PLATE NO. 51-125-2 — SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU — ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	004303	008369	078549	042132	007924	003886	004009	003775	003631
010	003559	003578	004072	004133	004030	003993	005006	009746	017569	016123
020	008035	004917	004455	004223	003911	003755	003446	002923	002615	002243
030	002056	002043	002091	002067	001895	001864	002225	002705	003368	004361
040	007291	012823	018932	022325	021151	016766	012620	008998	005949	003368
050	001601	000706	000344	000333	000424	000872	001874	003597	006239	009005
060	010873	011042	009995	008643	006498	004972	003274	002238	001321	000798
070	000445	000263	000096	000066	000021	000000	000011	000000	*	*

51-125-2

58 DAY TELLURIUM 125M

151 DETECTOR 3X3-2 DATE 8-14-62

PLATE NO. 52-125M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000334	000334	000302	000589	008799	022465	017262	006843	001083
010	000181	000221	000284	000377	000568	000809	001294	001822	001781	001485
020	001539	002692	007345	016694	023567	021422	013831	005090	001045	000081

52-125M-1

78 HR. TELLURIUM 132

DETECTOR 3X3-2 DATE 11-15-63

PLATE NO. 52-132-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000356	003539	086363	060137	012396	016273	002656	001488	001906
010	002030	002789	004844	004016	001723	001662	002039	001872	001777	001934
020	002420	004277	016118	039154	047686	031770	012423	003517	001197	000579
030	000303	000174	000000	000000	000000	000000	000000	000000	000000	000000

52-132-1

78 HR. TELLURIUM 132 — 2.3 HR. IODINE 132 (EQUILIBRIUM)

153 DETECTOR 3X3-2 DATE 11-18-63

PLATE NO. 52-132(53-132)-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	010911	021905	216817	128957	033945	042029	012860	011796	012485
010	013014	014630	018819	016820	011839	011885	012629	012358	013159	014764
020	016265	023630	056824	106785	110818	064908	026341	014760	012261	010976
030	010026	009561	009285	009189	009081	008989	009066	009351	009074	008590
040	008597	008674	008837	008869	009107	008767	008584	008448	008409	009449
050	010934	012800	013493	013088	011511	008806	006855	005441	004994	005058
060	006139	008264	011614	016641	022724	029420	033396	033559	028911	021943
070	015070	010723	009132	010179	013096	016255	019247	019889	018318	014827
080	011173	007717	005260	003434	002563	002028	001738	001633	001685	001960
090	002145	002613	003082	003523	003810	003533	003110	002553	002028	001624
100	001237	001010	000878	000763	000784	000701	000809	000832	000974	001034
110	001164	001229	001258	001268	001134	000979	000908	000741	000703	000622
120	000559	000543	000534	000581	000576	000688	000695	000682	000706	000760
130	000748	000815	000878	000942	001032	001126	001108	001098	001011	000939
140	000868	000769	000699	000631	000533	000409	000402	000292	000252	000225
150	000197	000168	000130	000122	000107	000130	000124	000127	000110	000134
160	000127	000115	000090	000126	000135	000099	000121	000119	000112	000129
170	000157	000105	000114	000104	000109	000100	000087	000077	000076	000083
180	000066	000100	000102	000114	000102	000103	000117	000119	000112	000112
190	000112	000131	000129	000126	000104	000107	000096	000080	000076	000064
200	000059	000063	000060	000042	000040	000035	000041	000033	000020	000045
210	000028	000036	000019	000028	000032	000027	000023	000022	000008	000017
220	000010	000019	000016	000007	000011	000005	000012	000010	000014	000009
230	000026	000014	000017	000014	000011	000006	000005	000009	000000	000004
240	000007	000003	000002	000009	000005	000007	000004	000000	000005	000000

52-132(53-132)-1

13.2 DAY IODINE 126

DETECTOR 3X3-2 DATE 9-24-63

PLATE NO. 53-126-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	012547	073732	590352	123748	014547	014279	013816	013602	013223
010	012567	012599	012541	012499	012638	013209	013873	013712	013811	014264
020	014506	014583	014201	013299	011595	010125	009641	009035	009028	009147
030	009094	008964	009004	009214	009708	012718	022596	046050	079288	104731
040	099937	070672	037267	017026	009278	007290	007328	008242	009573	010796
050	011133	009920	007764	005448	003875	002595	001864	001669	001745	001924
060	002608	004448	008186	015268	025020	035650	042319	042289	035463	025140
070	015656	008863	005965	005112	004850	004777	004250	003309	002332	001445
080	000870	000414	000371	000404	000513	000571	000761	000778	000772	000637
090	000480	000345	000275	000163	000142	000103	000077	000093	000053	000044
100	000068	000045	000060	000067	000055	000063	000047	000062	000072	000063
110	000053	000056	000062	000076	000070	000020	000058	000032	000033	000046
120	000028	000042	000037	000038	000028	000023	000023	000020	000012	000028
130	000016	000032	000037	000055	000069	000099	000130	000147	000148	000138
140	000153	000145	000132	000091	000085	000088	000023	000031	000016	000006
150	000011	000000	000000	000000	000000	000000	*	*	*	*

53-126-1

25 MIN IODINE 128

155 DETECTOR 3X3-2 DATE 7-22-63

PLATE NO. 53-128-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	019227	054878	325151	132467	031061	029232	026311	024808	023146
010	021373	019884	018980	018168	017429	017180	017125	017315	015883	014920
020	014123	014140	013968	013666	014032	014026	013554	012882	010977	009191
030	007932	006877	006465	006093	005867	005800	005558	005634	005859	006696
040	009658	018778	039149	071235	100670	109727	088717	055042	026231	011313
050	006853	007579	008902	009505	008461	006349	003910	002432	001665	001277
060	001160	001137	000974	001025	001006	000933	000936	000859	000881	000931
070	000953	000980	001082	001142	001104	000996	000950	000757	000669	000550
080	000481	000461	000420	000401	000369	000368	000359	000293	000325	000368
090	000417	000486	000584	000786	000919	001004	001013	000930	000799	000642
100	000464	000341	000211	000164	000118	000103	000103	000106	000096	000058
110	000086	000076	000087	000068	000046	000054	000052	000039	000035	000044
120	000035	000034	000032	000023	000028	000025	000020	000020	000011	000021
130	000011	000019	000023	000006	000016	000007	000017	000010	000015	000018

53-128-1

12.5 HR. IODINE 130

DETECTOR 3X3-2 DATE 11-16-62

PLATE NO. 53-130-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	916881	158756	245586	193807	160999	160563	161676	162930	161693
010	158608	157768	159439	161374	163320	166924	173685	183143	190272	191315
020	185358	179765	177389	176844	176389	173943	168827	164393	161716	160722
030	159408	158235	160301	160572	161311	160347	158494	153820	162811	200421
040	275179	356857	388065	341350	251292	173293	130576	114833	120329	154535
050	237058	370925	524942	623192	610405	485610	313014	179859	102142	067997
060	060613	074712	115407	190034	286545	378862	426130	418149	359505	301684
070	273922	286369	309690	317810	289616	232027	163183	103389	061016	036581
080	024018	017790	015040	013575	013049	012562	012202	011855	011585	011148
090	011390	011367	011391	011928	012174	012311	011896	010954	010060	008901
100	003074	007323	007116	006847	007594	008400	009859	011675	014497	017548
110	021206	024182	026475	025768	025524	023050	019958	016973	014118	012038
120	010333	009226	008380	007676	007018	006558	006237	005882	005192	004571
130	003876	003244	002781	002552	002395	002471	002754	002951	003327	003347
140	003490	003256	002878	002480	002043	001652	001237	001021	000819	000653
150	000541	000515	000432	000437	000418	000386	000342	000372	000395	000368
160	000390	000389	000388	000375	000416	000384	000448	000426	000404	000367
170	000339	000301	000261	000252	000222	000242	000295	000256	000273	000332
180	000303	000265	000235	000216	000207	000165	000146	000110	000098	000078
190	000069	000080	000053	000056	000087	000063	000042	000060	000084	000046
200	000039	000059	000036	000030	000016	000043	000049	000042	000048	000035
210	000040	000038	000056	000039	000049	000031	000043	000042	000030	000033
220	000052	000031	000025	000021	000037	*	*	*	*	*

53-130-1

8 DAY IODINE 131

157 DETECTOR 3X3-2 DATE 1-23-62

PLATE NO. 53-131-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	008717	007603	052453	040373	018247	013623	012664	024331	030278
010	017977	011772	011087	011482	012096	013226	013529	013302	013998	014771
020	014493	012823	010232	007846	006508	006125	007023	011075	019020	023801
030	021201	015070	010994	014439	034021	081570	143693	179287	155787	095233
040	041719	013905	004216	001767	001167	001024	000851	000748	000795	000865
050	000963	000916	000790	000607	000463	000403	000360	000399	000609	001072
060	001985	003388	005334	006886	007195	006404	004827	003136	001909	001418
070	001360	001516	001556	001552	001209	000837	000484	000279	000135	000080

53-131-2

2.3 HR. IODINE 132

DETECTOR 3X3-2 DATE 3-22-62

PLATE NO. 53-132-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	013168	017705	023544	016813	013953	013708	013516	013573	013321
010	013122	012930	013024	013202	013391	013769	013947	013951	014614	015935
020	015643	015063	014434	014131	014487	014947	016123	016584	016037	015312
030	014780	014208	013634	013608	013228	013296	013200	013449	013047	012918
040	012841	013084	013243	013272	013455	013283	012735	012537	012808	013936
050	016436	018744	020335	019815	016963	013454	010421	008218	007322	007602
060	009168	012340	017359	024458	034048	043980	050662	050947	043919	033305
070	022593	015838	013513	015601	019661	024921	028723	029890	027487	022179
080	016696	011422	007504	005135	003596	002883	002521	002392	002426	002663
090	003205	003918	004636	005410	005496	005335	004717	003981	003210	002437
100	001884	001459	001275	001182	001090	001103	001157	001188	001380	001494
110	001658	001764	001722	001774	001552	001412	001333	001147	000931	000891
120	000820	000793	000772	000812	000983	000994	000992	001127	001119	001115
130	001130	001220	001374	001432	001569	001592	001638	001625	001562	001361
140	001296	001184	001032	000856	000749	000673	000538	000496	000403	000323
150	000275	000234	000198	000135	000166	000169	000162	000169	000186	000178
160	000183	000184	000189	000209	000181	000189	000179	000189	000172	000166
170	000187	000183	000163	000173	000128	000120	000109	000103	000102	000116
180	000114	000130	000168	000150	000156	000169	000210	000195	000199	000189
190	000159	000163	000166	000154	000146	000131	000128	000107	000119	000106
200	000097	000077	000069	000056	000070	000071	000053	000055	000059	000044
210	000041	000041	000051	000055	000047	000037	000025	000024	000023	000022
220	000013	000018	000016	000020	000013	000019	000030	000028	000011	000014
230	000013	000014	000011	000022	000013	000014	000007	000011	000017	000011

53-132-2

20.8 HR. IODINE 133

159 DETECTOR 3X3-2 DATE 1-17-62

PLATE NO. 53-133-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	004949	005107	006935	005094	004029	003918	003772	003589	003614
010	003668	003760	003684	003553	003581	003653	003773	004019	004116	003925
020	003676	003561	003652	003696	003677	003844	003979	004091	003823	003521
030	003601	003657	003656	003772	003760	003450	002908	002240	001866	001459
040	001325	001416	001333	001394	001330	001272	001430	001769	002953	005898
050	011518	020111	028220	031623	028206	020104	011592	005294	002229	001005
060	000673	000578	000556	000486	000500	000471	000501	000550	000630	000712
070	000682	000634	000491	000393	000347	000331	000351	000279	000305	000298
080	000373	000471	000607	000815	000953	001093	001103	001036	000847	000694
090	000472	000348	000269	000192	000166	000157	000168	000165	000147	000192
100	000203	000218	000203	000196	000195	000181	000178	000184	000181	000151
110	000161	000147	000157	000128	000132	000115	000148	000157	000186	000238
120	000292	000314	000369	000393	000368	000405	000354	000327	000291	000243
130	000168	000137	000110	000082	000063	000049	000039	000066	000024	000040

53-133-2

53 MIN IODINE 134

DETECTOR 3X3-2 DATE 1-16-62

PLATE NO. 53-134-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	007000	007990	015549	012735	008892	008280	007926	007923	007955
010	007918	007966	007995	010634	015709	014515	010226	008922	009370	009903
020	009967	009743	009568	010090	010403	009707	008544	007855	007685	007765
030	007716	007609	007599	007850	007450	007841	007465	007509	008052	009223
040	010569	011674	011938	011094	010138	009351	008465	007965	007605	007874
050	008122	008802	009108	009940	010441	010392	010021	010334	010591	011745
060	012510	012894	012441	011477	009847	008620	007720	006716	006076	005382
070	004673	004079	003688	003531	003603	003766	003898	004166	004717	006444
080	009390	013242	018545	023773	026448	028080	027064	024172	019826	015965
090	011652	008067	005620	004132	003203	002799	002337	002165	001944	001785
100	001696	001966	002230	002663	002974	003226	003226	003231	002965	002767
110	002600	002379	002194	001993	001572	001437	001161	000933	000791	000725
120	000668	000653	000668	000682	000544	000662	000632	000639	000567	000612
130	000593	000596	000593	000572	000549	000550	000587	000609	000601	000626
140	000659	000666	000690	000689	000529	000588	000573	000546	000493	000515
150	000496	000491	000505	000511	000559	000561	000547	000571	000548	000518
160	000490	000435	000382	000357	000346	000356	000362	000378	000401	000479
170	000522	000567	000597	000605	000513	000546	000511	000482	000417	000356
180	000303	000249	000200	000161	000131	000116	000101	000090	000075	000092
190	000084	000072	000072	000065	000070	000063	000066	000054	000057	000042
200	000049	000045	000048	000047	000043	000038	000039	000030	000039	000040
210	000032	000033	000031	000035	000024	000000	*	*	*	*

53-134-1

6.7 HR. IODINE 135

161 DETECTOR 3X3-2 DATE 1-17-62

PLATE NO. 53-135-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	035551	047806	109780	080334	042929	035587	034359	034129	034128
010	031887	031407	031938	032645	031475	031034	031380	032958	033139	033760
020	033867	039571	049343	053711	050451	040453	032177	031122	039801	050367
030	050912	043446	035415	031390	029199	028353	027213	026137	024790	024955
040	027187	032675	037422	037474	033806	028129	023704	021668	022687	029028
050	044415	070747	102942	129039	133004	114099	082744	054472	033883	023916
060	019160	017714	016781	016999	016811	017000	016996	017093	017215	017565
070	017432	017151	017001	016766	016381	016152	016271	016752	017250	018686
080	020841	022713	024536	025503	025442	024367	022426	020245	018266	016491
090	015061	014282	013838	013806	014170	014494	014752	015410	015935	016798
100	017711	018606	018842	019313	018675	018821	019571	021516	024548	028652
110	031735	033206	032830	030174	026132	022103	018577	016548	016137	017657
120	020726	024195	027837	029831	029623	028490	024986	021344	017117	013572
130	010289	008399	006747	005917	005633	005571	005623	006144	006741	007588
140	008477	009108	009292	009468	009154	008408	007433	006397	005551	004704
150	004210	003688	003216	003089	002746	002833	002943	003232	003702	004466
160	005340	006144	006960	007640	007997	008080	007939	007356	006911	006581
170	006107	005926	005702	005583	005413	004905	004502	004147	003441	003035
180	002493	001983	001617	001341	001061	000854	000789	000639	000632	000577
190	000563	000556	000533	000564	000598	000587	000596	000600	000587	000623
200	000522	000553	000467	000440	000423	000332	000293	000265	000237	000233
210	000246	000221	000212	000221	000248	000264	000285	000248	000298	000294
220	000269	000286	000257	000258	000242	000236	000239	000258	000253	000272
230	000276	000275	000322	000306	000299	000301	000281	000251	000210	000197
240	000168	000112	000096	000084	000065	000052	000053	000039	000031	000026
250	000022	000020	000012	000000	000000	000000	000000	000000	*	*

53-135-1

18 HR. XENON 125

DETECTOR 3X3-2 DATE 8-24-61

PLATE NO. 54-125-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 0.160 G/CM SQ. POLY

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	002306	001920	001952	005996	038549	107637	090608	015069	001850
010	001561	003857	005867	004619	002046	002112	004761	009060	010752	006222
020	002066	000708	000711	000825	000874	000820	000716	000572	000580	000579
030	000651	000667	000820	000858	001084	002062	004688	009143	014609	017757
040	017124	013169	008199	004244	002222	001829	002426	003703	005786	007609
050	008635	008413	007140	005175	003346	001814	000970	000491	000257	000167
060	000118	000083	000068	000058	000012	000003	000021	000048	000027	000062
070	000089	000064	000027	000035	000093	000062	000050	000047	000054	000043
080	000034	000032	000046	000051	000090	000104	000124	000169	000287	000371
090	000406	000464	000474	000472	000444	000399	000273	000239	000145	000154
100	000104	000105	000088	000080	000101	000069	000054	000028	000039	000030
110	000017	000004	000003	000000	*	*	*	*	*	*

54-125-1

5.3 DAY XENON 133

163 DETECTOR 3X3-2 DATE 10-1-58

PLATE NO. 54-133-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 200 MG/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000088	000181	000239	000209	000890	003110	004488	001918	000406
010	000231	000316	000290	000203	000196	000327	000825	001795	002494	002099
020	001083	000365	000074	000046	*	*	*	*	*	*

54-133-1

6.5 DAY CESIUM 132

DETECTOR 3X3-2 DATE 2-17-63

PLATE NO. 55-132-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE + 200 MG CU

6.04 X 10^7 (0.665 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	999999	014681	024337	573439	532291	019507	011748	011696	011601	011444
010	011257	011606	011303	011580	011702	011924	011863	012499	013473	014547
020	014066	013419	012786	012653	012596	012646	012580	012533	012668	012554
030	012331	012339	012053	011905	011819	011836	011714	011898	012034	011979
040	012081	012119	012582	013237	013819	014432	014219	013430	011551	009659
050	007823	006851	005887	004792	003714	003317	003024	003026	003453	004030
060	005827	010097	019130	035771	057798	082332	098352	099217	083418	059521
070	036072	019411	009112	004279	001822	000923	000517	000329	000248	000195
080	000194	000138	000145	000143	000159	000144	000123	000127	000131	000128
090	000084	000101	000092	000083	000086	000103	000105	000118	000100	000129
100	000159	000168	000139	000141	000137	000113	000157	000155	000194	000206
110	000233	000275	000247	000262	000216	000152	000125	000108	000066	000055
120	000088	000077	000068	000107	000116	000174	000185	000221	000208	000253
130	000235	000218	000175	000135	000121	000059	000049	000009	000041	000005

55-132-1

2.9 HR. CESIUM 134M

165 DETECTOR 3X3-2 DATE 3-20-63

PLATE NO. 55-134M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	003203	001290	059475	087395	004600	000655	000556	000751	001124
010	001770	001937	006036	026889	030906	009351	001061	000129	000051	000017

55-134m-1

2.9 HR. CESIUM 134M

DETECTOR 3X3-2 DATE 3-20-63

PLATE NO. 55-134M-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 0.294 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	006516	009544	001685	002148	007665	075522	176695	083216	012883
010	001205	000607	000620	000562	000573	000621	000686	000732	000904	001274
020	001827	002059	001752	001810	003635	010626	024622	039331	041646	029729
030	013773	004137	000901	000211	000131	000100	000081	000038	000026	000025
040	000030	000017	*	*	*	*	*	*	*	*

55-134m-2

2.1 YR. CESIUM 134

167 DETECTOR 3X3-2 DATE 10-25-62

PLATE NO. 55-134-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	013055	018142	022978	021237	016688	016606	016814	016460	016347
010	016075	016020	016084	016484	016541	016804	017115	018395	019633	019881
020	019119	018354	017951	017524	017677	017603	017609	017555	017494	017287
030	017341	016914	016884	017061	016981	017189	017087	017632	017232	016962
040	016061	014991	013634	012039	011209	010702	010968	011196	011015	010717
050	010467	010711	012171	015340	021339	030250	041346	055533	070116	083101
060	088619	081600	062745	040417	022261	010981	005266	003114	002312	002017
070	002157	002606	003761	006354	011163	018750	029166	040479	048742	051038
080	046097	036310	024797	015071	008396	004430	002363	001421	001017	000811
090	000652	000643	000577	000596	000538	000540	000568	000612	000647	000707
100	000797	000769	000823	000810	000761	000673	000608	000581	000567	000601
110	000704	000708	000883	000910	000997	001008	000881	000774	000713	000588
120	000434	000410	000304	000218	000192	000221	000225	000260	000371	000476
130	000593	000774	000840	000924	000983	000971	000962	000894	000822	000782
140	000659	000553	000485	000334	000233	000161	000105	000059	000046	000025
150	000020	000007	000003	000023	000020	000006	000026	000012	000026	000010
160	000016	000009	000020	000018	000019	000022	000017	000008	000016	000016
170	000017	000010	000001	000011	000002	000007	000001	000009	000001	000012

55-134-1

13 DAY CESIUM 136

DETECTOR 3X3-2 DATE 6-30-61

PLATE NO. 55-136-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	001661	009765	017206	011698	001503	006380	012073	009151	005940
010	005233	002292	002467	002555	003022	005338	008960	011134	011655	009589
020	004760	002229	001921	001809	001887	002038	002883	004398	005635	005371
030	003613	002884	004007	007042	010924	012957	010851	006905	003512	001942
040	001565	001539	001471	001450	001532	001514	001482	001425	001522	001644
050	001614	001632	001645	001672	001679	001636	001685	001754	001849	001837
060	001862	001833	001740	001464	001357	001331	001164	001020	000860	000726
070	000733	000802	000905	000899	000973	001094	001439	001803	002764	003983
080	005506	006881	007904	007731	006719	005123	003617	002262	001443	000873
090	000600	000470	000350	000329	000338	000304	000362	000439	000598	000861
100	001300	001984	002659	003370	003823	004007	003734	003231	002332	001755
110	001175	000716	000413	000309	000235	000198	000209	000286	000303	000465
120	000574	000761	000825	000830	000712	000686	000566	000436	000283	000225
130	000138	000088	000063	000048	000042	000047	000053	000058	000058	000053

30 YR. CESIUM 137

169	DETECTOR 3X3-2	DATE 7-9-63
	PLATE NO. 55-137-1	SOURCE DISTANCE 10 CM.
	ENERGY SCALE 1.0 KEV/PHU	ABSORBER 1.18 G/CM SQ. BE

3.07×10^7 (0.662 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	006042	007506	031921	045999	007778	006031	006009	005955	005645
010	005721	005849	005750	005694	005933	005950	005920	006509	006884	007071
020	006778	006499	006205	006081	006096	006267	006247	006234	006124	006108
030	006086	006010	006008	005879	005951	005904	005935	005871	005977	005947
040	005979	006172	006271	006534	006416	006129	005893	004837	003877	002959
050	002330	001957	001622	001421	001293	001219	001301	001287	001498	001938
060	003201	006077	011844	022252	035252	046976	053404	049923	039055	025915
070	014483	006979	002942	001210	000451	000211	000089	000032	000063	000038

55-137-1

32 MIN. CESIUM 138

DETECTOR 3X3-2 DATE 9-12-63

PLATE NO. 55-138-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	014264	020051	025177	026647	014709	013668	013947	013669	012784
010	012520	012729	013036	013693	017437	018495	013944	012446	012573	013579
020	015197	014983	015350	016847	015585	013378	011491	010570	010552	010195
030	009624	009259	009095	009101	008978	008718	008737	008684	009221	010225
040	012640	014634	015721	017483	022634	032027	040263	041342	033769	022738
050	014406	011156	011282	013369	015215	015868	014136	011567	008826	007302
060	006175	006019	005775	005748	005803	005853	005843	005851	005802	005838
070	005874	005862	005727	005864	006128	005987	006163	005982	005740	005553
080	005376	005331	005652	005890	006463	006614	006794	006768	006528	005963
090	005747	005440	005763	006342	007216	008820	010815	013025	014776	015715
100	015324	013934	011897	009514	007982	006642	005651	005221	004973	004962
110	004995	005120	005079	005201	005120	004900	004568	004318	003907	003351
120	003120	002828	002405	002182	002071	001883	001872	001837	001907	002099
130	002419	002936	003689	005002	006833	009268	012154	014661	016505	017730
140	017550	016503	014182	011907	009147	007030	005132	003719	002721	002016
150	001565	001442	001187	001080	001092	000999	000989	001033	001041	000953
160	001004	001010	001038	001134	001193	001156	001165	001213	001132	001084
170	001131	001129	001045	001033	000991	001005	000982	000957	000987	001005
180	000992	001000	000989	000987	001008	000990	001006	000907	000941	000914
190	000789	000799	000773	000718	000656	000648	000645	000606	000615	000634
200	000653	000671	000724	000775	000930	001027	001238	001459	001622	001859
210	002010	002211	002161	002188	002037	001937	001812	001531	001317	001182
220	00104[illegible]	000851	000693	000595	000530	000447	000408	000385	000341	000333
230	000313	000288	000273	000281	000254	000250	000225	000231	000223	000235
240	000248	000266	000302	000362	000444	000534	000552	000600	000680	000757
250	000775	000786	000745	000732	000633	000573	000550	000475	000379	000311
260	000239	000202	000164	000125	000111	000090	000086	000067	000066	000055
270	000065	000052	000053	000051	000031	000052	000041	000039	000045	000031
280	000038	000030	000028	000034	000027	000033	000034	000022	000029	000025
290	000017	000020	000032	000026	000024	000017	000029	000018	000024	000028

55-138-1

9.5 MIN. CESIUM 139

171 DETECTOR 3X3-2 DATE 10-30-63

PLATE NO. 55-139-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	004019	009505	010913	011800	006530	005949	005604	005136	004747
010	004333	004028	003759	003800	003838	003753	006080	009985	009081	004695
020	002974	002851	002655	002441	002425	002190	002212	002095	002069	001878
030	001891	001838	001949	001781	001894	001827	001750	001726	001637	001628
040	001495	001605	001499	001436	001339	001310	001280	001270	001230	001291
050	001279	001275	001210	001230	001194	001274	001234	001302	001474	001589
060	001925	002064	002216	002334	002124	001720	001483	001248	001129	000977
070	000873	001001	001077	001046	000846	000886	000891	000855	000941	000906
080	000891	000962	000878	000928	000831	000836	000825	000811	000903	000929
090	000969	000963	001009	000910	000944	000739	000611	000628	000639	000761
100	000699	000782	000876	000775	000766	000741	000596	000669	000568	000600
110	000549	000599	000558	000442	000474	000513	000500	000635	000661	000825
120	001036	001231	001714	001958	002152	002482	002391	002195	001926	001561
130	001235	000931	000753	000589	000387	000440	000390	000435	000380	000430
140	000417	000393	000420	000380	000415	000364	000395	000354	000316	000351
150	000343	000236	000312	000316	000368	000317	000317	000328	000394	000399
160	000398	000383	000385	000388	000347	000344	000309	000269	000339	000324
170	000228	000191	000262	000197	000168	000196	000206	000254	000259	000228
180	000218	000217	000262	000218	000238	000228	000213	000248	000239	000218
190	000219	000223	000181	000202	000209	000222	000198	000193	000212	000200
200	000186	000209	000216	000248	000210	000170	000156	000148	000153	000113
210	000153	000072	000148	000120	000117	000100	000139	000160	000125	000182
220	000137	000158	000163	000154	000171	000139	000174	000140	000151	000160
230	000116	000129	000111	000080	000109	000108	000096	000085	000069	000112
240	000093	000088	000082	000089	000072	000052	000033	000065	000065	000063
250	000064	000044	000084	000134	000096	000104	000000	*	*	*

55-139-1

7.5 YR. BARIUM 133

DETECTOR 3X3-2 DATE 11-1-62

PLATE NO. 56-133-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	799999	009184	009580	250019	239924	016138	016174	013151	051784	092257
010	022473	004345	005001	005057	004364	004588	004987	005093	004514	004018
020	003838	003441	003087	002854	002557	002649	003829	007072	010555	014339
030	018023	018485	014942	013872	021704	035796	044610	040395	027844	015947
040	008339	004345	001972	000922	000661	000540	000475	000331	000179	000072

56-133-1

7.5 YR. BARIUM 133

173 DETECTOR 3X3-2 DATE 11-1-62

PLATE NO. 56-133-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	012331	011082	002911	004384	015490	121231	238737	103163	016314
010	005396	007849	008638	006495	005616	007808	018659	039959	052078	036370
020	013294	003568	001919	002036	002421	002698	002546	002362	002089	002031
030	002172	002315	002409	002577	002506	002372	002189	002049	001988	002046
040	001931	001942	001738	001627	001465	001446	001428	001423	001269	001201
050	001194	001367	001703	002320	003119	004038	004944	005926	006788	007734
060	008685	009260	009396	008956	007980	006907	006495	007302	009752	012936
070	016795	020113	022257	022819	021278	018381	014826	011282	008411	006186
080	004562	003342	002349	001589	001086	000687	000470	000356	000300	000253
090	000286	000262	000238	000210	000188	000142	000078	000063	000033	000026
100	000016	000017	000008	000000	000000	000000	000000	000000	*	*

56-133-2

83 MIN. BARIUM 139

DETECTOR 3X3-2 DATE 7-10-63

PLATE NO. 56-139-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	006383	008010	025580	048671	015096	006865	005538	004711	004289
010	004534	004802	004904	006384	007423	007775	034143	104290	111957	051872
020	012097	002279	001200	001114	001025	001007	000940	001028	000989	000856
030	000752	000685	000640	000617	000601	000583	000574	000549	000530	000528
040	000455	000403	000419	000405	000406	000339	000335	000322	000320	000330
050	000305	000312	000300	000280	000290	000247	000281	000227	000226	000243
060	000219	000179	000172	000200	000188	000177	000153	000156	000169	000163
070	000167	000126	000137	000123	000127	000112	000072	000081	000102	000125
080	000114	000073	000110	000081	000101	000081	000067	000064	000052	000083
090	000080	000072	000067	000064	000055	000064	000075	000050	000048	000067
100	000050	000050	000046	000033	000045	000037	000039	000032	000039	000047
110	000054	000025	000045	000033	000042	000031	000041	000028	000023	000048
120	000036	000004	000035	000030	000031	000026	000020	000018	000015	000026
130	000019	000021	000025	000022	000027	000036	000043	000056	000082	000086
140	000095	000079	000070	000057	000050	000047	000029	000013	000014	000005

56-139-1

12.8 DAY BARIUM 140

175 DETECTOR 3X3-2 DATE 10-23-63

PLATE NO. 56-140-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	001790	004357	042624	028974	002490	001866	001723	001604	001682
010	001621	001772	001827	002288	002605	003197	007997	012647	007655	002662
020	001465	001318	001346	001333	001343	001327	001323	001403	001539	002458
030	003934	004679	004010	002651	001686	001258	000944	000712	000583	000624
040	000965	001586	002416	002796	002778	002078	001392	000910	000756	001027
050	001848	003622	006182	008673	009540	008658	006177	003504	001670	000679
060	000278	000151	000087	000039	000044	000050	000036	000026	000030	000000

56-140-1

12.8 DAY BARIUM 140 - 40 HR. LANTHANUM 140

DETECTOR 3X3-2 DATE 6-13-63

PLATE NO. 56-140(57-140)-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	004910	007172	026453	028369	005982	004657	004547	004574	004297
010	004240	004396	004682	004986	005560	005424	007760	010856	009079	005355
020	004274	004065	004081	004202	004308	004281	004368	004412	004458	004886
030	005905	008129	011169	013385	013532	009879	005730	003370	002444	002263
040	002597	003094	003806	004563	004915	005202	006660	009444	013019	015569
050	015124	012822	010079	008867	008051	007108	005558	004002	002790	002012
060	001685	001561	001398	001317	001314	001274	001235	001206	001114	001129
070	001181	001240	001394	001476	001787	001931	002044	002380	002796	003474
080	004068	004295	004251	003909	003403	002878	002487	002276	002257	002283
090	002186	002212	002173	001985	001809	001525	001218	001097	001019	001013
100	000943	000986	000923	000960	000968	001050	001103	001143	001143	001172
110	001150	001165	001179	001065	001102	001077	001127	001136	001182	001183
120	001168	001180	001208	001206	001232	001220	001253	001227	001181	001216
130	001244	001179	001054	000940	000855	000750	000654	000608	000575	000529
140	000420	000357	000325	000341	000362	000428	000510	000678	000999	001421
150	001981	002656	003419	004033	004683	004996	004991	004623	004152	003479
160	002725	002077	001492	001098	000745	000525	000362	000263	000182	000129
170	000118	000108	000088	000074	000052	000071	000076	000067	000066	000066
180	000069	000072	000063	000065	000055	000068	000073	000063	000068	000084
190	000060	000062	000064	000062	000075	000070	000064	000079	000065	000066
200	000085	000086	000082	000096	000090	000078	000072	000083	000065	000054
210	000044	000051	000060	000052	000043	000043	000040	000035	000035	000034
220	000042	000049	000041	000046	000046	000041	000038	000048	000039	000027
230	000029	000043	000037	000046	000048	000054	000063	000075	000081	000090
240	000091	000096	000096	000089	000092	000081	000080	000073	000065	000040
250	000032	000031	000031	000018	000011	000011	000006	000009	000006	000000

56-140(57-140)-2

9.5 MIN. LANTHANUM 136

177 DETECTOR 3X3-3 DATE 9-22-63

PLATE NO. 57-136-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G BE + 200 MG CU SW

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	007200	007900	009067	015977	008864	008136	007114	007242	007127
010	007335	007105	007385	007251	007463	007540	007755	008244	009119	009462
020	009110	008801	008583	008436	008361	008406	008514	008395	008464	008580
030	008652	008844	008219	007059	005849	004730	003950	003576	003301	003055
040	002974	002904	002754	002871	002919	003185	004266	007558	016260	032159
050	054039	069840	071035	053522	030783	013042	004369	001366	000559	000321
060	000261	000272	000258	000282	000272	000312	000323	000312	000262	000267
070	000207	000212	000190	000222	000220	000190	000268	000226	000272	000391
080	000400	000433	000385	000316	000198	000126	000088	000055	000049	000054

57-136-1

40 HR. LANTHANUM 140

DETECTOR 3X3-2 DATE 10-28-63

PLATE NO. 57-140-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	016809	021109	020511	031082	023182	019051	014721	014303	014245
010	015727	015330	014537	014736	015371	014877	013997	014337	014477	013974
020	013366	013072	013164	013441	013615	013972	013797	013849	013824	013742
030	015710	022649	035705	047598	046262	032866	018161	010559	008053	007640
040	007995	008836	010162	011360	013238	016725	024034	037422	051619	058773
050	052178	038070	023221	013332	008826	007046	006738	006560	006542	006122
060	005940	005681	005379	005204	004866	004801	004586	004562	004633	004508
070	004606	005069	005581	006101	005998	007464	008384	009512	011769	014243
080	015971	017076	016369	014793	012352	010583	009166	008475	008170	008276
090	008639	008418	008164	007395	006394	005575	004764	004223	003881	003843
100	003756	003620	003717	003876	004029	004130	004283	004472	004582	004687
110	004694	004575	004394	004386	004359	004348	004496	004382	004492	004482
120	004579	004493	004672	004575	004624	004770	004794	004771	004576	004640
130	004441	004362	004066	003625	003262	003018	002544	002289	001961	001849
140	001618	001463	001477	001474	001438	001759	002239	003038	004263	006359
150	008375	011296	014046	016494	018133	018991	018547	017071	014803	012109
160	009566	007344	005143	003774	002592	001856	001213	000861	000679	000501
170	000398	000371	000351	000331	000288	000292	000279	000312	000279	000271
180	000263	000249	000319	000267	000264	000267	000288	000269	000295	000285
190	000318	000257	000306	000309	000304	000304	000307	000306	000336	000356
200	000343	000342	000344	000323	000370	000329	000305	000295	000251	000238
210	000248	000208	000191	000218	000195	000182	000165	000172	000168	000182
220	000151	000159	000183	000182	000180	000175	000159	000180	000171	000184
230	000161	000164	000160	000175	000206	000223	000239	000293	000328	000325
240	000363	000424	000417	000331	000354	000337	000278	000261	000219	000206
250	000166	000116	000093	000074	000036	000000	000000	000000	*	*

100

57-140-1

140 DAY CERIUM 139

179 DETECTOR 3X3-2 DATE 3-30-62

PLATE NO. 58-139-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 160 MG/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	016289	007397	002262	123130	067467	009480	001730	001289	000800
010	000873	001237	001337	001969	002496	002398	019179	071434	079097	033247
020	006377	001788	001243	000543	000100	000033	000030	000014	000000	000000

58-139-1

14C DAY CERIUM 139

DETECTOR 3X3-2 DATE 3-28-62

PLATE NO. 58-139-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 160 MG/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	017212	215134	100300	005710	003500	006149	094569	176133	114498
010	036483	007332	002219	001904	001800	001551	001264	001036	000778	000712
020	000846	001086	001288	001420	001513	001630	002209	002568	002936	002991
030	003474	007198	018674	043195	075596	097286	092624	067153	036760	015699
040	005303	002184	001625	001652	001457	001118	000609	000335	000116	000059
050	000000	000000	000000	000000	*	*	*	*	*	*

58-139-2

32.5 DAY CERIUM 141

181 DETECTOR 3X3-2 DATE 10-22-63

PLATE NO. 58-141-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	013400	005261	011151	074072	020626	002075	001240	001910	002721
010	003638	005828	008459	011632	052108	141833	116160	029424	002769	000209
020	000074	000060	000049	000056	000064	000015	000020	000040	000055	000033
030	000045	000029	000035	000011	000000	000000	*	*	*	*

58-141-1

32.5 DAY CERIUM 141

DETECTOR 3X3-2 DATE 10-22-63

PLATE NO. 58-141-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	007575	016682	004836	001862	001858	004187	024957	050018	031315
010	010890	002966	001056	000706	000652	000803	001001	001253	001421	001808
020	002016	002400	002831	003778	004768	005356	005589	007907	017476	039740
030	071619	092271	085059	056337	026868	009571	002607	000577	000120	000086
040	000048	000056	000048	000012	000026	000021	000036	000015	000038	000005
050	000022	000028	000028	000019	000025	000044	000040	000032	000027	000043
060	000022	000000	000000	000000	000000	000000	*	*	*	*

58-141-2

33 HR. CERIUM 143

183 DETECTOR 3X3-2 DATE 9-10-63

PLATE NO. 58-143-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	919999	093415	044352	079835	539216	173798	094758	077575	011310	007849
010	007452	006988	007418	008236	008447	008250	008000	007630	006939	006152
020	006205	006329	007835	011519	013741	011954	010444	017763	046659	097188
030	123731	101498	052632	020362	010918	010829	010519	007993	004899	002846
040	001969	001741	001732	001930	002016	002209	002334	002946	003652	004046
050	003995	003374	002295	001504	000967	000791	000722	000663	000782	000844
060	000892	001035	001465	002278	003374	004616	005475	006009	005526	005263
070	005040	005147	005007	004425	003299	002327	001332	000762	000455	000288
080	000225	000216	000215	000264	000414	000479	000642	000700	000620	000570
090	000428	000328	000217	000133	000094	000053	000067	000055	000076	000064
100	000064	000097	000072	000107	000121	000147	000161	000205	000213	000175
110	000170	000139	000093	000099	000062	000041	000030	000021	000024	000007

58-143-1

33 HR. CERIUM 143

DETECTOR 3X3-2 DATE 9-16-63

PLATE NO. 58-143-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	029999	044435	103165	027708	010122	011750	029741	132259	282527	187145
010	064545	022516	036897	059261	042194	013915	004890	003791	003558	003407
020	003285	003381	003308	003248	003434	003531	003590	003514	003730	003820
030	003750	003800	003563	003700	003450	003250	002985	002898	002813	002828
040	002794	002779	002759	002878	003103	003825	004690	005690	006075	006363
050	005949	005265	004655	004345	005948	009124	015310	024370	036831	048406
060	056285	058539	052942	042944	030665	020084	012234	007690	005429	004820
070	004892	005026	004826	004776	004256	003392	002742	002033	001523	001171
080	001004	000898	000838	000786	000819	000833	000827	000877	000987	000883
090	000952	001080	001017	001137	001255	001337	001594	001815	001844	002027
100	001896	001809	001654	001403	001193	000931	000787	000591	000481	000412
110	000384	000337	000337	000318	000339	000324	000379	000376	000381	000364
120	000371	000420	000444	000519	000581	000643	000911	001133	001386	001764
130	001958	002248	002535	002584	002712	002735	002544	002470	002381	002419
140	002326	002303	002350	002324	002379	002193	002084	001882	001625	001368
150	001073	000908	000650	000519	000381	000260	000183	000155	000126	000113
160	000070	000104	000112	000091	000104	000108	000125	000144	000149	000219
170	000255	000237	000237	000264	000293	000302	000294	000285	000246	000249
180	000193	000185	000127	000121	000120	000086	000057	000046	000047	000017
190	000032	000018	000033	000031	000034	000036	000030	000039	000033	000035
200	000031	000039	000049	000038	000042	000063	000045	000050	000054	000061
210	000032	000077	000034	000072	000105	000086	000074	000127	000092	000086
220	000071	000083	000060	000051	000044	000045	000024	000028	000029	000005

58-143-2

284 DAY CERIUM 144 - 17 MIN PRASEODYMIUM 144

185 DETECTOR 3X3-2 DATE 11-1-62

PLATE NO. 58-144(59-144)-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE + POLY CAP

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	113155	096397	239347	752726	204080	061860	055585	116122	145624
010	074436	068700	096339	326435	628353	352559	063210	015051	012063	011141
020	010210	009493	008681	008112	007575	007215	006608	006296	005869	005394
030	005321	005120	004851	004489	004104	004147	003933	003885	003743	003627
040	003311	003320	003357	003146	003129	003109	003150	002848	002833	002631
050	002488	002284	002078	001835	001627	001533	001551	001468	001414	001355
060	001325	001359	001353	001607	001902	002922	004477	006718	009280	010578
070	010452	008922	006434	004306	002542	001633	001049	000851	000694	000733
080	000684	000636	000606	000612	000562	000604	000554	000522	000564	000567
090	000486	000505	000488	000519	000479	000469	000503	000477	000483	000443
100	000492	000429	000427	000469	000475	000407	000427	000432	000440	000497
110	000470	000419	000547	000474	000480	000492	000504	000472	000435	000425
120	000414	000401	000413	000385	000375	000381	000366	000301	000298	000274
130	000252	000292	000283	000298	000290	000326	000335	000393	000390	000484
140	000469	000606	000702	000850	000888	000914	000916	000820	000764	000655
150	000586	000484	000439	000379	000338	000292	000273	000283	000308	000305
160	000338	000370	000418	000413	000399	000408	000395	000403	000389	000375
170	000376	000332	000332	000291	000308	000329	000288	000323	000333	000291
180	000303	000324	000333	000297	000303	000276	000297	000241	000237	000255
190	000236	000186	000208	000176	000162	000143	000130	000125	000112	000096
200	000120	000165	000218	000266	000359	000431	000575	000672	000788	000836
210	000959	000923	000896	000846	000790	000651	000564	000491	000382	000321
220	000254	000199	000145	000098	000080	000056	000044	000031	000019	*

58-144(59-144)-1

4.5 HR. PRASEODYMIUM 139

DETECTOR 3X3-3 DATE 6-20-63

PLATE NO. 59-139-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1 G/CM SQ BE + 200 MG CU SW.

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	002200	005248	004506	018919	011742	001900	001820	001800	001820
010	001830	001808	001745	001798	001778	001815	001870	001920	001950	001980
020	002050	002065	002121	002086	002072	002093	002140	002136	002003	002010
030	001995	001970	001898	001654	001308	001031	000834	000764	000665	000632
040	000585	000571	000572	000571	000595	000635	000865	001628	003723	007517
050	012237	015900	015937	012167	007022	003025	000905	000304	000103	000089
060	000082	000070	000070	000057	000070	000065	000054	000080	000053	000064
070	000076	000069	000070	000051	000067	000042	000051	000040	000044	000042
080	000044	000034	000040	000043	000039	000034	000040	000042	000036	000032
090	000027	000039	000041	000035	000038	000032	000047	000039	000031	000033
100	000040	000050	000037	000043	000046	000041	000027	000036	000032	000031
110	000028	000021	000028	000019	000023	000020	000017	000015	000012	000012
120	000016	000020	000016	000020	000029	000040	000039	000054	000062	000077
130	000090	000084	000090	000095	000057	000049	000043	000031	000020	000011
140	000006	000012	000011	000009	000003	000005	000005	000011	000009	000008
150	000013	000025	000034	000035	000035	000034	000045	000034	000035	000032
160	000034	000020	000023	000015	000005	000004	000007	000002	*	*

59-139-1

19.2 HR. PRASEODYMIUM 142

187 DETECTOR 3X3-2 DATE 10-28-63

PLATE NO. 59-142-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	033508	099861	114738	104559	068306	052882	046117	041372	037157
010	033647	030073	026705	024605	022441	020855	019308	018183	017132	015826
020	014878	014333	013617	013288	012336	011520	010954	010632	010170	009600
030	009197	009083	008626	008489	008121	007829	007557	007348	007090	006809
040	006517	006359	006318	005935	005877	005706	005642	005446	005343	005530
050	005388	005459	005204	005255	004960	004835	004631	004435	004358	004281
060	004127	003970	003976	003842	003726	003811	003591	003510	003431	003421
070	003281	003322	003189	003199	003104	003153	002974	002983	002952	002964
080	003014	002867	002765	002855	002777	002801	002778	002662	002630	002700
090	002612	002571	002588	002627	002560	002607	002632	002661	002597	002561
100	002552	002570	002729	002847	002930	003009	003048	003106	003089	002978
110	002852	002790	002867	002868	002816	002764	002916	002853	002822	002869
120	002933	002970	002941	002923	002960	002971	002859	002835	002896	002778
130	002593	002350	002127	001854	001610	001424	001229	001083	000972	000861
140	000824	000745	000837	000952	001224	001639	002297	003287	004761	006574
150	008441	010145	011386	012022	011955	011176	009876	008169	006718	004989
160	003532	002516	001668	001133	000743	000450	000303	000217	000132	000093
170	000079	000049	000037	000027	000021	000035	000023	000009	000008	000008
180	000005	000009	000015	000000	000000	000000	*	*	*	*

59-142-1

13.7 DAY PRASEODYMIUM 143

DETECTOR 3X3-2 DATE 9-17-63

PLATE NO. 59-143-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	021632	069349	076076	055309	033341	026084	022203	019127	017042
010	015391	012747	010849	010055	008920	007960	007070	006578	005820	005272
020	004907	004274	004007	003707	003314	003199	002893	002565	002400	002099
030	001927	001818	001661	001505	001415	001215	001101	000990	000847	000813
040	000712	000559	000542	000504	000460	000402	000364	000333	000294	000281
050	000240	000241	000211	000199	000174	000174	000105	000091	000090	000066
060	000044	000054	000039	000048	000052	000046	000034	000023	000017	000005

59-143-1

5.9 HR. PRASEODYMIUM 145

DETECTOR 3X3-2 DATE 9-10-63

PLATE NO. 59-145-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	099999	099791	221946	250804	344680	190301	104480	109730	137439	086458
010	065502	057278	051595	046836	042190	039591	037519	034772	032329	030629
020	029396	027817	025298	024460	023519	022269	021851	021162	020094	019323
030	018638	018594	018030	017913	017759	017408	017278	016310	014439	013795
040	012774	012079	011740	011417	011356	011187	010955	010494	010393	010407
050	010003	009420	008805	008127	007524	007062	006478	006160	005939	005815
060	005830	006194	007027	008399	010709	013560	015887	017272	016599	014602
070	012724	012113	012407	013349	013969	012871	010885	008276	005933	004424
080	003338	003087	003012	002959	002918	002948	002911	002934	003142	003349
090	003640	003964	004059	004306	004448	004679	004646	004432	004210	003848
100	003554	003268	003019	002959	002746	002526	002254	001960	001919	002051
110	002243	002462	002589	002678	002368	002008	001557	001150	000848	000489
120	000376	000286	000215	000147	000158	000134	000127	000131	000103	000080
130	000106	000077	000097	000078	000073	000078	000065	000084	000040	000048
140	000049	000024	000032	000031	000011	000023	000029	000023	000034	000013
150	000008	000018	000003	000006	000003	000001	000003	000004	000016	000008

59-145-1

2.4 HR. NEODYMIUM 141

DETECTOR 3X3-3 DATE 9-21-63

PLATE NO. 60-141-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G BE + 200 MG CU SAND

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	080000	102154	042895	058973	458949	268245	011174	002486	002342	001983
010	001903	002091	002353	002328	002979	004935	004995	002884	002499	002417
020	002334	002407	002511	002471	002299	002089	002157	002195	002251	002252
030	002165	002041	002059	001834	001517	001206	001000	000906	000896	000819
040	000762	000800	000797	000779	000826	000837	001127	001779	003732	007259
050	011981	015704	015664	012204	006960	003181	001338	000568	000379	000322
060	000272	000297	000299	000277	000338	000330	000340	000320	000341	000318
070	000318	000296	000284	000326	000263	000319	000317	000333	000308	000351
080	000343	000314	000347	000332	000342	000297	000305	000303	000308	000250
090	000255	000259	000204	000198	000210	000181	000190	000213	000179	000195
100	000186	000139	000159	000170	000219	000262	000387	000599	000781	001043
110	001234	001260	001199	000980	000790	000551	000294	000193	000117	000121
120	000140	000151	000232	000318	000433	000535	000555	000558	000490	000391
130	000272	000191	000105	000059	000038	000028	000029	000020	000034	000014

60-141-1

191

11.1 DAY NEODYMIUM 147

DETECTOR 3X3-2 DATE 9-11-63

PLATE NO. 60-147-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	064891	054540	020979	310317	224924	028559	017817	017371	108646
010	235312	076714	003419	005516	003929	002907	002858	002840	002850	003042
020	003277	003155	002712	002368	002310	002391	002871	003718	004634	004449
030	004180	004950	006554	006962	005246	003236	002026	001519	001606	002061
040	002430	002679	002686	002682	002759	002722	002245	001688	001630	002332
050	004539	008477	012870	016527	016262	012788	008256	004304	002022	000924
060	000548	000382	000329	000223	000225	000325	000451	000600	000682	000714
070	000619	000409	000291	000145	000046	000020	000000	000000	*	*

60-147-1

11.1 DAY NEODYMIUM 147

DETECTOR 3X3-2 | DATE 9-11-63

PLATE NO. 60-147-2 | SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU | ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	014158	064541	045364	013264	005669	008604	037764	157559	215174
010	107503	033331	010099	009581	009371	006991	007032	013186	035394	084307
020	126543	108207	050360	013596	003311	002497	002752	002595	002149	001692
030	001527	001427	001400	001419	001388	001480	001464	001475	001428	001491
040	001601	001618	001603	001506	001319	001317	001199	001151	001148	001226
050	001233	001247	001323	001522	001788	002043	002135	002317	002273	002177
060	002082	002069	002372	002855	003135	003477	003526	003279	002901	002358
070	001807	001418	001051	000859	000753	000753	000784	000884	001025	001080
080	001285	001344	001325	001348	001362	001325	001371	001348	001376	001422
090	001430	001227	001111	000995	000871	000796	000802	000940	001161	001588
100	002211	003047	004067	005363	006541	007507	008413	008575	008213	007573
110	006510	005171	004087	003092	002141	001384	000930	000623	000470	000343
120	000278	000211	000196	000189	000136	000107	000104	000114	000132	000110
130	000173	000161	000207	000291	000344	000309	000345	000368	000366	000324
140	000274	000245	000185	000152	000126	000073	000047	000040	000032	000022

60-147-2

1.9 HR. NEODYMIUM 149

193 DETECTOR 3X3-2 DATE 3-30-62

PLATE NO. 60-149-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	000000	459087	034401	013712	008513	009329	021123	071529	109638
010	068623	026292	010824	010068	010205	010224	012909	014957	012847	010283
020	010515	013108	018035	030399	048408	056823	045369	026265	013229	008653
030	008645	011243	014820	017219	016459	013338	010213	009202	009876	012955
040	017766	026051	036047	045298	049176	045331	035419	025695	018388	014781
050	013131	014003	015811	018631	021487	024088	024343	022358	018577	014510
060	011025	008042	006567	005796	005700	006005	006403	006457	006348	005851
070	005283	004538	003970	003503	002980	002642	002282	002173	002064	002212
080	002525	003107	003712	004630	005254	005903	006047	005913	005487	004729
090	003914	003183	002419	001855	001398	001138	000978	000901	000779	000841
100	000964	001156	001357	001700	002201	002608	002912	003487	003699	003681
110	003761	003327	002951	002554	002039	001641	001191	001005	000779	000662
120	000659	000742	000895	001102	001333	001718	002054	002423	002726	003034
130	003131	003076	002973	002606	002380	001865	001626	001211	000974	000805
140	000600	000434	000359	000280	000244	000205	000201	000173	000159	000154
150	000179	000151	000137	000138	000166	000142	000177	000135	000125	000176
160	000166	000178	000210	000177	000181	000186	000165	000184	000143	000137
170	000157	000133	000119	000104	000097	000074	000080	000058	000070	000078
180	000088	000087	000085	000069	000100	000088	000096	000100	000102	000094
190	000093	000076	000075	000075	000083	000084	000061	000073	000047	000063
200	000047	000081	000054	000042	000047	000034	000050	000034	000032	000053
210	000044	000051	000034	000050	000041	000051	000041	000029	000046	000022
220	000023	000030	000036	000022	000010	000009	000002	000039	000020	000024
230	000005	000018	000023	000003	000003	000025	000014	000000	000002	000019
240	000010	000003	000008	000009	000013	000016	000010	000002	000008	000008
250	000008	000016	000020	000010	000016	000015	*	*	*	*

60-149-1

12 MIN. NEODYMIUM 151

DETECTOR 3X3-2 | DATE 11-5-63

PLATE NO. 60-151-1 | SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU | ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	028375	011958	011818	007838	046215	035152	007138	007939	010183	014743
010	014501	023283	072223	067338	024829	016170	009756	012739	018551	013941
020	006911	004585	004057	004607	007438	013694	018005	015705	009331	005308
030	004191	004403	004345	004107	003623	003403	002958	002741	002829	003208
040	003874	005244	005867	005992	004973	003934	002909	002504	002209	002024
050	001916	002001	002011	002115	002238	002165	002206	002219	002249	002147
060	002026	001922	001659	001657	001699	001855	002027	002074	002074	002114
070	002380	002559	002788	003053	003127	002786	002816	002478	002471	002361
080	002099	001884	001746	001657	001477	001508	001400	001312	001259	001326
090	001210	001198	001144	001126	000998	000982	000934	000961	000952	000936
100	000995	000925	000975	000861	000857	000878	000868	000978	001100	001222
110	001347	001513	001625	001743	001924	001844	001758	001583	001361	001042
120	000802	000633	000507	000421	000347	000328	000312	000355	000339	000334
130	000302	000290	000262	000264	000245	000196	000188	000169	000143	000155
140	000130	000128	000135	000124	000122	000110	000129	000134	000127	000104
150	000125	000102	000131	000114	000134	000135	000108	000092	000108	000080
160	000084	000096	000075	000067	000084	000076	000058	000068	000069	000079
170	000067	000064	000090	000073	000067	000079	000055	000050	000050	000060
180	000049	000046	000047	000035	000029	000030	000025	000028	000019	000022
190	000022	000024	000017	000015	000015	000014	000011	000010	000005	000010
200	000009	000011	000003	000010	000005	000004	000005	000007	000004	000010
210	000006	000004	000010	000003	000001	000006	000003	000002	000005	000010

60-151-1

2.5 YR. PROMETHIUM 147

195 DETECTOR 3X3-2 DATE 9-23-62

PLATE NO. 61-147-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZED TO 10^5 DIS/SEC. (COUNT PERIOD 1000 SEC)

	0	1	2	3	4	5	6	7	8	9
000	010000	000112	000132	000081	000055	000031	000023	000014	000010	000007
010	000005	000005	000006	000003	000001	000000	000000	000000	000000	000000

61-147-1

5.4 DAY PROMETHIUM 148

DETECTOR 3X3-2 DATE 9-21-61

PLATE NO. 61-148-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

NORMALIZATION (7.74E6 1.46 MEV GAMMAS)

	0	1	2	3	4	5	6	7	8	9
000	600000	005195	006438	005934	005431	005199	004938	004759	004607	004446
010	004294	004156	004104	004050	004005	003958	004001	004153	004273	004273
020	004190	004086	004001	003903	003795	003734	003688	003644	003622	003608
030	003506	003613	003656	003700	003714	003664	003476	003126	002718	002369
040	002175	002062	002006	001984	001979	001964	001989	002045	002160	002353
050	002939	004641	008276	013953	020095	023777	022880	017959	011718	006673
060	003662	002263	001744	001584	001541	001504	001501	001470	001411	001320
070	001213	001104	001007	000938	000886	000846	000813	000802	000800	000791
080	000805	000832	000893	001042	001331	001855	002582	003776	004962	005915
090	006318	006154	005331	004223	003130	002239	001508	001220	001009	000902
100	000850	000814	000804	000796	000796	000810	000317	000824	000831	000838
110	000837	000851	000865	000879	000879	000872	000358	000823	000788	000721
120	000644	000574	000511	000448	000392	000336	000308	000273	000252	000238
130	000238	000252	000280	000336	000462	000679	001026	001488	002045	002658
140	003222	003642	003831	003768	003446	002945	002357	001779	001271	000872
150	000574	000364	000231	000140	000091	000056	000035	000028	000014	000000

61-148-1

41 DAY PROMETHIUM 148M - 5.4 DAY PROMETHIUM 148 (EQUILIBRIUM)

197 DETECTOR 3X3-2 DATE 7-5-61

PLATE NO. 61-148M(61-148)-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	036447	071944	098666	054480	032339	035981	036229	035851	033749
010	039511	035086	028097	025810	023563	022965	023446	024673	026292	027864
020	026262	023857	023004	022482	022483	022265	023582	028309	037390	043701
030	042414	034903	028816	024151	021464	020420	019479	019097	020065	023165
040	030068	036350	038768	034290	026224	018498	013871	012455	012821	014947
050	018770	025547	037596	055044	071675	080535	074975	059942	046129	041812
060	046806	057591	065366	064555	054996	040828	026509	016553	012243	012536
070	014720	017652	019172	018148	014767	010679	007281	004571	003121	002274
080	001920	001647	001552	001627	001902	002398	003134	004441	005945	007457
090	007953	007818	007222	006150	005106	004700	004937	005490	006291	007021
100	007181	006873	005748	004441	003313	002344	001634	001172	000823	000624
110	000576	000495	000511	000584	000600	000719	000894	000853	000947	000876
120	000832	000701	000592	000557	000492	000475	000452	000337	000407	000357
130	000342	000303	000220	000270	000311	000278	000314	000330	000314	000298
140	000333	000338	000401	000398	000364	000365	000355	000251	000225	000250
150	000146	000168	000137	000168	000187	000175	000147	000148	000149	000117
160	000110	000111	000101	000074	000064	000054	000028	000050	000043	000000

61-148M(61-148)-1

28 HR. PROMETHIUM 151

DETECTOR 3X3-2 DATE 11-6-63

PLATE NO. 61-151-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	003771	003935	002791	016107	014359	002330	003733	002437	001291
010	003069	005401	002736	001298	001418	001679	003060	005685	006073	003514
020	001834	001479	001526	001614	002120	001984	001890	001984	002296	001912
030	001403	001205	001886	003269	004660	004705	003168	001683	000751	000439
040	000389	000348	000511	000611	000835	000906	000722	000594	000327	000217
050	000169	000160	000138	000129	000119	000125	000136	000123	000136	000099
060	000104	000129	000161	000172	000230	000224	000245	000282	000297	000308
070	000325	000381	000335	000408	000327	000277	000232	000199	000164	000128
080	000114	000115	000082	000083	000064	000046	000043	000025	000032	000019
090	000029	000022	000017	000032	000029	000023	000024	000022	000004	000019

46.7 HR. SAMARIUM 153

199 DETECTOR 3X3-2 DATE 8-20-63

PLATE NO. 62-153-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	002125	015211	031482	010242	003980	002942	007622	037813	100282
010	088938	038305	011368	003372	004933	010156	012219	008017	004694	005181
020	010714	025202	043237	046214	030076	011897	002820	000543	000192	000125
030	000177	000282	000285	000303	000247	000201	000145	000152	000149	000155
040	000087	000072	000035	000028	000032	000003	000002	000008	000007	000013

62-153-1

9.3 HR. EUROPIUM 152M

DETECTOR 3X3-2 — DATE 3-31-64

PLATE NO. 63-152M-1 — SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU — ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	085555	095307	033041	363982	391711	044796	011684	012870	015929
010	015869	020312	074075	130830	059784	013506	008501	009247	009728	008911
020	008453	008254	007700	007147	007059	007025	007038	007341	007194	007134
030	006871	007267	008613	012609	017692	020048	017608	012325	008348	006564
040	006124	005897	005995	006035	006188	006051	006022	006101	005846	005983
050	005757	005856	006101	006146	006274	006462	006507	006960	006745	006701
060	006569	006187	005855	005666	005235	004781	004680	004524	004239	004243
070	004208	004123	003875	003591	003236	003159	003121	003558	004816	007317
080	011182	016000	020161	023026	022876	019990	016002	011588	008088	006103
090	006244	007431	010157	013035	015679	016664	016050	014049	011238	007943
100	005243	003289	002119	001302	000948	000630	000539	000459	000355	000344
110	000295	000272	000283	000201	000178	000185	000139	000124	000135	000128
120	000133	000164	000218	000324	000383	000524	000652	000795	000854	000958
130	000917	000944	000915	000936	000857	000804	000752	000689	000568	000522
140	000395	000270	000204	000149	000112	000081	000047	000047	000033	000035
150	000026	000027	000027	000024	000013	000024	000010	000005	000011	000013
160	000010	000015	000012	000011	000006	000009	000000	000000	000000	000000

63-152M-1

1.7 YR. EUROPIUM 155

201 DETECTOR 3X3-2 DATE 8-28-61

PLATE NO. 63-155-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 0.598 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	005543	014190	022001	011843	005056	004785	005102	022569	070788
010	075242	042947	022288	012855	008284	006915	010050	023829	054794	052026
020	090032	059202	050410	059011	053059	031208	013005	004746	001867	000735
030	000369	000255	000209	000000	*	*	*	*	*	*

63-155-1

15 DAY EUROPIUM 156

DETECTOR 3X3-2 DATE 9-16-63

PLATE NO. 63-156-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	017360	039608	018772	051741	128494	035695	015002	016903	064930
010	076998	022187	010161	007491	007241	007295	007203	007375	007763	009055
020	010864	011348	009558	008255	007646	007576	007273	007192	007063	007186
030	007191	007171	007225	007137	007017	006925	006884	006974	006882	006963
040	007088	007045	007251	007203	007066	006985	006786	006710	006727	006687
050	006609	006462	006165	006005	005778	005856	006098	006517	007265	007843
060	008552	009445	009932	010986	011532	011454	010708	009223	008626	008687
070	009102	009931	010366	009691	008789	007910	007439	008092	009091	010878
080	011685	011777	011161	009870	008593	007472	006435	005691	005086	004860
090	004887	005010	005149	005331	005445	005118	004949	004554	004380	004255
100	004534	004841	005405	006230	006753	007149	007139	006882	006778	006514
110	006813	007118	007295	007421	007522	007308	007192	007078	007125	007463
120	007829	007885	007740	007156	006299	005369	004489	003645	002978	002519
130	002201	001960	001799	001753	001690	001591	001473	001472	001366	001368
140	001279	001246	001228	001253	001226	001197	001240	001241	001201	001256
150	001294	001245	001304	001279	001278	001375	001381	001392	001340	001408
160	001421	001392	001382	001390	001405	001357	001369	001299	001199	001181
170	001173	001096	001134	001083	001041	001077	001094	001094	001190	001224
180	001292	001379	001475	001525	001619	001737	001849	001851	001954	001875
190	001933	001942	001889	001819	001759	001729	001661	001576	001490	001498
200	001453	001391	001409	001415	001422	001333	001371	001385	001491	001516
210	001481	001393	001297	001207	001126	000975	000918	000777	000604	000554
220	000454	000390	000333	000298	000184	000183	000132	000079	000065	000053
230	000039	000029	000017	000020	000019	000006	000012	000006	000005	000008

63-156-1

15 HR. EUROPIUM 157

203 DETECTOR 3X3-2 DATE 9-9-63

PLATE NO. 63-157-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	889999	016930	072090	023548	099477	298183	113230	113207	039510	005226
010	004536	004121	004103	003937	003879	003933	004226	004350	004004	003713
020	003746	003980	004053	003754	003318	003036	002572	002333	002318	002500
030	003111	004412	005796	006462	006337	007206	010528	014460	015909	017947
040	019912	022564	021522	016446	010541	006404	004907	004201	003591	002761
050	001874	001110	000819	000741	000772	000961	001238	001525	001580	001926
060	002250	002354	002676	002429	001877	001373	001037	001042	001003	000957
070	000864	000699	000524	000429	000379	000411	000332	000261	000246	000168
080	000057	000077	000006	000010	*	*	*	*	*	*

63-157-1

200 DAY GADOLINIUM 153

DETECTOR 3X3-2

DATE 2-1-63

PLATE NO. 64-153-1

SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU

ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	001419	010592	021225	009390	002569	001358	004805	031321	075156
010	066578	030778	008888	001945	002004	003127	003338	002616	002687	005560
020	012863	023270	027781	021519	011013	003646	000583	000246	000107	000166
030	000306	000392	000479	000379	000216	000121	000060	000000	000000	000000

64-153-1

205

18 HR. GADOLINIUM 159

DETECTOR 3X3-2 DATE 9-12-63

PLATE NO. 64-159-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	005919	026863	011582	035124	110490	040285	010226	002118	001791
010	001460	001264	001211	001157	001230	001270	001220	001228	001251	001277
020	001322	001325	001244	001204	000994	000664	000546	000491	000494	000580
030	000745	000677	000873	001508	003708	008550	014001	015942	012621	007166
040	002762	000780	000105	000000	000000	000000	000000	000000	000000	000000

64-159-1

18 HR. GADOLINIUM 159

DETECTOR 3X3-2 DATE 9-12-63

PLATE NO. 64-159-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	002825	006380	021052	018285	007044	006789	011067	021531	061158
010	037846	052243	024242	014069	006353	001850	001093	001177	001186	001129
020	000990	000955	000914	000871	000851	000818	000852	000769	000810	000898
030	000943	000942	000935	000887	000884	000851	000852	000870	000893	000992
040	000934	000884	000933	000922	000910	000866	000843	000726	000596	000535
050	000430	000382	000385	000351	000394	000399	000413	000455	000518	000524
060	000554	000561	000634	000705	000939	001326	002223	003505	005353	007530
070	009727	011160	011730	011211	009712	007527	005368	003515	002024	001051
080	000551	000208	000111	000040	000051	000032	000035	000032	000000	000000

64-159-2

73 DAY TERBIUM 160

207 DETECTOR 3X3-2 DATE 3-20-62

PLATE NO. 65-160-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	014177	014173	010926	008169	051238	038042	008516	007689	027327
010	029811	007632	003530	003532	003778	003975	003742	003625	003846	005896
020	010110	012346	010896	008305	005213	003758	003383	003983	007221	014999
030	023163	024257	016993	008893	004403	003124	002590	002605	002790	003021
040	003082	002902	002795	002458	002331	002325	002230	002203	002233	002380
050	002497	002499	002477	002465	002398	002476	002410	002300	002349	002435
060	002436	002416	002447	002576	002502	002570	002510	002402	002420	002295
070	002151	002103	002084	002119	002077	002081	002021	001844	001790	001663
080	001586	001661	002098	002890	003976	005134	006154	006655	006465	005937
090	005288	004886	004976	005395	005964	006392	006230	005563	004289	003275
100	002304	001583	001071	000818	000800	000884	001015	001143	001420	001624
110	001814	002010	002055	002271	002410	002455	002341	002220	002033	001646
120	001449	001301	001224	001142	001154	001166	001155	001012	000897	000748
130	000607	000446	000268	000235	000150	000106	000088	000065	000018	000025

65-160-2

75 SEC. DYSPROSIUM 165M

DETECTOR 3X3-2 | DATE 11-4-63

PLATE NO. 66-165M-1 | SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU | ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	003099	030290	020134	014362	119651	109354	012338	006286	006288
010	007014	028137	043898	013913	001554	002184	004036	003586	002015	001577
020	001190	000978	000757	000636	000633	000616	000686	000599	000508	000502
030	000703	000639	000629	000728	001156	001904	002657	002989	002397	001283
040	000592	000248	000179	000164	000171	000211	000303	000527	001097	002018
050	003381	004481	004650	003841	002526	001280	000603	000204	000107	000083

66-165M-1

2.3 HR. DYSPROSIUM 165

209 DETECTOR 3X3-2 DATE 11-4-63

PLATE NO. 66-165-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	016226	113744	064375	052684	420936	298694	051665	019427	055129
010	175967	102889	016063	007345	006350	006094	005864	005265	005148	005209
020	004817	004469	004061	003829	003706	004005	005167	008059	011440	011751
030	008471	004833	003507	003522	005294	008822	012419	012966	010377	006237
040	003424	002331	001908	001700	001773	001698	001864	001878	001836	001735
050	001582	001532	001763	002041	002431	002711	002871	002761	002492	002360
060	002683	003387	004049	004432	004118	003403	002615	002058	001999	002311
070	002824	002996	002777	002273	001590	000997	000596	000352	000244	000209
080	000156	000152	000141	000147	000096	000100	000069	000067	000078	000067
090	000073	000070	000081	000079	000088	000167	000190	000235	000268	000262
100	000300	000270	000273	000329	000336	000393	000328	000277	000237	000179
110	000141	000092	000040	000029	000024	000000	000000	000000	000000	000000

66-165-1

37 MIN. HOLMIUM 164

DETECTOR 3X3-3 DATE 6-20-63

PLATE NO. 67-164-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	036630	006877	010535	023330	017359	010034	006307	010983	028076
010	075533	095697	060648	026720	008594	002793	002892	003070	002330	002771
020	004032	003609	001955	000656	000219	000138	000124	000118	000127	000098
030	000074	000078	000057	000067	000054	000036	000044	000051	000049	000055
040	000040	000048	000045	000029	000036	000035	000031	000037	000036	000029
050	000025	000027	000025	000023	000029	000024	000022	000023	000025	000023
060	000025	000024	000020	000024	000012	000017	000021	000017	000017	000018
070	000015	000016	000015	000014	000021	000015	000012	000010	000010	000014
080	000016	000011	000010	000006	000007	000013	000006	000012	000012	000011
090	000015	000006	000012	000006	000007	000006	000007	000009	000013	000013
100	000009	000013	000019	000016	000014	000016	000013	000006	000008	000005

67-164-1

100 YR. HOLMIUM 166M

211 DETECTOR 3X3-2 DATE 3-1-63

PLATE NO. 67-166M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	014284	036366	029237	019255	109371	129922	032723	035606	056962
010	022418	013589	014433	015557	016320	017242	019443	032529	094682	171840
020	133872	052588	021366	016004	013877	013794	017901	030733	047041	051374
030	039659	023553	014152	010359	009752	009658	010367	010783	011104	012108
040	014161	016269	016935	015099	012586	011615	010987	010646	010083	009817
050	009834	010219	011079	011812	011517	010842	009897	009007	008101	007464
060	006278	005385	004672	004376	004603	005536	007406	010413	014538	019270
070	022874	024325	023102	020106	016444	013763	013194	014766	017210	020382
080	022094	021455	018813	014711	010358	006849	004174	002655	001938	001625
090	001520	001472	001405	001431	001317	001223	001030	000995	000945	000860
100	000703	000674	000582	000469	000398	000299	000295	000272	000234	000295
110	000286	000268	000294	000309	000241	000250	000179	000211	000230	000265
120	000295	000305	000324	000319	000312	000288	000218	000209	000199	000168
130	000152	000129	000128	000150	000158	000160	000175	000168	000150	000119
140	000183	000117	000141	000089	000081	000077	000093	000102	000128	000127
150	000153	000155	000175	000150	000119	000082	000082	000059	000046	000033
160	000019	000026	000015	000004	000012	000003	000013	000006	000008	000007

67-166m-1

27 HR. HOLMIUM 166

DETECTOR 3X3-2 DATE 11-5-63

PLATE NO. 67-166-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.C KEV/PHU ABSOREER 1.18 G/CM SQ. BE + POLY CAP

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	013514	112966	095089	062311	397712	390370	080622	169493	278015
010	059311	010130	008232	007352	005305	005760	004790	004492	003992	003626
020	003297	002929	002762	002498	002372	002106	001901	001720	001632	001563
030	001365	001366	001227	001155	001012	001081	001005	000958	000910	000845
040	000809	000764	000718	000715	000674	000641	000634	000593	000604	000604
050	000570	000568	000513	000493	000499	000454	000448	000478	000431	000415
060	000430	000405	000454	000426	000442	000488	000448	000491	000517	000512
070	000484	000459	000445	000404	000347	000366	000432	000408	000436	000391
080	000386	000428	000375	000360	000392	000375	000343	000376	000357	000408
090	000391	000354	000380	000372	000373	000336	000401	000364	000403	000413
100	000444	000393	000418	000370	000399	000422	000421	000387	000424	000410
110	000399	000405	000394	000349	000346	000310	000290	000220	000214	000191
120	000194	000192	000171	000188	000208	000196	000245	000339	000417	000629
130	000781	001019	001284	001413	001495	001563	001454	001240	001063	000817
140	000597	000520	000313	000213	000138	000110	000098	000123	000113	000141
150	000205	000226	000228	000242	000244	000306	000234	000264	000246	000233
160	000260	000234	000184	000192	000176	000118	000120	000087	000079	000072
170	000062	000049	000048	000039	000039	000028	000015	000016	000023	000016

67-166-1

7.5 HR. ERBIUM 171

213 DETECTOR 3X3-2 DATE 8-28-63

PLATE NO. 68-171-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	002038	002185	004354	010443	010504	005030	003055	003051	008018
010	028021	051078	043551	022334	008847	003121	001884	001917	002089	002160
020	002270	002877	005551	010862	016422	018076	015210	010806	006993	004109
030	002381	001658	001558	001347	001186	001065	000934	000857	000825	000764
040	000770	000781	000769	000866	000907	000940	000917	000890	000885	000848
050	000894	000917	000978	001108	001371	001900	002845	004581	007274	010449
060	014322	018025	020114	020990	019612	016919	012974	009068	005949	003485
070	001843	000987	000547	000418	000352	000363	000374	000255	000263	000235
080	000212	000159	000143	000124	000165	000191	000187	000269	000269	000248
090	000238	000175	000138	000130	000088	000055	000061	000077	000035	999998
100	000016	000052	000069	000036	000038	000036	000044	000074	000027	000047
110	000054	000032	000033	000010	000028	999996	000032	000068	000038	000041
120	000008	000040	000028	000017	000046	000045	000002	000045	000032	000041
130	000061	000045	000083	000071	000058	000045	000093	000079	000048	000034
140	000050	000039	000024	000024	000023	000006	000028	000015	000045	000033
150	000054	000066	000022	000022	000071	000052	000070	000059	000088	000053
160	000038	000057	000071	000054	000021	000051	000031	000038	000022	000053
170	000037	000039	000028	000013	000032	000029	000057	000029	000052	000067
180	000037	000060	000049	000060	000025	000026	000026	000046	999985	000011

68-171-1

85 DAY THULIUM 168

DETECTOR 3X3-2 DATE 6-26-63

PLATE NO. 69-168-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	011780	068824	053302	026547	295570	311270	063259	035727	044200
010	024589	023409	013191	009586	009955	011171	012555	016490	035549	082866
020	133355	127271	070078	025996	011097	009051	009248	008462	007417	006709
030	006276	005805	005566	005378	005524	005616	005662	005519	005458	005478
040	005689	006519	008499	012278	017257	020330	019503	015543	010969	007483
050	006070	005513	005408	005667	005824	005882	005638	005129	004862	004572
060	004779	005273	005995	006515	005262	005634	004767	003932	003895	004598
070	006222	007955	009938	010806	010604	009707	008781	008964	011000	014096
080	017705	019978	020038	017738	013901	009623	006318	003737	002531	001870
090	001605	001352	001132	000839	000739	000596	000450	000356	000375	000367
100	000433	000418	000471	000433	000431	000381	000257	000185	000184	000128
110	000104	000088	000067	000076	000079	000102	000064	000068	000088	000090
120	000141	000168	000193	000240	000283	000362	000339	000318	000267	000237
130	000193	000150	000113	000065	000053	000045	000038	000039	000033	000017
140	000031	000034	000031	000069	000059	000054	000046	000048	000054	000047
150	000013	000035	000029	000020	000025	000011	000011	000013	000016	000007

69-168-1

127 DAY THULIUM 170

215 DETECTOR 3X3-2 DATE 8-20-63

PLATE NO. 69-170-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000725	001551	002429	004424	006589	004676	002953	002026	002366
010	006421	018515	025601	017463	008545	003967	003072	006863	013721	016423
020	010773	004015	001110	000423	000321	000291	000262	000246	000227	000260
030	000223	000172	000224	000157	000188	000159	000168	000161	000154	000153
040	000146	000141	000160	000089	000082	000101	000096	000121	000104	000124
050	000080	000076	000105	000049	000086	000085	000076	000066	000037	000068
060	000045	000048	000038	000049	000059	000025	000057	000044	000015	000019
070	000019	000019	000050	000038	000017	000024	000017	000038	000041	000020
080	000022	000026	000000	000000	000000	000000	000000	000000	000000	000000

69-170-1

1.9 YEAR THULIUM 171

DETECTOR 3X3-2

DATE 9-3-63

PLATE NO. 69-171-1

SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU

ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	001933	003136	005226	012833	026196	018327	009233	007585	006556
010	023068	085801	124395	088336	052484	033284	017075	005551	001389	000535
020	000300	000148	000075	000101	000088	000058	000056	000051	000007	000007
030	000009	000019	000000	000000	000000	000000	000000	000000	000000	000000

69-171-1

32 DAY YTTERBIUM 169

217 DETECTOR 3X3-2 DATE 1-15-63

PLATE NO. 70-169-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	001163	002555	004033	014031	022729	011673	008679	007025	009976
010	040622	102027	108511	072000	051854	029108	009746	003027	002081	002397
020	003141	004372	006590	009749	011817	010514	008128	007349	007205	005929
030	003915	002256	001688	001987	003073	005188	007696	010058	011086	012099
040	012658	013186	011726	009041	005604	003091	001470	000759	000556	000516
050	000524	000642	000760	000830	000819	000741	000636	000616	000684	000910
060	001273	001667	001964	002109	002022	001745	001320	000939	000644	000328
070	000195	000114	000079	000049	000048	000041	000055	000044	000050	000047
080	000064	000021	000048	000033	000044	000030	000028	000014	000022	000009
090	000008	000007	000007	000006	000009	000025	000021	000026	000029	000024
100	000027	000038	000014	000014	000005	000018	000038	000003	000006	000028
110	000015	000050	000026	000027	000031	000012	000042	000038	000039	000035
120	000024	000034	000012	000027	000029	000031	000015	000002	000012	000006

70-169-1

4.2 DAY YTTERBIUM 175

DETECTOR 3X3-2 DATE 11-26-62

PLATE NO. 70-175-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	031959	003420	002217	003310	006887	007183	003805	002679	002640
010	005988	019926	036033	030795	016383	006908	003072	002112	002008	001948
020	001974	002347	004116	008674	014214	015717	011419	006223	003696	003422
030	003761	003732	003196	002260	001610	001311	001156	001191	001127	001211
040	001141	001266	001223	001271	001307	001265	001195	001241	001220	001203
050	001164	001336	001703	002335	003491	005220	007215	008936	009516	008989
060	007777	005718	003926	002377	001393	000801	000547	000464	000451	000554
070	000614	000736	000965	001426	002254	003504	005202	007209	009292	011259
080	012309	012503	011808	010135	003032	005820	003883	002326	001368	000755
090	000338	000170	000080	000031	000051	000009	000011	000019	000025	*

70-175-1

3.7 HR. LUTETIUM 176M

219 DETECTOR 3X3-2 DATE 5-26-64

PLATE NO. 71-176M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 0.594 G/CM SQ BE + POLY CAP

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	002473	002249	003177	005259	010590	015571	011059	006703	005530
010	008567	023691	056569	065757	040805	019649	009747	010058	022794	042106
020	045008	026670	009105	002520	001280	001028	001011	000874	000777	000754
030	000698	000640	000673	000561	000583	000563	000444	000423	000431	000366
040	000368	000346	000363	000332	000329	000321	000265	000273	000217	000200
050	000192	000168	000148	000170	000150	000154	000135	000140	000140	000103
060	000111	000121	000109	000093	000105	000065	000109	000069	000070	000061
070	000060	000078	000066	000068	000051	000068	000050	000043	000057	000040
080	000040	000026	000052	000031	000031	000043	000026	000018	000038	000016
090	000035	000038	000028	000019	000033	000029	000027	000006	000023	000027
100	000024	000008	000023	000009	000002	000008	000012	000015	000021	000014
110	000017	000003	000006	000011	000010	000011	000009	000010	000002	000014

71-176M-1

6.8 DAY LUTETIUM 177

DETECTOR 3X3-2 DATE 1-25-62

PLATE NO. 71-177-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 0.598 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	961155	108085	002206	002220	004051	005725	004271	002569	001579
010	001663	006967	019822	024563	016832	009075	004796	003004	002362	001866
020	001544	001925	004849	012516	021436	023642	016653	007717	002736	001047
030	000672	000614	000540	000547	000586	000727	000761	000912	001372	002514
040	005492	011145	017459	021930	023134	019202	013119	007736	003617	001647
050	000788	000469	000442	000377	000298	000301	000273	000193	000143	000179
060	000127	000084	000138	000152	000217	000320	000390	000417	000362	000341
070	000259	000152	000093	000064	000000	000000	000000	000000	*	*

71-177-1

24 HR. HAFNIUM 173

221

PLATE NO. 72-173-1 SOURCE DISTANCE 10 CM.

DETECTOR 3X3-3 DATE 9-23-63

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	010000	013989	004115	003318	006508	016667	018840	010809	006417	007506
010	015882	049519	089213	075312	041805	017545	005601	002951	003726	004653
020	005139	005188	006062	010366	023473	047144	063623	063997	044943	026220
030	015417	009610	006540	005679	005191	004105	002759	001528	000894	000805
040	000781	000795	000846	000832	000857	000815	000789	000761	000736	000783
050	000846	000857	000890	001118	001529	002365	003921	006359	009635	012407
060	014699	015534	014728	012390	009689	007019	004720	002991	001811	001107
070	000565	000328	000138	000153	000162	000207	000208	000164	000140	000123
080	000101	000115	000095	000072	000082	000076	000058	000071	000075	000082
090	000047	000058	000064	000057	000052	000052	000049	000055	000055	000060
100	000067	000075	000078	000101	000109	000136	000171	000185	000137	000157
110	000150	000133	000130	000100	000096	000107	000091	000052	000049	000056
120	000052	000058	000050	000044	000051	000057	000054	000045	000046	000048
130	000033	000019	000043	000029	000040	000040	000040	000045	000043	000041
140	000054	000048	000036	000056	000065	000058	000042	000029	000038	000026
150	000033	000041	000029	000024	000023	000026	000025	000021	000019	000033
160	000022	000023	000029	000034	000041	000065	000077	000077	000103	000111
170	000107	000125	000134	000165	000154	000136	000126	000120	000108	000100
180	000077	000067	000059	000044	000021	000025	000029	000023	000017	000015
190	000020	000014	000018	000019	000024	000026	000027	000031	000047	000035
200	000046	000053	000056	000060	000041	000044	000044	000036	000037	000037
210	000012	000009	000000	000000	000000	000000	000000	000000	000000	000000

72-173-1

24 HR. HAFNIUM 173

DETECTOR 3X3-2 DATE 9-22-63

PLATE NO. 72-173-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

6.33 X 10^5 (0.297 MEV) GAMMAS EMITTED

	0	1	2	3	4	5	6	7	8	9
000	000000	002007	008852	027173	014455	025418	135307	083391	012150	005995
010	008992	012181	037272	100760	088540	030526	012118	006796	005411	001863
020	001328	001436	001441	001449	001442	001423	001755	002907	007159	015977
030	025287	025641	016821	007200	001871	000522	000386	000477	000330	000218
040	000176	000119	000133	000117	000132	000101	000104	000120	000074	000095
050	000123	000160	000218	000252	000286	000242	000204	000158	000100	000100
060	000093	000094	000084	000067	000082	000079	000062	000066	000061	000084
070	000073	000101	000099	000073	000054	000064	000040	000042	000035	000051
080	000046	000054	000092	000141	000156	000196	000247	000246	000222	000173
090	000133	000098	000053	000048	000032	000033	000029	000032	000057	000062
100	000081	000097	000087	000058	000049	000030	000019	000006	000017	000012
110	000008	000003	000012	000003	000010	000022	000023	000034	000019	000017
120	000012	000010	000001	000000	000000	000000	*	*	*	*

72-173-2

70 DAY HAFNIUM 175

223 DETECTOR 3X3-2 DATE 6-22-63

PLATE NO. 72-175-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	001848	006554	016626	005554	025616	094087	037953	005596	003289
010	003465	002047	002067	001948	002018	002091	002046	002019	001964	001966
020	001615	001260	001078	001215	001164	001013	000889	000838	000925	000990
030	001108	002047	005303	013331	023667	029362	024425	014150	005768	001800
040	000759	000710	000721	000706	000585	000432	000264	000185	000097	000135
050	000091	000066	000036	000019	000026	000000	000000	000000	000000	000000

72-175-1

70 DAY HAFNIUM 175

DETECTOR 3X3-2 DATE 6-22-63

PLATE NO. 72-175-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	002221	001578	001740	003485	008280	008040	004283	002575	002492
010	007792	029697	054611	045091	022724	009056	002675	001121	001471	001992
020	002013	001644	001134	000977	001057	001147	001034	001033	000990	001007
030	001054	001138	001036	001114	001065	001062	001141	001070	001091	000939
040	000947	000787	000739	000606	000509	000599	000605	000658	000651	000568
050	000521	000520	000495	000484	000540	000497	000464	000557	000552	000595
060	000669	000807	001038	001640	002529	004563	007171	010315	013184	015109
070	015836	015250	013200	010205	006989	004486	002645	001439	000784	000446
080	000320	000311	000369	000384	000380	000378	000343	000321	000305	000290
090	000196	000185	000105	000099	000065	000059	000058	000052	000048	000042
100	000031	000027	000055	000026	000027	000015	000017	000010	000014	000024

72-175-2

19 SEC. HAFNIUM 179M

225 DETECTOR 3X3-2 DATE 11-6-63

PLATE NO. 72-179M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000789	001427	005193	002781	003233	025248	021623	004264	001147
010	000754	000697	000596	000641	000569	000726	001252	001996	001789	001597
020	003816	014172	026226	023961	010869	002674	000506	000224	000263	000355
030	000286	000000	000000	000000	000000	000000	*	*	*	*

72-179m-1

5.5 HR. HAFNIUM 180M

DETECTOR 3X3-2 DATE 11-7-63

PLATE NO. 72-180M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	003344	005811	016523	008737	010471	076530	057753	010228	008774
010	018614	010891	004655	004521	004897	004767	004654	004905	004902	004993
020	008359	023396	040259	035450	017215	006169	003058	002728	002912	002978
030	003307	005612	012961	023128	027622	022945	012987	005391	002157	001390
040	001649	002717	005138	009371	013929	016164	014399	009950	006017	003900
050	003348	003190	002603	001872	001184	000797	000732	000693	000560	000423
060	000274	000175	000133	000123	000151	000182	000256	000332	000359	000288
070	000235	000172	000117	000105	000106	000127	000139	000180	000217	000256
080	000277	000208	000169	000140	000093	000069	000044	000031	000008	000011
090	000024	000000	000000	000000	000000	000000	*	*	*	*

72-180m-1

43 DAY HAFNIUM 181

227 DETECTOR 3X3-2 DATE 11-14-63

PLATE NO. 72-181-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	009713	012860	028785	020685	019540	114085	115376	030520	011986
010	013329	015896	020377	076980	181159	123398	029112	009589	003093	007798
020	007393	006810	006505	006214	006353	006250	006472	006479	005903	007051
030	006824	006291	006751	010476	016824	021284	019239	012436	005063	003067
040	002262	002304	002494	003430	006052	013167	027152	047088	063438	065532
050	052692	033111	015969	006424	002316	001020	000673	000481	000342	000356
060	000475	000620	000813	000884	000782	000600	000343	000202	000079	000047
070	000023	000004	000021	000019	000017	000028	000017	000009	000024	000019
080	000032	000008	000014	000018	000024	000015	000006	000013	000011	000004

72-181-1

8.1 HR. TANTALUM 180M

DETECTOR 3X3-5

DATE 2-1-64

PLATE NO. 73-180M-1

SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU

ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	C	1	2	3	4	5	6	7	8	9
000	999999	000306	001239	001767	002198	005555	012123	011165	005699	004369
010	004137	007972	028671	068673	074936	043608	021839	007416	001577	000761
020	001596	003653	005330	004502	002447	001258	000671	000414	000283	000218
030	000157	000090	000092	000063	000084	000116	000096	000099	000069	000045

73-180M-1

115 DAY TANTALUM 182

DETECTOR 3X3-2 DATE 2-16-62

PLATE NO. 73-182-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	047516	027021	069243	090907	059038	286517	622989	373363	065442
010	087472	121982	055751	025425	021085	042276	067546	050174	031605	028465
020	024349	027556	043219	054279	041915	024895	019581	019674	015862	010720
030	007737	006752	006563	006546	006514	006613	006471	006183	005935	005882
040	005860	005884	005766	005675	005859	005984	005851	005930	005895	005873
050	005993	005973	005975	005951	005994	005950	005924	006058	006138	006058
060	006215	006253	006365	006356	006506	006531	006623	006561	006645	006747
070	006646	006816	006862	006948	007010	007093	006985	007151	007117	007414
080	007533	007504	007337	007620	007675	007617	007600	007586	007352	007325
090	007145	007033	006609	006456	006354	006057	005764	005662	005309	004739
100	004404	004076	003890	004024	004796	006362	008761	011452	014510	016921
110	017864	018372	017507	017119	017370	017935	019106	020596	021454	021429
120	020227	018595	015600	012635	009709	007171	005434	003875	002795	002001
130	001512	001060	000858	000661	000533	000466	000391	000347	000284	000224
140	000251	000180	000189	000148	000135	000093	000080	000086	000049	000046
150	000030	000026	000017	000017	000021	000022	000017	000017	000016	000003

73-182-1

5.2 DAY TANTALUM 183

DETECTOR 3X3-2 DATE 3-9-64

PLATE NO. 73-183-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	098700	005414	011520	007777	014484	058796	060530	015457	004404
010	007419	013890	010415	003699	002728	004359	008306	011200	006734	002489
020	002263	003546	004064	004637	008918	014207	012776	006961	002734	001859
030	002337	002792	002971	002466	002269	002669	002839	002717	001777	000840
040	000391	000210	000161	000166	000000	000000	000000	000000	000000	000000

73-183-1

24.0 HR. WOLFRAM (TUNGSTEN) 187

231 DETECTOR 3X3-2 DATE 3-24-64

PLATE NO. 74-187-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	086441	035023	071484	084751	063545	273490	558692	379738	087119
010	027505	027819	031740	075764	152646	107239	037877	022934	022084	022257
020	022175	022579	022303	021325	020378	021062	020641	020067	019705	019533
030	018931	017640	016047	015071	014566	014293	013761	013450	012997	013051
040	012917	013134	013411	014485	018410	028328	047202	070682	086533	085463
050	066898	044329	027707	020926	020179	021315	020081	017757	015054	014931
060	017183	020671	022900	024044	024736	029834	039403	050991	059272	059576
070	050223	036671	023783	014580	010259	008711	008596	008292	007484	005952
080	004053	002675	001636	001083	000890	000875	000860	000787	000670	000539
090	000421	000250	000170	000094	000062	000051	000051	000044	000031	000064
100	000033	000038	000037	000041	000054	000022	000036	000025	000029	000012
110	000023	000045	000044	000024	000040	000040	000049	000030	000033	000019
120	000029	000043	000035	000024	000035	000020	000008	000000	000000	000000

74-187-1

18.7 MIN. RHENIUM 188M

DETECTOR 3X3-2 DATE 11-7-63

PLATE NO. 75-188M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000263	001876	002020	000730	001041	003096	006723	005575	002568
010	001714	002330	008945	030613	049943	041738	021639	008743	002900	001947
020	003230	004337	005164	005941	005569	003439	001428	000523	000226	000255
030	000235	000414	000380	000418	000561	000562	000384	000227	000156	000037
040	000025	000000	*	*	*	*	*	*	*	*

75-188m-1

17 HR. RHENIUM 188

233 DETECTOR 3X3-2 DATE 11-8-63

PLATE NO. 75-188-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	022622	062267	088346	090207	061214	131461	332894	167232	051602
010	036168	039125	047151	057869	079818	268278	641571	534447	150810	022946
020	010206	009359	008759	008138	007647	007348	006871	006606	006462	006330
030	005884	005683	005349	005147	004669	004250	004044	003917	003706	003762
040	003617	003728	003821	004083	004859	006695	009707	012852	014870	013856
050	010328	006481	003920	002455	001983	001711	001801	002044	002363	003371
060	005257	007935	010493	012284	011834	010284	007264	004945	003089	002128
070	001428	001119	000816	000753	000679	000686	000752	000874	001120	001581
080	002100	002499	002726	002515	002338	001860	001449	001414	001455	001852
090	002188	002554	002718	002518	002138	001605	001172	000814	000606	000472
100	000378	000311	000283	000278	000270	000332	000329	000381	000471	000506
110	000578	000630	000571	000628	000562	000487	000390	000381	000283	000258
120	000229	000205	000210	000201	000239	000290	000329	000330	000388	000349
130	000299	000308	000274	000190	000186	000162	000135	000118	000114	000123
140	000143	000137	000131	000134	000112	000099	000115	000119	000100	000115
150	000039	000108	000157	000161	000183	000222	000215	000203	000219	000171
160	000166	000143	000097	000133	000081	000082	000065	000055	000072	000078
170	000100	000104	000107	000111	000125	000101	000124	000098	000071	000069
180	000056	000058	000043	000030	000038	000044	000031	000046	000030	000029
190	000036	000032	000033	000027	000023	000019	000013	000004	000007	000006

75-188-1

94 DAY OSMIUM 185

DETECTOR 3X3-2 DATE 2-19-63

PLATE NO. 76-185-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	00000C	007900	015100	038322	041988	023829	183822	356392	118165	017758
010	00653C	006367	00684C	007905	007919	006931	007954	008858	008542	008220
020	007715	007147	007307	007382	007943	007625	007210	006932	006806	006958
030	006787	0068[illegible]7	00664C	006594	006595	006579	006585	006543	006702	006811
040	006813	007037	00713C	007025	006558	006022	005185	004189	003561	003073
050	002583	002468	002239	0C2178	002023	002217	002453	002958	003774	005602
060	009809	016748	027691	040276	048723	050001	043016	031019	019603	011293
070	006887	004806	003916	003152	002266	001467	000811	000495	000344	000314
080	000386	000621	000968	0C1770	002804	003664	004383	004739	004442	003620
090	002669	001807	001132	000630	000339	000197	000125	000092	000074	000043

76-185-1

15 DAY OSMIUM 191

235 DETECTOR 3X3-2 DATE 10-8-62

PLATE NO. 76-191-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000099	000211	000194	000115	000217	000485	001082	001095	000612
010	000460	000429	001112	003895	007676	007646	004684	002452	001006	000389
020	000223	000160	000140	000216	000321	000615	001526	002561	003063	002501
030	001451	000630	000199	000112	000075	000043	000030	000019	000000	000000

76-191-1

32 HR. OSMIUM 193

DETECTOR 3X3-2 DATE 9-24-62

PLATE NO. 76-193-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	020500	030100	053262	090785	062354	103636	405681	337448	102784
010	031005	037552	037248	034628	083445	111358	053566	020508	017091	018143
020	014944	012632	013306	013698	012615	012146	012861	016521	022382	024945
030	022014	018812	018504	013497	015313	010827	009529	010714	013175	014846
040	013920	010057	007818	010727	013307	020313	026509	027593	022646	014876
050	008237	004545	003417	004441	006313	008633	009944	009438	007181	004428
060	002380	001289	000743	000511	000471	000341	000225	000181	000169	000143

76-193-1

11 DAY IRIDIUM 190

237 DETECTOR 3X3-2 DATE 12-15-63

PLATE NO. 77-190-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	002023	003118	004504	008097	005052	014486	045093	023884	006235
010	003038	003271	003351	003728	004107	004418	004852	005846	012221	022542
020	022146	012280	006231	004840	004147	003470	003033	003021	003497	004013
030	004157	003809	003085	002881	003201	004657	006640	008239	008592	008197
040	007844	007163	006167	004594	003062	002118	001658	001628	001887	002417
050	003308	004258	005041	005535	005691	006336	006872	007039	006743	006325
060	005589	004891	003909	002928	001966	001188	000764	000538	000491	000414
070	000435	000439	000532	000513	000467	000501	000392	000403	000410	000395
080	000421	000406	000459	000428	000342	000316	000199	000203	000141	000064
090	000124	000125	000101	000107	000084	000084	000068	000125	000133	000110
100	000142	000160	000137	000125	000136	000086	000067	000074	000067	000061
110	000075	000066	000065	000064	000050	000075	000056	000064	000060	000040
120	000031	000023	000029	000015	000021	000003	000009	000006	000018	000000

77-190-1

74 DAY IRIDIUM 192

DETECTOR 3X3-2 DATE 7-30-63

PLATE NO. 77-192-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	004000	005427	007572	006541	006900	020550	021102	011075	005746
010	004569	004584	004778	005412	006267	006347	005801	005138	004474	004496
020	005817	006297	005232	004112	003632	003812	004149	005773	011138	024595
030	042639	058959	059030	042673	021707	008094	002744	001438	001328	001352
040	001245	001269	001423	002141	004026	007604	011705	013992	013416	009997
050	005804	002707	001171	000533	000397	000510	000789	001303	002064	002837
060	003420	003524	003122	002396	001660	000956	000498	000269	000149	000066
070	000040	000063	000044	000054	000031	000032	000094	000115	000159	000200
080	000229	000200	000172	000148	000082	000056	000041	000048	000054	000067
090	000056	000055	000054	000049	000039	000022	000034	000000	000000	000000

77-192-1

239

19 HR. IRIDIUM 194

DETECTOR 3X3-2 — DATE 8-20-62

PLATE NO. 77-194-1 — SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU — ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	035091	073394	076391	060454	049425	054935	089273	066221	039508
010	031911	030284	028675	028557	030242	031806	030085	028872	026607	023303
020	020502	018380	017270	016873	016414	016557	017348	022725	038934	065336
030	090817	127226	188754	243899	224437	143991	063552	022516	009330	006273
040	005566	005297	005131	004925	004637	004446	004233	004195	004067	004048
050	003735	003544	003306	003275	003193	003329	003607	004065	004739	005607
060	006780	008472	010584	011956	012526	011924	009694	007291	004962	003537
070	002678	002348	002064	001941	001781	001628	001615	001557	001522	001449
080	001409	001389	001406	001395	001438	001534	001592	001726	002030	002538
090	002821	003172	003481	003563	003314	003007	002408	001968	001558	001296
100	001054	000956	000838	000830	000717	000757	000813	000939	001106	001533
110	001863	002160	002607	002824	003014	003005	002789	002377	001934	001736
120	001331	001082	000858	000780	000654	000620	000525	000531	000506	000450
130	000411	000339	000331	000287	000260	000193	000238	000215	000290	000353
140	000355	000471	000551	000539	000601	000532	000513	000569	000450	000376
150	000274	000288	000253	000227	000225	000215	000213	000167	000162	000154
160	000139	000101	000110	000128	000100	000062	000046	000052	000067	000043
170	000059	000075	000069	000086	000117	000131	000102	000094	000074	000047
180	000043	000025	000050	000037	000017	000007	000007	000000	000000	000000

77-194-1

4.1 DAY PLATINUM 195M

DETECTOR 3X3-2 DATE 9-24-62

PLATE NO. 78-195M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	000967	005898	008073	001677	001330	003718	008892	010557	007289
010	003993	003509	006066	020070	055345	080358	062735	034784	017675	007761
020	006565	010448	012095	008117	003519	001282	001245	002149	002604	002276
030	001380	000680	000150	000110	000034	000000	000000	000000	000000	000000

78-195m-1

20 HR. PLATINUM 197

241 DETECTOR 3X3-2 DATE 9-14-62

PLATE NO. 78-197-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	009000	035100	041884	011274	008556	009947	011831	013200	019494
010	028546	026641	021020	034808	073306	131534	226877	304689	226411	086190
020	018289	004536	001946	000908	000846	001700	002028	002166	002152	002016
030	002000	002262	002373	002715	002736	003561	006233	012559	022027	031555
040	035613	032382	023423	013868	006406	002644	001000	000427	000338	000322
050	000451	000678	000858	001196	001562	001780	001642	001459	001177	000822
060	000511	000300	000119	000108	000045	000000	000000	000000	000000	000000

78-197-1

30 MIN. PLATINUM 199

DETECTOR 3X3-2 DATE 5-20-63

PLATE NO. 78-199-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION

	0	1	2	3	4	5	6	7	8	9
000	999968	010398	018994	018956	020150	017287	017838	048568	064443	032573
010	011148	009308	008990	008931	008934	010542	013529	016026	024444	041370
020	039390	021697	012483	012163	015201	018411	015552	010353	007187	007681
030	011603	018118	022600	020297	013678	007459	004511	003263	002839	002705
040	003026	003224	003632	003995	004563	006113	008860	012426	015168	016929
050	016871	016887	018912	022879	025505	023532	018113	011279	005767	002628
060	001214	000747	000617	000562	000565	000667	000753	001017	001369	001820
070	002224	002350	002265	001926	001598	001317	001329	001286	001290	001175
080	001027	000840	000581	000369	000266	000197	000155	000122	000126	000185
090	000223	000298	000457	000545	000685	000732	000695	000592	000498	000331
100	000232	000153	000091	000078	000054	000046	000068	000069	000049	000048
110	000038	000034	000015	000029	000036	000024	000026	000013	000005	000002
120	000026	000018	000000	000019	000002	000027	000012	000007	000002	000009
130	000021	000005	000007	000015	000013	000009	000002	000016	000007	000003

78-199-1

6.1 DAY GOLD 196

243 DETECTOR 3X3-2 DATE 2-18-63

PLATE NO. 79-196-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	016235	025968	023983	062843	042735	062264	365620	375744	111548
010	021131	013669	012978	013122	014158	016382	016896	016259	016132	015997
020	014885	011986	009318	007851	007422	007213	007146	007405	007371	008072
030	010265	018400	038486	076334	130267	182710	201604	165529	096284	041015
040	015799	010812	013177	014902	013253	008991	004873	002005	000843	000411
050	000300	000333	000311	000303	000251	000215	000173	000191	000164	000147
060	000135	000152	000165	000159	000191	000189	000249	000395	000555	000677
070	000801	000878	000690	000511	000293	000238	000097	000094	000082	000062
080	000022	000039	000034	000037	000021	000022	000027	000010	000009	000006
090	000004	000006	000010	000008	000008	000004	000002	000008	000008	000013
100	000020	000010	000022	000047	000060	000075	000087	000073	000075	000063
110	000056	000043	000029	000023	000018	000005	000016	000009	000001	*

79-196-1

64.8 HR. GOLD 198

DETECTOR 3X3-2 DATE 11-4-63

PLATE NO. 79-198-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. E

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	022264	030243	033235	036376	035035	033753	055654	069301	040904
010	026757	024110	023815	023093	022698	023505	025309	024820	022662	021613
020	021715	022840	023286	024404	023403	020158	015839	011877	009446	008558
030	008000	007733	007509	007874	008451	009195	010456	016413	037204	091562
040	180196	266530	288890	230972	135586	059878	020215	005705	001755	000844
050	000565	000435	000370	000340	000274	000271	000273	000268	000250	000237
060	000241	000239	000273	000372	000518	000812	001099	001346	001279	001138
070	000865	000580	000385	000237	000154	000144	000157	000151	000150	000157
080	000142	000160	000180	000159	000160	000114	000073	000063	000056	000027
090	000022	000030	000009	000021	000006	000016	000021	000016	000015	000015
100	000004	000023	000043	000069	000076	000119	000140	000101	000127	000125
110	000113	000076	000048	000058	000035	000000	000011	000010	000009	000003

79-198-1

3.2 DAY GOLD 199

245 DETECTOR 3X3-2 DATE 1-9-63

PLATE NO. 79-199-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	000750	001824	000767	001280	001713	001421	005144	012654	005999
010	001547	000563	000647	000974	001388	004226	015000	020068	008811	001743
020	001272	002967	003267	001723	000430	000043	000000	000008	000006	000008

79-199-1

3.2 DAY GOLD 199

DETECTOR 3X3-2 | DATE 1-9-63

PLATE NO. 79-199-2 | SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU | ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999959	000318	001560	002452	000930	000745	000739	000821	001402	001825
010	001592	001495	001362	001790	004691	010662	013549	009583	005507	002873
020	001329	000676	000570	000516	000628	000848	001056	001196	001294	001719
030	003506	007729	014201	020210	021045	016031	009104	004163	001528	000819
040	001125	001942	002886	003489	003490	002807	001763	000963	000453	000161

79-199-2

24 HR. MERCURY 197M - 65 HR. MERCURY 197

247 DETECTOR 3X3-2 DATE 4-1-63

PLATE NO. 80-197M(80-197)-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	016784	053094	105360	021207	005393	008477	019576	045829	058272
010	041600	034434	037801	084444	247146	488601	555570	437370	282737	129211
020	032415	006054	003415	003517	003533	004311	006479	010904	016557	019352
030	016472	011033	006771	004760	003573	002641	001826	001546	001828	002383
040	002814	002784	002098	001409	000835	000513	000349	000272	000196	000173
050	000163	000173	000276	000360	000508	000673	000934	000957	000937	000803
060	000582	000419	000200	000115	000071	000038	000015	000000	000000	000000

80-197m(80-197)-1

65 HR. MERCURY 197

DETECTOR 3X3-2 DATE 4-8-63

PLATE NO. 80-197-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	093144	084795	130177	034500	006047	009544	021368	053057	072985
010	054582	043038	045057	095639	283451	580939	698883	565084	374844	180432
020	048225	008298	003567	003331	003903	004009	004048	004041	004109	004388
030	004775	005139	005076	005061	004455	003218	002218	001839	002143	002949
040	003537	003345	002613	001546	000696	000289	000106	000043	000028	000029
050	000037	000055	000089	000126	000149	000171	000165	000146	000106	000074
060	000043	000026	000000	000000	000000	000000	*	*	*	*

80-197-1

47 DAY MERCURY 203

249 DETECTOR 3X3-2 DATE 8-25-61

PLATE NO. 80-203-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	400000	002836	003378	004637	006041	006560	007998	021832	035302	018648
010	005316	003114	003852	004764	005007	003848	002567	002232	002326	002401
020	002415	002421	002733	003038	003844	006722	017596	045109	080570	092694
030	066263	028969	007492	001285	000154	000058	000072	000026	000025	000054
040	000038	000000	000000	000000	000000	000000	000000	000000	000000	00000

80-203-1

47 DAY MERCURY 203

DETECTOR 3X3-2 DATE 8-25-61

PLATE NO. 80-203-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	400000	002486	006079	007836	004271	003435	003456	003634	004484	005540
010	005102	003967	004028	005565	011873	024765	033242	026165	015550	009358
020	005129	003102	002535	002676	003039	003283	003743	004097	004183	003756
030	003170	002475	002095	001927	001844	001831	001835	001946	001878	001927
040	001903	001921	001987	001993	002122	002205	002388	002560	002807	003214
050	003919	006013	010211	018514	031584	048278	063906	075367	077692	070073
060	055236	038517	023431	012615	005900	002520	000892	000325	000121	000056
070	000035	000000	000000	000000	000000	000000	000000	000000	000000	000000

80-203-2

12 DAY THALLIUM 202

251 DETECTOR 3X3-2 DATE 10-21-63

PLATE NO. 81-202-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	004430	005261	002928	007611	007116	006993	046011	073147	026173
010	004873	001564	001489	001473	001485	001601	001675	001899	001607	001460
020	001459	001555	001482	001599	001600	001692	001553	001465	001008	000806
030	000532	000526	000502	000489	000447	000447	000491	000504	000632	000873
040	001872	004300	009036	015045	019147	018013	012784	006565	002733	000937
050	000415	000370	000480	000443	000345	000246	000112	000040	000010	000006

81-202-1

3.9 YR. THALLIUM 204

DETECTOR 3X3-2 — DATE 5-12-64

PLATE NO. 81-204-1 — SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU — ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	006601	010601	007717	006502	006484	004438	013413	035313	018232
010	004677	001277	001101	000924	000900	000755	000733	000666	000567	000499
020	000509	000410	000394	000352	000327	000280	000233	000246	000217	000158
030	000140	000160	000099	000130	000118	000102	000091	000065	000059	000042
040	000046	000048	000030	000028	000026	000032	000030	000024	000021	000021

81-204-1

3.1 MIN THALLIUM 208

253 DETECTOR 3X3-2 DATE 2-6-63

PLATE NO. 81-208-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	006584	006566	009779	009003	009416	008430	010602	025372	021913
010	011103	007191	006896	006938	006846	006727	006760	007097	007592	007507
020	007341	007097	007570	007978	008603	009167	010024	011932	014281	013480
030	010172	007705	006513	006401	006054	005850	005817	005731	005518	005247
040	004620	004074	003440	003054	002829	002717	002837	003640	005427	008229
050	011633	013805	013790	012251	011679	014735	021993	031108	036950	036335
060	029360	019840	011230	005684	002977	001841	001343	001297	001106	001118
070	001102	001110	001184	001312	001340	001445	001476	001380	001249	001361
080	001529	001908	002384	003065	003602	003903	003641	003262	002709	002012
090	001523	001217	000953	000898	000877	000820	000771	000779	000773	000771
100	000775	000787	000788	000774	000786	000796	000785	000847	000865	000890
110	000930	000933	000833	000810	000805	000791	000737	000783	000779	000755
120	000784	000769	000721	000706	000732	000803	000783	000814	000861	000802
130	000745	000795	000806	000804	000820	000796	000811	000803	000797	000805
140	000822	000842	000870	000865	000882	000911	000937	000980	001032	001077
150	001161	001259	001369	001462	001459	001452	001442	001382	001383	001279
160	001315	001219	001168	001194	001183	001192	001147	001129	001214	001214
170	001173	001199	001162	001150	001196	001222	001240	001205	001212	001250
180	001258	001283	001266	001258	001240	001221	001249	001297	001240	001340
190	001300	001296	001230	001315	001320	001341	001484	001464	001653	001793
200	001924	002068	002320	002412	002569	002542	002527	002492	002385	002336
210	002178	002089	001994	001841	001826	001794	001766	001728	001702	001719
220	001721	001624	001623	001631	001555	001572	001534	001467	001414	001327
230	001220	001207	001049	000985	000936	000819	000784	000705	000731	000728
240	000854	000960	001198	001425	001862	002241	002704	003080	003577	004016
250	004401	004385	004525	004407	004187	003812	003372	002869	002590	001960
260	001746	001482	001030	000859	000626	000508	000414	000313	000246	000200
270	000166	000145	000120	000115	000108	000099	000083	000091	000068	000081

81-208-1

52 HR. LEAD 203

DETECTOR 3X3-2 | DATE 2-8-61

PLATE NO. 82-203-1 | SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU | ABSORBER 0.160 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000814	001323	002943	006204	009240	009003	035732	076073	040240
010	006938	000641	001421	001787	001869	001516	001234	001135	001004	000881
020	000661	000632	000588	000597	000672	001501	005085	014992	028074	031403
030	020869	008434	002121	000405	000156	000293	000435	000591	000770	000721
040	000835	000880	000765	000525	000263	000106	000077	000043	000085	000084
050	000070	000103	000075	000078	000062	000046	000044	000040	000035	000042
060	000026	000024	000026	000023	000043	000023	000057	000078	000105	000107
070	000099	000073	000068	000052	000031	000035	000030	000021	*	*

82-203-1

67 MIN. LEAD 204M

255 DETECTOR 3X3-2 DATE 2-7-61

PLATE NO. 82-204M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 0.16 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	013000	013000	013319	016772	020241	019388	026210	045611	039074
010	018868	012830	012668	012642	012512	013120	013757	013714	014047	014550
020	015739	015570	013547	011378	009910	009209	008554	007852	007301	007623
030	008158	008339	008600	009075	013074	027091	054983	087851	100376	084318
040	052405	026079	012982	008548	007520	007120	007291	007239	007064	007134
050	007221	007164	007130	007403	007506	007290	007438	007393	007412	007776
060	007633	007917	008232	008293	008559	008467	008264	007877	007425	006355
070	005386	004348	003540	002764	002385	001894	001622	001452	001292	001234
080	001467	001642	002322	003832	006713	011968	020058	029654	040454	049062
090	051879	049076	041232	031491	021043	013100	007649	004230	002468	001445
100	000970	000746	000564	000479	000455	000387	000345	000350	000353	000271
110	000309	000293	000248	000267	000234	000223	000200	000203	000269	000255
120	000252	000295	000315	000407	000465	000571	000679	000750	000768	000771
130	000658	000539	000468	000322	000206	000155	000125	000095	000089	000086
140	000076	000046	000057	000067	000048	000076	000055	000056	000055	000057
150	000072	000058	000062	000040	000078	000068	000046	000054	000061	000054
160	000061	000040	000044	000055	000036	000040	000035	000052	000048	000046
170	000053	000056	000064	000072	000068	000083	000091	000086	000078	000093
180	000067	000091	000061	000032	000045	000024	000027	000006	000008	000008

82-204m-1

0.8 SEC LEAD 207M

DETECTOR 3X3-5 DATE 4-14-64

PLATE NO. 82-207M-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	001051	000870	000910	001430	001463	001620	002397	003209	002778
010	001843	001486	001512	001417	001608	001425	001608	001648	001843	001937
020	002125	002207	002151	002088	002094	001866	002039	001962	001860	001947
030	001726	001822	001824	001884	001811	001800	001805	001773	001593	001327
040	001277	001176	001096	001022	000990	000990	000993	000943	000950	000954
050	000927	001053	001334	001913	003593	005766	008178	009461	008914	006783
060	004416	002463	001460	001008	000807	000742	000678	000666	000672	000702
070	000775	000720	000701	000731	000749	000752	000750	000827	000872	000835
080	000867	000886	000736	000603	000539	000492	000359	000337	000298	000228
090	000225	000235	000180	000178	000167	000173	000180	000266	000361	000558
100	001030	001615	002382	003186	003668	003790	003405	002842	002094	001439
110	000901	000546	000377	000282	000162	000125	000108	000088	000074	000082
120	000088	000081	000096	000065	000073	000077	000084	000071	000054	000082
130	000059	000071	000061	000056	000052	000037	000021	000028	000022	000018
140	000014	000020	000015	000026	000020	000013	000020	000020	000021	000021
150	000036	000034	000033	000029	000041	000040	000045	000050	000051	000059
160	000076	000065	000069	000051	000041	000051	000046	000039	000026	000020

82-207M-1

10.6 HR. LEAD 212

257 DETECTOR 3X3-2 DATE 2-6-63

PLATE NO. 82-212-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	000000	006676	001979	002411	005141	004324	007619	036761	045201
010	016259	003707	001934	001751	001038	000918	000853	001142	001273	001378
020	001425	001921	004046	013406	028692	032527	019434	006652	001495	001107
030	001605	001811	001404	000618	000214	000058	000032	000038	000056	000036

82-212-1

15 DAY BISMUTH 205

DETECTOR 3X3-2 DATE 1-8-63

PLATE NO. 83-205-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	999999	025682	069256	011670	019555	044400	029923	082659	370520	296036
010	090191	015943	008674	008722	008571	008534	008824	009444	010424	012204
020	011400	009979	009550	009167	009539	010278	012040	013342	013863	013552
030	011920	010127	009145	009434	009938	010552	010076	009253	008203	007928
040	007714	007524	007315	007086	006863	006866	007047	007504	008009	008984
050	009726	010342	010840	011146	011629	013075	014105	014550	013673	011900
060	009537	007635	006525	006060	006270	007433	009767	013559	017838	021755
070	023143	021730	017931	013753	010443	008308	007328	006863	006664	006634
080	006130	005717	005048	004810	004584	004680	004942	005240	005168	004942
090	004595	004646	004697	005166	006259	007443	003553	009534	009282	008940
100	008206	007379	006630	005814	004893	004243	003722	003201	002719	002450
110	002288	002220	002356	002448	002429	002578	002685	002726	002807	002563
120	002637	002470	002491	002463	002537	002411	002352	002305	002288	002345
130	002369	002366	002234	002372	002331	002289	002231	002269	002183	002198
140	002214	002170	002181	002067	002133	002101	002123	002134	002137	001999
150	001880	001860	001869	001771	001657	001623	001639	001478	001393	001261
160	001313	001310	001494	001690	002140	002752	003368	004284	004878	005505
170	005912	005917	005699	005412	004867	004442	003740	003289	002726	002434
180	002090	001845	001605	001420	001242	001018	000873	000726	000517	000403
190	000316	000241	000195	000136	000116	000090	000063	000061	000046	000047
200	000034	000035	000028	000031	000029	000019	000026	000028	000012	000024
210	000022	000022	000022	000023	000023	000014	000019	000018	000017	000029
220	000018	000019	000012	000015	000016	000020	*	*	*	*

83-205-2

28 YR. BISMUTH 207

259 DETECTOR 3X3-2 DATE 9-14-62

PLATE NO. 83-207-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	019697	021618	009296	017438	025941	019365	076599	227262	131841
010	039327	009314	006738	006599	006742	006815	006789	007380	007720	007914
020	007540	007576	007439	007460	007351	007348	007171	007186	006944	006928
030	006785	006939	006874	006853	007018	007161	007120	006996	006472	005651
040	004883	004163	003746	003473	003330	003211	003037	003193	003143	003338
050	003549	004106	005627	010054	018057	029874	041798	048346	045769	035209
060	022588	012585	006681	004030	003095	002800	002572	002563	002590	002531
070	002456	002429	002488	002553	002603	002694	002749	002765	002667	002638
080	002649	002534	002386	002202	001967	001740	001424	001151	001067	000902
090	000800	000735	000695	000696	000669	000668	000864	001165	001719	002786
100	004484	006907	009774	012161	014132	014204	013241	011414	008588	006066
110	004096	002468	001508	000922	000654	000418	000317	000260	000267	000256
120	000251	000228	000251	000256	000210	000255	000250	000242	000223	000234
130	000214	000222	000232	000211	000230	000206	000232	000229	000241	000240
140	000241	000228	000226	000230	000222	000213	000179	000160	000170	000140
150	000145	000127	000121	000091	000094	000128	000123	000138	000148	000197
160	000198	000206	000201	000245	000248	000301	000344	000359	000469	000511
170	000605	000619	000657	000602	000542	000487	000405	000329	000254	000172
180	000110	000087	000071	000045	000035	000025	000013	000019	000010	000012
190	000010	000007	000011	000007	000001	000008	000006	000009	000011	000005
200	000005	000006	000003	000000	*	*	*	*	*	*

83-207-2

60 MIN. BISMUTH 212

DETECTOR 3X3-2 DATE 3-7-63

PLATE NO. 83-212-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	100000	007432	020246	004213	006657	007951	002601	002652	002453	002911
010	002067	001569	001500	001427	001436	001304	001487	001311	001070	001311
020	001211	001151	000857	000676	000672	000736	000814	000875	001221	001473
030	001759	001394	001157	001015	001036	000934	000867	000826	000810	000881
040	000751	000865	000958	000968	001165	001328	001339	001163	001021	000891
050	000602	000615	000734	000650	000492	000410	000350	000300	000240	000305
060	000348	000420	000475	000489	000540	000600	000690	000800	001104	001651
070	002473	003383	003848	003722	003200	002465	001790	001417	001164	000741
080	000625	000467	000315	000240	000167	000182	000240	000278	000314	000383
090	000317	000230	000258	000194	000154	000185	000157	000155	000140	000138
100	000168	000198	000182	000202	000245	000229	000346	000231	000241	000221
110	000204	000154	000157	000141	000114	000078	000139	000108	000122	000088
120	000088	000125	000166	000209	000155	000080	000107	000068	000068	000121
130	000119	000096	000096	000078	000043	000101	000048	000075	000071	000083
140	000073	000083	000071	000078	000071	000083	000074	000098	000105	000124
150	000156	000154	000170	000163	000209	000208	000288	000290	000262	000234
160	000254	000235	000162	000093	000099	000054	000095	000039	000039	000029
170	000036	000015	000040	000015	*	*	*	*	*	*

83-212-1

1.9 YR. THORIUM 228 + DAUGHTERS

261 DETECTOR 3X3-2 DATE 3-5-63

PLATE NO. 90-228-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	027085	092288	022847	029676	042432	030375	060257	229234	220694
010	080105	023237	017507	016394	013510	012383	012394	013525	014080	014633
020	015093	018027	032689	085580	162472	171557	102785	041197	020944	018873
030	019454	017157	013174	009657	007473	006904	006425	006267	006185	005907
040	005406	004792	004389	004116	004054	004034	004215	004618	005817	007959
050	010960	012974	013159	011976	011187	013114	018619	026450	032210	032618
060	027547	019304	011301	006065	003379	002181	001851	001938	002226	002929
070	004138	005300	006072	006267	005869	004925	004076	003225	002679	002312
080	002076	002164	002445	002887	003390	003633	003538	003287	002812	002254
090	001774	001468	001191	001062	001010	000991	000952	000883	000866	000867
100	000787	000834	000852	000888	000986	001021	001074	001083	001153	001084
110	001054	000914	000885	000890	000886	000826	000828	000804	000743	000861
120	000770	000746	000790	000776	000766	000847	000807	000775	000767	000794
130	000796	000774	000810	000794	000820	000754	000725	000804	000788	000761
140	000763	000791	000853	000852	000890	000866	000931	000987	001028	001078
150	001128	001268	001409	001495	001534	001560	001604	001593	001614	001519
160	001401	001328	001300	001247	001178	001147	001144	001132	001064	001089
170	001067	001088	001051	001090	001035	001039	001083	001104	001074	001045
180	001105	001126	001130	001136	001100	001106	001086	001148	001023	001082
190	001124	001074	001136	001149	001142	001226	001274	001361	001449	001536
200	001713	001901	002057	002121	002105	002211	002224	002163	002152	001977
210	002019	001866	001677	001690	001669	001575	001546	001542	001474	001481
220	001561	001477	001482	001453	001377	001400	001366	001230	001202	001117
230	001064	000977	000853	000798	000782	000730	000655	000677	000645	000704
240	000762	000974	001237	001520	001803	002207	002740	003064	003589	003738
250	003903	003897	003832	003621	003382	002974	002627	002176	001873	001621
260	001245	000958	000824	000643	000472	000368	000315	000237	000215	000124
270	000139	000136	000101	000101	000089	000066	000075	000095	000068	000060

90-228-1

1.9 YR. THORIUM 228 + DAUGHTERS

DETECTOR 3X3-2 DATE 3-5-63

PLATE NO. 90-228-2 SOURCE DISTANCE 10 CM.

ENERGY SCALE 2.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	063000	047344	059396	308767	150311	023408	021267	020559	022974
010	026695	090902	257639	113555	030508	027946	017732	010996	009862	009187
020	007750	006566	006359	007150	011435	018955	019054	019573	037191	050055
030	033434	011756	003946	003069	005200	008929	010800	010100	006600	003805
040	003398	004312	005671	005259	003681	002369	001695	001489	001331	001289
050	001293	001418	001589	001656	001637	001550	001414	001340	001250	001204
060	001212	001195	001299	001245	001177	001205	001212	001204	001237	001243
070	001131	001237	001384	001472	001642	001991	002258	002374	002379	002414
080	002147	001908	001790	001635	001644	001677	001608	001741	001626	001651
090	001659	001664	001737	001650	001709	001775	001745	001835	002014	002274
100	002836	002988	003388	003270	003087	002970	002654	002484	002406	002397
110	002240	002195	002232	001954	001853	001587	001416	001127	000992	001042
120	001177	001846	002725	004015	005120	005840	005819	005181	004203	003010
130	002104	001333	000843	000491	000322	000200	000167	000122	000117	000098
140	000087	000090	000073	000072	000055	000059	000034	000042	000053	000044
150	000055	000072	000086	000080	000087	000068	000067	000060	000048	000023

90-228-2

14,000,000,000 YR. THORIUM 232 WITH DAUGHTERS

DETECTOR 3X3-2 DATE 2-27-63

PLATE NO. 90-232-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 1.0 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	004414	004192	006579	007011	008476	008965	013077	031465	040536
010	042506	026308	014036	008701	007836	007211	007292	007380	007510	008048
020	009090	011110	013270	021302	033873	035364	023802	013611	009966	008931
030	007971	007691	008418	010469	012195	011440	008875	006060	004437	003869
040	003923	004087	004067	003762	003829	004141	004551	004812	004806	004925
050	005172	005478	005438	005001	004803	005086	006213	008027	009412	009481
060	008421	006515	004520	003248	002457	002181	002115	002105	002185	002221
070	002507	002702	002839	003063	002955	002784	002692	002609	002548	002534
080	002395	002242	002117	002222	002229	002425	002794	003312	003953	004701
090	005133	005258	005275	005091	004785	004423	004224	003650	002943	002396
100	001772	001270	000944	000723	000589	000590	000586	000515	000468	000499
110	000534	000530	000468	000441	000462	000418	000396	000403	000442	000419
120	000420	000439	000458	000463	000416	000411	000392	000406	000351	000362
130	000378	000333	000362	000325	000327	000339	000326	000312	000340	000347
140	000357	000370	000403	000406	000403	000424	000425	000488	000474	000503
150	000545	000552	000661	000705	000753	000790	000762	000744	000759	000711
160	000665	000576	000535	000474	000440	000376	000357	000306	000300	000306
170	000265	000289	000320	000290	000330	000302	000303	000307	000298	000284
180	000278	000289	000277	000264	000285	000258	000266	000300	000287	000292
190	000325	000298	000294	000305	000292	000310	000283	000305	000344	000366
200	000403	000433	000362	000511	000506	000561	000535	000529	000521	000488
210	000490	000493	000388	000428	000439	000402	000399	000382	000348	000386
220	000382	000326	000388	000352	000358	000355	000293	000278	000288	000236
230	000246	000238	000224	000186	000209	000174	000161	000179	000159	000167
240	000177	000233	000243	000277	000370	000479	000584	000691	000753	000850
250	000927	000994	000965	000958	000880	000766	000771	000632	000560	000442
260	000357	000310	000244	000183	000130	000113	000076	000058	000045	000024
270	000034	000029	000027	000018	000018	000014	000018	000014	000011	000015
280	000011	000013	000016	000006	000009	000011	000011	000009	000011	000015

90-232-1

27 DAY PROTACTINIUM 233

DETECTOR 3X3-2 DATE 12-17-62

PLATE NO. 91-233-1 SOURCE DISTANCE 10 CM.

ENERGY SCALE 0.5 KEV/PHU ABSORBER 1.18 G/CM SQ. BE

INTENSITY NORMALIZATION NONE

	0	1	2	3	4	5	6	7	8	9
000	000000	003000	006439	037580	067812	029121	005841	004313	003699	002755
010	002595	002485	002852	003728	004821	006132	007143	009027	011547	018767
020	034634	051316	053190	040137	026340	018100	011331	005868	003205	002390
030	002338	002276	002305	002091	001905	001855	001539	001420	001249	001152
040	001169	001091	001095	001091	000968	000982	000983	001036	001030	001071
050	001088	001211	001312	001452	001609	001897	002569	003591	005582	009157
060	013832	019723	025319	030015	031677	030649	026162	020893	015292	010605
070	007234	004988	003454	002321	001763	001357	001193	001039	001169	001194
080	001300	001416	001512	001487	001446	001300	001095	000937	000729	000522
090	000308	000221	000116	000056	000050	000016	000011	000014	000000	000000

91-233-1