DOE/TIC-11026

Radioactive Decay Data Tables

A Handbook of Decay Data for Application to Radiation Dosimetry and Radiological Assessments

David C. Kocher

Office of Scientific and Technical Information
U. S. DEPARTMENT OF ENERGY

ABOUT THE OFFICE OF SCIENTIFIC AND TECHNICAL INFORMATION

The Department of Energy's Scientific and Technical Information Program (STIP) is carried out at many levels within the Department and by its contractor organizations. The Office of Scientific and Technical Information (OSTI) in Oak Ridge, Tennessee, provides direction and leadership for STIP and serves as DOE's national center for scientific and technical information management and dissemination. Both DOE-originated information and worldwide literature regarding advances in subjects of interest to DOE researchers are collected, processed, and disseminated through an energy information system maintained by OSTI. The major data bases in this system are available within the United States through commercial on-line systems and to those outside the United States through formal governmental exchange agreements. The current-year records for the major data base, plus a number of specialized data bases, are available to DOE offices and contractors through OSTI's Integrated Technical Information System (ITIS). ITIS also serves as a gateway to other government and commercial systems and provides information merging for customized information products. To manage DOE's information resources effectively, DOE's Scientific and Technical Information Program is one of continual development and evaluation of new information products, systems, and technologies.

DISCLAIMER

DOE/TIC-11026
(DE81002999)

Radioactive Decay Data Tables

A Handbook of
Decay Data for Application to
Radiation Dosimetry and Radiological
Assessments

David C. Kocher
Health and Safety Research Division
Oak Ridge National Laboratory

1981

Published by
Office of Scientific and Technical Information
U. S. DEPARTMENT OF ENERGY

Library of Congress Cataloging in Publication Data

Kocher, David C.
Radioactive decay data tables.

"DOE/TIC-11026"
1. Radioactive decay—Tables. I. Title.
[DNLM: 1. Radioactivity—Tables. WN 16 K76r]
QC795.8.D4K62 539.7'5 81-607800
ISBN 0-87079-124-9 AACR2

Available as DE81002999

National Technical Information Service
U S. Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22161

DOE Distribution Category UC-41
Price Code: Paper Copy A11
Microfiche A01

Printed in the United States of America
April 1981; latest printing November 1988

Preface

Radioactive Decay Data Tables

This compilation of radioactive decay data culminates 8 years of effort in the field of nuclear data compilation and evaluation. During the first $4\frac{1}{2}$ years of this time, I worked with the Nuclear Data Project in the Physics Division at Oak Ridge National Laboratory (ORNL). The primary interest of this group is the evaluation of a wide variety of nuclear physics data to determine the structure and properties of atomic nuclei, and its most visible contribution to nuclear structure physics is the mass-chain evaluations published in the journal *Nuclear Data Sheets*.

In 1976, I joined the Technology Assessments Section of the Health and Safety Research Division at ORNL. Since that time I have been concerned with the evaluation and compilation of radioactive decay data from the point of view of its application to radiation dosimetry and radiological assessments. Initially, I prepared a data base of evaluated decay data for 240 radionuclides of potential importance in the nuclear fuel cycle. This data base was adopted for use by the U. S. Nuclear Regulatory Commission, and the data were published in August 1977 as the report ORNL/NUREG/TM-102.

The radioactive decay data tabulated in this handbook result from the continual expansion and updating of the data base published in the aforementioned report. In addition to the radionuclides of interest in the nuclear fuel cycle, the data base now comprises most of the nuclides occurring naturally in the environment, those of current interest in nuclear medicine and fusion reactor technology, and some (but hardly all!) additional radionuclides of interest to Committee 2 of the International Commission on Radiological Protection for the estimation of annual limits of intake and derived air concentrations for occupationally exposed individuals. Approximately 500 radionuclides are contained in the current data base, and our recent experience suggests that almost all radionuclides of potential impact on the general public or occupationally exposed individuals have been included. The data for each radionuclide have been maintained on an up-to-date basis by examination of all recent experimental results published in the open literature and incorporation of these results into the data base whenever warranted. The data base takes into account all experimental results reported to me prior to July 1, 1979.

Several compilations of radioactive decay data similar in some respects to this one have been published in recent years. Particularly noteworthy are the compilations by L. T. Dillman and F. C. Von der Lage, published in 1975 in Pamphlet No. 10 of the Medical Internal Radiation Dose Committee, and M. J. Martin of the Nuclear Data Project, published in 1978 in Report No. 58 of the National Council on Radiation Protection and Measurements. The proliferation of published compilations containing data for large numbers of radionuclides is testimony to the successful application of computers to the processing of data bases of this type.

In spite of the apparent similarities between the different compilations, there are some differences of importance to potential users of the data. The most obvious is the particular selection of radionuclides. More subtle differences may result from the various methods used to select and evaluate data from the literature and to prepare the data sets. It is worth emphasizing that there is a considerable degree of subjectivity in this process and two knowledgeable compilers can therefore produce somewhat different decay schemes for a given radionuclide starting from the same data in the literature. We note, however, that the differences would likely be within experimental uncertainties unless the decay scheme is poorly determined from the data.

In the preparation of the decay data in this handbook, the fundamental principle has been to critically evaluate the available data from all sources in the open literature and attempt to construct the most accurate decay scheme consistent with the data rather than simply to adopt a decay scheme proposed by another compiler or experimenter without further examination. The evaluation process is not always foolproof, however, since the compiler is occasionally faced with reconciling or choosing between disparate sets of data, and the choices made may not prove to be correct. It is clear, therefore, that the biases of the compiler can play an important role in the process of selecting and evaluating data. It is hoped that my biases and data-evaluation philosophy have been applied reasonably consistently to obtain the adopted data sets for all the radionuclides contained herein.

I cannot overemphasize the importance of the contributions of the staff of the Nuclear Data Project and other compilers who have published mass-chain compilations in the journals *Nuclear Data Sheets* and *Nuclear Physics* to the successful completion of this work. I am particularly grateful to W. B. Ewbank, director of the Nuclear Data Project, for his continual assistance and cooperation throughout this effort.

The Nuclear Data Project maintains a computer file called the Evaluated Nuclear Structure Data File (ENSDF). Radioactive decay data sets written in the ENSDF format were used to generate the tables of decay data given in this handbook. When work on this compilation began early in 1976, much of the radioactive decay data previously published in *Nuclear Data Sheets* and *Nuclear Physics* had not yet been entered in ENSDF. Consequently considerable effort was required on my part to prepare many of the data sets in the proper format. In the meantime, however, ENSDF has been expanded to currently include more than 1500 radioactive decay data sets. If a compiler were to begin now to assemble a compilation such as the one presented in this handbook, he or she would be able to rely almost exclusively on data sets already contained in ENSDF, and little additional effort in evaluating data and producing new data sets would be required. Thus it is my intention in the future to rely on ENSDF rather than continually updating a separate data base of my own to provide additional radioactive decay data that might be needed in the radiological assessment activities of the Health and Safety Research Division.

It is worth noting that, with few exceptions, the decay data contained in this handbook are not likely to change significantly over the next few years as the result of new measurements. Most of the decay schemes have been studied with reasonable care and accuracy, and only minor improvements in the data of little significance for radiological applications can be expected. Thus I anticipate that the data contained in this handbook and in other recent compilations can be used with confidence for a considerable period of time.

I would like to express my appreciation to G. G. Killough, R. O. Chester, P. S. Rohwer, and S. V. Kaye of the Health and Safety Research Division at ORNL and to F. Swanberg, Jr., of the Division of Safeguards, Fuel Cycle, and Environmental Research at the Nuclear Regulatory Commission for their support and encouragement of this effort. This research was sponsored by the Office of Nuclear Regulatory Research, U. S. Nuclear Regulatory Commission, under Interagency Agreement DOE 40-550-75 with the U. S. Department of Energy under contract W-7405-eng-26 with the Union Carbide Corporation.

David C. Kocher
Health and Safety Research Division
Oak Ridge National Laboratory

Radioactive Decay Data Tables

Contents

Preface		iii
Chapter 1	**Introduction**	1
	References	2
Chapter 2	**Review of Radioactive Decay Processes**	3
	2-1 Alpha Decay	3
	2-2 Beta Decay	4
	2-3 Electromagnetic De-Excitation of Nuclear Energy Levels	5
	2-4 Atomic Radiations	7
	References	8
Chapter 3	**Preparation of Radioactive Decay Data Sets**	9
	3-1 ENSDF Formats	9
	3-2 Preparation of Decay Data Sets	11
	References	14
Chapter 4	**Computer Code MEDLIST and Description of Tables of Radioactive Decay Data**	15
	Reference	17
Chapter 5	**Applications of Decay Data to Radiation Dosimetry and Radiological Assessments**	18
	References	19
Chapter 6	**Parent—Daughter Activity Ratios**	20
	References	20
Chapter 7	**Accuracy of the Data and Uncertain Decay Schemes**	21
	7-1 Uncertain Decay Data for Radionuclides from the Nuclear Fuel Cycle	21
	7-2 Uncertain Decay Schemes for Other Radionuclides	23
	Reference	25
Appendix 1	**Symbols and Definitions**	26
Appendix 2	**Index to Tables of Radioactive Decay Data**	27
Appendix 3	**References for Radioactive Decay Data Sets**	36
Appendix 4	**Diagrams of Radioactive Decay Chains**	49
Appendix 5	**Tables of Radioactive Decay Data**	68

Introduction

Chapter 1

The estimation of radiation dose to man from either external or internal exposure to radionuclides requires a knowledge of the energies and intensities of the atomic and nuclear radiations emitted during the radioactive decay process. The availability of evaluated decay data for the large number of radionuclides of interest is thus of fundamental importance for radiation dosimetry.

This handbook contains a compilation of decay data for approximately 500 radionuclides. These data constitute an evaluated data file that I have constructed for use in the radiological assessment activities of the Technology Assessments Section of the Health and Safety Research Division at Oak Ridge National Laboratory.

The radionuclides selected for this handbook include those occurring naturally in the environment, those of potential importance in routine or accidental releases from the nuclear fuel cycle, those of current interest in nuclear medicine and fusion reactor technology, and some of those of interest to Committee 2 of the International Commission on Radiological Protection for the estimation of annual limits on intake via inhalation and ingestion for occupationally exposed individuals. This handbook supersedes a previous report,[1] which was concerned only with radionuclides from the nuclear fuel cycle.

The physical processes involved in radioactive decay which produce the different types of radiation observed are discussed in Chap. 2. The methods used to prepare the decay data sets for each radionuclide in the format of the computerized Evaluated Nuclear Structure Data File (ENSDF),[2] developed and maintained by the Nuclear Data Project at Oak Ridge National Laboratory, are described in Chap. 3. Some of the discussion in Chaps. 2 and 3 is probably not comprehensible to readers lacking a basic knowledge of atomic and nuclear structure. Without deviating substantially from the scope of this handbook, it is difficult to adequately define such concepts as spin and parity, gamma-ray transition multipolarity, forbiddenness of beta transitions, and energy levels of nuclei and orbital atomic electrons. The inclusion of the material of a specialized nature should provide the interested reader with a reasonably self-contained description of the decay data and how they were obtained, but these discussions should not preclude proper interpretation of the data tables by any interested user.

Chapter 4 describes the tables of radioactive decay data and the computer code MEDLIST used to produce the tables.[3] Some applications of the radioactive decay data to problems of interest in radiation dosimetry and radiological assessments are described in Chap. 5. The calculation of the activity of a daughter radionuclide relative to the activity of its parent in a radioactive decay chain is described in Chap. 6. Chapter 7 discusses the accuracy of the decay data in this handbook with particular emphasis on radionuclides for which the data may be significantly in error with regard to applications to radiation dosimetry.

The symbols appearing in the tables of decay data and their definitions are listed in Appendix 1. Appendix 2 provides an index of the tables of radioactive decay data, and Appendix 3 contains the literature references on which the tables are based. Appendix 4 gives diagrams of all decay chains involving two or more radionuclides in the present compilation. The tables of radioactive decay data are presented in Appendix 5.

This handbook is one of several similar compilations of radioactive decay data which have appeared in recent years. Particularly recommended is the compilation by Dillman and Von der Lage,[4] which contains data for 122 radionuclides of interest to nuclear medicine, and the compilation prepared by M. J. Martin of the Nuclear Data Project for the National Council on Radiation Protection and Measurements,[5] which contains data for about 210 radionuclides of interest primarily to nuclear medicine and the nuclear fuel cycle. I have independently reevaluated decay data for all radionuclides in the previous compilations which are included in this compilation.

REFERENCES

1. D. C. Kocher, *Nuclear Decay Data for Radionuclides Occurring in Routine Releases from Nuclear Fuel Cycle Facilities,* ERDA Report ORNL/NUREG/TM-102, Oak Ridge National Laboratory, 1977, NTIS.
2. W. B. Ewbank and M. R. Schmorak, *Evaluated Nuclear Structure Data File—A Manual for Preparation of Data Sets,* ERDA Report ORNL-5054/R1, Oak Ridge National Laboratory, 1978, NTIS.
3. M. J. Martin (Ed.), *Nuclear Decay Data for Selected Radionuclides,* ERDA Report ORNL-5114, Oak Ridge National Laboratory, 1976, NTIS.
4. L. T. Dillman and F. C. Von der Lage, *Radionuclide Decay Schemes and Nuclear Parameters for Use in Radiation-Dose Estimation,* Pamphlet 10, Society of Nuclear Medicine, New York, 1975.
5. National Council on Radiation Protection and Measurements, *A Handbook of Radioactivity Measurements Procedures,* Report No. 58, 1978.

Review of Radioactive Decay Processes

Chapter 2

The term "radioactivity" denotes those spontaneous changes of state in atomic nuclei which release energy in the form of electromagnetic or particle radiations. This chapter discusses briefly the different radioactive decay processes in sufficient detail to allow an understanding of the tables in Appendix 5. This presentation and the discussions in Chaps. 4 and 6 follow closely those given previously by Martin.[1,2] For examples of more-detailed discussions of radioactive decay processes, the reader is referred to the report by Dillman[3] and the reference work of Siegbahn.[4]

In this compilation we are concerned with alpha decay, beta decay [including β^-, β^+, and electron capture (EC)], isomeric transitions (i.e., the decay of long-lived excited states of a nucleus to states of lower energy in the same nucleus), and the various atomic and nuclear radiations that accompany these processes. Nuclear radiations are those which result directly from a change of state of the nucleus and include alpha particles, β^- and β^+ particles, gamma rays, and internal conversion electrons. Atomic radiations are those which result from the subsequent changes of state of the orbital electrons in the daughter atom and include X rays and Auger electrons.

A radioactive decay process not considered in this compilation is spontaneous fission, which can be the most important mode of decay in terms of total energy released for some of the transuranic radionuclides. Methods for estimating energy distributions of neutrons, prompt and delayed gamma rays, and beta particles, as well as the average energies of these radiations, have been given by Dillman and Jones.[5]

A type of radiation also not considered in this compilation is bremsstrahlung, which is the gamma radiation produced when electrons emitted in radioactive decay are slowed down by passage through matter. Bremsstrahlung forms a continuous spectrum of energies ranging from zero energy to the kinetic energy of the emitted electron with the intensity distribution considerably skewed toward the lower energies. Intensities of bremsstrahlung from slowing down of alpha particles and other heavy charged particles, such as recoil nuclei and fission fragments, are expected to be very small compared with electron bremsstrahlung. Bremsstrahlung consists of two types, external and internal. External bremsstrahlung results from the interaction of the emitted electrons with the atoms in the material surrounding the radiating atom; so the energy spectrum depends on the atomic composition of the surrounding medium. In some cases, particularly for radionuclides that emit only beta particles, external bremsstrahlung can be of importance in radiation dosimetry. Methods for calculating external bremsstrahlung in such materials as air, muscle, fat, and bone have been implemented by Dillman.[3] Internal bremsstrahlung occurs as an electron is being ejected from the decaying nucleus itself and thus may be considered an inherent part of the radioactive decay process. Internal bremsstrahlung is also discussed in the report by Dillman.[3] In general, this radiation can be neglected for the purposes of radiation dosimetry because of its low intensity and low average energy.

2–1 ALPHA DECAY

In alpha decay an atom with atomic number Z and mass number A emits an alpha particle (a ^{4}He nucleus with Z = 2 and A = 4) producing a daughter atom with atomic number Z-2 and mass number A-4. The difference in total energy between the initial state in the parent atom and the final state in the daughter is divided between the emitted alpha particle and the recoil energy of the daughter. From conservation of energy and momentum, the energy of the alpha particle for a particular transition, E_α, can be written as

$$E_\alpha = \frac{E}{1 + (4.0026/M_d)} \tag{2.1}$$

$$E = Q_\alpha + E_p - E_L \tag{2.2}$$

where E = total transition energy

Q_α = difference in energy between the ground states of the parent and daughter atoms

E_p = excitation energy of the alpha-emitting level in the parent (E_p = 0.0 except for an isomeric level)

E_L = excitation energy of the level in the daughter fed by the alpha decay

M_d = atomic mass of the daughter

and 4.0026 is the atomic mass of an alpha particle. The recoil energy of the daughter is given by

$$E_r = E - E_\alpha = \frac{4.0026\, E_\alpha}{M_d} \tag{2.3}$$

The recoil energy of the daughter has not been included in the tables of decay data in this handbook, but this energy should be taken into account, for example, in estimating the dose from internally deposited alpha-emitting radionuclides.

Alpha transitions that feed excited states of the daughter nucleus are usually accompanied by additional prompt radiations (e.g., gamma rays and internal conversion electrons) as the excited state decays to the ground state of the daughter. These processes are described in Sec. 2-3. Except for alpha decays to an isomeric state in the daughter, which is then treated as a separate radionuclide, these additional radiations are included in the decay scheme of the parent radionuclide.

2–2 BETA DECAY

Beta decay includes the processes of β^-, β^+, and electron capture decay. As with alpha decay, the prompt radiations resulting from the de-excitation of excited states in the daughter nucleus produced by beta decay are included in the decay scheme of the parent radionuclide.

2–2.1 β^- Decay

In β^- decay, an antineutrino ($\bar{\nu}$) and a negative electron (β^-) are emitted from the nucleus as a result of the transformation of a neutron into a proton:

$$n \rightarrow p + \beta^- + \bar{\nu}$$

Therefore the decay increases the atomic number by one unit, but the mass number remains the same. Because two different radiations are emitted from the nucleus (beta decay is a so-called three-body process), the energy released in a single β^- transition is divided between the β^- particle and the antineutrino in a statistical manner. Thus, when a large number of transitions between the same two energy levels in the parent and daughter is considered, the β^- particles (and the antineutrinos) have a continuous kinetic energy distribution from zero energy to a maximum value called the endpoint energy. From conservation of energy, the endpoint energy for a β^- transition is given by

$$E^{max}(\beta^-) = Q^- + E_p - E_L \tag{2.4}$$

where Q^- is the energy difference between the ground states of the parent and daughter atoms and E_p and E_L are the same as in Eq. 2.2.

For application to radiation dosimetry, the quantity of interest for a continuous spectrum from β^- decay is often the average energy, $\bar{E}(\beta^-)$, defined as

$$\bar{E}(\beta^-) = \frac{\int_0^{E^{max}(\beta^-)} N_\beta^-(E)\, E\, dE}{\int_0^{E^{max}(\beta^-)} N_\beta^-(E)\, dE} \tag{2.5}$$

where $N_\beta^-(E)$, called the probability distribution function, is the probability that a β^- particle has energy between E and E + dE. The probability distribution function is obtained from the Fermi theory of beta decay, as described by Gove and Martin.[6] This function depends on the so-called degree of forbiddenness of the transition, which is determined by the changes in total angular momentum (spin) and parity between the initial state in the parent and the level fed in the daughter. In this compilation, the beta transitions are assumed to have the probability distribution function for an allowed transition unless the spin (J) and parity (π) change is

$\Delta J^{\pi} = 2^{-}$ or 3^{+}, in which case the distribution function for a first-forbidden unique transition or a second-forbidden unique transition is used.

2–2.2 β^{+} Decay

In β^{+} decay a neutrino (ν) and a positron (β^{+}) are emitted from the nucleus as a result of the transformation of a proton into a neutron:

$$p \rightarrow n + \beta^{+} + \nu$$

As in β^{-} decay, the β^{+} particles emitted in a transition between particular levels in the parent and daughter nuclei have a continuous distribution of energies that can be characterized by the endpoint, $E^{max}(\beta^{+})$, and average, $\bar{E}(\beta^{+})$, energies. The β^{+}-decay process decreases the atomic number by one unit, and the mass number remains the same. From conservation of energy, the endpoint energy for a β^{+} transition is given by

$$E^{max}(\beta^{+}) = Q^{+} + E_p - E_L - 2m_0c^2 \qquad (2.6)$$

where Q^{+} is the energy difference between the ground states of the parent and daughter atoms, m_0c^2 is the rest mass energy of an electron (511 keV), and E_p and E_L are as defined in Eq. 2.2. We note that β^{+} decay cannot occur unless the energy difference between the parent and daughter levels is greater than $2m_0c^2$ = 1022 keV. That part of the total transition energy which is "lost" in the formation of the two electron rest masses is normally "regained" when the emitted positron annihilates at rest in the matter surrounding the decaying atom, producing two 511-keV annihilation gamma rays. The small probability of positron annihilation in flight can be ignored.

As with β^{-} decay, the probability distribution function $N_{\beta}^{+}(E)$ for β^{+} particles is obtained by using the Fermi theory of beta decay for an allowed transition, with an appropriate correction for known first-forbidden unique or second-forbidden unique transitions.[6]

2–2.3 Electron Capture Decay

In electron capture decay an atomic electron is captured by the nucleus, which transforms a proton into a neutron, and a neutrino is emitted via the process

$$p + e^{-} \rightarrow n + \nu$$

Thus, like β^{+} decay, electron capture decay decreases the atomic number by one unit, and the mass number remains the same. The capture of an atomic electron leaves the daughter atom with a vacancy in one of its atomic energy levels, which are also called atomic shells. If Δ_X^E is defined as the electron binding energy for shell X in the daughter atom (i.e., the energy required to remove an electron in shell X from the atom), the total energy available for electron capture decay is

$$E_{EC} = Q^{+} + E_p - E_L - \Delta_X^E \qquad (2.7)$$

where Q^{+}, E_p, and E_L are as defined in Secs. 2-1 and 2-2.2. Thus the energy available for electron capture decay is greater than that available for β^{+} decay (see Eq. 2.6) by an amount equal to two electron rest masses minus a small correction for the orbital electron binding energy in the shell X from which electron capture occurs. The electron binding energies used in this work are obtained from Bearden and Burr.[7]

For a given transition, the vacancy resulting from atomic electron capture will be distributed among the various shells, denoted by K, L, M, etc., in order of decreasing binding energy. This distribution affects the relative intensities of X rays and Auger electrons that result from the filling of the initial vacancy by an electron from a higher (less tightly bound) atomic shell. The probabilities for K-, L-, and M-shell capture for allowed, first-forbidden unique, and second-forbidden unique electron capture transitions are calculated as described by Gove and Martin.[6] If K-shell electron capture is energetically allowed, it generally has a higher probability than capture from higher atomic shells. The report by Dillman[3] discusses electron capture decay in more detail.

Electron capture always competes with β^{+} decay whenever the transition energy is greater than $2m_0c^2$ (1022 keV). In general, the probability for electron capture relative to positron emission increases with decreasing transition energy and with increasing atomic number. When the transition energy is too small to allow positron emission, only electron capture decay occurs.

2–3 ELECTROMAGNETIC DE-EXCITATION OF NUCLEAR ENERGY LEVELS

Most of the excited states of a daughter nucleus formed by alpha or beta decay of a parent decay very rapidly via electromagnetic processes to states of lower energy (eventually to the ground state) in the daughter. The de-excitation results in the emission of either gamma rays or internal conversion electrons. Long-lived isomeric states may also decay to lower energy states in the same nucleus via electromagnetic transitions.

2–3.1 Gamma Radiation

When a gamma ray (γ) is emitted by a nucleus in a transition from a higher to a lower energy state, the gamma-ray energy is equal to the energy difference between the two levels minus the energy of nuclear recoil given by

$$E_r \simeq 5.4 \times 10^{-7} \frac{[E(\gamma)]^2}{A} \text{ keV} \qquad (2.8)$$

where $E(\gamma)$ is the gamma-ray energy in kilo electron volts (keV) and A is the mass number of the nucleus. The energy of nuclear recoil is usually negligible except for high-energy transitions in light nuclei.

2–3.2 Internal Conversion Electrons

The emission of internal conversion electrons (ce) competes with gamma-ray emission. In this process the energy difference between the initial and final states in the nucleus is transferred directly to a bound atomic electron which is then ejected from the atom. The energy of an internal conversion electron emitted from atomic shell X, $E_{ce,X}$, is given in terms of the corresponding gamma-ray energy $E(\gamma)$ by

$$E_{ce,X} = E(\gamma) - \Delta_X^E \qquad (2.9)$$

where Δ_X^E is the electron binding energy in shell X.

The emission of K-shell internal conversion electrons can occur only if the transition energy is greater than the K-shell binding energy and similarly for higher electron shells. For a particular transition, the ratio of the probability for emission of a K-shell electron to the probability for emission of a gamma ray is called the K-shell internal conversion coefficient. Internal conversion coefficients for the other atomic shells are defined in an analogous manner. Internal conversion for shells above the K-shell is often divided according to the contributions from the different subshells; e.g., L-shell internal conversion is calculated separately for the L_1-, L_2-, and L_3-subshells.

The internal conversion coefficients for the different atomic shells and subshells depend on the transition energy, the atomic number of the nucleus, and the so-called transition multipolarity, which is determined by the spin-parity change between the initial and final states in the nucleus.* In general, the internal conversion coefficient for a particular atomic shell or subshell increases with decreasing transition energy (as long as the particular internal conversion process is energetically allowed), increasing atomic number, and increasing transition multipolarity. Internal conversion is often negligible for transitions in light nuclei but may occur with nearly 100% probability in isomeric transitions with high multipolarity or in low-energy transitions in heavy nuclei. Usually, the internal conversion coefficient for a given transition is largest for the innermost shell for which internal conversion is energetically possible and decreases for each higher shell. Exceptions occur, however, for transition energies slightly greater than the binding energy of an atomic shell. The ratios of internal conversion coefficients among the different subshells of the L or M shell are often a sensitive indicator of the transition multipolarity.

A special type of electromagnetic transition is the monopole transition, for which the spins of the initial and final states are both zero. In this case the emission of a single gamma ray is strictly forbidden. Electric monopole (E0) transitions usually occur entirely by means of internal conversion or, if energetically possible, by emission of a positron–electron pair. Emission of two gamma rays is also possible but is usually negligible. Magnetic monopole (M0) transitions are not encountered in this work.

In this compilation the theoretical internal conversion coefficients for shells K, $L_{1...3}$, and $M_{1...5}$ are obtained by spline interpolation from the tables of Hager and Seltzer[8] and Band, Trzhaskovskaya, and Listengarten;[9] for E5 and M5 transitions, the values are obtained by polynomial interpolation from the tables of Sliv and Band.[10,11] Internal conversion coefficients for shells N + O + . . . are obtained by spline interpolation from the tables of Dragoun,

*The emitted radiation is classified into two multipole types, electric and magnetic. For a spin change of L units, an electric multipole type EL involves a parity change of $(-1)^L$, and a magnetic multipole type ML has parity change $(-1)^{L+1}$. For example, E1 denotes an electric dipole transition between states differing in spin by one unit and having opposite parity, M1 is a magnetic dipole transition with L = 1 and no change in parity, and E2 is an electric quadrupole transition with L = 2 and no change in parity. For increasing L, the transition is said to be of higher multipolarity.

Plajner, and Schmutzler.[12] For E0 transitions, the conversion electron intensity ratios K/L_1 and L_1/L_2 are obtained by graphical interpolation from the tables of Hager and Seltzer.[13]

2–3.3 Other Radiations

Other radiation processes besides emission of a single gamma ray or internal conversion electron can occur during the de-excitation of a nuclear energy level. If the transition energy is greater than $2m_0c^2$ (1022 keV), an alternative decay mode is emission of a positron–electron pair, which is an electromagnetic process taking place in the Coulomb field of the excited nucleus. Since the probability of pair formation is normally 0.003 per emitted gamma ray or less,[3] this process has been neglected in this compilation. We have also neglected other very unlikely processes, such as the emission of two gamma rays or one gamma ray and one internal conversion electron.

2–4 ATOMIC RADIATIONS

The nuclear decay processes of electron capture and internal conversion always produce a vacancy in an inner atomic electron shell. The filling of this vacancy by an electron from an outer shell to reduce the total energy of the atomic electrons results in the emission of either an X ray or an Auger electron, which we call the atomic radiations in the radioactive decay process. Vacancies that are created by the filling of the initial vacancy will, in turn, produce further X rays or Auger electrons. This cascade of radiations continues until the only remaining vacancies are in the outermost electron shell.

2–4.1 X Rays

An X ray is a photon emitted as a result of the filling of a vacancy in an atomic shell by an electron from a higher shell. The energy of the emitted X ray is just equal to the difference in energy between the two atomic shells.

The probability that a vacancy in a particular atomic shell results in the emission of an X ray is called the fluorescence yield for that shell. The K-shell fluorescence yield, for example, is denoted by ω_K. If n_K is the number of vacancies produced in the K-shell per decay of the parent, the number of K X rays per decay is $n_K\omega_K$ and similarly for higher shells. In this compilation we consider only K-shell and L-shell X rays, for which the adopted fluorescence yields are obtained from the review of Bambynek et al.[14]

A K X ray results from the filling of a K-shell vacancy by an electron from a higher shell. A transition from shell Y to the K-shell is denoted by K – Y. In order of increasing intensity, the most important K X rays are $K_{\alpha 1} = K - L_3$, $K_{\alpha 2} = K - L_2$, $K_{\beta 1} = K - M_3$, $K_{\beta 2} = K - N_3$, $K_{\beta 3} = K - M_2$, $K_{\beta 4} = K - N_2$, and $K_{\beta 5} = K - M_4$. In this compilation the energies and intensities for three K X-ray groups are given explicitly—the $K_{\alpha 1}$ and $K_{\alpha 2}$ lines and the composite $K_\beta = \Sigma\, K_{\beta i}$ group. The X-ray energies are obtained from Bearden and Burr,[7] and the intensity ratios K_β/K_α and $K_{\alpha 2}/K_{\alpha 1}$ are obtained from Rao, Chen, and Crasemann.[15]

As previously mentioned, the number of K X rays per decay is $n_K\omega_K$. The number of K-shell vacancies per decay is the sum of the vacancies produced by K-shell electron capture and those produced by internal conversion in the K-shell. Thus

$$n_K = \epsilon_K + I_{ce,K} \tag{2.10}$$

where ϵ_K is the number of K captures per decay and $I_{ce,K}$ is the number of K-shell internal conversion electrons per decay.

As with K-shell X rays, many separate transitions contribute to the L X-ray spectrum. However, since the relative intensities of the different transitions are not known for all atomic numbers and the energy differences between the strong transitions are small ($\leqslant 3$ keV for $Z \leqslant 92$), we have treated the total L X-ray intensity as a single group having the energy of the strongest transition.

The calculation of the number of L X rays per decay, $n_L\omega_L$, is similar to the calculation for K X rays, except that, in addition to initial vacancies produced by direct L-shell electron capture and by L-shell internal conversion, vacancies created by transfer of L-shell electrons to fill vacancies in the K-shell must be taken into account. Therefore the number of L-shell vacancies per decay is given by

$$n_L = \epsilon_L + I_{ce,L} + n_{KL}\, n_K \tag{2.11}$$

where n_{KL} is the number of vacancies in the L shell created per vacancy in the K-shell and the other symbols have meanings analogous to those in Eq. 2.10. The values of n_{KL} were obtained from Bambynek et al.[14]

2–4.2 Auger Electrons

The emission of Auger electrons competes with the emission of X rays as a means of carrying off the energy released by filling an inner-shell vacancy with an electron from an outer shell. A detailed discussion of the Auger process is given by Dillman.[3]

In the Auger process the filling of an inner-shell vacancy is accompanied by the simultaneous ejection of an outer-shell electron from the atom. The resulting atom is thus left with two vacancies. From the definition of the fluorescence yield given in the previous section, the yield of Auger electrons per decay of the parent for a particular atomic shell is $n_K(1 - \omega_K)$, $n_L(1 - \omega_L)$, etc.

If the initial vacancy is in the K-shell and if this vacancy is filled by an electron from shell X with the ejection of an electron from shell Y, the transition is denoted by KXY. The energy of the ejected electron is $E_K - E_X - E'_Y$, where E_K and E_X are the K- and X-shell electron binding energies in the neutral atom, respectively, and E'_Y is the binding energy of a Y-shell electron in an atom containing a vacancy in the X-shell. The most intense K Auger transitions are of the type KLL. In this compilation the K Auger electrons are treated as a single group having the energy of the strongest transition (KL_2L_3), because the relative intensities of the different electrons in the KLL group are not accurately known for all atomic numbers and the energy difference between transitions is small ($\leqslant$ 5 keV for $Z \leqslant 92$). The energy of the strongest KLL transition is obtained from Bergstrom et al.[16]

Very little is known about the energies or relative intensities of individual L Auger electrons. In this compilation the L Auger electrons are treated as a single group having the energy of an $L_3M_4M_5$ transition.

REFERENCES

1. M. J. Martin (Ed.), *Nuclear Decay Data for Selected Radionuclides,* ERDA Report ORNL-5114, Oak Ridge National Laboratory, 1976, NTIS.
2. National Council on Radiation Protection and Measurements, *A Handbook of Radioactivity Measurements Procedures,* Report No. 58, 1978.
3. L. T. Dillman, *EDISTR—A Computer Program to Obtain a Nuclear Decay Data Base for Radiation Dosimetry,* USDOE Report ORNL/TM-6689, Oak Ridge National Laboratory, 1980, NTIS.
4. K. Siegbahn (Ed.), *Alpha-, Beta-, and Gamma-Ray Spectroscopy,* North-Holland Publishing Co., Amsterdam, 1965.
5. L. T. Dillman and T. D. Jones, Internal Dosimetry of Spontaneously Fissioning Nuclides, *Health Phys.,* 29: 111 (1975).
6. N. B. Gove and M. J. Martin, Log-f Tables for Beta Decay, *Nucl. Data Tables,* 10: 205 (1971).
7. J. A. Bearden and A. F. Burr, Reevaluation of X-Ray Atomic Energy Levels, *Rev. Mod. Phys.,* 39: 125 (1967).
8. R. S. Hager and E. C. Seltzer, Internal Conversion Tables. Part I: K-, L-, M-Shell Conversion Coefficients for Z = 30 to Z = 103, *Nucl. Data,* A4: 1 (1968).
9. I. M. Band, M. B. Trzhaskovskaya, and M. A. Listengarten, Internal Conversion Coefficients for Atomic Nuclei with Z ⩽ 30, *At. Data Nucl. Data Tables,* 18: 433 (1976).
10. L. A. Sliv and I. M. Band, *Coefficients of Internal Conversion of Gamma Radiation,* Part I, Academy of Sciences of the USSR Press, Moscow and Leningrad, 1956; Report 57 ICC K1, University of Illinois, Urbana, Ill.,1957.
11. L. A. Sliv and I. M. Band, *Coefficients of Internal Conversion of Gamma Radiation,* Part 2, L-Shell, Academy of Sciences of the USSR Press, Moscow and Leningrad, 1958; Report 58 ICC L1, University of Illinois, Urbana, Ill., 1958.
12. O. Dragoun, Z. Plajner, and F. Schmutzler, Contribution of Outer Atomic Shells to Total Internal Conversion Coefficients, *Nucl. Data Tables,* A9: 119 (1971).
13. R. S. Hager and E. C. Seltzer, Internal Conversion Tables. Part III: Coefficients for the Analysis of Penetration Effects in Internal Conversion and E0 Internal Conversion, *Nucl. Data Tables,* A6: 1 (1969).
14. W. Bambynek et al., X-Ray Fluorescence Yields, Auger, and Coster-Kronig Transition Probabilities, *Rev. Mod. Phys.,* 44: 716 (1972).
15. P. V. Rao, M. S. Chen, and B. Crasemann, Atomic Vacancy Distributions Produced by Inner-Shell Ionization, *Phys. Rev.,* A5: 997 (1972).
16. I. Bergstrom, C. Nordling, A. H. Snell, R. Wilson, and B. G. Pettersson, Some "Internal" Effects in Nuclear Decay, in *Alpha-, Beta-, and Gamma-Ray Spectroscopy,* K. Siegbahn (Ed.), p. 1523, North-Holland Publishing Co., Amsterdam, 1965.

Chapter 3

Preparation of Radioactive Decay Data Sets

The tables of radioactive decay data given in Appendix 5 of this handbook were produced by the computer code MEDLIST,[1] which uses as input radioactive decay data sets consisting of card images written in the format of the Evaluated Nuclear Structure Data File (ENSDF).[2] In this chapter a sample data set is described, and the methods used in this compilation to prepare data sets in the ENSDF format are discussed.

3–1 ENSDF FORMATS

Radioactive decay data in ENSDF are organized into data sets, each of which summarizes the state of experimental knowledge for a distinct decay mode (alpha, beta, or isomeric transition) of a particular radionuclide. Thus, if a given radionuclide has more than one decay mode (e.g., isomeric transition and β^- decay), each of which necessarily leads to a different daughter nucleus, each decay mode is described by a separate data set. Each data set includes an adopted value for the radionuclide half-life and the decay branching fraction for the particular decay mode, adopted values for the energies and intensities of the nuclear radiations (alpha, β^-, β^+, gamma, and internal conversion electrons) occurring in the decay mode, and an adopted uncertainty for each quantity. A decay data set also includes descriptive information on daughter radionuclides produced in the particular decay mode and their abundances.

Each decay data set in ENSDF is written in a uniform, standard format. The format is illustrated by means of the data set for ^{134}Cs β^- decay shown in Fig. 3.1.

The data set begins with an identification record giving the daughter nucleus (134BA); the data set name [134CS B– DECAY (2.062 Y)]; key numbers for the literature references as assigned by the Nuclear Data Project (75HE08, 75VA12, 76GR11); the characters HASRD-DCK, which appear on all data sets prepared for this compilation in the Health and Safety Research Division (HASRD) by myself (DCK), and the month and year when the data set was prepared or last revised (3/78).

Following the identification record are comment records denoted by the letter "C" following the daughter nucleus. Comment records are optional in ENSDF, but they are always used in this compilation to give information on the decay branching ratio if the particular decay mode does not occur 100% of the time, on decay branching ratios for other modes of decay or cross-references to decay data sets for the other decay modes, and on daughter radionuclides produced by the particular decay mode of the parent. In Fig. 3.1 the comments indicate that ^{134}Cs decays (99.9997 ± 0.0001)% by β^- decay and the remaining (0.0003 ± 0.0001)% by electron capture (EC) decay (see Appendix 1 for the conventions used for writing a number and its uncertainty). We emphasize again that, since decay modes other than β^- decay produce daughter nuclei different from ^{134}Ba, data for the alternate decay modes are not contained in this data set. In this case a separate data set for ^{134}Cs electron capture decay was not prepared since the branching ratio is less than the arbitrary cutoff of 0.1% chosen for this compilation.

The normalization record, denoted by "N," gives the factors by which the adopted relative gamma-ray intensities are multiplied to obtain absolute intensi-

```
134BA    134CS B- DECAY (2.062 Y)      75HE08,75VA12,76GR11, HASRD-DCK, 3/78
134BA C              %B- DECAY=99.9997 1
134BA C              %EC DECAY=0.0003 1
134BA  N 1.000003   1           0.999997 1
134CS  P 0.0           4(+)             2.062 Y    5            2058.4     4
134BA  L 0.0           0+               STABLE
134BA  L 604.704    14 2+
134BA  B               0.008    4             14.0922
     2 B EAV=  534.46 18$
134BA  G 604.695    15 97.6     3 E2                       0.00599             C
134BA2 G KC=0.00503$
134BA  L 1167.933   17 2+
134BA  B               0.045   15             12.5415
     2 B EAV=  299.88 16$
134BA  G 563.227    15 8.38     5 M1+E2    7.5      9      0.00726 1           CC
134BA  G 1167.94     3 1.80     3 E2                                           C
134BA  L 1400.537   21 4+
134BA  B               70.1     5             8.884 4                         C
     2 B EAV=  210.11 15$
134BA  G 795.845    22 85.4     4 E2                       0.00305             CC
134BA2 G KC=0.00258$
134BA  L 1643.310   25 3+
134BA  B               2.48     5             9.655 9
     2 B EAV=  123.40 14$
134BA  G 242.89      5 0.0210   8 IF M1+E2                 0.0880 23
134BA  G 475.35      5 1.46     4 E2+(M1)                  0.0114              C
134BA  G 1038.571   26 1.00     1 M1+E2   -1.8      2
134BA  L 1969.857   20 4+
134BA  B               27.40   13             6.483 7
     2 B EAV=   23.06 11$
134BA  G 326.45     10 0.0144   6 IF M1+E2                 0.0370 23
134BA  G 569.315    15 15.43   11 M1+E2   -0.29     2      0.00952 3           C
134BA2 G KC=0.00813 3$
134BA  G 801.932    22 8.73     4 M1+E2    0.010    4      0.00427             C
134BA  G 1365.15     3 3.04     4 E2                                           C
```

Fig. 3.1 Data set for ^{134}Cs β^- decay written in ENSDF format.

ties. Multiplication by the first factor (1.000003 ± 0.000001) gives the number of gamma rays per 100 β^- decays of the parent. Multiplication of the resulting intensities by the second factor (0.999997 ± 0.000001), which is the decay branching fraction for the particular decay mode, gives the number of gamma rays per 100 decays of ^{134}Cs. We note in this case that the product of the two normalization factors is unity, which results from the fact that absolute gamma-ray intensities rather than relative values are given with the data set. It is more often the case that the adopted gamma-ray intensities are arbitrarily normalized to 100 units for the strongest transition, and therefore the first factor on the normalization record is different from unity.

Following the normalization record is the parent record, denoted by "P," which gives the parent nucleus (134CS), the excitation energy (0.0), and spin-parity [4(+)] of the parent (the parentheses around the "+" denote an uncertain parity assignment), the adopted half-life (2.062 ± 0.005 years), and the adopted decay Q-value (2058.4 ± 0.4 keV), which is the total energy difference between the ground states of the parent and daughter atoms.

The remainder of the data set consists of a series of records giving data on the levels in the daughter nucleus which are fed in the decay, the direct β^- feeding to these levels, and gamma rays and internal conversion electrons from de-excitation of the levels.

The level records for the daughter nucleus are denoted by "L." They give the level energy (e.g., 604.704 ± 0.014 keV for the first excited state), the spin-parity (e.g., 2+), and the half-life if known (e.g., STABLE for the ground state).

Following each level record is the β^- record, denoted by "B," for that level, which is included only if the direct β^- feeding to the level is nonzero. Each β^- record consists of two cards. The first card gives the number of β^- decays feeding the level per 100 decays of the parent (e.g., 0.008 ± 0.004 for the first excited state) and the log-ft value[3] (14.09 ± 0.22). The blank columns preceding the beta intensity can be used to enter the beta endpoint energy and its uncertainty. In this compilation, however, this field is normally left blank, and the endpoint energy is calculated automatically when the data set is processed by other computer codes from the adopted level energy and Q-value given on the parent record and from the adopted level energy in the daughter given on the level record (see Chap. 2, Eq. 2.4). The second card of each beta record gives the average beta energy (e.g., 534.46 ± 0.18 for the first excited state). For β^+ and electron capture decay, the records comparable to the β^- records are denoted by "E" and have the same form as the β^- records except that on the first card the β^+ and electron capture intensities are given separately and the second card of each record also contains the fraction of decay by electron capture from the K, L, M, and all higher shells. For alpha decay, the record denoted by "A" consists of a single card giving the energy of the alpha particle feeding the level (this datum must be entered for alpha decay) and the number of alpha particles per 100 alpha decays of the parent. For isomeric transitions, there are no records corresponding to the B, E, or A records.

The gamma records, denoted by "G," describe gamma-ray transitions originating from the decay of the particular level in the daughter. (If a gamma or an alpha radiation properly belongs in a data set but cannot be associated with any particular level, the record is placed in the data set before the first level record.) A gamma record consists of either one or two cards. The first card gives the adopted gamma-ray energy (e.g., 563.227 ± 0.015 keV for the first gamma ray from the second excited state); the adopted relative gamma-ray intensity (e.g., 97.6 ± 0.3); the transition multipolarity, if known (e.g., M1 + E2, indicating a mixture of magnetic dipole and electric quadrupole radiation); the multipole mixing ratio, if known (e.g., 7.5 ± 0.9), for transitions involving more than one multipole (the square of the mixing ratio in this case gives the ratio of E2 to M1 radiation); the total internal conversion coefficient (e.g., 0.00726 ± 0.00001), defined as the total number of internal conversion electrons per gamma ray for the transition; and symbols (CC) denoting measured gamma-gamma coincidences. For the transition multipolarity, the notation "IF M1 + E2" denotes a transition assumed to be M1 + E2 for the purpose of estimating the intensity of internal conversion electrons, and parentheses denote uncertain assignments. The second card of the gamma record gives internal conversion coefficients for the K, L, M, etc., shells. For example, the K-shell internal conversion coefficient (KC) for the decay of the first excited state is 0.00503. In this compilation an internal conversion coefficient is given on a second gamma card only if the resulting conversion electron intensity (i.e., the conversion coefficient for the particular shell multiplied by the number of gamma rays per 100 decays of the parent) is 0.1 per 100 decays or more.

Each decay data set written in the ENSDF format terminates with a blank card.

3–2 PREPARATION OF DECAY DATA SETS

In this section the methods used in this work to prepare radioactive decay data sets in the ENSDF format are described in some detail. All computer codes used in this process were developed by the Nuclear Data Project.

Preparation of the decay data sets normally involved the following procedures:

1. Evaluation of all available measurements reported in the literature, selection of adopted values for the measured quantities (the half-life and decay branching fraction, gamma-ray energies and relative intensities, energies and absolute intensities for β^-, β^+, and alpha particles, relative conversion electron intensities, and gamma-ray multipole mixing ratios), and placement of the observed radiations in a decay scheme involving energy levels in the daughter nucleus.

2. Calculation of internal conversion coefficients for the gamma-ray transitions.

3. Normalization of the decay scheme to obtain absolute gamma-ray and conversion electron intensities.

4. Calculation of adopted level energies in the daughter and, for beta decays, the intensity of beta transitions feeding each level.

5. For beta decays, calculation of average beta energies and log-ft values for each transition.

These procedures are described in the following paragraphs.

3–2.1 Data Evaluation and Construction of the Decay Scheme

The process of evaluating all data reported in the literature and constructing the decay scheme for a given mode of decay of a given radionuclide was normally based on an examination of the data presented in the relevant mass-chain compilation published either in the journal *Nuclear Data Sheets* (for radionuclides with $A \geqslant 45$) or in the journal *Nuclear Physics* (for A = 3 to 44). Many of the decay schemes published in the mass-chain compilations had already been prepared by other compilers in the ENSDF format. For a few radionuclides, we began by examining the data sets in ENSDF format previously prepared by M. J. Martin of the Nuclear Data Project.[4] Next, we examined all relevant papers published in the open literature since the cutoff date for papers included in the mass-chain compilation or in the existing data set in ENSDF format. The additional literature search was greatly facilitated by use of the issues of *Nuclear Data Sheets* called "Recent References."

All decay schemes adopted for use in this compilation are based on my evaluation of all data reported in the mass-chain compilations and "Recent References" through April 1979. If the date given with a data set precedes April 1979 (e.g., 3/78 on the first card in Fig. 3.1), this indicates that no new data were reported between the two dates. No previously proposed decay schemes were adopted for this compilation without further examination of all the data. For a few radionuclides, this reexamination produced significant changes in the decay scheme adopted for this compilation. Some of these cases are described in Chap. 7.

In this work the adopted values for the gamma-ray energies and multipole mixing ratios for a given decay data set were based on the most accurate measurements from any experiment and were not necessarily measured in the particular radioactive decay of concern. For example, the adopted gamma-ray energies in the beta decay of an isomeric state of a nucleus would be taken from measurements on the beta decay of the ground state of the same nucleus if more-accurate values were obtained in the latter experiment. Similarly, adopted gamma-ray energies for a β^- decay data set could be obtained from measurements following β^+ or electron capture decay leading to the same daughter nucleus and vice versa. Some of the adopted multipole mixing ratios were obtained from diverse experiments, such as Coulomb excitation or in-beam gamma-ray spectroscopy. Consequently, if more than one radionuclide in the present compilation decays to the same daughter nucleus, all gamma rays common to the different decay schemes have the same adopted energy, multipole mixing ratio, and internal conversion coefficients.

3–2.2 Calculation of Internal Conversion Coefficients

Following construction of the decay scheme, internal conversion coefficients for the gamma-ray transitions in the daughter nucleus were calculated by using the computer code HSICC (Ref. 2). For transitions with multipolarity $L \geqslant 3$, the adopted internal conversion coefficients were taken to be 3% less than the values calculated by the code to provide better overall agreement between theory and experiment.[5]

For some transitions, the adopted multipolarity and multipole mixing ratio were determined directly from such measurements as the ratio of conversion electron to gamma-ray intensities, ratios of conversion electron intensities for different atomic shells or subshells, or angular correlations of two cascading gamma rays. For other transitions, the multipolarity was inferred from the known spin-parity change between the initial and final states. For example, any transition involving a state with spin-parity 0^+ has a multipolarity uniquely determined by the spin-parity of the other state. A transition involving a spin-parity change $\Delta J^\pi = 1^-$ was assumed to be E1 in the absence of other data because possible M2 admixtures are usually small. For spin changes $\Delta J \geqslant 2$, we assumed that the transition proceeds by the lowest possible multipole order. Appreciable multipole mixing often occurs whenever both M1 and E2 transitions are allowed. If no experimental data were available but the spin-parity change was known to be $\Delta J^\pi = 0^+$ or 1^+, we normally assumed internal conversion coefficients equal to the average of the M1 and E2 values with an uncertainty equal to half the difference. Exceptions occurred, however, for some low-energy transitions in heavy nuclei if the E2 internal conversion coefficients resulted in an unreasonably large total transition intensity (gamma rays plus conversion electrons), in which case the transition was assumed to be pure M1.

If no data were available to determine the transition multipolarity or if the transition did not involve a known spin-parity change, no assumption was made in this compilation concerning the transition multipolarity, and internal conversion was assumed to be zero.

An adopted value for the total internal conversion coefficient, denoted by α_T, is entered on the first card of the gamma record only if the relative transition intensity, $I_\gamma(1+\alpha_T)$, where I_γ is the relative gamma-ray intensity, differs from I_γ by at least one digit in the last significant figure. Internal conversion coefficients for the different atomic shells are entered on the second card of the gamma record only if the resulting conversion electron intensity is at least 0.1 per 100 decays of the parent. Internal conversion coefficients for as many as four shells can be entered—K, L, M, and N+, where N+ includes internal conversion for the N and higher shells. An entry for M+-shell internal conversion (M and higher shells as a single group) is made whenever the M-shell internal conversion electron intensity, $I_{ce,M}$, is at least 0.1 per 100 decays but $I_{ce,N+}$ is less than this amount or whenever $I_{ce,M}$ and $I_{ce,N+}$ are both less than 0.1 per 100 decays but their sum exceeds this amount.

3–2.3 Normalization of Decay Schemes

Normalization of a decay scheme is the process of obtaining the constants entered on the normalization record which determine the number of gamma rays and conversion electrons per 100 decays of the parent from the adopted relative gamma-ray intensities and internal conversion coefficients. One normalization constant determines the number of gamma rays and conversion electrons per 100 decays via the particular decay mode for the data set, and the second normalization constant is the decay branching fraction for the particular decay mode.

Depending on the data available, the normalization constants for a decay scheme were determined by one or more methods. For a decay mode with a branching fraction of unity, for example, one common method for normalizing the decay scheme is to use measurements, where available, of the number of gamma rays emitted per β^- or β^+ particle for a strong gamma-ray transition. Another method is to use the requirement that the total intensity of the direct beta decay to the ground state plus all gamma rays and internal conversion electrons feeding the ground state must be 100 per 100 decays of the parent (i.e., all decays of the parent eventually populate the ground state). This method is especially useful whenever the direct beta feeding to the ground state has been accurately measured or can be assumed to be zero from the large spin change involved in the transition.

The system used in ENSDF, by which relative gamma-ray intensities are entered on the gamma records and all normalization factors for obtaining absolute intensities are entered on a single normalization record, has considerable advantages compared with entering absolute gamma-ray intensities directly on each gamma record. Suppose, for example, that the normalization for a decay scheme is determined by a measurement of the number of gamma rays per β^- decay for the strongest gamma-ray transition. If a new measurement changes the adopted value of this quantity, only a single entry has to be changed on the normalization record in the ENSDF format to obtain the new values of the absolute gamma-ray intensities, whereas the gamma-ray intensity on every gamma record would have to be changed if the normalization record were not used.

3–2.4 Calculation of Level Energies and Beta Decay Intensities

For each decay scheme, the adopted energies of the levels in the daughter nucleus were calculated by using the computer code GTOL,[2] which performs a least-squares adjustment of the energies of all gamma rays placed in the decay scheme. The calculations also take into account the recoil energy of the nucleus accompanying each transition.

For beta decay schemes, measured intensities of β^- or β^+ transitions feeding individual levels were adopted only if they were used to determine the normalization constants for the decay scheme. In general, it is very difficult to directly measure the intensity of each individual β^- or β^+ transition in a decay scheme containing more than one or two transitions, and intensities of electron capture transitions cannot be directly measured. Therefore the beta feedings to most levels in the daughter were calculated by the code GTOL as the difference between the number of gamma rays plus internal conversion electrons from decay of the level and the number of these radiations feeding the level from the deexcitation of higher excited states, with the intensities properly normalized to give transitions per 100 decays of the parent. For alpha decay schemes, measured alpha intensities were normally adopted for each level, but the calculations with the code GTOL were used to check that the measured alpha intensities agreed with those inferred from the gamma-ray plus conversion electron intensity balances.

3–2.5 Calculation of Average Energies and Log-ft Values for Beta Decay

For beta decay schemes, the average β^- or β^+ energy for a transition feeding a given level, the ratio of electron capture to β^+ intensity and the relative intensities for K-, L-, and M-shell electron capture, and the log-ft value were calculated by using the computer code LOGFT.[3] All transitions were assumed to be allowed except for known first-forbidden unique or second-forbidden unique transitions. The endpoint energy for each β^- or β^+ transition and the total energy released in an electron capture transition were obtained from the level energy of the parent state and the decay Q-value contained on the parent record and the excitation energy of the particular level in the daughter given on the level record. For most decay schemes, the adopted Q-value was obtained from the recent atomic mass adjustment of Wapstra and Bos.[6]

REFERENCES

1. M. J. Martin (Ed.), *Nuclear Decay Data for Selected Radionuclides,* ERDA Report ORNL-5114, Oak Ridge National Laboratory, 1976, NTIS.
2. W. B. Ewbank and M. R. Schmorak, *Evaluated Nuclear Structure Data File—A Manual for Preparation of Data Sets,* ERDA Report ORNL-5054/R1, Oak Ridge National Laboratory, 1978, NTIS.
3. N. B. Gove and M. J. Martin, Log-f Tables for Beta Decay, *Nucl. Data Tables,* 10: 205 (1971).
4. National Council on Radiation Protection and Measurements, *A Handbook of Radioactivity Measurements Procedures,* Report No. 58, 1978.
5. S. Raman, T. A. Walkiewicz, R. Gunnick, and B. Martin, How Good Are the Theoretical Internal Conversion Coefficients? *Phys. Rev.,* C7: 2531 (1973).
6. A. H. Wapstra and K. Bos, The 1977 Atomic Mass Evaluation, *At. Data Nucl. Data Tables,* 19: 177 (1977).

Computer Code MEDLIST and Description of Tables of Radioactive Decay Data

Chapter 4

The radioactive decay data tables given in Appendix 5 of this handbook were generated by processing the decay data sets in ENSDF format with the computer code MEDLIST.[1] The MEDLIST code also uses computer files of the relevant Z-dependent constants (X-ray energies, ω_K, n_{KL}, etc.) described in Chap. 2, Sec. 2-4. For each data set, the code calculates the energies and intensities of the atomic radiations (X rays and Auger electrons). The code then combines the atomic radiations with the nuclear radiations contained in the data set in ENSDF format, sorts them according to radiation type (internal conversion and Auger electrons, alpha particles, β^- or β^+ particles, and gamma rays and X rays), and, within each type, arranges and numerically labels them in order of increasing energy.

Uncertainties in all experimental quantities, including the Z-dependent constants, are propagated consistently throughout the calculations. An uncertainty of 3% is assigned to all theoretical internal conversion coefficients and is combined with the experimental uncertainties.

Figure 4.1 shows the data table for ^{134}Cs β^- decay obtained from the data set in ENSDF format shown in Fig. 3.1 and discussed in Chap. 3, Sec. 3-1. The symbols used in the data tables and their definitions are listed in Appendix 1.

For each decay data set, the table contains data on the atomic and nuclear radiations of the following types: Auger electrons (shells K and L); X rays ($K_{\alpha 1}$, $K_{\alpha 2}$, K_β, and L); β^- particles; β^+ particles; alpha (α) particles; gamma rays (γ); and internal conversion electrons (ce) (shells K, L, M, and N+).

The data tables list all radiations with intensity greater than the variable low-intensity limit built into the MEDLIST code. In this compilation the low-intensity limit is 0.1 per 100 decays, as indicated by the heading "I(min) = 0.10%" printed with the tables. Immediately following the listings for alpha, beta, and gamma radiations, the code prints a comment giving the number of radiations omitted from the list because of the low-intensity limit (provided that the total intensity of all omitted radiations of the particular type exceeds 0.01 per 100 decays), the average of the energies of the omitted radiations weighted by the respective intensities, and their total intensity. For ^{134}Cs β^- decay, for example, two weak β^- groups are omitted with weighted average energy of 335.3 keV and total intensity of 0.05 per 100 decays. For β^+ decays, the code prints a comment following the gamma-ray list giving the maximum possible intensity of the annihilation radiation, which is calculated as twice the total intensity of all emitted positrons.

It should be noted that a somewhat different convention is used in numerically labeling the alpha and beta radiations in the data tables compared with the labeling of gamma and conversion electron radiations. For alpha and beta radiations, only those transitions with intensity greater than 0.1 per 100 decays are given a numerical label in order of increasing energy. Thus, for example, one or more weak omitted β^- radiations could occur with energies between those for the transitions labeled "β^- 1" and "β^- 2" and similarly for alpha radiations. For gamma rays and their corresponding internal conversion electrons, however, the numerical labels are applied to *all* radiations contained in the data set in ENSDF format. These labels are maintained throughout the MEDLIST calculations and are carried into the output. Therefore, when gamma rays are omitted from the data table because of their low intensity, the

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
• ^{134}Cs β^-	Decay (2.062 y 5)	I (min) = 0.10%	
	$\%\beta^-$ Decay = 99.9997 1		
	%EC Decay = 0.0003 1		
Auger-L	3.67	0.66 5	≈0
ce-K- 5	531.874 15	0.125 1	0.0014
ce-K- 6	567.258 15	0.491 15	0.0059
ce-K- 7	758.404 22	0.220 7	0.0036
β^- 1 max	88.5 4		
avg	23.06 11	27.40 13	0.0135
β^- 2 max	415.1 4		
avg	123.40 14	2.48 5	0.0065
β^- 3 max	657.9 4		
avg	210.11 15	70.1 5	0.314
total β^-			
avg	156.8 3	100.0 6	0.334
	2 weak β's omitted: $E\beta$(avg)= 335.3; $\Sigma I\beta$= 0.05%		
X-ray $K\alpha_2$	31.8171 3	0.214 8	0.0001
X-ray $K\alpha_1$	32.1936 3	0.396 15	0.0003
X-ray $K\beta$	36.4	0.144 6	0.0001
γ 3	475.35 5	1.46 4	0.0148
γ 4	563.227 15	8.38 5	0.101
γ 5	569.315 15	15.43 11	0.187
γ 6	604.699 15	97.6 3	1.26
γ 7	795.845 22	85.4 4	1.45
γ 8	801.932 22	8.73 4	0.149
γ 9	1038.57 3	1.000 10	0.0221
γ 10	1167.94 3	1.80 3	0.0448
γ 11	1365.15 3	3.04 4	0.0884
	2 weak γ's omitted: $E\gamma$(avg)= 276.9; $\Sigma I\gamma$= 0.04%		

Fig. 4.1 Table of energies and intensities of atomic and nuclear radiations from ^{134}Cs β^- decay produced by the computer code MEDLIST from the data set in ENSDF format.

remaining radiations that are listed separately are not relabeled. In Fig. 4.1, for example, the list of gamma rays begins with γ 3, which indicates that the two weak gammas omitted are γ 1 and γ 2. The labeling of all gammas, whether or not they are listed separately in the tables, is maintained because an internal conversion electron line associated with an omitted gamma ray appears in the list if its intensity exceeds the low intensity cutoff. Suppose, for example, that the gamma listing contains the sequence γ 1, γ 2, γ 4, . . . , which indicates that γ 3, with energy between those of γ 2 and γ 4, has been omitted because of its low intensity. The conversion electron list would nonetheless contain an entry labeled ce-K-3 if the intensity for the K-shell internal conversion electron associated with γ 3 exceeds the low-intensity limit.

In each data table the radiations are listed in the first column by type. Particle radiations (Auger, ce, alpha, and beta) are listed first, followed by the electromagnetic radiations (X ray and gamma). Whenever more than one beta group occurs, the table contains a separate entry at the end of the beta listing, labeled "total β," which gives the average energy and total intensity for the composite spectrum. This entry includes the contributions from the groups omitted from the list because of the low-intensity limit. For β^- decay, the total beta intensity should, in principle, be precisely equal to the decay branching ratio for the parent radionuclide [e.g., (99.9997 ± 0.0001)% for ^{134}Cs and 100% for β^- emitters having no alternate mode of decay]. As indicated in Chap. 3, Sec. 3-2.4, however, the intensities of the individual β^- groups are usually determined indirectly from the gamma and ce intensity balances for the different levels in the daughter, and therefore the total β^- intensity does not normally equal the expected amount. This is particularly the case if there are levels in the daughter for which the gamma + ce intensity feeding the level from the de-excitation of higher excited states exceeds the gamma + ce intensity depopulating the level. The total β^- intensity could be replaced by the known branching ratio, but we have not done so in this compilation. We note that, for the decay data tables in Appendix 5, the total β^- intensity always agrees with the known branching ratio within experimental uncertainties.

The second and third columns in each table give the energy in keV and intensity in number per 100 decays of the parent, respectively. For beta groups, both the maximum (endpoint) and the average energies for each transition are given.

The last column gives the mean energy emitted per unit of cumulated activity, Δ, in units of gram-rads/microcurie-hour. For an infinite, homogeneous medium in which a radioactive source is uniformly dispersed with a concentration of 1 μCi-h/g, Δ gives the absorbed dose in rads. From the definitions of the curie as 3.7×10^{10} disintegrations per second and the rad as 100 ergs per gram, it is easy to show that, for a source concentration of 1 μCi-h/g, an energy release of 1 MeV per disintegration results in an absorbed dose of 2.13 rads.

The first entry in each data table (e.g., see Fig. 4.1) gives the title of the decay data set, the adopted half-life for the parent nucleus, and the low-intensity cutoff limit for the separate listing of radiations in the table. We note that the symbol "M" is not used with the mass number of the parent to denote a metastable isomeric state. Rather, an isomer is uniquely identified by the radionuclide name and the half-life.

The following policy concerning the use of "β^+" and "EC" in data set names for positron and/or electron capture decay should be noted. The use of "EC" may denote either pure electron capture decay or electron capture and positron decay if positron emission is energetically allowed. In the latter case, the notation "β^+" may also be used, especially if positron decay is more probable than electron capture.

If the given mode of decay produces a daughter nucleus that is also radioactive or if the parent radionuclide decays by more than one mode, comments are printed below the title for the data table. If no comments are given, the parent decays 100% by the given decay mode to a stable daughter.

We first consider the comments for the case of a single decay mode for the parent leading to one or more radioactive daughters. The radionuclide ^{88}Kr, for example, decays entirely to the radionuclide ^{88}Rb; thus the data set for ^{88}Kr β^- decay contains the comment "Feeds ^{88}Rb." As a more complicated example, ^{91}Sr decays to both the ground state (58.51 d) and the isomeric state (49.71 m) of ^{91}Y. Thus the data set for ^{91}Sr β^- decay contains the comments "% Feeding to ^{91}Y (58.51 d) = 42.6 16" and "% Feeding to ^{91}Y (49.71 m) = 57.4 16." So that contributions to the decay of a parent when daughter radionuclides are produced can be correctly included, the radiations for each member of the decay chain must be combined by using the standard equations for parent–daughter activity relations and the known feeding of each member of the chain. The equations describing parent–daughter activity ratios are given in Chap. 6.

For a parent radionuclide that has more than one mode of decay, each decay mode is given in a separate table, provided the decay mode yields at least one radiation with intensity greater than 0.1 per 100 decays of the parent, and comments giving cross-references to the alternate modes of decay are given. For example, ^{64}Cu decays by both β^+ and β^- decay. Thus the data set for ^{64}Cu β^+ decay contains the comment "See also ^{64}Cu β^- Decay" and the data set for ^{64}Cu β^- decay contains the comment "See also ^{64}Cu β^+ Decay." Whenever alternate decay modes occur, the radiations from each data set can simply be combined to obtain all radiations from the particular parent. If a separate data set has not been prepared because an alternate decay mode produced no radiations above the low-intensity limit, the alternate decay branching ratio is given in a comment with the data set for the prevalent decay mode. In Fig. 4.1, for example, we find that ^{134}Cs also decays (0.0003 ± 0.0001)% via electron capture decay. Known decay branches for spontaneous fission, which is not included in this compilation, are also indicated in this manner. For example, the data table for ^{256}Fm alpha decay contains the comment "% Spontaneous Fission = 91.9 3."

REFERENCE

1. M. J. Martin (Ed.), *Nuclear Decay Data for Selected Radionuclides,* ERDA Report ORNL-5114, Oak Ridge National Laboratory, 1976, NTIS.

Chapter 5

Applications of Decay Data to Radiation Dosimetry and Radiological Assessments

In addition to the data tables given in Appendix 5, the MEDLIST code produces output in a decimal, computer-readable format suitable for use as input to further calculations. This chapter briefly describes some of the applications of the decay data in computer-readable format to the radiation dosimetry and radiological assessment activities of the Health and Safety Research Division at Oak Ridge National Laboratory.

The formats for the card images of the decimal output from the MEDLIST code are a close approximation to the formats proposed for radioactive decay data in the ENDF/B-V file by the National Neutron Cross Section Center at Brookhaven National Laboratory.[1] The formats for the output produced by the MEDLIST code are available from the Nuclear Data Project upon request.

The MEDLIST decimal output is generally more extensive than required in applications to radiation dosimetry. Therefore the computer code CONVER[2] was written to prepare output of energies and intensities by radiation type in a simple format suitable for input to further calculations. The output from the CONVER code for ^{134}Cs β^- decay is shown in Fig. 5.1. The first card gives the radionuclide name, half-life, and atomic number. The

```
CS-134          2.062 Y       55.
  0
  4
8.8543E-02 2.3060E-02 2.7400E-01 4.1509E-01 1.2340E-01 2.4800E-02
6.5786E-01 2.1011E-01 7.0100E-01 9.7550E-01 3.3529E-01 5.3000E-04
  0
  5
3.6700E-03 6.5531E-03 2.6400E-02 8.2834E-04 5.3187E-01 1.2545E-03
5.6726E-01 4.9093E-03 7.5840E-01 2.2033E-03
 14
4.4700E-03 8.9360E-04 3.1817E-02 2.1438E-03 3.2194E-02 3.9554E-03
3.6400E-02 1.4394E-03 4.7535E-01 1.4600E-02 5.6323E-01 8.3800E-02
5.6932E-01 1.5430E-01 6.0470E-01 9.7600E-01 7.9584E-01 8.5400E-01
8.0193E-01 8.7300E-02 1.0386E 00 1.0000E-02 1.1679E 00 1.8000E-02
1.3652E 00 3.0400E-02 2.7688E-01 3.5400E-04
```

Fig. 5.1 *Table of energies* **and intensities of radiations from ^{134}Cs β^- decay in card-image form produced by the computer code CONVER from the computer-readable output from the MEDLIST code.**

atomic number of the parent is needed for the calculation of external dose from electrons from beta decay. The subsequent cards give the number of radiations for a particular type and the energies and intensities of the radiations of that type. The radiation type is listed in the following order: alpha particles, β^- particles, β^+ particles, Auger and internal conversion electrons, and gamma rays and X rays. In Fig. 5.1, for example, the "0" on the second card indicates that no alpha particles are emitted. The "4" on the next card indicates the number of β^- particles. The entries on the two cards following give the endpoint energy in million electron volts (MeV), the average energy in MeV, and the intensity in number per decay of the parent for the first β^- group, followed by similar data for the three remaining groups. The next "0" indicates the number of positrons emitted. The following "5" gives the number of Auger and internal conversion electrons. The entries on the next two cards give the energy in MeV and the intensity in number per decay for each of the five radiations. The data for the 14 gamma rays and X rays follow in the same format.

For application to radiation dosimetry, it is sensible to combine the data from the different modes of decay of a given radionuclide into a single data set. For example, ^{64}Cu decays by both β^+ and β^- decay, and two separate sets of decay data in decimal format are therefore produced by the MEDLIST code. The output from the code CONVER for each data set is then combined into a single data set giving all radiations from the decay of ^{64}Cu.

The MEDLIST decimal output in the simplified format illustrated in Fig. 5.1 has been used in the Health and Safety Research Division as input to two types of calculations in radiation dosimetry. First, the decay data published in a previous report[3] have been used to calculate dose-rate conversion factors for external exposure to electron and photon radiations for three modes of exposure—immersion in contaminated air, immersion in contaminated water, and exposure to a contaminated ground surface. For a unit concentration of a given radionuclide of 1 μCi/cm^3 in air or water or 1 μCi/cm^2 on the ground, the decay data are used to calculate dose-equivalent rates in units of millirems per year for various body organs of an exposed individual.[4] The second application concerns the calculation of S factors for internally deposited radionuclides.[5] For unit residence of 1 μCi-day in a particular source organ in the body, the S factors give the dose equivalent in rems for various target organs, including the source organ itself. The S factors are then combined with metabolic models for transport of radionuclides in the body following intake via inhalation or ingestion and models for retention of radionuclides in the various body organs to calculate dose conversion factors, which give the dose equivalent per unit intake for the organs of interest.[6,7]

The applications of decay data to radiation dosimetry described in the preceding text essentially give the dose equivalent per unit activity to which man is exposed. Realistic estimates of concentrations of radionuclides in the environment require implementation of models to describe such phenomena as atmospheric transport and dispersion, transport of radionuclides through terrestrial and aquatic food chains leading to ingestion by man, and the use of consumer products containing radioactive materials.[8]

REFERENCES

1. R. E. Schenter, P. F. Rose, and T. W. Burrows, *Proposed Formats and Procedures for ENDF/B-V Radioactive Decay Data (MT=457)*, Brookhaven National Laboratory, unpublished.
2. D. E. Dunning, Jr., Oak Ridge National Laboratory, unpublished.
3. D. C. Kocher, *Nuclear Decay Data for Radionuclides Occurring in Routine Releases from Nuclear Fuel Cycle Facilities*, ERDA Report ORNL/NUREG/TM-102, Oak Ridge National Laboratory, 1977, NTIS.
4. D. C. Kocher, Dose-Rate Conversion Factors for External Exposure to Photon and Electron Radiation from Radionuclides Occurring in Routine Releases from Nuclear Fuel Cycle Facilities, *Health Phys.*, 38: 543 (1980); see also USDOE Report ORNL/NUREG/TM-283, Oak Ridge National Laboratory, 1979, NTIS.
5. D. E. Dunning, Jr., J. C. Pleasant, and G. G. Killough, *SFACTOR: A Computer Code for Calculating Dose Equivalent to a Target Organ per Microcurie-Day Residence of a Radionuclide in a Source Organ*, ERDA Report ORNL/NUREG/TM-85, Oak Ridge National Laboratory, 1977, NTIS.
6. G. G. Killough, D. E. Dunning, Jr., S. R. Bernard, and J. C. Pleasant, *Estimates of Internal Dose Equivalent to 22 Target Organs for Radionuclides Occurring in Routine Releases from Nuclear Fuel Cycle Facilities*, ERDA Report ORNL/NUREG/TM-190(Vol. 1), Oak Ridge National Laboratory, 1978, NTIS.
7. D. E. Dunning, Jr., S. R. Bernard, P. J. Walsh, G. G. Killough, and J. C. Pleasant, *Estimates of Internal Dose Equivalent to 22 Target Organs for Radionuclides Occurring in Routine Releases from Nuclear Fuel Cycle Facilities*, USDOE Report ORNL/NUREG/TM-190(Vol. 2), Oak Ridge National Laboratory, 1979, NTIS.
8. G. G. Killough and L. R. McKay, *Methodology for Calculating Radiation Doses from Radioactivity Released to the Environment*, USAEC Report ORNL-4992, Oak Ridge National Laboratory, 1976, NTIS.

Chapter 6

Parent-Daughter Activity Ratios

A common occurrence in radioactive decay is a parent radionuclide decaying to a daughter that is also radioactive. Estimates of radiation dose to man must properly account for the buildup and decay of the radioactive daughter products.

First consider the case of a radioactive parent (p) with half-life $T_{1/2}(p)$ and decay constant λ_p [$\lambda = (\ln 2)/T_{1/2}$] which feeds a radioactive daughter (d) with half-life $T_{1/2}(d)$ and decay constant λ_d in a fraction f of the parent decays. If we assume that the activity of the daughter is zero at time t = 0, it is easy to show from the exponential law of radioactive decay that the ratio of the daughter activity, $\lambda_d N_d$, where N_d is the number of atoms of the daughter, to the activity of the parent, $\lambda_p N_p$, at time t is given by[1]

$$\frac{\lambda_d N_d}{\lambda_p N_p} = \frac{f\,T_{1/2}(p)}{T_{1/2}(p) - T_{1/2}(d)} \cdot [1 - e^{-(\lambda_d - \lambda_p)t}] \qquad (6.1)$$

In many parent–daughter decay chains, the daughter is short lived compared with the parent, in which case the activity of the daughter relative to that of the parent approaches a value that is constant with time. For a time that is large compared with $[1/(\lambda_d - \lambda_p)]$, the daughter is in transient equilibrium with the parent, and the activity ratio reduces to

$$\frac{\lambda_d N_d}{\lambda_p N_p} = \frac{f\,T_{1/2}(p)}{T_{1/2}(p) - T_{1/2}(d)} \qquad (6.2)$$

For example, the radionuclide ^{99}Mo, with $T_{1/2}(p) = 66.02 \pm 0.01$ hours, decays to the isomeric state in ^{99}Tc, with $T_{1/2}(d) = 6.02 \pm 0.02$ hours, in a fraction $f = 0.886 \pm 0.009$ of the decays. At transient equilibrium, which is essentially achieved for times greater than 10 half-lives of the daughter, the ratio of ^{99}Tc activity to ^{99}Mo activity is $(0.886 \pm 0.009)(1.1003 \pm 0.0004) = 0.975 \pm 0.010$. Therefore, so that all radiations from a ^{99}Mo source at transient equilibrium will be correctly accounted for, the intensities of the radiations from the decay of the daughter product ^{99}Tc (6.02 hours) should be multiplied by 0.975 ± 0.010 and combined with the radiations from ^{99}Mo decay.

For the general case of a parent that has a series of radioactive daughters, such as the alpha decay chains for many of the transuranic radionuclides, the activity of any daughter product as a function of time can be obtained from the general solution of the Bateman equations, which is given, for example, by Evans[1] and by Skrable et al.[2]

REFERENCES

1. R. D. Evans, *The Atomic Nucleus,* McGraw-Hill Book Company, New York, 1955.
2. K. Skrable, C. French, G. Chabot, and A. Major, A General Equation for the Kinetics of Linear First Order Phenomena and Suggested Applications, *Health Phys.,* 27: 155 (1976).

Accuracy of the Data and Uncertain Decay Schemes

Chapter 7

As described in Chap. 4, the uncertainties in the intensities given in the tables of decay data in Appendix 5 are based primarily on uncertainties in measurements estimated by the experimenters. For most of the radionuclides, it is evident from the tables that the experimental uncertainties are sufficiently small that the decay data may be used with confidence in applications to radiation dosimetry. For other radionuclides, however, the adopted uncertainties show that the available measurements are not sufficiently precise to determine the decay data with high accuracy. It is particularly the case that the intensities of some important β^- transitions, as obtained from gamma-ray plus conversion electron intensity balances, are relatively poorly determined. For some radionuclides, no experimental uncertainties have been given with the adopted intensities. In most of these cases, however, it is likely that the intensities of at least the stronger radiations have been determined with reasonable accuracy.

Other sources of error in the decay data may be more significant than the experimental uncertainties given in the data tables. One source of error arises from the subjective processes of choosing the adopted values for measured quantities from different sets of experimental results and constructing the adopted decay data set in the ENSDF format. The choices made may lead to significant errors in the decay data, particularly whenever conflicting sets of data are available. The extent to which subjective judgments have resulted in significant errors in this work is difficult to determine, but, for the radionuclides in common, the decay data given in this handbook are generally in good agreement with the results previously adopted by Martin.[1]

A second potentially important source of error in the decay data arises from a lack of measurements necessary to determine the decay scheme accurately. In these cases the decay data given for some of the more intense radiations may be significantly in error, and other important radiations may have been left out of account.

The remainder of this chapter briefly discusses those radionuclides in this handbook for which, in my opinion, the adopted decay data may contain significant uncertainties or errors resulting from lack of appropriate experimental data. The radionuclides are divided into two classes—those of interest to the nuclear fuel cycle and the remaining radionuclides. In each case the reader is referred to the appropriate data tables in Appendix 5. The literature references in the text are denoted by key number and are given in Appendix 3.

7–1 UNCERTAIN DECAY DATA FOR RADIONUCLIDES FROM THE NUCLEAR FUEL CYCLE

The decay schemes for the following radionuclides of interest to the nuclear fuel cycle may be significantly in error: ^{92}Sr, ^{115}Cd (44.6 d), ^{133}Te (55.4 m), ^{141}La, ^{142}Ba, ^{166}Ho (1200 y), ^{227}Ac, ^{228}Ra, ^{229}Th, ^{234}Pa (6.70 h), and ^{245}Cm.

7–1.1 Strontium-92

The absolute intensities of the radiations from ^{92}Sr β^- decay are based on the measured intensity of (90 ± 10)% for the 1384-keV gamma ray (72Ko60). As a consequence of the 10% uncertainty in this measurement, the calculated β^- intensity for the highest energy transition (β^- 4) is consistent with zero but may be as large as 8%. Therefore the value of Δ for the total β^- spectrum may be in error by more than 10%. This uncertainty could be reduced by a direct measurement of the intensity of the β^- transition in question or by a more precise measurement of the intensity of the 1384-keV gamma ray.

7–1.2 Cadmium-115 (44.6 d)

The absolute intensities of the radiations from the β^- decay of ^{115}Cd (44.6 d) are based on the measured intensity of ~98% for the β^- transition feeding the ground state in the daughter nucleus (75Ra27). A small error in this estimate would result in large errors in the absolute intensities of all gamma rays resulting from β^- transitions feeding excited states in the daughter. If, for example, the correct β^- intensity were only 2% less than the measured value, all gamma-ray intensities would be a factor of 2 larger than the adopted values. The absolute gamma-ray intensities could be determined independently of the measured β^- intensity from a measurement of the number of 934-keV gamma rays per β^- transition.

7–1.3 Tellurium-133 (55.4 m)

Of the 63 gamma rays assigned to the β^- decay of ^{133}Te (55.4 m), only three have been placed in a decay scheme involving energy levels in the daughter (74He27). The unplaced gamma rays comprise 53% of the total gamma-ray intensity. Furthermore, the conversion electron intensities for some of the unplaced gamma rays of low energy may be significant. Therefore, although the total β^- intensity of (87 ± 3)% is accurately known, the distribution of the total β^- intensity with energy and thus the total β^- energy per decay are quite uncertain. Careful gamma-gamma coincidence measurements to determine the placement of more of the gamma rays in the decay scheme and conversion electron measurements for relatively intense low-energy transitions are needed.

7–1.4 Lanthanum-141

Similarly to the case for ^{115}Cd (44.6 d), the absolute intensities of the radiations from ^{141}La β^- decay are based on the measured intensity of ~97% for the β^- transition feeding the ground state in the daughter nucleus (78Tu01), and a small error in this measurement would therefore result in a large error in the absolute intensities for all gamma rays. The absolute gamma-ray intensities could be determined independently of the measured β^- intensity from a measurement of the number of 1355-keV gamma rays per β^- transition.

7–1.5 Barium-142

The absolute intensities of the radiations from ^{142}Ba β^- decay are based on the assumption that the β^- feeding to the ground state in the daughter nucleus is zero. The resulting large uncertainty in the intensity of the highest energy β^- transition (β^- 13), deduced from the gamma-ray plus conversion electron intensity balance, is quite significant because the transition yields about one-third of the total β^- energy per decay. Furthermore, except for the 77.6-keV transition (γ 3), the transition multipolarities of the relatively intense low-energy gamma rays with energies between 69 and 255 keV are unknown (78Tu03). If these transitions are M1 or E2, the conversion electron intensities could be as large as 5%, and the β^- intensities for the high-energy transitions β^- 10 – β^- 13 calculated from gamma-ray plus conversion electron intensity balances could be in error by comparable amounts. A direct measurement of the intensity of the highest energy β^- transition and a measurement of the conversion electron spectrum could reduce possible errors in the β^- intensities.

7–1.6 Holmium-166 (1200 y)

The previously adopted decay scheme for the β^- decay of ^{166}Ho (1200 y) assumed that all the β^- intensity was contained in the two lowest energy transitions (β^- 1 and β^- 2), even though measured beta-gamma coincidences and calculated gamma-ray plus conversion electron intensity balances indicated significant higher energy β^- transitions (75Bu06). In this work we have adopted the additional β^- transitions (β^- 3 – β^- 7) obtained from the intensity balances. The assumed existence of these transitions clearly results in a significant increase in the value of Δ for the total β^- spectrum. The existence of these β^- transitions could be determined from measurements of the total β^- spectrum and beta-gamma coincidences. A determination of the spin and parity of the parent state in ^{166}Ho might also be useful in order to specify the levels in the daughter which could be directly fed in the decay on the basis of the known change in spin and parity.

7–1.7 Actinium-227

The adopted intensities of all radiations from the 98.6% decay branch for ^{227}Ac β^- decay are based on the crude estimates of the intensities for the three assumed β^- transitions (77Ma32), and all values, therefore, are subject to considerable error. We note, however, that the determination of a more accurate decay scheme for ^{227}Ac is probably not important for radiation dosimetry applications, because all radiations have low energies and the relatively short-lived ^{227}Th daughter product has many higher energy radiations with significant intensity.

7–1.8 Radium-228

The decay scheme for ^{228}Ra is not known, and therefore the data adopted in this handbook are quite uncertain (76Ho06). Several gamma rays between 6 and 31 keV are believed to belong to the decay scheme, but the intensities and transition multipolarities have not been established. As with ^{227}Ac, however, the determination of the decay scheme for ^{228}Ra is probably not important for radiation dosimetry applications because the relatively short-lived ^{228}Ac daughter product has many high-energy transitions with significant intensity.

7–1.9 Thorium-229

Most of the adopted gamma-ray intensities from ^{229}Th alpha decay are based on measured conversion electron intensities for which the relative uncertainties are 10 to 50% (78To04). Therefore many of the gamma-ray and conversion electron intensities are likely to be quite uncertain. Further indication of errors in the data is the fact that the adopted decay scheme (78To04, 73Ma66) contains significant intensity imbalances at several levels in the daughter nucleus ^{225}Ra up to 236 keV. Additional gamma-ray and conversion electron measurements are needed.

7–1.10 Protactinium-234 (6.70 h)

With the use of the adopted gamma-ray intensities and transition multipolarities in the β^- decay of ^{234}Pa (6.70 h), the total β^- intensity obtained from the gamma-ray plus conversion electron intensity balances at each level in the daughter nucleus is found to be 146% (77El06), which is clearly in error compared with the expected value of 100%. The larger value results from the fact that, for some levels in the daughter, the total gamma-ray plus conversion electron intensity feeding the level *exceeds* the total intensity from decay of the level by more than the experimental uncertainties. This strongly suggests that some of the measured gamma-ray intensities are in error. In this work the adopted β^- intensities were obtained by dividing all values calculated from the decay scheme by a factor of 1.46 to give a total β^- intensity of 100%, but the resulting values for the individual transitions are clearly suspect. A remeasurement of relative gamma-ray intensities is needed. Protactinium-234 (6.70 h), however, is not an important radionuclide in the decay chain for the uranium series (see Appendix 4) since it is produced only by the 0.16% isomeric transition from the decay of ^{234}Pa (1.17 m).

7–1.11 Curium-245

Only two gamma rays have been observed in ^{245}Cm alpha decay, even though at least six levels in the daughter nucleus are known to be populated (76El01, 78El02). From the measured alpha-particle intensities, we can estimate that 6% of the expected gamma-ray plus conversion electron intensity has not been observed. The missing transitions should be observable from a measurement of the conversion electron spectrum.

7–2 UNCERTAIN DECAY SCHEMES FOR OTHER RADIONUCLIDES

The decay schemes for the following additional radionuclides in this handbook may be significantly in error: ^{67}Cu, ^{91}Nb (61 d), ^{95}Tc (61 d), ^{126}I, ^{194}Ir (171 d), ^{210}Tl, ^{231}U, ^{236}Np (1.15E5 y), ^{236}Np (22 h), ^{245}Pu, ^{246}Pu, ^{250}Cm, ^{251}Bk, ^{251}Cf, ^{253}Es, and ^{255}Es. These radionuclides, however, will not likely be of great importance in radiation dosimetry and radiological assessment activities.

7–2.1 Copper-67

The absolute intensities of the radiations from ^{67}Cu β^- decay are based on the measured intensity of ~20% for the β^- transition feeding the ground state in the daughter nucleus (75Au10). An error in this measurement would result in comparable errors in all other β^- and gamma-ray intensities. A more precise measurement of the ground-state β^- transition intensity or a measurement of the number of 185-keV gamma rays per β^- transition would determine all absolute intensities more accurately.

7–2.2 Niobium-91 (61 d) and Technetium-95 (61 d)

For both ^{91}Nb (61 d) and ^{95}Tc (61 d), the available measurements indicate that the branching ratios for electron capture decay and the isomeric transition may not be accurately determined (72Ve09, 75MeHo). An error in the branching ratios would result in errors in the intensities of all radiations from these decays. For each radionuclide, a remeasurement of the intensity of the gamma ray from the isomeric transition relative to the intensity of a strong gamma ray from electron capture decay is needed.

7–2.3 Iodine-126

Absolute intensities of the radiations from ^{126}I decay differing by as much as 30% can be obtained, depending on the data chosen to normalize the electron capture and β^- decay schemes (73Au10). The intensities adopted in this handbook are barely in agreement with those adopted by Martin (78NCRP). Additional measurements of both β^+ and β^- intensity ratios are needed to reduce possible errors in the two decay schemes.

7–2.4 Iridium-194 (171 d)

The β^- decay of ^{194}Ir (171 d) is assumed to proceed via a single β^- transition (77Ha46), but only an upper limit of 250 keV has been established for the endpoint energy. The endpoint energy could be determined from measurements of the β^- spectrum or beta-gamma coincidences.

7–2.5 Thallium-210

The only data on the gamma-ray spectrum from ^{210}Tl β^- decay are crude measurements made with scintillation detectors (71Lew1). Consequently the energies and intensities of all gamma rays and internal conversion electrons are poorly known. Furthermore, the energies and intensities of the β^- transitions could be estimated only from measurements of the total β^- spectrum, a procedure that may result in considerable error. Since the β^- feeding to the ground state in the daughter nucleus can be assumed to be zero from the probable spins of ^{210}Tl, the decay scheme could be determined from measurements of the gamma-ray spectrum with modern detection techniques.

7–2.6 Uranium-231

The intensities of all radiations from ^{231}U electron capture decay are based on unpublished data (77Sc15) and appear to be poorly determined. Additional measurements of the gamma-ray and conversion electron spectra are needed.

7–2.7 Neptunium-236 (1.15E5 y)

No gamma rays have been observed following the β^- decay of ^{236}Np (1.15E5 y), for which the branching ratio is 8.9% (77Sc13). Therefore the adopted intensities for this decay branch are uncertain.

7–2.8 Neptunium-236 (22 h)

In the electron capture and β^- decays of ^{236}Np (22 h), the gamma-ray and conversion electron intensities of the two 45-keV transitions are poorly determined (77Sc13). Therefore the intensities of the individual electron capture and β^- transitions are also uncertain.

7–2.9 Plutonium-245

From the adopted decay scheme for ^{245}Pu β^- decay (76El01), it is evident that nearly all the gamma rays resulting from the decay of levels in the daughter nucleus below 200 keV excitation energy have not been observed. Therefore it is likely that most of the conversion electron intensity from the decay of ^{245}Pu has been left out of account. In addition, the energies and intensities for the two highest energy β^- groups (β^- 9 and β^- 10) were estimated from measurements of the total β^- spectrum and thus could be in error since several separate transitions likely contribute to each group.

7–2.10 Plutonium-246

No transition multipolarities are known for any of the gamma rays following ^{246}Pu β^- decay (76Sc02). For relatively low-energy transitions in a heavy nucleus, the conversion electron intensities that have been left out of account are undoubtedly significant and, in some cases, are likely to be greater than the corresponding gamma-ray intensities. Furthermore, the β^- intensities obtained from the gamma-ray intensity balances without accounting for the conversion electron intensities are undoubtedly in error.

7–2.11 Curium-250

The decay of ^{250}Cm has not been observed (76Sc02), and the estimated decay branching ratios for the alpha and β^- decays are based on the systematic trends of data for other radionuclides of similar atomic number and mass. It is obvious, therefore, that the adopted decay data are quite uncertain.

7–2.12 Berkelium-251 and Einsteinium-255

The decay schemes for both ^{251}Bk β^- decay and the 92% β^- branch for the decay of ^{255}Es are unknown (76Sc09). In each case we have assumed that all the β^- decays directly feed the ground state in the daughter nucleus. However, many excited states are known in the daughters which could be fed by β^- transitions from the decay of each parent. Therefore it is likely that significant gamma-ray and conversion electron intensities have been left out of account in the adopted decay data.

7–2.13 Californium-251

From the adopted decay scheme for ^{251}Cf alpha decay (76Sc09), it is evident that several gamma rays and conversion electrons resulting from decay of levels in the daughter nucleus have not been observed. These transitions likely account for more than 10% of the total gamma-ray and conversion electron intensity.

7–2.14 Einsteinium-253

The adopted gamma-ray and conversion electron intensities for transitions in ^{253}Es alpha decay with energies below 136 keV appear to be quite uncertain (76Sc09). The uncertainties are particularly significant for the conversion electrons since the intensities are much greater than for the corresponding gamma rays.

REFERENCE

1. National Council on Radiation Protection and Measurements, *A Handbook of Radioactivity Measurements Procedures,* Report No. 58, 1978.

Appendix 1

Symbols and Definitions

The symbols appearing in the tables of radioactive decay data in Appendix 5 and their definitions are:

Auger-K, Auger-L	K-shell, L-shell Auger electron
avg	Average
ce-K-1, ce-L-2, etc.	K-shell internal conversion electron for gamma-ray 1, L-shell internal conversion electron for gamma-ray 2, etc.
Ci	Curie
d	Day
EC	Electron capture
h	Hour
I(min)	Minimum intensity for separate listing of radiation in table
IT	Isomeric transition
$K_{\alpha 1}$, $K_{\alpha 2}$, K_{β}; L	K X rays; L X rays
m	Minute
max	Maximum
rad	Unit of absorbed dose, equal to 6.25×10^7 MeV/g
s	Second
y	Year
α	Alpha, as alpha decay in table headings
α 1, α 2, etc.	Alpha particle corresponding to transition 1, 2, etc.
β^+, β^-	Beta-plus, beta-minus, as beta decay in table headings
β 1, β 2, etc.	Beta particle corresponding to transition 1, 2, etc.
γ 1, γ 2, etc.	Gamma ray corresponding to transition 1, 2, etc.
$\gamma^{\pm}$	Annihilation radiation
Δ	Mean energy emitted per unit of cumulated activity
μCi-h	Microcurie-hour
3.624 12	3.624 ± 0.012
2.6 h 12	2.6 ± 1.2 h
2.1E5 y 2	$(2.1 \pm 0.2) \times 10^5$ y

Index to Tables of Radioactive Decay Data

This appendix contains an index to the tables of radioactive decay data in Appendix 5. Each entry in the index gives the data set name (including the half-life if it is needed to identify the radionuclide), the key numbers for the literature references assigned by the Nuclear Data Project and listed in Appendix 3, the identifying characters "HASRD-DCK" for all sets in this compilation, and the month and year when the data set was prepared or last revised. We emphasize that the decay data in Appendix 5 take into account all mass-chain compilations and "Recent References" published in the journals *Nuclear Data Sheets* and *Nuclear Physics* through April 1979.

The tables of decay data are ordered by increasing mass number of the radionuclides. Within a given mass number, the order is by increasing atomic number. For a particular atomic number and mass number, the order is by increasing level energy in the parent nucleus. If a given radionuclide has more than one mode of decay, the separate data tables for each decay mode are ordered first by increasing mass number of the daughter nucleus and then, within a given mass number, by increasing atomic number of the daughter.

3HE	3H B- DECAY	75FI08, HASRD-DCK, 10/77
7LI	7BE EC DECAY	74AJ01, HASRD-DCK, 10/77
10B	10BE B- DECAY	74AJ01, HASRD-DCK, 10/77
11B	11C B+ DECAY	75AJ02,75AZ01, HASRD-DCK, 10/77
13C	13N B+ DECAY	78NCRP,77AZ01, HASRD-DCK, 1/78
14N	14C B- DECAY	78NCRP, HASRD-DCK, 10/77
15N	15O B+ DECAY	76AJ04, HASRD-DCK, 10/77
16O	16N B- DECAY	77AJ02, HASRD-DCK, 3/79
18O	18F B+ DECAY	78NCRP, HASRD-DCK, 10/77
22NE	22NA B+ DECAY	78NCRP, HASRD-DCK, 10/77
24MG	24NA B- DECAY	78NCRP, HASRD-DCK, 10/77
26MG	26AL B+ DECAY (7.2E5 Y)	78EN02,78NCRP, HASRD-DCK, 3/79
27AL	27MG B- DECAY	78EN02,78NCRP, HASRD-DCK, 3/79
28AL	28MG B- DECAY	78NCRP,78DI05, HASRD-DCK, 6/79
28SI	28AL B- DECAY	78NCRP, HASRD-DCK, 10/77
31P	31SI B- DECAY	73ENVA, HASRD-DCK, 10/77
32P	32SI B- DECAY	78EN02, HASRD-DCK, 3/79
32S	32P B- DECAY	78NCRP, HASRD-DCK, 10/77
33S	33P B- DECAY	78NCRP, HASRD-DCK, 10/77
35CL	35S B- DECAY	78NCRP, HASRD-DCK, 10/77
36S	36CL EC DECAY	73ENVA, HASRD-DCK, 10/77
36AR	36CL B- DECAY	73ENVA, HASRD-DCK, 10/77
37CL	37AR EC DECAY	73ENVA,75KI10, HASRD-DCK, 10/77
38AR	38CL B- DECAY	78NCRP, HASRD-DCK, 10/77
39K	39AR B- DECAY	73ENVA, HASRD-DCK, 10/77
40AR	40K EC DECAY	73ENVA, HASRD-DCK, 10/77
40CA	40K B- DECAY	73ENVA, HASRD-DCK, 10/77
41K	41AR B- DECAY	78NCRP, HASRD-DCK, 10/77
41K	41CA EC DECAY	73ENVA,74MA30, HASRD-DCK, 10/77
42CA	42K B- DECAY	78NCRP, HASRD-DCK, 10/77
43CA	43K B- DECAY	78NCRP, HASRD-DCK, 10/77
44CA	44SC B+ DECAY (3.927 H)	78EN02,78NCRP, HASRD-DCK, 3/79
44SC	44TI EC DECAY	78EN02,78NCRP, HASRD-DCK, 3/79
45SC	45CA B- DECAY	78NCRP, HASRD-DCK, 10/77
45SC	45TI EC DECAY	77BE63, HASRD-DCK, 6/79
46TI	46SC B- DECAY (83.83 D)	78NCRP, HASRD-DCK, 10/77
46SC	46SC IT DECAY (18.72 S)	78AU04, HASRD-DCK, 3/79
47SC	47CA B- DECAY	78NCRP, HASRD-DCK, 10/77
47TI	47SC B- DECAY	78NCRP, HASRD-DCK, 10/77
48TI	48SC B- DECAY	78BE01, HASRD-DCK, 4/78
48TI	48V B+ DECAY	78BE01, HASRD-DCK, 4/78
49SC	49CA B- DECAY	78HA15, HASRD-DCK, 8/78
49TI	49SC B- DECAY	78HA15, HASRD-DCK, 8/78
49TI	49V EC DECAY	78HA15, HASRD-DCK, 8/78
49V	49CR B+ DECAY	78HA15, HASRD-DCK, 10/78
51V	51TI B- DECAY	78AU01, HASRD-DCK, 6/79
51V	51CR EC DECAY	78AU01, HASRD-DCK, 4/78
52CR	52V B- DECAY	78BE37, HASRD-DCK, 6/79
52CR	52MN B+ DECAY (5.591 D)	78BE37, HASRD-DCK, 10/78
52CR	52MN B+ DECAY (21.4 M)	78BE37, HASRD-DCK, 10/78
52MN	52MN IT DECAY (21.4 M)	78BE37, HASRD-DCK, 10/78
52MN	52FE B+ DECAY	78BE37, HASRD-DCK, 10/78
53CR	53MN EC DECAY	77AU08, HASRD-DCK, 4/79
54CR	54MN EC DECAY	78NCRP, HASRD-DCK, 10/77
55MN	55FE EC DECAY	78NCRP, HASRD-DCK, 10/77
56FE	56MN B- DECAY	77AU03, HASRD-DCK, 10/77
56FE	56CO B+ DECAY	77AU03,77GE12, HASRD-DCK, 8/78
56CO	56NI EC DECAY	77AU03, HASRD-DCK, 10/77
57FE	57MN B- DECAY	77AU04,78WY02, HASRD-DCK, 6/79
57FE	57CO EC DECAY	77AU04, HASRD-DCK, 10/77
57CO	57NI B+ DECAY	77AU04, HASRD-DCK, 2/78
58FE	58CO EC DECAY (70.80 D)	76KO16,76VA30, HASRD-DCK, 1/78
58CO	58CO IT DECAY (9.15 H)	76KO16, HASRD-DCK, 1/78
59CO	59FE B- DECAY	76KI03, HASRD-DCK, 10/77
59CO	59NI EC DECAY	78NCRP, HASRD-DCK, 10/77
60NI	60CO B- DECAY (5.271 Y)	75KI19,76CA18,78FU05, HASRD-DCK, 12/78
60CO	60CO IT DECAY (10.47 M)	75KI19, HASRD-DCK, 4/79
60NI	60CO B- DECAY (10.47 M)	75KI19, HASRD-DCK, 4/79
61NI	61CO B- DECAY	75AU05, HASRD-DCK, 5/79
61NI	61CU B+ DECAY	75AU05,78ME10, HASRD-DCK, 5/79
62NI	62CU B+ DECAY	79HA01, HASRD-DCK, 3/79
62CU	62ZN EC DECAY	79HA01, HASRD-DCK, 3/79
63CU	63NI B- DECAY	75AU03, HASRD-DCK, 10/77
64NI	64CU B+ DECAY	78NCRP, HASRD-DCK, 10/77
64ZN	64CU B- DECAY	78NCRP, HASRD-DCK, 10/77
65CU	65NI B- DECAY	75AU08, HASRD-DCK, 10/77
65CU	65ZN EC DECAY	75AU08, HASRD-DCK, 10/77
66ZN	66GA B+ DECAY	78NCRP, HASRD-DCK, 10/77
67ZN	67CU B- DECAY	75AU10,78ME10, HASRD-DCK, 12/78

67ZN	67GA EC DECAY	75AU10,78ME10, HASRD-DCK, 12/78
68ZN	68GA B+ DECAY	75LE12, HASRD-DCK, 10/77
68GA	68GE EC DECAY	78NCRP, HASRD-DCK, 10/77
69GA	69ZN B- DECAY (55.6 M)	76AU01, HASRD-DCK, 10/77
69ZN	69ZN IT DECAY (13.76 H)	76AU01,77HE20, HASRD-DCK, 5/78
71GA	71GE EC DECAY	73AL33, HASRD-DCK, 10/77
72GE	72GA B- DECAY	74AL34, HASRD-DCK, 3/79
72GE	72AS B+ DECAY	74AL34, HASRD-DCK, 3/79
73GE	73AS EC DECAY	78NCRP, HASRD-DCK, 10/77
73AS	73SE EC DECAY (7.15 H)	74AL33, HASRD-DCK, 10/77
74GE	74AS B+ DECAY	76KO07,75CA37,76HA61, HASRD-DCK, 10/77
74SE	74AS B- DECAY	76KO07,75CA37,76HA61, HASRD-DCK, 10/77
75AS	75SE EC DECAY	75HO17,76HU11,77GE12, HASRD-DCK, 8/78
76SE	76AS B- DECAY	78NCRP, HASRD-DCK, 10/77
77AS	77GE B- DECAY (11.30 H)	78NCRP,74GU30,75CH32, HASRD-DCK, 11/77
77SE	77AS B- DECAY	78NCRP, HASRD-DCK, 11/77
77SE	77BR EC DECAY (57.04 H)	78NCRP,75WA28, HASRD-DCK, 11/77
79BR	79SE B- DECAY	75UR03, HASRD-DCK, 11/77
79BR	79KR B+ DECAY (35.04 H)	78NCRP, HASRD-DCK, 11/77
80SE	80BR EC DECAY (17.4 M)	75GR19, HASRD-DCK, 11/77
80KR	80BR B- DECAY (17.4 M)	75GR19, HASRD-DCK, 11/77
80BR	80BR IT DECAY (4.42 H)	75GR19, HASRD-DCK, 11/77
81BR	81KR EC DECAY (2.1E5 Y)	78NCRP, HASRD-DCK, 11/77
81KR	81RB EC DECAY (4.58 H)	75LE08,75VA24,77LI14, HASRD-DCK, 5/78
82KR	82BR B- DECAY (35.30 H)	75LE11,77GE12, HASRD-DCK, 8/78
82KR	82RB B+ DECAY (1.25 M)	75LE11, HASRD-DCK, 11/77
82RB	82SR EC DECAY	75LE11, HASRD-DCK, 11/77
83KR	83BR B- DECAY	75KO07,76VA03, HASRD-DCK, 11/77
83KR	83KR IT DECAY (1.83 H)	75KO07, HASRD-DCK, 11/77
83KR	83RB EC DECAY	75KO07,76VA03, HASRD-DCK, 6/78
84KR	84BR B- DECAY	71AU82,72HI03, HASRD-DCK, 11/77
84KR	84RB B+ DECAY	78NCRP,76GI14, HASRD-DCK, 11/77
84SR	84RB B- DECAY	78NCRP,76GI14, HASRD-DCK, 11/77
85KR	85BR B- DECAY	71HOR1,75NU03, HASRD-DCK, 11/77
85RB	85KR B- DECAY (10.72 Y)	78NCRP, HASRD-DCK, 11/77
85KR	85KR IT DECAY (4.48 H)	78NCRP, HASRD-DCK, 11/77
85RB	85KR B- DECAY (4.48 H)	78NCRP, HASRD-DCK, 11/77
85RB	85SR EC DECAY (64.84 D)	78NCRP,77PR04, HASRD-DCK, 1/78
85RB	85SR EC DECAY (67.66 M)	71HOR1,71BU08,71VO06, HASRD-DCK, 11/77
85SR	85SR IT DECAY (67.66 M)	71HOR1,71BU08,71VO06, HASRD-DCK, 11/77
86SR	86RB B- DECAY	78TE01, HASRD-DCK, 12/78
86SR	86Y B+ DECAY (14.74 H)	78TE01, HASRD-DCK, 3/79
86Y	86ZR EC DECAY	78TE01, HASRD-DCK, 3/79
87RB	87KR B- DECAY	78NCRP, HASRD-DCK, 11/77
87SR	87RB B- DECAY	79LU05, HASRD-DCK, 11/77
87RB	87SR EC DECAY (2.805 H)	78NCRP, HASRD-DCK, 11/77
87SR	87SR IT DECAY (2.805 H)	78NCRP, HASRD-DCK, 11/77
87SR	87Y EC DECAY	78NCRP, HASRD-DCK, 11/77
88RB	88KR B- DECAY	76BU07,76BU05,76WO05, HASRD-DCK, 11/77
88SR	88RB B- DECAY	76BU07,76BU05,76WO05, HASRD-DCK, 6/79
88SR	88Y EC DECAY	76BU07, HASRD-DCK, 11/77
88Y	88ZR EC DECAY	76BU07, HASRD-DCK, 2/78
89RB	89KR B- DECAY	75KO21,76WO05,78WO15, HASRD-DCK, 6/79
89SR	89RB B- DECAY	75KO21,76WO05,78WU04, HASRD-DCK, 6/79
89Y	89SR B- DECAY	78NCRP, HASRD-DCK, 11/77
89Y	89ZR B+ DECAY	75KO21, HASRD-DCK, 2/78
90RB	90KR B- DECAY	75KO16,76WO05, HASRD-DCK, 11/77
90SR	90RB B- DECAY (157 S)	75KO16,77HU03, HASRD-DCK, 6/79
90RB	90RB IT DECAY (258 S)	75KO16,77HU03, HASRD-DCK, 5/78
90SR	90RB B- DECAY (258 S)	75KO16,77HU03, HASRD-DCK, 6/79
90Y	90SR B- DECAY	75KO16, HASRD-DCK, 11/77
90ZR	90Y B- DECAY (64.1 H)	75KO16, HASRD-DCK, 11/78
90Y	90Y IT DECAY (3.19 H)	75KO16,78RA05, HASRD-DCK, 12/78
90ZR	90NB B+ DECAY	75KO16,75PA07,78BE12, HASRD-DCK, 5/79
91Y	91SR B- DECAY	72VE09,73HA11,77HO12, HASRD-DCK, 1/78
91ZR	91Y B- DECAY (58.51 D)	72VE09, HASRD-DCK, 11/77
91Y	91Y IT DECAY (49.71 M)	72VE09, HASRD-DCK, 11/77
91ZR	91NB EC DECAY (1E4 Y)	72VE09, HASRD-DCK, 2/78
91ZR	91NB EC DECAY (61 D)	72VE09, HASRD-DCK, 2/78
91NB	91NB IT DECAY (61 D)	72VE09, HASRD-DCK, 2/78
91NB	91MO B+ DECAY (15.49 M)	72VE09,76DE37, HASRD-DCK, 6/79
92Y	92SR B- DECAY	72KO60,72OL03, HASRD-DCK, 11/77
92ZR	92Y B- DECAY	72KO60, HASRD-DCK, 11/77
92ZR	92NB EC DECAY (3.6E7 Y)	72KO60,78NE04, HASRD-DCK, 5/79
92ZR	92NB EC DECAY (10.15 D)	72KO60, HASRD-DCK, 2/78
93Y	93SR B- DECAY	72HE41,74AC04,77BI01, HASRD-DCK, 11/77
93ZR	93Y B- DECAY	72KO59,73TA15, HASRD-DCK, 11/77
93NB	93ZR B- DECAY	72KO59, HASRD-DCK, 1/78
93NB	93NB IT DECAY (14.6 Y)	72KO59,77LL01,77MO07, HASRD-DCK, 1/78

93NB	93MO EC DECAY	72K059, HASRD-DCK, 1/78
94MO	94NB B- DECAY (2.03E4 Y)	73K043, HASRD-DCK, 3/79
94NB	94NB IT DECAY (6.26 M)	73K043, HASRD-DCK, 3/79
94MO	94NB B- DECAY (6.26 M)	73K043, HASRD-DCK, 3/79
95NB	95ZR B- DECAY	72MEHO,74AN22,76HO04, HASRD-DCK, 11/77
95MO	95NB B- DECAY (35.06 D)	72MEHO,74AN22,76HO04, HASRD-DCK, 10/78
95NB	95NB IT DECAY (86.6 H)	72MEHO,76HO04, HASRD-DCK, 11/77
95MO	95NB B- DECAY (86.6 H)	72MEHO,74AN22,76HO04, HASRD-DCK, 10/78
95MO	95TC EC DECAY (20.0 H)	72MEHO,77ME12, HASRD-DCK, 10/78
95MO	95TC EC DECAY (61 D)	72MEHO,73BE54,77ME12, HASRD-DCK, 10/78
95TC	95TC IT DECAY (61 D)	72MEHO, HASRD-DCK, 10/78
96MO	96NB B- DECAY	72ME28, HASRD-DCK, 2/78
96MO	96TC EC DECAY (4.28 D)	72ME28,74GA14, HASRD-DCK, 12/77
96MO	96TC EC DECAY (51.5 M)	72ME28,74GA14, HASRD-DCK, 12/77
96TC	96TC IT DECAY (51.5 M)	72ME28, HASRD-DCK, 12/77
97NB	97ZR B- DECAY	73ME29,73SA36,75CO26, HASRD-DCK, 8/78
97MO	97NB B- DECAY (72.1 M)	73ME29,76KR01, HASRD-DCK, 12/77
97NB	97NB IT DECAY (60 S)	73ME29, HASRD-DCK, 12/77
97MO	97TC EC DECAY (2.6E6 Y)	73ME29, HASRD-DCK, 12/77
97TC	97TC IT DECAY (89 D)	73ME29, HASRD-DCK, 12/77
97TC	97RU EC DECAY	73ME29,74HU05,77KR03, HASRD-DCK, 1/78
98RU	98TC B- DECAY	74ME34, HASRD-DCK, 5/79
99TC	99MO B- DECAY	74ME33,74GA01, HASRD-DCK, 12/77
99RU	99TC B- DECAY (2.13E5 Y)	74ME33,73LE10,74EN02, HASRD-DCK, 12/77
99TC	99TC IT DECAY (6.02 H)	74ME33,74GA01, HASRD-DCK, 12/77
101TC	101MO B- DECAY	73TO17,73AL16,75WR01, HASRD-DCK, 6/79
101RU	101TC B- DECAY	73TO17,75WR01, HASRD-DCK, 12/77
103RH	103RU B- DECAY	74KO36,76MA37, HASRD-DCK, 12/77
103RH	103RH IT DECAY (56.119 M)	74KO36, HASRD-DCK, 12/77
103RH	103PD EC DECAY	74KO36,75CZ05,76MA37, HASRD-DCK, 12/77
105RH	105RU B- DECAY	74BE77,76BA39,77KR09, HASRD-DCK, 5/78
105PD	105RH B- DECAY (35.36 H)	74BE77,76BA39,77WI10, HASRD-DCK, 5/78
105RH	105RH IT DECAY (45 S)	74BE77, HASRD-DCK, 12/77
106RH	106RU B- DECAY	74BE76, HASRD-DCK, 12/77
106PD	106RH B- DECAY (29.92 S)	74BE76,75HS02,77OK02-3, HASRD-DCK, 5/79
106PD	106AG EC DECAY (8.46 D)	74BE76,77TI01,78GE01, HASRD-DCK, 5/79
107AG	107PD B- DECAY	72BEA6, HASRD-DCK, 12/77
108PD	108AG EC DECAY (2.37 M)	72BEA7,73SI02,74RY01, HASRD-DCK, 3/79
108CD	108AG B- DECAY (2.37 M)	72BEA7,73SI02,74RY01, HASRD-DCK, 3/79
108PD	108AG EC DECAY (127 Y)	72BEA7,73BE08,75MO34, HASRD-DCK, 3/79
108AG	108AG IT DECAY (127 Y)	72BEA7,72SC42, HASRD-DCK, 3/79
109AG	109PD B- DECAY (13.453 H)	78BE02,77GI11, HASRD-DCK, 4/78
109AG	109AG IT DECAY (39.6 S)	78BE02, HASRD-DCK, 4/78
109AG	109CD EC DECAY	78BE02, HASRD-DCK, 4/78
110PD	110AG EC DECAY (24.57 S)	77BE64, HASRD-DCK, 12/77
110CD	110AG B- DECAY (24.57 S)	77BE64, HASRD-DCK, 12/77
110AG	110AG IT DECAY (249.85 D)	77BE64, HASRD-DCK, 12/77
110CD	110AG B- DECAY (249.85 D)	77BE64,77GE12,78WA07, HASRD-DCK, 6/79
111CD	111AG B- DECAY (7.46 D)	71RA43,75SH29,77NE10, HASRD-DCK, 5/78
111CD	111CD IT DECAY (48.7 M)	71RA43,75SH29, HASRD-DCK, 1/78
111CD	111IN EC DECAY (2.83 D)	71RA43,72EM01,75SH29, HASRD-DCK, 1/78
113IN	113CD B- DECAY (9.3E15 Y)	71RA44, HASRD-DCK, 1/78
113IN	113CD B- DECAY (13.7 Y)	71RA44,72WA11, HASRD-DCK, 1/78
113IN	113IN IT DECAY (1.658 H)	71RA44,70GO48,76DE35, HASRD-DCK, 1/78
113IN	113SN EC DECAY	71RA44,73IN06,78HE08, HASRD-DCK, 12/78
114CD	114IN EC DECAY (71.9 S)	75KI17, HASRD-DCK, 1/78
114SN	114IN B- DECAY (71.9 S)	75KI17, HASRD-DCK, 1/78
114CD	114IN EC DECAY (49.51 D)	75KI17, HASRD-DCK, 1/78
114IN	114IN IT DECAY (49.51 D)	75KI17, HASRD-DCK, 1/78
115IN	115CD B- DECAY (53.46 H)	75RA27,78HE08, HASRD-DCK, 12/78
115IN	115CD B- DECAY (44.6 D)	75RA27,75BO29,78HE08, HASRD-DCK, 12/78
115SN	115IN B- DECAY (4.6E15 Y)	75RA27,78PF01, HASRD-DCK, 12/78
115IN	115IN IT DECAY (4.36 H)	75RA27,75BU24,78HE08, HASRD-DCK, 12/78
115SN	115IN B- DECAY (4.36 H)	75RA27,78HE08, HASRD-DCK, 12/78
116SN	116IN B- DECAY (54.15 M)	75CA10,74AR13,75YA08, HASRD-DCK, 4/79
117IN	117CD B- DECAY (2.49 H)	78AU06, HASRD-DCK, 5/79
117IN	117CD B- DECAY (3.36 H)	78AU06, HASRD-DCK, 5/79
117SN	117IN B- DECAY (43.8 M)	78AU06, HASRD-DCK, 5/79
117IN	117IN IT DECAY (116.5 M)	78AU06, HASRD-DCK, 5/79
117SN	117IN B- DECAY (116.5 M)	78AU06, HASRD-DCK, 5/79
117SN	117SN IT DECAY (13.60 D)	78AU06, HASRD-DCK, 11/78
117SN	117SB EC DECAY	78AU06, HASRD-DCK, 4/79
119SN	119SN IT DECAY (293.0 D)	79AU01, HASRD-DCK, 4/79
121SB	121TE EC DECAY (16.8 D)	79TA01, HASRD-DCK, 5/79
121SB	121TE EC DECAY (154 D)	79TA01, HASRD-DCK, 5/79
121TE	121TE IT DECAY (154 D)	79TA01, HASRD-DCK, 5/79
122SN	122SB EC DECAY	72BER1, HASRD-DCK, 1/78
122TE	122SB B- DECAY	72BER1, HASRD-DCK, 6/79
122TE	122I B+ DECAY	72BER1, HASRD-DCK, 6/79

122I	122XE EC DECAY	72BER1,73LO10, HASRD-DCK, 6/79
123SB	123SN B- DECAY (129.2 D)	72AUB1,74RA03, HASRD-DCK, 1/78
123SB	123TE EC DECAY (1E13 Y)	72AUB1, HASRD-DCK, 1/78
123TE	123TE IT DECAY (119.7 D)	72AUB1,72EM01,73RA32, HASRD-DCK, 1/78
123TE	123I EC DECAY	72AUB1,76WA13, HASRD-DCK, 1/78
123I	123XE B+ DECAY	72AUB1,74JO16, HASRD-DCK, 6/79
124TE	124SB B- DECAY (60.20 D)	73BE78,74JO03, HASRD-DCK, 1/78
124TE	124I B+ DECAY	73BE78,73KA45, HASRD-DCK, 1/78
125SB	125SN B- DECAY (9.64 D)	72AU10,74GA03, HASRD-DCK, 1/78
125TE	125SB B- DECAY	72AU10,76WA13,77GE12, HASRD-DCK, 8/78
125TE	125TE IT DECAY (58 D)	72AU10,76WA13, HASRD-DCK, 1/78
125TE	125I EC DECAY	72AU10,76MI18, HASRD-DCK, 1/78
125I	125XE EC DECAY	72AU10,76LE23, HASRD-DCK, 6/79
126SB	126SN B- DECAY	73AU10,76SM01, HASRD-DCK, 2/78
126TE	126SB B- DECAY (12.4 D)	73AU10,75BA17, HASRD-DCK, 2/78
126SB	126SB IT DECAY (19.0 M)	73AU10, HASRD-DCK, 2/78
126TE	126SB B- DECAY (19.0 M)	73AU10, HASRD-DCK, 2/78
126TE	126I EC DECAY	73AU10,77JA04, HASRD-DCK, 2/78
126XE	126I B- DECAY	73AU10,77JA04, HASRD-DCK, 6/79
126XE	126CS B+ DECAY	73AU10,76PA11,78DR01, HASRD-DCK, 6/79
127TE	127SB B- DECAY	72AU09, HASRD-DCK, 2/78
127I	127TE B- DECAY (9.35 H)	72AU09,77KU17, HASRD-DCK, 5/78
127TE	127TE IT DECAY (109 D)	72AU09, HASRD-DCK, 2/78
127I	127TE B- DECAY (109 D)	72AU09, HASRD-DCK, 2/78
127I	127XE EC DECAY (36.406 D)	72AU09,74CO05,76LE23, HASRD-DCK, 2/78
128TE	128I EC DECAY	73AU11, HASRD-DCK, 5/79
128XE	128I B- DECAY	73AU11,73OK04, HASRD-DCK, 5/79
129TE	129SB B- DECAY	72HO55,74FO06, HASRD-DCK, 2/78
129I	129TE B- DECAY (69.6 M)	72HO55,74DE15,76MA35, HASRD-DCK, 2/78
129TE	129TE IT DECAY (33.6 D)	72HO55, HASRD-DCK, 2/78
129I	129TE B- DECAY (33.6 D)	72HO55,74DE15,76MA35, HASRD-DCK, 2/78
129XE	129I B- DECAY	72HO55, HASRD-DCK, 2/78
129XE	129XE IT DECAY (8.89 D)	72HO55,73MI08, HASRD-DCK, 4/79
129XE	129CS EC DECAY	72HO55,74MA24,76ME16, HASRD-DCK, 2/78
130XE	130I B- DECAY (12.36 H)	74HI08, HASRD-DCK, 2/78
131I	131TE B- DECAY (25.0 M)	76AU03, HASRD-DCK, 2/78
131TE	131TE IT DECAY (30 H)	76AU03, HASRD-DCK, 2/78
131I	131TE B- DECAY (30 H)	76AU03,75MI14,76DE43, HASRD-DCK, 2/78
131XE	131I B- DECAY	76AU03,76BA42,76KO29, HASRD-DCK, 2/78
131XE	131XE IT DECAY (11.84 D)	76AU03,75HO18, HASRD-DCK, 2/78
131XE	131CS EC DECAY	76AU03, HASRD-DCK, 2/78
131CS	131BA EC DECAY	76AU03,76GE14, HASRD-DCK, 2/78
132I	132TE B- DECAY	76HI02, HASRD-DCK, 2/78
132XE	132I B- DECAY (2.30 H)	76HI02,78NE08, HASRD-DCK, 6/79
132XE	132CS EC DECAY	76HI02, HASRD-DCK, 6/79
132BA	132CS B- DECAY	76HI02, HASRD-DCK, 4/79
133I	133TE B- DECAY (12.45 M)	74HE27, HASRD-DCK, 2/78
133TE	133TE IT DECAY (55.4 M)	74HE27, HASRD-DCK, 2/78
133I	133TE B- DECAY (55.4 M)	74HE27,74FU13, HASRD-DCK, 3/78
133XE	133I B- DECAY	74HE27,74KO26,76ME16, HASRD-DCK, 3/78
133CS	133XE B- DECAY (5.245 D)	74HE27,74CA27, HASRD-DCK, 3/78
133XE	133XE IT DECAY (2.19 D)	74HE27, HASRD-DCK, 3/78
133CS	133BA EC DECAY (10.5 Y)	74HE27,77GE12,77SC31, HASRD-DCK, 8/78
133BA	133BA IT DECAY (38.9 H)	74HE27, HASRD-DCK, 4/79
134I	134TE B- DECAY	75HE08,76ME07, HASRD-DCK, 3/78
134XE	134I B- DECAY (52.6 M)	75HE08,74GU20, HASRD-DCK, 3/78
134BA	134CS B- DECAY (2.062 Y)	75HE08,75VA12,76GR11, HASRD-DCK, 3/78
134CS	134CS IT DECAY (2.90 H)	75HE08, HASRD-DCK, 3/78
135XE	135I B- DECAY	75HE12, HASRD-DCK, 3/78
135CS	135XE B- DECAY (9.11 H)	75HE12, HASRD-DCK, 3/78
135XE	135XE IT DECAY (15.36 M)	75HE12,75FU12, HASRD-DCK, 3/78
135BA	135CS B- DECAY (2.3E6 Y)	75HE12, HASRD-DCK, 3/78
135BA	135BA IT DECAY (28.7 H)	75HE12, HASRD-DCK, 3/78
136XE	136I B- DECAY (83 S)	79PE02, HASRD-DCK, 5/79
136BA	136CS B- DECAY	79PE02, HASRD-DCK, 5/79
137CS	137XE B- DECAY	75BU12,75FR23,77WE02, HASRD-DCK, 3/78
137BA	137CS B- DECAY	75BU12, HASRD-DCK, 12/78
137BA	137BA IT DECAY (2.552 M)	75BU12,76BO16, HASRD-DCK, 3/78
138CS	138XE B- DECAY	76PA04, HASRD-DCK, 4/78
138BA	138CS B- DECAY (32.2 M)	76PA04,75FR23,78WU04, HASRD-DCK, 6/79
139BA	139CS B- DECAY	74GR46,78WU04, HASRD-DCK, 6/79
139LA	139BA B- DECAY	74GR46,78LA03, HASRD-DCK, 12/78
139LA	139CE EC DECAY	74GR46,73LE29,76VA30, HASRD-DCK, 4/78
140LA	140BA B- DECAY	74PE19,77GE12, HASRD-DCK, 8/78
140CE	140LA B- DECAY	74PE19,76LI06,77GE12, HASRD-DCK, 12/78
141LA	141BA B- DECAY	78TU01, HASRD-DCK, 4/78
141CE	141LA B- DECAY	78TU01, HASRD-DCK, 4/78
141PR	141CE B- DECAY	78TU01, HASRD-DCK, 4/78
142LA	142BA B- DECAY	78TU03, HASRD-DCK, 9/78

142CE	142LA B- DECAY	78TU03, HASRD-DCK, 9/78
142ND	142PR B- DECAY (19.13 H)	78TU03, HASRD-DCK, 9/78
143PR	143CE B- DECAY	78TU05, HASRD-DCK, 12/78
143ND	143PR B- DECAY	78TU05, HASRD-DCK, 12/78
143ND	143PM EC DECAY	78TU05, HASRD-DCK, 5/79
144PR	144CE B- DECAY	75BU19,76CH33,77GE12, HASRD-DCK, 8/78
144ND	144PR B- DECAY (17.28 M)	75BU19,76RA22,77GE12, HASRD-DCK, 8/78
144PR	144PR IT DECAY (7.2 M)	75BU19, HASRD-DCK, 5/78
144ND	144PM EC DECAY	75BU19,75AV01, HASRD-DCK, 5/79
145ND	145PM EC DECAY	74BUR1,74TO04, HASRD-DCK, 4/79
146ND	146PM EC DECAY	75BU05,74DR08,74SC06, HASRD-DCK, 5/79
146SM	146PM B- DECAY	75BU05,74DR08,74SC06, HASRD-DCK, 5/79
147PM	147ND B- DECAY	78HA22, HASRD-DCK, 9/78
147SM	147PM B- DECAY	78HA22, HASRD-DCK, 9/78
143ND	147SM A DECAY	78HA22, HASRD-DCK, 9/78
148SM	148PM B- DECAY (5.37 D)	77HA16,77KA14, HASRD-DCK, 5/78
148PM	148PM IT DECAY (41.3 D)	77HA16, HASRD-DCK, 5/78
148SM	148PM B- DECAY (41.3 D)	77HA16,77KA14, HASRD-DCK, 5/78
149PM	149ND B- DECAY	76HO17, HASRD-DCK, 5/78
149SM	149PM B- DECAY	76HO17, HASRD-DCK, 5/78
151SM	151PM B- DECAY	76HA35,77BU12,77HO21, HASRD-DCK, 5/78
151EU	151SM B- DECAY	76HA35, HASRD-DCK, 5/78
152SM	152EU EC DECAY (13.6 Y)	78NCRP,77GE12, HASRD-DCK, 8/78
152GD	152EU B- DECAY (13.6 Y)	78NCRP,75HE13,77GE12, HASRD-DCK, 8/78
152SM	152EU EC DECAY (9.32 H)	78NCRP,75PR05,75SC32, HASRD-DCK, 6/78
152GD	152EU B- DECAY (9.32 H)	78NCRP,75PR05,75SC32, HASRD-DCK, 6/78
148SM	152GD A DECAY	78NCRP, HASRD-DCK, 6/78
153EU	153SM B- DECAY	73KR24, HASRD-DCK, 6/78
153EU	153GD EC DECAY	73KR24,72EM01,74SE08, HASRD-DCK, 6/78
154GD	154EU B- DECAY	79HA02, HASRD-DCK, 5/79
155GD	155EU B- DECAY	75KR07,75KR04, HASRD-DCK, 6/78
156GD	156EU B- DECAY	76BU09,76YA11,77CO22, HASRD-DCK, 7/78
157GD	157TB EC DECAY	73TU06, HASRD-DCK, 7/78
157TB	157DY EC DECAY	73TU06, HASRD-DCK, 7/78
159TB	159GD B- DECAY	73TU05, HASRD-DCK, 7/78
160DY	160TB B- DECAY	74TU07,74FO27,76DA09, HASRD-DCK, 7/78
162TB	162GD B- DECAY	76BU02, HASRD-DCK, 7/78
162DY	162TB B- DECAY	76BU02,77KA08, HASRD-DCK, 7/78
165HO	165DY B- DECAY (2.334 H)	74BU29,74AR26,75AR12, HASRD-DCK, 7/78
166HO	166DY B- DECAY	75BU06, HASRD-DCK, 7/78
166ER	166HO B- DECAY (26.80 H)	75BU06,74GR41,77AL27, HASRD-DCK, 7/78
166ER	166HO B- DECAY (1200 Y)	75BU06,77GE12,78SA14, HASRD-DCK, 12/78
169TM	169ER B- DECAY	73HA76,77MY02, HASRD-DCK, 7/78
169TM	169YB EC DECAY	73HA76,77GE12,78VE07, HASRD-DCK, 6/79
170YB	170TM B- DECAY	75SC26,75BO07, HASRD-DCK, 7/78
171TM	171ER B- DECAY	74HOHA,73EL13,75GO06, HASRD-DCK, 7/78
171YB	171TM B- DECAY	74HOHA, HASRD-DCK, 7/78
175LU	175YB B- DECAY	76MI07, HASRD-DCK, 7/78
177HF	177LU B- DECAY (6.71 D)	75EL07,77KE12, HASRD-DCK, 7/78
177LU	177LU IT DECAY (160.10 D)	75EL07,75MO14,75WA19, HASRD-DCK, 7/78
177HF	177LU B- DECAY (160.10 D)	75EL07,75MO14,75WA19, HASRD-DCK, 7/78
181TA	181HF B- DECAY	73EL18,76CA11,77FR10, HASRD-DCK, 7/78
181TA	181W EC DECAY	73EL18,73MY02, HASRD-DCK, 7/78
182W	182TA B- DECAY	75SC13,76HE18,77GE12, HASRD-DCK, 5/79
182W	182RE EC DECAY (64.0 H)	75SC13,77JE02, HASRD-DCK, 5/79
182W	182RE EC DECAY (12.7 H)	75SC13, HASRD-DCK, 5/79
183W	183RE EC DECAY	75ART1,77BR22, HASRD-DCK, 7/78
184W	184RE EC DECAY (38.0 D)	77MA13, HASRD-DCK, 5/79
184W	184RE EC DECAY (169 D)	77MA13, HASRD-DCK, 5/79
184RE	184RE IT DECAY (169 D)	77MA13, HASRD-DCK, 5/79
185RE	185W B- DECAY	74EL08, HASRD-DCK, 7/78
185RE	185OS EC DECAY	74EL08,77BR22, HASRD-DCK, 7/78
186W	186RE EC DECAY (90.64 H)	74SC38, HASRD-DCK, 7/78
186OS	186RE B- DECAY (90.64 H)	74SC38, HASRD-DCK, 7/78
182W	186OS A DECAY	74SC38,75VI01, HASRD-DCK, 7/78
187RE	187W B- DECAY	75EL02,76BR09, HASRD-DCK, 7/78
187OS	187RE B- DECAY	75EL02, HASRD-DCK, 7/78
188RE	188W B- DECAY	73SC41, HASRD-DCK, 8/78
188OS	188RE B- DECAY	73SC41,74BE75,75SV01, HASRD-DCK, 8/78
190OS	190OS IT DECAY (9.9 M)	73SC42,74BA77, HASRD-DCK, 9/78
190OS	190IR EC DECAY (11.78 D)	73SC42,74HE08,74YA02, HASRD-DCK, 9/78
190IR	190IR IT DECAY (1.2 H)	73SC42, HASRD-DCK, 9/78
190OS	190IR EC DECAY (3.2 H)	73SC42,70BO22, HASRD-DCK, 9/78
190IR	190IR IT DECAY (3.2 H)	73SC42,70BO22, HASRD-DCK, 9/78
191IR	191OS B- DECAY (15.4 D)	73LEW1, HASRD-DCK, 9/78
191OS	191OS IT DECAY (13.03 H)	73LEW1,73LO03, HASRD-DCK, 9/78
191IR	191PT EC DECAY	73LEW1,75RU06, HASRD-DCK, 9/78
192OS	192IR EC DECAY (74.02 D)	73SC43,73GE05,73WI10, HASRD-DCK, 9/78
192PT	192IR B- DECAY (74.02 D)	73SC43,73GE05,73WI10, HASRD-DCK, 9/78

193IR	193OS B- DECAY	72LEW1,73KR05, HASRD-DCK, 9/78
193IR	193IR IT DECAY (11.9 D)	72LEW1, HASRD-DCK, 9/78
193IR	193PT EC DECAY (50 Y)	72LEW1, HASRD-DCK, 9/78
193PT	193PT IT DECAY (4.33 D)	72LEW1, HASRD-DCK, 9/78
194PT	194IR B- DECAY (19.15 H)	77HA46, HASRD-DCK, 9/78
194PT	194IR B- DECAY (171 D)	77HA46, HASRD-DCK, 5/79
194PT	194AU EC DECAY	77HA46,77VY01, HASRD-DCK, 6/79
195PT	195PT IT DECAY (4.02 D)	78HA03, HASRD-DCK, 11/78
195PT	195AU EC DECAY (183 D)	78HA03, HASRD-DCK, 9/78
195AU	195AU IT DECAY (30.6 S)	78HA03, HASRD-DCK, 9/78
196PT	196AU EC DECAY (6.183 D)	72SC50, HASRD-DCK, 9/78
196HG	196AU B- DECAY (6.183 D)	72SC50, HASRD-DCK, 9/78
197AU	197PT B- DECAY (18.3 H)	77HA15, HASRD-DCK, 9/78
197PT	197PT IT DECAY (94.4 M)	77HA15, HASRD-DCK, 9/78
197AU	197PT B- DECAY (94.4 M)	77HA15, HASRD-DCK, 9/78
197AU	197HG EC DECAY (64.14 H)	77HA15, HASRD-DCK, 9/78
197AU	197HG EC DECAY (23.8 H)	77HA15, HASRD-DCK, 9/78
197HG	197HG IT DECAY (23.8 H)	77HA15, HASRD-DCK, 9/78
198HG	198AU B- DECAY (2.696 D)	77HA26,78KE02, HASRD-DCK, 9/78
199HG	199AU B- DECAY	78HA12, HASRD-DCK, 9/78
200HG	200TL EC DECAY	79SC01, HASRD-DCK, 3/79
201HG	201TL EC DECAY	78SC15, HASRD-DCK, 3/79
202HG	202TL EC DECAY	78SC16, HASRD-DCK, 12/78
203TL	203HG B- DECAY	78SC05, HASRD-DCK, 10/78
203TL	203PB EC DECAY	78SC05, HASRD-DCK, 10/78
204HG	204TL EC DECAY	71MA78, HASRD-DCK, 10/78
204PB	204TL B- DECAY	71MA78, HASRD-DCK, 10/78
204PB	204PB IT DECAY (66.9 M)	71MA78,72SI22, HASRD-DCK, 10/78
205TL	205PB EC DECAY	78SC01,78PE08, HASRD-DCK, 5/79
206PB	206BI EC DECAY	79WE01, HASRD-DCK, 3/79
207PB	207TL B- DECAY	77SC19,76BL13, HASRD-DCK, 12/78
207PB	207BI EC DECAY	77SC19,78YA04, HASRD-DCK, 12/78
208PB	208TL B- DECAY	71LEW1,75KO02,77GE12, HASRD-DCK, 10/78
208PB	208BI EC DECAY	71LEW1, HASRD-DCK, 5/79
209PB	209TL B- DECAY	77MA34,77VY02, HASRD-DCK, 10/78
209BI	209PB B- DECAY	77MA34, HASRD-DCK, 10/78
205PB	209PO A DECAY	77MA34, HASRD-DCK, 5/79
209BI	209PO EC DECAY	77MA34, HASRD-DCK, 5/79
210PB	210TL B- DECAY	71LEW2, HASRD-DCK, 10/78
210BI	210PB B- DECAY	71LEW2, HASRD-DCK, 10/78
210PO	210BI B- DECAY (5.013 D)	71LEW2, HASRD-DCK, 10/78
206PB	210PO A DECAY	71LEW2,73GO39, HASRD-DCK, 10/78
211BI	211PB B- DECAY	78MA29,76BL13, HASRD-DCK, 12/78
207TL	211BI A DECAY	78MA29,76BL13, HASRD-DCK, 12/78
211PO	211BI B- DECAY	78MA29, HASRD-DCK, 10/78
207PB	211PO A DECAY (0.516 S)	78MA29, HASRD-DCK, 12/78
207BI	211AT A DECAY	78MA29, HASRD-DCK, 12/78
211PO	211AT EC DECAY	78MA29, HASRD-DCK, 12/78
212BI	212PB B- DECAY	72PAMA,77KU25, HASRD-DCK, 12/78
208TL	212BI A DECAY	72PAMA, HASRD-DCK, 10/78
212PO	212BI B- DECAY	72PAMA, HASRD-DCK, 10/78
208PB	212PO A DECAY	72PAMA,74HU15,75SA06, HASRD-DCK, 10/78
209TL	213BI A DECAY	73MA63,77VY02, HASRD-DCK, 10/78
213PO	213BI B- DECAY	73MA63,77VY02, HASRD-DCK, 10/78
209PB	213PO A DECAY	73MA63,77VY02, HASRD-DCK, 10/78
214BI	214PB B- DECAY	77TO12,77ZO01, HASRD-DCK, 10/78
214PO	214BI B- DECAY	77TO12,77ZO01, HASRD-DCK, 10/78
210PB	214PO A DECAY	77TO12, HASRD-DCK, 10/78
211PB	215PO A DECAY	77MA29, HASRD-DCK, 10/78
212PB	216PO A DECAY	76EL03,77KU15, HASRD-DCK, 10/78
213BI	217AT A DECAY	73MA64, HASRD-DCK, 10/78
214PB	218PO A DECAY	77TO13, HASRD-DCK, 10/78
214PO	218RN A DECAY	77TO13, HASRD-DCK, 10/78
215PO	219RN A DECAY	77MA30,76BL13, HASRD-DCK, 12/78
216PO	220RN A DECAY	76EL04,77KU15, HASRD-DCK, 10/78
217AT	221FR A DECAY	73MA65, HASRD-DCK, 10/78
218PO	222RN A DECAY	77TO14, HASRD-DCK, 11/78
218RN	222RA A DECAY	77TO14, HASRD-DCK, 11/78
223RA	223FR B- DECAY	77MA31, HASRD-DCK, 11/78
219RN	223RA A DECAY	77MA31, HASRD-DCK, 11/78
220RN	224RA A DECAY	76EL05,77KU15,77KU25, HASRD-DCK, 11/78
225AC	225RA B- DECAY	73MA66, HASRD-DCK, 11/78
221FR	225AC A DECAY	73MA66,72DZ14, HASRD-DCK, 11/78
222RN	226RA A DECAY	77TO09,77ZO01, HASRD-DCK, 11/78
222RA	226TH A DECAY	77TO09,76KU08, HASRD-DCK, 11/78
223FR	227AC A DECAY	77MA32, HASRD-DCK, 11/78
227TH	227AC B- DECAY	77MA32, HASRD-DCK, 11/78
223RA	227TH A DECAY	77MA32, HASRD-DCK, 11/78
228AC	228RA B- DECAY	76HO06, HASRD-DCK, 12/78

228TH	228AC B- DECAY	76HO06, HASRD-DCK, 12/78
224RA	228TH A DECAY	76HO06,77KU15,77KU25, HASRD-DCK, 12/78
225RA	229TH A DECAY	78TO04, HASRD-DCK, 12/78
226RA	230TH A DECAY	77EL03,78KU08, HASRD-DCK, 6/79
230TH	230PA EC DECAY	77EL03, HASRD-DCK, 12/78
230U	230PA B- DECAY	77EL03, HASRD-DCK, 12/78
226TH	230U A DECAY	77EL03,76KU08, HASRD-DCK, 12/78
231PA	231TH B- DECAY	77SC15, HASRD-DCK, 12/78
227AC	231PA A DECAY	77SC15, HASRD-DCK, 12/78
231PA	231U EC DECAY	77SC15, HASRD-DCK, 6/79
228RA	232TH A DECAY	77SC13, HASRD-DCK, 1/79
228TH	232U A DECAY	77SC13, HASRD-DCK, 1/79
233PA	233TH B- DECAY	78EL04, HASRD-DCK, 6/79
233U	233PA B- DECAY	78EL04, HASRD-DCK, 1/79
229TH	233U A DECAY	78EL04, HASRD-DCK, 1/79
234PA	234TH B- DECAY	77EL06, HASRD-DCK, 1/79
234U	234PA B- DECAY (6.70 H)	77EL06, HASRD-DCK, 1/79
234PA	234PA IT DECAY (1.17 M)	77EL06,78CH06, HASRD-DCK, 1/79
234U	234PA B- DECAY (1.17 M)	77EL06, HASRD-DCK, 1/79
230TH	234U A DECAY	77EL06, HASRD-DCK, 1/79
231TH	235U A DECAY (7.038E8 Y)	77SC15, HASRD-DCK, 1/79
235U	235NP EC DECAY	77SC15, HASRD-DCK, 2/79
232TH	236U A DECAY	77SC13, HASRD-DCK, 1/79
236U	236NP EC DECAY (1.15E5 Y)	77SC13, HASRD-DCK, 6/79
236PU	236NP B- DECAY (1.15E5 Y)	77SC13, HASRD-DCK, 6/79
236U	236NP EC DECAY (22.5 H)	77SC13,77PO05, HASRD-DCK, 6/79
236PU	236NP B- DECAY (22.5 H)	77SC13, HASRD-DCK, 6/79
232U	236PU A DECAY	77SC13, HASRD-DCK, 1/79
237NP	237U B- DECAY	78EL01, HASRD-DCK, 1/79
233PA	237NP A DECAY	78EL01, HASRD-DCK, 1/79
237NP	237PU EC DECAY	78EL01, HASRD-DCK, 2/79
234TH	238U A DECAY	77EL07, HASRD-DCK, 1/79
238PU	238NP B- DECAY	77EL07, HASRD-DCK, 1/79
234U	238PU A DECAY	77EL07, HASRD-DCK, 1/79
239NP	239U B- DECAY	77SC15, HASRD-DCK, 6/79
239PU	239NP B- DECAY	77SC15, HASRD-DCK, 1/79
235U	239PU A DECAY	77SC15,77JA08, HASRD-DCK, 1/79
240NP	240U B- DECAY	77SC13, HASRD-DCK, 1/79
240PU	240NP B- DECAY (65 M)	77SC13, HASRD-DCK, 1/79
240NP	240NP IT DECAY (7.4 M)	77SC13, HASRD-DCK, 1/79
240PU	240NP B- DECAY (7.4 M)	77SC13, HASRD-DCK, 1/79
236U	240PU A DECAY	77SC13,77BA69,78JA11, HASRD-DCK, 6/79
241AM	241PU B- DECAY	78EL02, HASRD-DCK, 1/79
237NP	241AM A DECAY	78EL02,78GE06,78OV01, HASRD-DCK, 2/79
238U	242PU A DECAY	77EL08,76BU23, HASRD-DCK, 2/79
242PU	242AM EC DECAY (16.02 H)	77EL08, HASRD-DCK, 2/79
242CM	242AM B- DECAY (16.02 H)	77EL08, HASRD-DCK, 2/79
238NP	242AM A DECAY (152 Y)	77EL08, HASRD-DCK, 2/79
242AM	242AM IT DECAY (152 Y)	77EL08, HASRD-DCK, 2/79
238PU	242CM A DECAY	77EL08, HASRD-DCK, 2/79
243AM	243PU B- DECAY	76EL10, HASRD-DCK, 2/79
239NP	243AM A DECAY	76EL10, HASRD-DCK, 2/79
239PU	243CM A DECAY	76EL10, HASRD-DCK, 2/79
240U	244PU A DECAY	76SC02, HASRD-DCK, 2/79
244CM	244AM B- DECAY (10.1 H)	76SC02, HASRD-DCK, 2/79
240PU	244CM A DECAY	76SC02, HASRD-DCK, 2/79
245AM	245PU B- DECAY	76EL01, HASRD-DCK, 6/79
245CM	245AM B- DECAY	76EL01, HASRD-DCK, 6/79
241PU	245CM A DECAY	76EL01, HASRD-DCK, 2/79
246AM	246PU B- DECAY	76SC02, HASRD-DCK, 2/79
246CM	246AM B- DECAY (25.0 M)	76SC02,76MU03, HASRD-DCK, 2/79
242PU	246CM A DECAY	76SC02, HASRD-DCK, 3/79
243PU	247CM A DECAY	76EL02, HASRD-DCK, 3/79
244PU	248CM A DECAY	76SC02,77BA69, HASRD-DCK, 3/79
244CM	248CF A DECAY	76SC02, HASRD-DCK, 6/79
249BK	249CM B- DECAY	76SC09, HASRD-DCK, 3/79
249CF	249BK B- DECAY	76SC09, HASRD-DCK, 3/79
245CM	249CF A DECAY	76SC09, HASRD-DCK, 3/79
246PU	250CM A DECAY	76SC02, HASRD-DCK, 3/79
250BK	250CM B- DECAY	76SC02, HASRD-DCK, 3/79
250CF	250BK B- DECAY	76SC02, HASRD-DCK, 3/79
246CM	250CF A DECAY	76SC02, HASRD-DCK, 3/79
251CF	251BK B- DECAY	76SC09, HASRD-DCK, 3/79
247CM	251CF A DECAY	76SC09, HASRD-DCK, 3/79
248CM	252CF A DECAY	76SC02,76MO30, HASRD-DCK, 3/79
249CM	253CF A DECAY	76SC09, HASRD-DCK, 3/79
253ES	253CF B- DECAY	76SC09, HASRD-DCK, 3/79
249BK	253ES A DECAY	76SC09, HASRD-DCK, 3/79
250CM	254CF A DECAY	76SC02, HASRD-DCK, 3/79

250BK	254ES A DECAY (275.7 D)	76SC02, HASRD-DCK, 3/79
250BK	254ES A DECAY (39.3 H)	76SC02, HASRD-DCK, 3/79
254FM	254ES B- DECAY (39.3 H)	76SC02, HASRD-DCK, 3/79
250CF	254FM A DECAY	76SC02, HASRD-DCK, 3/79
251BK	255ES A DECAY	76SC09, HASRD-DCK, 3/79
255FM	255ES B- DECAY	76SC09, HASRD-DCK, 3/79
251CF	255FM A DECAY	76SC09, HASRD-DCK, 3/79
252CF	256FM A DECAY	76SC02, HASRD-DCK, 3/79

Appendix 3

References for Radioactive Decay Data Sets

This appendix contains the literature references for the radioactive decay data sets corresponding to the key numbers given with the index to tables in Appendix 2.

70Bo22 M.Bormann, H.H.Bissem, E.Magiera, R.Warnemunde - Nucl.Phys. A157, 481 (1970)
Total Cross Sections and Isomeric Cross-Section Ratios for (n,2n) Reactions in the Energy Region 12-18 MeV
70Go48 I.W.Goodier, F.H.Hughes, M.J.Woods - Int.J.Appl.Radiat.Isotop. 21, 678 (1970)
The Decay of Indium-113m
71Aub2 R.L.Auble - Nucl.Data Sheets B5, 109 (1971)
Nuclear Data Sheets fcr A = 84
71Bu08 I.F.Bubb, S.I.H.Naqvi, J.L.Wolfson - Nucl.Phys. A167, 252 (1971)
Gamma Rays Following the Decay of ^{85}Sr and ^{85}m-Sr
71Hor1 D.J.Horen - Nucl.Data Sheets B5, 131 (1971)
Nuclear Data Sheets for A = 85
71Lew1 M.B.Lewis - Nucl.Data Sheets B5, 243 (1971)
Nuclear Data Sheets for A = 208
71Lew2 M.B.Lewis - Nucl.Data Sheets B5, 631 (1971)
Nuclear Data Sheets for A = 210
71Ma78 M.J.Martin - Nucl.Data Sheets B5, 601 (1971)
Nuclear Data Sheets for A = 204
71Ra43 S.Raman, H.J.Kim - Nucl.Data Sheets B6, 39 (1971)
Nuclear Data Sheets for A = 111
71Ra44 S.Raman, H.J.Kim - Nucl.Data Sheets B5, 181 (1971)
Nuclear Data Sheets for A = 113
71Vo06 N.A.Voinova, A.I.Egorov, Y.V.Kalinichev, A.G.Sergeev - Izv.Akad.Nauk SSSR, Ser.Fiz. 35, 861 (1971); Bull.Acad.Sci.USSR, Phys.Ser. 35, 794 (1972)
Properties of Low-Lying Excited Levels of ^{85}Sr and ^{99}Tc
72Aub1 R.L.Auble - Nucl.Data Sheets B7, 363 (1972)
Nuclear Data Sheets for A = 123
72Au09 R.L.Auble - Nucl.Data Sheets B8, 77 (1972)
Nuclear Data Sheets for A = 127
72Au10 R.L.Auble - Nucl.Data Sheets B7, 465 (1972)
Nuclear Data Sheets for A = 125 R.L.Auble - Nucl.Data Sheets B7, 465 (1972) Nuclear Data Sheets for A = 125
72BeA6 F.E.Bertrand, D.J.Horen - Nucl.Data Sheets B7, 1 (1972)
Nuclear Data Sheets for A = 107
72BeA7 F.E.Bertrand - Nucl.Data Sheets B7, 33 (1972)
Nuclear Data Sheets for A = 108
72Ber1 F.E.Bertrand - Nucl.Data Sheets B7, 419 (1972)
Nuclear Data Sheets for A = 122
72Dz14 B.S.Dzhelepov, R.B.Ivanov, M.A.Mikhailova, V.O.Sergeev - Izv.Akad.Nauk SSSR, Ser.Fiz. 36, 2080 (1972); Bull.Acad.Sci.USSR, Phys.Ser. 36, 1832 (1973)
γ-Spectrum of ^{225}Ac
72Em01 J.F.Emery, S.A.Reynolds, E.I.Wyatt, G.I.Gleason - Nucl.Sci.Eng. 48, 319 (1972)
Half-Lives of Radionuclides - IV
72He41 W.Herzog, W.Grimm - Z.Phys. 257, 424 (1972)
Der Zerfall des ^{93}Sr
72Hi03 J.C.Hill, K.H.Wang - Phys.Rev. C5, 805 (1972)
Decay of ^{84}Br
72Ho55 D.J.Horen - Nucl.Data Sheets B8, 123 (1972)
Nuclear Data Sheets for A = 129
72Ko59 D.C.Kocher - Nucl.Data Sheets B8, 527 (1972)
Nuclear Data Sheets for A = 93
72Ko60 D.C.Kocher, D.J.Horen - Nucl.Data Sheets B7, 299 (1972)
Nuclear Data Sheets for A = 92 D.C.Kocher, D.J.Horen - Nucl.Data Sheets B7, 299 (1972) Nuclear Data Sheets for A = 92
72Lew1 M.B.Lewis - Nucl.Data Sheets B8, 389 (1972)
Nuclear Data Sheets for A = 193
72MeHo L.R.Medsker, D.J.Horen - Nucl.Data Sheets B8, 29 (1972)
Nuclear Data Sheets for A = 95
72Me28 L.R.Medsker - Nucl.Data Sheets B8, 599 (1972)
Nuclear Data Sheets for A = 96
72Ol03 R.J.Olson, W.L.Talbert,Jr., J.R.McConnell - Phys.Rev. C5, 2095 (1972)
Gamma-Ray Studies of the Decays of ^{92}Kr, ^{92}Rb, and ^{92}Sr
72PaMa S.C.Pancholi, M.J.Martin - Nucl.Data Sheets B8, 165 (1972)
Nuclear Data Sheets for A = 212
72Sc42 W.-D.Schmidt-Ott, R.W.Fink - Z.Phys. 254, 281 (1972)
The K-Conversion Coefficient Near Threshold of the 30 keV Isomeric Transition in ^{108}m-Ag Decay
72Sc50 M.R.Schmorak - Nucl.Data Sheets B7, 395 (1972)
Nuclear Data Sheets for A = 196
72Si22 C.Signorini, H.Morinaga - Phys.Lett. 40B, 549 (1972)
A $4^+ \rightarrow 0^+$ Cross-over Transition in ^{204}Pb
72Ve09 H.Verheul, W.B.Ewbank - Nucl.Data Sheets B8, 477 (1972)
Nuclear Data Sheets for A = 91
72Wa11 A.C.Wahl - J.Inorg.Nucl.Chem. 34, 1767 (1972)
14.6 +/- 0.5 Year Half-Life of ^{113}m-Cd
73Al16 A.V.Aldushchenkov, N.A.Voinova, V.G.Dubro, A.I.Egorov, Y.V.Kalinichev, D.M.Kaminker, L.K.Peker, A.G.Sergeev - Izv.Akad.Nauk SSSR, Ser.Fiz. 37, 965 (1973); Bull.Acad.Sci.USSR, Phys.Ser. 37, No.5, 48 (1974)
Three-Particle and 'Anomalous' Excited States of ^{101}Tc
73Al33 K.R.Alvar - Nucl.Data Sheets 10, 205 (1973)
Nuclear Data Sheets for A = 71

73Au10 R.L.Auble - Nucl.Data Sheets 9, 125 (1973)
Nuclear Data Sheets for A = 126

73Au11 R.L.Auble - Nucl.Data Sheets 9, 157 (1973)
Nuclear Data Sheets for A = 128

73Be08 M.Behar, K.S.Krane, R.M.Steffen, M.E.Bunker - Nucl.Phys. A201, 126 (1973)
The Spin and Parity of the 1771.2 keV Excited State of ^{108}Pd

73Be34 M.Behar, D.A.Garber, Z.W.Grabowski - Nucl.Phys. A209, 525 (1973)
Spins of the Levels and Multipole Mixing Ratios of the Transitions in ^{95}Mo

73Be78 F.E.Bertrand - Nucl.Data Sheets 10, 91 (1973)
Nuclear Data Sheets for A = 124

73El13 M.S.El-Nesr, E.Bashandy - Z.Naturforsch. 28a, 1959 (1973)
Anomalous L-Subshell Internal Conversion of Some Hindered E1 Transitions in ^{171}Tm, ^{175}Lu and ^{177}Hf

73El18 Y.A.Ellis - Nucl.Data Sheets 9, 319 (1973)
Nuclear Data Sheets for A = 181

73EnVa P.M.Endt, C.Van der Leun - Nucl.Phys. A214, 1 (1973); Erratum Nucl.Phys. A248, 153 (1975)
Energy Levels of A = 21-44 Nuclei (V)

73Ge05 R.J.Gehrke - Nucl.Phys. A204, 26 (1973)
The Decay of ^{192}Ir

73Go39 D.J.Gorman, A.Rytz - C.R.Acad.Sci., Ser.B 277, 29 (1973)
Nouvelle Determination Absolue de l'Energie α du ^{210}Po

73Ha11 J.K.Halbig, F.K.Wohn, W.L.Talbert,Jr., J.J.Eitter, J.R.McConnell - Nucl.Phys. A203, 532 (1973)
The β-Decay of ^{91}Sr

73Ha76 B.Harmatz - Nucl.Data Sheets 10, 359 (1973)
Nuclear Data Sheets for A = 169

73In06 H.Inoue, Y.Yoshizawa, T.Morii - J.Phys.Soc.Jap. 34, 1437 (1973)
Gamma-Ray Energies and Relative Intensities of ^{75}Se, ^{108}m-Ag, ^{113}Sn, ^{131}I and ^{133}Ba

73Ka45 H.M.A.Karim - Radiochim.Acta 19, 1 (1973)
A Study of 4 GeV Electron Spallation Products of Iodine-I

73Ko43 D.C.Kocher - Nucl.Data Sheets 10, 241 (1973)
Nuclear Data Sheets for A = 94

73Kr05 K.S.Krane, W.A.Steyert - Phys.Rev. C7, 1555 (1973)
Nuclear Orientation Studies of the Decays of ^{187}W and ^{185,191,193}Os

73Kr24 L.A.Kroger, C.W.Reich - Nucl.Data Sheets 10, 429 (1973)
Nuclear Data Sheets for A = 153

73Lew1 M.B.Lewis - Nucl.Data Sheets 9, 479 (1973)
Nuclear Data Sheets for A = 191

73Le10 J.Legrand, J.Morel - Phys.Rev. C8, 366 (1973)
Evidence of a Low-Intensity β^- Transition in the Disintegration of ^{99}Tc

73Le29 J.Legrand, M.Blondel, P.Magnier - Nucl.Instrum.Methods 112, 101 (1973)
High-Pressure 4π Proportional Counter for Internal Conversion Electron Measurements (^{139}Ce, ^{109}Cd, ^{99}Tc-m)

73Lo03 P.Loeweneck, B.Martin - Nucl.Phys. A203, 332 (1973)
Nuclear Structure Effect in Internal Conversion of the Isomeric Transition in ^{191}Os

73Lo10 D.Lode, F.Munnich, A.Hoglund, S.G.Malmskog - Nucl.Phys. A209, 170 (1973)
Half-Life Measurements of Excited Levels in ^{122}I

73Ma63 C.Maples - Nucl.Data Sheets 10, 597 (1973)
Nuclear Data Sheets for A = 213

73Ma64 C.Maples - Nucl.Data Sheets 10, 611 (1973)
Nuclear Data Sheets for A = 217

73Ma65 C.Maples - Nucl.Data Sheets 10, 625 (1973)
Nuclear Data Sheets for A = 221

73Ma66 C.Maples - Nucl.Data Sheets 10, 643 (1973)
Nuclear Data Sheets for A = 225

73Me29 L.R.Medsker - Nucl.Data Sheets 10, 1 (1973)
Nuclear Data Sheets for A = 97

73Mi08 L.D.Miller, F.J.Schima - Int.J.Appl.Radiat.Isotop. 24, 353 (1973)
The Half-Life of ^{129}m-Xe

73My02 W.A.Myers, R.J.Nagle,Jr. - J.Inorg.Nucl.Chem. 35, 3985 (1973)
The Half-Life of ^{181}W

73Ok04 K.Okano, Y.Kawase, T.Hayashi - Nucl.Instrum.Methods 108, 279 (1973)
Gamma-Gamma Angular Correlation Apparatus with on-Line Irradiation System for the Study of Short-Lived Isotopes

73Ra32 S.Raman, R.L.Auble, W.T.Milner - Phys.Lett. 47B, 19 (1973)
An E5 Transition in ^{123}Te and E5 Transitions in General

73Sa36 D.C.Santry, R.D.Werner - Can.J.Phys. 51, 2441 (1973)
Thermal Neutron Activation Cross Sections and Resonance Integrals of ^{94}Zr and ^{96}Zr

73Sc41 M.R. Schmorak - Nucl.Data Sheets 10, 553 (1973)
Nuclear Data Sheets for A = 188

73Sc42 M.R.Schmorak - Nucl.Data Sheets 9, 401 (1973)
Nuclear Data Sheets for A = 190

73Sc43 M.R.Schmorak - Nucl.Data Sheets 9, 195 (1973)
Nuclear Data Sheets for A = 192

73Si02 N.C.Singhal, N.R.Johnson, E.Eichler, J.H.Hamilton - Phys.Rev. C7, 774 (1973)
Gamma-Ray Studies on the Decay of 2.41-min ^{108}Ag

73Ta15 W.L.Talbert,Jr., R.J.Hanson - Phys.Rev. C8, 1945 (1973)
Decay of Mass-Separated ^{93}Y
73To17 R.R.Todd, W.H.Kelly, F.M.Bernthal, W.C.McHarris - Nucl.Data Sheets 10, 47 (1973)
Nuclear Data Sheets for A = 101
73Tu05 J.K.Tuli - Nucl.Data Sheets 9, 435 (1973)
Nuclear Data Sheets for A = 159
73Tu06 J.K.Tuli - Nucl.Data Sheets 9, 273 (1973)
Nuclear Data Sheets for A = 157
73Wi10 J.B.Willett, G.T.Emery - Ann.Phys.(New York) 78, 496 (1973)
Relative Intensity and Internal Conversion Coefficient Measurements in The Decays of ^{51}Cr, ^{137}Cs, ^{192}Ir, and ^{207}Bi
74Ac04 E.Achterberg, F.C.Iglesias, A.E.Jech, J.A.Moragues, D.Otero, M.L.Perez, A.N.Proto, J.J.Rossi, W.Scheuer - Phys.Rev. C10, 2526 (1974)
Levels of ^{93}Rb, ^{93}Sr, and ^{93}Y Fed in the Decays of ^{93}Kr, ^{93}Rb, and ^{93}Sr
74Aj01 F.Ajzenberg-Selove, T.Lauritsen - Nucl.Phys. A227, 1 (1974)
Energy Levels of Light Nuclei A = 5-10
74Al33 K.R.Alvar - Nucl.Data Sheets 13, 305 (1974)
Nuclear Data Sheets for A = 73
74Al34 K.R.Alvar - Nucl.Data Sheets 11, 121 (1974)
Nuclear Data Sheets for A = 72
74An22 N.M.Antoneva, A.V.Barkov, A.V.Zolotavin, G.S.Katykhin, V.M.Makarov, V.O.Sergeev - Izv.Akad.Nauk SSSR, Ser.Fiz. 38, 1741 (1974); Bull.Acad.Sci.USSR, Phys.Ser. 38, No.8, 154 (1974)
Weak Beta and Gamma Transitions in the Decay of ^{95}Zr, ^{95}Nb*, and ^{95}Nb-g
74Ar13 G.Ardisson - Radiochem.Radioanal.Lett. 16, 241 (1974)
Decroissance du $^{116}m_1$In (T = 54 mn)
74Ar26 G.Ardisson - Radiochem.Radioanal.Lett. 18, 365 (1974)
Decroissance du ^{165}Dy
74Ba77 H.Backe, R.Engfer, E.Kankeleit, R.Link, R.Michaelsen, C.Pettitjean, L.Schellenberg, H.Schneuwly, W.U.Schroder, J.L.Vuilleumier, H.K.Walter, A.Zehnder - Nucl.Phys. A234, 469 (1974)
Nuclear Excitation and Isomer Shifts in Muonic Atoms (I). Experiment and Evaluation
74Be75 B.N.Belyaev, S.S.Vasilenko, D.M.Kaminker, Y.V.Sergeenkov - Izv.Akad.Nauk SSSR, Ser.Fiz. 38, 2505 (1974); Bull.Acad.Sci.USSR, Phys.Ser. 38, No.12, 35 (1974)
Excited States of ^{188}Os. E0 Transitions
74Be76 F.E.Bertrand - Nucl.Data Sheets 13, 397 (1974)
Nuclear Data Sheets for A = 106
74Be77 F.E.Bertrand - Nucl.Data Sheets 11, 449 (1974)
Nuclear Data Sheets for A = 105
74Bur1 T.W.Burrows - Nucl.Data Sheets 12, 203 (1974)
Nuclear Data Sheets for A = 145
74Bu29 A.Buyrn - Nucl.Data Sheets 11, 189 (1974)
Nuclear Data Sheets for A = 165
74Ca27 L.M.Cavallo, F.J.Schima, M.P.Unterweger - Phys.Rev. C10, 2631 (1974)
Decay of ^{133}Xe-g
74Co05 R.Colle, R.Kishore - Phys.Rev. C9, 981 (1974)
Absolute γ-Ray Intensities in the Decay of ^{79}Kr and ^{127}Xe
74De15 J.De Raedt, M.Rots, H.Van de Voorde - Phys.Rev. C9, 2391 (1974)
Angular Correlation Study of ^{129}I Populated in the Decay of ^{129}Te
74Dr08 P.Drehmann - Z.Phys. 271, 349 (1974)
Beta-gamma-Winkelkorrelation bei ^{146}Pm
74El08 Y.A.Ellis - Nucl.Data Sheets 12, 533 (1974)
Nuclear Data Sheets for A = 185
74En02 C.E.Engelke, J.D.Ullman - Phys.Rev. C9, 2358 (1974)
Observation of a Weak Beta-Decay Branch in ^{99}Tc
74Fo06 M.M.Fowler, G.W.Goth, C.-C.Lin, A.C.Wahl - J.Inorg.Nucl.Chem. 36, 1191 (1974); A.C.Wahl, Priv.Comm. (January 1974)
Half-Lives of Tin and Antimony Fission Products with A = 128-133
74Fo27 R.A.Fox, W.D.Hamilton, D.D.Warner - J.Phys.(London) A7, 1716 (1974)
Multipole Mixing Ratios of Gamma Rays Emitted in the Decay of Polarized ^{160}Tb
74Fu13 I.Fujiwara, N.Imanishi, T.Nishi - J.Inorg.Nucl.Chem. 36, 1921 (1974)
Decay of ^{131}Te and ^{133}Te Isomers
74Ga01 P.L.Gardulski, M.L.Wiedenbeck - Phys.Rev. C9, 262 (1974)
Multipole Mixing Ratios of Transitions in ^{99}Tc
74Ga03 D.A.Garber, M.Behar, Z.W.Grabowski, Y.W.Yu - Nucl.Phys. A219, 370 (1974)
Spins of the Levels and Multipole Mixing Ratios of Transitions in ^{125}Sb Determined from γ-γ Directional Correlation and Polarization-Directional Correlation Measurements
74Ga14 V.I.Gavrilyuk, A.A.Klyuchnikov, V.T.Kupryashkin, G.D.Latyshev, V.K.Maidanyuk, Y.V.Makovetskii, A.F.Novgorodov, A.I.Feoktistov - Izv.Akad.Nauk SSSR, Ser.Fiz. 38, 36 (1974); Bull.Acad.Sci.USSR, Phys.Ser. 38, No.1, 31 (1974)
The Internal Conversion Spectrum of ^{96}Tc
74Gr41 E.P.Grigorev, A.V.Zolotavin, S.V.Kamynov - Izv.Akad.Nauk SSSR, Ser.Fiz. 38, 2499 (1974); Bull.Acad.Sci.USSR, Phys.Ser. 38, No.12, 30 (1974)
Decay of ^{166}g-Ho
74Gr46 L.R.Greenwood - Nucl.Data Sheets 12, 139 (1974)
Nuclear Data Sheets for A = 139

74Gu20 J.M.Gualda, R.N.Saxena, F.C.Zawislak - Nucl.Phys. A234, 357 (1974)
Directional Correlations of γ-Transitions in ^{134}Xe
74Gu30 J.M.Gualda, R.N.Saxena - Rev.Brasil.Fis. 4, 47 (1974)
Nuclear Spectroscopic Studies of Low-Lying States in ^{77}As
74He08 H.Helppi, A.Pakkanen, J.Hattula - Nucl.Phys. A223, 13 (1974)
The E2/M1 Mixing of the Transitions from the $K\pi = 2^+$ Bands in ^{190,192}Os and ^{192}Pt
74He27 E.A.Henry - Nucl.Data Sheets 11, 495 (1974)
Nuclear Data Sheets for A = 133
74Hi08 H.R.Hiddleston, C.P.Browne - Nucl.Data Sheets 13, 133 (1974)
Nuclear Data Sheets for A = 130
74HoHa D.J.Horen, B.Harmatz - Nucl.Data Sheets 11, 549 (1974)
Nuclear Data Sheets for A = 171
74Hu05 B.W.Huber, K.Kramer - Z.Phys. 267, 111 (1974)
Levels of ^{97}Tc from the Decay of ^{97}Ru
74Hu15 E.Huenges, H.Vonach, J.Labetzki - Nucl.Instrum.Methods 121, 307 (1974)
Precision Time-of-Flight System for Measurement of the Beam Energy of the Munich Tandem Accelerator
74Jo03 J.R.Johnson, K.C.Mann - Can.J.Phys. 52, 406 (1974)
The Decay of ^{124}Sb
74Jo16 A.S.Johnston - Med.Phys. 1, 280 (1974)
Photon Yield of 148.9-keV Gamma of ^{123}Xe
74Ko26 B.K.S.Koene, H.Ligthart, H.Postma - Nucl.Phys. A235, 267 (1974)
Directional Distribution of γ-Rays from Oriented ^{133}I
74Ko36 D.C.Kocher - Nucl.Data Sheets 13, 337 (1974)
Nuclear Data Sheets for A = 103
74Ma24 G.Marest, R.Haroutunian, I.Berkes, M.Meyer, M.Rots, J.De Raedt, H.Van de Voorde, H.Oonis, R.Coussement - Phys.Rev. C10, 402 (1974)
Electromagnetic Properties of Low-Lying Levels of ^{129}Xe
74Ma30 H.Mabuchi, H.Takahashi, Y.Nakamura, K.Notsu, H.Hamaguchi - J.Inorg.Nucl.Chem. 36, 1687 (1974)
The Half-Life of ^{41}Ca
74Me33 L.R.Medsker - Nucl.Data Sheets 12, 431 (1974)
Nuclear Data Sheets for A = 99
74Me34 L.R.Medsker - Nucl.Data Sheets 11, 157 (1974)
Nuclear Data Sheets for A = 98
74Pe19 L.K.Peker, V.M.Sigalov, Y.I.Kharitonov - Nucl.Data Sheets 12, 343 (1974)
Nuclear Data Sheets for A = 140
74Ra03 S.Raman, R.L.Auble, F.F.Dyer - Phys.Rev. C9, 426 (1974)
Weak Gamma Transitions in 129-Day ^{123}Sn-g Decay
74Ry01 T.B.Ryves, K.J.Zieba - J.Phys.(London) A7, 2318 (1974)
The Resonance Integrals of ^{63}Cu, ^{65}Cu, ^{107}Ag, ^{159}Tb, ^{164}Dy, and ^{165}Ho
74Sc06 H.M.Schupferling, K.-W.Hoffmann - Z.Phys. 266, 129 (1974)
Formfaktor des Betaspektrums von ^{146}Pm
74Sc38 M.R.Schmorak - Nucl.Data Sheets 13, 267 (1974)
Nuclear Data Sheets for A = 186
74Se08 V.A.Sergienko, V.M.Lebedev - Izv.Akad.Nauk SSSR, Ser.Fiz. 38, 802 (1974); Bull.Acad.Sci.USSR, Phys.Ser. 38, No.4, 122 (1974)
Determining K-Capture Intensities for ^{153}Gd → ^{153}Eu Decay
74To04 F.Tolea, K.R.Baker, W.D.Schmidt-Ott, R.W.Fink - Z.Phys. 268, 289 (1974)
The Electron Capture Decay of ^{125}I and ^{145}Pm
74Tu07 J.K.Tuli - Nucl.Data Sheets 12, 477 (1974)
Nuclear Data Sheets for A = 160
74Ya02 S.W.Yates, J.C.Cunnane, P.J.Daly, R.Thompson, R.K.Sheline - Nucl.Phys. A222, 276 (1974)
Levels of ^{190}Os Populated in the Decays of 3.3 h ^{190m}-Re and 12 d ^{190}Ir and in the ^{189}Os(d,p)^{190}Os Reaction
75Aj02 F.Ajzenberg-Selove - Nucl.Phys. A248, 1 (1975)
Energy Levels of Light Nuclei A = 11-12
75Art1 A.Artna-Cohen - Nucl.Data Sheets 16, 267 (1975)
Nuclear Data Sheets for A = 183
75Ar12 G.Ardisson - Nucl.Instrum.Methods 126, 269 (1975)
Energies et Intensities des γ Qui Suivent la Disintegration de ^{165}Dy
75Au03 R.L.Auble - Nucl.Data Sheets 14, 119 (1975)
Nuclear Data Sheets for A = 63
75Au05 R.L.Auble - Nucl.Data Sheets 16, 1 (1975)
Nuclear Data Sheets for A = 61
75Au08 R.L.Auble - Nucl.Data Sheets 16, 351 (1975)
Nuclear Data Sheets for A = 65
75Au10 R.L.Auble - Nucl.Data Sheets 16, 417 (1975)
Nuclear Data Sheets for A = 67
75Av01 F.T.Avignone,III, S.Raman - Phys.Rev. C12, 963 (1975)
Internal Conversion Studies in ^{144}Nd
75Az01 G.Azuelos, J.E.Kitching - Phys.Rev. C12, 563 (1975)
Half-Lives of Some T = 1/2 Mirror Decays
75Ba17 C.Bargholtz, J.Becker, S.Beshai, L.Eriksson, K.Fransson, L.Gidefeldt, L.Holmberg, V.Stefansson - Z.Phys. A272, 3 (1975)
Levels and Transitions in ^{126}Te
75Bo07 G.L.Borchert, W.Scheck, K.P.Wieder - Z.Naturforsch. 30a, 274 (1975)
Precision Measurement of the γ-Ray Energies from the Radioactive Decay of ^{51}Cr, ^{169}Yb, ^{170}Tm, ^{192}Ir and ^{203}Hg

75Bo29 H.E.Bosch, J.Davidson, V.Silbergleit, C.A.Heras, S.M.Abecasis - Z.Phys. A273, 373 (1975)
Studies on the Nuclear Structure of ^{115}In

75Bu05 T.W.Burrows - Nucl.Data Sheets 14, 413 (1975)
Nuclear Data Sheets for A = 146

75Bu06 A.Buyrn - Nucl.Data Sheets 14, 471 (1975)
Nuclear Data Sheets for A = 166

75Bu12 R.L.Bunting - Nucl.Data Sheets 15, 335 (1975)
Nuclear Data Sheets for A = 137

75Bu19 T.W.Burrows, R.L.Auble - Nucl.Data Sheets 16, 231 (1975)
Nuclear Data Sheets for A = 144

75Bu24 B.Bulow, M.Eriksson, G.G.Jonsson, E.Hagebo - Z.Phys. A275, 261 (1975)
Some (γ,1pxn) Reactions in ^{118}Sn at Intermediate Energies

75Ca10 G.H.Carlson, W.L.Talbert,Jr., S.Raman - Nucl.Data Sheets 14, 247 (1975)
Nuclear Data Sheets for A = 116

75Ca37 M.C.Cambiaggio, G.Garcia Bermudez, M.Behar - Z.Phys. A275, 183 (1975)
The Spin of the 2.198 keV Level in ^{74}Ge and Multipole Mixing Ratios of Gamma Transitions in the Decay of ^{74}As

75Ch32 R.N.Cherry,Jr., N.L.Wiedenbeck - Nucl.Phys. A252, 445 (1975)
Directional Correlations of Gamma Rays in ^{77}As

75Co26 V.Cojocaru, D.Pantelica, M.Patrutescu, M.Salagean - Rev.Roum.Phys. 20, 729 (1975)
The Level Scheme of ^{97}Nb Nucleus

75Cz05 K.H.Czock, N.Haselberger, F.Reichel, S.Popa - Int.J.Appl.Radiat.Isotop. 26, 782 (1975)
Determination of the Half-Life of ^{103}Pd

75El02 Y.A.Ellis - Nucl.Data Sheets 14, 347 (1975)
Nuclear Data Sheets for A = 187

75El07 Y.A.Ellis, B.Harmatz - Nucl.Data Sheets 16, 135 (1975)
Nuclear Data Sheets for A = 177

75Fi08 S.Fiarman, S.S.Hanna - Nucl.Phys. A251, 1 (1975)
Energy Levels of Light Nuclei A = 3

75Fr23 K.Fransson, A.Nilsson, J.de Raedt, L.Tauscher - Nucl.Instrum.Methods 131, 511 (1975)
Precise Energy Determination of the First Excited State in ^{137}Cs for Absolute Energy Calibration in Muonic Atoms

75Fu12 T.Fukuda, S.Omori - J.At.Energy Soc.Jap. 17, 177 (1975)
A Dry Method for Separating Xenon from its Precursor Fission-Iodine: Measurements of the ^{135}I Branching Ratio and Half-Life of ^{135}m-Xe

75Go06 K.P.Gopinathan, S.B.Patel - Phys.Rev. C11, 1364 (1975)
Properties of the Excited States in ^{171}Tm

75Gr19 L.R.Greenwood - Nucl.Data Sheets 15, 289 (1975)
Nuclear Data Sheets for A = 80

75He08 E.A.Henry - Nucl.Data Sheets 15, 203 (1975)
Nuclear Data Sheets for A = 134

75He12 E.A.Henry - Nucl.Data Sheets 14, 191 (1975)
Nuclear Data Sheets for A = 135

75He13 H.Helppi, A.Pakkanen, J.Hattula - Nucl.Phys. A247, 317 (1975)
Mixing of the Transitions from the 3$^+$ Quasi γ-Band Level in ^{152}Gd

75Ho17 D.J.Horen, M.B.Lewis - Nucl.Data Sheets 16, 25 (1975)
Nuclear Data Sheets for A = 75

75Ho18 D.C.Hoffman, J.W.Barnes, B.J.Dropesky, F.O.Lawrence, G.M.Kelley, M.A.Ott - J.Inorg.Nucl.Chem. 37, 2336 (1975)
Half-Lives of ^{129}m-Xe, ^{131}m-Xe, ^{133}m-Xe, ^{133}g-Xe and ^{135}g-Xe

75Hs02 S.T.Hsue, H.H.Hsu, F.K.Wohn, W.R.Western, S.A.Williams - Phys.Rev. C12, 582 (1975)
Level Structure of ^{106}Pd from the Decay of ^{106}Rh

75Ki10 R.Kishore, R.Colle, S.Katcoff, J.B.Cumming - Phys.Rev. C12, 21 (1975)
^{37}Cl(p,n)^{37}Ar Excitation Function up to 24 Mev: Study of (p,n) Reactions

75Ki17 H.J.Kim - Nucl.Data Sheets 16, 107 (1975)
Nuclear Data Sheets for A = 114

75Ki19 H.J.Kim - Nucl.Data Sheets 16, 317 (1975)
Nuclear Data Sheets for A = 60

75Ko02 M.Kortelahti, A.Pakkanen, J.Kantele - Nucl.Phys. A240, 87 (1975)
Electromagnetic Transition Rates in ^{208}Pb

75Ko07 D.C.Kocher - Nucl.Data Sheets 15, 169 (1975)
Nuclear Data Sheets for A = 83

75Ko16 D.C.Kocher - Nucl.Data Sheets 16, 55 (1975)
Nuclear Data Sheets for A = 90

75Ko21 D.C.Kocher - Nucl.Data Sheets 16, 445 (1975)
Nuclear Data Sheets for A = 89

75Kr04 H.J.Krell, S.Hofmann - Z.Phys. A272, 257 (1975)
$\gamma\gamma$-Winkelkorrelationsmessungen an ^{155}Gd

75Kr07 L.A.Kroger, C.W.Reich - Nucl.Data Sheets 15, 409 (1975)
Nuclear Data Sheets for A = 155

75Le08 J.F.Lemming - Nucl.Data Sheets 15, 137 (1975)
Nuclear Data Sheets for A = 81

75Le11 J.F.Lemming, R.L.Auble - Nucl.Data Sheets 15, 315 (1975)
Nuclear Data Sheets for A = 82

75Le12 M.B.Lewis - Nucl.Data Sheets 14, 155 (1975)
Nuclear Data Sheets for A = 68

75Mi14 Z.Miligy, D.A.E.Darwish, S.A.Eid - Acta Phys. 38, 123 (1975)
The Decay of ^{131}g-Te and ^{131}m-Te to ^{131}I Levels

75Mo14 T.Morii - J.Phys.Soc.Jap. 38, 616 (1975)
Precise Measurement of Rotational Levels of ^{177}Lu and ^{177}Hf

75Mo34 T.Morii, T.Saito - Nucl.Instrum.Methods 131, 197 (1975)
The 434 keV Gamma Ray of ^{108}Ag-m as a New Energy Standard

75Nu03 F.M.Nuh, D.R.Slaughter, S.G.Prussin - Nucl.Phys. A250, 1 (1975)
Decay of ^{85}Br

75Pa07 A.Pakkanen, M.Kortelahti, H.Helppi, J.Kantele, T.Poikolainen, R.Komu - Z.Phys. A274, 127 (1975)
Decay of 14.6 h ^{90}Nb

75Pr05 H.S.Pruys, E.A.Hermes, H.R.Von Gunten - J.Inorg.Nucl.Chem. 37, 1587 (1975)
The Decay of ^{152m1}Eu and ^{152m2}Eu and Reaction Cross Sections of ^{153}Eu for 14 MeV Neutrons

75Ra27 S.Raman, H.J.Kim - Nucl.Data Sheets 16, 195 (1975)
Nuclear Data Sheets for A = 115

75Ru06 H.Rubinsztein, M.Gustafsson - Phys.Lett. 58B, 283 (1975)
Nuclear Spin Measurements on Neutron-Deficient Isotopes of the Refractory Elements

75Sa06 S.Sanyal, R.K.Garg, S.D.Chauhan, S.L.Gupta, S.C.Pancholi - Phys.Rev. C12, 318 (1975)
Half-Life Measurement of the ^{212}Po Ground State

75Sc13 M.R.Schmorak - Nucl.Data Sheets 14, 559 (1975)
Nuclear Data Sheets for A = 182

75Sc26 M.R.Schmorak, R.L.Auble - Nucl.Data Sheets 15, 371 (1975)
Nuclear Data Sheets for A = 170

75Sc32 U.Schneider, U.Hauser - Z.Phys. A273, 239 (1975)
On E0 Transitions in the Decay of ^{152}Eu-m (9.3 h)

75Sh29 G.A.Shevelev, A.G.Troitskaya, V.M.Kartashov - Izv.Akad.Nauk SSSR, Ser.Fiz. 39, 2038 (1975); Bull.Acad.Sci.USSR, Phys.Ser. 39, No.10, 26 (1975)
The Excited States of ^{111}Cd

75Sv01 M.D.Svoren, E.F.Zganjar, I.L.Hawk - Z.Phys. A272, 213 (1975)
New Levels Observed in ^{188}Os from the Decay of ^{188}Re

75Ur03 P.P.Urone, D.C.Kocher - Nucl.Data Sheets 15, 257 (1975)
Nuclear Data Sheets for A = 79

75Va12 J.R.Van Hise, D.C.Camp, R.A.Meyer - Z.Phys. A274, 383 (1975)
Decay of the ^{134}Cs Isomers and the Levels of ^{134}Xe, ^{134}Cs, and ^{134}Ba

75Va24 S.Vaisala, T.Raunemaa, A.Fontell, G.Graeffe, A.Siivola - Phys.Fenn. 10, 133 (1975)
The Decay of ^{81}Rb 3/2$^-$ Ground State

75Vi01 V.E.Viola,Jr., C.T.Roche, M.M.Minor - J.Inorg.Nucl.Chem. 37, 11 (1975)
Alpha Decay of Natural ^{186}Os

75Wa19 T.E.Ward, Y.Y.Chu - Radiochem.Radioanal.Lett. 22, 1 (1975)
Refined Value for the Half-Life of ^{177}m-Lu

75Wa28 S.L.Waters, M.J.Woods - Int.J.Appl.Radiat.Isotop. 26, 484 (1975)
The Half-Life of ^{77}Br

75Wr01 J.F.Wright, W.L.Talbert,Jr., A.F.Voigt - Phys.Rev. C12, 572 (1975)
Decays of ^{101}Mo and ^{101}Tc

75Ya08 Y.Yamaguchi, J.Ruan(Gen), T.Nagahara - J.Phys.Soc.Jap. 38, 911 (1975)
The Properties of 2112 keV Level in ^{116}Sn

76Aj04 F.Ajzenberg-Selove - Nucl.Phys. A268, 1 (1976)
Energy Levels of Light Nuclei A = 13-15

76Au01 R.L.Auble - Nucl.Data Sheets 17, 193 (1976)
Nuclear Data Sheets for A = 69

76Au03 R.L.Auble, H.R.Hiddleston, C.P.Browne - Nucl.Data Sheets 17, 573 (1976)
Nuclear Data Sheets for A = 131

76Ba39 J.A.Barclay, S.S.Rosenblum, W.A.Steyert, K.S.Krane - Phys.Rev. C14, 1183 (1976)
Nuclear Orientation of ^{97,103,105}Ru and ^{105}Rh

76Ba42 C.Bargholtz, S.Beshai, L.Gidefeldt - Nucl.Phys. A270, 189 (1976)
Angular Correlation Measurements in ^{131}Xe

76Bl13 K.Blaton-Albicka, B.Kotlinska-Filipek, M.Matul, K.Stryczniewicz, M.Nowicki, E.Ruchowska-Lukasiak - Nukleonika 21, 935 (1976)
Precision Gamma-Ray Spectroscopy of the Decay of ^{223}Ra and its Daughter Products

76Bo16 G.L.Borchert - Z.Naturforsch. 31a, 387 (1976)
Precision Measurement of γ-Ray Energies from the Decay of ^{57}Co, ^{60}Co, ^{137}Cs, ^{152}Eu, ^{153}Sm and ^{198}Au

76Br09 D.S.Brenner, R.A.Meyer - Phys.Rev. C13, 1288 (1976)
Decay of ^{187}W and the 1/2$^+$[411] Band in Odd-Mass Re Isotopes

76Bu02 A.Buyrn - Nucl.Data Sheets 17, 97 (1976)
Nuclear Data Sheets for A = 162

76Bu05 R.L.Bunting, W.L.Talbert,Jr., J.R.McConnell, R.A.Meyer - Phys.Rev. C13, 1577 (1976)
Decays of ^{88}Kr and ^{88}Rb

76Bu07 R.L.Bunting, J.J.Kraushaar - Nucl.Data Sheets 18, 87 (1976)
Nuclear Data Sheets for A = 88

76Bu09 T.W.Burrows - Nucl.Data Sheets 18, 553 (1976)
Nuclear Data Sheets for A = 156

76Bu23 L.S.Bulyanitsa, A.M.Geidelman, Y.S.Egorov, L.M.Krizhanskii, A.A.Lipovskii, L.D.Preobrazhenskaya, A.V.Lovtsyus, Y.V.Kholnov - Izv.Akad.Nauk SSSR, Ser.Fiz. 40, 2075 (1976); Bull.Acad.Sci.USSR, Phys.Ser. 40, No.10, 42 (1976)
The Half-Life of ^{242}Pu

76Ca11 J.L.Campbell, B.Martin - Z.Phys. A277, 59 (1976)
Internal Conversion of the 6.2 keV Transition in ^{181}Ta

76Ca18 D.C.Camp, J.R.Van Hise - Phys.Rev. C14, 261 (1976)
Weak Gamma Rays Observed in the ^{60}Co Decay

76Ch33 J.M.Chatterjee-Das, R.K.Chattopadhyay, P.Bhattacharya, B.Sethi, S.K.Mukherjee - Radiochem.Radioanal.Lett. 27, 119 (1976)
The Decay Scheme of the 284.3 D ^{144}Ce and Energy Levels and Transitions in ^{144}Pr

76Da09 B.K.Dasmahapatra - J.Phys.(London) G2, 233 (1976)
Gamma Vibrational Band in ^{160}Dy

76De35 A.A.Delucchi, R.A.Meyer - J.Inorg.Nucl.Chem. 38, 2135 (1976)
Decay of ^{113}Sn to Levels of ^{113}In

76De37 J.C.de Lange, J.Bron, A.van Poelgeest, H.Verheul, W.B.Ewbank - Z.Phys. A279, 79 (1976)
The Decay of ^{93}g-Ru, ^{93}m-Ru, ^{91}g-Mo, ^{91}m-Mo, ^{91}g-Tc and ^{91}m-Tc

76De43 J.De Raedt, G.Lhersonneau, R.Geerts, H.Van de Voorde - J.Phys.(London) G2, 719 (1976)
Spin and Parity Assignment of the 1924 keV Level in ^{131}I

76El01 Y.A.Ellis - Nucl.Data Sheets 19, 143 (1976)
Nuclear Data Sheets for A = 245

76El02 Y.A.Ellis - Nucl.Data Sheets 19, 181 (1976)
Nuclear Data Sheets for A = 247

76El03 Y.A.Ellis - Nucl.Data Sheets 17, 329 (1976)
Nuclear Data Sheets for A = 216

76El04 Y.A.Ellis - Nucl.Data Sheets 17, 341 (1976)
Nuclear Data Sheets for A = 220

76El05 Y.A.Ellis - Nucl.Data Sheets 17, 351 (1976)
Nuclear Data Sheets for A = 224

76El10 Y.A.Ellis - Nucl.Data Sheets 19, 103 (1976)
Nuclear Data Sheets for A = 243

76Ge14 R.J.Gehrke, R.G.Helmer, C.W.Reich, R.C.Greenwood, R.A.Anderl - Phys.Rev. C14, 1896 (1976)
Level Structure of ^{131}Cs and the Decay Energy of ^{131}Ba

76Gi14 J.E.Gindler - Inorg.Nucl.Chem.Lett. 12, 931 (1976)
The Half-Lives of ^{83}Rb and ^{84}Rb

76Gr11 R.C.Greenwood, C.W.Reich, R.G.Helmer, R.J.Gehrke, R.A.Anderl - Phys.Rev. C14, 1906 (1976)
^{134}Ba Level Scheme as Observed in the Decay of ^{134}La

76Ha35 B.Harmatz - Nucl.Data Sheets 19, 33 (1976)
Nuclear Data Sheets for A = 151

76Ha61 W.Hartl, J.W.Hammer - Z.Phys. A279, 135 (1976)
The K-Fluorescence Yield of Germanium

76He18 R.G.Helmer - Nucl.Phys. A272, 269 (1976)
The K-Conversion Coefficients of γ-Rays Above 800 keV from ^{182}Ta Decay

76Hi02 H.R.Hiddleston, C.P.Browne - Nucl.Data Sheets 17, 225 (1976)
Nuclear Data Sheets for A = 132

76Ho04 P.K.Hopke, R.A.Meyer - Phys.Rev. C13, 434 (1976)
Hindered Beta Decay of ^{95}Nb-m and the Decay Sequence ^{95}Zr $\rightarrow$ ^{95}Nb-m,g, $\rightarrow$ ^{95}Mo

76Ho06 D.J.Horen - Nucl.Data Sheets 17, 367 (1976)
Nuclear Data Sheets for A = 228

76Ho17 G.E.Holland - Nucl.Data Sheets 19, 337 (1976)
Nuclear Data Sheets for A = 149

76Hu11 J.M.R.Hutchinson, P.A.Mullen - Int.J.Appl.Radiat.Isotop. 27, 47 (1976)
Standardization and Ground-State Branching of Selenium-75

76Ki03 H.J.Kim - Nucl.Data Sheets 17, 485 (1976)
Nuclear Data Sheets for A = 59

76Ko07 D.C.Kocher - Nucl.Data Sheets 17, 519 (1976)
Nuclear Data Sheets for A = 74

76Ko16 D.C.Kocher, R.L.Auble - Nucl.Data Sheets 19, 445 (1976)
Nuclear Data Sheets for A = 58

76Ko29 B.K.S.Koene, H.Postma - Hyperfine Interactions 2, 310 (1976)
Negative Parity States in ^{131}Xe Studied by Nuclear Orientation

76Kr01 K.S.Krane, C.E.Olsen, S.S.Rosenblum, W.A.Steyert - Phys.Rev. C13, 831 (1976)
Nuclear Orientation of ^{95,97}Nb and ^{95}Zr in $ZrFe_2$

76Ku08 W.Kurcewicz, N.Kaffrell, N.Trautmann, A.Plochocki, J.Zylicz, K.Stryczniewicz, I.Yutlandov - Nucl.Phys. A270, 175 (1976)
Collective States Fed by Weak α-Transitions in the ^{230}U Chain

76Le23 T.v.Ledebur - Helv.Phys.Acta 49, 661 (1976)
Gamma-Gamma Angular Correlation Experiments Using Gaseous Sources of ^{125}Xe, ^{127}Xe and ^{129}m-Xe

76Li06 C.-C.Lin - J.Inorg.Nucl.Chem. 38, 1409 (1976)
γ-Ray Intensities in the Decay of ^{140}Ba-^{140}La and ^{152}Eu: Use of 13 y ^{152}Eu as a Secondary Calibration Standard

76Ma35 L.G.Mann, W.B.Walters, R.A.Meyer - Phys.Rev. C14, 1141 (1976)
Levels of ^{129}I Populated in the Decay of ^{129}Te-m and ^{129}Te-g

76Ma37 E.S.Macias, M.E.Phelps, D.G.Sarantities, R.A.Meyer - Phys.Rev. C14, 639 (1976)
Decay of 39-Day ^{103}Ru and 17-Day ^{103}Pd to the Levels of ^{103}Rh

76Me07 R.A.Meyer, J.H.Landrum, S.V.Jackson, W.H.Zoller, W.B.Walters - Phys.Rev. C13, 1617 (1976)
Three-Particle One-Hole Configurations in Odd-Odd ^{134}I and the Decay of ^{134}Te

76Me16 R.A.Meyer, F.F.Momyer, J.H.Landrum, E.A.Henry, R.P.Yaffee, W.B.Walters - Phys.Rev. C14, 1152 (1976)
Levels of Odd-Mass Xe Populated in the Beta Decay of ^{129}Cs and ^{133}I

76Mi07 M.M.Minor - Nucl.Data Sheets 18, 331 (1976)
Nuclear Data Sheets for A = 175

76Mi18 J.P.Miller, F.Boehm, H.E.Henrikson - Nucl.Instrum.Methods 136, 403 (1976)
A Precision Energy Measurement of the ^{125}I Gamma Line

76Mo30 V.K.Mozhaev - At.Energ. 40, 174 (1976); Sov.At.Energy 40, 200 (1976)
Effective Half-Life of ^{252}Cf

76Mu03 L.G.Multhauf, K.G.Tirsell, R.A.Meyer - Phys.Rev. C13, 771 (1976)
Collective Excitations in ^{246}Cm and the Decay of ^{246}Am-m

76Pa04 S.C.Pancholi, M.J.Martin - Nucl.Data Sheets 18, 167 (1976)
Nuclear Data Sheets for A = 138

76Pa11 B.P.Pathak, L.Lessard, L.Nikkinen, I.L.Preiss - Phys.Rev. C14, 1573 (1976)
Decays of ^{126}Ba and ^{126}Cs

76Ra22 B.V.N.Rao, G.N.Rao - J.Phys.Soc.Jap. 40, 1 (1976)
Decay of ^{144}Ce to Levels in ^{144}Pr and ^{144}Nd

76Sc02 M.R.Schmorak - Nucl.Data Sheets 17, 391 (1976)
Nuclear Data Sheets for (Even-A) A = 244 Through A = 262

76Sc09 M.R.Schmorak - Nucl.Data Sheets 18, 389 (1976)
Nuclear Data Sheets for (Odd-A) A = 249 Through A = 263

76Sm01 H.A.Smith, Jr., M.E.Bunker, J.W.Starner, C.J.Orth, K.E.G.Lobner - Phys.Rev. C13, 387 (1976)
States in ^{126}Sb Populated in the β Decay of 10^5-yr ^{126}Sn

76Va03 S.Vaisala, G.Graeffe, J.Heinonen, A.A.Delucchi, R.A.Meyer - Phys.Rev. C13, 372 (1976)
Levels of ^{83}Kr Populated in the Decay of ^{83}Rb and ^{83}Br

76Va30 R.Vaninbroukx, G.Grosse - Int.J.Appl.Radiat.Isotop. 27, 727 (1977)
New Determination of the Half-Lives of ^{58}Co, ^{60}Co, ^{139}Ce and ^{141}Ce

76Wa13 W.B.Walters, R.A.Meyer - Phys.Rev. C14, 1925 (1976)
Levels of ^{123}Te and ^{125}Te and the Decay of 13.3-h ^{123}I and 2.7-yr ^{125}Sb

76Wo05 F.K.Wohn, M.D.Glascock, W.L.Talbert,Jr., S.T.Hsue, R.J.Hanson - Phys.Rev. C13, 2492 (1976)
Ground-State β Branching of Gaseous Fission Products and their Daughters for A = 88-91

76Ya11 H.Yamada, T.Katoh, M.Fujioka, M.Sekikawa, S.H.Ahn, J.H.Hamilton, N.R.Johnson, J.J.Pinajian - J.Phys.Soc.Jap. 41, 1843 (1976)
Electric Monopole Transitions from Excited 0^+ States in ^{156}Gd

77Aj02 F.Ajzenberg-Selove - Nucl.Phys. A281, 1 (1977)
Energy Levels of Light Nuclei A = 16-17

77Al27 M.Allab, F.Azgui, G.Ardisson - Radiochem.Radioanal.Lett. 30, 253 (1977)
Niveaux de ^{166}Er Peuples par Decroissande de ^{166}g-Ho

77Au03 R.L.Auble - Nucl.Data Sheets 20, 253 (1977)
Nuclear Data Sheets for A = 56

77Au04 R.L.Auble - Nucl.Data Sheets 20, 327 (1977)
Nuclear Data Sheets for A = 57

77Au08 R.L.Auble - Nucl.Data Sheets 21, 323 (1977)
Nuclear Data Sheets for A = 53

77Az01 G.Azuelos, J.E.Kitching, K.Ramavataram - Phys.Rev. C15, 1847 (1977)
Half-Lives and Branching Ratios of Some T = 1/2 Nuclei

77Ba69 S.A.Baranov, V.M.Shatinskii - Yad.Fiz. 26, 461 (1977); Sov.J.Nucl.Phys. 26, 244 (1977)
Alpha Decay of ^{246}Cf, ^{248}Cm, and ^{240}Pu

77Be63 J.R.Beene - Nucl.Data Sheets 22, 1 (1977)
Nuclear Data Sheets for A = 45

77Be64 F.E.Bertrand - Nucl.Data Sheets 22, 135 (1977)
Nuclear Data Sheets for A = 110

77Bi01 C.J.Bischof, W.L.Talbert,Jr. - Phys.Rev. C15, 1047 (1977)
Gamma-Ray Decay Schemes for ^{93}Kr, ^{93}Rb, and ^{93}Sr

77Br22 D.S.Brenner, M.Lindner, R.A.Meyer - Phys.Rev. C16, 747 (1977)
Unique First Forbidden Beta Decay of ^{183}Re and ^{185}Os

77Bu12 J.Burde, A.Ginzburg, A.Molchadzki - Phys.Rev. C15, 2187 (1977)
Absolute Transition Probabilities in ^{151}Sm

77Co22 W.E.Collins, J.H.Hamilton, J.Lange - Phys.Rev. C16, 2019 (1977)
Properties of the Second $K\pi = 0+$ Band in ^{156}Gd

77El03 Y.A.Ellis - Nucl.Data Sheets 20, 139 (1977)
Nuclear Data Sheets for A = 230

77El06 Y.A.Ellis - Nucl.Data Sheets 21, 493 (1977)
Nuclear Data Sheets for A = 234

77El07 Y.A.Ellis - Nucl.Data Sheets 21, 549 (1977)
Nuclear Data Sheets for A = 238

77El08 Y.A.Ellis, R.L.Haese - Nucl.Data Sheets 21, 615 (1977)
Nuclear Data Sheets for A = 242

77Fr10 K.Freitag, K.Krien, J.C.Soares, P.Herzog, W.D.Schneider, E.Bodenstedt - Z.Phys. A282, 39 (1977)

The Penetration Parameter λ of the Anomalous M1-Conversion of the 482 keV Transition in ^{181}Ta
77Ge12 R.J.Gehrke, R.G.Helmer, R.C.Greenwood - Nucl.Instrum.Methods 147, 405 (1977)
Precise Relative γ-Ray Intensities for Calibration of Ge Semiconductor Detectors
77Gi11 J.E.Gindler, L.E.Glendenin - Inorg.Nucl.Chem.Lett. 13, 95 (1977)
The Half-Lives of ^{109}Pd and ^{112}Pd
77Ha15 B.Harmatz - Nucl.Data Sheets 20, 73 (1977)
Nuclear Data Sheets for A = 197
77Ha16 B.Harmatz, J.R.Shepard - Nucl.Data Sheets 20, 373 (1977)
Nuclear Data Sheets for A = 148
77Ha26 B.Harmatz - Nucl.Data Sheets 21, 377 (1977)
Nuclear Data Sheets for A = 198
77Ha46 B.Harmatz - Nucl.Data Sheets 22, 433 (1977)
Nuclear Data Sheets for A = 194
77He20 P.Herzog,H.-R.Folle,E.Bodenstedt - Hyperfine Interactions 3,361(1977)
The Sign of the Electric Field Gradient at the Nuclear Site of Zn in Zn Metal
77Ho12 O.Horibe, Y.Mizumoto, M.Kawamura - J.Phys.Soc.Jap. 42, 1803 (1977)
The Decay Scheme of ^{91}Sr
77Ho21 M.Hoshi - J.Phys.Soc.Jap. 43, 25 (1977)
Decay of ^{151}Pm
77Hu03 H.Huang, B.P.Pathak, R.Iafigliola, L.Lessard, J.K.P.Lee - Z.Phys. A282, 285 (1977)
Decay of ^{90m,g}-Rb
77Ja04 S.V.Jackson, R.A.Meyer - Phys.Rev. C15, 1806 (1977)
Population of 0+ States in ^{126}Te by Decay of ^{126}I and γ Softness in Even-Even Te Nuclei
77Ja08 A.H.Jaffey, H.Diamond, W.C.Bentley, K.F.Flynn, D.J.Rokop, A.M.Essling, J.Williams - Phys.Rev. C16, 354 (1977)
Half-Life of ^{239}Pu by Two Independent Methods
77Je02 B.D.Jeltema, F.M.Bernthal, T.L.Khoo, C.L.Dors - Nucl.Phys. A280, 21 (1977)
Rotational and Intrinsic Structure of ^{182}W from the (α,2nγ) Reaction and Decay of ^{182}m-Re
77Ka08 K.Kawade, H.Yamamoto, Y.Ikeda, V.N.Bhoraskar, T.Katoh - Nucl.Phys. A279, 269 (1977)
Excited States of ^{162}Dy in the Decay of ^{162}Tb
77Ka14 C.A.Kalfas - J.Phys.(London) G3, 929 (1977)
Structure of ^{148}Sm Studied from the Decay of ^{148}Pm and ^{148}m-Pm
77Ke12 H.E.Keus, W.J.Huiskamp - Physica 85B, 137 (1977)
Nuclear Orientation of ^{177}Lu in Iron, Cobalt and Nickel
77Kr03 K.S.Krane, J.M.Shobaki - Phys.Rev. C15, 1589 (1977)
Angular Correlation Measurements in the Decay of ^{97}Ru
77Kr09 K.S.Krane, J.M.Shobaki - Phys.Rev. C16, 1576 (1977)
Angular Correlation Measurements in the Decay of ^{105}Ru
77Ku15 W.Kurcewicz, N.Kaffrell, N.Trautmann, A.Plochocki, J.Zylicz, M.Matul, K.Stryczniewicz - Nucl.Phys. A289, 1 (1977)
Collective States Fed by Weak α-Transitions in the ^{232}U Chain
77Ku17 A.Kumar, S.K.Soni, S.C.Pancholi, S.L.Gupta - Phys.Rev. C16, 2027 (1977)
Perturbation of the 360.3-57.6 keV Gamma-Gamma Directional Correlation in ^{127}I
77Ku25 W.Kurcewicz, E.Ruchowska, N.Kaffrell, N.Trautmann - Nucl.Instrum.Methods 146, 613 (1977)
Precise Energies of Gamma Rays from the ^{230}Th and ^{228}Th Decay
77Li14 J.Liptak, K.Kristiakova, J.Kristiak - Nucl.Phys. A286, 263 (1977)
Properties of ^{81}Kr Levels Populated in the Decay of ^{81}Rb Isomers
77Ll01 R.Lloret - Radiochem.Radioanal.Lett. 29, 165 (1977)
Mesure de la Periode de Decroissance Radioactive de ^{93}Nb-m
77Ma13 M.J.Martin, P.H.Stelson - Nucl.Data Sheets 21, 1 (1977)
Nuclear Data Sheets for A = 184
77Ma29 C.Maples - Nucl.Data Sheets 22, 207 (1977)
Nuclear Data Sheets for A = 215
77Ma30 C.Maples - Nucl.Data Sheets 22, 223 (1977)
Nuclear Data Sheets for A = 219
77Ma31 C.Maples - Nucl.Data Sheets 22, 243 (1977)
Nuclear Data Sheets for A = 223
77Ma32 C.Maples - Nucl.Data Sheets 22, 275 (1977)
Nuclear Data Sheets for A = 227
77Ma34 M.J.Martin - Nucl.Data Sheets 22, 545 (1977)
Nuclear Data Sheets for A = 209
77Me12 R.A.Meyer, K.V.Marsh, D.S.Brenner, V.Paar - Phys.Rev. C15, 417 (1977)
Cluster-Vibrational-Field Model for ^{95}Mo and Levels Populated in the Decay of ^{95}Tc-m,g
77Mo07 J.Morel, J.-P. Perolat, N.Coursol - C.R.Acad.Sci.,Ser.B 284, 223 (1977)
Mise en Evidence de l'Emission γ Lors de la Desexcitation du Niobium-93 m
77My02 W.A.Myers - J.Inorg.Nucl.Chem. 39, 925 (1977)
The Half-Life of ^{169}Er
77Ne10 D.R.Nethaway, A.L.Prindle, W.A.Myers, W.C.Fuqua, M.V.Kantelo - Phys.Rev. C16, 1907 (1977)
Fission of ^{240}Pu with 14.8-MeV Neutrons
77Ok02 K.Okano, Y.Kawase, S.Yamada - J.Phys.Soc.Jap. 43, 381 (1977)
Excited States and Transitions in ^{106}Pd from the Decay of ^{106}Rh-g

77Ok03 K.Okano, Y.Kawase - J.Phys.Soc.Jap. 43, 389 (1977)
Gamma-Gamma Angular Correlation Measurements in ^{106}Pd

77Po05 W.L.Posthumus, K.E.G.Lobner, J.L.Maarleveld, H.P.Geerke, J.Konijn - Z.Phys. A281, 277 (1977)
The Odd-Parity Level at 687.59 keV in ^{236}U

77Pr04 W.W.Pratt - J.Inorg.Nucl.Chem. 39, 919 (1977)
Decay of ^{85}Sr

77Sc13 M.R.Schmorak - Nucl.Data Sheets 20, 165 (1977)
Nuclear Data Sheets for A = 232, 236, 240

77Sc15 M.R.Schmorak - Nucl.Data Sheets 21, 91 (1977)
Nuclear Data Sheets for A = 231, 235, 239

77Sc19 M.R.Schmorak - Nucl.Data Sheets 22, 487 (1977)
Nuclear Data Sheets for A = 207

77Sc31 U.Schotzig, K.Debertin, K.F.Walz - Int.J.Appl.Radiat.Isotop. 28, 503 (1977)
Standardization and Decay Data of ^{133}Ba

77Ti01 P.J.Tivin, B.Singh, H.W.Taylor - J.Phys.(London) G3, 1267 (1977)
Gamma-Gamma Directional Correlations in ^{106}Pd

77To09 K.S.Toth - Nucl.Data Sheets 20, 119 (1977)
Nuclear Data Sheets for A = 226

77To12 K.S.Toth - Nucl.Data Sheets 21, 437 (1977)
Nuclear Data Sheets for A = 214

77To13 K.S.Toth - Nucl.Data Sheets 21, 467 (1977)
Nuclear Data Sheets for A = 218

77To14 K.S.Toth - Nucl.Data Sheets 21, 479 (1977)
Nuclear Data Sheets for A = 222

77Vy01 T.Vylov, A.A.Klyuchnikov, V.T.Kupryashkin, A.F.Novgorodov, A.I.Feoktistov - Izv.Akad.Nauk SSSR, Ser.Fiz. 41, 64 (1977); Bull.Acad.Sci.USSR, Phys.Ser. 41, No.1, 50 (1977)
The γ-Spectrum of ^{194}Au

77Vy02 T.Vylov, N.A.Golovkov, B.S.Dzhelepov, R.B.Ivanov, M.A.Mikhailova, Y.V.Norseev, V.G.Chumin - Izv.Akad.Nauk SSSR, Ser.Fiz. 41, 1635 (1977); Bull.Acad.Sci.USSR, Phys.Ser. 41, No.8, 85 (1977)
The Decay of ^{221}Rn

77We02 W.R.Western, J.C.Hill, W.L.Talbert,Jr., W.C.Schick,Jr. - Phys.Rev. C15, 1024 (1977)
Decay of Mass-Separated ^{137}Xe to Levels in the N = 82 Nucleus ^{137}Cs

77Wi10 G.Wittkemper,H.D.Ruter,W.Haaks,E.Gerdau - Hyperfine Interactions 3,157(1977)
Nuclear Orientation of ^{105}Rh and ^{95}Tc in Iron

77Zo01 V.Zobel, J.Eberth, U.Eberth, E.Eube - Nucl.Instrum.Methods 141, 329 (1977)
^{226}Ra as Calibration Standard for Ge(Li) Spectrometers

78Au01 R.L.Auble - Nucl.Data Sheets 23, 163 (1978)
Nuclear Data Sheets for A = 51

78Au04 R.L.Auble - Nucl.Data Sheets 24, 1 (1978)
Nuclear Data Sheets for A = 46

78Au06 R.L.Auble - Nucl.Data Sheets 25, 315 (1978)
Nuclear Data Sheets for A = 117

78Be01 J.R.Beene - Nucl.Data Sheets 23, 1 (1978)
Nuclear Data Sheets for A = 48

78Be02 F.E.Bertrand - Nucl.Data Sheets 23, 229 (1978)
Nuclear Data Sheets for A = 109

78Be12 S.Beshai, K.Fransson, L.-E.Froberg, B.Sundstrom - Nucl.Phys. A296, 151 (1978)
Gamma-Gamma Directional Correlations in ^{90}Zr

78Be37 J.R.Beene - Nucl.Data Sheets 25, 235 (1978)
Nuclear Data Sheets for A = 52

78Ch06 Y.Y.Chu, G.Scharff-Goldhaber - Phys.Rev. C17, 1507 (1978)
Decay of ^{234}Th to the ^{234}Pa Isomers

78Di05 P.A.Dickey, J.E.Bussoletti, E.G.Adelberger - Nucl.Phys. A303, 442 (1978)
Isospin-Forbidden β-Decay of ^{28}Mg

78Dr01 C.Droste, L.Goettig, T.Morek, J.Srebrny, J.Bucka, J.Dobaczewski, S.G.Rohozinski - Z.Phys. A284, 297 (1978)
Study of the ^{124}Xe and ^{126}Xe Structure

78El01 Y.A.Ellis - Nucl.Data Sheets 23, 71 (1978)
Nuclear Data Sheets for A = 237

78El02 Y.A.Ellis - Nucl.Data Sheets 23, 123 (1978)
Nuclear Data Sheets for A = 241

78El04 Y.A.Ellis - Nucl.Data Sheets 24, 289 (1978)
Nuclear Data Sheets for A = 233

78En02 P.M.Endt, C.van der Leun - Nucl.Phys. A310, 1 (1978)
Energy Levels of A = 21-44 (VI)

78Fu05 M.Fujishiro - J.Nucl.Sci.Technol. 15, 237 (1978)
Intensity of 2,505 keV Gamma-Ray in Decay of Cobalt-60

78Ge01 C,P,Gerner, J.van Pelt, O.W.De Ridder, J.Blok - Nucl.Phys. A295, 221 (1978)
The Electron Capture of ^{106m}-Ag

78Ge06 A.Genoux-Lubain, G.Ardisson - Radiochem.Radioanal.Lett. 33, 59 (1978)
Le Rayonnement γ de Basse Energie Qui Accompagne la Decroissance α de ^{241}Am

78Ha03 B.Harmatz - Nucl.Data Sheets 23, 607 (1978)
Nuclear Data Sheets for A = 195

78Ha12 J.Halperin - Nucl.Data Sheets 24, 57 (1978)
Nuclear Data Sheets for A = 199

78Ha15 M.L.Halbert - Nucl.Data Sheets 24, 175 (1978)
Nuclear Data Sheets for A = 49

78Ha22 B.Harmatz, W.B.Ewbank - Nucl.Data Sheets 25, 113 (1978)
Nuclear Data Sheets for A = 147

78He08 K.Heyde, M.Waroquier, R.A.Meyer - Phys.Rev. C17, 1219 (1978)
Unified Description of Odd-Mass Indium Nuclei I. General Theory and Comparison to ^{113}In and ^{115}In Levels Populated in the Decay of ^{113}Sn and ^{115}Cd-m,g

78Ja11 A.H.Jaffey, H.Diamond, W.C.Bentley, D.G.Graczyk, K.P.Flynn - Phys.Rev. C18, 969 (1978)
Half-Life of ^{240}Pu

78Ke02 E.G.Kessler,Jr., R.D.Deslattes, A.Henins, W.C.Sauder - Phys.Rev.Lett. 40, 171 (1978)
Redetermination of ^{198}Au and ^{192}Ir γ-Ray Standards between 0.1 and 1.0 MeV

78Ku08 W.Kurcewicz, E.Ruchowska, J.Zylicz, N.Kaffrell, N.Trautmann - Nucl.Phys. A304, 77 (1978)
Search for the $K\pi = 0^{+}$ Excited States in ^{226}Ra Fed in the α-Decay of ^{230}Th

78La03 R.E.Laird - Phys.Rev. C17, 1498 (1978)
Radioactive Decay of ^{139}Ba

78Ma29 M.J.Martin - Nucl.Data Sheets 25, 397 (1978)
Nuclear Data Sheets for A = 211

78Me10 R.A.Meyer, A.L.Prindle, W.A.Myers, P.K.Hopke, D.Dieterly, J.E.Koops - Phys.Rev. C17, 1822 (1978)
Multiparticle Configurations in the Odd-Neutron Nuclei ^{61}Ni and ^{67}Zn Populated by Decay of ^{61}Cu, ^{67}Cu, and ^{67}Ga

78NCRP National Council on Radiation Protection and Measurements - NCRP Report No.58 (1978)
A Handbook of Radioactivity Measurements Procedures

78Ne04 D.R.Nethaway, A.L.Prindle, R.A.Van Konyenburg - Phys.Rev. C17, 1409 (1978)
Half-Life of ^{92}Nb

78Ne08 W.G.Nettles, R.K.Scoggins, W.K.James, L.C.Whitlock, B.N.Subba Rao, J.H.Hamilton, A.V.Ramayya, R.Gunnink - Phys.Rev. C18, 2441 (1978)
Energies and Intensities of Weak Transitions in the Decay of ^{132}I

78Ov01 V.V.Ovechkin - Izv.Akad.Nauk SSSR, Ser.Fiz. 42, 101 (1978); Bull.Acad.Sci.USSR, Phys.Ser. 42, No.1, 82 (1978)
The γ-Rays of ^{241}Am Above 600 keV

78Pe08 J.G.Pengra, H.Genz, R.W.Fink - Nucl.Phys. A302, 1 (1978)
Orbital Electron Capture Ratios in the Decay of ^{205}Pb

78Pf01 L.Pfeiffer, A.P.Mills,Jr., R.S.Raghavan, E.A.Chandross - Phys.Rev.Lett. 41, 63 (1978)
Indium-Loaded Liquid Scintillator for Low-Energy Solar-Neutrino Spectroscopy

78Ra05 G.N.Rao, C.Gunther - Phys.Rev. C17, 1266 (1978)
Remeasurement of the $7^{+} \rightarrow 2^{-}$ E5 Transition Probability in ^{90}Y

78Sa14 T.E.Sampson - Nucl.Instrum.Methods 150, 361 (1978)
Relative Intensities of Gamma Rays from ^{166}m-Ho

78Sc01 M.R.Schmorak - Nucl.Data Sheets 23, 287 (1978)
Nuclear Data Sheets for A = 205

78Sc05 M.R.Schmorak - Nucl.Data Sheets 24,117 (1978)
Nuclear Data Sheets for A = 203

78Sc15 M.R.Schmorak - Nucl.Data Sheets 25, 193 (1978)
Nuclear Data Sheets for A = 201

78Sc16 M.R.Schmorak - Nucl.Data Sheets 25, 675 (1978)
Nuclear Data Sheets for A = 202

78Te01 J.W.Tepel - Nucl.Data Sheets 25, 553 (1978)
Nuclear Data Sheets for A = 86

78To04 K.S.Toth - Nucl.Data Sheets 24, 263 (1978)
Nuclear Data Sheets for A = 229

78Tu01 J.K.Tuli - Nucl.Data Sheets 23, 529 (1978)
Nuclear Data Sheets for A = 141

78Tu03 J.K.Tuli - Nucl.Data Sheets 25, 53 (1978)
Nuclear Data Sheets for A = 142

78Tu05 J.K.Tuli - Nucl.Data Sheets 25, 603 (1978)
Nuclear Data Sheets for A = 143

78Ve07 H.R.Verma, A.K.Sharma, N.Singh, P.N.Trehan - J.Phys.Soc.Jpn. 45, 374 (1978)
The Level Structure of Tm^{169}

78Wa07 G.W.Wang, A.J.Becker, L.M.Chirovsky, J.L.Groves, C.S.Wu - Phys.Rev. C18, 476 (1978)
Time-Reversal Test and Nuclear-Structure Study Using ^{110}Ag-m

78Wo15 F.K.Wohn, W.L.Talbert,Jr. - Phys.Rev. C18, 2328 (1978)
Decay Energies of Gaseous Fission Products and their Daughters for A = 88 to 93 and A = 138 to 142

78Wu04 K.D.Wunsch, R.Decker, H.Wollnik, J.Munzel, G.Siegert, G.Jung, E.Koglin - Z.Phys. A288, 105 (1978)
Precision Beta Endpoint Energy Measurements of Rubidium and Caesium Fission Products with an Intrinsic Ge-Detector

78Wy02 A.Wyttenbach, A.Schubiger, H.S.Pruys - Phys.Rev. C18, 590 (1978)
Half-Life of ^{57}Mn

78Ya04 M.Yanokura, H.Kudo, H.Nakahara, K.Miyano, S.Ohya, O.Nitoh - Nucl.Phys. A299, 92 (1978)
The Half-Life of ^{207}Bi and Decays of ^{211}At and ^{211}Po

79Au01 R.L.Auble - Nucl.Data Sheets 26, 207 (1979)
Nuclear Data Sheets for A = 119
79Ha01 M.L.Halbert - Nucl.Data Sheets 26, 5 (1979)
Nuclear Data Sheets for A = 62
79Ha02 B.Harmatz - Nucl.Data Sheets 26, 281 (1979)
Nuclear Data Sheets for A = 154
79Lu05 P.Luksch, J.W.Tepel - Nucl.Data Sheets 27, 389 (1979)
Nuclear Data Sheets for A = 87
79Pe02 L.K.Peker - Nucl.Data Sheets 26, 473 (1979)
Nuclear Data Sheets for A = 136
79Sc01 M.R.Schmorak - Nucl.Data Sheets 26, 81 (1979)
Nuclear Data Sheets for A = 200
79Ta01 T.Tamura, Z.Matumoto, A.Hashizume, Y.Tendow, K.Miyano, S.Ohya, K.Kitao, M.Kanabe - Nucl.Data Sheets 26, 385 (1979)
Nuclear Data Sheets for A = 121
79We01 M.P.Webb - Nucl.Data Sheets 26, 145 (1979)
Nuclear Data Sheets for A = 206

Diagrams of Radioactive Decay Chains

This appendix contains diagrams of the decay chains that involve two or more of the radionuclides considered in this handbook. The half-life, modes of decay, and decay branching ratios for each radionuclide in the decay chain are shown. The branching ratios for spontaneous fission are not shown, and modes of decay with branching ratios less than 0.1% are omitted.

$$^{28}\mathrm{Mg}\ (20.91\ \mathrm{h}) \xrightarrow{\beta^-} {}^{28}\mathrm{Al}\ (2.240\ \mathrm{m}) \xrightarrow{\beta^-} {}^{28}\mathrm{Si}$$

$$^{32}\mathrm{Si}\ (3.3\mathrm{E}2\ \mathrm{y}) \xrightarrow{\beta^-} {}^{32}\mathrm{P}\ (14.29\ \mathrm{d}) \xrightarrow{\beta^-} {}^{32}\mathrm{S}$$

$$^{44}\mathrm{Ca} \xleftarrow{\beta^+} {}^{44}\mathrm{Sc}\ (3.927\ \mathrm{h}) \xleftarrow{\mathrm{EC}} {}^{44}\mathrm{Ti}\ (47.3\ \mathrm{y})$$

$$\begin{tikzcd}
{}^{46}\mathrm{Sc}\ (18.67\ \mathrm{s}) \arrow[d, "\mathrm{IT}"'] & \\
{}^{46}\mathrm{Sc}\ (83.83\ \mathrm{d}) \arrow[r, "\beta^-"] & {}^{46}\mathrm{Ti}
\end{tikzcd}$$

$$^{47}\mathrm{Ca}\ (4.536\ \mathrm{d}) \xrightarrow{\beta^-} {}^{47}\mathrm{Sc}\ (3.422\ \mathrm{d}) \xrightarrow{\beta^-} {}^{47}\mathrm{Ti}$$

$$^{49}\mathrm{Ca}\ (8.719\ \mathrm{m}) \xrightarrow{\beta^-} {}^{49}\mathrm{Sc}\ (57.4\ \mathrm{m}) \xrightarrow{\beta^-} {}^{49}\mathrm{Ti} \xleftarrow{\mathrm{EC}} {}^{49}\mathrm{V}\ (330\ \mathrm{d}) \xleftarrow{\beta^+} {}^{49}\mathrm{Cr}\ (42.09\ \mathrm{m})$$

$$\begin{tikzcd}
 & & {}^{52}\mathrm{Mn}\ (21.4\ \mathrm{m}) \arrow[dl, "\beta^+\ 98.25\%"'] \arrow[dd, "\mathrm{IT}\ 1.75\%"] & \\
{}^{52}\mathrm{V}\ (3.75\ \mathrm{m}) \arrow[r, "\beta^-"] & {}^{52}\mathrm{Cr} & & {}^{52}\mathrm{Fe}\ (8.275\ \mathrm{h}) \arrow[ul, "\beta^+"'] \\
 & & {}^{52}\mathrm{Mn}\ (5.591\ \mathrm{d}) \arrow[ul, "\beta^+"] &
\end{tikzcd}$$

$$^{56}\mathrm{Mn}\ (2.5785\ \mathrm{h}) \xrightarrow{\beta^-} {}^{56}\mathrm{Fe} \xleftarrow{\beta^+} {}^{56}\mathrm{Co}\ (78.76\ \mathrm{d}) \xleftarrow{\mathrm{EC}} {}^{56}\mathrm{Ni}\ (6.10\ \mathrm{d})$$

$$^{57}\mathrm{Mn}\ (1.47\ \mathrm{m}) \xrightarrow{\beta^-} {}^{57}\mathrm{Fe} \xleftarrow{\mathrm{EC}} {}^{57}\mathrm{Co}\ (270.9\ \mathrm{d}) \xleftarrow{\beta^+} {}^{57}\mathrm{Ni}\ (36.08\ \mathrm{h})$$

$$\begin{tikzcd}
 & {}^{58}\mathrm{Co}\ (9.15\ \mathrm{h}) \arrow[d, "\mathrm{IT}"'] \\
{}^{58}\mathrm{Fe} & {}^{58}\mathrm{Co}\ (70.80\ \mathrm{d}) \arrow[l, "\mathrm{EC}"']
\end{tikzcd}$$

$$\begin{tikzcd}
{}^{60}\mathrm{Co}\ (10.47\ \mathrm{m}) \arrow[d, "\mathrm{IT}"', "99.76\%"] \arrow[dr, "\beta^-", "0.24\%"'] & \\
 & {}^{60}\mathrm{Ni} \\
{}^{60}\mathrm{Co}\ (5.271\ \mathrm{y}) \arrow[ur, "\beta^-"] &
\end{tikzcd}$$

$$^{62}\mathrm{Ni} \xleftarrow{\beta^+} {}^{62}\mathrm{Cu}\ (9.74\ \mathrm{m}) \xleftarrow{\mathrm{EC}} {}^{62}\mathrm{Zn}\ (9.26\ \mathrm{h})$$

$$^{68}\mathrm{Zn} \xleftarrow{\beta^+} {}^{68}\mathrm{Ga}\ (68.0\ \mathrm{m}) \xleftarrow{\mathrm{EC}} {}^{68}\mathrm{Ge}\ (288\ \mathrm{d})$$

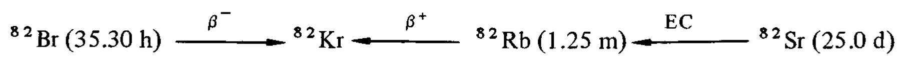
$$\begin{tikzcd}
{}^{69}\mathrm{Zn}\ (13.76\ \mathrm{h}) \arrow[d, "\mathrm{IT}"', "99.967\%"] & {}^{69}\mathrm{Ga} \\
{}^{69}\mathrm{Zn}\ (55.6\ \mathrm{m}) \arrow[ur, "\beta^-"] &
\end{tikzcd}$$

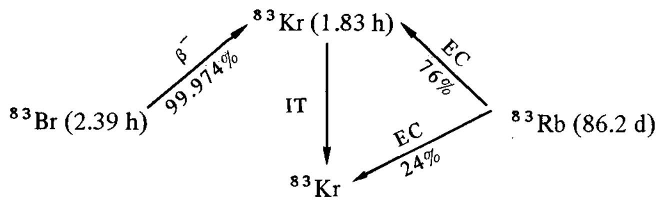
$$^{73}\mathrm{Ge} \xleftarrow{\mathrm{EC}} {}^{73}\mathrm{As}\ (80.30\ \mathrm{d}) \xleftarrow{\mathrm{EC}} {}^{73}\mathrm{Se}\ (7.15\ \mathrm{h})$$

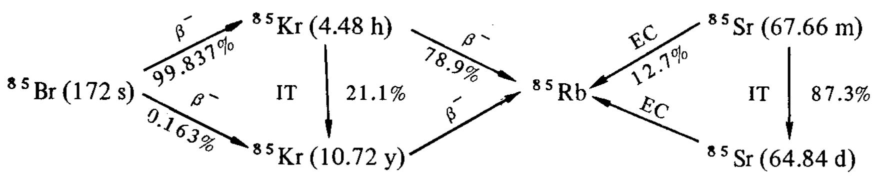
$$^{77}\mathrm{Ge}\ (11.30\ \mathrm{h}) \xrightarrow{\beta^-} {}^{77}\mathrm{As}\ (38.8\ \mathrm{h}) \xrightarrow{\beta^-} {}^{77}\mathrm{Se} \xleftarrow{\mathrm{EC}} {}^{77}\mathrm{Br}\ (57.04\ \mathrm{h})$$

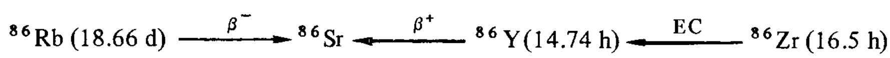
$$\begin{tikzcd}
 & {}^{80}\mathrm{Br}\ (4.42\ \mathrm{h}) \arrow[d, "\mathrm{IT}"'] & \\
{}^{80}\mathrm{Se} & {}^{80}\mathrm{Br}\ (17.4\ \mathrm{m}) \arrow[l, "\mathrm{EC}"', "8.26\%"] \arrow[r, "\beta^-", "91.74\%"'] & {}^{80}\mathrm{Kr}
\end{tikzcd}$$

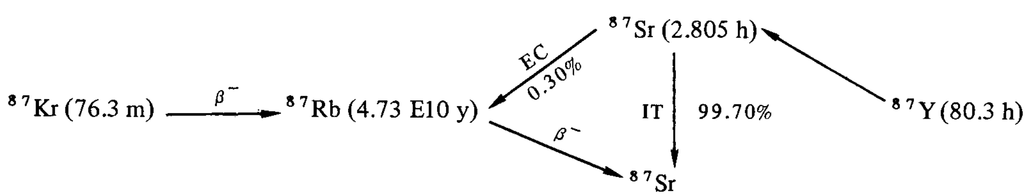
$$^{81}\mathrm{Br} \xleftarrow{\mathrm{EC}} {}^{81}\mathrm{Kr}\ (2.1\mathrm{E}5\ \mathrm{y}) \xleftarrow{\mathrm{EC}} {}^{81}\mathrm{Rb}\ (4.58\ \mathrm{h})$$

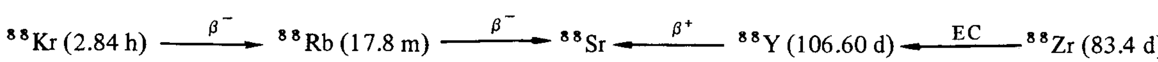

^{82}Br (35.30 h)
β^-
^{82}Kr
β^+
^{82}Rb (1.25 m)
EC
^{82}Sr (25.0 d)

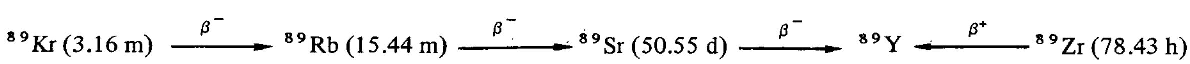

^{83}Br (2.39 h)
β^- 99.974%
^{83}Kr (1.83 h)
IT
EC 76%
^{83}Rb (86.2 d)
EC 24%
^{83}Kr

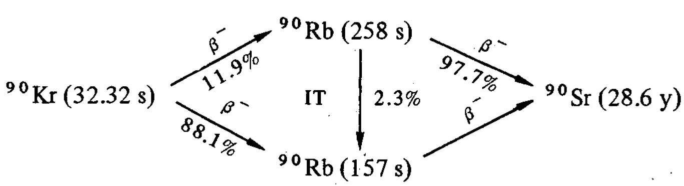

^{85}Br (172 s)
β^- 99.837%
β^- 0.163%
^{85}Kr (4.48 h)
IT 21.1%
^{85}Kr (10.72 y)
β^- 78.9%
β^-
^{85}Rb
EC 12.7%
EC
^{85}Sr (67.66 m)
IT 87.3%
^{85}Sr (64.84 d)

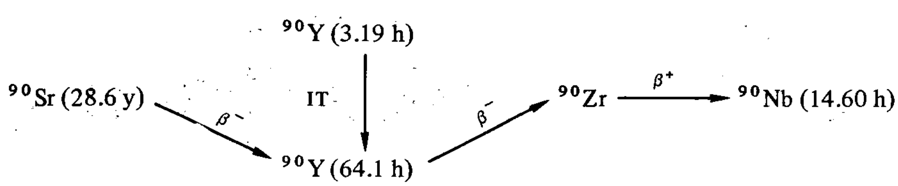

^{86}Rb (18.66 d)
β^-
^{86}Sr
β^+
^{86}Y (14.74 h)
EC
^{86}Zr (16.5 h)

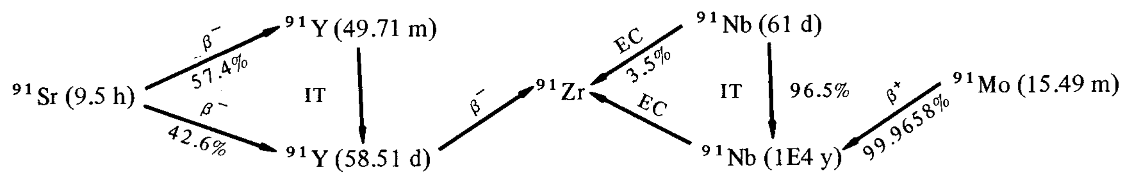

^{87}Kr (76.3 m)
β^-
^{87}Rb (4.73 E10 y)
EC 0.30%
^{87}Sr (2.805 h)
IT 99.70%
β^-
^{87}Sr
^{87}Y (80.3 h)


^{88}Kr (2.84 h)
β^-
^{88}Rb (17.8 m)
β^-
^{88}Sr
β^+
^{88}Y (106.60 d)
EC
^{88}Zr (83.4 d)

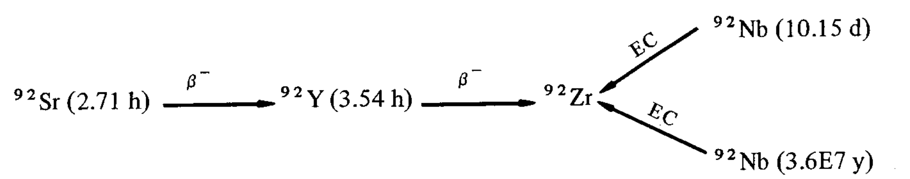

^{89}Kr (3.16 m)
β^-
^{89}Rb (15.44 m)
β^-
^{89}Sr (50.55 d)
β^-
^{89}Y
β^+
^{89}Zr (78.43 h)


^{90}Kr (32.32 s)
β^- 11.9%
β^- 88.1%
^{90}Rb (258 s)
IT 2.3%
^{90}Rb (157 s)
β^- 97.7%
β^-
^{90}Sr (28.6 y)

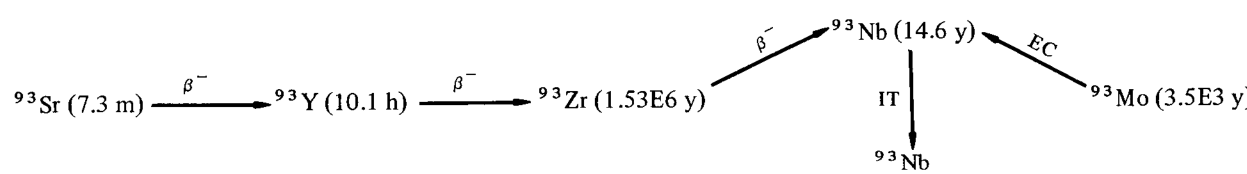

^{90}Sr (28.6 y)
β^-
^{90}Y (3.19 h)
IT
^{90}Y (64.1 h)
β^-
^{90}Zr
β^+
^{90}Nb (14.60 h)



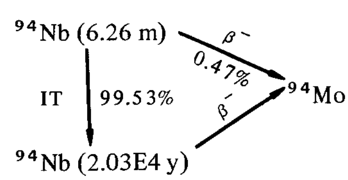
^{91}Sr (9.5 h)
β^-
57.4%
β^-
42.6%
^{91}Y (49.71 m)
IT
^{91}Y (58.51 d)
β^-
^{91}Zr
EC
3.5%
EC
^{91}Nb (61 d)
IT
96.5%
^{91}Nb (1E4 y)
β^+
99.9658%
^{91}Mo (15.49 m)



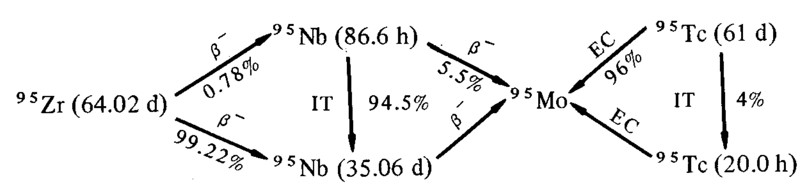
^{92}Sr (2.71 h)
β^-
^{92}Y (3.54 h)
β^-
^{92}Zr
EC
EC
^{92}Nb (10.15 d)
^{92}Nb (3.6E7 y)



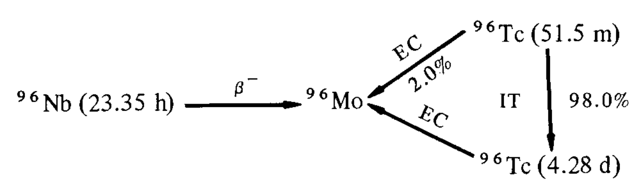
^{93}Sr (7.3 m)
β^-
^{93}Y (10.1 h)
β^-
^{93}Zr (1.53E6 y)
β^-
^{93}Nb (14.6 y)
IT
^{93}Nb
EC
^{93}Mo (3.5E3 y)



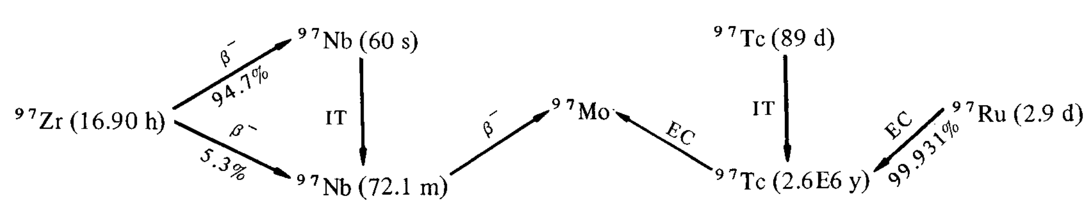
^{94}Nb (6.26 m)
β^-
0.47%
IT
99.53%
β^-
^{94}Mo
^{94}Nb (2.03E4 y)



^{95}Zr (64.02 d)
β^-
0.78%
β^-
99.22%
^{95}Nb (86.6 h)
IT
94.5%
^{95}Nb (35.06 d)
β^-
5.5%
β^-
^{95}Mo
EC
96%
EC
^{95}Tc (61 d)
IT
4%
^{95}Tc (20.0 h)



^{96}Nb (23.35 h)
β^-
^{96}Mo
EC
2.0%
EC
^{96}Tc (51.5 m)
IT
98.0%
^{96}Tc (4.28 d)



^{97}Zr (16.90 h)
β^-
94.7%
β^-
5.3%
^{97}Nb (60 s)
IT
^{97}Nb (72.1 m)
β^-
^{97}Mo
EC
^{97}Tc (89 d)
IT
^{97}Tc (2.6E6 y)
EC
99.931%
^{97}Ru (2.9 d)

$$\begin{tikzcd}
 & {}^{99}\text{Tc (6.02 h)} \arrow[d, "\text{IT}"'] & \\
{}^{99}\text{Mo (66.02 h)} \arrow[ur, "\beta^-", "88.6\%"'] \arrow[r, "\beta^-", "11.4\%"'] & {}^{99}\text{Tc (2.13E5 y)} \arrow[r, "\beta^-"] & {}^{99}\text{Ru}
\end{tikzcd}$$

$$ {}^{101}\text{Mo (14.61 m)} \xrightarrow{\beta^-} {}^{101}\text{Tc (14.2 m)} \xrightarrow{\beta^-} {}^{101}\text{Ru} $$

$$\begin{tikzcd}
 & {}^{103}\text{Rh (56.119 m)} \arrow[d, "\text{IT}"'] & \\
{}^{103}\text{Ru (39.35 d)} \arrow[ur, "\beta^-", "99.737\%"'] & {}^{103}\text{Rh} & {}^{103}\text{Pd (16.961 d)} \arrow[ul, "\text{EC}"', "99.9740\%"]
\end{tikzcd}$$

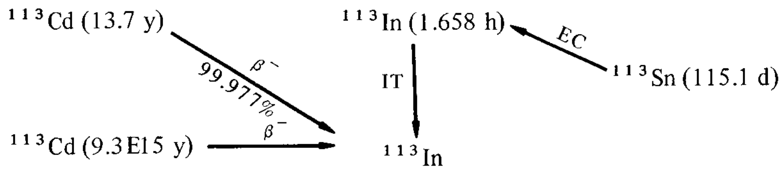
$$\begin{tikzcd}
 & {}^{105}\text{Rh (45 s)} \arrow[d, "\text{IT}"'] & \\
{}^{105}\text{Ru (4.44 h)} \arrow[ur, "\beta^-", "24.5\%"'] \arrow[r, "\beta^-", "75.5\%"'] & {}^{105}\text{Rh (35.36 h)} \arrow[r, "\beta^-"] & {}^{105}\text{Pd}
\end{tikzcd}$$

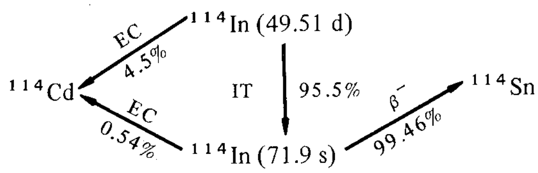
$$ {}^{106}\text{Ru (368.2 d)} \xrightarrow{\beta^-} {}^{106}\text{Rh (29.92 s)} \xrightarrow{\beta^-} {}^{106}\text{Pd} \xleftarrow{\text{EC}} {}^{106}\text{Ag (8.46 d)} $$

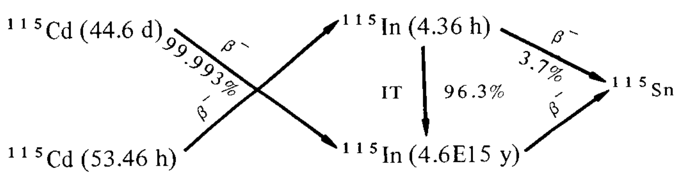
$$\begin{tikzcd}
 & {}^{108}\text{Ag (127 y)} \arrow[dl, "\text{EC}"', "90.7\%"] \arrow[d, "\text{IT}"', "9.3\%"] & \\
{}^{108}\text{Pd} & {}^{108}\text{Ag (2.37 m)} \arrow[l, "\text{EC}"', "2.3\%"] \arrow[r, "\beta^-", "97.7\%"'] & {}^{108}\text{Cd}
\end{tikzcd}$$

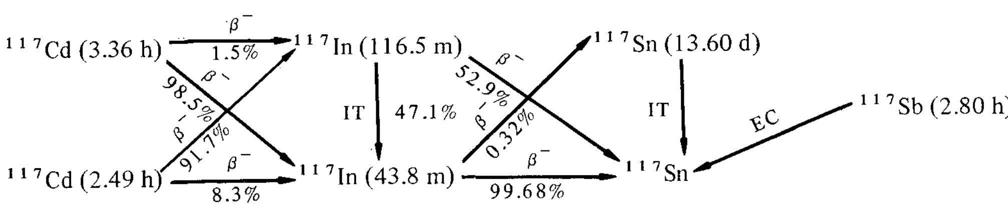
$$\begin{tikzcd}
 & {}^{109}\text{Ag (39.6 s)} \arrow[d, "\text{IT}"'] & \\
{}^{109}\text{Pd (13.53 h)} \arrow[ur, "\beta^-", "99.949\%"'] & {}^{109}\text{Ag} & {}^{109}\text{Cd (464 d)} \arrow[ul, "\text{EC}"']
\end{tikzcd}$$

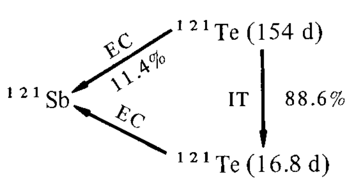
$$\begin{tikzcd}
 & {}^{110}\text{Ag (249.85 d)} \arrow[d, "\text{IT}"', "1.33\%"] \arrow[dr, "\beta^-", "98.67\%"'] & \\
{}^{110}\text{Pd} & {}^{110}\text{Ag (24.57 s)} \arrow[l, "\text{EC}"', "0.30\%"] \arrow[r, "\beta^-", "99.70\%"'] & {}^{110}\text{Cd}
\end{tikzcd}$$

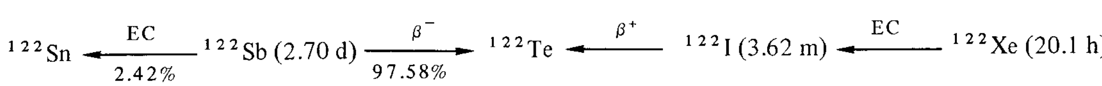

113Cd (13.7 y)
β⁻
99.977%
113Cd (9.3E15 y)
β⁻
113In (1.658 h)
IT
113In
EC
113Sn (115.1 d)

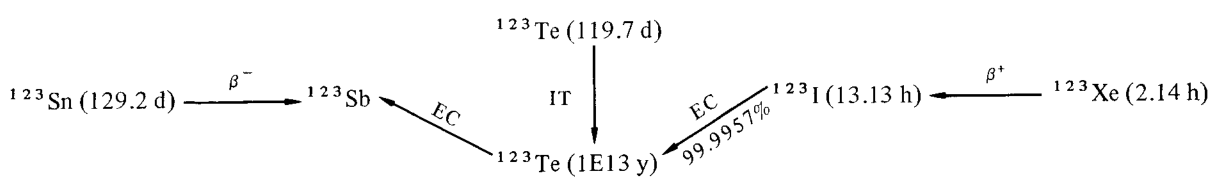

114In (49.51 d)
EC
4.5%
114Cd
IT
95.5%
EC
0.54%
114In (71.9 s)
β⁻
99.46%
114Sn

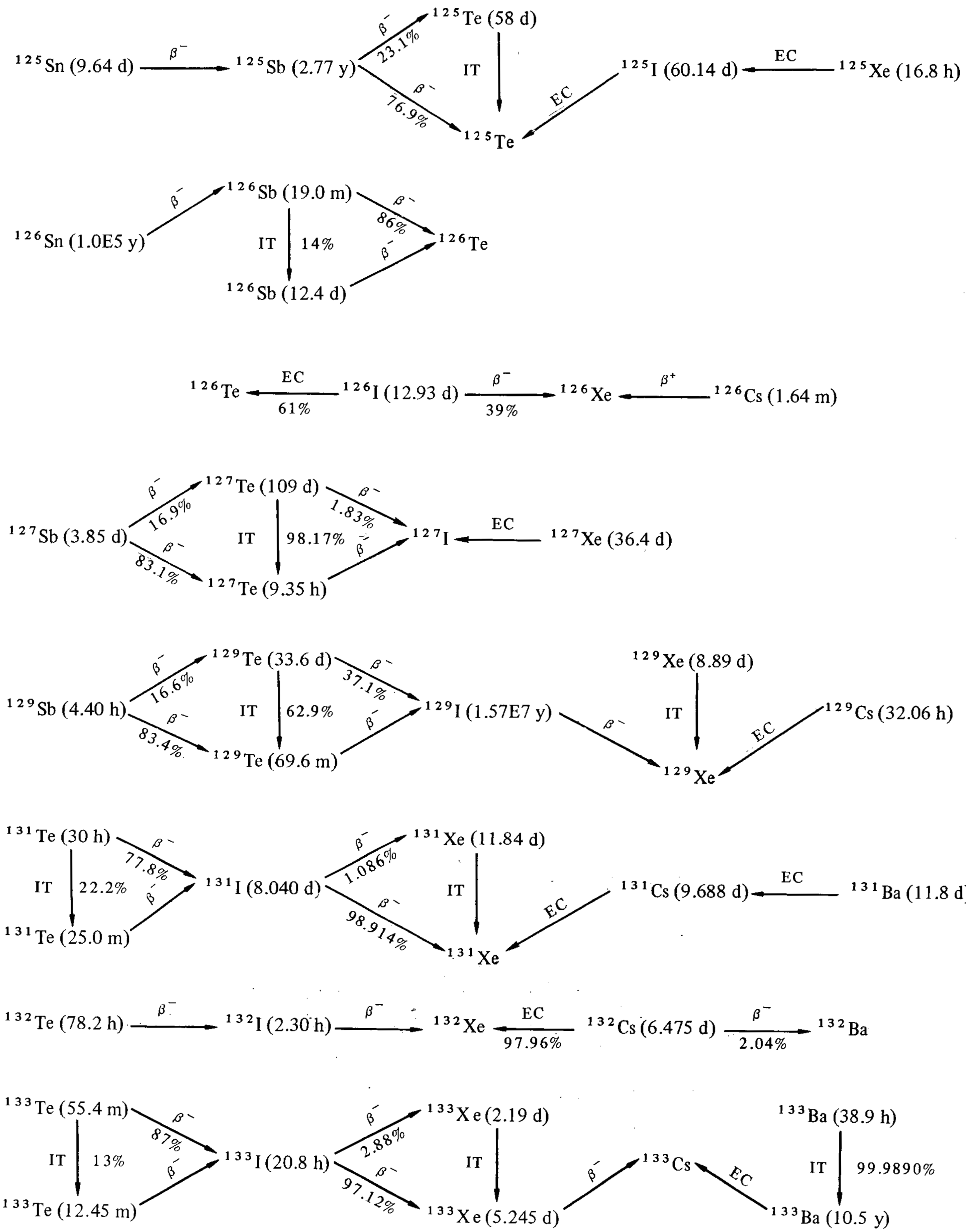

115Cd (44.6 d)
β⁻
99.993%
β⁻
115Cd (53.46 h)
115In (4.36 h)
IT
96.3%
115In (4.6E15 y)
β⁻
3.7%
β⁻
115Sn


117Cd (3.36 h)
β⁻
1.5%
β⁻
98.5%
β⁻
91.7%
117Cd (2.49 h)
β⁻
8.3%
117In (116.5 m)
IT
47.1%
117In (43.8 m)
β⁻
52.9%
β⁻
0.32%
β⁻
99.68%
117Sn (13.60 d)
IT
117Sn
EC
117Sb (2.80 h)


121Te (154 d)
EC
11.4%
121Sb
IT
88.6%
EC
121Te (16.8 d)


122Sn
EC
2.42%
122Sb (2.70 d)
β⁻
97.58%
122Te
β⁺
122I (3.62 m)
EC
122Xe (20.1 h)


123Sn (129.2 d)
β⁻
123Sb
EC
123Te (119.7 d)
IT
123Te (1E13 y)
EC
99.9957%
123I (13.13 h)
β⁺
123Xe (2.14 h)



^{125}Sn (9.64 d)
β^-
^{125}Sb (2.77 y)
β^- 23.1%
^{125}Te (58 d)
IT
β^- 76.9%
^{125}Te
EC
^{125}I (60.14 d)
EC
^{125}Xe (16.8 h)
^{126}Sn (1.0E5 y)
β^-
^{126}Sb (19.0 m)
IT 14%
β^- 86%
^{126}Te
β^-
^{126}Sb (12.4 d)
^{126}Te
EC 61%
^{126}I (12.93 d)
β^- 39%
^{126}Xe
β^+
^{126}Cs (1.64 m)
^{127}Sb (3.85 d)
β^- 16.9%
^{127}Te (109 d)
IT 98.17%
β^- 1.83%
β^- 83.1%
^{127}Te (9.35 h)
β^-
^{127}I
EC
^{127}Xe (36.4 d)
^{129}Sb (4.40 h)
β^- 16.6%
^{129}Te (33.6 d)
IT 62.9%
β^- 37.1%
β^- 83.4%
^{129}Te (69.6 m)
β^-
^{129}I (1.57E7 y)
β^-
^{129}Xe (8.89 d)
IT
^{129}Xe
EC
^{129}Cs (32.06 h)
^{131}Te (30 h)
IT 22.2%
β^- 77.8%
^{131}Te (25.0 m)
β^-
^{131}I (8.040 d)
β^- 1.086%
^{131}Xe (11.84 d)
IT
β^- 98.914%
^{131}Xe
EC
^{131}Cs (9.688 d)
EC
^{131}Ba (11.8 d)
^{132}Te (78.2 h)
β^-
^{132}I (2.30 h)
β^-
^{132}Xe
EC 97.96%
^{132}Cs (6.475 d)
β^- 2.04%
^{132}Ba
^{133}Te (55.4 m)
IT 13%
β^- 87%
^{133}Te (12.45 m)
β^-
^{133}I (20.8 h)
β^- 2.88%
^{133}Xe (2.19 d)
IT
β^- 97.12%
^{133}Xe (5.245 d)
β^-
^{133}Cs
EC
^{133}Ba (38.9 h)
IT 99.9890%
^{133}Ba (10.5 y)

$$^{134}\mathrm{Te}\ (41.8\ \mathrm{m}) \xrightarrow{\beta^-} {}^{134}\mathrm{I}\ (52.6\ \mathrm{m}) \xrightarrow{\beta^-} {}^{134}\mathrm{Xe}$$

$$^{134}\mathrm{Cs}\ (2.90\ \mathrm{h}) \xrightarrow{\mathrm{IT}} {}^{134}\mathrm{Cs}\ (2.062\ \mathrm{y}) \xrightarrow{\beta^-} {}^{134}\mathrm{Ba}$$

$$^{135}\mathrm{I}\ (6.61\ \mathrm{h}) \xrightarrow[16.5\%]{\beta^-} {}^{135}\mathrm{Xe}\ (15.36\ \mathrm{m})$$

$$^{135}\mathrm{I}\ (6.61\ \mathrm{h}) \xrightarrow[83.5\%]{\beta^-} {}^{135}\mathrm{Xe}\ (9.11\ \mathrm{h})$$

$$^{135}\mathrm{Xe}\ (15.36\ \mathrm{m}) \xrightarrow[99.9964\%]{\mathrm{IT}} {}^{135}\mathrm{Xe}\ (9.11\ \mathrm{h}) \xrightarrow{\beta^-} {}^{135}\mathrm{Cs}\ (2.3\mathrm{E}6\ \mathrm{y}) \xrightarrow{\beta^-} {}^{135}\mathrm{Ba}$$

$$^{135}\mathrm{Ba}\ (28.7\ \mathrm{h}) \xrightarrow{\mathrm{IT}} {}^{135}\mathrm{Ba}$$

$$^{137}\mathrm{Xe}\ (3.83\ \mathrm{m}) \xrightarrow{\beta^-} {}^{137}\mathrm{Cs}\ (30.17\ \mathrm{y}) \xrightarrow[94.6\%]{\beta^-} {}^{137}\mathrm{Ba}\ (2.522\ \mathrm{m}) \xrightarrow{\mathrm{IT}} {}^{137}\mathrm{Ba}$$

$$^{137}\mathrm{Cs}\ (30.17\ \mathrm{y}) \xrightarrow[5.4\%]{\beta^-} {}^{137}\mathrm{Ba}$$

$$^{138}\mathrm{Xe}\ (14.13\ \mathrm{m}) \xrightarrow{\beta^-} {}^{138}\mathrm{Cs}\ (32.2\ \mathrm{m}) \xrightarrow{\beta^-} {}^{138}\mathrm{Ba}$$

$$^{139}\mathrm{Cs}\ (9.40\ \mathrm{m}) \xrightarrow{\beta^-} {}^{139}\mathrm{Ba}\ (83.1\ \mathrm{m}) \xrightarrow{\beta^-} {}^{139}\mathrm{La} \xleftarrow{\mathrm{EC}} {}^{139}\mathrm{Ce}\ (137.66\ \mathrm{d})$$

$$^{140}\mathrm{Ba}\ (12.789\ \mathrm{d}) \xrightarrow{\beta^-} {}^{140}\mathrm{La}\ (40.22\ \mathrm{h}) \xrightarrow{\beta^-} {}^{140}\mathrm{Ce}$$

$$^{141}\mathrm{Ba}\ (18.27\ \mathrm{m}) \xrightarrow{\beta^-} {}^{141}\mathrm{La}\ (3.94\ \mathrm{h}) \xrightarrow{\beta^-} {}^{141}\mathrm{Ce}\ (32.50\ \mathrm{d}) \xrightarrow{\beta^-} {}^{141}\mathrm{Pr}$$

$$^{142}\mathrm{Ba}\ (10.70\ \mathrm{m}) \xrightarrow{\beta^-} {}^{142}\mathrm{La}\ (95.4\ \mathrm{m}) \xrightarrow{\beta^-} {}^{142}\mathrm{Ce}$$

$$^{142}\mathrm{Pr}\ (19.13\ \mathrm{h}) \xrightarrow[99.9836\%]{\beta^-} {}^{142}\mathrm{Nd}$$

$$^{143}\mathrm{Ce}\ (33.0\ \mathrm{h}) \xrightarrow{\beta^-} {}^{143}\mathrm{Pr}\ (13.56\ \mathrm{d}) \xrightarrow{\beta^-} {}^{143}\mathrm{Nd} \xleftarrow{\mathrm{EC}} {}^{143}\mathrm{Pm}\ (265\ \mathrm{d})$$

$$\begin{tikzcd}
 & {}^{144}\mathrm{Pr}\ (7.2\ \mathrm{m}) \arrow[d, "\mathrm{IT}"', "99.94\%"] & & \\
{}^{144}\mathrm{Ce}\ (284.3\ \mathrm{d}) \arrow[ur, "\beta^-", "1.43\%"'] \arrow[r, "\beta^-", "98.57\%"'] & {}^{144}\mathrm{Pr}\ (17.28\ \mathrm{m}) \arrow[r, "\beta^-"] & {}^{144}\mathrm{Nd} & {}^{144}\mathrm{Pm}\ (363\ \mathrm{d}) \arrow[l, "\mathrm{EC}"']
\end{tikzcd}$$

$$\begin{tikzcd}
{}^{147}\mathrm{Nd}\ (10.98\ \mathrm{d}) \arrow[r, "\beta^-"] & {}^{147}\mathrm{Pm}\ (2.6234\ \mathrm{y}) \arrow[r, "\beta^-"] & {}^{147}\mathrm{Sm}\ (1.06\mathrm{E}11\ \mathrm{y}) \arrow[d, Rightarrow, "\alpha"'] \\
 & & {}^{143}\mathrm{Nd}
\end{tikzcd}$$

$$\begin{tikzcd}
{}^{148}\mathrm{Pm}\ (41.3\ \mathrm{d}) \arrow[d, "\mathrm{IT}"', "4.2\%"] \arrow[dr, "\beta^-", "95.8\%"'] & \\
{}^{148}\mathrm{Pm}\ (5.37\ \mathrm{d}) \arrow[r, "\beta^-"] & {}^{148}\mathrm{Sm}
\end{tikzcd}$$

$${}^{149}\mathrm{Nd}\ (1.73\ \mathrm{h}) \xrightarrow{\beta^-} {}^{149}\mathrm{Pm}\ (53.08\ \mathrm{h}) \xrightarrow{\beta^-} {}^{149}\mathrm{Sm}$$

$${}^{151}\mathrm{Pm}\ (28.40\ \mathrm{h}) \xrightarrow{\beta^-} {}^{151}\mathrm{Sm}\ (90\ \mathrm{y}) \xrightarrow{\beta^-} {}^{151}\mathrm{Eu}$$

$$\begin{tikzcd}
 & {}^{152}\mathrm{Eu}\ (9.32\ \mathrm{h}) \arrow[dl, "\mathrm{EC}"', "29\%"] \arrow[dr, "\beta^-", "71\%"'] & \\
{}^{152}\mathrm{Sm} & & {}^{152}\mathrm{Gd}\ (1.1\mathrm{E}14\ \mathrm{y}) \arrow[d, Rightarrow, "\alpha"'] \\
 & {}^{152}\mathrm{Eu}\ (13.6\ \mathrm{y}) \arrow[ul, "\mathrm{EC}", "72.2\%"'] \arrow[ur, "\beta^-"', "27.8\%"] & {}^{148}\mathrm{Sm}
\end{tikzcd}$$

$${}^{157}\mathrm{Gd} \xleftarrow{\mathrm{EC}} {}^{157}\mathrm{Tb}\ (150\ \mathrm{y}) \xleftarrow{\mathrm{EC}} {}^{157}\mathrm{Dy}\ (8.06\ \mathrm{h})$$

$${}^{162}\mathrm{Gd}\ (9.7\ \mathrm{m}) \xrightarrow{\beta^-} {}^{162}\mathrm{Tb}\ (7.76\ \mathrm{m}) \xrightarrow{\beta^-} {}^{162}\mathrm{Dy}$$

$$
\begin{tikzcd}
 & {}^{166}\mathrm{Ho}\ (1200\ \mathrm{y}) \arrow[dr, "\beta^-"] & \\
{}^{166}\mathrm{Dy}\ (81.6\ \mathrm{h}) \arrow[dr, "\beta^-"] & & {}^{166}\mathrm{Er} \\
 & {}^{166}\mathrm{Ho}\ (26.80\ \mathrm{h}) \arrow[ur, "\beta^-"'] &
\end{tikzcd}
$$

$$
{}^{171}\mathrm{Er}\ (7.52\ \mathrm{h}) \xrightarrow{\beta^-} {}^{171}\mathrm{Tm}\ (1.92\ \mathrm{y}) \xrightarrow{\beta^-} {}^{171}\mathrm{Yb}
$$

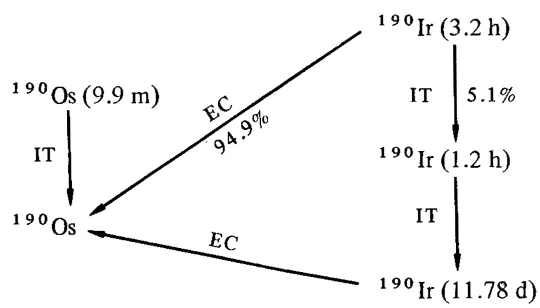
$$
\begin{tikzcd}
{}^{177}\mathrm{Lu}\ (160.10\ \mathrm{d}) \arrow[dr, "\beta^-", "78.5\%"'] \arrow[dd, "\mathrm{IT}"', "21.5\%"] & \\
 & {}^{177}\mathrm{Hf} \\
{}^{177}\mathrm{Lu}\ (6.71\ \mathrm{d}) \arrow[ur, "\beta^-"] &
\end{tikzcd}
$$

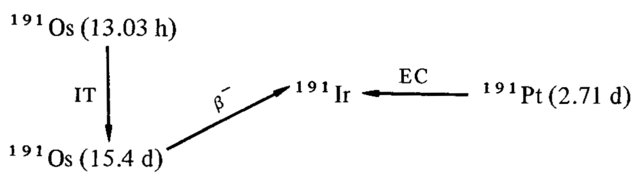
$$
\begin{tikzcd}
 & {}^{184}\mathrm{Re}\ (169\ \mathrm{d}) \arrow[dl, "\mathrm{EC}"', "25.3\%"] \arrow[dd, "\mathrm{IT}"', "74.7\%"] \\
{}^{184}\mathrm{W} & \\
 & {}^{184}\mathrm{Re}\ (38.0\ \mathrm{d}) \arrow[ul, "\mathrm{EC}"]
\end{tikzcd}
$$

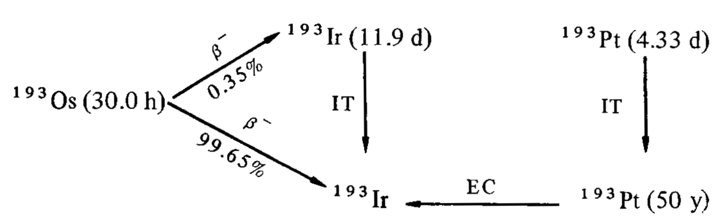
$$
\begin{tikzcd}
{}^{186}\mathrm{W} & {}^{186}\mathrm{Re}\ (90.64\ \mathrm{h}) \arrow[l, "\mathrm{EC}"', "6.8\%"] \arrow[r, "\beta^-", "93.2\%"'] & {}^{186}\mathrm{Os}\ (2.0\mathrm{E}15\ \mathrm{y}) \arrow[d, Rightarrow, "\alpha"'] \\
 & & {}^{182}\mathrm{W}
\end{tikzcd}
$$

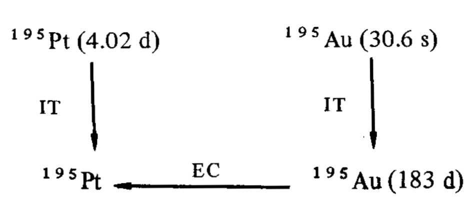
$$
{}^{187}\mathrm{W}\ (23.83\ \mathrm{h}) \xrightarrow{\beta^-} {}^{187}\mathrm{Re}\ (4.7\mathrm{E}10\ \mathrm{y}) \xrightarrow{\beta^-} {}^{187}\mathrm{Os}
$$

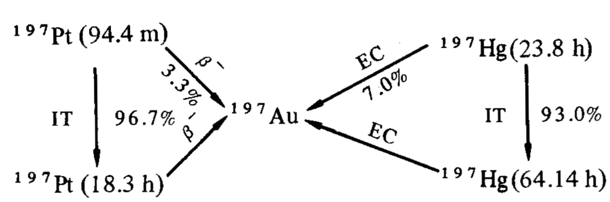
$$
{}^{188}\mathrm{W}\ (69.4\ \mathrm{d}) \xrightarrow{\beta^-} {}^{188}\mathrm{Re}\ (16.98\ \mathrm{h}) \xrightarrow{\beta^-} {}^{188}\mathrm{Os}
$$


^{190}Ir (3.2 h)
IT 5.1%
^{190}Os (9.9 m)
EC 94.9%
IT
^{190}Ir (1.2 h)
IT
^{190}Os
EC
^{190}Ir (11.78 d)

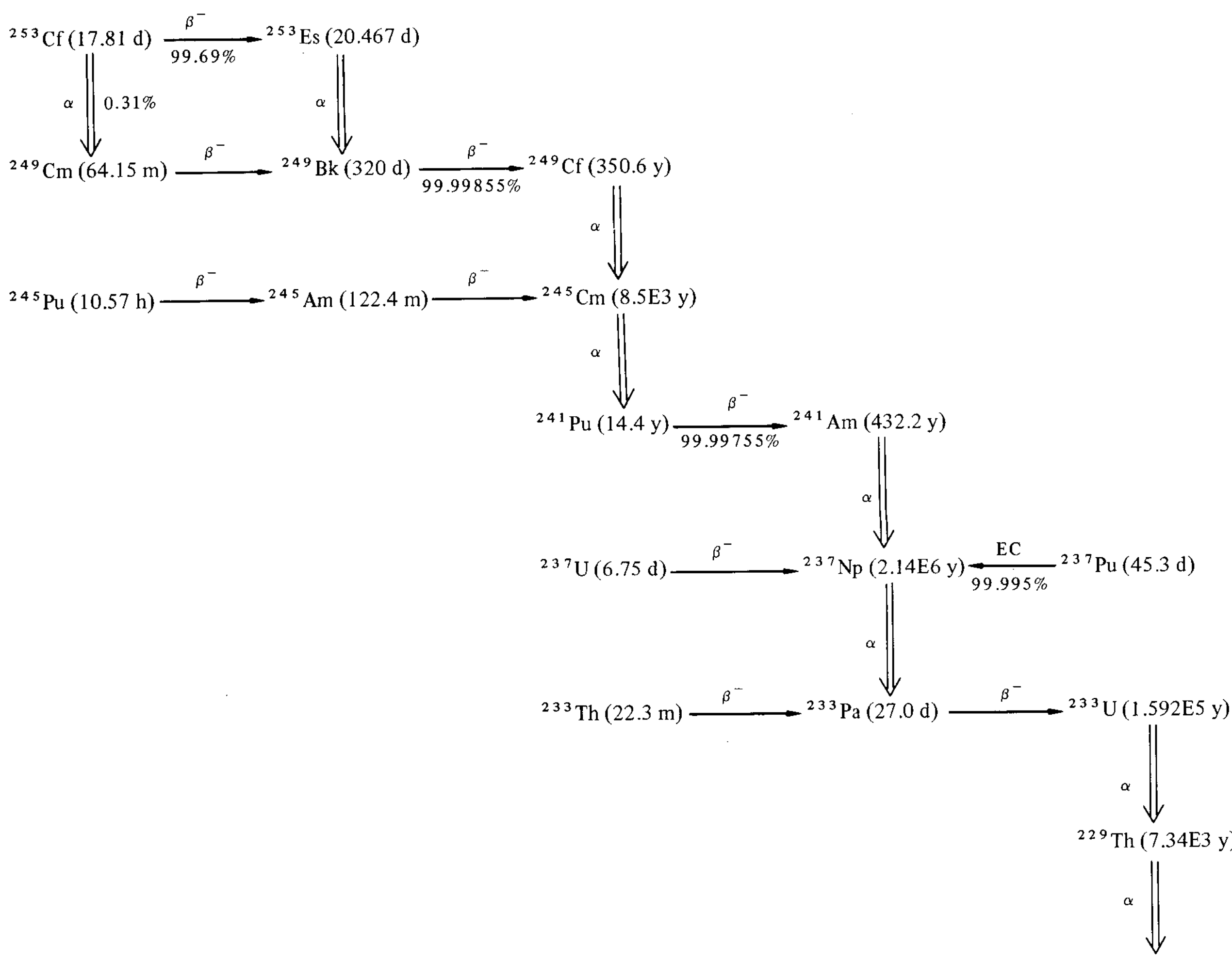

^{191}Os (13.03 h)
IT
β^-
^{191}Ir
EC
^{191}Pt (2.71 d)
^{191}Os (15.4 d)


^{193}Ir (11.9 d)
^{193}Pt (4.33 d)
β^- 0.35%
^{193}Os (30.0 h)
IT
IT
β^- 99.65%
^{193}Ir
EC
^{193}Pt (50 y)

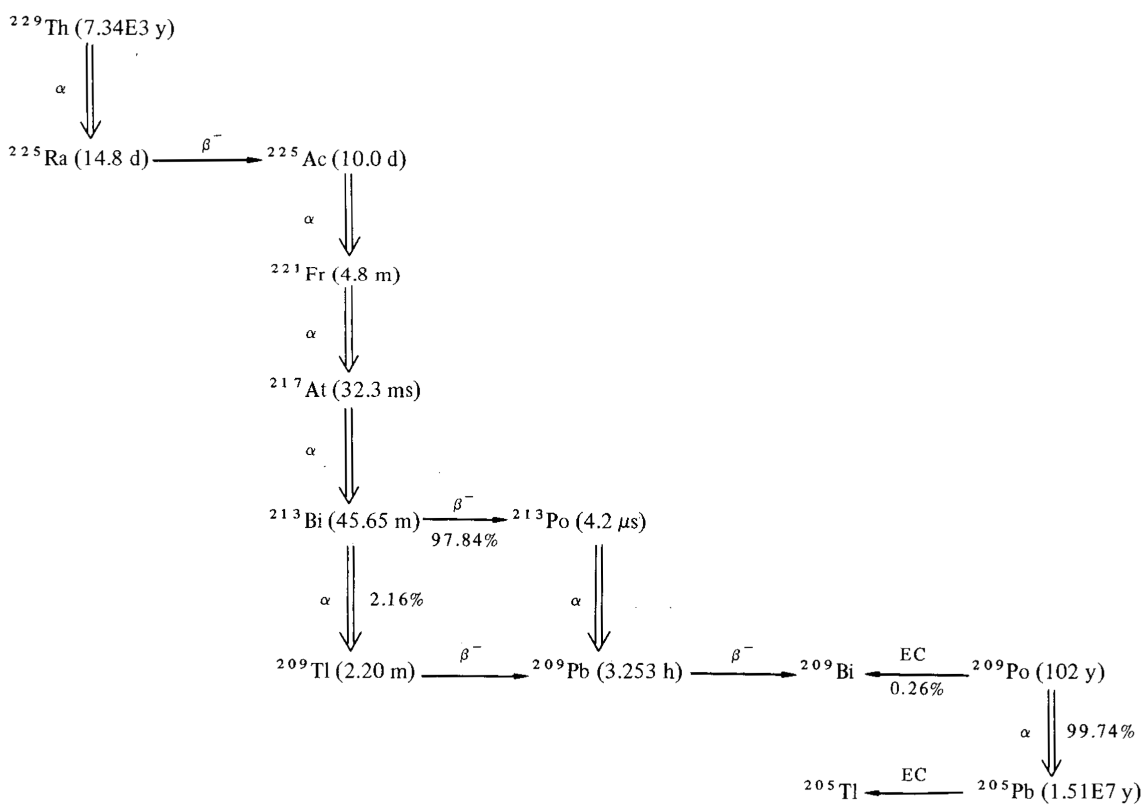

^{195}Pt (4.02 d)
^{195}Au (30.6 s)
IT
IT
^{195}Pt
EC
^{195}Au (183 d)


^{197}Pt (94.4 m)
β^- 3.3%
EC 7.0%
^{197}Hg (23.8 h)
IT 96.7%
β^-
^{197}Au
EC
IT 93.0%
^{197}Pt (18.3 h)
^{197}Hg (64.14 h)

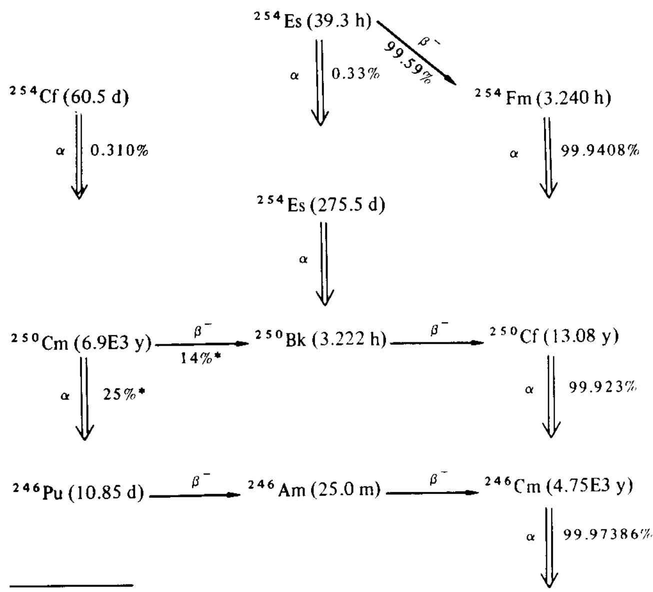
Neptunium Series



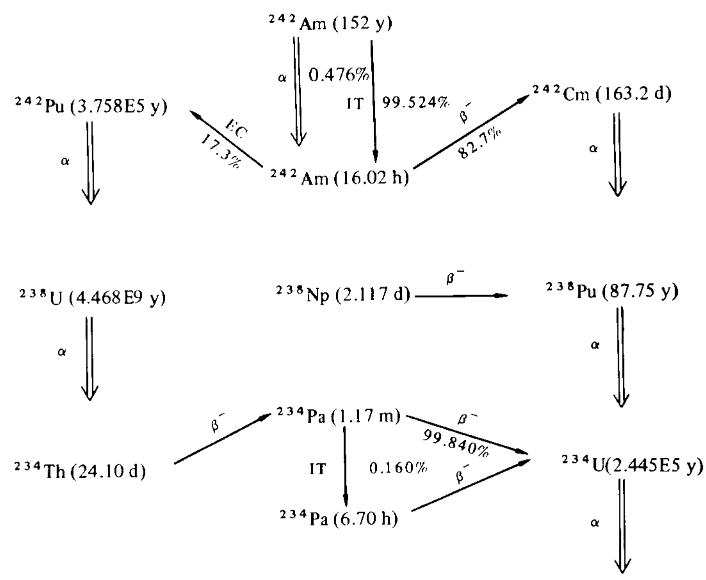
(continued)


^{229}Th (7.34E3 y)
α
^{225}Ra (14.8 d)
β⁻
^{225}Ac (10.0 d)
α
^{221}Fr (4.8 m)
α
^{217}At (32.3 ms)
α
^{213}Bi (45.65 m)
β⁻
97.84%
^{213}Po (4.2 μs)
α
2.16%
α
^{209}Tl (2.20 m)
β⁻
^{209}Pb (3.253 h)
β⁻
^{209}Bi
EC
0.26%
^{209}Po (102 y)
α
99.74%
^{205}Tl
EC
^{205}Pb (1.51E7 y)

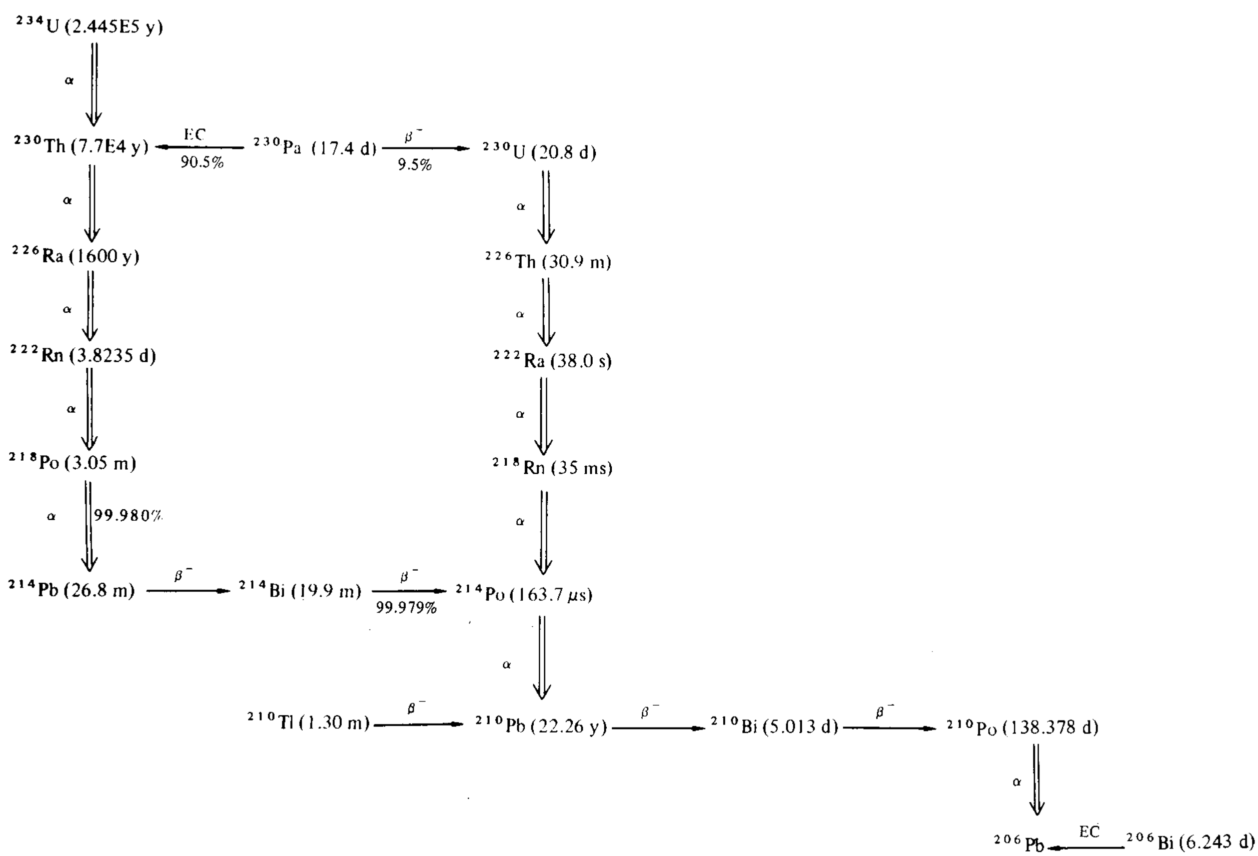
Uranium Series



*Branching ratio based on systematics; decay has not been deserved.

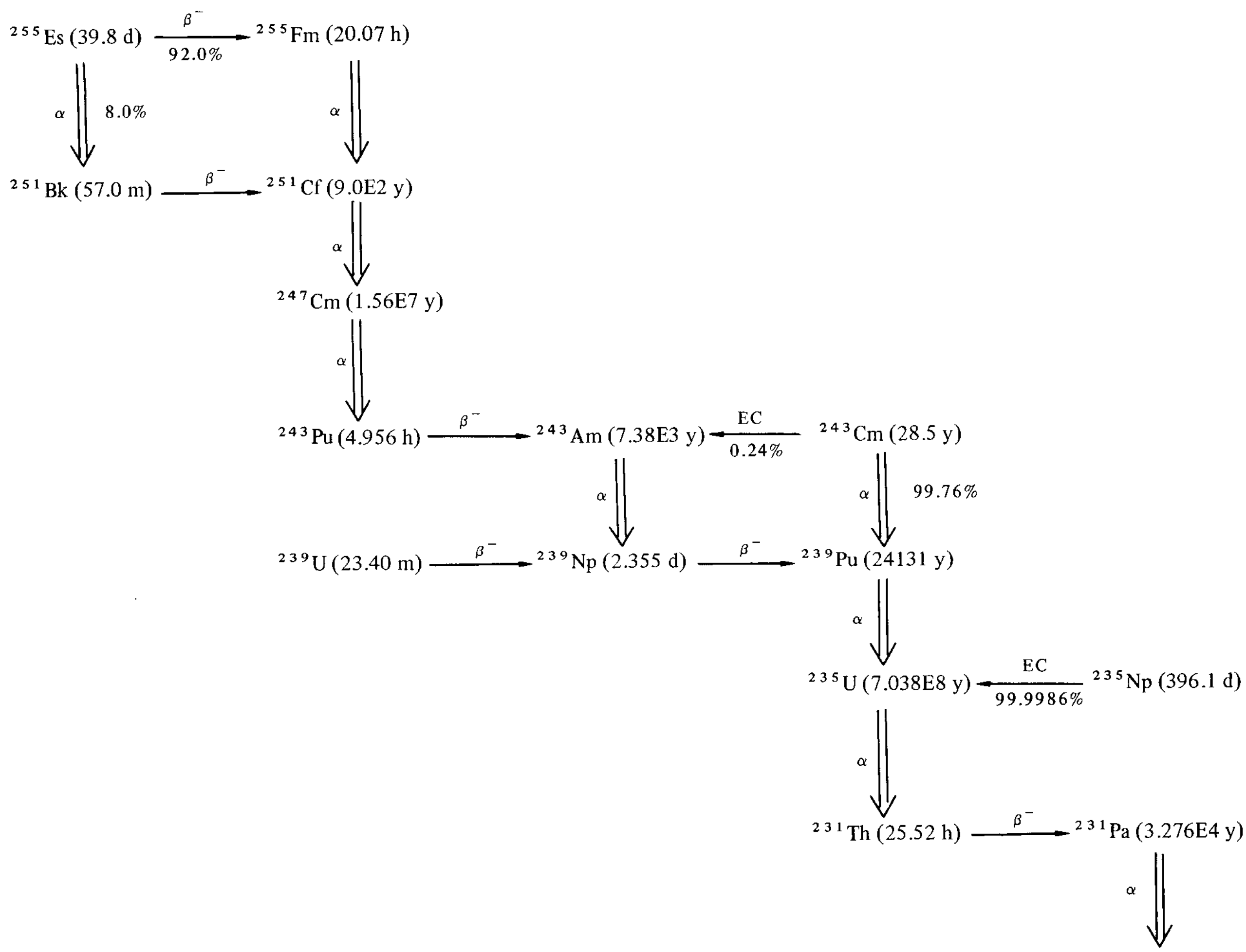


(continued)

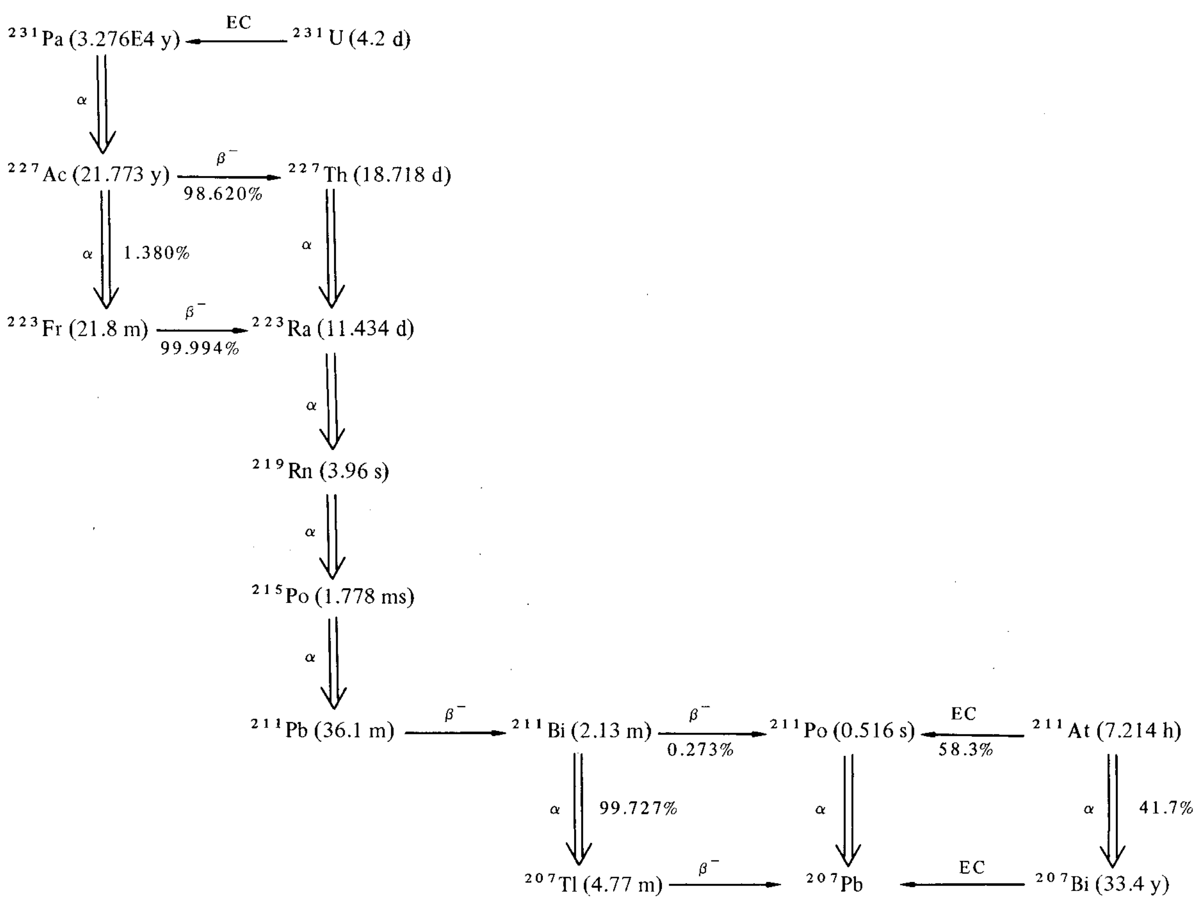


²³⁴U (2.445E5 y)
α
²³⁰Th (7.7E4 y)
EC
90.5%
²³⁰Pa (17.4 d)
β⁻
9.5%
²³⁰U (20.8 d)
α
²²⁶Ra (1600 y)
²²⁶Th (30.9 m)
²²²Rn (3.8235 d)
²²²Ra (38.0 s)
²¹⁸Po (3.05 m)
²¹⁸Rn (35 ms)
99.980%
²¹⁴Pb (26.8 m)
²¹⁴Bi (19.9 m)
99.979%
²¹⁴Po (163.7 μs)
²¹⁰Tl (1.30 m)
²¹⁰Pb (22.26 y)
²¹⁰Bi (5.013 d)
²¹⁰Po (138.378 d)
²⁰⁶Pb
²⁰⁶Bi (6.243 d)

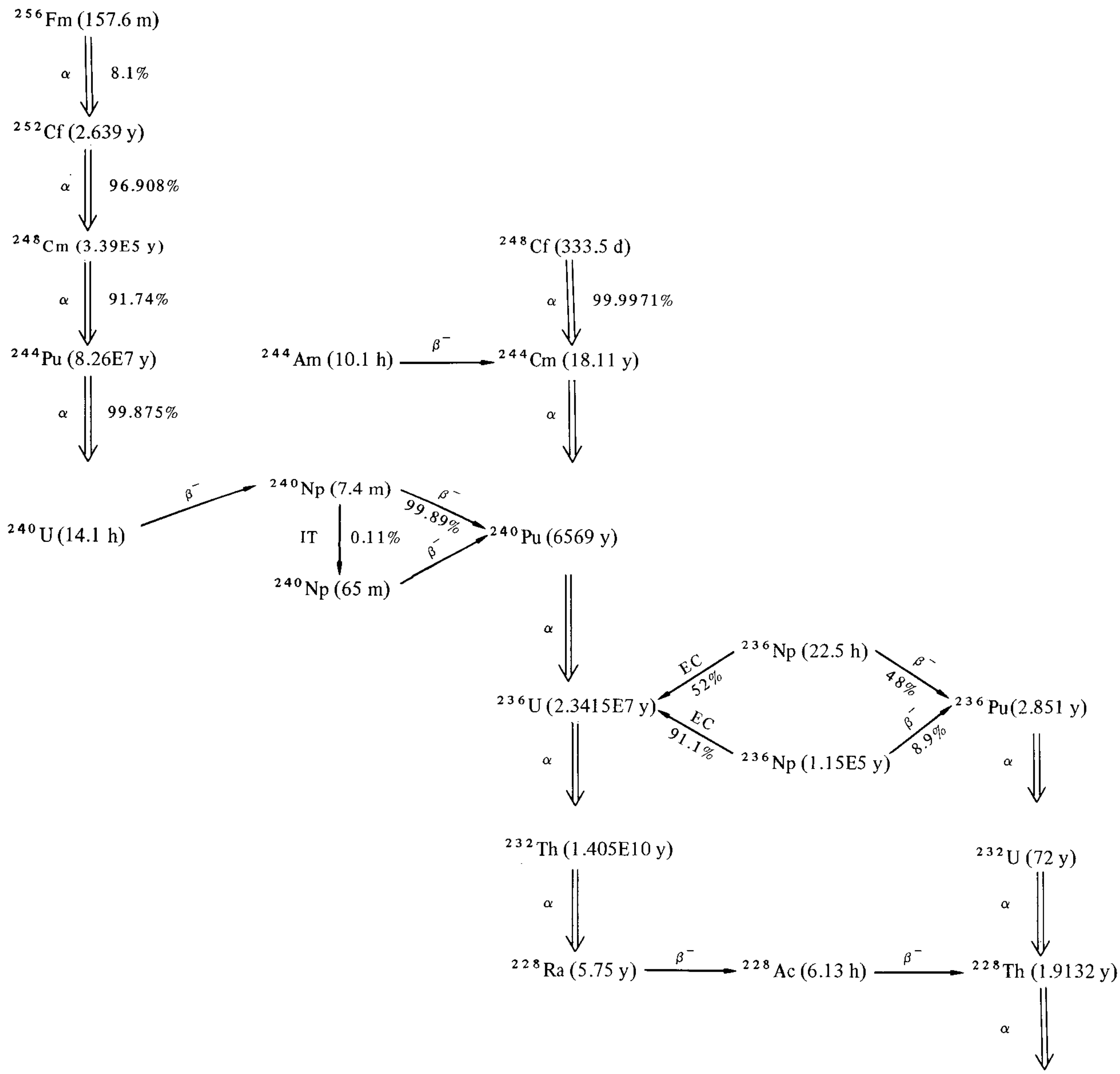
Actinium Series



(continued)


231Pa (3.276E4 y)
EC
231U (4.2 d)
α
227Ac (21.773 y)
β−
98.620%
227Th (18.718 d)
α
1.380%
α
223Fr (21.8 m)
β−
99.994%
223Ra (11.434 d)
α
219Rn (3.96 s)
α
215Po (1.778 ms)
α
211Pb (36.1 m)
β−
211Bi (2.13 m)
β−
0.273%
211Po (0.516 s)
EC
58.3%
211At (7.214 h)
α
99.727%
α
α
41.7%
207Tl (4.77 m)
β−
207Pb
EC
207Bi (33.4 y)

Thorium Series



(continued)

$$
\begin{tikzcd}
{}^{228}\mathrm{Th}\,(1.9132\ \mathrm{y}) \arrow[d, Rightarrow, "\alpha"'] & & & \\
{}^{224}\mathrm{Ra}\,(3.62\ \mathrm{d}) \arrow[d, Rightarrow, "\alpha"'] & & & \\
{}^{220}\mathrm{Rn}\,(55.61\ \mathrm{s}) \arrow[d, Rightarrow, "\alpha"'] & & & \\
{}^{216}\mathrm{Po}\,(0.146\ \mathrm{s}) \arrow[d, Rightarrow, "\alpha"'] & & & \\
{}^{212}\mathrm{Pb}\,(10.643\ \mathrm{h}) \arrow[r, "\beta^-"] & {}^{212}\mathrm{Bi}\,(60.55\ \mathrm{m}) \arrow[r, "\beta^-", "64.07\%"'] \arrow[d, Rightarrow, "\alpha"', "35.93\%"] & {}^{212}\mathrm{Po}\,(0.298\ \mu\mathrm{s}) \arrow[d, Rightarrow, "\alpha"'] & \\
 & {}^{208}\mathrm{Tl}\,(3.053\ \mathrm{m}) \arrow[r, "\beta^-"] & {}^{208}\mathrm{Pb} & {}^{208}\mathrm{Bi}\,(3.68\mathrm{E}5\ \mathrm{y}) \arrow[l, "\mathrm{EC}"']
\end{tikzcd}
$$

Appendix 5

Tables of Radioactive Decay Data

● ^{3}H β^- Decay (12.28 y 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β− 1 max	18.600 20		
avg	5.685 7	100	0.0121

● ^{7}Be EC Decay (53.44 d 9) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
γ 1	477.593 12	10.42 18	0.106

● ^{10}Be β^- Decay (1.6E6 y 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β− 1 max	555.8 7		
avg	202.5 3	100	0.431

● ^{11}C β^+ Decay (20.48 m 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-K	0.17	0.221	≈0
β+ 1 max	960.1 11		
avg	385.6 5	99.766 2	0.819

Maximum γ±-intensity =199.53%

● ^{13}N β^+ Decay (9.97 m 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-K	0.26	0.185	≈0
β+ 1 max	1198.5 9		
avg	491.8 4	99.804 3	1.05

Maximum γ±-intensity =199.61%

● ^{14}C β^- Decay (5730 y 40) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β− 1 max	156.478 9		
avg	49.470 3	100	0.105

● ^{15}O β^+ Decay (122.24 s 16) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β+ 1 max	1731.9 7		
avg	735.2 4	99.900 1	1.56

Maximum γ±-intensity =199.80%

● ^{16}N β^- Decay (7.13 s 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β− 1 max	1546.8 24		
avg	630.4 11	1.00 20	0.0134
β− 2 max	3301.9 23		
avg	1461.5 12	4.9 4	0.153
β− 3 max	4288.3 23		
avg	1941.2 12	68.0 20	2.81
β− 4 max	10418.7 23		
avg	4979.2 12	26.0 20	2.76
total β− avg	2695.1 15	100 3	5.74

1 weak β's omitted:
Eβ(avg)= 1998.8; ΣIβ= 0.01%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
γ 3	1754.8 6	0.13 3	0.0049
γ 5	2741.2 6	0.76 15	0.0444
γ 8	6129.17 5	69.0 20	9.01
γ 10	7115.15 20	5.0 4	0.758

7 weak γ's omitted:
Eγ(avg)= 6334.2; ΣIγ= 0.16%

● ^{18}F β^+ Decay (109.74 m 4) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-K	0.52	3.069 11	≈0
β+ 1 max	633.5 6		
avg	249.8 3	96.73 4	0.515

Maximum γ±-intensity =193.46%

● ^{22}Na β^+ Decay (2.602 y 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-K	0.82	9.20 5	0.0002
β+ 1 max	545.5 5		
avg	215.54 21	89.84 9	0.412

1 weak β's omitted:
Eβ(avg)= 835.0; ΣIβ= 0.06%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
K X-ray	0.84	0.12 4	≈0
γ 1	1274.540 20	99.940 20	2.71

Maximum γ±-intensity =179.80%

● ^{24}Na β^- Decay (15.00 h 4) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β− 1 max	1390.2 7		
avg	553.9 4	99.935 4	1.18

1 weak β's omitted:
Eβ(avg)= 88.6; ΣIβ= 0.06%

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
^{24}Na β^- Decay (15.00 h 4) (Continued)			
γ 2	1368.53 5	99.9991 1	2.91
γ 3	2754.09 5	99.862 5	5.86
4 weak γ's omitted: Eγ(avg) = 3823.6; ΣIγ = 0.06%			
• ^{26}Al β^+ Decay (7.2E5 y 3)			I (min) = 0.10%
Auger-K	1.18	16.20 19	0.0004
β+ 1 max	1174.2 5		
avg	543.87 23	81.81 22	0.948
K X-ray	1.25	0.44 6	≈0
γ 1	129.67 10	2.50 20	0.0602
γ 2	1808.65 7	99.76 4	3.84
γ 3	2938.24 13	0.240 20	0.0150
Maximum γ±-intensity = 163.62%			
• ^{27}Mg β^- Decay (9.458 m 12)			I (min) = 0.10%
β- 1 max	1594.8 12		
avg	645.7 6	29.0 4	0.399
β- 2 max	1765.5 12		
avg	724.4 6	71.0 4	1.10
total β- avg	701.6 6	100.0 6	1.49
γ 1	170.686 15	0.84 3	0.0031
γ 2	843.76 3	71.8 4	1.29
γ 3	1014.44 4	28.0 4	0.605
• ^{28}Mg β^- Decay (20.91 h 3) Feeds ^{28}Al			I (min) = 0.10%
Auger-K	1.39	26 6	0.0008
ce-K- 1	29.080 20	27 7	0.0168
ce-L- 1	30.522 20	2.6 7	0.0017
β- 1 max	211.8 20		
avg	65.2 7	4.70 20	0.0065
β- 2 max	458.9 20		
avg	155.9 8	95.1 19	0.316
β- 3 max	859.6 20		
avg	319.3 9	0.21 12	0.0014
total β- avg	152.0 9	100.0 20	0.324
K X-ray	1.48	0.97 24	≈0
γ 1	30.640 20	66 4	0.0431
γ 2	400.690 20	36.6 10	0.312
γ 5	941.45 3	38.3 10	0.768
γ 8	1342.25 3	52.6 16	1.50
γ 9	1372.89 6	4.70 20	0.137
γ 10	1589.36 3	4.20 20	0.142
γ 11	1620.00 15	0.30 10	0.0104
4 weak γ's omitted: Eγ(avg) = 717.6; ΣIγ = 0.13%			
• ^{28}Al β^- Decay (2.240 m 1)			I (min) = 0.10%
β- 1 max	2864.2 6		
avg	1242.3 3	100	2.65
γ 1	1778.85 3	100	3.79
• ^{31}Si β^- Decay (157.3 m 3)			I (min) = 0.10%
β- 1 max	1490.8 8		
avg	595.6 4	100	1.27
1 weak β's omitted: Eβ(avg) = 68.7; ΣIβ = 0.07%			
1 weak γ's omitted: Eγ(avg) = 1266.1; ΣIγ = 0.07%			
• ^{32}Si β^- Decay (3.3E2 y 4) Feeds ^{32}P			I (min) = 0.10%
β- 1 max	213 7		
avg	64.7 24	100	0.138
• ^{32}P β^- Decay (14.29 d 3)			I (min) = 0.10%
β- 1 max	1710.4 6		
avg	694.9 3	100	1.48
• ^{33}P β^- Decay (25.4 d 2)			I (min) = 0.10%
β- 1 max	249.0 20		
avg	76.6 6	100	0.163
• ^{35}S β^- Decay (87.44 d 7)			I (min) = 0.10%
β- 1 max	167.47 19		
avg	48.83 7	100	0.104

- ^{36}Cl EC Decay (3.01E5 y 2) I (min) = 0.10%
  %(EC + β^+) Decay = 1.0 8
  See also ^{36}Cl β^- Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-K	2.1	0.8 7	≈0

- ^{36}Cl β^- Decay (3.01E5 y 2) I (min) = 0.10%
  %β^- Decay = 99.0 8
  See also ^{36}Cl EC Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	709.6 3		
avg	251.33 13	99.0 8	0.530

- ^{37}Ar EC Decay (35.02 d 5) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-K	2.38	81.7 5	0.0041
K X-ray	2.62	8.5 5	0.0005

- ^{38}Cl β^- Decay (37.21 m 4) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	1107.0 9		
avg	420.3 4	32.5 6	0.291
β- 2 max	2749.4 9		
avg	1181.5 5	11.5 8	0.289
β- 3 max	4917.0 9		
avg	2244.1 5	56.0 5	2.68
total β- avg	1529.2 8	100.0 12	3.26
γ 1	1642.42 6	32.5 6	1.14
γ 2	2167.51 5	44.0 5	2.03

1 weak γ's omitted:
Eγ(avg) = 3809.0; ΣIγ = 0.03%

- ^{39}Ar β^- Decay (269 y 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	565 5		
avg	218.8 21	100	0.466

- ^{40}K EC Decay (1.277E9 y 8) I (min) = 0.10%
  %(EC + β^+) Decay = 10.67 11
  See also ^{40}K β^- Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-K	2.66	7.22 10	0.0004
K X-ray	2.95	0.94 5	≈0
γ 1	1460.81 4	10.67 11	0.332

- ^{40}K β^- Decay (1.277E9 y 8) I (min) = 0.10%
  %β^- Decay = 89.33 11
  See also ^{40}K EC Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	1311.6 5		
avg	508.54 23	89.33 11	0.968

- ^{41}Ar β^- Decay (1.827 h 7) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	1198.3 8		
avg	459.3 4	99.170 20	0.970
β- 2 max	2492.0 8		
avg	1076.7 4	0.780 20	0.0179
total β- avg	464.0 4	100.00 3	0.988
γ 1	1293.64 4	99.160 20	2.73

1 weak β's omitted:
Eβ(avg) = 294.0; ΣIβ = 0.05%

1 weak γ's omitted:
Eγ(avg) = 1677.0; ΣIγ = 0.05%

- ^{41}Ca EC Decay (1.03E5 y 4) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-K	3	77.0 12	0.0049
K X-ray	3.31	12.3 12	0.0009

- ^{42}K β^- Decay (12.36 h 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	1683.7 16		
avg	700.9 8	0.319 17	0.0048
β- 2 max	1996.4 16		
avg	822.3 8	17.5 5	0.307
β- 3 max	3521.1 16		
avg	1563.9 8	82.1 5	2.73
total β- avg	1429.8 9	100.0 7	3.05
γ 1	312.75 3	0.319 17	0.0021
γ 6	1524.665 20	17.9 5	0.581

2 weak β's omitted:
Eβ(avg) = 191.5; ΣIβ = 0.12%

6 weak γ's omitted:
Eγ(avg) = 1446.4; ΣIγ = 0.14%

• ^{43}K β^- Decay (22.6 h 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
β− 1 max	422 10		
avg	137 4	2.24 9	0.0065
β− 2 max	827 10		
avg	298 5	92.2 14	0.585
β− 3 max	1224 10		
avg	469 5	3.6 4	0.0360
β− 4 max	1817 10		
avg	762 5	1.3 3	0.0211
total β− avg	307 6	99.3 15	0.649
γ 1	184.00 20	0.27 6	0.0011
γ 2	220.608 18	4.11 22	0.0193
γ 3	372.763 15	87.3 5	0.693
γ 4	396.870 20	11.43 12	0.0966
γ 5	404.30 20	0.109 8	0.0009
γ 6	593.40 8	11.0 3	0.139
γ 7	617.494 25	80.5 14	1.06
γ 8	800.8 10	0.147 10	0.0025
γ 9	990.25 20	0.33 7	0.0069
γ 10	1015.1 10	0.16 7	0.0034
γ 11	1021.79 18	1.88 8	0.0409
γ 12	1394.2 7	0.102 12	0.0030

• ^{44}Sc β^+ Decay (3.927 h 8) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	0.3	8.55 16	≈0
Auger-K	3.3	4.22 9	0.0003
β+ 1 max	1476.3 20		
avg	632.9 9	94.37 6	1.27
X-ray Kα2	3.68809	0.244 25	≈0
X-ray Kα1	3.69168	0.48 5	≈0
γ 1	1157.002 11	99.881 15	2.46
γ 2	1499.451 23	0.912 20	0.0291
γ 5	2656.41 3	0.112 4	0.0064

Maximum γ±-intensity =188.74%

• ^{44}Ti EC Decay (47.3 y 12) I (min) = 0.10%
Feeds ^{44}Sc (3.927 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	0.37	165 3	0.0013
Auger-K	3.64	79.9 16	0.0062
ce-K- 1	63.36 4	7.13 22	0.0096
ce-L- 1	67.35 4	0.631 19	0.0009
ce-MNO- 1	67.80 4	0.208	0.0003
ce-K- 2	73.89 4	2.72 9	0.0043
ce-L- 2	77.88 4	0.249 8	0.0004
X-ray L	0.4	0.33 12	≈0
X-ray Kα2	4.08610 2	5.5 5	0.0005
X-ray Kα1	4.09060 2	11.0 10	0.0010
X-ray Kβ	4.46	2.17 19	0.0002
γ 1	67.85 4	91.92 22	0.133
γ 2	78.38 4	97.6 8	0.163
γ 3	147.0 15	0.10 3	0.0003

• ^{45}Ca β^- Decay (162.7 d 4) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
β− 1 max	256.9 10		
avg	77.2 4	99.998 1	0.164

• ^{45}Ti EC Decay (3.08 h 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	0.37	22.6 5	0.0002
Auger-K	3.64	10.99 23	0.0009
β+ 1 max	1040.6 24		
avg	439.1 11	84.82 16	0.793

1 weak β's omitted:
Eβ(avg)= 133.4; ΣIβ= 0.01%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
X-ray Kα2	4.08610 2	0.76 7	≈0
X-ray Kα1	4.09060 2	1.52 13	0.0001
X-ray Kβ	4.46	0.30 3	≈0
γ 12	720.34 15	0.154 12	0.0024

18 weak γ's omitted:
Eγ(avg)= 1200.8; ΣIγ= 0.20%
Maximum γ±-intensity =169.67%

• ^{46}Sc β^- Decay (83.83 d 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
β− 1 max	357.3 8		
avg	112.0 3	99.996	0.239
γ 1	889.25 3	99.983	1.89
γ 2	1120.51 5	99.987	2.39

• ^{46}Sc IT Decay (18.72 s 6) I (min) = 0.10%
Feeds ^{46}Sc (83.83 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	0.37	54.7 15	0.0004
Auger-K	3.64	26.6 8	0.0021
ce-K- 1	138.035 3	32.8 7	0.0964
ce-L- 1	142.028 3	3.34 10	0.0101
ce-MNO- 1	142.474 3	1.10 3	0.0033
X-ray L	0.4	0.11 4	≈0
X-ray Kα2	4.08610 2	1.84 17	0.0002
X-ray Kα1	4.09060 2	3.7 4	0.0003
X-ray Kβ	4.46	0.72 7	≈0
γ 1	142.528 3	62.7 7	0.190

● ^{47}Ca β^- Decay (4.536 d 2) I (min) = 0.10%
Feeds ^{47}Sc

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	690 4		
avg	240.9 15	81.7 20	0.419
β- 2 max	1988 4		
avg	816.8 17	18.0 20	0.313
total β-			
avg	344.9 19	100 3	0.733

2 weak β's omitted:
Eβ(avg)= 374.0; ΣIβ= 0.11%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
γ 2	489.23 10	6.7 3	0.0702
γ 3	530.4 3	0.105 16	0.0012
γ 4	767.0 3	0.195 16	0.0032
γ 5	807.86 10	6.9 3	0.119
γ 6	1297.09 10	74.9 18	2.07

2 weak γ's omitted:
Eγ(avg)= 1542.2; ΣIγ= 0.03%

● ^{47}Sc β^- Decay (3.422 d 4) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	0.42	0.59 5	≈0
Auger-K	4	0.300 21	≈0
ce-K- 1	154.42 5	0.384 25	0.0013
β- 1 max	441.1 19		
avg	142.7 8	68 3	0.207
β- 2 max	600.5 19		
avg	204.0 8	32 3	0.139
total β-			
avg	162.3 9	100 5	0.346
γ 1	159.39 5	68 3	0.231

● ^{48}Sc β Decay (43.67 h 9) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	0.42	0.23 19	≈0
Auger-K	4	0.12 10	≈0
ce-K- 1	170.391 5	0.15 12	0.0005
β- 1 max	482 6		
avg	157.9 23	10.01 25	0.0337
β- 2 max	657 6		
avg	226.5 25	89.99 25	0.434
total β-			
avg	220 3	100.0 4	0.468
γ 1	175.357 5	7.47 17	0.0279
γ 2	983.5010 20	100.0 21	2.09
γ 3	1037.4960 20	97.5 20	2.15
γ 4	1212.849 7	2.38 6	0.0615
γ 5	1312.087 3	100.0 21	2.79

● ^{48}V β^+ Decay (15.971 d 4) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	0.42	73.6 21	0.0007
Auger-K	4	34.8 10	0.0030
β+ 1 max	697 3		
avg	291.4 13	50.1 12	0.311
X-ray L	0.45	0.15 6	≈0
X-ray Kα₂	4.50486	2.89 25	0.0003
X-ray Kα₁	4.51084	5.7 5	0.0006
X-ray Kβ	5	1.15 10	0.0001
γ 1	803.23 8	0.150 21	0.0026
γ 2	928.32 4	0.77 6	0.0152
γ 3	944.101 7	7.76 18	0.156
γ 4	983.5010 20	100.0 20	2.09
γ 5	1312.087 3	97.5 20	2.72
γ 6	1437.31 7	0.120 21	0.0037
γ 7	2240.341 17	2.41 7	0.115

3 weak γ's omitted:
Eγ(avg)= 2361.5; ΣIγ= 0.03%
Maximum γ±-intensity =100.20%

● ^{49}Ca β^- Decay (8.719 m 13) I (min) = 0.10%
Feeds ^{49}Sc

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	530 4		
avg	177.1 16	0.21 6	0.0008
β- 2 max	775 4		
avg	275.4 17	0.63 7	0.0037
β- 3 max	1196 4		
avg	456.1 18	7.1 8	0.0690
β- 4 max	1751 4		
avg	707.2 19	0.18 4	0.0027
β- 5 max	2184 4		
avg	908.6 19	91.5 7	1.77
β- 6 max	2896 4		
avg	1247.2 20	0.41 10	0.0109
total β-			
avg	872.0 20	100.0 11	1.86
γ 2	856.1 5	0.13 3	0.0024
γ 4	1144.5 5	0.11 3	0.0027
γ 6	1408.90 20	0.63 7	0.0188
γ 7	2228.9 5	0.19 5	0.0092
γ 8	2371.7 5	0.49 10	0.0247
γ 9	3084.40 10	92.1 7	6.05
γ 10	4071.90 10	7.0 8	0.607
γ 11	4738.20 20	0.21 6	0.0214

3 weak γ's omitted:
Eγ(avg)= 947.0; ΣIγ= 0.18%

● ^{49}Sc β^- Decay (57.4 m 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
β- 1 max	2004 4		
avg	823.1 19	99.940 10	1.75

2 weak β's omitted:
Eβ(avg) = 80.0; ΣIβ = 0.06%

2 weak γ's omitted:
Eγ(avg) = 1738.7; ΣIγ = 0.06%

● ^{49}V EC Decay (330 d 15) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	0.42	147 4	0.0013
Auger-K	4	69.7 16	0.0059
X-ray L	0.45	0.31 11	≈0
X-ray Kα$_2$	4.50486	5.8 5	0.0006
X-ray Kα$_1$	4.51084	11.5 10	0.0011
X-ray Kβ	5	2.29 20	0.0002

● ^{49}Cr β^+ Decay (42.09 m 15) I (min) = 0.10%
Feeds ^{49}V

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	0.47	18.3 5	0.0002
Auger-K	4.38	8.48 22	0.0008
ce-K- 1	56.8239 21	1.17 6	0.0014
ce-L- 1	61.6608 21	0.113 6	0.0001
ce-K- 2	85.1739 21	1.59 12	0.0029
ce-L- 2	90.0108 21	0.152 12	0.0003
ce-K- 3	147.4629 21	2.00 10	0.0063
ce-L- 3	152.2998 21	0.192 9	0.0006
β+ 1 max	1453 3		
avg	625.5 14	46.3 16	0.617
β+ 2 max	1515 3		
avg	653.7 14	34.6 12	0.482
β+ 3 max	1606 3		
avg	695.0 14	11 3	0.163
total β+			
avg	644.4 14	92 4	1.26
X-ray Kα$_2$	4.94464	0.84 4	≈0
X-ray Kα$_1$	4.95220	1.66 7	0.0002
X-ray Kβ	5.43	0.332 14	≈0
γ 1	62.2890 20	16.4 7	0.0217
γ 2	90.6390 20	53.2 16	0.103
γ 3	152.9280 20	30.3 12	0.0988

13 weak γ's omitted:
Eγ(avg) = 1450.9; ΣIγ = 0.12%
Maximum γ±-intensity = 183.80%

● ^{51}Ti β^- Decay (5.752 m 7) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	0.47	0.217 6	≈0
Auger-K	4.38	0.107 3	≈0
ce-K- 1	314.611 6	0.143 4	0.0010
β- 1 max	1537 3		
avg	606.7 14	8.1 4	0.105
β- 2 max	2146 3		
avg	888.2 14	91.9 4	1.74
total β-			
avg	865.4 15	100.0 6	1.84
γ 1	320.076 6	92.9 3	0.633
γ 2	608.55 5	1.18 10	0.0153
γ 3	928.63 6	6.9 4	0.136

● ^{51}Cr EC Decay (27.704 d 4) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	0.47	144.7 12	0.0014
Auger-K	4.38	66.9 7	0.0062
X-ray L	0.5	0.33 12	≈0
X-ray Kα$_2$	4.94464	6.59 21	0.0007
X-ray Kα$_1$	4.95220	13.1 4	0.0014
X-ray Kβ	5.43	2.62 9	0.0003
γ 1	320.076 6	9.83 14	0.0670

● ^{52}V β^- Decay (3.75 m 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
β- 1 max	1011.72 11		
avg	372.57 5	0.116 2	0.0009
β- 2 max	1208.78 11		
avg	458.36 5	0.570 11	0.0056
β- 3 max	2542.42 11		
avg	1073.97 5	99.2 10	2.27
total β-			
avg	1069.03 5	100.0 10	2.28

5 weak β's omitted:
Eβ(avg) = 424.7; ΣIβ = 0.09%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
γ 6	1333.615 16	0.588 10	0.0167
γ 7	1434.056 16	100.0 10	3.05
γ 8	1530.670 10	0.116 2	0.0038

12 weak γ's omitted:
Eγ(avg) = 1005.8; ΣIγ = 0.12%

● ^{52}Mn β^+ Decay (5.591 d 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	0.54	99.4 17	0.0011
Auger-K	4.78	44.7 9	0.0046
β+ 1 max	575.3 23		
avg	241.6 10	29.4 7	0.151

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	0.57	0.26 9	≈0
X-ray Kα₂	5.40551	5.20 17	0.0006
X-ray Kα₁	5.41472	10.3 4	0.0012
X-ray Kβ	6	2.06 8	0.0003
γ 2	346.03 3	0.980 20	0.0072
γ 4	399.56 5	0.183 8	0.0016
γ 5	502.05 5	0.210 20	0.0022
γ 6	600.18 4	0.390 20	0.0050
γ 7	647.450 20	0.400 20	0.0055
γ 8	744.214 11	90.0 19	1.43
γ 9	848.13 3	3.32 8	0.0600
γ 11	935.520 20	94.5 20	1.88
γ 13	1246.246 12	4.21 10	0.112
γ 14	1247.85 9	0.38 4	0.0101
γ 15	1333.615 16	5.07 11	0.144
γ 16	1434.056 16	100	3.05

9 weak γ's omitted:
Eγ(avg) = 884.5; ΣIγ = 0.37%
Maximum γ±-intensity = 58.80%

• ^{52}Mn β^+ Decay (21.4 m 5)   I (min) = 0.10%

%(EC + β^+) Decay = 98.25 5
See also ^{52}Mn IT Decay (21.4 m)

Auger-L	0.54	2.37 5	≈0
Auger-K	4.78	1.067 24	0.0001
β+ 1 max	905.1 23		
avg	382.9 10	0.164 8	0.0013
β+ 2 max	2632.8 23		
avg	1173.8 11	96.4 20	2.41
total β+			
avg	1172.1 11	96.6 20	2.41

4 weak β's omitted:
Eβ(avg) = 410.2; ΣIβ = 0.05%

X-ray Kα₂	5.40551	0.124 5	≈0
X-ray Kα₁	5.41472	0.246 8	≈0
γ 5	1434.056 16	98.2 20	3.00
γ 7	1727.53 7	0.216 10	0.0080

14 weak γ's omitted:
Eγ(avg) = 1643.9; ΣIγ = 0.17%
Maximum γ±-intensity = 193.23%

• ^{52}Mn IT Decay (21.4 m 5)   I (min) = 0.10%

%IT Decay = 1.75 5
Feeds ^{52}Mn (5.591 d)
See also ^{52}Mn β^+ Decay (21.4 m)

γ 1	377.738 11	1.68 5	0.0135

• ^{52}Fe β^+ Decay (8.275 h 8)   I (min) = 0.10%

Feeds ^{52}Mn (21.4 m)

Auger-L	0.6	66 5	0.0009
Auger-K	5.19	28.9 20	0.0032
ce-K- 1	162.145 11	3.0 22	0.0104
ce-L- 1	167.915 11	0.30 23	0.0011

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β+ 1 max	804 12		
avg	340 6	56.0 13	0.406
X-ray L	0.64	0.20 7	≈0
X-ray Kα₂	5.88765	3.9 4	0.0005
X-ray Kα₁	5.89875	7.8 8	0.0010
X-ray Kβ	6.49	1.57 16	0.0002
γ 1	168.684 11	96.6 25	0.347

Maximum γ±-intensity = 112.00%

• ^{53}Mn EC Decay (3.7E6 y 4)   I (min) = 0.10%

Auger-L	0.54	142.0 12	0.0016
Auger-K	4.78	63.9 7	0.0065
X-ray L	0.57	0.37 13	≈0
X-ray Kα₂	5.40551	7.43 21	0.0009
X-ray Kα₁	5.41472	14.7 4	0.0017
X-ray Kβ	6	2.95 10	0.0004

• ^{54}Mn EC Decay (312.7 d 3)   I (min) = 0.10%

Auger-L	0.54	142.0 12	0.0016
Auger-K	4.78	63.9 7	0.0065
X-ray L	0.57	0.37 13	≈0
X-ray Kα₂	5.40551	7.43 21	0.0009
X-ray Kα₁	5.41472	14.7 4	0.0017
X-ray Kβ	6	2.94 10	0.0004
γ 1	834.827 21	99.975	1.78

• ^{55}Fe EC Decay (2.7 y 1)   I (min) = 0.10%

Auger-L	0.6	139 4	0.0018
Auger-K	5.19	60.7 21	0.0067
X-ray L	0.64	0.42 14	≈0
X-ray Kα₂	5.88765	8.2 7	0.0010
X-ray Kα₁	5.89875	16.3 12	0.0020
X-ray Kβ	6.49	3.29 25	0.0005

• ^{56}Mn β^- Decay (2.5785 h 6)   I (min) = 0.10%

β- 1 max	325.6 12		
avg	99.1 5	1.16 4	0.0024
β- 2 max	735.5 12		
avg	255.2 5	14.6 4	0.0794
β- 3 max	1037.9 12		
avg	381.9 6	27.8 8	0.226
β- 4 max	2848.6 12		
avg	1216.7 6	56.2 10	1.46
total β-			
avg	829.8 9	99.9 14	1.77

3 weak β's omitted:
Eβ(avg) = 373.1; ΣIβ = 0.12%

(Continued)

^{56}Mn β^- Decay (2.5785 h 6) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 2	846.752 19	98.9 3	1.78
γ 6	1810.69 4	27.2 8	1.05
γ 7	2113.05 4	14.3 4	0.645
γ 9	2522.88 6	0.99 3	0.0531
γ 11	2657.45 5	0.653 20	0.0369
γ 12	2959.77 6	0.306 10	0.0193
γ 13	3369.60 7	0.168 10	0.0121

6 weak γ's omitted:
Eγ(avg) = 1351.4; ΣIγ = 0.16%

• ^{56}Co β^+ Decay (78.76 d 12) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	0.67	109.8 14	0.0016
Auger-K	5.62	46.5 7	0.0056
β+ 1 max	422.6 19		
avg	179.4 8	1.05 3	0.0040
β+ 2 max	1460.5 19		
avg	631.9 9	18.7 7	0.252
total β+			
avg	607.8 10	19.7 7	0.256
X-ray L	0.7	0.34 11	≈0
X-ray Kα$_2$	6.39084	7.33 21	0.0010
X-ray Kα$_1$	6.40384	14.5 4	0.0020
X-ray Kβ	7	2.92 9	0.0004
γ 5	733.63 7	0.192 22	0.0030
γ 6	787.84 4	0.307 7	0.0051
γ 7	846.752 19	99.958 5	1.80
γ 9	977.42 4	1.425 21	0.0297
γ 10	996.9 4	0.14 3	0.0030
γ 11	1037.818 22	14.03 20	0.310
γ 13	1140.32 14	0.126 15	0.0031
γ 15	1175.09 3	2.28 3	0.0570
γ 17	1238.25 3	67.0 7	1.77
γ 19	1335.51 6	0.120 2	0.0034
γ 20	1360.21 3	4.29 4	0.124
γ 21	1442.69 6	0.174 4	0.0053
γ 24	1771.40 10	15.51 14	0.585
γ 25	1810.69 4	0.650 10	0.0251
γ 26	1963.79 11	0.713 11	0.0298
γ 27	2015.35 5	3.03 5	0.130
γ 28	2034.91 5	7.78 12	0.337
γ 29	2113.05 4	0.376 7	0.0169
γ 30	2213.01 11	0.388 15	0.0183
γ 31	2276.08 8	0.120 18	0.0058
γ 34	2598.48 9	16.9 3	0.935
γ 37	3009.67 14	1.06 3	0.0679
γ 38	3202.24 7	3.18 10	0.217
γ 39	3253.52 12	7.79 25	0.540
γ 40	3273.20 6	1.85 6	0.129
γ 42	3451.42 13	0.93 3	0.0683
γ 43	3548.14 10	0.190 6	0.0144

18 weak γ's omitted:
Eγ(avg) = 1452.8; ΣIγ = 0.71%
Maximum γ±-intensity = 39.50%

• ^{56}Ni EC Decay (6.10 d 2) I (min) = 0.10%
Feeds ^{56}Co

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	0.75	136 5	0.0022
Auger-K	6	55.5 25	0.0072
ce-K- 1	150.67 3	1.10 4	0.0035
ce-L- 1	157.45 3	0.109 4	0.0004
ce-K- 2	261.791 20	0.107 4	0.0006
X-ray L	0.78	0.48 17	≈0
X-ray Kα$_2$	6.91530	10.1 8	0.0015
X-ray Kα$_1$	6.93032	20.0 15	0.0029
X-ray Kβ	7.65	4.1 3	0.0007
γ 1	158.38 3	98.8 10	0.333
γ 2	269.500 20	36.5 8	0.210
γ 3	480.440 20	36.5 8	0.373
γ 4	749.95 3	49.5 12	0.791
γ 5	811.85 3	86.0 9	1.49
γ 6	1561.80 5	14.0 6	0.466

• ^{57}Mn β^- Decay (1.47 m 4) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	0.67	120 8	0.0017
Auger-K	5.62	51 4	0.0061
ce-K- 1	7.3007 10	77 6	0.0120
ce-L- 1	13.5666 6	8.7 7	0.0025
ce-MNO- 1	14.3198 10	1.28 12	0.0004
ce-K- 2	114.951 4	0.222 13	0.0005
ce-K- 3	129.364 4	0.192 13	0.0005
β- 1 max	967 8		
avg	351 4	0.155 12	0.0012
β- 2 max	1065 8		
avg	393 4	0.85 5	0.0071
β- 3 max	1685 8		
avg	670 4	0.299 19	0.0043
β- 4 max	1986 8		
avg	809 4	4.7 3	0.0810
β- 5 max	2325 8		
avg	968 4	1.65 10	0.0340
β- 6 max	2556 8		
avg	1077 4	11.5 5	0.264
β- 7 max	2678 8		
avg	1135 4	80.8 8	1.95
total β-			
avg	1101 4	100.0 10	2.34
X-ray L	0.7	0.37 13	≈0
X-ray Kα$_2$	6.39084	8.0 6	0.0011
X-ray Kα$_1$	6.40384	15.8 12	0.0022
X-ray Kβ	7	3.19 25	0.0005
γ 1	14.4127 4	10.6 10	0.0033
γ 2	122.063 3	10.3 6	0.0269
γ 3	136.476 3	1.43 9	0.0042
γ 4	230.25 4	0.164 12	0.0008
γ 5	339.60 6	0.127 14	0.0009
γ 6	352.32 3	1.55 9	0.0117
γ 7	366.73 4	0.29 3	0.0023
γ 8	569.93 5	0.384 25	0.0047
γ 9	692.00 3	4.09 24	0.0603
γ 10	706.42 6	0.176 12	0.0026
γ 11	870.68 5	0.192 13	0.0036
γ 13	992.68 8	0.106 10	0.0022

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 15	1260.54 8	0.241 17	0.0065
γ 16	1612.82 7	0.54 4	0.0187
γ 17	1725.18 11	0.123 11	0.0045

2 weak γ's omitted:
Eγ(avg) = 952.4; ΣIγ = 0.10%

● ^{57}Co EC Decay (270.9 d 6) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	0.67	249 3	0.0036
Auger-K	5.62	105.5 13	0.0126
ce-K- 1	7.3007 10	69.5 3	0.0108
ce-L- 1	13.5666 6	7.78 22	0.0022
ce-MNO- 1	14.3198 10	1.15 7	0.0004
ce-K- 2	114.951 4	1.838 10	0.0045
ce-L- 2	121.217 3	0.183 1	0.0005
ce-K- 3	129.364 4	1.42 5	0.0039
ce-L- 3	135.630 3	0.147 5	0.0004
X-ray L	0.7	0.8 3	≈0
X-ray Kα₂	6.39084	16.6 5	0.0023
X-ray Kα₁	6.40384	32.8 8	0.0045
X-ray Kβ	7	6.62 21	0.0010
γ 1	14.4127 4	9.54 12	0.0029
γ 2	122.063 3	85.51 18	0.222
γ 3	136.476 3	10.60 18	0.0308
γ 9	692.00 3	0.160 5	0.0024

6 weak γ's omitted:
Eγ(avg) = 536.0; ΣIγ = 0.03%

● ^{57}Ni β^+ Decay (36.08 h 9) I (min) = 0.10%
Feeds ^{57}Co

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	0.75	82 4	0.0013
Auger-K	6	33.6 20	0.0043
ce-K- 1	119.48 3	1.3 12	0.0033
ce-L- 1	126.26 3	0.14 12	0.0004
β+ 1 max	302 7		
avg	130 3	0.41 5	0.0011
β+ 2 max	463 7		
avg	197 3	0.87 10	0.0037
β+ 3 max	716 7		
avg	304 3	5.7 7	0.0369
β+ 4 max	843 7		
avg	359 3	33.1 17	0.253
total β+			
avg	345 3	40.1 19	0.295
X-ray L	0.78	0.29 10	≈0
X-ray Kα₂	6.91530	6.1 5	0.0009
X-ray Kα₁	6.93032	12.1 10	0.0018
X-ray Kβ	7.65	2.46 21	0.0004
γ 1	127.19 3	12.9 9	0.0350
γ 7	1046.40 20	0.124 2	0.0028
γ 9	1377.59 4	77.9 22	2.29
γ 11	1757.48 8	7.1 7	0.265
γ 13	1919.43 8	14.7 10	0.602
γ 16	2803.90 20	0.132 3	0.0079

11 weak γ's omitted:
Eγ(avg) = 1192.5; ΣIγ = 0.50%
Maximum γ±-intensity = 80.16%

● ^{58}Co EC Decay (70.80 d 7) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	0.67	116.5 13	0.0017
Auger-K	5.62	49.4 7	0.0059
β+ 1 max	475.0 13		
avg	201.2 6	14.93 18	0.0640
X-ray L	0.7	0.36 12	≈0
X-ray Kα₂	6.39084	7.78 21	0.0011
X-ray Kα₁	6.40384	15.4 4	0.0021
X-ray Kβ	7	3.10 10	0.0005
γ 1	810.757 18	99.4 3	1.72
γ 2	863.935 18	0.74 4	0.0135
γ 3	1674.68 4	0.54 4	0.0192

Maximum γ±-intensity = 29.86%

● ^{58}Co IT Decay (9.15 h 10) I (min) = 0.10%
Feeds ^{58}Co (70.80 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	0.75	130 4	0.0021
Auger-K	6	46.5 21	0.0060
ce-K- 1	17.180 21	75.2 6	0.0275
ce-L- 1	23.963 21	24.8 6	0.0127
ce-MNO- 1	24.788 21	8.17 23	0.0043
X-ray L	0.78	0.46 16	≈0
X-ray Kα₂	6.91530	8.5 7	0.0013
X-ray Kα₁	6.93032	16.8 12	0.0025
X-ray Kβ	7.65	3.4 3	0.0006

1 weak γ's omitted:
Eγ(avg) = 24.9; ΣIγ = 0.04%

● ^{59}Fe β^- Decay (44.63 d 9) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	130.8 22		
avg	35.7 7	1.37 9	0.0010
β- 2 max	273.4 22		
avg	81.0 8	45.2 11	0.0780
β- 3 max	465.8 22		
avg	149.2 9	53.1 11	0.169
β- 4 max	1565.0 22		
avg	614.5 10	0.18 4	0.0024
total β-			
avg	117.5 10	99.9 16	0.250

1 weak β's omitted:
Eβ(avg) = 22.2; ΣIβ = 0.09%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 1	142.648 4	1.03 5	0.0031
γ 2	192.344 6	3.11 16	0.0127
γ 3	334.80 20	0.260 20	0.0019
γ 5	1099.224 25	56.5 10	1.32
γ 6	1291.56 3	43.2 10	1.19

2 weak γ's omitted:
Eγ(avg) = 1227.9; ΣIγ = 0.09%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
• ^{59}Ni EC Decay (7.5E4 y 13)			I (min) = 0.10%
Auger-L	0.75	134 5	0.0021
Auger-K	6	54.9 24	0.0071
X-ray L	0.78	0.47 17	≈0
X-ray $K\alpha_2$	6.91530	10.0 8	0.0015
X-ray $K\alpha_1$	6.93032	19.8 14	0.0029
X-ray Kβ	7.65	4.0 3	0.0007
• ^{60}Co β^- Decay (5.271 y 1)			I (min) = 0.10%
β- 1 max	317.90 12		
avg	95.79 4	100	0.204
γ 3	1173.216 21	100	2.50
γ 4	1332.486 22	100	2.84
4 weak γ's omitted: Eγ(avg)= 693.8; ΣIγ= 0.02%			
• ^{60}Co IT Decay (10.47 m 2) %IT Decay = 99.76 3 Feeds ^{60}Co (5.271 y) See also ^{60}Co β^- Decay (10.47 m)			I (min) = 0.10%
Auger-L	0.75	125 4	0.0020
Auger-K	6	48.8 22	0.0063
ce-K- 1	50.894 7	78.9 5	0.0855
ce-L- 1	57.677 7	14.2 5	0.0174
ce-MNO- 1	58.502 7	4.67 17	0.0058
X-ray L	0.78	0.44 16	≈0
X-ray $K\alpha_2$	6.91530	8.9 7	0.0013
X-ray $K\alpha_1$	6.93032	17.6 13	0.0026
X-ray Kβ	7.65	3.6 3	0.0006
γ 1	58.603 7	2.02 7	0.0025
• ^{60}Co β^- Decay (10.47 m 2) %β^- Decay = 0.24 3 See also ^{60}Co IT Decay (10.47 m)			I (min) = 0.10%
β- 1 max	1549.73 12		
avg	606.38 5	0.23 3	0.0030
γ 2	1332.486 22	0.24 3	0.0068
• ^{61}Co β^- Decay (1.650 h 5)			I (min) = 0.10%
Auger-L	0.84	15.5 7	0.0003
Auger-K	6.54	6.1 4	0.0009
ce-K- 1	59.079 3	10.5 4	0.0132
ce-L- 1	66.404 3	1.09 4	0.0015
ce-MNO- 1	67.300 3	0.359 1	0.0005
β- 1 max	413.5 11		
avg	129.6 4	3.7 4	0.0102
β- 2 max	1254.7 11		
avg	474.4 5	96.3 4	0.973
total β- avg	461.6 6	100.0 6	0.983
X-ray $K\alpha_2$	7.46089	1.28 10	0.0002
X-ray $K\alpha_1$	7.47815	2.53 19	0.0004
X-ray Kβ	8.26	0.51 4	≈0
γ 1	67.412 3	85.0 4	0.122
γ 3	282.9560 20	0.119 17	0.0007
γ 4	625.605 24	0.119 17	0.0016
γ 5	841.211 17	0.59 6	0.0105
γ 6	908.631 17	3.0 4	0.0576
• ^{61}Cu β^+ Decay (3.408 h 10)			I (min) = 0.10%
Auger-L	0.84	51.5 20	0.0009
Auger-K	6.54	20.4 11	0.0028
ce-K- 1	59.079 3	0.48 4	0.0006
β+ 1 max	560.4 14		
avg	238.8 6	2.54 14	0.0129
β+ 2 max	933.4 14		
avg	399.3 7	5.6 3	0.0476
β+ 3 max	1149.0 14		
avg	494.2 7	1.98 15	0.0208
β+ 4 max	1216.4 14		
avg	524.2 7	51.3 13	0.573
total β+ avg	499.8 8	61.5 14	0.654
1 weak β's omitted: Eβ(avg)= 133.1; ΣIβ= 0.04%			
X-ray L	0.85	0.20 7	≈0
X-ray $K\alpha_2$	7.46089	4.3 3	0.0007
X-ray $K\alpha_1$	7.47815	8.4 6	0.0013
X-ray Kβ	8.26	1.71 13	0.0003
γ 1	67.412 3	3.87 23	0.0056
γ 5	282.9560 20	12.3 6	0.0741
γ 6	373.050 5	2.12 12	0.0168
γ 7	529.169 22	0.41 8	0.0046
γ 8	588.605 9	1.18 6	0.0148
γ 11	656.008 4	10.5 6	0.147
γ 13	816.692 13	0.355 19	0.0062
γ 15	841.211 17	0.244 16	0.0044
γ 17	908.631 17	1.19 7	0.0231
γ 23	1099.560 19	0.279 17	0.0065
γ 26	1185.234 15	3.63 20	0.0916
23 weak γ's omitted: Eγ(avg)= 1198.2; ΣIγ= 0.82% Maximum γ±-intensity =122.91%			
• ^{62}Cu β^+ Decay (9.74 m 2)			I (min) = 0.10%
Auger-L	0.84	2.88 10	≈0
Auger-K	6.54	1.14 6	0.0002

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β+ 1 max	1754 5		
avg	767.5 23	0.132 10	0.0022
β+ 2 max	2927 5		
avg	1316.0 24	97.59 3	2.74
total β+			
avg	1314.3 24	97.82 4	2.74

2 weak β's omitted:
Eβ(avg) = 354.1; ΣIβ = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray Kα2	7.46089	0.239 17	≈0
X-ray Kα1	7.47815	0.47 4	≈0
γ 1	875.71 7	0.148 10	0.0028
γ 4	1173.05 8	0.336 17	0.0084

12 weak γ's omitted:
Eγ(avg) = 1966.1; ΣIγ = 0.09%
Maximum γ±-intensity = 195.64%

● ^{62}Zn EC Decay (9.26 h 2) I (min) = 0.10%
Feeds ^{62}Cu

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	0.92	142 4	0.0028
Auger-K	7	54.3 17	0.0081
ce-K- 1	31.86 4	15.7 11	0.0106
ce-L- 1	39.74 4	1.67 11	0.0014
ce-MNO- 1	40.72 4	0.55 4	0.0005
β+ 1 max	605.0 10		
avg	258.6 5	7.6 7	0.0419
X-ray L	0.93	0.64 22	≈0
X-ray Kα2	8.027830	12.9 5	0.0022
X-ray Kα1	8.047780	25.4 9	0.0044
X-ray Kβ	9	5.18 20	0.0010
γ 1	40.84 4	26.9 16	0.0234
γ 3	243.44 3	2.67 16	0.0138
γ 4	247.04 4	2.01 13	0.0106
γ 5	260.50 6	1.43 9	0.0079
γ 6	304.88 9	0.305 19	0.0020
γ 7	349.59 7	0.48 4	0.0035
γ 9	394.06 4	2.36 13	0.0199
γ 11	507.60 10	15.7 10	0.169
γ 12	548.41 4	16.2 10	0.190
γ 13	596.65 4	27.5 7	0.349
γ 15	637.41 7	0.269 18	0.0037

19 weak γ's omitted:
Eγ(avg) = 921.2; ΣIγ = 0.20%
Maximum γ±-intensity = 15.20%

● ^{63}Ni β⁻ Decay (100.1 y 20) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	65.87 20		
avg	17.13 6	100	0.0365

● ^{64}Cu β⁺ Decay (12.701 h 2) I (min) = 0.10%
%(EC + β⁺) Decay = 62.8 4
See also ^{64}Cu β⁻ Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	0.84	59.1 21	0.0011
Auger-K	6.54	23.3 12	0.0033
β+ 1 max	652.9 8		
avg	278.1 4	17.87 18	0.106
X-ray L	0.85	0.23 8	≈0
X-ray Kα2	7.46089	4.9 4	0.0008
X-ray Kα1	7.47815	9.6 7	0.0015
X-ray Kβ	8.26	1.96 14	0.0003
γ 1	1345.9 3	0.49 4	0.0140

Maximum γ±-intensity = 35.74%

● ^{64}Cu β⁻ Decay (12.701 h 2) I (min) = 0.10%
%β⁻ Decay = 37.2 4
See also ^{64}Cu β⁺ Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	578.2 15		
avg	190.2 6	37.2 4	0.151

● ^{65}Ni β⁻ Decay (2.520 h 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	412.1 16		
avg	128.7 6	0.54 3	0.0015
β- 2 max	513.6 16		
avg	166.1 6	0.84 4	0.0030
β- 3 max	655.2 16		
avg	220.9 7	28.1 10	0.132
β- 4 max	1021.5 16		
avg	372.0 7	9.8 5	0.0777
β- 5 max	2137.0 16		
avg	875.7 8	60.7 14	1.13
total β-			
avg	632.3 11	100.0 18	1.35
γ 2	366.27 3	4.61 20	0.0359
γ 3	507.80 20	0.287 20	0.0031
γ 4	609.30 20	0.141 11	0.0018
γ 8	1115.52 3	14.8 6	0.352
γ 9	1481.84 5	23.5 8	0.742
γ 10	1623.42 6	0.475 23	0.0164
γ 11	1724.92 6	0.388 21	0.0142

4 weak γ's omitted:
Eγ(avg) = 814.8; ΣIγ = 0.17%

● ^{65}Zn EC Decay (244.4 d 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	0.92	126.7 18	0.0025
Auger-K	7	48.3 8	0.0072
β+ 1 max	329.9 11		
avg	143.0 5	1.415 23	0.0043

(Continued)

^{65}Zn EC Decay (244.4 d 2) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	0.93	0.57 20	≈0
X-ray $K\alpha_2$	8.027830	11.5 3	0.0020
X-ray $K\alpha_1$	8.047780	22.6 5	0.0039
X-ray $K\beta$	9	4.61 13	0.0009
γ 3	1115.52 3	50.75 10	1.21

Maximum $\gamma\pm$-intensity = 2.83%

• ^{66}Ga β^+ Decay (9.40 h 7) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	0.99	57 3	0.0012
Auger-K	7.53	20.7 13	0.0033
β^+ 1 max	361 3		
avg	156.8 13	0.98 5	0.0033
β^+ 2 max	720 3		
avg	308.7 13	0.166 6	0.0011
β^+ 3 max	772 3		
avg	330.9 13	0.699 23	0.0049
β^+ 4 max	924 3		
avg	397.0 14	3.70 12	0.0313
β^+ 5 max	1780 3		
avg	781.5 14	0.372 18	0.0062
β^+ 6 max	4153 3		
avg	1904.1 15	49.3 13	2.00
total β^+			
avg	1739.1 21	55.2 13	2.05

5 weak β's omitted:
$E\beta$(avg) = 330.9; $\Sigma I\beta$ = 0.03%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	1	0.28 12	≈0
X-ray $K\alpha_2$	8.61578	5.7 4	0.0010
X-ray $K\alpha_1$	8.63886	11.1 8	0.0020
X-ray $K\beta$	9.57	2.26 16	0.0005
γ 4	448.90 10	0.113 5	0.0011
γ 7	686.28 10	0.264 11	0.0039
γ 8	833.56 10	6.19 18	0.110
γ 10	856.70 10	0.124 5	0.0023
γ 11	907.0 3	0.116 9	0.0022
γ 15	1039.29 10	38.8 10	0.859
γ 18	1190.36 10	0.136 13	0.0034
γ 20	1232.9	0.543 21	0.0143
γ 21	1333.20 20	1.26 4	0.0359
γ 22	1356.2	0.38 4	0.0110
γ 23	1356.6	0.128 20	0.0037
γ 24	1357	0.19 8	0.0056
γ 25	1418.88 10	0.652 19	0.0197
γ 26	1459.2 3	0.101 5	0.0031
γ 27	1508.33 10	0.590 20	0.0189
γ 29	1899.18 10	0.438 17	0.0177
γ 30	1918.64 10	2.19 6	0.0896
γ 32	2173.90 20	0.12 3	0.0056
γ 33	2190.00 20	5.82 17	0.271
γ 34	2213.60 20	0.144 9	0.0068
γ 36	2393.30 20	0.256 11	0.0131
γ 37	2422.70 10	1.99 6	0.103
γ 40	2752.10 20	23.7 7	1.39
γ 41	2780.50 20	0.130 6	0.0077
γ 42	2934.30 20	0.221 7	0.0138
γ 46	3229.26 10	1.52 4	0.105
γ 47	3256.57 15	0.101 12	0.0070
γ 48	3381.32 10	1.45 4	0.104
γ 49	3422.64 15	0.84 3	0.0614
γ 50	3433.00 15	0.287 9	0.0210
γ 53	3767.40 20	0.144 9	0.0115
γ 54	3791.47 10	1.04 3	0.0837
γ 58	4086.36 10	1.16 5	0.101
γ 59	4295.70 20	3.56 10	0.326
γ 60	4462.01 15	0.726 21	0.0690
γ 61	4806.59 15	1.51 5	0.155

25 weak γ's omitted:
$E\gamma$(avg) = 1349.2; $\Sigma I\gamma$ = 1.05%
Maximum $\gamma\pm$-intensity = 110.49%

• ^{67}Cu β^- Decay (61.88 d 14) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	0.99	19.1 10	0.0004
Auger-K	7.53	7.0 5	0.0011
ce-K- 1	81.607 5	0.51 5	0.0009
ce-K- 2	83.652 5	12.1 5	0.0215
ce-L- 2	92.117 5	1.48 6	0.0029
ce-MNO- 2	93.175 6	0.489 10	0.0010
ce-K- 3	174.918 10	0.82 12	0.0031
β^- 1 max	181 8		
avg	50.7 25	1	0.0012
β^- 2 max	390 8		
avg	121 3	57	0.147
β^- 3 max	482 8		
avg	154 3	22	0.0722
β^- 4 max	575 8		
avg	189 3	20	0.0805
total β^-			
avg	141 4	100	0.301
X-ray $K\alpha_2$	8.61578	1.91 14	0.0004
X-ray $K\alpha_1$	8.63886	3.8 3	0.0007
X-ray $K\beta$	9.57	0.76 6	0.0002
γ 1	91.266 5	7.00 10	0.0136
γ 2	93.311 5	16.1 3	0.0320
γ 3	184.577 10	48.7 6	0.191
γ 4	208.951 10	0.115 5	0.0005
γ 5	300.219 10	0.797 14	0.0051
γ 6	393.529 10	0.220 8	0.0018

• ^{67}Ga EC Decay (3.261 d 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	0.99	165 11	0.0035
Auger-K	7.53	60 5	0.0097
ce-K- 2	81.607 5	0.208 21	0.0004
ce-K- 3	83.652 5	26.8 17	0.0478
ce-L- 3	92.117 5	3.28 21	0.0064
ce-MNO- 3	93.175 6	1.09 6	0.0022
ce-K- 4	174.918 10	0.33 5	0.0012
X-ray L	1	0.8 4	≈0
X-ray $K\alpha_2$	8.61578	16.5 14	0.0030
X-ray $K\alpha_1$	8.63886	32 3	0.0059
X-ray $K\beta$	9.57	6.6 6	0.0013
γ 2	91.266 5	2.86 17	0.0056
γ 3	93.311 5	35.7 20	0.0710
γ 4	184.577 10	19.7 12	0.0775
γ 5	208.951 10	2.24 13	0.0100
γ 6	300.219 10	16.0 9	0.102
γ 7	393.529 10	4.5 3	0.0375
γ 14	887.693 15	0.139 8	0.0026

7 weak γ's omitted:
$E\gamma$(avg) = 629.4; $\Sigma I\gamma$ = 0.12%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)

● ^{68}Ga β^+ Decay (68.0 m 2) I (min) = 0.10%

Auger-L	0.99	14.0 6	0.0003
Auger-K	7.53	5.1 3	0.0008
β+ 1 max	821.7 12		
avg	352.6 6	1.22 10	0.0092
β+ 2 max	1899.1 12		
avg	836.0 6	87.7 3	1.56
total β+ avg	829.4 6	88.9 4	1.57
X-ray Kα$_2$	8.61578	1.40 10	0.0003
X-ray Kα$_1$	8.63886	2.75 18	0.0005
X-ray Kβ	9.57	0.56 4	0.0001
γ 3	1077.35 6	3.29 24	0.0755
γ 7	1883.09 7	0.142 12	0.0057

7 weak γ's omitted:
Eγ(avg)= 1014.5; ΣIγ= 0.24%
Maximum γ±-intensity =177.84%

● ^{68}Ge EC Decay (288 d 6) I (min) = 0.10%
Feeds ^{68}Ga

Auger-L	1	121.5 18	0.0028
Auger-K	8	42.4 7	0.0073
X-ray L	1	0.67 19	≈0
X-ray Kα$_2$	9.22482	13.1 3	0.0026
X-ray Kα$_1$	9.25174	25.6 5	0.0050
X-ray Kβ	10.3	5.46 14	0.0012

● ^{69}Zn β^- Decay (55.6 m 16) I (min) = 0.10%

β- 1 max	905 3		
avg	320.9 13	99.9986 2	0.684

● ^{69}Zn IT Decay (13.756 h 18) I (min) = 0.10%
%IT Decay = 99.967 3
Feeds ^{69}Zn (55.6 m)
%β^- Decay = 0.033 3

Auger-L	0.99	6.3 3	0.0001
Auger-K	7.53	2.29 15	0.0004
ce-K- 1	428.975 18	4.39 12	0.0401
ce-L- 1	437.440 18	0.514 15	0.0048
ce-MNO- 1	438.498 18	0.170 5	0.0016
X-ray Kα$_2$	8.61578	0.63 5	0.0001
X-ray Kα$_1$	8.63886	1.23 9	0.0002
X-ray Kβ	9.57	0.250 18	≈0
γ 1	438.634 18	94.89 15	0.887

● ^{71}Ge EC Decay (11.8 d 4) I (min) = 0.10%

Auger-L	1	121.9 18	0.0029
Auger-K	8	42.9 7	0.0074
X-ray L	1	0.67 19	≈0
X-ray Kα$_2$	9.22482	13.2 3	0.0026
X-ray Kα$_1$	9.25174	25.9 5	0.0051
X-ray Kβ	10.3	5.52 14	0.0012

● ^{72}Ga β^- Decay (14.1 h 2) I (min) = 0.10%

Auger-L	1.19	0.53 3	≈0
Auger-K	8.56	0.194 13	≈0
ce-K- 20	680.10 20	0.421 12	0.0061
β- 1 max	234 4		
avg	67.0 10	0.124 4	0.0002
β- 2 max	313 4		
avg	93.2 11	0.769 19	0.0015
β- 3 max	425 4		
avg	132.4 12	0.222 6	0.0006
β- 4 max	536 4		
avg	173.3 12	0.341 9	0.0013
β- 5 max	552 4		
avg	179.3 12	0.317 12	0.0012
β- 6 max	650 4		
avg	217.0 13	15.0 3	0.0693
β- 7 max	667 4		
avg	223.5 13	21.52 24	0.102
β- 8 max	956 4		
avg	341.8 13	27.9 6	0.203
β- 9 max	1048 4		
avg	380.8 14	1.86 4	0.0151
β-10 max	1477 4		
avg	568.9 14	8.94 17	0.108
β-11 max	1528 4		
avg	591.8 14	0.14 4	0.0018
β-12 max	1589 4		
avg	619.6 14	0.242 15	0.0032
β-13 max	1927 4		
avg	774.0 15	3.03 15	0.0500
β-14 max	2263 4		
avg	930.6 15	0.81 24	0.0161
β-15 max	2528 4		
avg	1054.9 15	8.0 8	0.180
β-16 max	3158 4		
avg	1354.3 15	10.6 10	0.306
total β- avg	497.7 20	100.1 15	1.06

9 weak β's omitted:
Eβ(avg)= 234.5; ΣIβ= 0.25%

X-ray Kα$_1$	9.88642	0.131 8	≈0
γ 2	112.52 3	0.136 6	0.0003
γ 6	289.50 20	0.201 7	0.0012
γ 9	336.60 20	0.107 3	0.0008
γ 10	381.20 20	0.276 8	0.0022
γ 12	428.40 20	0.184 8	0.0017
γ 17	587.4 3	0.124 4	0.0016
γ 18	600.85 3	5.59 14	0.0715
γ 19	629.86 4	24.4 7	0.327
γ 21	735.60 20	0.360 11	0.0056
γ 24	786.43 5	3.17 7	0.0530
γ 25	810.24 9	2.01 5	0.0347

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
^{72}Ga β^- Decay (14.1 h 2) (Continued)			
γ 26	834.00 3	95.65 7	1.70
γ 27	861.11 5	0.912 25	0.0167
γ 29	894.22 5	9.85 21	0.188
γ 30	924.10 20	0.143 4	0.0028
γ 32	939.35 8	0.259 7	0.0052
γ 34	970.54 6	1.105 23	0.0228
γ 36	999.86 6	0.796 23	0.0169
γ 40	1050.76 5	6.93 15	0.155
γ 44	1215.14 5	0.797 21	0.0206
γ 45	1230.86 7	1.44 3	0.0379
γ 46	1260.10 8	1.148 24	0.0308
γ 47	1276.75 8	1.559 20	0.0424
γ 50	1464.00 7	3.56 8	0.111
γ 55	1568.20 10	0.199 7	0.0066
γ 56	1571.70 20	0.835 24	0.0280
γ 57	1596.65 9	4.24 9	0.144
γ 60	1680.77 8	0.868 23	0.0311
γ 61	1710.90 7	0.383 10	0.0139
γ 63	1837.80 20	0.203 6	0.0079
γ 64	1861.09 8	5.23 12	0.207
γ 65	1878.0 3	0.231 6	0.0093
γ 66	1920.20 20	0.159 5	0.0065
γ 67	1991.14 8	0.112 3	0.0047
γ 68	2029.1 4	0.124 4	0.0054
γ 70	2109.50 10	1.034 22	0.0465
γ 72	2201.67 8	26.1 6	1.22
γ 73	2214.10 20	0.186 11	0.0088
γ 77	2490.98 8	7.48 18	0.397
γ 78	2507.80 8	12.8 3	0.685
γ 79	2515.40 20	0.253 10	0.0135
γ 82	2621.50 10	0.131 4	0.0073
γ 85	2844.10 20	0.410 12	0.0249

52 weak γ's omitted:
Eγ(avg) = 1274.7; ΣIγ = 1.55%

• ^{72}As β^+ Decay (26.0 h 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	1.19	15.5 6	0.0004
Auger-K	8.56	5.3 3	0.0010
ce-K- 19	680.10 20	0.87 8	0.0125
β+ 1 max	814 7		
avg	351 3	0.473 17	0.0035
β+ 2 max	927 7		
avg	400 3	0.152 7	0.0013
β+ 3 max	1865 7		
avg	822 4	5.78 18	0.101
β+ 4 max	2495 7		
avg	1115 4	64.7 12	1.54
β+ 5 max	2638 7		
avg	1203 4	0.19 8	0.0049
β+ 6 max	3329 7		
avg	1526 4	16.6 14	0.540
total β+ avg	1167 5	88.1 19	2.19

8 weak β's omitted:
Eβ(avg) = 358.5; ΣIβ = 0.17%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray $K\alpha_2$	9.85532	1.82 10	0.0004
X-ray $K\alpha_1$	9.88642	3.56 18	0.0007
X-ray Kβ	11	0.80 5	0.0002

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 17	600.85 3	0.314 11	0.0040
γ 18	629.86 4	7.86 21	0.105
γ 23	786.43 5	0.469 17	0.0079
γ 25	834.00 3	79.7 13	1.42
γ 28	894.22 5	0.77 3	0.0146
γ 38	1050.76 5	0.99 3	0.0221
γ 43	1215.14 5	0.206 7	0.0053
γ 47	1390.44 5	0.236 8	0.0070
γ 48	1464.00 7	1.10 3	0.0343
γ 49	1475.91 7	0.512 17	0.0161
γ 51	1568.20 10	0.128 5	0.0043
γ 57	1680.77 8	0.116 4	0.0042
γ 58	1710.90 7	0.243 9	0.0089
γ 63	1991.14 8	0.337 12	0.0143
γ 65	2105.90 20	0.630 20	0.0283
γ 66	2109.50 10	0.270 9	0.0121
γ 68	2201.67 8	0.465 15	0.0218
γ 70	2248.50 10	0.308 12	0.0148
γ 75	2507.80 8	0.320 11	0.0171
γ 80	2621.50 10	0.386 13	0.0215
γ 89	2940.10 10	0.289 10	0.0181
γ 108	3803.6 3	0.102 6	0.0083

88 weak γ's omitted:
Eγ(avg) = 1929.5; ΣIγ = 1.85%
Maximum γ±-intensity = 176.12%

• ^{73}As EC Decay (80.30 d 6) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	1.19	320 10	0.0081
ce-K- 1	2.160 17	27.8 6	0.0013
Auger-K	8.56	88 5	0.0160
ce-L- 1	11.849 15	60.3 7	0.0152
ce-M- 1	13.083 15	8.93 24	0.0025
ce-NOP- 1	13.263 15	2.95 9	0.0008
ce-K- 2	42.334 12	75.1 6	0.0677
ce-L- 2	52.023 9	10.9 3	0.0121
ce-MNO- 2	53.257 9	3.61 11	0.0041
X-ray L	1.19	1.9 7	≈0
X-ray $K\alpha_2$	9.85532	30.3 16	0.0064
X-ray $K\alpha_1$	9.88642	59 3	0.0125
X-ray Kβ	11	13.3 7	0.0031
γ 2	53.437 9	10.3 3	0.0117

1 weak γ's omitted:
Eγ(avg) = 13.3; ΣIγ = 0.09%

• ^{73}Se EC Decay (7.15 h 8) I (min) = 0.10%
Feeds ^{73}As

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	1.24	67 4	0.0018
Auger-K	9.1	21.8 16	0.0042
ce-K- 1	55.13 10	19.1 4	0.0224
ce-L- 1	65.47 10	2.09 6	0.0029
ce-M- 1	66.80 10	0.327 9	0.0005
ce-NOP- 1	67.00 10	0.107 3	0.0002
ce-K- 2	349.23 10	1.12 4	0.0083
ce-L- 2	359.57 10	0.124 4	0.0009

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β+ 1 max	1208 10		
avg	525 5	0.49 25	0.0055
β+ 2 max	1290 10		
avg	562 5	64.6 7	0.773
β+ 3 max	1651 10		
avg	725 5	0.71 19	0.0110
total β+			
avg	563 5	65.9 8	0.790

6 weak β's omitted:
Eβ(avg) = 201.3; ΣIβ = 0.05%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	1.28	0.47 14	≈0
X-ray Kα2	10.50800 1	8.4 5	0.0019
X-ray Kα1	10.54370 1	16.4 10	0.0037
X-ray Kβ	11.7	3.79 23	0.0009
γ 1	67.00 10	77.3 8	0.110
γ 2	361.10 10	96.5 5	0.742
γ 4	509.5 8	1.1 4	0.0115
γ 8	764.4 8	0.135 20	0.0022
γ 12	865.40 20	0.47 3	0.0087
γ 14	901.2 4	0.145 20	0.0028
γ 17	1111.0 4	0.183 20	0.0043
γ 19	1422.90 20	0.135 20	0.0041

13 weak γ's omitted:
Eγ(avg) = 894.4; ΣIγ = 0.42%
Maximum γ±-intensity = 131.70%

● ^{74}As β^+ Decay (17.77 d 3) I (min) = 0.10%
%(EC + β^+) Decay = 65.7 14
See also ^{74}As β^- Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	1.19	43.4 21	0.0011
Auger-K	8.56	14.6 10	0.0027
β+ 1 max	944.5 17		
avg	408.0 8	26.6 11	0.231
β+ 2 max	1540.4 17		
avg	701.1 8	3.0 12	0.0448
total β+			
avg	437.5 9	29.6 17	0.276

1 weak β's omitted:
Eβ(avg) = 147.6; ΣIβ = 0.02%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	1.19	0.26 9	≈0
X-ray Kα2	9.85532	5.1 3	0.0011
X-ray Kα1	9.88642	9.9 6	0.0021
X-ray Kβ	11	2.22 14	0.0005
γ 1	595.88 4	59.9 24	0.760
γ 2	608.40 5	0.55 3	0.0071
γ 9	1204.29 6	0.287 22	0.0074

8 weak γ's omitted:
Eγ(avg) = 1194.1; ΣIγ = 0.09%
Maximum γ±-intensity = 59.23%

● ^{74}As β^- Decay (17.77 d 3) I (min) = 0.10%
%β^- Decay = 34.3 14
See also ^{74}As β^+ Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	718 3		
avg	242.9 11	15.5 9	0.0802
β- 2 max	1353 3		
avg	530.9 12	18.8 10	0.213
total β-			
avg	400.5 14	34.3 14	0.293

1 weak β's omitted:
Eβ(avg) = 22.1; ΣIβ = 0.03%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 1	634.78 8	15.4 10	0.209

2 weak γ's omitted:
Eγ(avg) = 685.4; ΣIγ = 0.03%

● ^{75}Se EC Decay (119.78 d 7) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	1.24	129 8	0.0034
Auger-K	9.1	42 4	0.0081
ce-K- 1	12.53 20	5.0 11	0.0013
ce-L- 1	22.87 20	0.98 20	0.0005
ce-MNO- 1	24.20 20	0.21 5	0.0001
ce-K- 2	54.183 10	0.360 23	0.0004
ce-K- 4	84.8663 22	2.65 16	0.0048
ce-L- 4	95.2065 22	0.354 22	0.0007
ce-K- 5	109.248 3	0.62 3	0.0015
ce-K- 6	124.133 5	1.56 8	0.0041
ce-L- 6	134.473 5	0.161 9	0.0005
ce-K- 10	252.784 8	0.380 2	0.0021
ce-K- 11	267.661 8	0.179 13	0.0010
X-ray L	1.28	0.9 3	≈0
X-ray Kα2	10.50800 1	16.1 11	0.0036
X-ray Kα1	10.54370 1	31.4 20	0.0071
X-ray Kβ	11.7	7.3 5	0.0018
γ 2	66.050 10	1.02 3	0.0014
γ 4	96.7330 20	3.41 18	0.0070
γ 5	121.115 3	16.7 6	0.0432
γ 6	136.000 5	59.2 25	0.171
γ 7	198.596 7	1.45 3	0.0061
γ 10	264.651 8	59.8 3	0.337
γ 11	279.528 8	25.2 3	0.150
γ 13	303.910 11	1.32 5	0.0086
γ 16	400.646 9	11.4 4	0.0975

15 weak γ's omitted:
Eγ(avg) = 332.6; ΣIγ = 0.10%

● ^{76}As β^- Decay (26.32 h 7) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	298.8 19		
avg	87.8 6	0.63 4	0.0012
β- 2 max	313.1 19		
avg	92.6 7	1.20 7	0.0024
β- 3 max	539.8 19		
avg	173.7 7	1.88 12	0.0070
β- 4 max	1180.9 18		
avg	436.2 8	2.08 10	0.0193
β- 5 max	1752.5 18		
avg	691.5 9	7.6 5	0.112

(Continued)

^{76}As β^- Decay (26.32 h 7) (Continued)

Radiation Type		Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 6	max	1846.2 18		
	avg	749.1 9	0.75 6	0.0120
β- 7	max	2409.5 18		
	avg	996.3 9	34.7 15	0.736
β- 8	max	2968.6 18		
	avg	1266.9 9	51.0 20	1.38
total β-				
	avg	1064.2 11	100 3	2.27

5 weak β's omitted:
Eβ(avg) = 373.8; ΣIβ= 0.22%

Radiation Type		Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ	7	559.10 5	44.7 18	0.532
γ	8	563.23 8	1.17 6	0.0140
γ	9	571.30 20	0.139 8	0.0017
γ	12	657.03 5	6.1 4	0.0851
γ	14	665.31 7	0.39 4	0.0056
γ	17	740.12 8	0.116 7	0.0018
γ	19	771.76 8	0.116 10	0.0019
γ	23	867.63 8	0.125 7	0.0023
γ	29	1129.87 7	0.143 11	0.0034
γ	31	1212.72 18	1.63 11	0.0420
γ	32	1216.02 7	3.84 24	0.0996
γ	33	1228.52 8	1.39 8	0.0363
γ	35	1439.13 8	0.326 19	0.0100
γ	36	1453.60 8	0.130 11	0.0040
γ	42	1787.67 8	0.331 23	0.0126
γ	46	2096.33 14	0.66 5	0.0295
γ	47	2110.79 15	0.393 24	0.0177

34 weak γ's omitted:
Eγ(avg) = 1152.0; ΣIγ= 0.65%

● ^{77}Ge β^- Decay (11.30 h 1) I (min) = 0.10%
Feeds ^{77}As

Radiation Type		Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L		1.24	4.4 8	0.0001
Auger-K		9.1	1.5 3	0.0003
ce-K-	2	144.49 3	0.104 6	0.0003
ce-K-	7	199.164 19	1.93 9	0.0082
ce-K-	8	203.638 22	0.7 5	0.0031
ce-L-	7	209.504 19	0.223 10	0.0010
ce-K-	11	252.573 17	0.7 4	0.0037
β- 1	max	188 3		
	avg	52.5 10	0.217 5	0.0002
β- 2	max	277 3		
	avg	80.8 10	0.147 4	0.0003
β- 3	max	347 3		
	avg	104.6 11	1.022 24	0.0023
β- 4	max	360 3		
	avg	108.8 11	2.23 4	0.0052
β- 5	max	591 3		
	avg	193.5 12	2.17 4	0.0089
β- 6	max	701 3		
	avg	236.7 12	7.9 4	0.0398
β- 7	max	730 3		
	avg	248.3 12	2.47 5	0.0131
β- 8	max	1128 3		
	avg	414.1 13	1.83 4	0.0161
β- 9	max	1141 3		
	avg	419.8 13	7.00 13	0.0626
β-10	max	1173 3		
	avg	433.8 13	0.890 17	0.0082
β-11	max	1244 3		
	avg	464.6 14	3.65 9	0.0361
β-12	max	1303 3		
	avg	490.6 14	1.74 5	0.0182
β-13	max	1356 3		
	avg	514.2 14	0.150 3	0.0016
β-14	max	1382 3		
	avg	525.5 14	0.568 12	0.0064
β-15	max	1512 3		
	avg	583.5 14	19.2 4	0.239
β-16	max	1536 3		
	avg	594.6 14	0.168 3	0.0021
β-17	max	1643 3		
	avg	642.7 14	0.178 7	0.0024
β-18	max	1812 3		
	avg	720.1 14	0.301 16	0.0046
β-19	max	1826 3		
	avg	726.5 14	0.265 16	0.0041
β-20	max	1917 3		
	avg	768.1 14	0.69 7	0.0111
β-21	max	2067 3		
	avg	837.7 14	0.964 24	0.0172
β-22	max	2070 3		
	avg	838.9 14	20.6 6	0.368
β-23	max	2087 3		
	avg	846.9 14	0.85 6	0.0153
β-24	max	2226 3		
	avg	911.7 14	17.2 9	0.334
β-25	max	2437 3		
	avg	1010.7 15	1.0 10	0.0215
β-26	max	2486 3		
	avg	1044.0 14	6.0 9	0.133
total β-				
	avg	646.7 18	99.7 19	1.37

7 weak β's omitted:
Eβ(avg) = 281.2; ΣIβ= 0.34%

Radiation Type		Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray	$K\alpha_2$	10.50800 1	0.57 10	0.0001
X-ray	$K\alpha_1$	10.54370 1	1.12 20	0.0003
X-ray	Kβ	11.7	0.26 5	≈0
γ	2	156.36 3	0.79 4	0.0026
γ	3	159.11 15	0.228 9	0.0008
γ	4	177.28 3	0.177 7	0.0007
γ	5	194.762 20	1.75 6	0.0073
γ	6	208.98 6	0.93 3	0.0042
γ	7	211.031 19	30.5 9	0.137
γ	8	215.505 22	28.3 9	0.130
γ	9	219.1 3	0.288 5	0.0013
γ	10	254.74 16	0.208 6	0.0011
γ	11	264.440 17	53.3 9	0.300
γ	12	268.10 22	0.586 10	0.0033
γ	14	337.63 6	0.229 7	0.0016
γ	15	338.66 4	0.661 20	0.0048
γ	18	367.397 16	13.9 4	0.108
γ	20	416.328 14	21.6 5	0.191
γ	21	419.75 3	1.217 25	0.0109
γ	23	439.438 20	0.200 4	0.0019
γ	25	461.378 15	1.251 25	0.0123
γ	27	475.433 17	0.979 19	0.0099
γ	29	520	0.29 4	0.0032
γ	33	558.018 13	15.9 3	0.189
γ	36	582.537 14	0.771 14	0.0096
γ	38	614.39	0.50 6	0.0066
γ	40	624.76 9	0.180 4	0.0024
γ	41	631.823 13	6.89 12	0.0927
γ	42	634.389 15	2.06 4	0.0278
γ	47	673	0.53 6	0.0076
γ	48	673	0.132 14	0.0019
γ	52	698.538 25	0.226 5	0.0034
γ	53	705.24 8	0.105 2	0.0016
γ	54	712.35 4	0.818 15	0.0124
γ	55	714.345 12	7.07 13	0.108
γ	57	743.649 25	0.175 4	0.0028

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 58	745.748 12	0.955 17	0.0152
γ 59	749.861 12	0.874 16	0.0140
γ 60	766.715 13	0.776 14	0.0127
γ 62	781.261 13	1.002 18	0.0167
γ 63	784.770 12	1.299 23	0.0217
γ 65	794.328 18	0.273 5	0.0046
γ 68	810.352 12	2.24 4	0.0387
γ 69	813.36 8	0.130 2	0.0023
γ 70	823.13 4	0.594 11	0.0104
γ 71	843.173 17	0.206 4	0.0037
γ 73	875.191 17	0.773 14	0.0144
γ 76	896.51 5	0.121 2	0.0023
γ 77	900.97 11	0.119 2	0.0023
γ 78	906.986 13	0.940 17	0.0182
γ 79	913.805 20	0.361 7	0.0070
γ 81	923.143 20	0.682 12	0.0134
γ 83	925.473	0.71 8	0.0140
γ 85	928.853 12	1.032 19	0.0204
γ 86	939.350 15	0.281 5	0.0056
γ 93	996.55 3	0.103 1	0.0022
γ 100	1061.699 23	0.149 3	0.0034
γ 101	1080.82 8	0.238 5	0.0055
γ 102	1085.188 13	5.98 11	0.138
γ 104	1114.80 4	0.101 1	0.0024
γ 105	1124.99 3	0.116 2	0.0028
γ 108	1151.837 25	0.193 4	0.0047
γ 112	1193.263 13	2.54 5	0.0645
γ 114	1215.418 25	0.125 2	0.0033
γ 116	1242.183 15	0.393 7	0.0104
γ 117	1263.862 15	0.838 15	0.0226
γ 118	1279.957 20	0.172 3	0.0047
γ 121	1309.271 16	0.481 9	0.0134
γ 122	1312.802 16	0.354 7	0.0099
γ 123	1319.662 17	0.297 6	0.0084
γ 130	1368	3.3 4	0.0963
γ 134	1452.59 4	0.119 2	0.0037
γ 138	1476.524 22	0.239 5	0.0075
γ 139	1479	0.126 13	0.0040
γ 141	1495.597 17	0.492 9	0.0157
γ 143	1538.763 20	0.140 2	0.0046
γ 146	1573.688 20	0.650 12	0.0218
γ 151	1709.812 25	0.303 6	0.0110
γ 152	1719.656 22	0.394 7	0.0144
γ 154	1727.18 3	0.146 3	0.0054
γ 162	1846.41 3	0.169 3	0.0066
γ 168	2000.10 3	0.553 10	0.0236
γ 170	2077.20 3	0.230 4	0.0102
γ 171	2089.60 3	0.236 5	0.0105
γ 172	2126.15 4	0.201 4	0.0091
γ 176	2341.63 4	0.466 9	0.0233

94 weak γ's omitted:
Eγ(avg) = 1100.8; ΣIγ = 2.90%

• ^{77}As β^- Decay (38.8 h 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β− 1 max	170 4		
avg	46.8 12	0.69 18	0.0007
β− 2 max	441 4		
avg	137.1 14	0.66 17	0.0019
β− 3 max	451 4		
avg	141.0 15	1.5 4	0.0045
β− 4 max	690 4		
avg	231.8 16	97.1 8	0.479
total β−			
avg	228.5 17	100.0 10	0.487

2 weak β's omitted:
Eβ(avg) = 117.1; ΣIβ = 0.02%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 3	87.876 20	0.20 6	0.0004
γ 6	161.933 20	0.13 4	0.0004
γ 9	238.999 20	1.6 4	0.0080
γ 10	249.790 20	0.42 11	0.0023
γ 15	520.652 20	0.61 16	0.0068

10 weak γ's omitted:
Eγ(avg) = 245.5; ΣIγ = 0.10%

• ^{77}Br EC Decay (57.04 h 11) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	1.32	115 7	0.0032
Auger-K	9.67	36 3	0.0073
ce-K- 4	75.218 20	0.161 18	0.0003
ce-K- 9	149.275 20	0.79 4	0.0025
ce-L- 9	160.279 21	0.134 6	0.0005
ce-K- 15	226.341 20	0.219 7	0.0011
β+ 1 max	343 3		
avg	151.7 12	0.73 4	0.0024
X-ray L	1.38	1.05 24	≈0
X-ray $K\alpha_2$	11.18140 2	15.4 9	0.0037
X-ray $K\alpha_1$	11.22240 2	30.0 17	0.0072
X-ray Kβ	12.5	7.2 5	0.0019
γ 4	87.876 20	1.40 4	0.0026
γ 6	138.95 9	0.129 6	0.0004
γ 9	161.933 20	1.10 3	0.0038
γ 10	180.68 7	0.284 10	0.0011
γ 13	200.40 7	1.21 6	0.0052
γ 15	238.999 20	23.1 5	0.118
γ 17	249.790 20	2.98 10	0.0159
γ 18	270.83 7	0.321 14	0.0019
γ 20	281.68 3	2.29 7	0.0137
γ 21	297.23 8	4.16 21	0.0263
γ 22	303.76 9	1.18 4	0.0076
γ 28	384.99 8	0.84 3	0.0069
γ 33	439.47 6	1.56 5	0.0146
γ 35	484.57 7	1.00 4	0.0103
γ 37	517.9 4	0.16 5	0.0018
γ 38	520.652 20	22.4 6	0.248
γ 40	565.91 19	0.427 17	0.0052
γ 41	567.90 8	0.86 3	0.0104
γ 42	574.64 8	1.19 4	0.0145
γ 43	578.91 7	2.96 10	0.0365
γ 44	585.48 7	1.57 5	0.0196
γ 49	755.35 7	1.67 5	0.0268
γ 52	817.79 6	2.08 7	0.0362
γ 60	1005.05 6	0.92 3	0.0198

38 weak γ's omitted:
Eγ(avg) = 428.2; ΣIγ = 0.83%
Maximum γ±-intensity = 1.46%

• ^{79}Se β^- Decay (≤6.5E4 y) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β− 1 max	149 5		
avg	52.2 19	100	0.111

• ^{79}Kr β^+ Decay (35.04 h 10) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	1.4	105 5	0.0032
Auger-K	10.2	31 3	0.0067
ce-K- 1	30.7 4	0.214 22	0.0001
ce-K- 6	247.79 10	0.104 5	0.0005
β^+ 1 max	348 8		
avg	154 4	0.181 19	0.0006
β^+ 2 max	609 8		
avg	265 4	6.9 3	0.0389
total β^+			
avg	262 4	7.1 3	0.0396

2 weak β^+'s omitted:
$E\beta$(avg) = 102.8; $\Sigma I\beta$ = 0.02%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	1.48	1.1 4	≈0
X-ray $K\alpha_2$	11.87760 2	14.9 9	0.0038
X-ray $K\alpha_1$	11.92420 2	28.9 16	0.0074
X-ray $K\beta$	13.3	7.1 4	0.0020
γ 1	44.2 4	0.210 20	0.0002
γ 2	135.99 10	1.00 10	0.0029
γ 3	180.21 15	0.10 5	0.0004
γ 4	208.45 10	0.78 4	0.0035
γ 5	217.02 10	2.40 10	0.0111
γ 6	261.26 10	12.7 4	0.0707
γ 8	299.51 10	1.57 7	0.0100
γ 9	306.31 15	2.60 10	0.0170
γ 10	344.70 10	0.240 10	0.0018
γ 11	389.00 10	1.52 7	0.0126
γ 12	397.56 10	9.5 3	0.0804
γ 16	522.98 20	0.250 10	0.0028
γ 17	525.32 15	0.430 20	0.0048
γ 20	606.07 10	8.10 20	0.105
γ 27	832.04 10	1.26 6	0.0223
γ 32	934.81 15	0.126 7	0.0025
γ 33	1025.70 10	0.156 9	0.0034
γ 38	1115.1 3	0.370 20	0.0088
γ 42	1332.13 10	0.44 3	0.0125

24 weak γ's omitted:
$E\gamma$(avg) = 787.3; $\Sigma I\gamma$ = 0.55%
Maximum $\gamma\pm$-intensity = 14.21%

• ^{80}Br EC Decay (17.4 m 2) I (min) = 0.10%
%(EC + β^+) Decay = 8.26 17
See also ^{80}Br β^- Decay (17.4 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	1.32	7.0 5	0.0002
Auger-K	9.67	2.16 19	0.0004
β^+ 1 max	848.3 20		
avg	367.8 9	2.20 7	0.0172
X-ray $K\alpha_2$	11.18140 2	0.94 6	0.0002
X-ray $K\alpha_1$	11.22240 2	1.82 11	0.0004
X-ray $K\beta$	12.5	0.44 3	0.0001
γ 1	665.80 20	1.05 12	0.0149

3 weak γ's omitted:
$E\gamma$(avg) = 957.5; $\Sigma I\gamma$ = 0.07%
Maximum $\gamma\pm$-intensity = 4.40%

• ^{80}Br β^- Decay (17.4 m 2) I (min) = 0.10%
%β^- Decay = 91.74 17
See also ^{80}Br EC Decay (17.4 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β^- 1 max	686 11		
avg	229 5	0.19 3	0.0009
β^- 2 max	750 11		
avg	254 5	0.32 4	0.0017
β^- 3 max	1390 11		
avg	526 5	6.2 6	0.0695
β^- 4 max	2006 11		
avg	805 5	85.0 6	1.46
total β^-			
avg	783 6	91.7 9	1.53
γ 1	616.2 5	6.6 6	0.0867
γ 2	639.40 20	0.26 3	0.0035
γ 3	703.80 20	0.19 3	0.0029

1 weak γ's omitted:
$E\gamma$(avg) = 1256.1; $\Sigma I\gamma$ = 0.07%

• ^{80}Br IT Decay (4.42 h 1) I (min) = 0.10%
Feeds ^{80}Br (17.4 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	1.4	175 8	0.0053
Auger-K	10.2	48 4	0.0103
ce-K- 1	23.5783 21	53.6 7	0.0269
ce-L- 1	35.2700 21	6.04 17	0.0045
ce-K- 2	35.4 4	72.3 6	0.0546
ce-M- 1	36.7955 21	0.95 3	0.0007
ce-NOP- 1	37.0247 21	0.314 9	0.0002
ce-L- 2	47.1 4	22.4 5	0.0225
ce-M- 2	48.6 4	3.79 11	0.0039
ce-NOP- 2	48.9 4	1.25 4	0.0013
X-ray L	1.48	1.8 6	≈0
X-ray $K\alpha_2$	11.87760 2	22.9 13	0.0058
X-ray $K\alpha_1$	11.92420 2	44.4 24	0.0113
X-ray $K\beta$	13.3	11.0 7	0.0031
γ 1	37.0520 20	39.0 7	0.0308
γ 2	48.9 4	0.335 10	0.0003

• ^{81}Kr EC Decay (2.1E5 y 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	1.4	110 6	0.0033
Auger-K	10.2	31 3	0.0067
X-ray L	1.48	1.1 4	≈0
X-ray $K\alpha_2$	11.87760 2	14.9 8	0.0038
X-ray $K\alpha_1$	11.92420 2	28.9 16	0.0073
X-ray $K\beta$	13.3	7.1 4	0.0020
γ 1	275.990 11	3.6 5	0.0212

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
● ^{81}Rb EC Decay (4.58 h 1) Feeds ^{81}Kr		I (min) = 0.10%	
Auger-L	1.5	106 6	0.0034
Auger-K	10.8	30 3	0.0068
ce-K- 7	175.97 3	25.6 8	0.0958
ce-L- 7	188.38 3	4.37 14	0.0175
ce-MNO- 7	190.01 3	1.439 14	0.0058
β+ 1 max	600 30		
avg	264 13	1.7 3	0.0096
β+ 2 max	1050 30		
avg	458 14	31.4 19	0.306
total β+ avg	448 15	33.1 20	0.316
3 weak β's omitted: Eβ(avg)= 112.2; ΣIβ= 0.01%			
X-ray L	1.59	1.4 6	≈0
X-ray Kα2	12.5980 20	15.8 9	0.0042
X-ray Kα1	12.6490 20	30.6 17	0.0082
X-ray Kβ	14	7.8 5	0.0023
γ 6	180.20 10	0.125 4	0.0005
γ 7	190.30 3	65.7 6	0.266
γ 9	243.80 8	0.204 7	0.0011
γ 14	357.38 4	0.558 14	0.0043
γ 16	388.84 6	0.283 7	0.0023
γ 19	446.140 20	18.95 18	0.180
γ 20	456.71 3	2.313 25	0.0225
γ 21	476.68 3	0.388 8	0.0039
γ 23	510.5 5	0.5 3	0.0050
γ 24	537.60 4	1.551 25	0.0178
γ 26	549.05 4	0.328 8	0.0038
γ 27	568.90 4	0.394 8	0.0048
γ 33	729.09 6	0.217 7	0.0034
γ 36	803.74 6	0.657 9	0.0112
γ 37	834.73 6	0.631 9	0.0112
γ 40	977.15 4	0.381 8	0.0079
γ 43	1041.25 5	0.394 8	0.0087
39 weak γ's omitted: Eγ(avg)= 626.6; ΣIγ= 1.03% Maximum γ±-intensity = 66.23%			
● ^{82}Br β⁻ Decay (35.30 h 3)		I (min) = 0.10%	
β- 1 max	264.6 15		
avg	76.2 5	1.359 20	0.0022
β- 2 max	444.3 15		
avg	137.8 6	97.9 6	0.287
total β- avg	137.0 6	99.3 6	0.290
1 weak β's omitted: Eβ(avg)= 171.6; ΣIβ= 0.09%			
γ 1	92.184 8	0.72 4	0.0014
γ 4	137.40 20	0.142 25	0.0004
γ 6	221.45 3	2.26 7	0.0106
γ 7	273.45 3	0.80 3	0.0047
γ 12	554.320 20	70.6 5	0.833
γ 14	606.30 10	1.17 9	0.0151
γ 15	619.070 20	43.1 5	0.568
γ 17	698.330 20	28.2 3	0.419
γ 19	776.49 3	83.31 14	1.38
γ 20	827.81 3	24.2 3	0.426
γ 23	952.10 20	0.37 3	0.0074
γ 24	1007.57 9	1.268 18	0.0272
γ 25	1043.97 3	27.3 4	0.608
γ 27	1081.40 20	0.62 4	0.0144
γ 30	1317.47 5	26.9 4	0.755
γ 31	1426	0.11 5	0.0033
γ 32	1474.82 8	16.58 17	0.521
γ 33	1650.30 10	0.741 11	0.0260
γ 34	1779.60 20	0.113 1	0.0043
17 weak γ's omitted: Eγ(avg)= 743.6; ΣIγ= 0.76%			
● ^{82}Rb β⁺ Decay (1.25 m 3)		I (min) = 0.10%	
Auger-L	1.5	5.0 3	0.0002
Auger-K	10.8	1.41 13	0.0003
β+ 1 max	1184 19		
avg	517 9	0.276 17	0.0030
β+ 2 max	1881 19		
avg	833 9	0.171 21	0.0030
β+ 3 max	2580 19		
avg	1157 9	11.7 5	0.288
β+ 4 max	3356 19		
avg	1524 9	83.3 5	2.70
total β+ avg	1474 10	95.5 7	3.00
3 weak β's omitted: Eβ(avg)= 628.6; ΣIβ= 0.06%			
X-ray Kα2	12.5980 20	0.75 4	0.0002
X-ray Kα1	12.6490 20	1.46 8	0.0004
X-ray Kβ	14	0.371 20	0.0001
γ 2	698.330 20	0.147 20	0.0022
γ 4	776.49 3	13.5 5	0.223
γ 5	1395.2 3	0.509 24	0.0151
8 weak γ's omitted: Eγ(avg)= 1633.8; ΣIγ= 0.33% Maximum γ±-intensity =191.01%			
● ^{82}Sr EC Decay (25.0 d 4) Feeds ^{82}Rb (1.25 m)		I (min) = 0.10%	
Auger-L	1.68	107.2 18	0.0038
Auger-K	11.4	28.5 7	0.0069
X-ray L	1.69	1.6 6	≈0
X-ray Kα2	13.33580 2	16.8 4	0.0048
X-ray Kα1	13.39530 2	32.4 5	0.0093
X-ray Kβ	15	8.51 20	0.0027

• ^{83}Br β^- Decay (2.39 h 2) I (min) = 0.10%

% Feeding to ^{83}Kr (1.83 h) = 99.974 8

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	389 15		
avg	118 6	1.3 4	0.0033
β- 2 max	918 15		
avg	323 7	98.6 4	0.678
total β- avg	320 7	100.0 6	0.682

2 weak β's omitted:
Eβ(avg) = 112.7; ΣIβ = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
γ 6	529.640 10	1.3 4	0.0147

9 weak γ's omitted:
Eγ(avg) = 537.4; ΣIγ = 0.10%

• ^{83}Kr IT Decay (1.83 h 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	1.5	165.2 21	0.0053
ce-L- 1	7.469 10	77.7 6	0.0124
ce-M- 1	9.102 10	12.7 4	0.0025
ce-NOP- 1	9.366 10	4.20 12	0.0008
Auger-K	10.8	8.6 8	0.0020
ce-K- 2	17.834 20	24.3 6	0.0092
ce-L- 2	30.239 20	61.7 7	0.0397
ce-M- 2	31.872 20	10.4 3	0.0071
ce-NOP- 2	32.136 20	3.44 10	0.0024
X-ray L	1.59	2.2 9	≈0
γ 1	9.390 10	5.41 16	0.0011
X-ray $K\alpha_2$	12.5980 20	4.57 25	0.0012
X-ray $K\alpha_1$	12.6490 20	8.9 5	0.0024
X-ray Kβ	14	2.26 13	0.0007

1 weak γ's omitted:
Eγ(avg) = 32.2; ΣIγ = 0.05%

• ^{83}Rb EC Decay (86.2 d 1) I (min) = 0.10%

% Feeding to ^{83}Kr (1.83 h) = 76 4

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	1.5	127 8	0.0041
ce-L- 1	7.469 10	19 3	0.0029
ce-M- 1	9.102 10	3.0 5	0.0006
ce-NOP- 1	9.366 10	1.00 15	0.0002
Auger-K	10.8	31 3	0.0071
X-ray L	1.59	1.7 7	≈0
γ 1	9.390 10	1.29 20	0.0003
X-ray $K\alpha_2$	12.5980 20	16.4 12	0.0044
X-ray $K\alpha_1$	12.6490 20	31.8 23	0.0086
X-ray Kβ	14	8.1 6	0.0024
γ 5	520.41 3	46 3	0.509
γ 6	529.640 10	30.3 19	0.342
γ 7	552.650 20	16.4 11	0.193
γ 11	790.14 5	0.67 4	0.0114
γ 12	799.36 5	0.243 14	0.0041

6 weak γ's omitted:
Eγ(avg) = 591.9; ΣIγ = 0.14%

• ^{84}Br β^- Decay (31.80 m 8) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	480 30		
avg	152 10	0.22 5	0.0007
β- 2 max	560 30		
avg	179 10	2.1 4	0.0080
β- 3 max	590 30		
avg	191 10	0.49 7	0.0020
β- 4 max	750 30		
avg	253 11	11.7 13	0.0631
β- 5 max	790 30		
avg	272 11	0.29 4	0.0017
β- 6 max	800 30		
avg	276 11	0.18 5	0.0011
β- 7 max	970 30		
avg	343 11	2.5 3	0.0183
β- 8 max	1200 30		
avg	442 12	0.49 14	0.0046
β- 9 max	1310 30		
avg	490 12	9.5 11	0.0992
β-10 max	1590 30		
avg	616 12	3.9 4	0.0512
β-11 max	1910 30		
avg	763 12	1.13 22	0.0184
β-12 max	1970 30		
avg	790 12	7.4 9	0.125
β-13 max	2050 30		
avg	826 12	1.9 3	0.0334
β-14 max	2180 30		
avg	888 13	0.34 7	0.0064
β-15 max	2330 30		
avg	955 13	1.6 4	0.0325
β-16 max	2780 30		
avg	1166 13	12.1 20	0.301
β-17 max	3790 30		
avg	1650 13	13.7 16	0.481
β-18 max	4670 30		
avg	2072 13	32 5	1.41
total β- avg	1230 21	102 6	2.66

1 weak β's omitted:
Eβ(avg) = 1194.0; ΣIβ = 0.06%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
γ 1	230.20 20	0.31 5	0.0015
γ 3	354.70 20	0.31 5	0.0023
γ 4	382.00 20	0.57 10	0.0046
γ 10	604.8 3	1.8 3	0.0228
γ 12	736.5 3	1.31 24	0.0205
γ 13	802.20 20	6.1 8	0.104
γ 14	881.50 10	42 4	0.792
γ 15	947.5 7	0.36 9	0.0072
γ 17	987.3 4	0.78 14	0.0164
γ 18	1005.7 7	0.46 14	0.0099
γ 19	1015.90 10	6.2 8	0.135
γ 20	1082.6 4	0.14 3	0.0033
γ 21	1119.1 4	0.14 3	0.0034
γ 23	1185.0 7	0.110 23	0.0028
γ 24	1213.30 20	2.6 4	0.0676
γ 27	1463.8 7	2.0 5	0.0618
γ 28	1534.7 6	0.101 23	0.0033
γ 29	1578.1 4	0.66 14	0.0221
γ 30	1607.6 4	0.40 7	0.0137
γ 31	1741.2 4	1.6 3	0.0610
γ 34	1818.7 4	0.24 5	0.0095
γ 35	1877.5 4	1.14 19	0.0456
γ 36	1897.3 3	14.9 19	0.604
γ 37	2029.6 5	2.1 5	0.0912
γ 38	2094.2 5	0.22 5	0.0096
γ 39	2200.7 4	1.18 20	0.0554
γ 41	2484.1 3	6.8 9	0.357

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
γ 42	2593.7 6	0.14 4	0.0077
γ 43	2622.9 5	0.30 7	0.0170
γ 44	2758.7 5	0.49 10	0.0290
γ 45	2824.1 4	1.14 19	0.0685
γ 46	2988.7 7	0.18 5	0.0113
γ 47	3045.4 4	2.5 5	0.164
γ 48	3202.1 7	0.21 5	0.0144
γ 49	3235.3 5	2.1 4	0.142
γ 50	3365.8 4	2.9 5	0.209
γ 51	3927.5 4	6.9 9	0.575
γ 52	4084.6 6	0.28 5	0.0242

15 weak γ's omitted:
Eγ(avg) = 1122.9; ΣIγ = 0.67%

● ^{84}Rb β^+ Decay (32.9 d 2) I (min) = 0.10%
%(EC + β^+) Decay = 96.0 3
See also ^{84}Rb β^- Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	1.5	75 4	0.0024
Auger-K	10.8	21.4 19	0.0049
β+ 1 max	777 3		
avg	338.5 13	13.67 22	0.0986
β+ 2 max	1658 3		
avg	756.3 13	13.50 8	0.217
total β+			
avg	546.1 16	27.17 24	0.316
X-ray L	1.59	1.0 4	≈0
X-ray Kα2	12.5980 20	11.4 6	0.0030
X-ray Kα1	12.6490 20	22.0 11	0.0059
X-ray Kβ	14	5.6 3	0.0017
γ 1	881.50 10	67.7 6	1.27
γ 2	1015.90 10	0.318 21	0.0069
γ 3	1897.3 3	0.927 10	0.0375

Maximum γ±-intensity = 54.34%

● ^{84}Rb β^- Decay (32.9 d 2) I (min) = 0.10%
%β^- Decay = 4.0 3
See also ^{84}Rb β^+ Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
β- 1 max	890 4		
avg	331.2 15	4.0 3	0.0282

● ^{85}Br β^- Decay (172 s 2) I (min) = 0.10%
% Feeding to ^{85}Kr (10.72 y) = 0.163 13
% Feeding to ^{85}Kr (4.48 h) = 99.837 13

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
β- 1 max	660 100		
avg	220 40	0.41 3	0.0019
β- 2 max	770 100		
avg	260 40	2.23 16	0.0123
β- 3 max	860 100		
avg	300 50	0.110 12	0.0007
β- 4 max	1580 100		
avg	610 50	0.52 5	0.0068
β- 5 max	1690 100		
avg	660 50	0.85 10	0.0119
β- 6 max	2500 100		
avg	1030 50	95.72 20	2.10
total β-			
avg	1000 60	100.0 3	2.14

4 weak β's omitted:
Eβ(avg) = 465.0; ΣIβ = 0.20%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
γ 19	794.78 10	0.104 11	0.0018
γ 21	802.41 10	2.56 16	0.0437
γ 25	861.76 8	0.228 20	0.0042
γ 26	865.22 8	0.178 15	0.0033
γ 27	913.31 9	0.134 12	0.0026
γ 28	919.06 8	0.65 6	0.0127
γ 29	924.63 8	1.63 13	0.0321
γ 32	1037.83 8	0.103 11	0.0023
γ 40	1727.02 11	0.38 3	0.0140
γ 42	1832.50 10	0.150 13	0.0059

34 weak γ's omitted:
Eγ(avg) = 789.3; ΣIγ = 1.08%

● ^{85}Kr β^- Decay (10.72 y 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
β- 1 max	173.0 20		
avg	47.5 6	0.437 11	0.0004
β- 2 max	687.0 20		
avg	251.4 8	99.563 11	0.533
total β-			
avg	250.5 8	100.000 16	0.534
γ 1	513.990 10	0.434 11	0.0048

● ^{85}Kr IT Decay (4.48 h 1) I (min) = 0.10%
%IT Decay = 21.1 6
Feeds ^{85}Kr (10.72 y)
See also ^{85}Kr β^- Decay (4.48 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	1.5	7.6 5	0.0002
Auger-K	10.8	2.10 19	0.0005
ce-K- 1	290.544 20	5.93 19	0.0367
ce-L- 1	302.949 20	0.90 4	0.0058
ce-MNO- 1	304.582 20	0.295 12	0.0019
X-ray L	1.59	0.10 4	≈0
X-ray Kα2	12.5980 20	1.12 7	0.0003
X-ray Kα1	12.6490 20	2.16 13	0.0006
X-ray Kβ	14	0.55 4	0.0002
γ 1	304.870 20	14.0 5	0.0908

● ^{85}Kr β^- Decay (4.48 h 1) I (min) = 0.10%
%β^- Decay = 78.9 6
See also ^{85}Kr IT Decay (4.48 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	1.68	3.85 13	0.0001
Auger-K	11.4	1.04 4	0.0003
ce-K- 2	135.980 10	3.15 10	0.0091
ce-L- 2	149.115 10	0.350 11	0.0011
ce-MNO- 2	150.858 10	0.115	0.0004

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)

^{85}Kr β^- Decay (4.48 h 1) (Continued)

β- 1 max	710.8 20		
avg	238.2 8	0.290 9	0.0015
β- 2 max	840.7 20		
avg	290.4 9	78.6 6	0.486
total β- avg	290.2 9	78.9 6	0.488

1 weak β's omitted:
Eβ(avg) = 74.6; ΣIβ= 0.02%

X-ray Kα2	13.33580 2	0.612 23	0.0002
X-ray Kα1	13.39530 2	1.18 4	0.0003
X-ray Kβ	15	0.310 12	≈0
γ 1	129.850 20	0.301 8	0.0008
γ 2	151.180 10	75.3 6	0.242

2 weak γ's omitted:
Eγ(avg) = 581.3; ΣIγ= 0.02%

● ^{85}Sr EC Decay (64.84 d 3) I (min) = 0.10%

Auger-L	1.68	108.2 19	0.0039
Auger-K	11.4	29.1 7	0.0071
ce-K- 1	498.790 10	0.625 19	0.0066
X-ray L	1.69	1.6 6	≈0
X-ray Kα2	13.33580 2	17.1 4	0.0048
X-ray Kα1	13.39530 2	33.0 5	0.0094
X-ray Kβ	15	8.66 20	0.0028
γ 1	513.990 10	99.270 22	1.09

1 weak γ's omitted:
Eγ(avg) = 868.5; ΣIγ= 0.01%

● ^{85}Sr EC Decay (67.66 m 7) I (min) = 0.10%
%EC Decay = 12.7
See also ^{85}Sr IT Decay (67.66 m)

Auger-L	1.68	14.22 24	0.0005
Auger-K	11.4	3.84 10	0.0009
ce-K- 1	135.980 10	0.507 16	0.0015
X-ray L	1.69	0.22 8	≈0
X-ray Kα2	13.33580 2	2.26 5	0.0006
X-ray Kα1	13.39530 2	4.37 7	0.0012
X-ray Kβ	15	1.15 3	0.0004
γ 1	151.180 10	12.125	0.0390

● ^{85}Sr IT Decay (67.66 m 7) I (min) = 0.10%
%IT Decay = 87.3
Feeds ^{85}Sr (64.84 d)
See also ^{85}Sr EC Decay (67.66 m)

Auger-L	1.79	69.9 6	0.0027
ce-L- 1	4.74 18	68.5 5	0.0069
ce-M- 1	6.60 18	13.7 4	0.0019
ce-NOP- 1	6.92 18	4.52 13	0.0007
Auger-K	12	0.68 7	0.0002
ce-K- 2	215.59 10	1.69 11	0.0077
ce-K- 3	222.55 15	0.509 16	0.0024
ce-L- 2	229.47 10	0.195 14	0.0010
X-ray L	1.8	1.1 4	≈0
X-ray Kα2	14.09790 2	0.44 3	0.0001
X-ray Kα1	14.16500 2	0.85 6	0.0003
X-ray Kβ	15.8	0.228 15	≈0
γ 2	231.69 10	84.72 13	0.418
γ 3	238.65 15	0.322	0.0016

● ^{86}Rb β^- Decay (18.66 d 2) I (min) = 0.10%
%β^- Decay = 99.9948 5
%EC Decay = 0.0052 5

β- 1 max	697.6 19		
avg	232.5 8	8.78 8	0.0435
β- 2 max	1774.4 19		
avg	709.3 9	91.22 8	1.38
total β- avg	667.4 10	100.00 12	1.42
γ 1	1076.63 10	8.78 8	0.201

● ^{86}Y β^+ Decay (14.74 h 2) I (min) = 0.10%

Auger-L	1.79	70 4	0.0027
Auger-K	12	18.1 16	0.0047
β+ 1 max	420 10		
avg	187 5	0.31 4	0.0012
β+ 2 max	485 10		
avg	215 5	0.33 3	0.0015
β+ 3 max	606 10		
avg	267 5	0.371 25	0.0021
β+ 4 max	889 10		
avg	389 5	0.198 16	0.0016
β+ 5 max	933 10		
avg	408 5	1.28 20	0.0111
β+ 6 max	1066 10		
avg	467 5	2.0 5	0.0199
β+ 7 max	1195 10		
avg	524 5	1.41 12	0.0157
β+ 8 max	1254 10		
avg	550 5	12.4 5	0.145
β+ 9 max	1373 10		
avg	603 5	0.72 12	0.0092
β+10 max	1578 10		
avg	696 5	5.6 5	0.0830
β+11 max	1769 10		
avg	783 5	1.7 10	0.0284
β+12 max	2021 10		
avg	899 5	3.6 9	0.0689
β+13 max	2397 10		
avg	1093 5	1.0 10	0.0233
β+14 max	3174 10		
avg	1452 5	2.0 12	0.0619
total β+ avg	672 6	33.2 23	0.475

9 weak β's omitted:
Eβ(avg) = 355.0; ΣIβ= 0.27%

(Continued)

Radiation Type		Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray	L	1.8	1.1 4	≈0
X-ray	$K\alpha_2$	14.09790 2	11.7 6	0.0035
X-ray	$K\alpha_1$	14.16500 2	22.6 11	0.0068
X-ray	Kβ	15.8	6.1 3	0.0020
γ	1	132.34 10	0.165 9	0.0005
γ	3	182.34 20	0.11 4	0.0004
γ	4	187.87 13	1.26 5	0.0051
γ	5	190.80 13	1.01 4	0.0041
γ	6	209.80 23	0.396 17	0.0018
γ	7	235.37 23	0.396 17	0.0020
γ	8	237.9 3	0.132 25	0.0007
γ	9	252.05 13	0.371 17	0.0020
γ	11	264.53 13	0.536 25	0.0030
γ	12	307.00 10	3.46 9	0.0227
γ	13	331.08 23	0.83 3	0.0059
γ	15	370.28 17	0.82 5	0.0065
γ	16	380.4 3	0.45 4	0.0037
γ	17	382.86 23	3.63 12	0.0296
γ	18	425.97 23	0.305 17	0.0028
γ	19	439.5 3	0.20 7	0.0019
γ	20	443.13 10	16.9 5	0.160
γ	21	444.18 23	0.64 17	0.0061
γ	23	469.24 25	0.297 25	0.0030
γ	26	515.18 20	4.89 15	0.0537
γ	27	580.57 10	4.78 15	0.0592
γ	28	608.29 10	2.01 15	0.0261
γ	29	618.2 4	0.21 4	0.0028
γ	30	627.72 10	32.6 10	0.436
γ	32	644.82	2.2 4	0.0306
γ	33	645.87	9.2 11	0.126
γ	35	689.29 25	0.17 4	0.0025
γ	36	702.2 6	0.25 9	0.0037
γ	37	703.33 10	15.4 5	0.231
γ	38	709.90 10	2.62 8	0.0397
γ	39	719.17 23	0.22 4	0.0034
γ	40	740.81 13	1.36 5	0.0215
γ	41	767.63 13	2.4 4	0.0391
γ	42	768.25	0.32 11	0.0053
γ	43	777.37 10	22.4 6	0.372
γ	44	783.6 3	0.26 4	0.0044
γ	45	826.02 13	3.30 9	0.0581
γ	46	833.72	1.5 4	0.0264
γ	47	835.67	4.4 6	0.0778
γ	48	882.96 17	0.25 9	0.0047
γ	49	887.40 17	0.44 5	0.0083
γ	50	955.35 20	1.04 5	0.0212
γ	51	971.43 18	0.27 4	0.0056
γ	52	1017.93 23	0.18 12	0.0039
γ	53	1024.04 10	3.79 17	0.0828
γ	54	1076.63 10	82.5 4	1.89
γ	56	1092.68 13	0.69 5	0.0161
γ	57	1102.02 23	0.198 25	0.0046
γ	58	1133.3 10	0.297 25	0.0072
γ	61	1153.05 10	30.5 10	0.750
γ	63	1163.03 10	1.18 5	0.0292
γ	64	1253.11 10	1.53 5	0.0410
γ	65	1270.16 13	0.65 10	0.0176
γ	66	1283.96 13	0.29 11	0.0079
γ	67	1294.9 3	0.29 9	0.0080
γ	68	1296.03 23	0.54 4	0.0150
γ	70	1349.15 10	2.95 10	0.0846
γ	71	1404.8 4	0.18 5	0.0054
γ	72	1415.20 23	0.33 9	0.0099
γ	73	1507.86 10	0.35 5	0.0114
γ	74	1533.19 13	0.22 4	0.0073
γ	75	1535.67 13	0.12 4	0.0038
γ	76	1564.4 5	0.18 5	0.0060
γ	77	1696.25 13	0.635 17	0.0230
γ	78	1711.6 7	0.17 4	0.0063
γ	79	1724.15 10	0.55 5	0.0203
γ	80	1790.90 10	1.00 5	0.0381
γ	81	1801.70 10	1.65 5	0.0633
γ	82	1854.38 13	17.2 5	0.678
γ	83	1920.72 13	20.8 7	0.851
γ	85	2017.1 6	0.132 17	0.0057
γ	86	2088.09 25	0.247 25	0.0110
γ	89	2291.8 5	0.124 9	0.0060
γ	90	2482.08 17	0.115 9	0.0061
γ	92	2567.97 18	2.25 11	0.123
γ	93	2610.11 20	1.24 8	0.0688
γ	94	2641.9 4	0.16 5	0.0093
γ	96	2794.9 4	0.206 17	0.0123
γ	99	2865.9 3	0.38 7	0.0232
γ	101	3069.7 4	0.115 17	0.0076
γ	102	3334.0 5	0.124 17	0.0088

23 weak γ's omitted:
Eγ(avg) = 1366.1; ΣIγ = 1.03%
Maximum γ±-intensity = 66.37%

• ^{86}Zr EC Decay (16.5 h 1) I (min) = 0.10%

Feeds ^{86}Y (14.74 h)

Radiation Type		Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L		2	189 11	0.0077
ce-K-	1	12.06 10	70 6	0.0180
Auger-K		12.7	47 6	0.0126
ce-L-	1	26.73 10	8.7 7	0.0050
ce-MNO-	1	28.71 10	1.95 14	0.0012
ce-K-	9	225.76 10	3.56 10	0.0171
ce-L-	9	240.43 10	0.446 13	0.0023
ce-MNO-	9	242.41 10	0.147 4	0.0008
X-ray	L	2	4.3 14	0.0002
X-ray	$K\alpha_2$	14.88290 2	33.1 19	0.0105
X-ray	$K\alpha_1$	14.95840 2	64 4	0.0203
X-ray	Kβ	16.7	17.5 11	0.0062
γ	1	29.10 10	21.6 15	0.0134
γ	4	135.60 10	0.47 5	0.0014
γ	9	242.80 10	95.80 10	0.495
γ	10	612.00 10	5.7 3	0.0743
γ	11	620.60 20	0.27 3	0.0036

7 weak γ's omitted:
Eγ(avg) = 169.3; ΣIγ = 0.45%

• ^{87}Kr β^- Decay (76.3 m 5) I (min) = 0.10%

Feeds ^{87}Rb

Radiation Type		Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L		1.68	0.194 8	≈0
ce-K-	2	387.378 20	0.174 6	0.0014
β- 1	max	580 5		
	avg	187.8 19	0.50 3	0.0020
β- 2	max	834 5		
	avg	287.5 21	0.108 12	0.0007
β- 3	max	928 5		
	avg	326.4 21	4.4 3	0.0306
β- 4	max	1078 5		
	avg	389.3 22	0.58 4	0.0048
β- 5	max	1334 5		
	avg	500.4 22	9.5 6	0.101
β- 6	max	1475 5		
	avg	562.6 23	5.51 22	0.0660
β- 7	max	1511 5		
	avg	578.7 23	0.42 6	0.0052

(Continued)

^{87}Kr β^- Decay (76.3 m 5) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
β- 8 max	2148 5		
avg	870.0 24	0.62 10	0.0115
β- 9 max	2311 5		
avg	945.6 24	0.16 6	0.0032
β-10 max	2499 5		
avg	1033.7 24	0.124 11	0.0027
β-11 max	3044 5		
avg	1294.2 24	6.9 4	0.190
β-12 max	3486 5		
avg	1502.0 24	40.7 14	1.30
β-13 max	3889 5		
avg	1694.8 24	30.4 24	1.10
total β-			
avg	1324 3	100 3	2.82
γ 2	402.578 20	49.5 16	0.424
γ 6	673.87 4	1.91 10	0.0274
γ 7	814.25 7	0.168 12	0.0029
γ 8	836.37 6	0.75 4	0.0134
γ 9	845.43 4	7.3 4	0.131
γ 12	946.64 15	0.139 11	0.0028
γ 15	1175.40 8	1.12 6	0.0281
γ 16	1337.96 8	0.65 4	0.0185
γ 17	1382.53 7	0.287 18	0.0085
γ 18	1389.91 16	0.124 11	0.0037
γ 20	1531.2 4	0.36 6	0.0116
γ 21	1577.99 14	0.129 11	0.0043
γ 22	1611.16 16	0.104 20	0.0036
γ 23	1740.52 8	2.05 10	0.0760
γ 24	1842.61 24	0.139 11	0.0054
γ 25	2011.88 12	2.90 14	0.124
γ 27	2408.50 20	0.213 17	0.0109
γ 28	2554.80 20	9.3 6	0.506
γ 29	2558.10 20	3.9 3	0.213
γ 31	2811.40 20	0.317 23	0.0190
γ 34	3308.50 20	0.450 25	0.0317

13 weak γ's omitted:
Eγ(avg)= 1620.1; ΣIγ= 0.65%

• ^{87}Rb β^- Decay (4.73E10 y 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
β- 1 max	273.3 19		
avg	78.8 7	100	0.168

• ^{87}Sr EC Decay (2.805 h 3) I (min) = 0.10%
%EC Decay = 0.30 8
Feeds ^{87}Rb
See also ^{87}Sr IT Decay (2.805 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	1.68	0.32 8	≈0

• ^{87}Sr IT Decay (2.805 h 3) I (min) = 0.10%
%IT Decay = 99.70 8
See also ^{87}Sr EC Decay (2.805 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	1.79	17.9 10	0.0007
Auger-K	12	4.5 4	0.0012
ce-K- 1	372.30 8	14.6 4	0.115
ce-L- 1	386.18 8	2.13 6	0.0176
ce-MNO- 1	388.04 8	0.704 21	0.0058
X-ray L	1.8	0.29 10	≈0
X-ray Kα$_2$	14.09790 2	2.92 15	0.0009
X-ray Kα$_1$	14.16500 2	5.6 3	0.0017
X-ray Kβ	15.8	1.51 8	0.0005
γ 1	388.40 8	82.3 4	0.680

• ^{87}Y EC Decay (80.3 h 3) I (min) = 0.10%
Feeds ^{87}Sr (2.805 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	1.79	105 6	0.0040
Auger-K	12	27.0 23	0.0070
ce-K- 2	468.60 20	0.235 7	0.0023
β+ 1 max	451.3 13		
avg	200.5 6	0.160 20	0.0007
X-ray L	1.8	1.7 6	≈0
X-ray Kα$_2$	14.09790 2	17.5 7	0.0053
X-ray Kα$_1$	14.16500 2	33.8 13	0.0102
X-ray Kβ	15.8	9.1 4	0.0031
γ 2	484.70 20	93.94 9	0.970

Maximum γ±-intensity = 0.32%

• ^{88}Kr β^- Decay (2.84 h 3) I (min) = 0.10%
Feeds ^{88}Rb

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	1.68	14.9 7	0.0005
Auger-K	11.4	4.04 21	0.0010
ce-K- 1	12.313 14	10.7 6	0.0028
ce-K- 2	13.06 11	0.13 5	≈0
ce-L- 1	25.448 14	1.23 7	0.0007
ce-MNO- 1	27.191 14	0.273 16	0.0002
ce-K- 4	150.78 4	0.208 21	0.0007
ce-K- 7	181.120 15	1.14 12	0.0044
ce-L- 7	194.255 15	0.138 15	0.0006
β- 1 max	142 17		
avg	38 5	0.353 25	0.0003
β- 2 max	365 17		
avg	109 6	2.65 16	0.0062
β- 3 max	521 17		
avg	165 7	67 4	0.235
β- 4 max	681 17		
avg	227 7	9.1 5	0.0440
β- 5 max	824 17		
avg	284 7	0.14 3	0.0008
β- 6 max	997 17		
avg	355 8	0.204 19	0.0015
β- 7 max	1198 17		
avg	441 8	1.92 11	0.0180
β- 8 max	1252 17		
avg	464 8	0.23 4	0.0023

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β− 9 max	1471 17		
avg	561 8	0.22 3	0.0026
β−10 max	1731 17		
avg	678 8	0.90 6	0.0130
β−11 max	1772 17		
avg	697 8	0.10 6	0.0015
β−12 max	2051 17		
avg	825 8	1.3 3	0.0228
β−13 max	2522 17		
avg	1052 8	0.26 9	0.0058
β−14 max	2717 17		
avg	1136 8	1.8 3	0.0436
β−15 max	2913 17		
avg	1233 8	14 4	0.368
total β−			
avg	359 13	100 6	0.766

2 weak β's omitted:
Eβ(avg) = 233.8; ΣIβ = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	1.69	0.23 8	≈0
X-ray Kα$_2$	13.33580 2	2.37 12	0.0007
X-ray Kα$_1$	13.39530 2	4.59 22	0.0013
X-ray Kβ	15	1.20 6	0.0004
γ 1	27.513 14	2.06 12	0.0012
γ 3	122.27 6	0.197 12	0.0005
γ 4	165.98 4	3.10 15	0.0110
γ 7	196.320 15	26.0 13	0.109
γ 8	240.71 4	0.253 14	0.0013
γ 9	311.69 3	0.107 9	0.0007
γ 10	334.71 3	0.145 10	0.0010
γ 12	362.226 13	2.25 12	0.0174
γ 14	390.543 11	0.64 6	0.0054
γ 16	421.70 18	0.128 25	0.0011
γ 17	471.80 3	0.73 4	0.0073
γ 25	677.34 5	0.235 18	0.0034
γ 30	788.28 4	0.53 3	0.0089
γ 31	790.32 7	0.125 12	0.0021
γ 34	834.830 3	13.0 7	0.231
γ 35	850.34 5	0.173 14	0.0031
γ 36	862.327 19	0.67 4	0.0123
γ 39	944.92 4	0.294 20	0.0059
γ 42	985.780 16	1.31 7	0.0276
γ 43	990.09 9	0.142 19	0.0030
γ 44	1039.59 3	0.48 3	0.0107
γ 45	1049.48 12	0.142 13	0.0032
γ 48	1141.33 6	1.28 7	0.0312
γ 49	1179.51 3	1.00 5	0.0250
γ 50	1184.95 4	0.69 5	0.0174
γ 51	1209.84 8	0.14 3	0.0037
γ 52	1212.73 17	0.14 5	0.0036
γ 54	1245.22 4	0.363 25	0.0096
γ 55	1250.67 4	1.12 6	0.0299
γ 58	1324.98 4	0.16 4	0.0045
γ 60	1352.32 11	0.159 22	0.0046
γ 61	1369.50 20	1.48 9	0.0431
γ 62	1406.94 10	0.218 20	0.0065
γ 63	1464.84 9	0.114 15	0.0036
γ 64	1518.39 3	2.15 12	0.0696
γ 65	1529.77 3	10.9 6	0.356
γ 66	1603.79 5	0.46 4	0.0156
γ 69	1685.6 4	0.66 8	0.0239
γ 73	1892.76 13	0.14 3	0.0056
γ 74	1908.7 4	0.100 15	0.0041
γ 75	2029.84 3	4.53 23	0.196
γ 76	2035.411 18	3.74 21	0.162
γ 77	2186.5 3	0.29 6	0.0134
γ 78	2195.842 7	13.2 7	0.617
γ 79	2231.772 21	3.39 17	0.161
γ 81	2352.08 4	0.73 4	0.0366
γ 83	2392.11 4	34.6 16	1.76
γ 84	2408.91 7	0.104 12	0.0053
γ 86	2548.40 3	0.62 3	0.0338
γ 87	2771.02 5	0.149 10	0.0088

37 weak γ's omitted:
Eγ(avg) = 1003.2; ΣIγ = 1.88%

• ^{88}Rb β^- Decay (17.8 m 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β− 1 max	462 5		
avg	143.6 18	0.66 5	0.0020
β− 2 max	470 5		
avg	146.3 19	0.362 25	0.0011
β− 3 max	572 5		
avg	184.3 19	0.143 11	0.0006
β− 4 max	801 5		
avg	273.7 21	2.13 13	0.0124
β− 5 max	901 5		
avg	314.5 21	0.210 18	0.0014
β− 6 max	2097 5		
avg	844.5 24	0.98 7	0.0176
β− 7 max	2581 5		
avg	1070.6 24	13.3 8	0.303
β− 8 max	3479 5		
avg	1496.5 24	4.1 4	0.131
β− 9 max	5315 5		
avg	2372.4 24	78.0 12	3.94
total β−			
avg	2072 4	99.9 15	4.41

4 weak β's omitted:
Eβ(avg) = 526.4; ΣIβ = 0.06%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 5	898.021 19	14.0 8	0.269
γ 8	1366.26 12	0.103 14	0.0030
γ 9	1382.39 5	0.74 5	0.0219
γ 11	1779.83 7	0.216 18	0.0082
γ 13	1836.01 4	21.4 13	0.837
γ 14	2111.22 12	0.118 13	0.0053
γ 15	2118.85 7	0.42 3	0.0190
γ 17	2577.72 6	0.180 14	0.0099
γ 18	2677.86 5	1.96 12	0.112
γ 19	2734.03 7	0.109 9	0.0064
γ 20	3009.43 7	0.244 17	0.0156
γ 22	3218.48 8	0.214 14	0.0147
γ 23	3486.46 9	0.131 9	0.0097
γ 26	4742.69 11	0.143 11	0.0145

13 weak γ's omitted:
Eγ(avg) = 1474.6; ΣIγ = 0.33%

• ^{88}Y EC Decay (106.60 d 4) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	1.79	105 6	0.0040
Auger-K	12	26.9 23	0.0069
β+ 1 max	755 4		
avg	355.2 15	0.217 16	0.0016

(Continued)

^{88}Y EC Decay (106.60 d 4) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
X-ray L	1.8	1.7 6	≈0
X-ray $K\alpha_2$	14.09790 2	17.4 7	0.0052
X-ray $K\alpha_1$	14.16500 2	33.7 13	0.0102
X-ray Kβ	15.8	9.0 4	0.0030
γ 3	898.021 19	93.4 4	1.79
γ 5	1836.01 4	99.380 20	3.89
γ 6	2734.03 7	0.596 20	0.0347

4 weak γ's omitted:
Eγ(avg) = 1188.3; ΣIγ = 0.10%
Maximum γ±-intensity = 0.43%

• ^{88}Zr EC Decay (83.4 d 3) I (min) = 0.10%
Feeds ^{88}Y

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	2	105 6	0.0043
Auger-K	12.7	26 3	0.0069
ce-K- 1	375.86 10	2.26 7	0.0181
ce-L- 1	390.53 10	0.312 9	0.0026
ce-MNO- 1	392.51 10	0.103 3	0.0009
X-ray L	2	2.4 8	≈0
X-ray $K\alpha_2$	14.88290 2	18.2 9	0.0058
X-ray $K\alpha_1$	14.95840 2	35.1 16	0.0112
X-ray Kβ	16.7	9.6 5	0.0034
γ 1	392.90 10	97.32 8	0.814

• ^{89}Kr β^- Decay (3.16 m 4) I (min) = 0.10%
Feeds ^{89}Rb

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	1.68	0.7 4	≈0
Auger-K	11.4	0.21 11	≈0
ce-K- 4	205.70 7	0.6 4	0.0027
β- 1 max	340 60		
avg	101 21	0.57 7	0.0012
β- 2 max	480 60		
avg	151 23	0.36 4	0.0012
β- 3 max	490 60		
avg	155 23	0.32 4	0.0011
β- 4 max	570 60		
avg	182 23	0.172 24	0.0007
β- 5 max	600 60		
avg	196 24	0.59 5	0.0025
β- 6 max	630 60		
avg	206 24	0.214 20	0.0009
β- 7 max	630 60		
avg	207 24	0.158 23	0.0007
β- 8 max	660 60		
avg	219 24	0.14 3	0.0007
β- 9 max	740 60		
avg	249 24	0.20 6	0.0011
β-10 max	750 60		
avg	255 25	0.180 20	0.0010
β-11 max	830 60		
avg	284 25	0.58 6	0.0035
β-12 max	890 60		
avg	310 25	0.68 7	0.0045
β-13 max	920 60		
avg	320 30	0.49 6	0.0033
β-14 max	990 60		
avg	350 30	0.45 6	0.0034
β-15 max	1000 60		
avg	360 30	0.20 3	0.0015
β-16 max	1070 60		
avg	390 30	0.17 3	0.0014
β-17 max	1250 60		
avg	460 30	2.36 17	0.0231
β-18 max	1250 60		
avg	460 30	0.33 5	0.0032
β-19 max	1440 60		
avg	550 30	1.49 12	0.0175
β-20 max	1500 60		
avg	580 30	0.31 4	0.0038
β-21 max	1610 60		
avg	620 30	1.55 13	0.0205
β-22 max	1600 60		
avg	620 30	2.09 15	0.0276
β-23 max	1640 60		
avg	640 30	2.00 15	0.0273
β-24 max	1720 60		
avg	670 30	0.27 4	0.0039
β-25 max	1950 60		
avg	780 30	0.85 13	0.0141
β-26 max	2100 60		
avg	850 30	4.0 3	0.0724
β-27 max	2190 60		
avg	890 30	1.51 13	0.0286
β-28 max	2180 60		
avg	890 30	0.28 4	0.0053
β-29 max	2370 60		
avg	970 30	14.4 10	0.298
β-30 max	2570 60		
avg	1070 30	5.7 5	0.130
β-31 max	2580 60		
avg	1070 30	0.31 4	0.0071
β-32 max	2600 60		
avg	1080 30	0.19 3	0.0044
β-33 max	2750 60		
avg	1150 30	0.224 22	0.0055
β-34 max	2810 60		
avg	1180 30	3.09 23	0.0777
β-35 max	2970 60		
avg	1260 30	2.53 20	0.0679
β-36 max	3110 60		
avg	1320 30	0.47 6	0.0132
β-37 max	3150 60		
avg	1340 30	0.17 9	0.0049
β-38 max	3280 60		
avg	1400 30	10.2 10	0.304
β-39 max	3440 60		
avg	1480 30	2.9 3	0.0914
β-40 max	3630 60		
avg	1570 30	0.62 10	0.0207
β-41 max	3650 60		
avg	1580 30	3.6 4	0.121
β-42 max	3970 60		
avg	1730 30	1.3 3	0.0479
β-43 max	4040 60		
avg	1770 30	0.44 18	0.0166
β-44 max	4380 60		
avg	1930 30	2.3 11	0.0946
β-45 max	4390 60		
avg	1940 30	4.4 5	0.182
β-46 max	4470 60		
avg	1980 30	1.2 6	0.0506
β-47 max	4970 60		
avg	2210 30	23 4	1.08
total β-			
avg	1360 50	100 5	2.90

4 weak β's omitted:
Eβ(avg) = 478.8; ΣIβ = 0.29%

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray $K\alpha_2$	13.33580 2	0.12 7	≈0
X-ray $K\alpha_1$	13.39530 2	0.23 13	≈0
γ 1	196.2 5	0.22 10	0.0009
γ 2	197.5 3	1.82 18	0.0077
γ 3	205.03 20	0.124 25	0.0005
γ 4	220.90 7	20.0 17	0.0941
γ 6	264.11 10	0.66 6	0.0037
γ 12	338.20 10	0.34 4	0.0025
γ 13	345.03 10	1.18 11	0.0087
γ 14	356.06 7	4.1 4	0.0314
γ 15	364.88 10	0.90 8	0.0070
γ 16	369.30 10	1.38 11	0.0109
γ 18	402.25 20	0.32 4	0.0027
γ 19	411.42 10	2.56 20	0.0224
γ 21	438.08 10	0.96 9	0.0090
γ 22	466.13 10	0.80 8	0.0079
γ 24	490.76 20	0.32 5	0.0034
γ 25	497.5 3	6.6 7	0.0704
γ 26	498.6 4	1.14 21	0.0121
γ 30	557.30 20	0.160 19	0.0019
γ 31	576.96 10	5.6 5	0.0693
γ 32	585.80 7	16.6 14	0.207
γ 35	626.20 10	0.60 6	0.0080
γ 36	629.75 20	0.34 4	0.0046
γ 40	665.72 20	0.114 18	0.0016
γ 42	671.40 20	0.106 21	0.0015
γ 43	674.11 20	0.23 3	0.0033
γ 45	696.24 10	1.78 16	0.0264
γ 46	707.01 20	0.50 5	0.0075
γ 47	710.05 20	0.78 8	0.0118
γ 48	729.63 20	0.30 4	0.0046
γ 49	738.39 7	4.2 4	0.0661
γ 50	747.4 3	0.11 3	0.0018
γ 52	762.9 3	0.40 9	0.0065
γ 53	762.9 3	0.92 13	0.0149
γ 54	776.49 20	1.12 19	0.0185
γ 56	826.75 10	0.76 8	0.0134
γ 57	835.53 10	1.10 10	0.0196
γ 58	857.37 15	0.29 3	0.0052
γ 59	867.08 7	5.9 5	0.109
γ 60	870.42 20	0.160 20	0.0030
γ 61	904.27 7	7.2 6	0.138
γ 63	930.95 10	0.62 6	0.0123
γ 66	944.19 15	0.164 19	0.0033
γ 67	953.18 20	0.106 17	0.0022
γ 68	960.42 10	0.32 4	0.0066
γ 71	974.39 10	0.98 8	0.0203
γ 72	997.37 10	0.66 6	0.0140
γ 73	1010.84 20	0.108 16	0.0023
γ 75	1044.40 10	0.41 4	0.0091
γ 80	1076.48 20	0.24 3	0.0054
γ 81	1088.07 10	0.36 4	0.0083
γ 83	1103.18 20	0.90 8	0.0211
γ 84	1107.78 10	2.92 25	0.0689
γ 85	1116.61 7	1.66 14	0.0395
γ 86	1131.51 20	0.160 24	0.0039
γ 88	1162.50 10	0.214 24	0.0053
γ 90	1172.33 20	0.98 10	0.0245
γ 91	1182.38 20	0.166 24	0.0042
γ 92	1186.54 20	0.184 21	0.0047
γ 96	1228.8 3	0.144 20	0.0038
γ 97	1235.62 10	0.59 6	0.0156
γ 101	1273.73 10	1.36 11	0.0369
γ 104	1302.7 3	0.100 15	0.0028
γ 106	1324.28 7	3.06 25	0.0863
γ 107	1335.4 3	0.13 3	0.0038
γ 108	1340.6 3	0.19 3	0.0055
γ 109	1367.48 20	0.148 20	0.0043
γ 110	1372.16 20	0.126 18	0.0037
γ 112	1412.59 15	0.26 3	0.0079
γ 113	1421.64 20	0.224 24	0.0068
γ 117	1461.3 5	0.122 25	0.0038
γ 118	1464.2 3	0.18 3	0.0056
γ 119	1468.5 3	0.19 3	0.0059
γ 120	1472.76 10	6.9 6	0.216
γ 123	1500.96 10	1.32 13	0.0422
γ 124	1506.2 3	0.112 21	0.0036
γ 125	1530.04 15	3.3 3	0.108
γ 126	1533.68 15	5.1 4	0.167
γ 127	1555.28 20	0.152 20	0.0050
γ 128	1573.78 20	0.190 21	0.0064
γ 131	1634.06 10	0.82 8	0.0285
γ 132	1643.82 10	0.34 4	0.0118
γ 134	1667.51 20	0.128 16	0.0045
γ 135	1676.9 3	0.140 24	0.0050
γ 137	1683.8 4	0.13 3	0.0047
γ 138	1692.0 12	0.26 11	0.0094
γ 139	1693.70 10	4.4 4	0.158
γ 142	1721.29 15	0.224 22	0.0082
γ 146	1777.60 10	0.76 8	0.0288
γ 147	1788.2 3	0.106 17	0.0040
γ 150	1810.73 20	0.140 18	0.0054
γ 154	1837.5 4	0.12 3	0.0046
γ 155	1839.72 25	0.35 4	0.0137
γ 158	1868.47 25	0.196 21	0.0078
γ 159	1879.80 25	0.158 19	0.0063
γ 162	1903.40 10	1.04 12	0.0422
γ 165	1939.11 15	0.64 6	0.0264
γ 166	1966.55 20	0.132 16	0.0055
γ 168	1998.6 5	0.118 23	0.0050
γ 170	2012.23 10	1.56 14	0.0669
γ 171	2021.04 15	0.244 24	0.0105
γ 173	2046.47 15	0.262 25	0.0114
γ 176	2100.63 8	0.94 8	0.0421
γ 180	2160.02 9	0.53 5	0.0243
γ 183	2195.8 4	0.13 6	0.0060
γ 186	2280.2 3	0.20 5	0.0099
γ 190	2377.38 9	0.80 8	0.0405
γ 191	2400.99 9	0.72 8	0.0368
γ 201	2597.92 20	0.108 17	0.0060
γ 203	2645.26 15	0.42 4	0.0237
γ 208	2750.9 3	0.124 16	0.0073
γ 212	2782.11 10	0.76 8	0.0450
γ 214	2793.75 20	0.68 6	0.0405
γ 216	2819.58 25	0.132 18	0.0079
γ 217	2853.3 3	0.24 4	0.0146
γ 218	2866.23 10	1.74 14	0.106
γ 220	2878.69 25	0.32 4	0.0199
γ 224	3017.9 3	0.25 4	0.0163
γ 225	3029.16 25	0.27 3	0.0174
γ 228	3107.26 25	0.194 21	0.0128
γ 229	3140.26 20	1.04 10	0.0696
γ 232	3172.1 3	0.100 15	0.0068
γ 234	3219.84 20	0.43 4	0.0294
γ 243	3361.70 20	1.04 10	0.0745
γ 244	3371.1 4	0.62 7	0.0445
γ 245	3399.9 3	0.136 16	0.0098
γ 249	3532.88 20	1.34 11	0.101
γ 251	3583.9 3	0.258 25	0.0197
γ 258	3717.8 4	0.84 8	0.0665
γ 260	3732.5 6	0.14 5	0.0110
γ 262	3781.4 4	0.132 14	0.0106
γ 264	3827.4 4	0.138 18	0.0113
γ 266	3842.7 4	0.110 14	0.0090
γ 269	3901.76 4	0.134 22	0.0111
γ 270	3923.0 4	0.41 4	0.0346
γ 271	3965.5 4	0.208 20	0.0176
γ 272	3977.5 4	0.27 6	0.0229
γ 274	3996.0 4	0.142 15	0.0121
γ 277	4048.0 5	0.116 14	0.0100
γ 290	4341.1 6	0.104 12	0.0096
γ 295	4489.2 8	0.134 14	0.0128

159 weak γ's omitted:
Eγ(avg) = 2181.1; ΣIγ = 7.12%

● ^{89}Rb β^- Decay (15.44 m 22) I (min) = 0.10%
Feeds ^{89}Sr

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β− 1 max	994 5		
avg	353.2 21	1.52 16	0.0114
β− 2 max	1275 5		
avg	473.6 22	33 3	0.333
β− 3 max	1796 5		
avg	706.4 23	2.19 23	0.0330
β− 4 max	1933 5		
avg	769.1 23	3.0 8	0.0491
β− 5 max	2223 5		
avg	903.1 24	34 4	0.654
β− 6 max	2446 5		
avg	1007.1 24	0.46 13	0.0099
β− 7 max	2495 5		
avg	1030.4 24	0.49 20	0.0108
β− 8 max	2563 5		
avg	1062.0 24	0.22 4	0.0050
β− 9 max	3030 5		
avg	1284.8 24	0.24 5	0.0066
β−10 max	4503 5		
avg	1987.4 24	25 5	1.06
total β−			
avg	1015 3	100 8	2.17

7 weak β's omitted:
Eβ(avg) = 272.4; ΣIβ = 0.37%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 3	272.45 10	1.42 14	0.0082
γ 4	289.76 10	0.54 10	0.0033
γ 8	657.71 7	10.0 10	0.140
γ 10	766.79 15	0.162 23	0.0027
γ 14	947.69 7	9.2 10	0.186
γ 16	1025.3 5	0.23 9	0.0049
γ 17	1031.88 7	58 6	1.27
γ 23	1220.32 10	0.22 3	0.0057
γ 24	1228.40 15	0.122 21	0.0032
γ 26	1248.10 7	42 5	1.13
γ 29	1473.22 20	0.35 5	0.0111
γ 30	1501.07 20	0.197 25	0.0063
γ 31	1538.08 10	2.6 3	0.0836
γ 35	1940.2 3	0.33 4	0.0137
γ 37	2007.54 10	2.4 3	0.102
γ 38	2058.0 11	0.23 9	0.0102
γ 40	2196.00 15	13.3 15	0.624
γ 42	2280.06 10	0.180 24	0.0087
γ 45	2570.14 10	9.9 10	0.540
γ 48	2707.20 10	2.03 21	0.117
γ 57	3508.84 25	1.15 13	0.0858

41 weak γ's omitted:
Eγ(avg) = 1950.3; ΣIγ = 1.18%

● ^{89}Sr β^- Decay (50.55 d 9) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β− 1 max	1491 4		
avg	583.0 15	99.985 5	1.24

1 weak β's omitted:
Eβ(avg) = 187.6; ΣIβ = 0.02%

1 weak γ's omitted:
Eγ(avg) = 909.1; ΣIγ = 0.02%

● ^{89}Zr β^+ Decay (78.43 h 8) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2	80 4	0.0032
Auger-K	12.7	19.6 21	0.0053
ce-K- 1	892.06 10	0.715 22	0.0136
β+ 1 max	904.7 23		
avg	396.9 10	22.94 24	0.194
X-ray L	2	1.8 6	≈0
X-ray Kα2	14.88290 2	14.0 7	0.0044
X-ray Kα1	14.95840 2	26.9 12	0.0086
X-ray Kβ	16.7	7.4 4	0.0026
γ 1	909.10 10	99.04 3	1.92
γ 4	1712.9 8	0.76 7	0.0278
γ 5	1744.50 20	0.129 10	0.0048

2 weak γ's omitted:
Eγ(avg) = 1642.1; ΣIγ = 0.17%
Maximum γ±-intensity = 45.88%

● ^{90}Kr β^- Decay (32.32 s 9) I (min) = 0.10%
% Feeding to ^{90}Rb (157 s) = 88.1 14
% Feeding to ^{90}Rb (258 s) = 11.9 14

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	1.68	11 7	0.0004
Auger-K	11.4	2.8 19	0.0007
ce-K- 1	90.85 3	0.15 11	0.0003
ce-K- 3	105.72 3	0.7 5	0.0015
ce-K- 4	106.62 3	8 6	0.0175
ce-L- 4	119.75 3	1.1 9	0.0027
ce-MNO- 4	121.50 3	0.20 15	0.0005
β− 1 max	510 30		
avg	161 12	0.140 20	0.0005
β− 2 max	690 30		
avg	228 12	0.16 4	0.0008
β− 3 max	760 30		
avg	260 12	0.100 20	0.0006
β− 4 max	1150 30		
avg	421 13	0.18 4	0.0016
β− 5 max	1300 30		
avg	484 14	0.66 8	0.0068
β− 6 max	1310 30		
avg	488 14	1.84 21	0.0191
β− 7 max	1960 30		
avg	781 14	0.29 4	0.0048
β− 8 max	2120 30		
avg	856 14	0.10 3	0.0018
β− 9 max	2260 30		
avg	923 14	2.25 25	0.0442
β−10 max	2490 30		
avg	1029 14	0.34 5	0.0075
β−11 max	2610 30		
avg	1086 15	62 7	1.43
β−12 max	2700 30		
avg	1129 15	0.17 4	0.0041
β−13 max	3460 30		
avg	1488 15	0.55 7	0.0174
β−14 max	3550 30		
avg	1533 15	0.14 6	0.0046
β−15 max	3650 30		
avg	1580 15	0.33 7	0.0111
β−16 max	3680 30		
avg	1593 15	0.19 4	0.0064
β−17 max	3710 30		
avg	1611 15	0.16 5	0.0055

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
β-18 max	3780 30		
avg	1640 15	0.19 7	0.0066
β-19 max	4390 30		
avg	1935 15	29 4	1.20
total β-			
avg	1317 17	99 8	2.78

4 weak β's omitted:
Eβ(avg) = 925.6; ΣIβ = 0.24%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
X-ray L	1.69	0.16 11	≈0
X-ray Kα₂	13.33580 2	1.7 11	0.0005
X-ray Kα₁	13.39530 2	3.2 21	0.0009
X-ray Kβ	15	0.8 6	0.0003
γ 1	106.05 3	0.38 5	0.0009
γ 3	120.92 3	2.7 4	0.0070
γ 4	121.82 3	32 4	0.0833
γ 7	227.76 8	0.119 17	0.0006
γ 8	234.44 3	2.5 3	0.0125
γ 9	242.19 3	9.6 11	0.0495
γ 10	249.32 3	1.28 17	0.0068
γ 12	309.07 9	0.131 18	0.0009
γ 13	356.00 20	0.10 4	0.0008
γ 14	386.48 9	0.123 17	0.0010
γ 17	419.12 5	0.31 4	0.0027
γ 18	429.93 14	0.14 4	0.0013
γ 19	433.47 5	1.25 14	0.0115
γ 22	470.34 8	0.23 3	0.0023
γ 23	476.10 11	0.127 18	0.0013
γ 24	492.63 5	1.16 13	0.0121
γ 25	498.59 12	0.145 19	0.0015
γ 27	539.49 4	29 4	0.339
γ 28	554.37 5	4.8 6	0.0573
γ 29	565.19 8	0.20 3	0.0024
γ 30	569.20 5	0.58 7	0.0070
γ 33	614.38 9	0.20 3	0.0026
γ 34	619.08 5	1.04 12	0.0137
γ 36	626.49 8	0.27 4	0.0036
γ 38	661.23 5	0.32 4	0.0045
γ 39	677.69 7	0.37 5	0.0053
γ 40	690.72 7	0.38 5	0.0056
γ 41	705.47 12	0.119 17	0.0018
γ 42	731.33 4	1.42 16	0.0221
γ 45	925.49 9	0.21 3	0.0042
γ 46	941.86 5	1.28 14	0.0257
γ 48	967.33 11	0.21 3	0.0042
γ 49	980.29 11	0.179 24	0.0037
γ 51	1039.11 8	0.40 5	0.0088
γ 52	1103.92 7	0.33 4	0.0077
γ 53	1118.69 5	37 4	0.889
γ 54	1165.56 6	0.79 9	0.0196
γ 55	1240.34 11	0.34 5	0.0089
γ 58	1309.68 10	0.26 4	0.0074
γ 59	1341.31 22	0.149 25	0.0043
γ 60	1386.62 15	0.19 3	0.0055
γ 61	1423.77 6	2.8 3	0.0852
γ 63	1466.26 15	0.23 3	0.0073
γ 65	1537.85 5	9.3 10	0.303
γ 66	1552.18 6	2.10 23	0.0694
γ 67	1620.22 22	0.145 22	0.0050
γ 68	1658.18 6	1.27 14	0.0448
γ 72	1780.04 6	6.4 7	0.243
γ 74	1885.42 15	0.22 3	0.0087
γ 75	1899.61 16	0.183 25	0.0074
γ 76	1980.99 15	0.164 21	0.0069
γ 77	2006.00 14	0.112 22	0.0048
γ 78	2127.52 7	1.32 15	0.0597
γ 79	2149.51 10	0.26 3	0.0121
γ 81	2191.46 25	0.108 16	0.0050
γ 84	2417.33 23	0.183 25	0.0094
γ 86	2432.78 21	0.145 22	0.0075
γ 87	2468.56 11	0.45 6	0.0235
γ 90	2726.68 11	0.84 10	0.0485
γ 92	2855.4 3	0.31 7	0.0188
γ 93	2865.73 21	0.179 24	0.0109
γ 100	3344.3 3	0.108 19	0.0077
γ 102	3855.3 4	0.116 17	0.0095

40 weak γ's omitted:
Eγ(avg) = 1518.8; ΣIγ = 1.81%

● ^{90}Rb β^- Decay (157 s 3) I (min) = 0.10%
Feeds ^{90}Sr

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
β- 1 max	731 15		
avg	246 6	0.20 8	0.0010
β- 2 max	930 15		
avg	326 7	0.44 12	0.0031
β- 3 max	1122 15		
avg	407 7	0.34 5	0.0029
β- 4 max	1220 15		
avg	450 7	0.52 5	0.0050
β- 5 max	1299 15		
avg	484 7	1.42 13	0.0146
β- 6 max	1366 15		
avg	513 7	4.9 4	0.0535
β- 7 max	1579 15		
avg	608 7	0.68 10	0.0088
β- 8 max	1634 15		
avg	633 7	0.37 4	0.0050
β- 9 max	1763 15		
avg	691 7	0.16 4	0.0024
β-10 max	1868 15		
avg	739 7	0.140 22	0.0022
β-11 max	1907 15		
avg	757 7	3.1 3	0.0500
β-12 max	1972 15		
avg	787 7	0.36 6	0.0060
β-13 max	2187 15		
avg	886 7	14.2 12	0.268
β-14 max	2417 15		
avg	994 7	8.5 8	0.180
β-15 max	2516 15		
avg	1040 7	1.35 13	0.0299
β-16 max	3170 15		
avg	1349 8	6.3 6	0.181
β-17 max	3514 15		
avg	1513 8	0.48 7	0.0155
β-18 max	4056 15		
avg	1772 8	0.15 8	0.0057
β-19 max	4661 15		
avg	2063 8	4.7 5	0.207
β-20 max	5721 15		
avg	2574 8	14.3 16	0.784
β-21 max	6553 15		
avg	2976 8	37 5	2.35
total β-			
avg	1963 11	100 6	4.17

3 weak β's omitted:
Eβ(avg) = 785.8; ΣIβ = 0.23%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
γ 8	824.23 10	0.75 8	0.0132
γ 9	831.69 5	33 3	0.578
γ 14	997.85 6	0.51 5	0.0107
γ 17	1038.63 7	0.35 3	0.0076
γ 18	1060.70 4	7.8 7	0.176
γ 20	1140.50 6	0.132 12	0.0032
γ 24	1302.2 3	0.117 19	0.0033
γ 25	1326.50 20	0.147 20	0.0041

(Continued)

^{90}Rb β^- Decay (157 s 3) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 26	1375.36 3	0.35 4	0.0102
γ 33	1590.3 3	0.156 24	0.0053
γ 34	1631.78 20	0.189 23	0.0066
γ 35	1665.61 7	0.37 3	0.0130
γ 36	1668.9 6	0.17 6	0.0059
γ 40	1804.10 7	0.67 6	0.0258
γ 41	1829.80 20	0.173 22	0.0067
γ 44	1892.28 8	0.44 4	0.0177
γ 49	2139.33 19	0.36 4	0.0165
γ 50	2148.2 3	0.24 4	0.0112
γ 51	2207.47 11	0.51 5	0.0238
γ 52	2216.29 15	0.59 6	0.0277
γ 53	2239.7 8	0.18 10	0.0086
γ 58	2473.90 20	0.68 9	0.0359
γ 59	2476.7 11	0.12 8	0.0064
γ 61	2688.9 5	0.14 3	0.0078
γ 62	2724.30 20	0.160 24	0.0093
γ 63	2789.1 22	0.10 7	0.0060
γ 65	2980.7 6	0.104 25	0.0066
γ 67	3039.17 12	0.82 8	0.0534
γ 68	3081.3 4	0.17 4	0.0113
γ 69	3205.09 16	0.55 6	0.0378
γ 70	3295.09 14	0.95 9	0.0668
γ 71	3303.91 13	0.98 9	0.0693
γ 72	3317.00 12	0.31 3	0.0221
γ 73	3361.88 13	1.08 10	0.0770
γ 74	3383.24 12	7.5 7	0.538
γ 75	3534.24 13	4.5 4	0.336
γ 76	3538.6 6	0.17 4	0.0130
γ 77	3627.4 7	0.14 6	0.0108
γ 79	3814.36 20	0.65 7	0.0524
γ 83	4061.7 3	0.264 21	0.0228
γ 84	4087.30 20	0.28 3	0.0247
γ 85	4135.51 17	7.5 7	0.658
γ 88	4332.10 20	0.43 4	0.0400
γ 89	4355.80 20	0.49 5	0.0457
γ 90	4365.90 18	8.8 8	0.822
γ 92	4599.4 3	0.166 19	0.0163
γ 94	4646.45 20	2.48 22	0.245
γ 99	4974.1 3	0.228 25	0.0242
γ 101	5070.2 3	0.160 13	0.0173
γ 102	5187.40 20	1.29 12	0.142
γ 103	5254.3 3	0.26 3	0.0288
γ 105	5333.00 20	0.48 5	0.0544

54 weak γ's omitted:
Eγ(avg)= 2427.7; ΣIγ= 2.59%

• ^{90}Rb IT Decay (258 s 4) I (min) = 0.10%
%IT Decay = 2.3 6
Feeds ^{90}Rb (157 s)
See also ^{90}Rb β^- Decay (258 s)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	1.68	2.2 5	≈0
Auger-K	11.4	0.56 15	0.0001
ce-K- 1	91.72 15	1.7 5	0.0033
ce-L- 1	104.85 15	0.34 9	0.0007
X-ray $K\alpha_2$	13.33580 2	0.33 9	≈0
X-ray $K\alpha_1$	13.39530 2	0.64 17	0.0002
X-ray Kβ	15	0.17 5	≈0
γ 1	106.92 15	0.20 6	0.0005

• ^{90}Rb β^- Decay (258 s 4) I (min) = 0.10%
%β^- Decay = 97.7 6
Feeds ^{90}Sr
See also ^{90}Rb IT Decay (258 s)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	832 15		
avg	286 7	1.27 25	0.0077
β- 2 max	875 15		
avg	304 7	0.35 11	0.0023
β- 3 max	1102 15		
avg	399 7	0.59 6	0.0050
β- 4 max	1374 15		
avg	517 7	1.66 11	0.0183
β- 5 max	1571 15		
avg	604 7	1.42 10	0.0183
β- 6 max	1619 15		
avg	626 7	6.2 3	0.0827
β- 7 max	1633 15		
avg	633 7	0.53 7	0.0071
β- 8 max	1713 15		
avg	668 7	0.51 10	0.0073
β- 9 max	1806 15		
avg	711 7	0.35 7	0.0053
β-10 max	1851 15		
avg	732 7	0.70 11	0.0109
β-11 max	1855 15		
avg	733 7	0.46 5	0.0072
β-12 max	1856 15		
avg	734 7	0.50 10	0.0078
β-13 max	2229 15		
avg	906 7	0.96 13	0.0185
β-14 max	2255 15		
avg	918 7	1.66 11	0.0325
β-15 max	2325 15		
avg	950 7	9.6 4	0.194
β-16 max	2467 15		
avg	1017 7	0.88 7	0.0191
β-17 max	2511 15		
avg	1038 7	16.2 6	0.358
β-18 max	2706 15		
avg	1129 7	0.80 22	0.0192
β-19 max	3075 15		
avg	1304 8	14.8 10	0.411
β-20 max	3210 15		
avg	1368 8	6.4 3	0.186
β-21 max	3515 15		
avg	1514 8	0.30 6	0.0097
β-22 max	3627 15		
avg	1567 8	1.03 10	0.0344
β-23 max	3732 15		
avg	1617 8	1.08 14	0.0372
β-24 max	4089 15		
avg	1789 8	1.38 12	0.0526
β-25 max	4132 15		
avg	1809 8	2.10 11	0.0809
β-26 max	4163 15		
avg	1821 8	0.87 22	0.0337
β-27 max	4453 15		
avg	1959 8	3.7 10	0.154
β-28 max	4768 15		
avg	2110 8	4.1 4	0.184
β-29 max	5004 15		
avg	2229 8	2.3 5	0.109
β-30 max	5828 15		
avg	2620 8	15 3	0.837
total β-			
avg	1419 10	98 4	2.95

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 1	196.8 4	0.30 6	0.0013
γ 2	314.5 3	0.84 6	0.0056
γ 4	442.3 4	0.12 3	0.0011
γ 5	522.10 13	0.41 3	0.0046
γ 6	551.2 3	0.87 7	0.0102
γ 7	720.70 9	0.57 4	0.0087
γ 10	779.9 4	0.28 6	0.0046
γ 11	824.23 10	7.5 5	0.131
γ 12	831.69 5	93 4	1.65
γ 13	872.00 15	0.54 4	0.0100
γ 15	921.20 20	0.23 4	0.0046
γ 16	952.44 7	1.73 8	0.0352
γ 19	1013.95 19	0.26 3	0.0056
γ 21	1027.1 4	0.14 3	0.0031
γ 22	1060.70 4	9.5 4	0.214
γ 24	1140.50 6	0.82 6	0.0199
γ 27	1242.84 4	3.12 20	0.0827
γ 28	1271.77 7	1.63 10	0.0442
γ 29	1298.5 5	0.21 4	0.0057
γ 31	1375.36 3	17.0 8	0.497
γ 32	1377.2 5	2.3 8	0.0684
γ 33	1391.6 3	0.45 8	0.0133
γ 34	1425.2 3	0.28 3	0.0085
γ 36	1456.7 3	0.26 7	0.0081
γ 37	1460.1 6	0.20 5	0.0061
γ 38	1485.6 7	0.21 7	0.0068
γ 39	1489.0 4	0.35 5	0.0112
γ 40	1576.9 7	0.12 4	0.0041
γ 41	1603.52 20	0.48 5	0.0162
γ 42	1658.9 3	0.45 6	0.0158
γ 43	1665.61 7	4.59 18	0.163
γ 44	1692.1 3	0.28 5	0.0101
γ 45	1696.16 7	1.70 8	0.0613
γ 46	1738.93 9	1.97 10	0.0728
γ 47	1747.3 3	0.26 4	0.0097
γ 49	1793.89 11	0.87 6	0.0331
γ 50	1838.15 14	0.85 7	0.0332
γ 51	1877.40 20	0.46 5	0.0183
γ 52	1892.28 8	0.65 7	0.0263
γ 53	1903.1 6	0.14 6	0.0057
γ 54	1941.81 17	0.63 6	0.0262
γ 55	2128.30 7	5.37 22	0.243
γ 56	2139.33 19	0.12 6	0.0055
γ 57	2200.9 3	0.49 6	0.0232
γ 58	2207.47 11	0.166 13	0.0078
γ 59	2245.2 9	0.30 18	0.0143
γ 60	2256.55 17	0.68 5	0.0327
γ 61	2298.1 9	0.38 20	0.0187
γ 62	2311.2 6	0.30 10	0.0147
γ 63	2335.2 10	0.21 9	0.0107
γ 64	2442.9 5	0.27 7	0.0141
γ 66	2497.27 15	0.74 8	0.0392
γ 67	2537.8 9	0.18 7	0.0096
γ 68	2543.9 3	0.57 7	0.0308
γ 69	2592.30 20	0.66 7	0.0365
γ 70	2617.8 3	0.63 9	0.0353
γ 71	2724.27 21	0.51 6	0.0297
γ 72	2741.0 12	0.15 8	0.0087
γ 73	2752.68 9	11.8 5	0.694
γ 74	2834.43 13	1.90 13	0.115
γ 75	2900.3 13	0.11 7	0.0069
γ 76	2911.7 11	0.13 7	0.0081
γ 77	3032.1 5	0.45 7	0.0289
γ 78	3039.17 12	0.271 22	0.0176
γ 79	3148.58 12	2.55 13	0.171
γ 80	3197.9 10	0.15 6	0.0102
γ 81	3214.5 11	0.14 6	0.0096
γ 82	3317.00 12	14.7 6	1.04
γ 83	3370.8 4	0.41 6	0.0294
γ 84	3383.24 12	0.429 19	0.0309
γ 85	3503.52 15	2.43 13	0.182
γ 87	3572.82 18	1.58 11	0.121
γ 88	3620.8 11	0.60 23	0.0460
γ 89	3627.4 7	0.9 4	0.0720
γ 91	3972.2 5	0.37 7	0.0315
γ 92	4115.6 4	0.36 6	0.0319
γ 93	4192.80 20	0.88 7	0.0782
γ 94	4209.5 3	0.93 9	0.0836
γ 95	4257.30 20	0.75 6	0.0685
γ 97	4454.07 21	1.21 9	0.115
γ 99	4726.1 7	0.11 3	0.0113

19 weak γ's omitted:
Eγ(avg) = 2072.2; ΣIγ = 0.83%

• ^{90}Sr β^- Decay (28.6 y 3) I(min) = 0.10%
Feeds ^{90}Y (64.1 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	546.0 20		
avg	195.8 8	100	0.417

• ^{90}Y β^- Decay (64.1 h 1) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	2283.9 25		
avg	934.8 12	99.988 1	1.99

1 weak β's omitted:
Eβ(avg) = 186.5; ΣIβ = 0.01%

• ^{90}Y IT Decay (3.19 h 1) I(min) = 0.10%
Feeds ^{90}Y (64.1 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2	11.8 7	0.0005
Auger-K	12.7	2.9 4	0.0008
ce-K- 1	185.47 3	2.65 15	0.0105
ce-L- 1	200.14 3	0.307 20	0.0013
ce-MNO- 1	202.12 3	0.102 7	0.0004
ce-K- 2	462.49 4	7.32 22	0.0721
ce-L- 2	477.16 4	1.03 3	0.0104
ce-MNO- 2	479.14 4	0.338	0.0035
X-ray L	2	0.27 9	≈0
X-ray Kα$_2$	14.88290 2	2.05 11	0.0006
X-ray Kα$_1$	14.95840 2	3.95 21	0.0013
X-ray Kβ	16.7	1.09 6	0.0004
γ 1	202.51 3	96.6 4	0.417
γ 2	479.53 4	90.99 24	0.929
γ 3	682	0.32 3	0.0046

• ^{90}Nb β^+ Decay (14.60 h 15) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2	77 5	0.0033
Auger-K	13.4	17.8 23	0.0051
ce-K- 1	114.60 3	8.7 23	0.0212
ce-K- 2	123.151 20	18.6 12	0.0489
ce-L- 1	130.07 3	2.6 6	0.0071
ce-MNO- 1	132.17 3	0.53 11	0.0015
ce-L- 2	138.617 20	2.77 18	0.0082
ce-MNO- 2	140.719 20	0.56 3	0.0017

(Continued)

^{90}Nb β^+ Decay (14.60 h 15) *(Continued)*

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β+ 1 max	1500 4		
avg	662.2 18	53 3	0.748

3 weak β's omitted:
Eβ(avg) = 363.3; ΣIβ = 0.08%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	2	2.2 8	≈0
X-ray $K\alpha_2$	15.69090 2	13.9 9	0.0046
X-ray $K\alpha_1$	15.77510 2	26.6 17	0.0090
X-ray Kβ	17.7	7.5 5	0.0028
γ 1	132.60 3	4.1 4	0.0117
γ 2	141.149 20	69 4	0.207
γ 3	329.10 15	0.110 19	0.0008
γ 5	371.28 7	1.90 14	0.0150
γ 7	518.22 25	0.49 10	0.0054
γ 8	561.52 8	0.129 19	0.0015
γ 10	827.71 8	0.90 8	0.0159
γ 11	890.60 8	1.73 12	0.0328
γ 12	1051.67 12	0.23 3	0.0052
γ 13	1129.14 8	92.0 9	2.21
γ 14	1270.41 12	1.21 9	0.0329
γ 15	1470.40 20	0.42 6	0.0133
γ 16	1575.00 20	0.47 6	0.0157
γ 17	1611.80 15	2.21 19	0.0758
γ 18	1658.0 3	0.31 5	0.0110
γ 19	1716.40 20	0.52 5	0.0192
γ 20	1843.30 20	0.65 7	0.0256
γ 21	1913.30 20	1.23 13	0.0502
γ 22	1984.7 3	0.63 8	0.0268
γ 24	2056.3 4	0.11 3	0.0048
γ 25	2186.40 20	18.0 10	0.840
γ 26	2222.5 3	0.63 8	0.0296
γ 27	2319.20 20	82.0 9	4.05

5 weak γ's omitted:
Eγ(avg) = 1272.6; ΣIγ = 0.16%
Maximum γ±-intensity = 106.16%

• ^{91}Sr β^- Decay (9.5 h 2) I (min) = 0.10%
% Feeding to ^{91}Y (58.51 d) = 42.6 16
% Feeding to ^{91}Y (49.71 m) = 57.4 16

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	405 4		
avg	122.9 14	0.231 10	0.0006
β- 2 max	477 4		
avg	148.8 15	1.44 5	0.0046
β- 3 max	617 4		
avg	200.9 16	2.02 6	0.0086
β- 4 max	704 4		
avg	234.3 16	0.361 12	0.0018
β- 5 max	1104 4		
avg	398.9 17	33.9 10	0.288
β- 6 max	1138 4		
avg	413.4 18	1.77 6	0.0156
β- 7 max	1210 4		
avg	444.5 18	0.185 9	0.0018
β- 8 max	1379 4		
avg	518.0 18	24.4 8	0.269
β- 9 max	1497 4		
avg	570.5 18	0.643 24	0.0078
β-10 max	2031 4		
avg	812.9 19	3.3 4	0.0571
β-11 max	2684 4		
avg	1121.2 19	30.8 4	0.736
total β- avg	658.5 23	99.2 14	1.39

3 weak β's omitted:
Eβ(avg) = 110.2; ΣIβ = 0.13%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 2	261.20 20	0.435 14	0.0024
γ 3	272.7 4	0.25 4	0.0015
γ 4	274.70 20	1.00 4	0.0059
γ 6	379.90 10	0.143 6	0.0012
γ 14	620.10 10	1.72 6	0.0228
γ 16	631.30 10	0.539 18	0.0073
γ 17	652.3 3	2.89 19	0.0402
γ 18	652.90 20	7.8 4	0.108
γ 19	653.0 20	0.45 7	0.0063
γ 21	749.80 10	23.0 7	0.367
γ 22	761.40 10	0.559 19	0.0091
γ 24	820.80 20	0.156 6	0.0027
γ 26	879.70 10	0.182 6	0.0034
γ 29	925.80 20	3.74 11	0.0737
γ 32	1024.30 10	32.5 9	0.709
γ 33	1054.60 10	0.218 7	0.0049
γ 34	1140.80 10	0.123 5	0.0030
γ 35	1280.90 10	0.91 3	0.0247
γ 39	1413.40 10	0.95 3	0.0287
γ 40	1473.80 10	0.162 6	0.0051
γ 46	1651.4 5	0.283 9	0.0099
γ 47	1724.0 5	0.156 6	0.0057

27 weak γ's omitted:
Eγ(avg) = 776.3; ΣIγ = 1.19%

• ^{91}Y β^- Decay (58.51 d 6) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	338.1 22		
avg	99.9 8	0.30 3	0.0006
β- 2 max	1543.0 20		
avg	603.8 9	99.70 3	1.28
total β- avg	602.3 9	100.00 5	1.28
γ 1	1204.9 8	0.30 3	0.0077

• ^{91}Y IT Decay (49.71 m 4) I (min) = 0.10%
Feeds ^{91}Y (58.51 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2	5.0 3	0.0002
Auger-K	12.7	1.21 14	0.0003
ce-K- 1	540.53 5	4.17 12	0.0480
ce-L- 1	555.20 5	0.561 17	0.0066
ce-MNO- 1	557.18 5	0.185 6	0.0022
X-ray L	2	0.11 4	≈0
X-ray $K\alpha_2$	14.88290 2	0.86 5	0.0003
X-ray $K\alpha_1$	14.95840 2	1.65 9	0.0005
X-ray Kβ	16.7	0.45 3	0.0002
γ 1	557.57 5	95.08 14	1.13

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)

● ^{91}Nb EC Decay (~1E4 y) I (min) = 0.10%

Auger-L	2	100 6	0.0043
Auger-K	13.4	23 3	0.0067
β+ 1 max	234 3		
avg	108.7 12	0.164 8	0.0004
X-ray L	2	2.8 10	0.0001
X-ray Kα₂	15.69090 2	18.3 9	0.0061
X-ray Kα₁	15.77510 2	35.2 16	0.0118
X-ray Kβ	17.7	9.9 5	0.0037

Maximum γ±-intensity = 0.33%

● ^{91}Nb EC Decay (61 d) I (min) = 0.10%
%EC Decay = 3.5
See also ^{91}Nb IT Decay (61 d)

Auger-L	2	3.48 18	0.0001
Auger-K	13.4	0.80 10	0.0002
X-ray Kα₂	15.69090 2	0.63 3	0.0002
X-ray Kα₁	15.77510 2	1.20 6	0.0004
X-ray Kβ	17.7	0.338 16	0.0001
γ 1	1204.9 8	3.5	0.0898

● ^{91}Nb IT Decay (61 d) I (min) = 0.10%
%IT Decay = 96.5
Feeds ^{91}Nb (1E4 y)
See also ^{91}Nb EC Decay (61 d)

Auger-L	2.15	91 4	0.0042
Auger-K	14	16.5 21	0.0049
ce-K- 1	85.51 10	65.6 7	0.120
ce-L- 1	101.80 10	24.7 6	0.0536
ce-M- 1	104.03 10	4.73 14	0.0105
ce-NOP- 1	104.44 10	0.86 3	0.0019
X-ray L	2.17	2.8 10	0.0001
X-ray Kα₂	16.52100 2	14.1 7	0.0050
X-ray Kα₁	16.61510 2	27.1 13	0.0096
X-ray Kβ	18.6	7.8 4	0.0031
γ 1	104.50 10	0.578 18	0.0013

● ^{91}Mo β+ Decay (15.49 m 1) I (min) = 0.10%
% Feeding to ^{91}Nb (1E4 y) = 99.9658 22

Auger-L	2.15	6.2 4	0.0003
Auger-K	14	1.37 18	0.0004
β+ 1 max	1779 13		
avg	790 6	0.224 12	0.0038
β+ 2 max	1835 13		
avg	815 6	0.147 10	0.0026
β+ 3 max	3416 13		
avg	1553 7	93.36 10	3.09
total β+			
avg	1549 7	93.78 11	3.10

9 weak β's omitted:
Eβ(avg) = 609.3; ΣIβ = 0.05%

X-ray L	2.17	0.19 7	≈0
X-ray Kα₂	16.52100 2	1.17 6	0.0004
X-ray Kα₁	16.61510 2	2.25 11	0.0008
X-ray Kβ	18.6	0.65 3	0.0003
γ 6	1581.50 10	0.226 14	0.0076
γ 8	1637.30 10	0.329 17	0.0115
γ 13	2632.10 20	0.118 7	0.0066

18 weak γ's omitted:
Eγ(avg) = 2233.2; ΣIγ = 0.30%
Maximum γ±-intensity =187.57%

● ^{92}Sr β⁻ Decay (2.71 h 1) I (min) = 0.10%
Feeds ^{92}Y

β- 1 max	550 30		
avg	174 12	96 11	0.356
β- 2 max	980 30		
avg	345 13	0.3 3	0.0022
β- 3 max	1040 30		
avg	371 13	0.21 6	0.0017
β- 4 max	1930 30		
avg	777 14	4 4	0.0662
total β-			
avg	199 14	101 12	0.426
γ 1	241.52 3	3.0 4	0.0153
γ 3	430.56 5	3.3 5	0.0305
γ 4	491.30 20	0.26 5	0.0027
γ 5	650.70 20	0.37 5	0.0051
γ 7	953.32 9	3.6 5	0.0731
γ 8	1142.30 10	2.9 4	0.0701
γ 9	1383.94 6	90 10	2.65

2 weak γ's omitted:
Eγ(avg) = 664.6; ΣIγ = 0.17%

● ^{92}Y β⁻ Decay (3.54 h 1) I (min) = 0.10%

β- 1 max	814 16		
avg	278 7	0.100 13	0.0006
β- 2 max	1294 16		
avg	480 7	6.5 7	0.0665
β- 3 max	1567 16		
avg	601 8	0.24 3	0.0031
β- 4 max	1787 16		
avg	700 8	0.43 8	0.0064
β- 5 max	2138 16		
avg	869 8	1.16 20	0.0215
β- 6 max	2251 16		
avg	920 8	2.3 3	0.0451
β- 7 max	2700 16		
avg	1123 8	3.4 10	0.0813
β- 8 max	3634 16		
avg	1563 8	85.7 16	2.85
total β-			
avg	1447 9	99.9 21	3.08

4 weak β's omitted:
Eβ(avg) = 183.4; ΣIβ = 0.04%

(Continued)

^{92}Y β^- Decay (3.54 h 1) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 1	448.50 10	2.3 3	0.0223
γ 2	492.60 10	0.49 6	0.0051
γ 3	561.10 10	2.4 3	0.0287
γ 4	844.30 10	1.25 15	0.0225
γ 5	912.60 20	0.63 8	0.0122
γ 6	934.46 7	13.9 16	0.277
γ 8	1132.40 10	0.24 3	0.0059
γ 9	1405.40 10	4.8 6	0.143
γ 10	1847.30 10	0.36 4	0.0142

10 weak γ's omitted:
Eγ(avg) = 1647.2; ΣIγ = 0.15%

• ^{92}Nb EC Decay (3.6E7 y 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2	100 6	0.0043
Auger-K	13.4	23 3	0.0067
ce-K- 1	543.10 10	0.261 8	0.0030
X-ray L	2	2.8 10	0.0001
X-ray Kα₂	15.69090 2	18.3 9	0.0061
X-ray Kα₁	15.77510 2	35.2 16	0.0118
X-ray Kβ	17.7	9.9 5	0.0037
γ 1	561.10 10	99.699 9	1.19
γ 2	934.46 7	99.921 2	1.99

• ^{92}Nb EC Decay (10.15 d 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2	100 6	0.0043
Auger-K	13.4	23 3	0.0067

1 weak β's omitted:
Eβ(avg) = 88.7; ΣIβ = 0.06%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	2	2.8 10	0.0001
X-ray Kα₂	15.69090 2	18.3 9	0.0061
X-ray Kα₁	15.77510 2	35.3 16	0.0119
X-ray Kβ	17.7	9.9 5	0.0037
γ 1	912.60 20	1.68 9	0.0326
γ 2	934.46 7	99.15 4	1.97
γ 3	1847.30 10	0.85 4	0.0336

• ^{93}Sr β^- Decay (7.3 m 3) I (min) = 0.10%
Feeds ^{93}Y

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2	17.1 13	0.0007
Auger-K	12.7	3.9 5	0.0011
ce-K- 2	151.65 5	13.3 9	0.0431
ce-L- 2	166.32 5	2.91 19	0.0103
ce-MNO- 2	168.30 5	0.96 6	0.0034
ce-K- 24	573.24 5	0.130 13	0.0016
β- 1 max	120 120		
avg	30 40	0.50 4	0.0003
β- 2 max	260 120		
avg	70 40	0.140 20	0.0002
β- 3 max	490 120		
avg	150 50	0.24 4	0.0008
β- 4 max	510 120		
avg	160 50	0.19 3	0.0006
β- 5 max	560 120		
avg	180 50	0.20 4	0.0008
β- 6 max	1260 120		
avg	470 60	0.38 4	0.0038
β- 7 max	1370 120		
avg	520 60	1.32 8	0.0146
β- 8 max	1490 120		
avg	570 60	1.28 7	0.0155
β- 9 max	1560 120		
avg	600 60	3.77 22	0.0482
β-10 max	1600 120		
avg	610 60	3.12 14	0.0405
β-11 max	1610 120		
avg	620 60	7.6 3	0.100
β-12 max	1600 120		
avg	620 60	0.10 4	0.0013
β-13 max	1690 120		
avg	660 60	17.9 5	0.252
β-14 max	1800 120		
avg	710 60	11.3 4	0.171
β-15 max	1810 120		
avg	710 60	11.5 5	0.174
β-16 max	1840 120		
avg	720 60	3.78 21	0.0580
β-17 max	2020 120		
avg	810 60	1.14 8	0.0197
β-18 max	2020 120		
avg	810 60	2.01 10	0.0347
β-19 max	2250 120		
avg	910 60	0.36 17	0.0070
β-20 max	2470 120		
avg	1020 60	1.46 20	0.0317
β-21 max	2590 120		
avg	1070 60	0.25 10	0.0057
β-22 max	2680 120		
avg	1120 60	0.35 4	0.0083
β-23 max	2730 120		
avg	1140 60	15.5 13	0.376
β-24 max	3070 120		
avg	1300 60	1.44 25	0.0399
β-25 max	3080 120		
avg	1300 60	3.9 13	0.108
β-26 max	3100 120		
avg	1320 60	0.44 11	0.0124
β-27 max	3240 120		
avg	1380 60	2.3 5	0.0676
β-28 max	3500 120		
avg	1510 60	2.2 15	0.0708
β-29 max	3620 120		
avg	1560 60	7.1 23	0.236
total β-			
avg	880 80	102 4	1.90
X-ray L	2	0.38 13	≈0
X-ray Kα₂	14.88290 2	2.77 22	0.0009
X-ray Kα₁	14.95840 2	5.3 5	0.0017
X-ray Kβ	16.7	1.47 12	0.0005
γ 1	166.6 3	0.62 17	0.0022
γ 2	168.69 5	18.2 11	0.0654
γ 3	260.12 5	7.3 5	0.0406
γ 4	285.65 7	0.269 21	0.0016
γ 5	332.04 7	0.35 3	0.0025
γ 7	346.49 5	3.24 18	0.0239
γ 8	377.36 6	1.46 10	0.0118
γ 9	406.71 10	0.42 4	0.0037
γ 10	424.70 13	0.26 4	0.0023
γ 11	428.03 21	0.15 3	0.0013
γ 12	432.67 6	1.46 9	0.0135
γ 13	440.80 18	0.19 4	0.0018
γ 14	446.20 6	2.33 14	0.0222

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 15	481.96 10	1.12 11	0.0115
γ 16	483.73 8	1.65 13	0.0170
γ 17	486.7 4	0.12 5	0.0013
γ 18	518.50 15	0.128 21	0.0014
γ 19	541.89 6	0.72 5	0.0083
γ 20	545.81 7	0.39 3	0.0045
γ 21	559.92 8	0.202 21	0.0024
γ 22	571.96 16	0.21 3	0.0025
γ 23	586.5 4	0.44 16	0.0055
γ 24	590.28 5	67.2 12	0.845
γ 25	593.81 18	1.10 15	0.0139
γ 26	596.15 13	1.32 15	0.0167
γ 27	610.93 6	1.08 7	0.0140
γ 28	630.97 16	0.19 3	0.0026
γ 29	633.5 3	0.108 21	0.0015
γ 30	650.56 15	0.188 21	0.0026
γ 31	658.56 11	0.42 4	0.0058
γ 32	663.58 6	1.63 10	0.0230
γ 33	687.79 11	0.66 7	0.0096
γ 34	690.06 12	1.00 9	0.0147
γ 35	692.0 4	0.22 6	0.0033
γ 36	710.40 5	21.5 12	0.325
γ 37	716.8 5	0.29 16	0.0044
γ 38	718.33 12	1.48 21	0.0226
γ 40	771.19 6	1.15 7	0.0189
γ 41	776.07 13	0.26 3	0.0043
γ 42	782.83 15	0.22 3	0.0036
γ 44	788.68 8	0.76 5	0.0128
γ 45	791.10 14	0.26 3	0.0043
γ 46	795.29 12	0.228 21	0.0039
γ 48	834.89 5	1.65 9	0.0294
γ 49	837.85 19	0.116 17	0.0021
γ 50	858.47 7	0.72 5	0.0131
γ 51	875.73 6	24.2 14	0.451
γ 52	888.13 5	21.8 12	0.413
γ 53	900.98 7	0.69 5	0.0132
γ 54	910.18 8	0.81 5	0.0158
γ 55	922.70 11	0.33 3	0.0065
γ 56	927.69 8	0.63 5	0.0125
γ 57	930.91 10	0.40 4	0.0080
γ 58	952.58 23	0.108 21	0.0022
γ 59	991.59 21	0.121 21	0.0026
γ 60	1032.4 5	0.10 4	0.0022
γ 61	1035.5 3	0.20 4	0.0044
γ 62	1040.63 6	3.16 21	0.0700
γ 65	1055.13 11	0.34 3	0.0077
γ 66	1064.37 9	0.37 3	0.0084
γ 67	1077.86 16	0.24 3	0.0054
γ 68	1094.00 7	1.74 11	0.0406
γ 69	1104.69 23	0.15 3	0.0035
γ 71	1122.48 6	3.96 21	0.0948
γ 72	1136.77 20	0.195 21	0.0047
γ 73	1180.76 17	0.24 3	0.0061
γ 74	1196.23 6	0.97 6	0.0247
γ 76	1215.48 7	2.47 14	0.0639
γ 77	1239.15 25	0.12 3	0.0032
γ 78	1243.41 8	0.79 5	0.0210
γ 81	1266.38 10	1.10 9	0.0297
γ 82	1269.47 7	7.1 4	0.191
γ 83	1277.99 9	0.86 7	0.0234
γ 84	1308.60 9	0.40 3	0.0111
γ 85	1321.24 7	2.58 14	0.0726
γ 88	1332.5 5	0.5 3	0.0134
γ 89	1334.50 10	0.67 5	0.0191
γ 90	1378.98 10	0.35 3	0.0103
γ 91	1387.11 7	3.43 21	0.101
γ 92	1434.01 8	0.89 6	0.0273
γ 93	1438.93 9	0.50 4	0.0152
γ 94	1466.2 3	0.101 21	0.0031
γ 95	1469.50 12	0.52 4	0.0162
γ 96	1483.3 3	0.101 21	0.0032
γ 97	1492.13 12	0.54 4	0.0173
γ 100	1520.1 5	0.32 7	0.0102
γ 101	1538.71 25	0.101 21	0.0033
γ 103	1551.59 9	1.01 7	0.0333
γ 104	1609.77 20	0.195 21	0.0067
γ 105	1634.05 8	1.43 9	0.0498
γ 107	1647.53 8	0.88 6	0.0309
γ 109	1668.7 5	0.16 9	0.0057
γ 110	1684.84 13	0.71 6	0.0253
γ 111	1694.07 9	2.55 15	0.0921
γ 112	1699.06 9	3.29 21	0.119
γ 113	1706.59 10	1.10 7	0.0398
γ 115	1765.36 9	1.06 6	0.0397
γ 116	1774.83 16	0.161 21	0.0061
γ 118	1811.45 10	1.39 9	0.0537
γ 119	1816.12 19	0.23 3	0.0088
γ 120	1894.1 3	0.121 21	0.0049
γ 122	1907.73 23	0.175 21	0.0071
γ 123	1928.79 10	1.16 7	0.0475
γ 125	1944.75 12	0.55 5	0.0228
γ 131	2010.80 25	0.120 17	0.0052
γ 132	2054.68 25	0.134 21	0.0059
γ 133	2063.64 12	0.62 5	0.0272
γ 136	2104.78 15	0.31 3	0.0139
γ 138	2129.2 5	0.10 4	0.0046
γ 140	2179.49 20	0.29 4	0.0134
γ 143	2230.27 12	1.53 9	0.0728
γ 144	2296.13 14	0.73 5	0.0358
γ 145	2364.72 11	1.56 9	0.0785
γ 146	2416.3 3	0.108 21	0.0055
γ 148	2543.84 11	2.99 17	0.162
γ 149	2574.2 3	0.128 21	0.0070
γ 152	2688.65 12	2.10 13	0.120
γ 156	2828.54 20	0.169 17	0.0102
γ 158	2985.72 21	0.19 3	0.0124
γ 160	3006.86 22	0.116 12	0.0074

41 weak γ's omitted:
Eγ(avg) = 1801.5; ΣIγ = 2.30%

● ^{93}Y β^- Decay (10.1 h 2) I (min) = 0.10%
Feeds ^{93}Zr

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2	0.16 3	≈0
ce-K- 1	248.90 10	0.15 3	0.0008
β- 1 max	432 20		
avg	132 8	0.187 11	0.0005
β- 2 max	705 20		
avg	235 8	1.60 8	0.0080
β- 3 max	1420 20		
avg	535 9	0.145 9	0.0017
β- 4 max	1440 20		
avg	544 9	0.377 20	0.0044
β- 5 max	1465 20		
avg	555 9	0.266 14	0.0031
β- 6 max	1943 20		
avg	771 10	2.51 12	0.0412
β- 7 max	2623 20		
avg	1087 10	4.6 4	0.107
β- 8 max	2890 20		
avg	1214 10	90.2 5	2.33
total β- avg	1173 11	100.0 7	2.50

4 weak β's omitted:
Eβ(avg) = 310.5; ΣIβ = 0.12%

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
^{93}Y β^- Decay (10.1 h 2) (Continued)			
γ 1	266.90 10	6.9 4	0.0389
γ 2	680.20 10	0.61 3	0.0088
γ 4	947.10 10	1.95 11	0.0393
γ 11	1203.30 10	0.103 7	0.0026
γ 13	1425.40 10	0.238 14	0.0072
γ 14	1450.50 10	0.336 19	0.0104
γ 19	1917.80 10	1.40 8	0.0574
γ 20	2184.60 10	0.155 13	0.0072
γ 21	2190.80 10	0.171 11	0.0080

14 weak γ's omitted:
Eγ(avg) = 1413.3; ΣIγ = 0.33%

• **^{93}Zr β^- Decay (1.53E6 y 10)** I (min) = 0.10%
Feeds ^{93}Nb (14.6 y)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β− 1 max	61.5 19		
avg	19.5 7	100	0.0415

• **^{93}Nb IT Decay (14.6 y 13)** I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	2.15	79.4 15	0.0036
ce-K- 1	11.784 20	15.0 4	0.0038
Auger-K	14	3.8 5	0.0011
ce-L- 1	28.072 20	66.1 7	0.0395
ce-M- 1	30.302 20	14.2 4	0.0092
ce-NOP- 1	30.712 20	4.69 13	0.0031
X-ray L	2.17	2.5 9	0.0001
X-ray $K\alpha_2$	16.52100 2	3.23 17	0.0011
X-ray $K\alpha_1$	16.61510 2	6.2 4	0.0022
X-ray Kβ	18.6	1.78 10	0.0007

• **^{93}Mo EC Decay (3.5E3 y 7)** I (min) = 0.10%
Feeds ^{93}Nb (14.6 y)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	2.15	98 5	0.0045
Auger-K	14	21 3	0.0063
X-ray L	2.17	3.0 11	0.0001
X-ray $K\alpha_2$	16.52100 2	18.1 9	0.0064
X-ray $K\alpha_1$	16.61510 2	34.8 16	0.0123
X-ray Kβ	18.6	10.0 5	0.0040

• **^{94}Nb β^- Decay (2.03E4 y 16)** I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	2.27	0.159 11	≈0
ce-K- 1	682.627 19	0.161 5	0.0023
β− 1 max	471 3		
avg	145.8 10	100	0.311
γ 1	702.627 19	100	1.50
γ 2	871.099 18	100	1.86

• **^{94}Nb IT Decay (6.26 m 1)** I (min) = 0.10%
%IT Decay = 99.53 9
Feeds ^{94}Nb (2.03E4 y)
See also ^{94}Nb β^- Decay (6.26 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	2.15	91 4	0.0042
Auger-K	14	14.4 19	0.0043
ce-K- 1	21.96 4	57.1 7	0.0267
ce-L- 1	38.25 4	33.6 7	0.0274
ce-MNO- 1	40.48 4	8.71 24	0.0075
X-ray L	2.17	2.8 10	0.0001
X-ray $K\alpha_2$	16.52100 2	12.3 6	0.0043
X-ray $K\alpha_1$	16.61510 2	23.6 11	0.0084
X-ray Kβ	18.6	6.8 4	0.0027

1 weak γ's omitted:
Eγ(avg) = 41.0; ΣIγ = 0.08%

• **^{94}Nb β^- Decay (6.26 m 1)** I (min) = 0.10%
%β^- Decay = 0.47 9
See also ^{94}Nb IT Decay (6.26 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β− 1 max	1215 3		
avg	444.0 12	0.47 9	0.0044
γ 2	871.099 18	0.47 9	0.0087

• **^{95}Zr β^- Decay (64.02 d 4)** I (min) = 0.10%
% Feeding to ^{95}Nb (35.06 d) = 99.22 4
% Feeding to ^{95}Nb (86.6 h) = 0.78 4

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β− 1 max	366 3		
avg	109.3 10	55.4 11	0.129
β− 2 max	399 3		
avg	120.4 10	43.7 8	0.112
β− 3 max	887 3		
avg	327.0 11	0.78 4	0.0054
β− 4 max	1123 3		
avg	405.4 12	0.10 3	0.0009
total β−			
avg	116.1 11	100.0 14	0.247
γ 2	724.184 12	43.7 8	0.673
γ 3	756.715 15	55.3 11	0.892

• **^{95}Nb β^- Decay (35.06 d 9)** I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	2.27	0.126 9	≈0
ce-K- 3	745.790 10	0.128 4	0.0020
β− 1 max	159.8 5		
avg	43.35 15	99.970 5	0.0923

1 weak β's omitted:
Eβ(avg) = 321.9; ΣIβ = 0.03%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
γ 3	765.790 10	99.808 6	1.63

2 weak γ's omitted:
Eγ(avg) = 389.2; ΣIγ = 0.03%

● ^{95}Nb IT Decay (86.6 h 8) I (min) = 0.10%
%IT Decay = 94.5 4
Feeds ^{95}Nb (35.06 d)
See also ^{95}Nb β^- Decay (86.6 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	2.15	67 4	0.0030
Auger-K	14	13.8 18	0.0041
ce-K- 1	216.704 20	54.9 7	0.253
ce-L- 1	232.992 20	11.0 3	0.0544
ce-MNO- 1	235.222 20	3.62 11	0.0181
X-ray L	2.17	2.1 7	≈0
X-ray Kα$_2$	16.52100 2	11.8 6	0.0042
X-ray Kα$_1$	16.61510 2	22.7 11	0.0080
X-ray Kβ	18.6	6.5 4	0.0026
γ 1	235.690 20	25.0 6	0.126

● ^{95}Nb β^- Decay (86.6 h 8) I (min) = 0.10%
%β^- Decay = 5.5 4
See also ^{95}Nb IT Decay (86.6 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	957.2 5		
avg	334.97 21	0.134 12	0.0010
β- 2 max	1161.3 5		
avg	437.80 21	5.4 4	0.0504
total β-			
avg	435.08 21	5.5 4	0.0513
γ 1	204.117 5	0.130 11	0.0006

● ^{95}Tc EC Decay (20.0 h 5) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	2.27	96 6	0.0047
Auger-K	14.8	20 3	0.0065
ce-K- 9	745.790 10	0.120 4	0.0019
X-ray L	2.29	4.0 14	0.0002
X-ray Kα$_2$	17.3743 14	19.1 9	0.0071
X-ray Kα$_1$	17.47930 1	36.5 16	0.0136
X-ray Kβ	19.6	10.7 5	0.0045
γ 3	204.117 5	0.31 4	0.0013
γ 8	604.040 20	0.304 9	0.0039
γ 9	765.790 10	93.82 20	1.53
γ 11	785.930 20	0.145 9	0.0024
γ 13	869.60 3	0.317 8	0.0059
γ 14	947.670 20	1.951 19	0.0394
γ 16	1073.710 20	3.74 4	0.0856

14 weak γ's omitted:
Eγ(avg) = 693.7; ΣIγ = 0.15%

● ^{95}Tc EC Decay (61 d 2) I (min) = 0.10%
%EC Decay = 96
See also ^{95}Tc IT Decay (61 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	2.27	95 6	0.0046
Auger-K	14.8	20 3	0.0064
ce-K- 1	184.117 5	2.81 12	0.0110
ce-L- 1	201.251 5	0.359 16	0.0015
ce-MNO- 1	203.612 5	0.118 5	0.0005
β+ 1 max	513 8		
avg	230 4	0.234 18	0.0011
β+ 2 max	717 8		
avg	341 4	0.28 5	0.0020
total β+			
avg	290 5	0.51 6	0.0032
X-ray L	2.29	4.0 13	0.0002
X-ray Kα$_2$	17.3743 14	18.8 10	0.0070
X-ray Kα$_1$	17.47930 1	36.0 19	0.0134
X-ray Kβ	19.6	10.6 6	0.0044
γ 1	204.117 5	61.9 19	0.269
γ 3	252.950 10	0.598 19	0.0032
γ 6	582.070 10	29.3 9	0.364
γ 7	616.490 20	1.26 4	0.0165
γ 8	786.184 17	8.5 3	0.142
γ 10	820.610 10	4.61 14	0.0806
γ 11	835.130 10	26.1 8	0.464
γ 13	1039.250 20	2.72 9	0.0602

12 weak γ's omitted:
Eγ(avg) = 883.1; ΣIγ = 0.13%
Maximum γ±-intensity = 1.03%

● ^{95}Tc IT Decay (61 d 2) I (min) = 0.10%
%IT Decay = 4
Feeds ^{95}Tc (20.0 h)
See also ^{95}Tc EC Decay (61 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	2.17	3.25 8	0.0002
Auger-K	15.5	0.20 3	≈0
ce-K- 1	17.86 10	0.908 20	0.0003
ce-L- 1	35.86 10	2.49 3	0.0019
ce-MNO- 1	38.36 10	0.728 16	0.0006
X-ray L	2.42	0.15 6	≈0
X-ray Kα$_2$	18.2508 8	0.203 10	≈0
X-ray Kα$_1$	18.3671 8	0.388 19	0.0002
X-ray Kβ	20.6	0.116 6	≈0

● ^{96}Nb β^- Decay (23.35 h 5) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	2.27	0.51 4	≈0
Auger-K	14.8	0.123 17	≈0
ce-K- 5	199.10 20	0.100 6	0.0004
ce-K- 21	440.03 6	0.150 7	0.0014
ce-K- 25	548.86 6	0.150 11	0.0018
ce-K- 31	758.220 20	0.120 4	0.0019
β- 1 max	312 4		
avg	90.7 14	0.59 6	0.0011
β- 2 max	432 4		
avg	131.8 14	0.65 9	0.0018
β- 3 max	746 4		
avg	249.7 16	2.8 5	0.0149
β- 4 max	749 4		
avg	250.6 16	95.9 5	0.512
total β-			
avg	248.8 16	100.0 8	0.530

1 weak β's omitted:
Eβ(avg) = 59.0; ΣIβ = 0.02%

(Continued)

^{96}Nb β^- Decay (23.35 h 5) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray $K\alpha_2$	17.3743 14	0.114 6	≈0
X-ray $K\alpha_1$	17.47930 1	0.219 12	≈0
γ 5	219.10 20	3.78 20	0.0176
γ 8	241.40 20	3.87 20	0.0199
γ 12	349.90 20	0.73 8	0.0054
γ 13	350.32 15	1.11 12	0.0083
γ 14	352.50 15	0.82 10	0.0062
γ 15	369.67 12	0.12 6	0.0009
γ 16	371.81 10	2.81 20	0.0222
γ 19	434.71 5	0.53 6	0.0049
γ 21	460.03 6	28.2 10	0.276
γ 22	477.67 6	0.12 6	0.0012
γ 23	480.68 8	6.3 4	0.0644
γ 25	568.86 6	55.7 20	0.674
γ 27	591.20 15	0.97 20	0.0122
γ 28	593.30 20	0.31 8	0.0039
γ 29	719.55 5	7.3 4	0.111
γ 30	721.5 3	0.8 3	0.0119
γ 31	778.220 20	96.80 20	1.60
γ 32	810.25 7	9.9 6	0.170
γ 33	812.54 4	3.4 5	0.0586
γ 34	847.67 11	1.6 4	0.0297
γ 35	849.86 4	20.7 10	0.375
γ 37	1091.30 4	49.4 20	1.15
γ 38	1126.85 6	0.53 8	0.0128
γ 40	1200.19 6	20.0 10	0.512
γ 43	1441.14 10	0.40 4	0.0122
γ 44	1497.68 8	3.00 20	0.0957

19 weak γ's omitted:
Eγ(avg) = 589.2; ΣIγ = 0.53%

• ^{96}Tc EC Decay (4.28 d 6) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	2.27	95 7	0.0046
Auger-K	14.8	20 3	0.0064
ce-K- 29	758.220 20	0.124 4	0.0020
X-ray L	2.29	4.0 14	0.0002
X-ray $K\alpha_2$	17.3743 14	18.8 12	0.0070
X-ray $K\alpha_1$	17.47930 1	36.0 22	0.0134
X-ray Kβ	19.6	10.6 7	0.0044
γ 10	314.27 5	2.43 24	0.0163
γ 11	316.50 6	1.40 20	0.0094
γ 17	434.71 5	0.75 5	0.0069
γ 19	460.03 6	0.43 4	0.0042
γ 22	535.78 8	0.41 4	0.0047
γ 23	568.86 6	0.92 6	0.0111
γ 25	591.20 15	0.11 6	0.0014
γ 27	719.55 5	0.20 5	0.0031
γ 28	721.5 3	0.12 5	0.0018
γ 29	778.220 20	99.760 8	1.65
γ 30	810.25 7	0.21 9	0.0036
γ 31	812.54 4	82 4	1.42
γ 33	849.86 4	98 4	1.77
γ 35	1091.30 4	1.10 8	0.0255
γ 36	1126.85 6	15.2 12	0.364
γ 38	1200.19 6	0.37 3	0.0094

25 weak γ's omitted:
Eγ(avg) = 650.9; ΣIγ = 0.89%

• ^{96}Tc EC Decay (51.5 m 10) I (min) = 0.10%

%EC Decay = 2.0 5
See also ^{96}Tc IT Decay (51.5 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	2.27	2.0 4	≈0
Auger-K	14.8	0.42 11	0.0001
X-ray $K\alpha_2$	17.3743 14	0.39 8	0.0001
X-ray $K\alpha_1$	17.47930 1	0.75 16	0.0003
X-ray Kβ	19.6	0.22 5	≈0
γ 16	480.68 8	0.34 9	0.0035
γ 21	719.55 5	0.30 8	0.0045
γ 23	778.220 20	1.9 5	0.0310
γ 25	847.67 11	0.12 3	0.0021
γ 26	849.86 4	0.28 8	0.0051
γ 37	1200.19 6	1.1 3	0.0273
γ 41	1497.68 8	0.12 3	0.0037

39 weak γ's omitted:
Eγ(avg) = 887.6; ΣIγ = 0.56%

• ^{96}Tc IT Decay (51.5 m 10) I (min) = 0.10%

%IT Decay = 98.0 5
Feeds ^{96}Tc (4.28 d)
See also ^{96}Tc EC Decay (51.5 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	2.17	83 3	0.0038
ce-K- 1	13.4 4	43.6 8	0.0124
Auger-K	15.5	9.6 14	0.0032
ce-L- 1	31.4 4	42.7 8	0.0285
ce-M- 1	33.9 4	8.71 24	0.0063
ce-NOP- 1	34.3 4	2.87 9	0.0021
X-ray L	2.42	3.9 13	0.0002
X-ray $K\alpha_2$	18.2508 8	9.7 5	0.0038
X-ray $K\alpha_1$	18.3671 8	18.6 9	0.0073
X-ray Kβ	20.6	5.6 3	0.0025

1 weak γ's omitted:
Eγ(avg) = 34.4; ΣIγ = 0.03%

• ^{97}Zr β^- Decay (16.90 h 5) I (min) = 0.10%

% Feeding to ^{97}Nb (72.1 m) = 5.3 3
% Feeding to ^{97}Nb (60 s) = 94.7 3

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	409.9 20		
avg	124.3 7	0.49 4	0.0013
β- 2 max	551.5 20		
avg	175.3 8	5.5 4	0.0205
β- 3 max	893.0 20		
avg	309.2 9	1.88 21	0.0124
β- 4 max	906.9 20		
avg	314.9 9	0.5 3	0.0034
β- 5 max	1004.7 21		
avg	355.4 9	0.18 6	0.0014
β- 6 max	1109.1 20		
avg	399.4 9	0.38 8	0.0032
β- 7 max	1109.6 20		
avg	399.6 9	0.65 7	0.0055
β- 8 max	1381.3 20		
avg	517.2 9	0.21 11	0.0023
β- 9 max	1406.4 20		
avg	528.3 9	4.4 6	0.0495

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
β-10 max	1914.1 20		
avg	756.6 10	86.0 6	1.39
total β- avg	696.1 11	100.2 11	1.49
γ 4	202.2 6	0.10 3	0.0004
γ 5	218.68 15	0.23 6	0.0011
γ 6	254.15 20	1.25 14	0.0068
γ 7	272.27 20	0.25 4	0.0015
γ 10	330.43 20	0.11 3	0.0008
γ 11	355.39 10	2.27 24	0.0172
γ 12	400.39 20	0.32 5	0.0028
γ 13	507.63 10	5.3 6	0.0572
γ 14	513.47 20	0.51 10	0.0056
γ 15	602.52 15	1.39 14	0.0179
γ 16	690.63 20	0.25 4	0.0037
γ 17	699.2 3	0.121 19	0.0018
γ 18	703.80 10	0.93 10	0.0139
γ 20	795.7 8	0.121 19	0.0020
γ 21	804.53 10	0.65 7	0.0111
γ 23	829.80 10	0.223 19	0.0039
γ 24	854.90 10	0.33 4	0.0061
γ 25	971.39 10	0.29 3	0.0060
γ 26	1021.3 3	1.21 19	0.0263
γ 27	1119.1 4	0.111 19	0.0027
γ 28	1147.95 10	2.6 3	0.0647
γ 29	1276.09 10	0.97 10	0.0265
γ 30	1362.66 10	1.35 14	0.0391
γ 31	1750.46 10	1.35 14	0.0502
γ 32	1851.55 10	0.35 4	0.0139

7 weak γ's omitted:
Eγ(avg) = 344.1; ΣIγ = 0.21%

• ^{97}Nb β^- Decay (72.1 m 7)   I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	2.27	0.175 12	≈0
ce-K- 5	637.90 10	0.177 6	0.0024
β- 1 max	303.8 20		
avg	88.2 7	0.118 17	0.0002
β- 2 max	417.3 20		
avg	126.6 7	0.167 22	0.0005
β- 3 max	664.3 20		
avg	217.6 8	0.206 22	0.0010
β- 4 max	908.4 21		
avg	314.9 9	1.08 10	0.0072
β- 5 max	1274.9 20		
avg	469.8 9	98.30 12	0.984
total β- avg	466.4 9	99.96 16	0.993

1 weak β's omitted:
Eβ(avg) = 277.3; ΣIβ = 0.09%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
γ 3	480.90 10	0.147 20	0.0015
γ 5	657.90 10	98.09 11	1.37
γ 9	1024.5 3	1.08 10	0.0235
γ 12	1268.60 10	0.157 20	0.0042
γ 13	1515.60 20	0.118 20	0.0038

9 weak γ's omitted:
Eγ(avg) = 798.3; ΣIγ = 0.49%

• ^{97}Nb IT Decay (60 s 8)   I (min) = 0.10%

Feeds ^{97}Nb (72.1 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	2.15	1.99 12	≈0
Auger-K	14	0.44 6	0.0001
ce-K- 1	724.37 10	1.74 5	0.0268
ce-L- 1	740.66 10	0.225 7	0.0035
X-ray Kα$_2$	16.52100 2	0.375 20	0.0001
X-ray Kα$_1$	16.61510 2	0.72 4	0.0003
X-ray Kβ	18.6	0.207 12	≈0
γ 1	743.36 10	97.96 6	1.55

• ^{97}Tc EC Decay (2.6E6 y 4)   I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	2.27	96 6	0.0046
Auger-K	14.8	20 3	0.0064
X-ray L	2.29	4.0 14	0.0002
X-ray Kα$_2$	17.3743 14	18.9 9	0.0070
X-ray Kα$_1$	17.47930 1	36.1 16	0.0134
X-ray Kβ	19.6	10.6 5	0.0044

• ^{97}Tc IT Decay (89 d 3)   I (min) = 0.10%

Feeds ^{97}Tc (2.6E6 y)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	2.17	89 4	0.0041
Auger-K	15.5	14.0 21	0.0046
ce-K- 1	75.46 10	63.2 7	0.102
ce-L- 1	93.46 10	29.4 6	0.0585
ce-M- 1	95.96 10	5.90 17	0.0121
ce-NOP- 1	96.43 10	1.17 3	0.0024
X-ray L	2.42	4.2 14	0.0002
X-ray Kα$_2$	18.2508 8	14.1 7	0.0055
X-ray Kα$_1$	18.3671 8	27.0 12	0.0106
X-ray Kβ	20.6	8.1 4	0.0036
γ 1	96.50 10	0.324 9	0.0007

• ^{97}Ru EC Decay (2.9 d 1)   I (min) = 0.10%

% Feeding to ^{97}Tc (2.6E6 y) = 99.931 4

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	2.17	97 6	0.0045
Auger-K	15.5	20 3	0.0065
ce-K- 5	194.64 4	2.83 4	0.0117
ce-L- 5	212.64 4	0.340 6	0.0015
ce-K- 6	303.44 5	0.185 7	0.0012
X-ray L	2.42	4.6 16	0.0002
X-ray Kα$_2$	18.2508 8	20.0 9	0.0078
X-ray Kα$_1$	18.3671 8	38.3 16	0.0150
X-ray Kβ	20.6	11.5 6	0.0050
γ 2	108.80 4	0.108 12	0.0002
γ 5	215.68 4	85.50 18	0.393
γ 6	324.48 5	10.86 18	0.0750
γ 7	460.55 5	0.117 6	0.0011
γ 11	569.27 5	0.872 18	0.0106

14 weak γ's omitted:
Eγ(avg) = 599.3; ΣIγ = 0.37%

• ^{98}Tc β^- Decay (4.2E6 y 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.53	0.358 24	≈0
ce-K- 1	630.29 5	0.221 7	0.0030
ce-K- 2	723.23 5	0.156 5	0.0024
β- 1 max	394 8		
avg	118 3	100	0.251
X-ray Kα$_1$	19.27920 2	0.163 8	≈0
γ 1	652.41 5	99.745 8	1.39
γ 2	745.35 5	99.819 5	1.58

• ^{99}Mo β^- Decay (66.02 h 1) I (min) = 0.10%
% Feeding to ^{99}Tc (2.13E5 y) = 11.4 9
% Feeding to ^{99}Tc (6.02 h) = 88.6 9

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.17	4.4 5	0.0002
Auger-K	15.5	0.89 16	0.0003
ce-K- 2	19.5400 22	2.9 4	0.0012
ce-L- 2	37.5415 21	0.35 5	0.0003
ce-K- 3	119.464 4	0.37 5	0.0010
ce-K- 6	160.019 8	0.79 6	0.0027
ce-L- 6	178.020 8	0.117 9	0.0004
β- 1 max	214.6 10		
avg	59.8 3	0.113 11	0.0001
β- 2 max	352.7 11		
avg	104.2 4	0.136 13	0.0003
β- 3 max	436.0 10		
avg	133.0 4	17.3 12	0.0490
β- 4 max	847.6 10		
avg	289.6 4	1.36 12	0.0084
β- 5 max	1214.0 10		
avg	442.7 5	82.7 12	0.780
total β-			
avg	386.9 6	101.7 17	0.838

4 weak β's omitted:
Eβ(avg) = 180.9; ΣIβ = 0.06%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	2.42	0.20 8	≈0
X-ray Kα$_2$	18.2508 8	0.90 10	0.0004
X-ray Kα$_1$	18.3671 8	1.73 19	0.0007
X-ray Kβ	20.6	0.52 6	0.0002
γ 2	40.5840 20	0.88 12	0.0008
γ 3	140.508 4	3.8 5	0.0113
γ 6	181.063 8	6.2 5	0.0240
γ 9	366.43 3	1.37 12	0.0107
γ 21	739.58 6	12.8 8	0.202
γ 23	778.00 20	4.5 4	0.0742
γ 24	822.90 20	0.133 13	0.0023

22 weak γ's omitted:
Eγ(avg) = 680.1; ΣIγ = 0.26%

• ^{99}Tc β^- Decay (2.13E5 y 5) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	293.6 18		
avg	84.6 6	99.998	0.180

• ^{99}Tc IT Decay (6.02 h 2) I (min) = 0.10%
%IT Decay = 99.999902 7
Feeds ^{99}Tc (2.13E5 y)
%β^- Decay = 0.000098 7

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-M- 1	1.626 10	74.5 23	0.0026
ce-NOP- 1	2.102 11	24.6 7	0.0011
Auger-L	2.17	10.3 7	0.0005
Auger-K	15.5	2.1 3	0.0007
ce-K- 2	119.464 4	8.79 25	0.0224
ce-K- 3	121.59 3	0.61 4	0.0016
ce-L- 2	137.465 4	1.06 3	0.0031
ce-L- 3	139.59 3	0.191 12	0.0006
ce-MNO- 2	139.964 5	0.230 7	0.0007
X-ray L	2.42	0.48 17	≈0
X-ray Kα$_2$	18.2508 8	2.10 11	0.0008
X-ray Kα$_1$	18.3671 8	4.02 20	0.0016
X-ray Kβ	20.6	1.21 7	0.0005
γ 2	140.508 4	89.07 24	0.267

2 weak γ's omitted:
Eγ(avg) = 142.6; ΣIγ = 0.02%

• ^{101}Mo β^- Decay (14.61 m 7) I (min) = 0.10%
Feeds ^{101}Tc

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.17	140 5	0.0065
ce-L- 1	3.238 7	61 3	0.0042
ce-MNO- 1	5.737 7	14.7 17	0.0018
ce-L- 2	6.274 10	75 3	0.0101
ce-MNO- 2	8.773 10	18.1 18	0.0034
ce-L- 3	12.563 15	1.45 24	0.0004
ce-MNO- 3	15.062 15	0.36 6	0.0001
Auger-K	15.5	1.6 3	0.0005
ce-K- 4	59.88 3	2.7 4	0.0034
ce-L- 4	77.88 3	0.37 9	0.0006
ce-K- 10	170.89 4	4.7 3	0.0173
ce-L- 10	188.89 4	0.66 4	0.0027
ce-MNO-10	191.39 4	0.145 8	0.0006
β- 1 max	152 24		
avg	41 7	0.178 14	0.0002
β- 2 max	238 24		
avg	67 8	0.34 4	0.0005
β- 3 max	253 24		
avg	72 8	1.36 10	0.0021
β- 4 max	392 24		
avg	118 9	0.129 12	0.0003
β- 5 max	457 24		
avg	140 9	0.17 6	0.0005
β- 6 max	573 24		
avg	182 9	0.56 4	0.0022
β- 7 max	593 24		
avg	190 9	0.17 4	0.0007
β- 8 max	662 24		
avg	216 10	0.129 21	0.0006
β- 9 max	682 24		
avg	224 10	2.30 12	0.0110
β-10 max	754 24		
avg	252 10	3.13 16	0.0168
β-11 max	763 24		
avg	256 10	20.7 9	0.113
β-12 max	810 24		
avg	274 10	0.93 5	0.0054
β-13 max	849 24		
avg	290 10	11.7 4	0.0723

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β−14 max	882 24		
avg	303 10	0.67 5	0.0043
β−15 max	913 24		
avg	316 10	3.3 5	0.0222
β−16 max	918 24		
avg	318 10	0.145 10	0.0010
β−17 max	1003 24		
avg	353 10	0.41 6	0.0031
β−18 max	1005 24		
avg	354 10	3.37 14	0.0254
β−19 max	1036 24		
avg	367 10	1.55 19	0.0121
β−20 max	1133 24		
avg	408 11	0.23 15	0.0020
β−21 max	1167 24		
avg	422 11	1.00 20	0.0090
β−22 max	1193 24		
avg	434 11	8.4 14	0.0777
β−23 max	1196 24		
avg	435 11	1.83 11	0.0170
β−24 max	1212 24		
avg	442 11	0.13 7	0.0012
β−25 max	1217 24		
avg	444 11	1.45 13	0.0137
β−26 max	1246 24		
avg	456 11	0.27 3	0.0026
β−27 max	1363 24		
avg	507 11	0.35 4	0.0038
β−28 max	1491 24		
avg	564 11	6.9 3	0.0829
β−29 max	1579 24		
avg	603 11	0.20 4	0.0026
β−30 max	1670 24		
avg	643 11	0.280 18	0.0038
β−31 max	1783 24		
avg	694 11	6.9 16	0.102
β−32 max	2189 24		
avg	880 11	0.46 5	0.0086
β−33 max	2195 24		
avg	883 11	1.12 11	0.0211
β−34 max	2205 24		
avg	887 11	6.7 16	0.127
β−35 max	2290 24		
avg	927 12	1.2 6	0.0237
β−36 max	2417 24		
avg	986 12	0.50 14	0.0105
β−37 max	2522 24		
avg	1035 12	2.1 7	0.0463
β−38 max	2603 24		
avg	1073 12	11.0 15	0.251
total β−			
avg	504 15	103 4	1.10

3 weak β's omitted:
Eβ(avg) = 310.1; ΣIβ = 0.26%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	2.42	6.6 22	0.0003
γ 1	6.281 7	0.54 8	≈0
γ 2	9.317 10	1.94 24	0.0004
X-ray $K\alpha_2$	18.2508 8	1.66 13	0.0006
X-ray $K\alpha_1$	18.3671 8	3.18 24	0.0012
X-ray Kβ	20.6	0.95 8	0.0004
γ 4	80.92 3	5.4 4	0.0093
γ 5	104.70 8	0.163 20	0.0004
γ 6	105.95 5	0.24 3	0.0005
γ 7	115.80 15	0.169 24	0.0004
γ 9	187.41 20	0.48 6	0.0019
γ 10	191.93 4	19.2 11	0.0785
γ 11	195.94 5	2.92 17	0.0122
γ 12	212.00 8	0.52 6	0.0023
γ 13	221.80 23	0.102 12	0.0005
γ 17	317.77 13	0.240 18	0.0016

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 18	327.68 13	0.217 16	0.0015
γ 19	333.50 7	0.79 5	0.0056
γ 21	352.90 17	0.144 14	0.0011
γ 23	367.9 7	0.11 3	0.0009
γ 24	370.0 8	0.16 5	0.0013
γ 25	371.6 8	0.16 5	0.0012
γ 26	377.9 5	0.17 5	0.0013
γ 27	379.3 3	0.23 10	0.0019
γ 29	381.23 14	0.311 24	0.0025
γ 31	398.70 7	0.92 6	0.0078
γ 32	408.53 6	1.63 9	0.0142
γ 33	421.41 14	0.42 8	0.0038
γ 35	432.9 4	0.113 8	0.0010
γ 37	448.49 6	0.70 4	0.0067
γ 39	469.04 22	0.119 12	0.0012
γ 43	497.0 8	0.14 5	0.0014
γ 44	499.59 10	1.4 3	0.0145
γ 45	505.05 18	1.3 6	0.0145
γ 46	505.88 5	12.1 8	0.130
γ 47	510.14 14	1.00 8	0.0108
γ 48	512.18 17	1.79 13	0.0195
γ 49	514.1 4	0.83 8	0.0090
γ 50	515.80 25	0.52 8	0.0057
γ 51	523.80 12	0.177 14	0.0020
γ 52	533.51 11	0.41 3	0.0046
γ 55	566.51 10	0.75 12	0.0090
γ 56	571.69 19	0.190 14	0.0023
γ 58	590.10 19	5.8 14	0.0724
γ 59	590.82 5	16.7 16	0.210
γ 60	602.98 24	0.104 14	0.0013
γ 61	606.8 3	0.217 18	0.0028
γ 62	608.32 8	1.09 7	0.0142
γ 63	611.6 5	0.15 3	0.0019
γ 64	625.6 5	0.11 4	0.0014
γ 66	642.58 5	1.27 7	0.0173
γ 69	660.61 10	0.228 15	0.0032
γ 72	695.53 7	6.0 6	0.0882
γ 73	701.80 13	0.34 3	0.0051
γ 75	712.88 6	3.34 19	0.0507
γ 77	732.92 25	0.27 4	0.0042
γ 79	739.54 13	0.307 21	0.0048
γ 80	773.81 17	0.34 3	0.0056
γ 81	775.8 8	0.109 20	0.0018
γ 82	778.17 8	0.98 7	0.0162
γ 83	790.01 18	0.129 12	0.0022
γ 85	804.19 8	1.02 7	0.0174
γ 86	815.20 18	0.182 16	0.0032
γ 89	852.98 11	0.238 15	0.0043
γ 90	859.09 19	0.113 10	0.0021
γ 91	869.7 3	0.35 6	0.0064
γ 92	871.11 10	1.57 11	0.0292
γ 93	877.37 9	3.15 21	0.0588
γ 94	883.31 9	0.64 4	0.0121
γ 95	887.0 3	0.24 4	0.0045
γ 96	888.7 3	0.23 3	0.0044
γ 98	896.3 4	0.22 4	0.0041
γ 99	903.41 15	0.205 16	0.0040
γ 100	933.3 3	0.77 23	0.0153
γ 101	934.20 9	0.35 3	0.0069
γ 103	980.40 12	0.271 17	0.0057
γ 104	987.94 17	0.161 14	0.0034
γ 105	1007.4 3	0.180 18	0.0039
γ 106	1011.05 14	1.8 4	0.0385
γ 107	1011.05 14	0.5 5	0.0112
γ 108	1012.50 8	13.1 9	0.282
γ 109	1018.58 25	0.65 10	0.0142
γ 110	1020.0 3	0.48 8	0.0104
γ 112	1049.75 10	0.353 21	0.0079
γ 113	1064.2 3	0.22 4	0.0050
γ 114	1065.9 4	0.17 4	0.0037
γ 115	1160.92 9	4.05 23	0.100
γ 116	1168.99 17	0.240 18	0.0060

(Continued)

^{101}Mo β^- Decay (14.61 m 7) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
γ 117	1184.19 23	0.200 18	0.0050
γ 118	1186.59 9	1.06 7	0.0267
γ 119	1199.87 8	1.79 11	0.0456
γ 120	1209.88 22	0.134 12	0.0035
γ 122	1249.4 5	0.27 6	0.0072
γ 123	1251.10 9	4.7 3	0.125
γ 124	1260.5 3	0.156 18	0.0042
γ 125	1286.26 17	0.146 10	0.0040
γ 126	1290.7 3	0.117 12	0.0032
γ 127	1293.29 17	0.213 15	0.0059
γ 128	1304.03 9	2.84 17	0.0789
γ 131	1314.28 25	0.236 18	0.0066
γ 133	1326.1 6	0.17 6	0.0049
γ 134	1336.6 3	0.142 14	0.0040
γ 135	1339.36 20	0.179 14	0.0051
γ 136	1346.12 11	0.88 6	0.0253
γ 138	1355.99 11	1.71 12	0.0494
γ 139	1377.72 20	0.250 18	0.0073
γ 140	1380.4 8	0.109 18	0.0032
γ 141	1382.73 10	1.17 7	0.0345
γ 143	1394.91 13	0.62 4	0.0185
γ 144	1414.16 10	0.51 3	0.0154
γ 145	1418.54 9	0.89 5	0.0270
γ 147	1430.0 6	0.14 3	0.0043
γ 148	1432.05 25	0.37 4	0.0112
γ 150	1440.85 15	0.161 11	0.0049
γ 152	1485.90 20	0.106 8	0.0033
γ 154	1514.10 22	0.190 14	0.0061
γ 155	1517.8 4	0.225 24	0.0073
γ 156	1520.4 5	0.24 4	0.0078
γ 157	1523.0 3	0.30 3	0.0096
γ 158	1526.6 5	0.115 22	0.0037
γ 159	1530.3 5	0.28 5	0.0091
γ 160	1532.45 8	6.0 6	0.194
γ 163	1548.68 24	0.154 14	0.0051
γ 165	1589.61 12	0.288 17	0.0098
γ 167	1599.22 8	1.79 11	0.0608
γ 174	1662.43 9	0.13 6	0.0048
γ 175	1662.43 9	0.56 12	0.0197
γ 176	1673.81 8	1.73 11	0.0616
γ 177	1712.76 17	0.205 15	0.0075
γ 179	1754.84 12	0.355 21	0.0133
γ 180	1759.69 9	0.36 20	0.0137
γ 181	1759.69 9	0.63 18	0.0237
γ 182	1768.22 19	0.152 11	0.0057
γ 183	1840.21 9	0.17 8	0.0068
γ 184	1840.21 9	1.23 20	0.0482
γ 193	2028.1 9	0.106 18	0.0046
γ 194	2032.04 10	7.1 4	0.307
γ 195	2038.4 5	0.22 3	0.0095
γ 196	2041.22 11	2.15 13	0.0935
γ 198	2088.82 12	0.81 8	0.0359
γ 199	2112.77 25	0.15 3	0.0068
γ 200	2114.49 16	0.46 3	0.0208
γ 203	2223.28 14	0.169 11	0.0080

66 weak γ's omitted:
Eγ(avg) = 1109.9; ΣIγ = 4.05%

● ^{101}Tc β^- Decay (14.2 m 1) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	2.53	1.92 14	0.0001
Auger-K	16.2	0.39 6	0.0001
ce-K- 1	105.12 4	0.56 5	0.0012
ce-K- 3	161.99 5	0.121 19	0.0004
ce-K- 8	284.69 5	1.20 7	0.0073
ce-L- 8	303.59 5	0.140 9	0.0009
β- 1 max	624 24		
avg	201 10	1.2 4	0.0051
β- 2 max	687 24		
avg	225 10	0.82 5	0.0039
β- 3 max	696 24		
avg	229 10	0.309 19	0.0015
β- 4 max	782 24		
avg	263 10	1.94 7	0.0109
β- 5 max	905 24		
avg	312 10	0.16 3	0.0011
β- 6 max	1080 24		
avg	385 11	6.5 3	0.0533
β- 7 max	1318 24		
avg	487 11	89 5	0.923
total β-			
avg	469 12	100 5	0.999
X-ray L	2.56	0.10 4	≈0
X-ray $K\alpha_2$	19.15040 2	0.43 3	0.0002
X-ray $K\alpha_1$	19.27920 2	0.81 5	0.0003
X-ray $K\beta$	21.7	0.249 16	0.0001
γ 1	127.24 4	2.82 12	0.0076
γ 2	179.57 5	0.58 3	0.0022
γ 3	184.11 5	1.62 7	0.0063
γ 4	233.71 7	0.275 15	0.0014
γ 5	238.26 7	0.307 17	0.0016
γ 8	306.81 5	88 5	0.577
γ 9	311.5 3	0.140 22	0.0009
γ 11	393.33 17	0.112 16	0.0009
γ 13	515.95 25	0.109 14	0.0012
γ 14	531.49 6	1.02 6	0.0116
γ 15	545.14 6	6.0 3	0.0697
γ 18	627.05 13	0.42 4	0.0055
γ 21	694.7 3	1.1 4	0.0170
γ 22	715.52 11	0.69 4	0.0105
γ 23	720.00 20	0.19 3	0.0028
γ 25	842.79 10	0.230 14	0.0041
γ 26	928.71 15	0.127 12	0.0025

10 weak γ's omitted:
Eγ(avg) = 617.8; ΣIγ = 0.48%

● ^{103}Ru β^- Decay (39.35 d 5) I(min) = 0.10%
% Feeding to ^{103}Rh (56.119 m) = 99.737 14

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	2.39	1.01 8	≈0
Auger-K	17	0.21 4	≈0
ce-K- 3	30.055 10	0.68 5	0.0004
ce-K- 13	473.860 20	0.407 21	0.0041
β- 1 max	113 4		
avg	29.8 10	6.4 4	0.0041
β- 2 max	226 4		
avg	63.2 12	90 5	0.121
β- 3 max	468 4		
avg	143.8 13	0.238 13	0.0007
β- 4 max	723 4		
avg	239.2 14	3.5	0.0178
total β-			
avg	67.4 13	100 5	0.144

3 weak β's omitted:
Eβ(avg) = 38.7; ΣIβ = 0.10%

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray Kα$_2$	20.07370 2	0.251 16	0.0001
X-ray Kα$_1$	20.21610 2	0.48 3	0.0002
X-ray Kβ	22.7	0.149 10	≈0
γ 3	53.275 10	0.373 23	0.0004
γ 9	294.980 20	0.249 13	0.0016
γ 12	443.800 20	0.320 16	0.0030
γ 13	497.080 20	89 5	0.941
γ 15	557.040 20	0.83 5	0.0098
γ 17	610.330 20	5.6 4	0.0728

13 weak γ's omitted:
Eγ(avg) = 486.9; ΣIγ = 0.12%

● ^{103}Rh IT Decay (56.119 m 9) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.39	76.6 16	0.0039
ce-K- 1	16.528 8	9.5 3	0.0034
Auger-K	17	1.8 3	0.0007
ce-L- 1	36.336 8	71.3 6	0.0552
ce-M- 1	39.121 8	14.4 4	0.0120
ce-NOP- 1	39.667 8	4.75 14	0.0040
X-ray L	2.7	4.0 13	0.0002
X-ray Kα$_2$	20.07370 2	2.20 11	0.0009
X-ray Kα$_1$	20.21610 2	4.18 20	0.0018
X-ray Kβ	22.7	1.30 7	0.0006

1 weak γ's omitted:
Eγ(avg) = 39.7; ΣIγ = 0.07%

● ^{103}Pd EC Decay (16.961 d 16) I (min) = 0.10%
% Feeding to ^{103}Rh (56.119 m) = 99.9740 10

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.39	91 6	0.0046
Auger-K	17	17 3	0.0060
X-ray L	2.7	4.8 16	0.0003
X-ray Kα$_2$	20.07370 2	19.8 9	0.0085
X-ray Kα$_1$	20.21610 2	37.7 15	0.0162
X-ray Kβ	22.7	11.7 5	0.0057

9 weak γ's omitted:
Eγ(avg) = 359.6; ΣIγ = 0.03%

● ^{105}Ru β$^-$ Decay (4.44 h 2) I (min) = 0.10%
% Feeding to ^{105}Rh (35.36 h) = 75.5 11
% Feeding to ^{105}Rh (45 s) = 24.5 11

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.39	0.67 22	≈0
Auger-K	17	0.14 5	≈0
ce-K- 5	62.7 3	0.35 23	0.0005
ce-K- 13	125.98 20	0.204 20	0.0005
ce-K- 19	239.68 20	0.167 8	0.0009
β- 1 max	220 4		
avg	61.3 12	0.108 9	0.0001
β- 2 max	431 4		
avg	130.8 13	0.340 17	0.0009
β- 3 max	476 9		
avg	147 4	0.20 5	0.0006
β- 4 max	541 4		
avg	170.1 14	1.32 5	0.0048
β- 5 max	573 4		
avg	181.8 14	4.47 16	0.0173
β- 6 max	596 4		
avg	190.7 14	0.500 25	0.0020
β- 7 max	703 4		
avg	231.1 15	0.113 12	0.0006
β- 8 max	948 4		
avg	329.3 16	5.22 24	0.0366
β- 9 max	1112 4		
avg	397.5 16	20.0 8	0.169
β-10 max	1132 4		
avg	406.0 16	18.1 5	0.157
β-11 max	1156 4		
avg	416.2 16	0.29 3	0.0026
β-12 max	1193 4		
avg	432.2 16	49.9 20	0.459
β-13 max	1525 4		
avg	576.8 17	0.5 4	0.0061
total β-			
avg	397.7 17	101.2 23	0.857

2 weak β's omitted:
Eβ(avg) = 140.3; ΣIβ = 0.16%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray Kα$_2$	20.07370 2	0.17 6	≈0
X-ray Kα$_1$	20.21610 2	0.32 10	0.0001
γ 5	85.9 3	0.320 20	0.0006
γ 13	149.20 20	1.67 5	0.0053
γ 14	163.60 20	0.140 7	0.0005
γ 15	183.60 20	0.100 7	0.0004
γ 16	225.00 20	0.150 9	0.0007
γ 19	262.90 20	7.2 3	0.0403
γ 20	316.50 20	11.7 4	0.0789
γ 21	326.10 20	1.18 6	0.0082
γ 22	330.90 20	0.79 4	0.0056
γ 23	350 5	0.30 10	0.0022
γ 24	350.20 20	1.10 10	0.0082
γ 27	393.40 20	4.20 20	0.0352
γ 28	407.5 3	0.180 20	0.0016
γ 29	413.50 20	2.48 12	0.0218
γ 30	469.40 20	17.5 10	0.175
γ 31	470 3	1.30 20	0.0130
γ 32	489.60 20	0.59 3	0.0062
γ 33	499.20 20	2.40 12	0.0255
γ 34	500.4 4	0.30 5	0.0032
γ 35	513.70 20	0.36 4	0.0039
γ 36	539.2 3	0.13 4	0.0015
γ 38	575 5	0.13 5	0.0016
γ 39	575.30 20	1.07 5	0.0131
γ 42	632.30 20	0.230 20	0.0031
γ 43	638.60 20	0.28 3	0.0038
γ 44	652.60 20	0.350 20	0.0049
γ 45	656 8	0.20 5	0.0028
γ 46	656.10 20	2.40 9	0.0335
γ 47	676.40 20	16.7 7	0.241
γ 48	724.50 20	49.0 20	0.756
γ 52	822.10 20	0.190 10	0.0033
γ 53	845.90 20	0.73 3	0.0132
γ 54	875.80 20	3.40 14	0.0634
γ 56	907.70 20	0.59 3	0.0114
γ 58	969.40 20	2.34 9	0.0483
γ 59	1017.20 20	0.340 17	0.0074
γ 64	1321.10 20	0.230 10	0.0065

30 weak γ's omitted:
Eγ(avg) = 707.4; ΣIγ = 1.28%

• ^{105}Rh β^- Decay (35.36 h 5) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.5	0.38 4	≈0
ce-K- 1	14.42 7	0.136 25	≈0
ce-K- 4	294.55 10	0.288 10	0.0018
β− 1 max	248 3		
avg	69.9 9	19.7 4	0.0293
β− 2 max	261 3		
avg	73.9 10	5.22 22	0.0082
β− 3 max	567 3		
avg	179.4 11	75.0 5	0.287
total β−			
avg	152.3 12	100.0 7	0.324

1 weak β's omitted:
Eβ(avg)= 33.0; ΣIβ= 0.04%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray $K\alpha_1$	21.17710 2	0.188 14	≈0
γ 2	280.10 20	0.167 10	0.0010
γ 3	306.10 20	5.13 21	0.0334
γ 4	318.90 10	19.2 3	0.130

2 weak γ's omitted:
Eγ(avg)= 294.9; ΣIγ= 0.06%

• ^{105}Rh IT Decay (45 s) I (min) = 0.10%

Feeds ^{105}Rh (35.36 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.39	70 4	0.0035
Auger-K	17	9.9 16	0.0036
ce-K- 1	106.35 8	51.2 7	0.116
ce-L- 1	126.16 8	23.0 5	0.0618
ce-M- 1	128.94 8	4.48 13	0.0123
ce-NOP- 1	129.49 8	7.77 23	0.0214
X-ray L	2.7	3.7 12	0.0002
X-ray $K\alpha_2$	20.07370 2	11.8 6	0.0051
X-ray $K\alpha_1$	20.21610 2	22.5 10	0.0097
X-ray Kβ	22.7	7.0 3	0.0034
γ 1	129.57 8	20.4 5	0.0563

• ^{106}Ru β^- Decay (368.2 d 12) I (min) = 0.10%

Feeds ^{106}Rh (29.92 s)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β− 1 max	39.4 3		
avg	10.03 8	100	0.0214

• ^{106}Rh β^- Decay (29.92 s 23) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β− 1 max	1540 9		
avg	582 4	0.427 21	0.0053
β− 2 max	1979 9		
avg	780 5	1.92 10	0.0319
β− 3 max	2407 9		
avg	977 5	9.8 5	0.204
β− 4 max	2413 9		
avg	979 5	0.58 7	0.0121
β− 5 max	3029 9		
avg	1267 5	8.2 4	0.221
β− 6 max	3541 9		
avg	1509 5	78.7 7	2.53
total β−			
avg	1411 5	100.0 10	3.01

33 weak β's omitted:
Eβ(avg)= 404.7; ΣIβ= 0.42%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 7	511.85 3	20.6 6	0.225
γ 12	616.17 3	0.70 7	0.0092
γ 13	621.84 10	9.8 5	0.130
γ 21	873.60 20	0.416 21	0.0077
γ 25	1050.47 7	1.73 10	0.0387
γ 29	1128.02 7	0.396 15	0.0095
γ 50	1562.20 6	0.157 12	0.0052

101 weak γ's omitted:
Eγ(avg)= 1357.0; ΣIγ= 0.58%

• ^{106}Ag EC Decay (8.46 d 10) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.5	89 6	0.0047
Auger-K	17.7	15 3	0.0058
ce-K- 3	197.351 15	0.251 11	0.0011
ce-K- 9	381.832 20	0.129 4	0.0010
ce-K- 17	487.50 3	0.424 19	0.0044
X-ray L	2.84	5.3 19	0.0003
X-ray $K\alpha_2$	21.02010 2	20.0 8	0.0089
X-ray $K\alpha_1$	21.17710 2	37.9 15	0.0171
X-ray Kβ	23.8	12.0 5	0.0061
γ 2	195.07 5	0.31 5	0.0013
γ 3	221.701 15	6.6 3	0.0311
γ 4	228.633 21	2.10 10	0.0103
γ 5	328.463 23	1.14 6	0.0080
γ 7	374.46 13	0.26 4	0.0021
γ 8	391.04 3	3.68 18	0.0307
γ 9	406.182 20	13.4 4	0.116
γ 10	418.55 23	0.33 7	0.0030
γ 12	429.646 22	13.2 4	0.120
γ 15	450.976 22	28.2 8	0.271
γ 16	474.06 3	0.93 6	0.0094
γ 17	511.85 3	88 3	0.956
γ 19	585.97 10	0.44 10	0.0055
γ 20	601.17 7	1.61 9	0.0207
γ 21	616.17 3	21.6 7	0.283
γ 23	646.03 5	1.46 10	0.0200
γ 24	680.19 10	2.18 8	0.0316
γ 25	703.11 8	4.47 18	0.0670
γ 26	717.27 3	28.9 8	0.442
γ 27	748.36 11	20.6 7	0.329
γ 28	793.17 10	5.9 3	0.0993
γ 29	804.28 10	12.4 6	0.212
γ 30	808.36 11	4.0 5	0.0695
γ 31	824.69 7	15.3 5	0.270
γ 32	847.6	2.456 14	0.0443
γ 33	848.2	1.929 11	0.0349
γ 34	874.81 18	0.33 5	0.0062
γ 35	949.5 3	0.19 4	0.0039
γ 36	956.22 23	0.47 8	0.0096
γ 37	1019.72 15	1.04 16	0.0227
γ 38	1045.83 8	29.6 10	0.658
γ 39	1050.47 7	0.26 14	0.0059
γ 40	1053.77 21	0.96 14	0.0217
γ 42	1121.59 18	0.57 7	0.0136
γ 43	1128.02 7	11.8 6	0.282
γ 45	1136.85 19	0.23 3	0.0055

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 47	1178.07 21	0.19 3	0.0048
γ 48	1199.39 10	11.2 6	0.287
γ 49	1222.88 12	7.0 4	0.183
γ 50	1349.5 6	0.12 5	0.0035
γ 51	1394.35 14	1.49 18	0.0443
γ 54	1527.65 19	16.3 14	0.531
γ 56	1565.4 3	0.48 5	0.0161
γ 57	1572.35 15	6.6 6	0.220
γ 59	1722.76 18	1.40 18	0.0515
γ 62	1839.05 10	2.0 3	0.0790

18 weak γ's omitted:
Eγ(avg) = 1043.2; ΣIγ = 0.63%

● ^{107}Pd β^- Decay (6.5E6 y 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β− 1 max	33 3		
avg	9.3 10	100	0.0198

● ^{108}Ag EC Decay (2.37 m 1) I (min) = 0.10%
%EC Decay = 2.3 3
See also ^{108}Ag β^- Decay (2.37 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.5	1.9 3	≈0
Auger-K	17.7	0.33 8	0.0001
β+ 1 max	899 7		
avg	400 3	0.22 5	0.0019
X-ray L	2.84	0.11 5	≈0
X-ray Kα₂	21.02010 2	0.43 8	0.0002
X-ray Kα₁	21.17710 2	0.81 15	0.0004
X-ray Kβ	23.8	0.26 5	0.0001
γ 3	433.927 9	0.51 10	0.0047
γ 6	618.86 5	0.27 6	0.0035

10 weak γ's omitted:
Eγ(avg) = 913.4; ΣIγ = 0.03%
Maximum γ±-intensity = 0.44%

● ^{108}Ag β^- Decay (2.37 m 1) I (min) = 0.10%
%β^- Decay = 97.7 3
See also ^{108}Ag EC Decay (2.37 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β− 1 max	1017 8		
avg	356 4	1.75 10	0.0133
β− 2 max	1650 8		
avg	629 4	95.9 3	1.28
total β−			
avg	624 4	97.6 4	1.30
γ 1	632.98 5	1.74 17	0.0235

● ^{108}Ag EC Decay (127 y 21) I (min) = 0.10%
%EC Decay = 90.7 7
See also ^{108}Ag IT Decay (127 y)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.5	81 5	0.0043
Auger-K	17.7	14.1 24	0.0053
ce-K- 1	409.577 9	0.707 22	0.0062
ce-K- 2	590.02 10	0.264 9	0.0033
ce-K- 3	698.60 8	0.172 6	0.0026
X-ray L	2.84	4.8 17	0.0003
X-ray Kα₂	21.02010 2	18.2 8	0.0082
X-ray Kα₁	21.17710 2	34.6 14	0.0156
X-ray Kβ	23.8	11.0 5	0.0056
γ 1	433.927 9	89.9 7	0.831
γ 2	614.37 10	90.4 7	1.18
γ 3	722.95 8	90.5 7	1.39

● ^{108}Ag IT Decay (127 y 21) I (min) = 0.10%
%IT Decay = 9.3 7
Feeds ^{108}Ag (2.37 m)
See also ^{108}Ag EC Decay (127 y)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.6	8.5 6	0.0005
ce-K- 1	4.87 6	0.245 20	≈0
Auger-K	18.5	0.37 6	0.0001
ce-L- 1	26.57 6	6.8 6	0.0038
ce-MNO- 1	29.66 6	2.26 18	0.0014
ce-K- 2	53.69 5	1.93 16	0.0022
ce-L- 2	75.39 5	0.238 19	0.0004
X-ray L	3	0.57 20	≈0
X-ray Kα₂	21.9903 3	0.51 4	0.0002
X-ray Kα₁	22.16290 1	0.97 8	0.0005
X-ray Kβ	24.9	0.314 25	0.0002
γ 2	79.20 5	7.1 6	0.0120

● ^{109}Pd β^- Decay (13.453 h 11) I (min) = 0.10%
% Feeding to ^{109}Ag (39.6 s) = 99.949 5

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β− 1 max	1027.9 20		
avg	361.0 9	99.879 17	0.768

12 weak β's omitted:
Eβ(avg) = 139.9; ΣIβ = 0.11%

36 weak γ's omitted:
Eγ(avg) = 508.6; ΣIγ = 0.14%

● ^{109}Ag IT Decay (39.6 s 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.6	79 3	0.0044
Auger-K	18.5	7.1 11	0.0028
ce-K- 1	62.5180 21	41.7 7	0.0555
ce-L- 1	84.2262 21	44.0 7	0.0789
ce-M- 1	87.3145 21	8.94 24	0.0166
ce-NOP- 1	87.9368 21	1.60 5	0.0030

(Continued)

^{109}Ag IT Decay (39.6 s 2) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	3	5.3 18	0.0003
X-ray Kα$_2$	21.9903 3	9.9 4	0.0046
X-ray Kα$_1$	22.16290 1	18.7 7	0.0088
X-ray Kβ	24.9	6.03 24	0.0032
γ 1	88.0320 20	3.72 11	0.0070

• ^{109}Cd EC Decay (464 d 1) I (min) = 0.10%
Feeds ^{109}Ag (39.6 s)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.6	87 5	0.0048
Auger-K	18.5	13.4 20	0.0053
X-ray L	3	5.8 20	0.0004
X-ray Kα$_2$	21.9903 3	18.6 7	0.0087
X-ray Kα$_1$	22.16290 1	35.3 12	0.0166
X-ray Kβ	24.9	11.4 5	0.0060

• ^{110}Ag EC Decay (24.57 s 23) I (min) = 0.10%
%EC Decay = 0.30 6
See also ^{110}Ag β^- Decay (24.57 s)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.5	0.27 5	≈0
X-ray Kα$_1$	21.17710 2	0.115 24	≈0

• ^{110}Ag β^- Decay (24.57 s 23) I (min) = 0.10%
%β^- Decay = 99.70 6
See also ^{110}Ag EC Decay (24.57 s)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β⁻ 1 max	2235.0 19		
avg	894.1 9	4.42 22	0.0842
β⁻ 2 max	2892.8 19		
avg	1199.3 9	95.19 23	2.43
total β⁻ avg	1185.1 9	99.7 4	2.52

8 weak β's omitted:
Eβ(avg) = 406.8; ΣIβ = 0.09%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 2	657.749 10	4.49 22	0.0629

12 weak γ's omitted:
Eγ(avg) = 1046.0; ΣIγ = 0.10%

• ^{110}Ag IT Decay (249.85 d 8) I (min) = 0.10%
%IT Decay = 1.33 10
Feeds ^{110}Ag (24.57 s)
See also ^{110}Ag β^- Decay (249.85 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-MNO- 1	0.56 10	1.33 10	≈0
Auger-L	2.6	1.11 8	≈0
Auger-K	18.5	0.140 24	≈0
ce-K- 2	90.97 5	0.83 7	0.0016
ce-L- 2	112.67 5	0.39 3	0.0009
X-ray Kα$_2$	21.9903 3	0.196 17	≈0
X-ray Kα$_1$	22.16290 1	0.37 3	0.0002
X-ray Kβ	24.9	0.119 10	≈0

• ^{110}Ag β^- Decay (249.85 d 8) I (min) = 0.10%
%β^- Decay = 98.67 10
See also ^{110}Ag IT Decay (249.85 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.72	0.228 17	≈0
ce-K- 26	631.038 10	0.257 9	0.0035
β⁻ 1 max	83.9 19		
avg	21.8 6	67.3 4	0.0313
β⁻ 2 max	133.8 19		
avg	35.7 6	0.407 12	0.0003
β⁻ 3 max	530.7 19		
avg	165.6 7	30.5 4	0.108
total β⁻ avg	66.6 14	98.4 6	0.140

5 weak β's omitted:
Eβ(avg) = 92.8; ΣIβ = 0.19%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray Kα$_1$	23.17360 2	0.116 6	≈0
γ 12	365.441 15	0.106 9	0.0008
γ 17	446.797 8	3.64 4	0.0347
γ 23	620.346 11	2.77 3	0.0365
γ 24	626.246 10	0.234 7	0.0031
γ 26	657.749 10	94.4 10	1.32
γ 27	676.60 10	0.142 19	0.0020
γ 28	677.606 11	10.68 11	0.154
γ 29	686.988 11	6.47 7	0.0946
γ 30	706.670 13	16.68 17	0.251
γ 31	708.115 20	0.28 10	0.0043
γ 32	744.260 13	4.64 5	0.0736
γ 33	763.928 13	22.28 23	0.362
γ 35	818.016 12	7.30 8	0.127
γ 36	884.667 13	72.6 8	1.37
γ 37	937.478 13	34.2 4	0.682
γ 39	997.233 18	0.125 5	0.0026
γ 49	1334.304 17	0.132 10	0.0038
γ 50	1384.270 13	24.26 25	0.715
γ 52	1475.759 22	3.97 4	0.125
γ 53	1505.001 21	13.06 14	0.419
γ 54	1562.266 22	1.180 13	0.0393

40 weak γ's omitted:
Eγ(avg) = 734.5; ΣIγ = 0.91%

• ^{111}Ag β^- Decay (7.46 d 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-K- 4	315.419 20	0.102 6	0.0007
β⁻ 1 max	686 3		
avg	223.5 12	7.0 4	0.0333
β⁻ 2 max	783 3		
avg	278.9 12	1.10 7	0.0065
β⁻ 3 max	1028 3		
avg	360.4 13	91.9 4	0.705
total β⁻ avg	349.8 13	100.1 6	0.745

3 weak β's omitted:
Eβ(avg) = 67.8; ΣIβ = 0.06%

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 1	96.750 20	0.120 15	0.0002
γ 2	245.390 20	1.23 7	0.0064
γ 4	342.130 20	6.7 4	0.0487

8 weak γ's omitted:
Eγ(avg) = 654.7; ΣIγ = 0.06%

• ^{111}Cd IT Decay (48.7 m 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.72	63 4	0.0037
Auger-K	19.3	7.8 15	0.0032
ce-K- 1	124.10 3	43.8 7	0.116
ce-L- 1	146.79 3	20.4 5	0.0638
ce-M- 1	150.04 3	4.13 12	0.0132
ce-NCP- 1	150.70 3	0.778 23	0.0025
ce-K- 2	218.679 20	5.03 14	0.0234
ce-L- 2	241.372 20	0.785 23	0.0040
ce-MNO- 2	244.620 20	0.182 5	0.0009
X-ray L	3.13	4.5 15	0.0003
X-ray $K\alpha_2$	22.98410 2	11.7 5	0.0057
X-ray $K\alpha_1$	23.17360 2	22.1 9	0.0109
X-ray Kβ	26	7.2 3	0.0040
γ 1	150.81 3	30.9 7	0.0993
γ 2	245.390 20	94.00 17	0.491

• ^{111}In EC Decay (2.83 d 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.72	100 6	0.0058
Auger-K	19.3	16 3	0.0065
ce-K- 2	144.57 3	8.41 23	0.0259
ce-L- 2	167.26 3	1.05 3	0.0037
ce-MNO- 2	170.51 3	0.245 7	0.0009
ce-K- 3	218.679 20	5.04 16	0.0235
ce-L- 3	241.372 20	0.785 24	0.0040
ce-MNO- 3	244.620 20	0.181	0.0009
X-ray L	3.13	7.1 24	0.0005
X-ray $K\alpha_2$	22.98410 2	23.6 9	0.0116
X-ray $K\alpha_1$	23.17360 2	44.6 16	0.0220
X-ray Kβ	26	14.6 6	0.0081
γ 2	171.28 3	90.2 4	0.329
γ 3	245.390 20	94.00 17	0.491

• ^{113}Cd β^- Decay (9.3E15 y 19) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	322 5		
avg	93.3 17	100	0.199

• ^{113}Cd β^- Decay (13.7 y 4) I (min) = 0.10%
%β^- Decay = 99.977
%IT Decay = 0.023

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	586 5		
avg	185.4 19	100	0.395

• ^{113}In IT Decay (1.658 h 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.84	29.7 19	0.0018
Auger-K	20	4.2 9	0.0018
ce-K- 1	363.748 15	28.2 6	0.218
ce-L- 1	387.450 15	5.48 16	0.0452
ce-M- 1	390.862 15	1.11 3	0.0092
ce-NCP- 1	391.566 15	0.245 7	0.0020
X-ray L	3.29	2.3 8	0.0002
X-ray $K\alpha_2$	24.00200 2	6.8 3	0.0035
X-ray $K\alpha_1$	24.20970 2	12.9 6	0.0066
X-ray Kβ	27.3	4.27 19	0.0025
γ 1	391.688 15	64.9 7	0.541

• ^{113}Sn EC Decay (115.1 d 3) I (min) = 0.10%
% Feeding to ^{113}In (1.658 h) = 99.999996 2

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.84	85 6	0.0052
Auger-K	20	12.8 25	0.0055
X-ray L	3.29	6.7 23	0.0005
X-ray $K\alpha_2$	24.00200 2	20.7 8	0.0106
X-ray $K\alpha_1$	24.20970 2	39.0 14	0.0201
X-ray Kβ	27.3	12.9 5	0.0075
γ 1	255.120 20	1.93 10	0.0105

• ^{114}In EC Decay (71.9 s 1) I (min) = 0.10%
%EC Decay = 0.54 10
See also ^{114}In β^- Decay (71.9 s)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.72	0.82 10	≈0
Auger-K	19.3	0.13 3	≈0
X-ray $K\alpha_2$	22.98410 2	0.195 22	≈0
X-ray $K\alpha_1$	23.17360 2	0.37 4	0.0002
X-ray Kβ	26	0.120 14	≈0

2 weak γ's omitted:
Eγ(avg) = 567.1; ΣIγ = 0.01%

• ^{114}In β^- Decay (71.9 s 1) I (min) = 0.10%
%β^- Decay = 99.46 10
See also ^{114}In EC Decay (71.9 s)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	685 3		
avg	222.3 11	0.199 12	0.0009
β- 2 max	1985 3		
avg	776.9 13	99.26 10	1.64
total β- avg	775.8 13	99.46 10	1.64
γ 1	1299.83 7	0.199 14	0.0055

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)

● ^{114}In EC Decay (49.51 d 1) I (min) = 0.10%
%EC Decay = 4.5 3
See also ^{114}In IT Decay (49.51 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	2.72	3.9 4	0.0002
Auger-K	19.3	0.61 12	0.0003
X-ray L	3.13	0.28 10	≈0
X-ray Kα₂	22.98410 2	0.91 7	0.0004
X-ray Kα₁	23.17360 2	1.73 13	0.0009
X-ray Kβ	26	0.56 5	0.0003
γ 1	558.43 3	4.5 3	0.0533
γ 2	725.24 3	4.5 3	0.0693

● ^{114}In IT Decay (49.51 d 1) I (min) = 0.10%
%IT Decay = 95.5 3
Feeds ^{114}In (71.9 s)
See also ^{114}In EC Decay (49.51 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	2.84	64 3	0.0039
Auger-K	20	6.0 12	0.0026
ce-K- 1	162.33 3	39.9 7	0.138
ce-L- 1	186.03 3	31.7 7	0.126
ce-M- 1	189.44 3	6.65 19	0.0268
ce-NOP- 1	190.15 3	1.34 4	0.0054
X-ray L	3.29	5.1 17	0.0004
X-ray Kα₂	24.00200 2	9.7 4	0.0049
X-ray Kα₁	24.20970 2	18.2 8	0.0094
X-ray Kβ	27.3	6.1 3	0.0035
γ 1	190.27 3	15.9 4	0.0646

● ^{115}Cd β^- Decay (53.46 h 8) I (min) = 0.10%
% Feeding to ^{115}In (4.36 h) = 99.99993 1

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	2.84	4.6 3	0.0003
ce-K- 1	7.574 3	4.14 15	0.0007
Auger-K	20	0.62 13	0.0003
ce-L- 1	31.276 3	1.04 7	0.0007
ce-MNO- 1	34.688 3	0.272 21	0.0002
β− 1 max	583.4 20		
avg	184.6 8	35.2 12	0.138
β− 2 max	618.9 20		
avg	197.8 8	3.4 3	0.0143
β− 3 max	850.4 20		
avg	287.5 8	1.25 7	0.0077
β− 4 max	1111.3 20		
avg	394.4 9	60.1 12	0.505
total β−			
avg	312.5 10	100.0 18	0.665

3 weak β's omitted:
Eβ(avg) = 70.4; ΣIβ = 0.02%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
X-ray L	3.29	0.36 12	≈0
X-ray Kα₂	24.00200 2	1.00 6	0.0005
X-ray Kα₁	24.20970 2	1.89 10	0.0010
X-ray Kβ	27.3	0.63 4	0.0004
γ 1	35.514 3	0.446 16	0.0003
γ 2	231.443 3	0.78 3	0.0039
γ 4	260.896 3	2.06 8	0.0114
γ 10	492.351 4	8.5 3	0.0893
γ 11	527.901 7	29.1 11	0.328

12 weak γ's omitted:
Eγ(avg) = 296.9; ΣIγ = 0.11%

● ^{115}Cd β^- Decay (44.6 d 2) I (min) = 0.10%
% Feeding to ^{115}In (4.6E15 y) = 99.993

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
β− 1 max	202.7 21		
avg	55.8 6	0.196 4	0.0002
β− 2 max	330.4 21		
avg	96.0 7	0.605 15	0.0012
β− 3 max	687.2 21		
avg	241.7 8	1.145 6	0.0059
β− 4 max	1621.0 21		
avg	615.0 9	98	1.28
total β−			
avg	606.2 10	100.002 17	1.29

4 weak β's omitted:
Eβ(avg) = 124.7; ΣIβ = 0.06%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
γ 11	484.471 15	0.193 4	0.0020
γ 17	933.838 4	1.330 4	0.0265
γ 21	1290.585 11	0.592 15	0.0163

22 weak γ's omitted:
Eγ(avg) = 932.7; ΣIγ = 0.10%

● ^{115}In β^- Decay (4.6E15 y 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
β− 1 max	495 8		
avg	152 3	100	0.324

● ^{115}In IT Decay (4.36 h 10) I (min) = 0.10%
%IT Decay = 96.3 8
Feeds ^{115}In (4.6E15 y)
See also ^{115}In β^- Decay (4.36 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	2.84	42 3	0.0025
Auger-K	20	5.9 12	0.0025
ce-K- 1	308.361 3	39.2 8	0.257
ce-L- 1	332.063 3	8.27 25	0.0585
ce-M- 1	335.475 3	1.69 5	0.0120
ce-NOP- 1	336.179 3	0.373 12	0.0027
X-ray L	3.29	3.3 11	0.0002
X-ray Kα₂	24.00200 2	9.5 4	0.0049
X-ray Kα₁	24.20970 2	17.9 8	0.0092
X-ray Kβ	27.3	5.9 3	0.0035
γ 1	336.301 3	46.7 8	0.335

● ^{115}In β^- Decay (4.36 h 10) I (min) = 0.10%
%β^- Decay = 3.7 8
See also ^{115}In IT Decay (4.36 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	861 8		
avg	291 4	3.6 8	0.0223

1 weak β's omitted:
Eβ(avg)= 107.0; ΣIβ= 0.05%

1 weak γ's omitted:
Eγ(avg)= 497.4; ΣIγ= 0.05%

● ^{116}In β^- Decay (54.15 m 6) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3	1.13 10	≈0
Auger-K	21	0.16 4	≈0
ce-K- 5	109.126 8	0.86 8	0.0020
ce-L- 5	133.861 8	0.152 18	0.0004
ce-K- 15	387.79 4	0.297 18	0.0025
β- 1 max	304 8		
avg	87 3	0.36 4	0.0007
β- 2 max	354 8		
avg	104 3	2.69 13	0.0060
β- 3 max	395 8		
avg	118 3	0.44 6	0.0011
β- 4 max	599 8		
avg	190 3	10.2 5	0.0413
β- 5 max	871 8		
avg	295 4	32.8 14	0.206
β- 6 max	1009 8		
avg	351 4	50.8 20	0.380
total β-			
avg	306 4	97.4 25	0.636

1 weak β's omitted:
Eβ(avg)= 416.0; ΣIβ= 0.07%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray Kα2	25.04400 2	0.284 22	0.0002
X-ray Kα1	25.27130 2	0.53 4	0.0003
X-ray Kβ	28.5	0.180 14	0.0001
γ 5	138.326 8	3.30 17	0.0097
γ 9	262.95 8	0.144 17	0.0008
γ 12	303.80 7	0.118 17	0.0008
γ 14	355.36 4	0.84 6	0.0064
γ 15	416.99 4	27.8 14	0.247
γ 18	463.31 10	0.84 6	0.0083
γ 27	689.0 3	0.194 17	0.0029
γ 28	705.7 3	0.19 3	0.0028
γ 31	779.5 8	0.27 5	0.0045
γ 32	781.1 8	0.110 21	0.0018
γ 33	818.67 8	11.6 6	0.202
γ 37	972.550 25	0.46 4	0.0095
γ 39	1097.21 18	55.3 20	1.29
γ 42	1293.54 4	84.5 6	2.33
γ 44	1507.57 5	9.9 5	0.317
γ 46	1752.39 10	2.39 12	0.0893
γ 48	2112.30 8	15.4 7	0.692

32 weak γ's omitted:
Eγ(avg)= 707.4; ΣIγ= 1.34%

● ^{117}Cd β^- Decay (2.49 h 4) I (min) = 0.10%
% Feeding to ^{117}In (43.8 m) = 8.3 4
% Feeding to ^{117}In (116.5 m) = 91.7 4

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.84	7.3 6	0.0004
Auger-K	20	0.96 20	0.0004
ce-K- 1	43.180 20	0.155 23	0.0001
ce-K- 2	61.790 10	5.3 4	0.0070
ce-L- 2	85.492 10	1.69 12	0.0031
ce-MNO- 2	88.904 10	0.40 3	0.0008
ce-K- 12	245.409 18	0.95 15	0.0050
ce-L- 12	269.111 18	0.13 4	0.0008
β- 1 max	72 14		
avg	19 4	0.11 4	≈0
β- 2 max	183 14		
avg	50 5	0.35 9	0.0004
β- 3 max	200 14		
avg	55 5	0.40 7	0.0005
β- 4 max	216 14		
avg	60 5	6.6 3	0.0084
β- 5 max	356 14		
avg	105 5	1.87 15	0.0042
β- 6 max	415 14		
avg	125 5	0.13 9	0.0003
β- 7 max	418 14		
avg	126 5	1.64 13	0.0044
β- 8 max	464 14		
avg	141 5	1.49 13	0.0045
β- 9 max	506 14		
avg	156 5	2.15 15	0.0071
β-10 max	531 14		
avg	165 5	8.2 4	0.0288
β-11 max	636 14		
avg	204 6	32.2 11	0.140
β-12 max	743 14		
avg	245 6	0.55 9	0.0029
β-13 max	815 14		
avg	274 6	3.37 24	0.0197
β-14 max	916 14		
avg	314 6	0.34 11	0.0023
β-15 max	919 14		
avg	315 6	0.36 22	0.0024
β-16 max	974 14		
avg	337 6	0.11 7	0.0008
β-17 max	1089 14		
avg	385 6	0.12 4	0.0010
β-18 max	1152 14		
avg	411 6	0.30 5	0.0026
β-19 max	1779 14		
avg	685 7	13.0 9	0.190
β-20 max	1868 14		
avg	726 7	1.7 8	0.0263
β-21 max	1939 14		
avg	758 7	4.1 5	0.0662
β-22 max	2213 14		
avg	882 7	21.0 20	0.395
total β-			
avg	425 11	100 3	0.907
X-ray L	3.29	0.57 20	≈0
X-ray Kα2	24.00200 2	1.55 11	0.0008
X-ray Kα1	24.20970 2	2.92 21	0.0015
X-ray Kβ	27.3	0.97 7	0.0006
γ 1	71.120 20	0.39 6	0.0006
γ 2	89.730 10	3.26 22	0.0062
γ 6	160.8 3	0.25 12	0.0009
γ 10	220.92 3	1.17 9	0.0055
γ 12	273.349 18	27.9 8	0.162
γ 14	279.80 10	0.11 6	0.0007

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
^{117}Cd β^- Decay (2.49 h 4) (Continued)			
γ 16	292.05 3	0.64 9	0.0040
γ 20	344.459 10	17.9 7	0.131
γ 22	387.96 4	0.31 6	0.0025
γ 23	397.20 10	0.20 6	0.0017
γ 25	419.79 4	0.18 4	0.0016
γ 26	434.190 17	9.8 5	0.0906
γ 27	439.39 7	0.11 6	0.0010
γ 29	463.04 3	0.75 6	0.0074
γ 30	497.77 10	0.11 6	0.0012
γ 33	527.0 5	0.14 6	0.0016
γ 35	627.01 11	0.11 3	0.0015
γ 37	660.83 8	0.11 3	0.0016
γ 39	699.58 8	0.24 4	0.0036
γ 40	712.71 5	0.56 17	0.0085
γ 41	716.43 7	0.20 4	0.0031
γ 42	728.64 7	0.24 4	0.0037
γ 44	748.06 3	0.56 20	0.0089
γ 47	831.80 3	2.26 11	0.0400
γ 48	840.21 4	0.81 6	0.0145
γ 49	850.72 8	0.12 4	0.0022
γ 50	861.3 4	0.28 20	0.0051
γ 51	862.60 5	0.61 6	0.0113
γ 52	880.710 17	3.96 23	0.0743
γ 53	945.67 3	1.53 10	0.0309
γ 54	949.63 8	0.22 4	0.0045
γ 55	952.33 8	0.14 4	0.0028
γ 56	963.11 6	0.61 6	0.0126
γ 59	969.30 5	0.45 6	0.0092
γ 65	1035.61 7	0.24 4	0.0053
γ 67	1051.70 10	3.79 23	0.0850
γ 68	1052.70 10	0.73 17	0.0163
γ 70	1116.60 5	1.03 7	0.0246
γ 71	1120.05 7	0.24 4	0.0057
γ 72	1125.10 6	0.45 6	0.0107
γ 73	1142.43 3	1.67 13	0.0407
γ 74	1143.5 3	0.14 6	0.0034
γ 75	1183.40 10	0.13 4	0.0033
γ 76	1229.11 7	0.61 6	0.0161
γ 77	1232.30 20	0.28 6	0.0073
γ 78	1247.89 4	1.20 7	0.0319
γ 80	1260.00 3	1.14 7	0.0307
γ 81	1272.73 3	0.73 6	0.0197
γ 83	1291.00 4	0.67 6	0.0184
γ 84	1294.3 3	0.446 13	0.0123
γ 85	1303.27 3	18.4 7	0.510
γ 86	1314.71 6	0.59 6	0.0164
γ 89	1337.57 7	1.62 12	0.0461
γ 90	1362.40 8	0.24 4	0.0070
γ 91	1404.40 10	0.12 3	0.0036
γ 92	1408.72 3	1.28 7	0.0385
γ 93	1422.27 6	0.33 6	0.0101
γ 94	1430.97 5	0.98 7	0.0298
γ 95	1433.50 20	0.11 9	0.0034
γ 96	1450.15 7	0.61 6	0.0190
γ 98	1475.46 7	0.42 6	0.0132
γ 101	1562.24 4	1.42 7	0.0473
γ 103	1576.62 3	11.2 4	0.376
γ 104	1578.4 3	0.14 6	0.0047
γ 108	1652.10 20	0.28 12	0.0098
γ 109	1682.07 5	0.70 6	0.0250
γ 111	1706.93 4	1.00 7	0.0365
γ 112	1723.06 3	2.01 11	0.0737
γ 113	1739.13 9	0.13 4	0.0047
γ 116	1856.40 10	0.25 6	0.0099
γ 117	1867.30 10	0.11 3	0.0042
γ 118	2012.49 8	0.109 23	0.0047

47 weak γ's omitted:
Eγ(avg)= 959.7; ΣIγ= 2.12%

• ^{117}Cd β^- Decay (3.36 h 5) I (min) = 0.10%
% Feeding to ^{117}In (43.8 m) = 98.5 2
% Feeding to ^{117}In (116.5 m) = 1.5 2

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	2.84	1.0 5	≈0
Auger-K	20	0.14 7	≈0
ce-K- 3	69.76 4	0.9 5	0.0014
ce-L- 3	93.46 4	0.22 16	0.0004
β^- 1 max	124 14		
avg	33 4	0.23 6	0.0002
β^- 2 max	188 14		
avg	51 5	0.24 4	0.0003
β^- 3 max	202 14		
avg	56 5	0.212 24	0.0003
β^- 4 max	247 14		
avg	69 5	1.70 11	0.0025
β^- 5 max	259 14		
avg	73 5	3.7 4	0.0058
β^- 6 max	264 14		
avg	75 5	1.23 11	0.0020
β^- 7 max	342 14		
avg	100 5	8.6 3	0.0183
β^- 8 max	568 14		
avg	179 6	8.34 24	0.0318
β^- 9 max	569 14		
avg	179 6	21.6 9	0.0824
β^-10 max	667 14		
avg	216 6	46.9 13	0.216
β^-11 max	707 14		
avg	231 6	1.02 16	0.0050
β^-12 max	1231 14		
avg	445 6	1.5 9	0.0142
β^-13 max	1430 14		
avg	531 7	0.9 5	0.0102
β^-14 max	1455 14		
avg	542 7	0.47 24	0.0054
β^-15 max	1598 14		
avg	605 7	1.4 8	0.0180
β^-16 max	1916 14		
avg	750 7	1.2 11	0.0192
total β^-			
avg	204 7	99.2 25	0.431
X-ray $K\alpha_2$	24.00200 2	0.23 11	0.0001
X-ray $K\alpha_1$	24.20970 2	0.43 20	0.0002
X-ray $K\beta$	27.3	0.14 7	≈0
γ 3	97.70 4	1.05 14	0.0022
γ 4	99.40 10	0.10 6	0.0002
γ 9	168.63 5	0.29 6	0.0010
γ 11	220.92 3	0.24 16	0.0011
γ 12	273.349 18	0.29 14	0.0017
γ 13	292.05 3	0.10 11	0.0007
γ 14	299.45 10	0.45 8	0.0028
γ 15	310.26 15	0.50 11	0.0033
γ 18	325.30 20	0.13 6	0.0009
γ 19	344.459 10	0.26 16	0.0019
γ 20	366.91 3	3.33 24	0.0260
γ 24	439.39 7	0.18 8	0.0017
γ 26	460.94 4	1.62 14	0.0159
γ 28	484.79 3	1.02 14	0.0106
γ 30	545.0 4	0.16 8	0.0018
γ 31	564.397 16	14.7 8	0.176
γ 32	597.34 20	0.131 1	0.0017
γ 33	617.50 7	0.34 8	0.0045
γ 34	627.26 15	0.236 3	0.0032
γ 35	631.80 4	2.80 19	0.0377
γ 36	663.50 6	0.68 8	0.0096
γ 38	712.71 5	1.00 14	0.0151
γ 39	730.8 4	0.104 1	0.0016

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 40	748.06 3	4.5 11	0.0710
γ 41	762.72 4	1.73 14	0.0281
γ 42	788.16 13	0.50 11	0.0084
γ 43	827.60 10	0.26 8	0.0046
γ 44	860.41 4	7.9 3	0.145
γ 45	880.710 17	0.7 3	0.0133
γ 46	886.00 10	0.39 8	0.0074
γ 48	929.30 10	0.79 14	0.0156
γ 49	931.37 4	3.64 24	0.0722
γ 50	957.20 10	0.39 11	0.0080
γ 52	1029.06 3	11.7 4	0.256
γ 54	1065.98 3	23.1 6	0.523
γ 55	1170.71 10	0.65 14	0.0163
γ 56	1196.20 10	0.39 11	0.0100
γ 57	1205.5 3	0.13 4	0.0034
γ 59	1209.0 4	0.13 8	0.0034
γ 60	1209.0 4	0.18 8	0.0047
γ 61	1234.59 3	11.0 4	0.289
γ 62	1256.90 20	0.18 8	0.0049
γ 63	1339.3 5	2.07 24	0.0590
γ 64	1365.54 5	1.65 11	0.0480
γ 66	1432.91 3	13.4 4	0.410
γ 68	1652.24 11	0.47 11	0.0166
γ 69	1669.5 3	0.63 8	0.0224
γ 70	1957.50 20	0.16 4	0.0066
γ 71	1997.33 3	26.2 3	1.11
γ 72	2096.40 4	7.44 18	0.332
γ 73	2322.75 8	7.86 21	0.389
γ 74	2400.45 16	0.76 6	0.0388
γ 76	2417.40 10	1.02 6	0.0526
γ 78	2462.5 3	0.212 24	0.0111
γ 79	2476.20 20	0.186 19	0.0098
γ 80	2540.73 14	0.149 19	0.0081

24 weak γ's omitted:
Eγ(avg) = 865.4; ΣIγ = 0.71%

• ^{117}In β⁻ Decay (43.8 m 7) I (min) = 0.10%

% Feeding to ^{117}Sn (13.60 d) = 0.32

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3	11.7 7	0.0007
Auger-K	21	1.7 4	0.0008
ce-K- 2	129.362 15	11.6 3	0.0320
ce-L- 2	154.097 15	1.47 4	0.0048
ce-MNO- 2	157.678 15	0.352 11	0.0012
ce-K- 4	523.80 10	0.48 5	0.0053
β⁻ 1 max	743 8		
avg	245 4	99.83	0.521
β⁻ 2 max	1140 8		
avg	406 4	0.17	0.0015
total β⁻			
avg	245 4	100	0.522
X-ray L	3.44	1.0 4	≈0
X-ray Kα₂	25.04400 2	2.96 13	0.0016
X-ray Kα₁	25.27130 2	5.55 24	0.0030
X-ray Kβ	28.5	1.87 9	0.0011
γ 2	158.562 15	86 9	0.292
γ 3	396.6 4	0.14 4	0.0012
γ 4	553.00 10	99 10	1.17

• ^{117}In IT Decay (116.5 m 7) I (min) = 0.10%

%IT Decay = 47.1 15
Feeds ^{117}In (43.8 m)
See also ^{117}In β⁻ Decay (116.5 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	2.84	23.3 16	0.0014
Auger-K	20	3.3 7	0.0014
ce-K- 1	287.362 13	21.7 8	0.133
ce-L- 1	311.064 13	4.76 21	0.0315
ce-M- 1	314.476 13	0.97 5	0.0065
ce-NOP- 1	315.180 13	0.215 10	0.0014
X-ray L	3.29	1.8 7	0.0001
X-ray Kα₂	24.00200 2	5.3 3	0.0027
X-ray Kα₁	24.20970 2	9.9 5	0.0051
X-ray Kβ	27.3	3.29 18	0.0019
γ 1	315.302 13	19.5 7	0.131

• ^{117}In β⁻ Decay (116.5 m 7) I (min) = 0.10%

%β⁻ Decay = 52.9 15
See also ^{117}In IT Decay (116.5 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3	2.08 24	0.0001
Auger-K	21	0.30 7	0.0001
ce-K- 1	129.362 15	2.14 24	0.0059
ce-L- 1	154.097 15	0.27 3	0.0009
β⁻ 1 max	1612 8		
avg	610 4	18.3 19	0.238
β⁻ 2 max	1770 8		
avg	680 4	34.5 25	0.500
total β⁻			
avg	655 4	53 4	0.738

2 weak β's omitted:
Eβ(avg) = 249.4; ΣIβ = 0.03%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	3.44	0.18 7	≈0
X-ray Kα₂	25.04400 2	0.52 6	0.0003
X-ray Kα₁	25.27130 2	0.98 12	0.0005
X-ray Kβ	28.5	0.33 4	0.0002
γ 1	158.562 15	15.9 17	0.0536

4 weak γ's omitted:
Eγ(avg) = 918.6; ΣIγ = 0.03%

• ^{117}Sn IT Decay (13.60 d 4) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3	91 5	0.0057
Auger-K	21	10.8 22	0.0048
ce-K- 1	126.82 3	64.8 7	0.175
ce-K- 2	129.362 15	11.7 3	0.0322
ce-L- 1	151.56 3	26.1 6	0.0843
ce-L- 2	154.097 15	1.48 4	0.0049
ce-M- 1	155.14 3	5.64 16	0.0186
ce-NOP- 1	155.88 3	1.35 4	0.0045
ce-MNO- 2	157.678 15	0.354 11	0.0012

(Continued)

^{117}Sn IT Decay (13.60 d 4) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	3.44	8 3	0.0006
X-ray $K\alpha_2$	25.04400 2	18.7 7	0.0100
X-ray $K\alpha_1$	25.27130 2	35.1 13	0.0189
X-ray Kβ	28.5	11.8 5	0.0072
γ 1	156.02 3	2.11 6	0.0070
γ 2	158.562 15	86.4 4	0.292

● ^{117}Sb EC Decay (2.80 h 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	3	94 6	0.0059
Auger-K	21	14 3	0.0061
ce-K- 2	129.362 15	11.6 4	0.0320
ce-L- 2	154.097 15	1.47 5	0.0048
ce-MNO- 2	157.678 15	0.353 1	0.0012
β+ 1 max	564 18		
avg	258 8	1.70 22	0.0093
X-ray L	3.44	8 3	0.0006
X-ray $K\alpha_2$	25.04400 2	23.5 9	0.0125
X-ray $K\alpha_1$	25.27130 2	44.1 16	0.0237
X-ray Kβ	28.5	14.9 6	0.0090
γ 2	158.562 15	86.1 4	0.291
γ 6	861.35 5	0.31 4	0.0057
γ 7	1004.51 15	0.21 3	0.0044
γ 8	1020.6 5	0.103 18	0.0022
γ 9	1021.0 5	0.112 18	0.0024

11 weak γ's omitted:
Eγ(avg) = 1037.4; ΣIγ = 0.26%
Maximum γ±-intensity = 3.40%

● ^{119}Sn IT Decay (293.0 d 13) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	3	137 5	0.0086
ce-L- 1	19.405 8	66.6 7	0.0275
Auger-K	21	4.5 9	0.0020
ce-MNO- 1	22.986 8	17.3 4	0.0085
ce-K- 2	36.460 10	32.2 7	0.0250
ce-L- 2	61.195 10	52.3 7	0.0682
ce-M- 2	64.776 10	12.4 3	0.0171
ce-NOP- 2	65.523 10	3.10 9	0.0043
X-ray L	3.44	12 4	0.0009
γ 1	23.870 8	16.1 4	0.0082
X-ray $K\alpha_2$	25.04400 2	7.9 4	0.0042
X-ray $K\alpha_1$	25.27130 2	14.8 6	0.0080
X-ray Kβ	28.5	4.99 22	0.0030

1 weak γ's omitted:
Eγ(avg) = 65.7; ΣIγ = 0.02%

● ^{121}Te EC Decay (16.8 d 4) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	3	84 5	0.0055
ce-K- 1	6.647 10	1.12 3	0.0002
Auger-K	21.8	11.6 25	0.0054
ce-L- 1	32.440 10	0.145 6	0.0001
ce-K- 2	35.057 13	0.49 3	0.0004
ce-K- 4	477.100 11	0.127 3	0.0013
ce-K- 5	542.648 11	0.367 14	0.0042
X-ray L	3.6	8 3	0.0006
X-ray $K\alpha_2$	26.11080 2	21.4 8	0.0119
X-ray $K\alpha_1$	26.35910 2	40.2 14	0.0225
X-ray Kβ	29.7	13.7 6	0.0087
γ 1	37.138 10	0.117 4	≈0
γ 2	65.548 13	0.259 9	0.0004
γ 3	470.472 13	1.41 4	0.0141
γ 4	507.591 11	17.7 4	0.191
γ 5	573.139 11	80.3 18	0.980

● ^{121}Te EC Decay (154 d 7) I (min) = 0.10%
%EC Decay = 11.4 11
See also ^{121}Te IT Decay (154 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	3	18.0 19	0.0012
ce-K- 1	6.647 10	9.0 13	0.0013
Auger-K	21.8	2.5 6	0.0011
ce-L- 1	32.440 10	1.17 17	0.0008
ce-MNO- 1	36.194 10	0.31 5	0.0002
X-ray L	3.6	1.7 6	0.0001
X-ray $K\alpha_2$	26.11080 2	4.6 5	0.0026
X-ray $K\alpha_1$	26.35910 2	8.6 9	0.0048
X-ray Kβ	29.7	2.9 4	0.0019
γ 1	37.138 10	0.94 14	0.0007
γ 8	1102.149 18	2.5 3	0.0596

8 weak γ's omitted:
Eγ(avg) = 953.6; ΣIγ = 0.16%

● ^{121}Te IT Decay (154 d 7) I (min) = 0.10%
%IT Decay = 88.6 11
Feeds ^{121}Te (16.8 d)
See also ^{121}Te EC Decay (154 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	3.19	72 4	0.0049
Auger-K	22.7	5.1 12	0.0025
ce-K- 1	49.974 15	34.5 8	0.0367
ce-L- 1	76.849 15	41.6 8	0.0680
ce-M- 1	80.782 15	9.9 3	0.0171
ce-NOP- 1	81.620 15	2.65 9	0.0046
ce-K- 2	180.38 3	6.12 19	0.0235
ce-L- 2	207.25 3	0.81 3	0.0036
ce-MNO- 2	211.18 3	0.214 7	0.0010
X-ray L	3.77	7.1 24	0.0006
X-ray $K\alpha_2$	27.20170 2	10.1 4	0.0059
X-ray $K\alpha_1$	27.47230 2	18.9 8	0.0110
X-ray Kβ	31	6.5 3	0.0043
γ 2	212.19 3	81.5 11	0.368

1 weak γ's omitted:
Eγ(avg) = 81.8; ΣIγ = 0.05%

● ^{122}Sb EC Decay (2.70 d 1) I (min) = 0.10%
%EC Decay = 2.42 12
See also ^{122}Sb β^- Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3	2.02 17	0.0001
Auger-K	21	0.29 7	0.0001
X-ray L	3.44	0.18 6	≈0
X-ray Kα$_2$	25.04400 2	0.50 4	0.0003
X-ray Kα$_1$	25.27130 2	0.94 8	0.0005
X-ray Kβ	28.5	0.32 3	0.0002
γ 1	1140.2 10	0.77 9	0.0188

● ^{122}Sb β^- Decay (2.70 d 1) I (min) = 0.10%
%β^- Decay = 97.58 12
See also ^{122}Sb EC Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.19	0.293 21	≈0
ce-K- 1	532.12 19	0.353 11	0.0040
β- 1 max	724 4		
avg	236.5 15	4.5 3	0.0227
β- 2 max	1417 4		
avg	522.4 17	67.3 5	0.749
β- 3 max	1981 4		
avg	772.1 17	25.7 5	0.423
total β-			
avg	574.9 18	97.5 8	1.19

2 weak β's omitted:
Eβ(avg)= 138.8; ΣIβ= 0.02%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray Kα$_1$	27.47230 2	0.164 8	≈0
γ 1	563.93 19	70.6 4	0.849
γ 2	692.8 3	3.7 3	0.0553
γ 5	1257.0 3	0.78 7	0.0208

3 weak γ's omitted:
Eγ(avg)= 1179.2; ΣIγ= 0.02%

● ^{122}I β^+ Decay (3.62 m 6) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.19	19.8 16	0.0013
Auger-K	22.7	2.6 6	0.0013
ce-K- 1	532.12 19	0.105 21	0.0012
β+ 1 max	1180 40		
avg	528 18	0.16 4	0.0018
β+ 2 max	1760 40		
avg	789 19	0.54 13	0.0091
β+ 3 max	1860 40		
avg	834 19	0.26 8	0.0046
β+ 4 max	2550 40		
avg	1152 19	12 3	0.294
β+ 5 max	3120 40		
avg	1414 19	63 4	1.90
total β+			
avg	1363 20	76 5	2.21

10 weak β's omitted:
Eβ(avg)= 443.1; ΣIβ= 0.07%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	3.77	2.0 7	0.0002
X-ray Kα$_2$	27.20170 2	5.2 4	0.0030
X-ray Kα$_1$	27.47230 2	9.7 7	0.0057
X-ray Kβ	31	3.37 24	0.0022
γ 1	563.93 19	21 4	0.252
γ 3	683.5 3	0.97 20	0.0141
γ 4	692.8 3	1.5 3	0.0220
γ 5	793.2 3	1.7 4	0.0280
γ 8	1075.2	0.34 7	0.0077
γ 11	1257.0 3	0.31 7	0.0084
γ 15	1499.5 3	0.18 4	0.0058
γ 19	1747.2 3	0.38 9	0.0141
γ 22	1843.8 3	0.16 4	0.0062
γ 28	2193.0 4	0.36 8	0.0167

37 weak γ's omitted:
Eγ(avg)= 1861.9; ΣIγ= 0.81%
Maximum γ±-intensity =152.06%

● ^{122}Xe EC Decay (20.1 h 1) I (min) = 0.10%
Feeds ^{122}I

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.3	84 13	0.0059
Auger-K	23.6	10 3	0.0052
ce-K- 2	24.93 20	0.31 11	0.0002
ce-K- 3	28.63 20	1.2 3	0.0007
ce-K- 5	39.43 20	0.40 10	0.0003
ce-L- 2	52.91 20	0.14 12	0.0002
ce-L- 3	56.61 20	0.19 6	0.0002
ce-K- 6	57.53 20	0.71 18	0.0009
ce-L- 6	85.51 20	0.15 8	0.0003
ce-K- 10	115.63 20	0.81 19	0.0020
ce-L- 10	143.61 20	0.11 3	0.0003
ce-K- 18	317.03 20	0.20 4	0.0013
X-ray L	4	9 4	0.0007
X-ray Kα$_2$	28.3172 4	22 4	0.0134
X-ray Kα$_1$	28.6120 3	41 7	0.0252
X-ray Kβ	32.3	14.5 24	0.0100
γ 3	61.80 20	0.44 10	0.0006
γ 5	72.60 20	0.23 5	0.0004
γ 6	90.70 20	0.72 15	0.0014
γ 9	116.3 3	0.12 3	0.0003
γ 10	148.80 20	3.7 9	0.0117
γ 11	163.30 20	0.17 4	0.0006
γ 12	174.7 4	0.18 6	0.0007
γ 13	175.7 4	0.39 9	0.0014
γ 14	187.10 20	0.74 16	0.0029
γ 15	201.60 20	0.16 4	0.0007
γ 16	253.70 20	0.14 4	0.0007
γ 17	288.40 20	0.55 13	0.0034
γ 18	350.20 20	9.2 18	0.0686
γ 19	355.2 3	0.21 5	0.0016
γ 20	416.90 20	2.1 5	0.0184

5 weak γ's omitted:
Eγ(avg)= 79.4; ΣIγ= 0.27%

● ^{123}Sn β^- Decay (129.2 d 4) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	308 4		
avg	88.6 13	0.6	0.0011
β- 2 max	1397 4		
avg	523.1 17	99.4	1.11
total β- avg	520.3 18	100	1.11

4 weak β's omitted:
Eβ(avg)= 101.8; ΣIβ= 0.03%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 4	1088.64 10	0.6	0.0139

8 weak γ's omitted:
Eγ(avg)= 992.9; ΣIγ= 0.04%

● ^{123}Te EC Decay (~1E13 y) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3	78 6	0.0051
Auger-K	21.8	7.3 17	0.0034
X-ray L	3.6	7.2 25	0.0006
X-ray $K\alpha_2$	26.11080 2	13.6 11	0.0075
X-ray $K\alpha_1$	26.35910 2	25.4 21	0.0143
X-ray Kβ	29.7	8.7 8	0.0055

● ^{123}Te IT Decay (119.7 d 1) I (min) = 0.10%
Feeds ^{123}Te (1E13 y)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.19	88 4	0.0060
Auger-K	22.7	7.0 16	0.0034
ce-K- 1	56.65 3	42.7 7	0.0515
ce-L- 1	83.52 3	44.1 7	0.0785
ce-M- 1	87.45 3	10.4 3	0.0194
ce-NCP- 1	88.29 3	2.76 8	0.0052
ce-K- 2	127.19 3	13.7 4	0.0371
ce-L- 2	154.06 3	1.77 5	0.0058
ce-MNO- 2	157.99 3	0.436 13	0.0015
X-ray L	3.77	9 3	0.0007
X-ray $K\alpha_2$	27.20170 2	14.0 6	0.0081
X-ray $K\alpha_1$	27.47230 2	26.2 10	0.0153
X-ray Kβ	31	9.1 4	0.0060
γ 2	159.00 3	84.1 4	0.285

2 weak γ's omitted:
Eγ(avg)= 89.1; ΣIγ= 0.09%

● ^{123}I EC Decay (13.13 h 10) I (min) = 0.10%
% Feeding to ^{123}Te (1E13 y) = 99.9957 4

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.19	94 6	0.0064
Auger-K	22.7	12 3	0.0060
ce-K- 2	127.19 3	13.59 11	0.0368
ce-L- 2	154.06 3	1.760 19	0.0058
ce-MNO- 2	157.99 3	0.433 5	0.0015
X-ray L	3.77	9 4	0.0007
X-ray $K\alpha_2$	27.20170 2	24.6 9	0.0143
X-ray $K\alpha_1$	27.47230 2	46.0 16	0.0269
X-ray Kβ	31	16.0 6	0.0105
γ 2	159.00 3	83.4 4	0.282
γ 20	346.35 5	0.126 5	0.0009
γ 23	440.02 5	0.429 14	0.0040
γ 26	505.33 5	0.316 10	0.0034
γ 27	528.96 5	1.39 5	0.0157
γ 28	538.54 5	0.382 13	0.0044

40 weak γ's omitted:
Eγ(avg)= 494.4; ΣIγ= 0.48%

● ^{123}Xe β^+ Decay (2.14 h 5) I (min) = 0.10%
Feeds ^{123}I

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.3	81 5	0.0057
Auger-K	23.6	9.9 24	0.0050
ce-K- 3	115.73 20	15.9 6	0.0392
ce-L- 3	143.71 20	3.95 15	0.0121
ce-K- 4	144.93 20	2.3 5	0.0072
ce-M- 3	147.83 20	0.82 3	0.0026
ce-NCP- 3	148.71 20	0.192 7	0.0006
ce-L- 4	172.91 20	0.41 18	0.0015
ce-MNO- 4	177.03 20	0.10 5	0.0004
ce-K- 6	297.03 20	0.210 13	0.0013
β+ 1 max	1324 15		
avg	593 7	1.06 13	0.0134
β+ 2 max	1476 15		
avg	661 7	3.9 4	0.0549
β+ 3 max	1505 15		
avg	674 7	17.2 6	0.247
total β+ avg	666 7	22.3 8	0.316

8 weak β's omitted:
Eβ(avg)= 257.4; ΣIβ= 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	4	8 3	0.0007
X-ray $K\alpha_2$	28.3172 4	21.0 8	0.0127
X-ray $K\alpha_1$	28.6120 3	39.1 15	0.0238
X-ray Kβ	32.3	13.7 6	0.0094
γ 2	138.10 20	0.240 25	0.0007
γ 3	148.90 20	48.0 10	0.152
γ 4	178.10 20	14.6 8	0.0555
γ 6	330.20 20	8.4 6	0.0591
γ 7	474.20 20	0.101 15	0.0010
γ 9	680.50 20	0.197 15	0.0029
γ 10	691.5 3	0.110 15	0.0016
γ 11	718.50 20	0.168 15	0.0026
γ 12	728.30 20	0.120 15	0.0019
γ 14	782.90 20	0.44 5	0.0073
γ 24	870.7 3	0.28 4	0.0052
γ 25	899.6 4	2.40 25	0.0460
γ 28	934.9 3	0.31 4	0.0061
γ 31	964.0 3	0.53 5	0.0108
γ 32	979.4 3	0.28 4	0.0058
γ 34	1011.3 5	0.43 5	0.0093
γ 35	1013.5 5	0.115 15	0.0025
γ 37	1048.9 3	0.134 15	0.0030
γ 38	1060.7 4	0.77 10	0.0174
γ 39	1064.3 4	0.65 8	0.0147
γ 40	1093.4 3	2.74 25	0.0637
γ 41	1113.1 3	1.54 15	0.0364
γ 44	1161.3 3	0.101 10	0.0025
γ 48	1242.0 4	0.110 2	0.0029

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 49	1242.0 4	0.442 10	0.0117
γ 53	1310.3 3	0.130 10	0.0036
γ 56	1390.9 3	0.115 10	0.0034
γ 58	1534.9 3	0.30 3	0.0097
γ 59	1603.9 3	0.168 15	0.0057
γ 60	1625.9 3	0.58 5	0.0199
γ 61	1656.8 4	0.130 15	0.0046
γ 62	1686.8 3	0.60 8	0.0216
γ 63	1715.9 3	0.187 25	0.0068
γ 64	1732.2 3	0.139 20	0.0051
γ 68	1807.3 3	1.22 13	0.0471
γ 69	1822.3 3	0.120 15	0.0047
γ 72	1884.5 3	0.62 8	0.0250
γ 75	1934.2 3	0.216 25	0.0089
γ 77	1974.3 3	0.134 20	0.0057
γ 79	2003.3 4	0.182 25	0.0078
γ 80	2037.6 4	0.24 3	0.0104
γ 84	2071.9 4	0.163 20	0.0072
γ 85	2101.3 4	0.154 20	0.0069

67 weak γ's omitted:
Eγ(avg) = 1446.8; ΣIγ = 2.70%
Maximum γ±-intensity = 44.52%

• ^{124}Sb β^- Decay (60.20 d 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.19	0.340 24	≈0
ce-K- 16	570.894 23	0.411 13	0.0050
β- 1 max	130.1 19		
avg	34.6 6	0.52 4	0.0004
β- 2 max	203.2 19		
avg	55.9 6	0.502 23	0.0006
β- 3 max	211.3 19		
avg	58.3 6	8.76 19	0.0109
β- 4 max	421.6 19		
avg	126.2 7	0.37 10	0.0010
β- 5 max	611.3 19		
avg	194.0 7	52.8 6	0.218
β- 6 max	722.4 19		
avg	236.0 8	0.258 11	0.0013
β- 7 max	813.2 19		
avg	271.3 8	0.64 5	0.0037
β- 8 max	865.7 19		
avg	292.0 8	4.09 17	0.0254
β- 9 max	947.1 19		
avg	324.7 8	2.13 10	0.0147
β-10 max	1579.5 19		
avg	593.4 9	5.14 22	0.0650
β-11 max	1656.4 19		
avg	627.3 9	2.53 13	0.0338
β-12 max	2302.3 19		
avg	918.6 9	21.9 7	0.428
total β-			
avg	377.6 14	100.0 10	0.805

8 weak β's omitted:
Eβ(avg) = 138.8; ΣIβ = 0.39%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray $K\alpha_2$	27.20170 2	0.102 5	≈0
X-ray $K\alpha_1$	27.47230 2	0.191 9	0.0001
γ 7	400.03 6	0.129 15	0.0011
γ 8	443.99 5	0.21 8	0.0019
γ 14	525.50 10	0.17 5	0.0019
γ 16	602.708 23	97.87 8	1.26
γ 17	632.36 10	0.147 20	0.0020
γ 18	645.85 3	7.26 11	0.0999
γ 20	709.31 5	1.42 5	0.0214
γ 21	713.82 4	2.38 10	0.0362
γ 22	722.78 4	11.10 10	0.171
γ 23	735.67 10	0.127 10	0.0020
γ 27	790.74 5	0.744 10	0.0125
γ 34	968.20 4	1.92 5	0.0396
γ 38	1045.16 5	1.86 4	0.0414
γ 51	1325.50 4	1.50 8	0.0423
γ 52	1355.24 5	1.00 6	0.0288
γ 54	1368.21 5	2.51 13	0.0730
γ 55	1376.25 6	0.440 20	0.0129
γ 58	1436.60 5	1.14 11	0.0347
γ 59	1445.15 11	0.215 20	0.0066
γ 61	1489.06 8	0.63 5	0.0199
γ 63	1526.35 9	0.401 10	0.0130
γ 66	1579.90 20	0.196 10	0.0066
γ 70	1691.02 4	49.0 6	1.77
γ 79	2091.00 5	5.73 14	0.255

68 weak γ's omitted:
Eγ(avg) = 1208.5; ΣIγ = 1.34%

• ^{124}I β^+ Decay (4.18 d 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.19	63 5	0.0043
Auger-K	22.7	8.3 19	0.0040
ce-K- 16	570.894 23	0.248 23	0.0030
β+ 1 max	809 4		
avg	365.7 18	0.27 3	0.0021
β+ 2 max	1532 4		
avg	685.9 18	11.0 10	0.161
β+ 3 max	2135 4		
avg	973.6 18	12.0 19	0.249
total β+			
avg	830.5 19	23.3 22	0.412
X-ray L	3.77	6.2 22	0.0005
X-ray $K\alpha_2$	27.20170 2	16.5 11	0.0096
X-ray $K\alpha_1$	27.47230 2	30.8 20	0.0180
X-ray Kβ	31	10.7 7	0.0071
γ 13	541.20 10	0.183 17	0.0021
γ 14	554.0 10	0.10 4	0.0012
γ 16	602.708 23	59 5	0.757
γ 18	645.85 3	0.92 9	0.0127
γ 20	695.0 10	0.18 7	0.0027
γ 23	713.82 4	0.106 15	0.0016
γ 24	722.78 4	9.7 9	0.150
γ 37	968.20 4	0.40 4	0.0083
γ 38	976.32 14	0.100 15	0.0021
γ 41	1045.16 5	0.41 5	0.0092
γ 42	1054.00 20	0.118 12	0.0026
γ 49	1325.50 4	1.40 13	0.0395
γ 52	1368.21 5	0.28 3	0.0081
γ 53	1376.25 6	1.62 14	0.0476
γ 58	1489.06 8	0.177 17	0.0056
γ 59	1509.49 4	2.91 25	0.0937
γ 60	1559.80 20	0.16 3	0.0053
γ 62	1637.7 5	0.189 20	0.0066
γ 64	1675.8 4	0.11 3	0.0038
γ 65	1691.02 4	10.1 9	0.366
γ 67	1720.20 8	0.165 19	0.0061
γ 70	1851.50 20	0.20 3	0.0079
γ 71	1918.58 4	0.165 23	0.0068
γ 73	2038.3 3	0.33 4	0.0143
γ 75	2078.86 7	0.34 3	0.0149
γ 76	2091.00 5	0.55 5	0.0247
γ 77	2099.09 9	0.136 13	0.0061
γ 78	2144.320 10	0.106 11	0.0049

(Continued)

^{124}I β^+ Decay (4.18 d 3) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
γ 80	2232.25 7	0.55 5	0.0264
γ 82	2283.25 8	0.64 7	0.0313
γ 89	2746.90 10	0.45 5	0.0262

59 weak γ's omitted:
Eγ(avg) = 1139.6; ΣIγ = 1.27%
Maximum γ±-intensity = 46.55%

• ^{125}Sn β^- Decay (9.64 d 3) I (min) = 0.10%
Feeds ^{125}Sb

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β⁻ 1 max	62 6		
avg	16.0 16	0.22 7	≈0
β⁻ 2 max	75 6		
avg	19.5 17	0.19 6	≈0
β⁻ 3 max	96 6		
avg	25.2 17	0.11 4	≈0
β⁻ 4 max	110 6		
avg	28.9 17	0.53 16	0.0003
β⁻ 5 max	348 6		
avg	101.7 20	2.2 7	0.0048
β⁻ 6 max	367 6		
avg	108.0 20	3.9 12	0.0090
β⁻ 7 max	460 6		
avg	139.8 21	5.9 18	0.0176
β⁻ 8 max	544 6		
avg	169.6 22	0.13 5	0.0005
β⁻ 9 max	1001 6		
avg	347.3 25	0.31 10	0.0023
β⁻10 max	1261 6		
avg	456 3	2.7 9	0.0262
β⁻11 max	2350 6		
avg	938 3	83 5	1.66
total β⁻			
avg	813 5	99 6	1.72

3 weak β's omitted:
Eβ(avg) = 114.9; ΣIβ = 0.08%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
γ 9	331.90 20	1.3 5	0.0091
γ 10	350.9 5	0.22 7	0.0017
γ 15	469.7 5	1.3 5	0.0129
γ 20	800.5 5	0.9 3	0.0161
γ 21	822.6 5	3.8 12	0.0663
γ 22	893.7 5	0.23 8	0.0044
γ 23	915.5 5	3.8 12	0.0738
γ 25	934.7 5	0.15 5	0.0029
γ 26	1017.1 5	0.26 8	0.0056
γ 27	1066.6 5	8.6 25	0.195
γ 28	1087.4 10	0.9 3	0.0219
γ 29	1088.9 10	4.0 13	0.0937
γ 32	1151.3 5	0.10 4	0.0025
γ 34	1173.2 5	0.19 6	0.0047
γ 38	1221.0 5	0.21 7	0.0056
γ 41	1419.5 5	0.46 15	0.0140
γ 44	1805.7 5	0.15 5	0.0056
γ 47	2001.7 5	2.1 7	0.0880
γ 50	2275.2 5	0.18 6	0.0088

31 weak γ's omitted:
Eγ(avg) = 833.2; ΣIγ = 0.70%

• ^{125}Sb β^- Decay (2.77 y 4) I (min) = 0.10%
% Feeding to ^{125}Te (58 d) = 23.1 6

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	3.19	50 4	0.0034
ce-K- 2	3.6781 6	50.0 24	0.0039
ce-L- 1	14.94 15	0.18 11	≈0
Auger-K	22.7	6.4 15	0.0031
ce-L- 2	30.5527 6	7.9 11	0.0051
ce-M- 2	34.4859 6	1.58 22	0.0012
ce-NOP- 2	35.3236 6	0.52 8	0.0004
ce-K- 9	144.520 11	1.03 21	0.0032
ce-L- 9	171.395 11	0.19 9	0.0007
ce-K- 19	396.075 15	0.337 18	0.0028
β⁻ 1 max	95.4 20		
avg	24.9 6	13.60 22	0.0072
β⁻ 2 max	124.7 20		
avg	33.1 6	5.81 9	0.0041
β⁻ 3 max	130.8 20		
avg	34.8 6	18.1 3	0.0134
β⁻ 4 max	241.6 20		
avg	67.5 7	1.59 3	0.0023
β⁻ 5 max	303.4 20		
avg	87.0 7	39.9 4	0.0739
β⁻ 6 max	445.7 20		
avg	134.5 7	7.4 5	0.0212
β⁻ 7 max	622.0 20		
avg	215.5 8	13.5 5	0.0620
total β⁻			
avg	86.5 11	99.9 9	0.184
X-ray L	3.77	4.9 17	0.0004
X-ray $K\alpha_2$	27.20170 2	12.8 8	0.0074
X-ray $K\alpha_1$	27.47230 2	23.9 14	0.0140
X-ray Kβ	31	8.3 5	0.0055
γ 2	35.4919 5	4.16 15	0.0031
γ 5	116.952 11	0.261 9	0.0007
γ 8	172.615 15	0.181 7	0.0007
γ 9	176.334 11	6.89 22	0.0259
γ 12	204.129 25	0.323 12	0.0014
γ 13	208.088 25	0.243 8	0.0011
γ 14	227.91 4	0.131 6	0.0006
γ 16	321.03 4	0.417 8	0.0029
γ 17	380.435 20	1.496 25	0.0121
γ 18	408.01 4	0.182 9	0.0016
γ 19	427.889 15	29.33 25	0.267
γ 20	443.50 4	0.302 12	0.0029
γ 21	463.383 15	10.35 18	0.102
γ 23	600.557 18	17.8 3	0.227
γ 24	606.641 19	5.02 9	0.0649
γ 25	635.895 18	11.32 20	0.153
γ 26	671.409 20	1.81 3	0.0259

9 weak γ's omitted:
Eγ(avg) = 159.0; ΣIγ = 0.07%

• ^{125}Te IT Decay (58 d 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	3.19	153 9	0.0104
ce-K- 1	3.6781 6	78 4	0.0061
Auger-K	22.7	16 4	0.0078
ce-L- 1	30.5527 6	12.3 16	0.0080
ce-M- 1	34.4859 6	2.5 4	0.0018
ce-NOP- 1	35.3236 6	0.81 12	0.0006
ce-K- 2	77.462 15	51.9 7	0.0856
ce-L- 2	104.337 15	37.3 7	0.0829
ce-M- 2	108.270 15	8.59 24	0.0198
ce-NOP- 2	109.108 15	2.25 7	0.0052

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	3.77	15 5	0.0012
X-ray $K\alpha_2$	27.20170 2	32.3 15	0.0187
X-ray $K\alpha_1$	27.47230 2	60 3	0.0353
X-ray $K\beta$	31	20.9 10	0.0138
γ 1	35.4919 5	6.49 21	0.0049
γ 2	109.276 15	0.283 8	0.0007

● ^{125}I EC Decay (60.14 d 11) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.19	156 10	0.0106
ce-K- 1	3.6781 6	78 4	0.0061
Auger-K	22.7	20 5	0.0095
ce-L- 1	30.5527 6	12.3 16	0.0080
ce-M- 1	34.4859 6	2.5 4	0.0018
ce-NOP- 1	35.3236 6	0.81 12	0.0006
X-ray L	3.77	15 6	0.0012
X-ray $K\alpha_2$	27.20170 2	39.2 17	0.0227
X-ray $K\alpha_1$	27.47230 2	73 3	0.0428
X-ray $K\beta$	31	25.4 11	0.0168
γ 1	35.4919 5	6.49 21	0.0049

● ^{125}Xe EC Decay (16.8 h 2) I (min) = 0.10%

Feeds ^{125}I

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.3	109 7	0.0077
ce-K- 1	21.791 15	21.8 13	0.0101
Auger-K	23.6	14 4	0.0068
ce-K- 2	41.691 20	0.345 23	0.0003
ce-L- 1	49.772 15	2.89 14	0.0031
ce-M- 1	53.888 15	0.58 3	0.0007
ce-NOP- 1	54.774 15	0.142 7	0.0002
ce-L- 2	69.672 20	0.194 13	0.0003
ce-K- 3	80.40 3	0.217 11	0.0004
ce-K- 4	155.26 3	6.39 21	0.0211
ce-L- 4	183.24 3	0.904 12	0.0035
ce-MNO- 4	187.36 3	0.226 3	0.0009
ce-K- 6	210.23 4	1.89 9	0.0085
ce-L- 6	238.21 4	0.344 16	0.0017
X-ray L	4	11 4	0.0010
X-ray $K\alpha_2$	28.3172 4	28.9 12	0.0174
X-ray $K\alpha_1$	28.6120 3	53.9 21	0.0328
X-ray $K\beta$	32.3	18.9 8	0.0130
γ 1	54.960 15	6.0 3	0.0070
γ 2	74.860 20	0.118 7	0.0002
γ 3	113.57 3	0.479 23	0.0012
γ 4	188.43 3	55.1 6	0.221
γ 6	243.40 4	28.9 10	0.150
γ 7	372.08 6	0.248 12	0.0020
γ 8	453.83 5	4.24 18	0.0410
γ 11	635.8 4	0.105 11	0.0014
γ 12	635.8 4	0.121 11	0.0016
γ 17	846.5 4	1.04 4	0.0187
γ 18	901.5 4	0.540 23	0.0104
γ 19	937.3 4	0.116 11	0.0023
γ 20	992.5 4	0.105 6	0.0022
γ 21	1007.5 4	0.143 12	0.0031
γ 27	1138.4 4	0.287 17	0.0069
γ 28	1181.0 4	0.63 3	0.0159

20 weak γ's omitted:
$E\gamma$(avg) = 904.8; $\Sigma I\gamma$ = 0.40%

● ^{126}Sn β^- Decay (~1.0E5 y) I (min) = 0.10%

Feeds ^{126}Sb (19.0 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3	120 7	0.0079
ce-K- 5	12.149 10	3.2 4	0.0008
ce-L- 2	16.952 10	2.1 3	0.0008
ce-L- 3	18.00 7	58 5	0.0222
ce-L- 4	18.582 10	32 4	0.0125
ce-M- 2	20.706 10	0.41 6	0.0002
ce-NOP- 2	21.498 10	0.136 18	≈0
ce-M- 3	21.76 7	12.4 10	0.0057
Auger-K	21.8	4.5 10	0.0021
ce-M- 4	22.336 10	6.3 8	0.0030
ce-NOP- 3	22.55 7	4.1 3	0.0020
ce-NOP- 4	23.128 10	2.1 3	0.0010
ce-K- 6	33.789 10	5.4 7	0.0039
ce-L- 5	37.942 10	0.41 6	0.0003
ce-MNO- 5	41.696 10	0.108 14	≈0
ce-K- 7	56.449 10	16.4 21	0.0197
ce-K- 8	57.079 10	8.8 7	0.0107
ce-L- 6	59.582 10	0.72 9	0.0009
ce-MNO- 6	63.336 10	0.171 21	0.0002
ce-L- 7	82.242 10	6.3 8	0.0111
ce-L- 8	82.872 10	1.13 9	0.0020
ce-M- 7	85.996 10	1.30 17	0.0024
ce-MNO- 8	86.626 10	0.270 19	0.0005
ce-NOP- 7	86.788 10	0.28 4	0.0005
β^- 1 max	250 30		
avg	70 10	100	0.149
X-ray L	3.6	11 4	0.0009
γ 2	21.650 10	1.24 16	0.0006
γ 4	23.280 10	6.4 8	0.0032
X-ray $K\alpha_2$	26.11080 2	8.3 7	0.0046
X-ray $K\alpha_1$	26.35910 2	15.6 12	0.0088
X-ray $K\beta$	29.7	5.3 5	0.0034
γ 5	42.640 10	0.50 7	0.0005
γ 6	64.280 10	9.6 12	0.0131
γ 7	86.940 10	8.9 11	0.0165
γ 8	87.570 10	37.0 25	0.0690

2 weak γ's omitted:
$E\gamma$(avg) = 22.7; $\Sigma I\gamma$ = 0.10%

● ^{126}Sb β^- Decay (12.4 d 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.19	1.58 11	0.0001
Auger-K	22.7	0.22 5	0.0001
ce-K- 5	264.7 3	0.143 14	0.0008
ce-K- 7	382.89 20	0.99 4	0.0081
ce-L- 7	409.76 20	0.145 6	0.0013
ce-K- 15	634.517 6	0.324 10	0.0044
ce-K- 17	663.19 20	0.291 9	0.0041
β^- 1 max	90 40		
avg	24 9	0.50 10	0.0003
β^- 2 max	110 40		
avg	30 9	2.09 14	0.0013
β^- 3 max	370 40		
avg	109 11	29 7	0.0673
β^- 4 max	390 40		
avg	117 11	5.9 10	0.0147
β^- 5 max	490 40		
avg	152 12	8.4 4	0.0272
β^- 6 max	580 40		
avg	181 12	4.2 3	0.0162

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
^{126}Sb β^- Decay (12.4 d 1)		*(Continued)*	
β- 7 max	590 40		
avg	204 12	0.56 23	0.0024
β- 8 max	730 40		
avg	237 13	0.50 21	0.0025
β- 9 max	730 40		
avg	238 13	0.48 11	0.0024
β-10 max	750 40		
avg	248 13	8.1 6	0.0428
β-11 max	800 40		
avg	266 13	4.8 4	0.0272
β-12 max	1070 40		
avg	374 14	16 8	0.127
β-13 max	1170 40		
avg	416 14	0.9 4	0.0080
β-14 max	1790 40		
avg	689 14	19 3	0.279
total β-			
avg	289 21	100 12	0.619
X-ray L	3.77	0.16 6	≈0
X-ray $K\alpha_2$	27.20170 2	0.436 19	0.0003
X-ray $K\alpha_1$	27.47230 2	0.81 4	0.0005
X-ray Kβ	31	0.282 13	0.0002
γ 1	149.30 20	0.40 20	0.0013
γ 2	208.6 8	0.50 20	0.0022
γ 3	223.80 20	1.39 10	0.0066
γ 4	278.60 20	2.4 6	0.0142
γ 5	296.5 3	4.5 4	0.0283
γ 6	297.1 8	0.50 20	0.0032
γ 7	414.70 20	83.3 21	0.736
γ 8	415.3 8	1.0 3	0.0088
γ 9	555.20 20	1.69 20	0.0200
γ 10	573.80 20	6.7 3	0.0816
γ 11	593.00 20	7.5 4	0.0944
γ 12	620.20 20	0.90 10	0.0118
γ 13	639.70 20	0.90 10	0.0122
γ 14	656.30 20	2.19 10	0.0306
γ 15	666.331 6	99.619 11	1.41
γ 16	675.00 20	3.7 10	0.0530
γ 17	695.00 20	99.619 11	1.47
γ 18	697.00 20	29 7	0.429
γ 19	720.50 20	53.8 21	0.826
γ 20	856.80 20	17.6 9	0.322
γ 21	954.00 20	1.20 10	0.0243
γ 22	959.60 20	0.50 10	0.0102
γ 23	989.30 20	6.8 3	0.143
γ 24	1034.80 20	1.00 5	0.0220
γ 25	1061.30 20	0.20 10	0.0045
γ 26	1063.90 20	0.90 6	0.0203
γ 27	1213.00 20	2.39 20	0.0618
γ 28	1476.20 20	0.28 3	0.0088

• **^{126}Sb IT Decay (19.0 m 3)** I (min) = 0.10%

%IT Decay = 14 4

Feeds ^{126}Sb (12.4 d)

See also ^{126}Sb β^- Decay (19.0 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3	10 3	0.0006
ce-L- 1	13.0 3	11 3	0.0029
ce-M- 1	16.8 3	2.5 8	0.0009
ce-NOP- 1	17.5 3	0.84 25	0.0003
X-ray L	3.6	0.9 4	≈0

• **^{126}Sb β^- Decay (19.0 m 3)** I (min) = 0.10%

%β^- Decay = 86 4

See also ^{126}Sb IT Decay (19.0 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.19	1.42 11	≈0
Auger-K	22.7	0.19 5	≈0
ce-K- 1	382.89 20	1.02 8	0.0083
ce-L- 1	409.76 20	0.149 12	0.0013
ce-K- 3	634.517 6	0.278 16	0.0038
ce-K- 4	663.19 20	0.250 14	0.0035
β- 1 max	750 40		
avg	245 13	0.86 13	0.0045
β- 2 max	880 40		
avg	297 13	1.3 3	0.0082
β- 3 max	1190 40		
avg	424 14	3.3 3	0.0298
β- 4 max	1810 40		
avg	694 15	81 4	1.20
total β-			
avg	673 16	86 4	1.24
X-ray L	3.77	0.14 5	≈0
X-ray $K\alpha_2$	27.20170 2	0.386 24	0.0002
X-ray $K\alpha_1$	27.47230 2	0.72 5	0.0004
X-ray Kβ	31	0.250 16	0.0002
γ 1	414.70 20	86 6	0.757
γ 2	620.00 20	1.54 19	0.0204
γ 3	666.331 6	86 4	1.22
γ 4	695.00 20	86 4	1.27
γ 5	928.2 3	1.3 3	0.0254
γ 6	1034.80 20	1.80 19	0.0397
γ 7	1061.30 20	0.51 9	0.0116
γ 8	1476.20 20	0.34 9	0.0108

• **^{126}I EC Decay (12.93 d 6)** I (min) = 0.10%

%(EC + β^+) Decay = 61 3

See also ^{126}I β^- Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.19	48 5	0.0033
Auger-K	22.7	6.4 15	0.0031
ce-K- 1	634.517 6	0.131 8	0.0018
β+ 1 max	468 5		
avg	216.8 22	0.244 17	0.0011
β+ 2 max	1134 5		
avg	530.2 22	0.83 17	0.0094
total β+			
avg	459 3	1.07 17	0.0105
X-ray L	3.77	4.8 17	0.0004
X-ray $K\alpha_2$	27.20170 2	12.7 11	0.0074
X-ray $K\alpha_1$	27.47230 2	23.7 19	0.0139
X-ray Kβ	31	8.2 7	0.0054
γ 1	666.331 6	40.2 21	0.571
γ 2	753.819 7	5.1 3	0.0812
γ 5	1420.19 3	0.358 20	0.0108

Maximum γ±-intensity = 2.15%

● ^{126}I β^- Decay (12.93 d 6) I (min) = 0.10%
%β^- Decay = 39 3
See also ^{126}I EC Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	3.43	0.37 4	≈0
ce-K- 1	354.072 6	0.45 4	0.0034
β- 1 max	371 5		
avg	108.9 17	3.10 25	0.0072
β- 2 max	862 5		
avg	289.7 20	27.2 22	0.168
β- 3 max	1251 5		
avg	458.6 21	9 4	0.0879
total β-			
avg	314.1 23	39 5	0.263
X-ray $K\alpha_2$	29.4580 10	0.115 11	≈0
X-ray $K\alpha_1$	29.7790 10	0.213 19	0.0001
γ 1	388.633 5	29.1 24	0.241
γ 2	491.243 4	2.43 20	0.0254
γ 3	879.876 8	0.64 6	0.0121

● ^{126}Cs β^+ Decay (1.64 m 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	3.43	15.0 15	0.0011
Auger-K	24.6	1.8 4	0.0009
ce-K- 2	354.072 6	0.59 11	0.0045
β+ 1 max	1460 140		
avg	660 70	0.13 6	0.0018
β+ 2 max	2130 140		
avg	960 70	1.1 3	0.0225
β+ 3 max	2490 140		
avg	1120 70	3.1 8	0.0740
β+ 4 max	2930 140		
avg	1330 70	2.5 6	0.0708
β+ 5 max	3420 140		
avg	1560 70	24 5	0.797
β+ 6 max	3810 140		
avg	1740 70	51 7	1.89
total β+			
avg	1640 80	82 9	2.86

5 weak β's omitted:
Eβ(avg) = 652.4; ΣIβ = 0.23%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	4.1	1.7 6	0.0001
X-ray $K\alpha_2$	29.4580 10	4.1 4	0.0026
X-ray $K\alpha_1$	29.7790 10	7.6 8	0.0048
X-ray Kβ	33.6	2.7 3	0.0019
γ 1	364.6 3	0.42 14	0.0032
γ 2	388.633 5	38 7	0.315
γ 3	434.00 20	1.06 25	0.0098
γ 4	491.243 4	4.1 8	0.0429
γ 5	548.7 3	0.61 16	0.0071
γ 6	553.4 5	0.27 9	0.0031
γ 8	736.5 3	0.23 9	0.0036
γ 9	798.10 10	0.47 10	0.0080
γ 10	879.876 8	1.19 23	0.0222
γ 11	925.20 20	4.5 10	0.0884
γ 12	1033.4 5	0.27 9	0.0059
γ 13	1289.8 5	0.34 10	0.0094
γ 15	1608.0 5	0.11 5	0.0039
γ 16	1622.8 3	0.22 5	0.0077
γ 17	1674.5 5	0.19 9	0.0068
γ 18	1678.30 20	0.72 14	0.0257
γ 19	1958.90 20	0.19 5	0.0079
γ 20	2067.00 20	0.30 7	0.0134
γ 23	2407.1 3	0.13 3	0.0064

7 weak γ's omitted:
Eγ(avg) = 1849.6; ΣIγ = 0.38%
Maximum γ±-intensity = 164.11%

● ^{127}Sb β^- Decay (3.85 d 5) I (min) = 0.10%
% Feeding to ^{127}Te (9.35 h) = 83.1 6
% Feeding to ^{127}Te (109 d) = 16.9 6

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	3.19	3.9 3	0.0003
Auger-K	22.7	0.53 13	0.0003
ce-K- 1	29.29 10	3.47 20	0.0022
ce-L- 1	56.16 10	0.45 3	0.0005
ce-K- 6	220.6 3	0.43 5	0.0020
ce-K- 19	441.19 20	0.220 17	0.0021
ce-K- 30	653.4 3	0.121 18	0.0017
β- 1 max	258 5		
avg	72.7 16	0.110 20	0.0002
β- 2 max	291 5		
avg	82.9 16	0.61 5	0.0011
β- 3 max	425 5		
avg	127.5 18	0.8 3	0.0022
β- 4 max	441 5		
avg	132.8 18	1.25 20	0.0035
β- 5 max	504 5		
avg	155.1 18	5.22 15	0.0172
β- 6 max	657 5		
avg	211.1 19	1.25 25	0.0056
β- 7 max	795 5		
avg	264.0 20	7.80 23	0.0439
β- 8 max	798 5		
avg	265.1 20	17.2 4	0.0971
β- 9 max	896 5		
avg	304.1 20	34.9 4	0.226
β-10 max	950 5		
avg	325.8 21	4.10 21	0.0285
β-11 max	1108 5		
avg	390.9 21	22.8 9	0.190
β-12 max	1240 5		
avg	446.5 22	2.4 3	0.0228
β-13 max	1493 5		
avg	561.9 21	2.0 5	0.0239
total β-			
avg	309.2 22	100.6 14	0.662

2 weak β's omitted:
Eβ(avg) = 164.4; ΣIβ = 0.14%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	3.77	0.39 14	≈0
X-ray $K\alpha_2$	27.20170 2	1.06 7	0.0006
X-ray $K\alpha_1$	27.47230 2	1.97 12	0.0012
X-ray Kβ	31	0.68 4	0.0005
γ 1	61.10 10	1.42 7	0.0018
γ 5	154.3 5	0.11 3	0.0004
γ 6	252.4 3	8.39 17	0.0451
γ 7	280.4 5	0.54 4	0.0032
γ 8	290.8 5	1.82 8	0.0113
γ 9	293.3 9	0.29 15	0.0018
γ 10	310.0 7	0.20 4	0.0013
γ 11	391.8 5	0.93 8	0.0077
γ 12	405.0 10	0.114 18	0.0010
γ 13	411.60 20	3.43 19	0.0300
γ 15	440.7 7	0.25 11	0.0023
γ 16	444.9 3	4.21 12	0.0399

(Continued)

^{127}Sb β^- Decay (3.85 d 5) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
γ 17	451.0 7	0.18 8	0.0017
γ 18	456.0 10	0.11 8	0.0010
γ 19	473.00 20	25.0 8	0.252
γ 20	502.8 6	0.61 11	0.0065
γ 21	543.00 20	2.64 12	0.0306
γ 22	584.2 11	0.32 18	0.0040
γ 23	603.60 20	4.25 12	0.0546
γ 25	637.8 5	0.36 4	0.0048
γ 26	653.5 7	0.25 4	0.0035
γ 27	666.9 3	0.54 18	0.0076
γ 29	682.3 10	0.54 25	0.0078
γ 30	685.2 3	35.7 4	0.521
γ 31	698.5 3	3.39 19	0.0505
γ 32	722.2 5	1.75 8	0.0269
γ 33	745.9 5	0.11 4	0.0017
γ 35	783.8 3	14.7 4	0.245
γ 37	817.3 5	0.27 3	0.0047
γ 38	820.1 3	0.114 22	0.0020
γ 39	923.5 7	0.46 3	0.0091
γ 40	1141.2 7	0.36 8	0.0087
γ 42	1290.3 8	0.35 4	0.0095

10 weak γ's omitted:
Eγ(avg) = 736.7; ΣIγ = 0.53%

● ^{127}Te β^- Decay (9.35 h 7) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	276 5		
avg	78.2 16	1.184 13	0.0020
β- 2 max	694 5		
avg	224.7 19	98.789 19	0.473
total β- avg	222.9 20	100.000 23	0.475

3 weak β's omitted:
Eβ(avg) = 148.3; ΣIβ = 0.03%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
γ 6	360.30 10	0.134 1	0.0010
γ 8	417.90 10	0.988 10	0.0088

7 weak γ's omitted:
Eγ(avg) = 172.7; ΣIγ = 0.13%

● ^{127}Te IT Decay (109 d 2) I(min) = 0.10%
%IT Decay = 98.17 24
Feeds ^{127}Te (9.35 h)
See also ^{127}Te β^- Decay (109 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	3.19	74 4	0.0050
Auger-K	22.7	5.2 12	0.0025
ce-K- 1	56.45 8	41.8 7	0.0503
ce-L- 1	83.32 8	43.3 7	0.0768
ce-M- 1	87.25 8	10.2 3	0.0190
ce-NOP- 1	88.09 8	2.72 8	0.0051
X-ray L	3.77	7.3 25	0.0006
X-ray Kα2	27.20170 2	10.4 4	0.0060
X-ray Kα1	27.47230 2	19.4 8	0.0114
X-ray Kβ	31	6.7 3	0.0045

1 weak γ's omitted:
Eγ(avg) = 88.3; ΣIγ = 0.09%

● ^{127}Te β^- Decay (109 d 2) I(min) = 0.10%
%β- Decay = 1.83 24
See also ^{127}Te IT Decay (109 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	3.3	1.16 21	≈0
Auger-K	23.6	0.14 5	≈0
ce-K- 1	24.431 20	1.21 24	0.0006
ce-L- 1	52.412 20	0.17 4	0.0002
β- 1 max	725 5		
avg	252.9 19	1.82 24	0.0098

3 weak β's omitted:
Eβ(avg) = 20.1; ΣIβ = 0.01%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	4	0.12 5	≈0
X-ray Kα2	28.3172 4	0.30 6	0.0002
X-ray Kα1	28.6120 3	0.57 12	0.0003
X-ray Kβ	32.3	0.20 4	0.0001
γ 1	57.600 20	0.38 8	0.0005

4 weak γ's omitted:
Eγ(avg) = 648.6; ΣIγ = 0.01%

● ^{127}Xe EC Decay (36.406 d 16) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	3.3	96 6	0.0068
Auger-K	23.6	12 3	0.0059
ce-K- 1	24.431 20	4.2 3	0.0022
ce-L- 1	52.412 20	0.60 4	0.0007
ce-MNO- 1	56.528 20	0.151 10	0.0002
ce-K- 2	112.05 3	1.53 9	0.0036
ce-K- 3	138.93 3	3.53 18	0.0105
ce-L- 2	140.03 3	0.387 23	0.0012
ce-L- 3	166.91 3	0.462 19	0.0016
ce-K- 4	169.67 3	6.61 14	0.0239
ce-MNO- 3	171.03 3	0.115 5	0.0004
ce-L- 4	197.65 3	0.97 4	0.0041
ce-MNO- 4	201.77 3	0.245 9	0.0011
ce-K- 5	341.79 5	0.292 19	0.0021
X-ray L	4	10 4	0.0008
X-ray Kα2	28.3172 4	25.0 11	0.0151
X-ray Kα1	28.6120 3	46.6 19	0.0284
X-ray Kβ	32.3	16.3 7	0.0112
γ 1	57.600 20	1.31 8	0.0016
γ 2	145.22 3	4.24 21	0.0131
γ 3	172.10 3	24.7 10	0.0905
γ 4	202.84 3	68.1 13	0.294
γ 5	374.96 5	17.4 10	0.139

1 weak γ's omitted:
Eγ(avg) = 618.4; ΣIγ = 0.01%

● ^{128}I EC Decay (24.99 m 2) I(min) = 0.10%
%EC Decay = 5.0 2
See also ^{128}I β^- Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	3.19	4.1 3	0.0003
Auger-K	22.7	0.53 13	0.0003

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	3.77	0.40 14	≈0
X-ray $K\alpha_2$	27.20170 2	1.06 6	0.0006
X-ray $K\alpha_1$	27.47230 2	1.98 11	0.0012
X-ray $K\beta$	31	0.69 4	0.0005
γ 1	743.24 4	0.130 24	0.0021

● ^{128}I β^- Decay (24.99 m 2) I (min) = 0.10%
%β^- Decay = 95.0 2
See also ^{128}I EC Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.43	0.124 15	≈0
ce-K- 1	408.35 7	0.152 16	0.0013
β- 1 max	1158 5		
avg	410.1 21	1.72 22	0.0150
β- 2 max	1684 5		
avg	637.3 23	13.0 14	0.176
β- 3 max	2127 5		
avg	835.7 23	80.2 15	1.43
total β-			
avg	800.7 24	94.9 21	1.62

2 weak β's omitted:
Eβ(avg) = 164.8; ΣIβ= 0.01%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 1	442.91 7	14.2 15	0.134
γ 2	526.62 10	1.37 19	0.0153
γ 4	969.4 4	0.34 6	0.0071

3 weak γ's omitted:
Eγ(avg) = 1051.3; ΣIγ= 0.01%

● ^{129}Sb β^- Decay (4.40 h 2) I (min) = 0.10%
% Feeding to ^{129}Te (69.6 m) = 83.4 11
% Feeding to ^{129}Te (33.6 d) = 16.6 11

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.19	0.31 8	≈0
ce-K- 6	149.0 5	0.38 9	0.0012
β- 1 max	264 21		
avg	74 7	1.10 17	0.0017
β- 2 max	292 21		
avg	83 7	0.41 21	0.0007
β- 3 max	307 21		
avg	88 7	2.0 4	0.0037
β- 4 max	506 21		
avg	156 8	0.94 14	0.0031
β- 5 max	534 21		
avg	166 8	22.5 13	0.0796
β- 6 max	625 21		
avg	199 8	3.4 3	0.0144
β- 7 max	650 21		
avg	208 8	26.6 13	0.118
β- 8 max	722 21		
avg	236 8	1.05 23	0.0053
β- 9 max	744 21		
avg	244 9	1.74 17	0.0090
β-10 max	778 21		
avg	258 9	1.10 17	0.0060
β-11 max	895 21		
avg	304 9	0.27 10	0.0017
β-12 max	1060 21		
avg	371 9	4.0 4	0.0316
β-13 max	1096 21		
avg	386 9	0.59 14	0.0049
β-14 max	1149 21		
avg	408 9	2.1 17	0.0182
β-15 max	1411 21		
avg	520 10	3.2 7	0.0354
β-16 max	1564 21		
avg	587 10	10.1 15	0.126
β-17 max	1617 21		
avg	610 10	4.3 3	0.0559
β-18 max	1743 21		
avg	666 10	2.7 5	0.0383
β-19 max	1832 21		
avg	706 10	7.7 20	0.116
β-20 max	1912 21		
avg	741 10	0.9 4	0.0142
β-21 max	2132 21		
avg	841 10	0.27 13	0.0048
β-22 max	2271 21		
avg	901 10	3.8 14	0.0729
total β-			
avg	355 12	101 4	0.762

1 weak β's omitted:
Eβ(avg) = 68.0; ΣIβ= 0.05%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray $K\alpha_1$	27.47230 2	0.18 4	0.0001
γ 1	96.1 7	0.18 5	0.0004
γ 3	116.2 7	0.18 5	0.0005
γ 4	146.6 7	0.23 5	0.0007
γ 6	180.8 5	2.70 15	0.0104
γ 11	244.7 6	0.55 10	0.0029
γ 12	268.6 8	0.27 5	0.0016
γ 13	295.5 6	1.10 10	0.0069
γ 14	313.5	0.91 10	0.0061
γ 15	332.5	0.23 10	0.0016
γ 16	359.4 5	3.0 3	0.0231
γ 17	363	0.457 9	0.0035
γ 18	405.0 7	1.46 14	0.0126
γ 20	453.5 10	0.82 23	0.0079
γ 21	499.6	0.23 10	0.0024
γ 22	523.8 5	1.69 15	0.0189
γ 23	544.7 3	19.1 11	0.221
γ 24	633.7 5	2.92 24	0.0395
γ 25	654.3 5	3.20 24	0.0446
γ 26	669.8 10	0.87 19	0.0124
γ 27	683.6 3	0.73 23	0.0106
γ 28	683.6 3	5.4 17	0.0792
γ 29	737.1 10	0.41 10	0.0065
γ 30	761.0 5	4.0 3	0.0652
γ 31	773.4 6	2.92 24	0.0482
γ 32	786.6 6	2.01 19	0.0337
γ 33	812.8 5	45.7 9	0.791
γ 34	876.2 7	2.74 24	0.0512
γ 35	914.6 5	21.3 13	0.415
γ 36	939.7 7	0.78 19	0.0156
γ 38	966.4 6	8.2 6	0.168
γ 39	995.4 11	0.14 10	0.0029
γ 40	1030.1 6	13.4 9	0.294
γ 42	1083.8 7	0.55 19	0.0127
γ 43	1104.3 10	0.23 10	0.0054
γ 45	1125.4	0.114 23	0.0027
γ 46	1139.2	0.18 5	0.0044
γ 48	1161.8	0.114 23	0.0028
γ 49	1167.8 10	0.27 10	0.0068
γ 50	1208.5 7	0.96 14	0.0247
γ 51	1223.3	0.18 5	0.0048
γ 52	1237.4 15	0.27 10	0.0072
γ 53	1257.0 18	0.37 19	0.0098
γ 54	1261.3 10	0.78 19	0.0209
γ 55	1273.0 15	0.27 14	0.0074

(Continued)

^{129}Sb β^- Decay (4.40 h 2) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
γ 56	1280.8 10	0.59 14	0.0162
γ 57	1300.0 12	0.27 10	0.0076
γ 58	1317.2 10	0.37 10	0.0103
γ 59	1325.9 10	0.55 10	0.0155
γ 60	1418.6 11	0.55 10	0.0166
γ 61	1436.1 12	0.32 14	0.0098
γ 62	1479.7 10	0.50 23	0.0158
γ 64	1525.9 10	0.46 14	0.0149
γ 65	1540.0 15	0.14 5	0.0045
γ 66	1568.7 8	0.73 10	0.0244
γ 68	1598.5 9	0.55 14	0.0187
γ 69	1621.1 12	0.27 14	0.0095
γ 70	1654.6 10	1.05 23	0.0370
γ 72	1724.1 20	0.27 14	0.0101
γ 74	1736.5 10	6.4 8	0.235
γ 75	1841.8	0.23 10	0.0090
γ 76	1869.9 11	0.32 10	0.0127
γ 81	2069.6 15	0.59 14	0.0262
γ 83	2113.0 15	0.37 14	0.0165

23 weak γ's omitted:
Eγ(avg)= 1310.7; ΣIγ= 0.98%

● ^{129}Te β^- Decay (69.6 m 4) I(min) = 0.10%
Feeds ^{129}I

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	3.3	59 10	0.0041
ce-L- 1	22.582 20	65 11	0.0312
ce-M- 1	26.698 20	13.0 22	0.0074
ce-NOP- 1	27.584 20	4.3 7	0.0025
β- 1 max	386 4		
avg	114.1 14	0.81 10	0.0020
β- 2 max	668 4		
avg	214.9 15	0.196 23	0.0009
β- 3 max	938 4		
avg	320.6 17	0.23 3	0.0016
β- 4 max	1011 4		
avg	350.0 17	8.6 10	0.0641
β- 5 max	1220 4		
avg	437.0 17	0.52 7	0.0048
β- 6 max	1470 4		
avg	544.5 18	90 10	1.04
total β- avg	522.4 19	100 10	1.12

4 weak β's omitted:
Eβ(avg)= 74.5; ΣIβ= 0.06%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
X-ray L	4	6.2 23	0.0005
γ 1	27.770 20	16.3 25	0.0096
γ 2	208.960 15	0.166 20	0.0007
γ 5	250.615 15	0.35 5	0.0019
γ 7	278.430 10	0.52 6	0.0031
γ 8	281.262 15	0.152 18	0.0009
γ 15	459.600 10	7.1 8	0.0695
γ 16	487.390 20	1.31 16	0.0136
γ 32	802.100 20	0.177 21	0.0030
γ 42	1083.850 20	0.45 6	0.0105
γ 43	1111.640 20	0.176 21	0.0042

37 weak γ's omitted:
Eγ(avg)= 656.9; ΣIγ= 0.38%

● ^{129}Te IT Decay (33.6 d 2) I(min) = 0.10%
%IT Decay = 62.9 24
Feeds ^{129}Te (69.6 m)
See also ^{129}Te β^- Decay (33.6 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	3.19	48 3	0.0033
Auger-K	22.7	4.0 9	0.0019
ce-K- 1	73.69 5	31.6 13	0.0497
ce-L- 1	100.56 5	24.0 11	0.0515
ce-M- 1	104.49 5	5.6 3	0.0124
ce-NOP- 1	105.33 5	1.46 7	0.0033
X-ray L	3.77	4.8 16	0.0004
X-ray Kα2	27.20170 2	7.9 5	0.0046
X-ray Kα1	27.47230 2	14.7 8	0.0086
X-ray Kβ	31	5.1 3	0.0034
γ 1	105.50 5	0.147 8	0.0003

● ^{129}Te β^- Decay (33.6 d 2) I(min) = 0.10%
%β- Decay = 37.1 24
Feeds ^{129}I
See also ^{129}Te IT Decay (33.6 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	3.3	0.105 16	≈0
ce-L- 1	22.582 20	0.116 17	≈0
β- 1 max	202 4		
avg	55.5 12	0.166 21	0.0002
β- 2 max	874 4		
avg	294.8 16	0.76 10	0.0048
β- 3 max	908 4		
avg	308.3 16	3.3 4	0.0217
β- 4 max	1604 4		
avg	607.3 17	32.8 25	0.424
total β- avg	571.0 18	37 3	0.451

5 weak β's omitted:
Eβ(avg)= 232.5; ΣIβ= 0.08%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
γ 13	556.652	0.129 17	0.0015
γ 15	695.882 20	3.3 4	0.0485
γ 19	729.570 20	0.76 10	0.0119

31 weak γ's omitted:
Eγ(avg)= 742.5; ΣIγ= 0.31%

● ^{129}I β^- Decay (1.57E7 y 4) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	3.43	74 4	0.0054
ce-K- 1	5.020 15	78.9 5	0.0084
Auger-K	24.6	8.8 16	0.0046
ce-L- 1	34.128 15	10.7 3	0.0078
ce-M- 1	38.439 15	2.16 7	0.0018
ce-NOP- 1	39.373 15	0.714 22	0.0006
β- 1 max	152 4		
avg	40.9 12	100	0.0871

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
X-ray L	4.1	8.2 25	0.0007
X-ray $K\alpha_2$	29.4580 10	20.0 6	0.0125
X-ray $K\alpha_1$	29.7790 10	37.0 10	0.0235
X-ray $K\beta$	33.6	13.2 4	0.0094
γ 1	39.581 15	7.52 23	0.0063

• ^{129}Xe IT Decay (8.89 d 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	3.43	147 8	0.0108
ce-K- 1	5.020 15	78.9 5	0.0084
Auger-K	24.6	16 3	0.0083
ce-L- 1	34.128 15	10.7 3	0.0078
ce-M- 1	38.439 15	2.16 7	0.0018
ce-NOP- 1	39.373 15	0.714 22	0.0006
ce-K- 2	162.00 3	63.9 7	0.220
ce-L- 2	191.11 3	24.4 6	0.0993
ce-M- 2	195.42 3	5.48 16	0.0228
ce-NOP- 2	196.35 3	1.48 4	0.0062
X-ray L	4.1	16 5	0.0014
X-ray $K\alpha_2$	29.4580 10	36.1 10	0.0227
X-ray $K\alpha_1$	29.7790 10	67.0 17	0.0425
X-ray $K\beta$	33.6	23.8 7	0.0170
γ 1	39.581 15	7.52 23	0.0063
γ 2	196.56 3	4.74 13	0.0198

• ^{129}Cs EC Decay (32.06 h 6) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	3.43	110 8	0.0080
ce-K- 1	5.020 15	32 3	0.0034
Auger-K	24.6	13.1 25	0.0068
ce-L- 1	34.128 15	4.3 4	0.0031
ce-M- 1	38.439 15	0.87 7	0.0007
ce-NOP- 1	39.373 15	0.287 22	0.0002
ce-K- 3	58.768 4	0.58 5	0.0007
ce-K- 12	337.3566 23	0.59 4	0.0043
ce-K- 13	376.9286 23	0.33 4	0.0026
X-ray L	4.1	12 4	0.0011
X-ray $K\alpha_2$	29.4580 10	29.7 18	0.0187
X-ray $K\alpha_1$	29.7790 10	55 4	0.0350
X-ray $K\beta$	33.6	19.6 12	0.0140
γ 1	39.581 15	3.02 23	0.0025
γ 3	93.329 3	0.66 5	0.0013
γ 4	177.036 10	0.274 18	0.0010
γ 5	266.820 7	0.277 18	0.0016
γ 6	270.352 5	0.216 15	0.0012
γ 7	278.614 4	1.34 10	0.0080
γ 8	282.131 6	0.246 17	0.0015
γ 9	318.1800 20	2.49 17	0.0169
γ 12	371.9180 20	31.1 19	0.246
γ 13	411.4900 20	22.7 15	0.199
γ 17	548.945 8	3.45 22	0.0404
γ 22	588.549 8	0.61 5	0.0077
γ 27	906.425 6	0.224 15	0.0043

15 weak γ's omitted:
$E\gamma$(avg) = 636.5; $\Sigma I\gamma$ = 0.28%

• ^{130}I β^- Decay (12.36 h 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	3.43	1.35 9	≈0
Auger-K	24.6	0.19 4	≈0
ce-K- 9	383.449 20	0.47 5	0.0039
ce-K- 14	501.529 20	0.623 20	0.0067
ce-K- 20	633.979 10	0.341 11	0.0046
ce-K- 23	704.919 20	0.229 8	0.0034
β^- 1 max	232 10		
avg	64 3	0.316 16	0.0004
β^- 2 max	355 10		
avg	103 4	0.328 17	0.0007
β^- 3 max	376 10		
avg	110 4	0.492 14	0.0012
β^- 4 max	557 10		
avg	173 4	0.184 5	0.0007
β^- 5 max	622 10		
avg	197 4	46.7 3	0.196
β^- 6 max	812 10		
avg	270 4	2.14 3	0.0123
β^- 7 max	902 10		
avg	306 4	0.173 16	0.0011
β^- 8 max	1040 10		
avg	361 5	47.5 8	0.365
β^- 9 max	1176 10		
avg	418 5	1.43 5	0.0127
total β^-			
avg	279 5	99.5 9	0.591

5 weak β's omitted:
$E\beta$(avg) = 91.4; $\Sigma I\beta$ = 0.27%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
X-ray L	4.1	0.15 5	≈0
X-ray $K\alpha_2$	29.4580 10	0.422 17	0.0003
X-ray $K\alpha_1$	29.7790 10	0.78 3	0.0005
X-ray $K\beta$	33.6	0.278 12	0.0002
γ 9	418.010 20	34.15 20	0.304
γ 12	457.720 20	0.237 15	0.0023
γ 13	510.350 20	0.852 21	0.0093
γ 14	536.090 20	99.0 7	1.13
γ 15	539.10 3	1.396 7	0.0160
γ 16	553.900 10	0.662 17	0.0078
γ 17	586.050 20	1.693 22	0.0211
γ 18	603.530 10	0.615 21	0.0079
γ 20	668.540 10	96.1 8	1.37
γ 21	685.990 10	1.069 21	0.0156
γ 23	739.480 20	82.3 8	1.30
γ 26	800.23 3	0.101 5	0.0017
γ 27	808.290 20	0.236 6	0.0041
γ 32	877.35 4	0.191 8	0.0036
γ 35	967.020 20	0.877 14	0.0181
γ 39	1096.48 3	0.552 10	0.0129
γ 40	1122.15 3	0.253 8	0.0061
γ 41	1157.470 10	11.31 11	0.279
γ 42	1222.56 3	0.179 5	0.0047
γ 43	1272.120 20	0.748 12	0.0203
γ 45	1403.900 20	0.345 12	0.0103

32 weak γ's omitted:
$E\gamma$(avg) = 813.0; $\Sigma I\gamma$ = 0.85%

• ^{131}Te β^- Decay (25.0 m 1) I (min) = 0.10%
Feeds ^{131}I

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	3.3	13.8 10	0.0010
Auger-K	23.6	1.7 5	0.0009
ce-K- 4	116.547 5	14.5 5	0.0359

(Continued)

^{131}Te β^- Decay (25.0 m 1) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-L- 4	144.528 5	1.87 7	0.0057
ce-MNO- 4	148.644 5	0.467 7	0.0015
ce-K- 24	419.1536 21	0.193 17	0.0017
β− 1 max	748 6		
avg	245.6 24	1.199 22	0.0063
β− 2 max	805 6		
avg	267.6 24	1.186 22	0.0068
β− 3 max	822 6		
avg	274.2 24	1.34 3	0.0078
β− 4 max	903 6		
avg	306.2 24	0.119 9	0.0008
β− 5 max	951 6		
avg	325.6 25	0.54 9	0.0037
β− 6 max	1102 6		
avg	387.7 25	9.99 16	0.0825
β− 7 max	1151 6		
avg	408 3	2.59 5	0.0225
β− 8 max	1372 6		
avg	502 3	1.178 23	0.0126
β− 9 max	1647 6		
avg	622 3	21.8 3	0.289
β−10 max	1756 6		
avg	670 3	0.78 5	0.0111
β−11 max	2099 6		
avg	825 3	59.2 16	1.04
total β−			
avg	696 4	100.1 17	1.48
5 weak β's omitted: Eβ(avg)= 136.0; ΣIβ= 0.21%			
X-ray L	4	1.4 5	0.0001
X-ray Kα2	28.3172 4	3.68 18	0.0022
X-ray Kα1	28.6120 3	6.9 4	0.0042
X-ray Kβ	32.3	2.40 12	0.0017
γ 4	149.716 5	68.9 9	0.220
γ 5	151.10 10	0.17 7	0.0006
γ 15	342.945 4	0.703 12	0.0051
γ 19	384.059 3	0.896 14	0.0073
γ 24	452.3230 20	18.22 25	0.176
γ 26	492.660 10	4.84 7	0.0508
γ 29	544.880 10	0.427 15	0.0050
γ 32	567.33 4	0.103 7	0.0012
γ 34	602.039 3	4.20 6	0.0538
γ 35	605.550 20	0.117 7	0.0015
γ 36	654.260 10	1.530 25	0.0213
γ 37	696.190 20	0.179 14	0.0027
γ 40	727.000 20	0.469 10	0.0073
γ 45	841.990 20	0.200 8	0.0036
γ 48	856.08 3	0.131 7	0.0024
γ 50	898.54 3	0.138 8	0.0026
γ 51	934.483 5	0.875 18	0.0174
γ 52	948.542 4	2.26 4	0.0457
γ 53	951.390 20	0.331 9	0.0067
γ 54	997.250 10	3.34 5	0.0710
γ 57	1007.960 10	0.799 13	0.0172
γ 60	1098.250 20	0.172 8	0.0040
γ 61	1146.960 10	4.96 7	0.121
γ 62	1148.51 6	0.110 7	0.0027
γ 68	1277.440 10	0.118 5	0.0032
γ 69	1294.340 20	0.482 10	0.0133
γ 73	1427.140 20	0.105 4	0.0032
γ 74	1500.62 3	0.115 4	0.0037
56 weak γ's omitted: Eγ(avg)= 696.0; ΣIγ= 1.19%			

● ^{131}Te IT Decay (30 h 2) I (min) = 0.10%
%IT Decay = 22.2 16
Feeds ^{131}Te (25.0 m)
See also ^{131}Te β^- Decay (30 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.19	16.9 13	0.0011
Auger-K	22.7	1.8 5	0.0009
ce-K- 1	150.436 20	14.4 11	0.0462
ce-L- 1	177.311 20	5.4 5	0.0205
ce-M- 1	181.244 20	1.20 10	0.0046
ce-NOP- 1	182.082 20	0.304 24	0.0012
X-ray L	3.77	1.7 6	0.0001
X-ray Kα2	27.20170 2	3.6 3	0.0021
X-ray Kα1	27.47230 2	6.7 6	0.0039
X-ray Kβ	31	2.32 19	0.0015
γ 1	182.250 20	0.85 7	0.0033

● ^{131}Te β^- Decay (30 h 2) I (min) = 0.10%
%β^- Decay = 77.8 16
Feeds ^{131}I
See also ^{131}Te IT Decay (30 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.3	10.6 7	0.0007
Auger-K	23.6	1.3 4	0.0007
ce-K- 14	47.971 20	4.80 21	0.0049
ce-K- 21	68.891 10	4.88 22	0.0072
ce-L- 14	75.952 20	0.63 3	0.0010
ce-MNO-14	80.068 20	0.157 5	0.0003
ce-L- 21	96.872 10	0.64 3	0.0013
ce-MNO-21	100.988 10	0.159 5	0.0003
ce-K- 36	116.547 5	1.07 15	0.0026
ce-L- 36	144.528 5	0.138 19	0.0004
ce-K- 48	167.461 20	0.191 8	0.0007
ce-K- 58	207.761 10	0.117 5	0.0005
ce-K- 75	301.101 10	0.234 10	0.0015
β− 1 max	161 6		
avg	43.3 18	0.56 4	0.0005
β− 2 max	190 6		
avg	51.8 18	0.31 4	0.0003
β− 3 max	255 6		
avg	71.5 19	0.20 4	0.0003
β− 4 max	261 6		
avg	73.3 19	0.45 4	0.0007
β− 5 max	263 6		
avg	74.0 19	0.95 6	0.0015
β− 6 max	317 6		
avg	91.3 20	1.65 21	0.0032
β− 7 max	368 6		
avg	108.0 20	0.341 25	0.0008
β− 8 max	420 6		
avg	125.6 21	2.27 17	0.0061
β− 9 max	430 6		
avg	129.0 21	5.4 4	0.0148
β−10 max	451 6		
avg	136.2 21	36.9 10	0.107
β−11 max	507 6		
avg	155.7 22	2.14 13	0.0071
β−12 max	532 6		
avg	164.8 22	16.6 6	0.0583
β−13 max	544 6		
avg	169.0 22	1.50 8	0.0054
β−14 max	785 6		
avg	259.9 24	2.5 3	0.0138

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β− 15 max	1116 6		
avg	394 3	0.22 21	0.0018
β− 16 max	1372 6		
avg	502 3	0.37 15	0.0040
β− 17 max	1425 6		
avg	525 3	0.20 6	0.0022
β− 18 max	2431 6		
avg	970 3	3.8 4	0.0785
total β−			
avg	189 3	76.6 14	0.308

6 weak β's omitted:
Eβ(avg) = 222.7; ΣIβ = 0.28%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	4	1.1 4	≈0
X-ray Kα₂	28.3172 4	2.83 13	0.0017
X-ray Kα₁	28.6120 3	5.27 24	0.0032
X-ray Kβ	32.3	1.85 9	0.0013
γ 13	79.19 3	0.128 5	0.0002
γ 14	81.140 20	4.07 13	0.0070
γ 15	86.430 20	0.147 6	0.0003
γ 20	101.6 3	0.170 16	0.0004
γ 21	102.060 10	7.9 3	0.0173
γ 33	134.860 20	0.71 3	0.0020
γ 36	149.716 5	5.1 7	0.0162
γ 39	159.66 4	0.128 16	0.0004
γ 43	182.250 20	0.74 20	0.0029
γ 44	183.11 8	0.155 20	0.0006
γ 45	188.13 5	0.213 13	0.0009
γ 46	189.76 4	0.50 4	0.0020
γ 47	190.52 6	0.116 16	0.0005
γ 48	200.630 20	7.56 23	0.0323
γ 53	213.98 3	0.426 22	0.0019
γ 55	230.65 5	0.194 13	0.0010
γ 58	240.930 10	7.59 21	0.0390
γ 59	253.170 20	0.651 20	0.0035
γ 60	255.44 7	0.310 14	0.0017
γ 64	269.2 3	0.108 3	0.0006
γ 65	278.560 20	1.78 6	0.0106
γ 67	283.20 20	0.39 4	0.0023
γ 72	309.47 6	0.38 4	0.0025
γ 75	334.270 10	9.6 3	0.0681
γ 76	335.44 7	0.136 24	0.0010
γ 77	342.92 5	0.39 12	0.0028
γ 80	351.30 10	0.209 20	0.0016
γ 82	354.70 10	0.229 13	0.0017
γ 85	364.98 10	1.20 16	0.0093
γ 90	383.90 7	0.20 4	0.0016
γ 93	417.40 20	0.279 21	0.0025
γ 94	432.40 7	0.66 4	0.0061
γ 95	452.3230 20	1.5 4	0.0149
γ 96	462.92 5	1.82 6	0.0180
γ 97	468.16 9	0.31 4	0.0031
γ 100	524.80 10	0.136 16	0.0015
γ 101	530.70 10	0.105 20	0.0012
γ 102	541.40 10	0.112 24	0.0013
γ 107	586.30 3	1.98 10	0.0247
γ 109	602.039 3	0.31 12	0.0040
γ 110	609.40 10	0.139 16	0.0018
γ 113	665.05 3	4.34 14	0.0615
γ 115	685.90 10	0.155 13	0.0023
γ 116	695.62 8	0.40 4	0.0059
γ 117	702.50 7	0.391 22	0.0059
γ 118	713.10 4	1.43 16	0.0218
γ 120	744.20 4	1.59 6	0.0252
γ 122	773.67 3	38.2 11	0.630
γ 123	774.10 10	0.54 8	0.0089
γ 124	782.49 4	7.79 23	0.130
γ 125	793.75 3	13.9 4	0.235
γ 127	822.78 4	6.12 18	0.107
γ 128	844.90 20	0.15 4	0.0028
γ 130	852.21 3	0.39 20	0.0070
γ 131	852.21 3	20.7 7	0.375
γ 132	856.08 3	0.62 5	0.0113
γ 133	865.10 20	0.19 4	0.0036
γ 134	872.3 3	0.101 12	0.0019
γ 136	910.00 3	3.29 12	0.0638
γ 137	920.62 5	1.20 9	0.0236
γ 138	923.40 20	0.116 24	0.0023
γ 140	941.27 5	0.78 4	0.0157
γ 141	987.80 10	0.155 13	0.0033
γ 143	999.26 15	0.170 20	0.0036
γ 148	1035.40 20	0.105 9	0.0023
γ 149	1059.69 4	1.55 6	0.0350
γ 153	1125.46 4	11.4 4	0.274
γ 154	1127.96 6	0.97 9	0.0233
γ 156	1148.89 7	1.5 4	0.0370
γ 157	1148.89 7	0.38 12	0.0094
γ 158	1150.90 9	0.66 8	0.0161
γ 160	1165.50 10	0.139 13	0.0035
γ 162	1206.60 4	9.8 3	0.251
γ 166	1237.32 5	0.66 4	0.0174
γ 168	1315.16 8	0.70 8	0.0195
γ 172	1340.60 10	0.101 12	0.0029
γ 175	1394.83 9	0.108 9	0.0032
γ 179	1646.01 5	1.24 5	0.0435
γ 183	1987.70 7	1.36 6	0.0545
γ 187	2000.94 6	2.01 7	0.0859
γ 188	2168.54 9	0.349 22	0.0161
γ 189	2270.65 9	0.384 22	0.0186

109 weak γ's omitted:
Eγ(avg) = 638.4; ΣIγ = 3.48%

• ^{131}I β− Decay (8.040 d 3) I(min) = 0.10%

% Feeding to ^{131}Xe (11.84 d) = 1.086 13

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.43	5.0 3	0.0004
Auger-K	24.6	0.59 11	0.0003
ce-K- 1	45.622 10	3.53 13	0.0034
ce-L- 1	74.730 10	0.463 16	0.0007
ce-MNO- 1	79.041 10	0.117 2	0.0002
ce-K- 7	249.737 11	0.248 8	0.0013
ce-K- 14	329.919 11	1.54 5	0.0108
ce-L- 14	359.027 11	0.244 8	0.0019
β− 1 max	247.9 6		
avg	69.36 19	2.12 3	0.0031
β− 2 max	303.9 6		
avg	86.95 20	0.627 9	0.0012
β− 3 max	333.8 6		
avg	96.62 20	7.36 10	0.0151
β− 4 max	606.3 6		
avg	191.58 23	89.3 11	0.364
β− 5 max	806.9 6		
avg	283.25 23	0.393 16	0.0024
total β−			
avg	181.70 24	99.9 11	0.387

1 weak β's omitted:
Eβ(avg) = 200.2; ΣIβ = 0.07%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	4.1	0.55 17	≈0
X-ray Kα₂	29.4580 10	1.35 5	0.0008
X-ray Kα₁	29.7790 10	2.50 9	0.0016
X-ray Kβ	33.6	0.89 4	0.0006
γ 1	80.183 10	2.62 5	0.0045
γ 4	177.210 10	0.265 4	0.0010
γ 7	284.298 11	6.05 8	0.0366
γ 12	325.781 11	0.251 6	0.0017

(Continued)

^{131}I β^- Decay (8.040 d 3) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
γ 14	364.480 11	81.2 11	0.630
γ 16	502.991 11	0.361 6	0.0039
γ 17	636.973 10	7.26 10	0.0985
γ 18	642.703 11	0.220 4	0.0030
γ 19	722.893 10	1.803 25	0.0278

10 weak γ's omitted:
Eγ(avg)= 329.4; ΣIγ= 0.23%

• ^{131}Xe IT Decay (11.84 d 7) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	3.43	75 4	0.0055
Auger-K	24.6	6.8 13	0.0036
ce-K- 1	129.369 13	61.2 7	0.169
ce-L- 1	158.477 13	28.6 6	0.0965
ce-M- 1	162.788 13	6.50 18	0.0225
ce-NOP- 1	163.722 13	1.78 5	0.0062
X-ray L	4.1	8 3	0.0007
X-ray Kα2	29.4580 10	15.5 5	0.0097
X-ray Kα1	29.7790 10	28.7 8	0.0182
X-ray Kβ	33.6	10.2 4	0.0073
γ 1	163.930 13	1.96 6	0.0068

• ^{131}Cs EC Decay (9.688 d 4) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	3.43	79 4	0.0058
Auger-K	24.6	9.3 17	0.0049
X-ray L	4.1	9 3	0.0008
X-ray Kα2	29.4580 10	21.1 6	0.0132
X-ray Kα1	29.7790 10	39.1 10	0.0248
X-ray Kβ	33.6	13.9 4	0.0100

• ^{131}Ba EC Decay (11.8 d 2) I (min) = 0.10%
Feeds ^{131}Cs

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	3.55	103 5	0.0078
ce-K- 1	18.98 11	0.58 4	0.0002
Auger-K	25.5	11.4 14	0.0062
ce-K- 2	42.779 16	1.14 6	0.0010
ce-L- 1	49.25 11	0.76 5	0.0008
ce-MNO- 1	53.74 11	0.206 11	0.0002
ce-K- 4	56.304 14	0.64 9	0.0008
ce-L- 2	73.050 16	0.154 6	0.0002
ce-K- 5	87.817 8	18.1 8	0.0338
ce-K- 7	97.627 14	0.807 25	0.0017
ce-L- 5	118.088 8	6.0 3	0.0151
ce-M- 5	122.585 8	1.27 6	0.0033
ce-NOP- 5	123.571 8	0.316 14	0.0008
ce-L- 7	127.898 14	0.14 3	0.0004
ce-K- 10	180.088 8	1.82 7	0.0070
ce-K- 11	203.638 8	0.168 6	0.0007
ce-L- 10	210.359 8	0.241 10	0.0011
ce-K- 13	213.441 8	0.177 7	0.0008
ce-K- 17	337.252 11	0.28 3	0.0020
ce-K- 25	460.328 13	0.505 16	0.0050
X-ray L	4.29	13 4	0.0012
X-ray Kα2	30.6251 3	27.7 7	0.0180
X-ray Kα1	30.9728 3	51.2 12	0.0338
X-ray Kβ	35	18.4 5	0.0137
γ 2	78.764 16	0.730 25	0.0012
γ 4	92.289 14	0.64 9	0.0013
γ 5	123.802 8	29.0 9	0.0764
γ 7	133.612 14	2.16 7	0.0061
γ 9	157.147 9	0.190 6	0.0006
γ 10	216.073 8	19.7 5	0.0909
γ 11	239.623 8	2.40 5	0.0123
γ 12	246.879 12	0.641 20	0.0034
γ 13	249.426 8	2.82 7	0.0150
γ 14	294.508 20	0.167 5	0.0010
γ 15	351.188 24	0.102 7	0.0008
γ 17	373.237 11	14.0 4	0.111
γ 18	404.036 11	1.306 20	0.0112
γ 21	461.246 24	0.103 1	0.0010
γ 23	480.395 13	0.323 9	0.0033
γ 24	486.510 12	2.07 4	0.0215
γ 25	496.313 13	46.8 5	0.495
γ 29	572.672 15	0.155 5	0.0019
γ 30	585.026 15	1.221 13	0.0152
γ 31	620.095 17	1.36 9	0.0180
γ 32	674.415 20	0.133 4	0.0019
γ 33	696.470 20	0.149 5	0.0022
γ 37	831.60 3	0.231 7	0.0041
γ 40	923.846 22	0.730 21	0.0144
γ 44	1047.571 25	1.170 13	0.0261

23 weak γ's omitted:
Eγ(avg)= 501.8; ΣIγ= 0.58%

• ^{132}Te β^- Decay (78.2 h 8) I (min) = 0.10%
Feeds ^{132}I (2.30 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	3.3	69 6	0.0049
ce-K- 1	16.551 10	64 4	0.0226
Auger-K	23.6	8.6 21	0.0043
ce-L- 1	44.532 10	8.5 6	0.0080
ce-M- 1	48.648 10	1.70 11	0.0018
ce-NOP- 1	49.534 10	0.56 4	0.0006
ce-K- 2	78.59 8	0.88 10	0.0015
ce-K- 3	83.13 8	0.82 10	0.0015
ce-L- 2	106.57 8	0.114 14	0.0003
ce-L- 3	111.11 8	0.107 12	0.0003
ce-K- 4	194.99 6	7.1 5	0.0295
ce-L- 4	222.97 6	1.34 9	0.0064
ce-MNO- 4	227.09 6	0.338 20	0.0016
β- 1 max	215 4		
avg	59.4 12	100	0.127
X-ray L	4	7.3 25	0.0006
X-ray Kα2	28.3172 4	18.3 12	0.0110
X-ray Kα1	28.6120 3	34.1 21	0.0208
X-ray Kβ	32.3	11.9 8	0.0082
γ 1	49.720 10	13.1 9	0.0139
γ 2	111.76 8	1.85 21	0.0044
γ 3	116.30 8	1.94 21	0.0048
γ 4	228.16 6	88 5	0.428

● ^{132}I β^- Decay (2.30 h 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.43	0.55 4	≈0
ce-K- 32	488.09 9	0.138 17	0.0014
ce-K- 48	633.13 8	0.351 11	0.0047
ce-K- 58	738.05 8	0.190 8	0.0030
β− 1 max	319 20		
avg	92 7	0.26 4	0.0005
β− 2 max	353 20		
avg	103 7	0.12 3	0.0003
β− 3 max	424 20		
avg	127 7	0.19 3	0.0005
β− 4 max	503 20		
avg	154 8	0.53 8	0.0017
β− 5 max	522 20		
avg	161 8	0.33 4	0.0011
β− 6 max	689 20		
avg	223 8	0.76 6	0.0036
β− 7 max	741 20		
avg	242 8	12.4 8	0.0639
β− 8 max	740 20		
avg	242 8	1.90 8	0.0098
β− 9 max	826 20		
avg	275 8	0.32 5	0.0019
β−10 max	910 20		
avg	309 8	3.55 14	0.0234
β−11 max	966 20		
avg	331 9	8.1 4	0.0571
β−12 max	991 20		
avg	342 9	2.75 16	0.0200
β−13 max	996 20		
avg	343 9	3.36 23	0.0245
β−14 max	1155 20		
avg	409 9	2.49 21	0.0217
β−15 max	1185 20		
avg	422 9	18.9 6	0.170
β−16 max	1229 20		
avg	440 9	0.95 15	0.0089
β−17 max	1393 20		
avg	510 9	0.113 13	0.0012
β−18 max	1413 20		
avg	519 9	1.7 6	0.0188
β−19 max	1470 20		
avg	543 9	10.1 10	0.117
β−20 max	1468 20		
avg	543 9	2.0 8	0.0231
β−21 max	1540 20		
avg	574 9	0.14 3	0.0017
β−22 max	1617 20		
avg	608 9	12.4 7	0.161
β−23 max	2140 20		
avg	841 9	16.9 23	0.303
total β− avg	482 11	101 3	1.04

11 weak β's omitted:
Eβ(avg) = 134.5; ΣIβ = 0.50%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray Kα2	29.4580 10	0.172 7	0.0001
X-ray Kα1	29.7790 10	0.319 13	0.0002
X-ray Kβ	33.6	0.113 5	≈0
γ 2	147.20 10	0.237 20	0.0007
γ 3	183.3	0.138 20	0.0005
γ 7	254.80 20	0.19 3	0.0010
γ 8	262.70 10	1.44 9	0.0081
γ 10	284.80 10	0.72 7	0.0044
γ 16	316.5 4	0.14 3	0.0009
γ 20	363.5 4	0.49 10	0.0038
γ 22	387.8 4	0.30 5	0.0024
γ 24	416.8 4	0.47 6	0.0042
γ 25	431.9 4	0.48 6	0.0044
γ 27	446.0 4	0.60 6	0.0057
γ 28	473.9 6	0.18 4	0.0018
γ 29	478.5 6	0.15 5	0.0015
γ 30	488.2 4	0.41 6	0.0043
γ 31	505.90 15	5.03 20	0.0542
γ 32	522.65 9	16.1 6	0.179
γ 33	535.5 4	0.52 5	0.0060
γ 34	540.0 6	0.109 20	0.0012
γ 35	547.10 20	1.25 9	0.0146
γ 39	600.0 6	0.14 3	0.0018
γ 42	620.8 3	0.39 20	0.0052
γ 43	621.2 10	1.58 20	0.0209
γ 44	630.22 9	13.7 6	0.184
γ 46	650.60 20	2.66 20	0.0369
γ 47	659.0 7	0.394	0.0055
γ 48	667.69 8	98.70 10	1.40
γ 49	669.8 3	4.9 8	0.0704
γ 50	671.6 3	5.2 4	0.0748
γ 54	727.0 3	3.2 6	0.0489
γ 55	727.2 3	2.2 6	0.0336
γ 56	728.50 20	1.1 3	0.0168
γ 57	764.5	0.394	0.0064
γ 58	772.61 8	76.2 18	1.25
γ 59	780.2 3	1.23 6	0.0205
γ 60	784.5 4	0.42 5	0.0071
γ 62	809.80 20	2.9 3	0.0494
γ 63	812.20 20	5.6 5	0.0973
γ 66	863.30 20	0.58 4	0.0107
γ 68	876.80 20	1.08 5	0.0201
γ 72	910.30 20	0.92 4	0.0178
γ 73	927.6 3	0.41 4	0.0082
γ 75	954.55 9	18.1 6	0.367
γ 77	983.7 4	0.56 5	0.0118
γ 82	1034.70 20	0.47 7	0.0104
γ 91	1136.03 12	2.96 20	0.0716
γ 92	1143.40 20	1.35 4	0.0329
γ 93	1147.4 6	0.28 7	0.0068
γ 94	1173.20 20	1.09 10	0.0271
γ 100	1272.7 4	0.18 3	0.0048
γ 101	1290.7 3	1.14 6	0.0312
γ 102	1295.3 3	1.97 10	0.0545
γ 103	1297.6 4	0.89 10	0.0246
γ 105	1317.80 20	0.118 20	0.0033
γ 107	1372.07 13	2.47 10	0.0721
γ 109	1398.57 10	7.1 3	0.212
γ 111	1442.56 10	1.42 6	0.0437
γ 114	1476.80 20	0.135 12	0.0043
γ 133	1757.50 20	0.30 3	0.0111
γ 142	1921.08 12	1.18 9	0.0485
γ 146	2002.2 5	1.09 10	0.0463
γ 147	2086.82 15	0.237 20	0.0105
γ 148	2172.68 15	0.197 20	0.0091
γ 150	2223.17 15	0.118 20	0.0056
γ 154	2390.48 15	0.168 20	0.0085

107 weak γ's omitted:
Eγ(avg) = 1014.6; ΣIγ = 3.19%

● ^{132}Cs EC Decay (6.475 d 10) I (min) = 0.10%

%(EC + β^+) Decay = 97.96 10

See also ^{132}Cs β^- Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.43	78 4	0.0057
Auger-K	24.6	9.3 17	0.0049
ce-K- 4	633.13 8	0.347 11	0.0047

(Continued)

^{132}Cs EC Decay (6.475 d 10) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β+ 1 max	421 23		
avg	198 10	0.36 9	0.0015
X-ray L	4.1	9 3	0.0008
X-ray $K\alpha_2$	29.4580 10	21.1 6	0.0132
X-ray $K\alpha_1$	29.7790 10	39.1 10	0.0248
X-ray Kβ	33.6	13.9 4	0.0100
γ 2	505.90 15	0.80 10	0.0086
γ 3	630.22 9	1.01 8	0.0136
γ 4	667.69 8	97.42 11	1.39
γ 6	1136.03 12	0.51 4	0.0123
γ 8	1317.80 20	0.58 5	0.0164

4 weak γ's omitted:
Eγ(avg) = 1090.3; ΣIγ = 0.27%
Maximum γi-intensity = 0.72%

● ^{132}Cs β^- Decay (6.475 d 10) I(min) = 0.10%

%β^- Decay = 2.04 10
See also ^{132}Cs EC Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	247 24		
avg	69 8	0.37 4	0.0005
β- 2 max	814 24		
avg	270 10	1.61 16	0.0093
total β-			
avg	227 12	2.04 17	0.0099

1 weak β's omitted:
Eβ(avg) = 41.0; ΣIβ = 0.06%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 1	464.55 6	1.89 17	0.0187
γ 2	567.14 3	0.24 4	0.0029
γ 4	1031.70 3	0.123 13	0.0027

1 weak γ's omitted:
Eγ(avg) = 663.1; ΣIγ = 0.06%

● ^{133}Te β^- Decay (12.45 m 28) I(min) = 0.10%

Feeds ^{133}I

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.3	2.34 15	0.0002
Auger-K	23.6	0.30 7	0.0001
ce-K- 1	278.82 8	2.082 22	0.0124
ce-L- 1	306.80 8	0.30 5	0.0020
ce-K- 4	374.46 7	0.42 3	0.0034
β- 1 max	430 60		
avg	129 21	0.35 15	0.0010
β- 2 max	780 60		
avg	256 24	1.8 3	0.0098
β- 3 max	830 60		
avg	279 24	0.85 23	0.0051
β- 4 max	1250 60		
avg	450 30	8.7 7	0.0834
β- 5 max	1410 60		
avg	520 30	4.4 4	0.0487
β- 6 max	1600 60		
avg	600 30	0.50 15	0.0064
β- 7 max	1640 60		
avg	620 30	13.2 7	0.174
β- 8 max	1660 60		
avg	630 30	7.0 8	0.0939
β- 9 max	2180 60		
avg	860 30	1.3 8	0.0238
β-10 max	2250 60		
avg	890 30	33.3 10	0.631
β-11 max	2660 60		
avg	1080 30	28.6 12	0.658
total β-			
avg	810 40	100.0 23	1.74
X-ray L	4	0.25 9	≈0
X-ray $K\alpha_2$	28.3172 4	0.628 24	0.0004
X-ray $K\alpha_1$	28.6120 3	1.17 5	0.0007
X-ray Kβ	32.3	0.410 16	0.0003
γ 1	311.99 8	70.8 7	0.470
γ 2	384.6 5	0.28 7	0.0023
γ 3	392.9 6	0.57 22	0.0047
γ 4	407.63 7	30.1 7	0.261
γ 5	474.72 13	1.2 3	0.0122
γ 6	546.4 6	0.57 22	0.0066
γ 7	587.1 5	0.50 15	0.0062
γ 8	613.6 7	0.28 15	0.0037
γ 9	719.65 10	6.7 5	0.102
γ 10	786.77 10	5.6 5	0.0937
γ 11	844.39 7	3.3 3	0.0586
γ 12	930.67 10	4.5 6	0.0884
γ 13	1000.77 11	6.2 8	0.133
γ 14	1021.07 15	2.7 3	0.0585
γ 15	1061.8 8	1.27 22	0.0288
γ 16	1252.20 20	1.13 15	0.0302
γ 17	1307.7 8	0.9 3	0.0256
γ 18	1313.5 8	0.8 3	0.0218
γ 19	1333.23 12	9.9 6	0.281
γ 20	1405.70 20	0.57 15	0.0170
γ 21	1474.0 10	0.35 15	0.0111
γ 22	1518.6 8	0.50 7	0.0160
γ 23	1588.2 9	0.28 15	0.0096
γ 24	1717.65 15	3.4 3	0.124
γ 25	1825.1 10	0.57 22	0.0220
γ 26	1881.5 4	1.42 22	0.0567
γ 27	2136.5 12	0.28 7	0.0129
γ 28	2228.0 13	0.28 15	0.0134

1 weak γ's omitted:
Eγ(avg) = 2540.6; ΣIγ = 0.07%

● ^{133}Te IT Decay (55.4 m 4) I(min) = 0.10%

%IT Decay = 13 3
Feeds ^{133}Te (12.45 m)
See also ^{133}Te β^- Decay (55.4 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.19	6.1 12	0.0004
Auger-K	22.7	0.73 24	0.0004
ce-K- 1	302.33 7	5.8 14	0.0377
ce-L- 1	329.20 7	1.4 4	0.0096
ce-MNO- 1	333.13 7	0.36 9	0.0025
X-ray L	3.77	0.60 24	≈0
X-ray $K\alpha_2$	27.20170 2	1.5 4	0.0008
X-ray $K\alpha_1$	27.47230 2	2.7 7	0.0016
X-ray Kβ	31	0.94 22	0.0006
γ 1	334.14 7	5.4 13	0.0387

● ^{133}Te β^- Decay (55.4 m 4) I (min) = 0.10%
%β^- Decay = 87 3
Feeds ^{133}I
See also ^{133}Te IT Decay (55.4 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	3.3	16 3	0.0011
Auger-K	23.6	1.7 6	0.0008
ce-K- 1	40.93 20	8 3	0.0069
ce-K- 2	48.33 20	0.5 3	0.0005
ce-K- 3	54.83 20	1.7 3	0.0020
ce-K- 4	61.73 20	4.1 5	0.0054
ce-L- 1	68.91 20	2.3 9	0.0034
ce-L- 3	82.81 20	0.4 3	0.0007
ce-L- 4	89.71 20	1.9 7	0.0037
β- 1 max	1530 60		
avg	570 30	19.5 11	0.237
β- 2 max	1740 60		
avg	670 30	29.3 21	0.418
β- 3 max	2390 60		
avg	960 30	38.2 25	0.781
total β-			
avg	770 40	87 4	1.44
X-ray L	4	1.7 7	0.0001
X-ray Kα$_2$	28.3172 4	3.6 8	0.0022
X-ray Kα$_1$	28.6120 3	6.6 14	0.0040
X-ray Kβ	32.3	2.3 5	0.0016
γ 1	74.10 20	1.3 5	0.0021
γ 2	81.50 20	0.7 4	0.0012
γ 3	88.00 20	2.1 3	0.0039
γ 4	94.90 20	8.7 10	0.0176
γ 5	164.34 9	2.3 3	0.0082
γ 6	168.87 9	11.5 14	0.0413
γ 7	177.10 20	1.5 4	0.0056
γ 8	178.20 20	0.87 3	0.0033
γ 9	184.45 10	0.348 12	0.0014
γ 10	193.22 10	0.6 3	0.0025
γ 11	198.20 20	0.522 18	0.0022
γ 12	213.36 8	2.9 3	0.0130
γ 13	220.94 13	0.435 15	0.0020
γ 14	224.03 13	0.348 12	0.0017
γ 15	244.28 10	0.609 21	0.0032
γ 16	251.49 10	0.522 18	0.0028
γ 17	257.64 9	0.87 3	0.0048
γ 18	261.55 7	15.7 15	0.0872
γ 19	285.7 5	0.87 18	0.0053
γ 20	344.50 20	2.3 8	0.0166
γ 21	347.22 9	1.13 4	0.0084
γ 22	355.57 14	1.5 4	0.0112
γ 23	362.81 15	0.96 4	0.0074
γ 24	376.83 14	0.522 18	0.0042
γ 25	396.96 9	1.48 5	0.0125
γ 26	429.02 11	1.22 18	0.0111
γ 27	435.4 7	1.0 4	0.0097
γ 28	444.90 9	2.3 3	0.0214
γ 29	462.11 16	2.0 3	0.0197
γ 30	471.85 9	2.00 7	0.0201
γ 31	478.59 10	1.57 6	0.0160
γ 32	519.60 20	0.435 15	0.0048
γ 33	534.85 11	1.74 6	0.0198
γ 34	574.04 10	2.3 4	0.0287
γ 35	622.03 16	1.39 5	0.0184
γ 36	647.40 8	29.3 21	0.404
γ 37	702.75 12	3.74 13	0.0560
γ 38	731.69 15	1.48 5	0.0231
γ 39	733.89 10	2.87 10	0.0449
γ 40	779.75 10	3.39 12	0.0564
γ 41	795.7 4	1.30 5	0.0221
γ 42	800.51 12	1.91 7	0.0326
γ 43	863.91 13	19.5 11	0.359
γ 44	882.83 12	5.7 8	0.106
γ 45	897.7 4	0.435 15	0.0083
γ 46	912.58 10	87 3	1.69
γ 47	914.72 13	16.5 6	0.322
γ 48	934.4 3	1.30 5	0.0260
γ 49	978.19 9	9.5 11	0.198
γ 50	980.40 20	2.35 8	0.0491
γ 51	982.90 20	1.13 4	0.0237
γ 52	1007.5 10	1.0 4	0.0224
γ 53	1029.80 20	1.3 5	0.0286
γ 54	1348.90 20	2.52 9	0.0725
γ 55	1459.10 20	2.17 8	0.0676
γ 56	1516.1 3	0.96 4	0.0309
γ 57	1531.6 4	0.87 3	0.0284
γ 58	1683.30 20	5.7 7	0.206
γ 59	1704.4 3	0.96 4	0.0347
γ 60	1885.7 3	1.13 4	0.0454
γ 61	2004.9 3	3.3 4	0.141
γ 62	2027.7 4	2.1 4	0.090[illegible]
γ 63	2049.2 4	1.0 3	0.04[illegible]

● ^{133}I β^- Decay (20.8 h 1) I (min) = 0.10%
% Feeding to ^{133}Xe (5.245 d) = 97.12 2
% Feeding to ^{133}Xe (2.19 d) = 2.88 2

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	3.43	0.48 3	≈0
ce-K- 16	495.311 4	0.598 9	0.0063
β- 1 max	170 30		
avg	46 9	0.410 14	0.0004
β- 2 max	370 30		
avg	110 10	1.24 4	0.0029
β- 3 max	410 30		
avg	122 11	0.397 10	0.0010
β- 4 max	460 30		
avg	140 11	3.75 5	0.0112
β- 5 max	520 30		
avg	162 11	3.13 6	0.0108
β- 6 max	710 30		
avg	230 12	0.542 19	0.0027
β- 7 max	880 30		
avg	299 12	4.16 10	0.0265
β- 8 max	1020 30		
avg	352 13	1.81 4	0.0136
β- 9 max	1230 30		
avg	441 13	83.5 4	0.784
β-10 max	1530 30		
avg	573 13	1.07 4	0.0131
total β-			
avg	407 15	100.0 5	0.867

1 weak β's omitted:
Eβ(avg)= 284.0; ΣIβ= 0.03%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
X-ray Kα$_2$	29.4580 10	0.151 5	≈0
X-ray Kα$_1$	29.7790 10	0.281 8	0.0002
γ 5	262.702 6	0.357 10	0.0020
γ 6	267.173 19	0.117 6	0.0007
γ 7	345.43 5	0.104 18	0.0008
γ 8	361.08 5	0.11 4	0.0009
γ 12	418.047 15	0.153 11	0.0014
γ 13	422.910 12	0.309 8	0.0028
γ 15	510.530 4	1.81 4	0.0197
γ 16	529.872 3	86.3 4	0.974
γ 20	617.974 14	0.539 13	0.0071
γ 24	680.247 11	0.645 15	0.0093
γ 25	706.578 8	1.49 4	0.0225

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
^{133}I β^- Decay (20.8 h 1) (Continued)			
γ 26	768.382 15	0.457 12	0.0075
γ 28	820.506 22	0.154 6	0.0027
γ 29	856.278 7	1.23 4	0.0225
γ 30	875.329 5	4.47 9	0.0834
γ 31	909.67 3	0.212 8	0.0041
γ 35	1052.296 18	0.552 13	0.0124
γ 36	1060.07 6	0.137 6	0.0031
γ 38	1236.411 6	1.49 4	0.0393
γ 39	1298.223 5	2.33 5	0.0644
γ 40	1350.38 3	0.148 5	0.0043

21 weak γ's omitted:
Eγ(avg) = 535.2; ΣIγ = 0.61%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
• ^{133}Xe β^- Decay (5.245 d 6) I(min) = 0.10%			
Auger-L	3.55	49.7 25	0.0038
Auger-K	25.5	5.6 7	0.0031
ce-K- 1	43.636 11	0.33 3	0.0003
ce-K- 2	45.012 5	53.3 19	0.0511
ce-L- 2	75.283 5	8.14 16	0.0130
ce-M- 2	79.780 5	1.67 4	0.0028
ce-NOP- 2	80.766 5	0.434 9	0.0007
β- 1 max	267 3		
avg	75.1 10	0.69 6	0.0011
β- 2 max	346 3		
avg	100.6 10	99.30 6	0.213
total β- avg	100.4 10	100.00 9	0.214
X-ray L	4.29	6.1 17	0.0006
X-ray Kα₂	30.6251 3	13.6 6	0.0089
X-ray Kα₁	30.9728 3	25.3 10	0.0167
X-ray Kβ	35	9.1 4	0.0068
γ 1	79.621 11	0.217 19	0.0004
γ 2	80.997 5	36.5 7	0.0629

4 weak γ's omitted:
Eγ(avg) = 177.7; ΣIγ = 0.07%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
• ^{133}Xe IT Decay (2.19 d 3) I(min) = 0.10% Feeds ^{133}Xe (5.245 d)			
Auger-L	3.43	70 4	0.0051
Auger-K	24.6	7.0 13	0.0037
ce-K- 1	198.660 15	63.3 7	0.268
ce-L- 1	227.768 15	20.6 5	0.0999
ce-M- 1	232.079 15	4.56 13	0.0225
ce-NOP- 1	233.013 15	1.22 4	0.0061
X-ray L	4.1	7.8 24	0.0007
X-ray Kα₂	29.4580 10	16.0 5	0.0100
X-ray Kα₁	29.7790 10	29.7 8	0.0188
X-ray Kβ	33.6	10.6 4	0.0076
γ 1	233.221 15	10.3 3	0.0512

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
• ^{133}Ba EC Decay (10.5 y 1) I(min) = 0.10%			
Auger-L	3.55	136 6	0.0103
ce-K- 1	17.170 16	10.5 5	0.0038
Auger-K	25.5	14.1 17	0.0077
ce-K- 2	43.636 11	3.9 3	0.0036
ce-K- 3	45.012 5	48 4	0.0462
ce-L- 1	47.441 16	1.56 10	0.0016
ce-MNO- 1	51.938 16	0.403 25	0.0004
ce-L- 2	73.907 11	0.56 4	0.0009
ce-L- 3	75.283 5	7.4 5	0.0118
ce-MNO- 2	78.404 11	0.146 10	0.0002
ce-M- 3	79.780 5	1.51 10	0.0026
ce-NOP- 3	80.766 5	0.39 3	0.0007
ce-K- 4	124.62 4	0.143 9	0.0004
ce-K- 6	240.412 12	0.319 18	0.0016
ce-K- 7	266.854 8	0.67 4	0.0038
ce-K- 8	320.020 17	1.28 7	0.0087
ce-K- 9	347.866 20	0.147 9	0.0011
ce-L- 8	350.291 17	0.211 12	0.0016
X-ray L	4.29	17 5	0.0015
X-ray Kα₂	30.6251 3	34.2 12	0.0223
X-ray Kα₁	30.9728 3	63.4 21	0.0418
X-ray Kβ	35	22.8 9	0.0170
γ 1	53.155 16	2.14 11	0.0024
γ 2	79.621 11	2.55 16	0.0043
γ 3	80.997 5	33.0 22	0.0569
γ 4	160.60 4	0.60 4	0.0020
γ 5	223.11 4	0.442 24	0.0021
γ 6	276.397 12	6.9 4	0.0406
γ 7	302.839 8	17.8 9	0.115
γ 8	356.005 17	60 3	0.459
γ 9	383.851 20	8.7 4	0.0709

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
• ^{133}Ba IT Decay (38.9 h 1) I(min) = 0.10% %IT Decay = 99.9890 6; Feeds ^{133}Ba (10.5 y); %EC Decay = 0.0110 6			
Auger-L	3.67	130 6	0.0102
ce-L- 1	6.30 4	77.6 7	0.0104
ce-MNO- 1	11.00 4	21.1 7	0.0049
Auger-K	26.4	5.8 16	0.0033
ce-K- 2	238.65 15	58.9 7	0.299
ce-L- 2	270.10 15	18.0 4	0.104
ce-M- 2	274.80 15	4.02 12	0.0235
ce-NOP- 2	275.84 15	1.15 3	0.0068
X-ray L	4.47	18 5	0.0017
γ 1	12.29 4	1.35 6	0.0004
X-ray Kα₂	31.8171 3	15.1 6	0.0102
X-ray Kα₁	32.1936 3	27.8 9	0.0191
X-ray Kβ	36.4	10.1 4	0.0079
γ 2	276.09 15	18.0 5	0.106

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
• ^{134}Te β^- Decay (41.8 m 8) I(min) = 0.10% Feeds ^{134}I (52.6 m)			
Auger-L	3.3	33.8 23	0.0024
Auger-K	23.6	4.1 10	0.0021
ce-K- 3	43.66 6	0.56 21	0.0005
ce-K- 4	46.276 12	27.1 10	0.0267
ce-K- 5	68.25 3	0.29 11	0.0004

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
ce-L- 3	71.64 6	0.22 17	0.0003
ce-L- 4	74.257 12	4.2 6	0.0066
ce-M- 4	78.373 12	0.84 13	0.0014
ce-NOP- 4	79.259 12	0.20 3	0.0003
ce-K- 8	147.722 15	2.7 5	0.0084
ce-K- 10	168.066 15	0.94 14	0.0034
ce-L- 8	175.703 15	0.49 20	0.0018
ce-K- 11	177.296 16	2.06 25	0.0078
ce-MNO- 8	179.819 15	0.12 5	0.0005
ce-L- 10	196.047 15	0.16 7	0.0007
ce-L- 11	205.277 16	0.35 11	0.0015
ce-K- 13	244.782 8	0.88 5	0.0046
ce-L- 13	272.763 8	0.132 24	0.0008
ce-K- 14	401.89 4	0.218 21	0.0019
ce-K- 15	427.828 22	0.109 10	0.0010
ce-K- 17	532.823 13	0.112 14	0.0013
β− 1 max	193.534 23		
avg	52.941 7	14.7 7	0.0166
β− 2 max	376.568 14		
avg	110.830 5	42.9 15	0.101
β− 3 max	453.312 16		
avg	136.986 6	41.1 13	0.120
total β−			
avg	113.100 7	98.7 21	0.238
X-ray L	4	3.5 13	0.0003
X-ray $K\alpha_2$	28.3172 4	8.8 5	0.0053
X-ray $K\alpha_1$	28.6120 3	16.3 8	0.0099
X-ray Kβ	32.3	5.7 3	0.0039
γ 2	43.9 4	0.13 9	0.0001
γ 3	76.83 6	0.279 25	0.0005
γ 4	79.445 12	21.0 6	0.0355
γ 5	101.42 3	0.33 6	0.0007
γ 6	131.05 20	0.18 6	0.0005
γ 8	180.891 15	18.0 8	0.0694
γ 9	183.05 13	0.6 3	0.0023
γ 10	201.235 15	8.7 4	0.0373
γ 11	210.465 16	21.9 6	0.0982
γ 12	259.8 3	0.48 9	0.0027
γ 13	277.951 8	21.3 8	0.126
γ 14	435.06 4	18.6 10	0.172
γ 15	460.997 22	10.8 4	0.106
γ 16	464.64 5	5.10 17	0.0505
γ 17	565.992 13	18.9 8	0.228
γ 18	636.26 10	1.71 22	0.0232
γ 19	645.40 10	0.90 10	0.0124
γ 20	665.85 10	1.20 19	0.0170
γ 21	712.97 5	4.2 4	0.0638
γ 22	742.586 18	14.7 7	0.233
γ 23	767.196 21	30.0 10	0.490
γ 24	844.06 5	1.2 3	0.0216
γ 25	896.02 10	0.45 12	0.0086
γ 26	925.55 7	1.65 19	0.0325
γ 27	1027.00 10	0.45 12	0.0098

2 weak γ's omitted:
Eγ(avg)= 137.0; ΣIγ= 0.09%

● ^{134}I β^- Decay (52.6 m 5) — I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	3.43	1.52 11	0.0001
Auger-K	24.6	0.19 4	≈0
ce-K- 1	100.838 22	1.14 8	0.0025
ce-L- 1	129.946 22	0.150 10	0.0004
ce-K- 7	200.91 3	0.141 14	0.0006
ce-K- 11	370.890 20	0.112 10	0.0009
ce-K- 30	812.46 3	0.193 6	0.0033
ce-K- 33	849.53 3	0.119 4	0.0022
β− 1 max	770 60		
avg	255 24	1.48 9	0.0080
β− 2 max	790 60		
avg	261 24	0.33 4	0.0018
β− 3 max	840 60		
avg	279 24	0.153 19	0.0009
β− 4 max	1070 60		
avg	372 25	1.22 7	0.0097
β− 5 max	1280 60		
avg	460 30	32.5 8	0.318
β− 6 max	1380 60		
avg	500 30	0.53 4	0.0056
β− 7 max	1500 60		
avg	550 30	8.1 5	0.0949
β− 8 max	1560 60		
avg	580 30	16.3 5	0.201
β− 9 max	1600 60		
avg	600 30	3.67 17	0.0469
β−10 max	1740 60		
avg	660 30	7.6 5	0.107
β−11 max	1800 60		
avg	690 30	11.2 7	0.165
β−12 max	1850 60		
avg	710 30	1.12 17	0.0169
β−13 max	2230 60		
avg	880 30	3.7 9	0.0694
β−14 max	2420 60		
avg	970 30	11.5 15	0.238
total β−			
avg	610 40	99.6 23	1.28

4 weak β's omitted:
Eβ(avg)= 263.5; ΣIβ= 0.23%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
X-ray L	4.1	0.17 6	≈0
X-ray $K\alpha_2$	29.4580 10	0.432 23	0.0003
X-ray $K\alpha_1$	29.7790 10	0.80 4	0.0005
X-ray Kβ	33.6	0.285 16	0.0002
γ 1	135.399 22	3.76 22	0.0108
γ 2	139.03 3	0.69 5	0.0020
γ 3	151.98 15	0.106 12	0.0003
γ 4	162.48 7	0.26 3	0.0009
γ 5	188.47 4	0.70 4	0.0028
γ 6	217.00 20	0.25 3	0.0011
γ 7	235.47 3	1.98 16	0.0100
γ 8	278.80 15	0.131 15	0.0008
γ 9	319.81 6	0.52 5	0.0035
γ 10	351.08 10	0.50 6	0.0037
γ 11	405.451 20	7.3 4	0.0634
γ 12	411.00 8	0.61 6	0.0053
γ 13	433.35 3	4.19 24	0.0387
γ 14	458.92 6	1.30 9	0.0127
γ 15	465.50 10	0.36 4	0.0036
γ 16	488.88 4	1.41 9	0.0147
γ 17	514.40 3	2.34 14	0.0256
γ 18	540.825 25	7.8 5	0.0901
γ 19	565.52 4	0.88 6	0.0106
γ 20	570.75 15	0.21 3	0.0026
γ 21	595.362 20	11.4 6	0.144
γ 22	621.790 25	10.6 6	0.140
γ 23	627.96 3	2.37 14	0.0316
γ 24	677.34 3	8.5 5	0.123
γ 25	706.65 10	0.83 6	0.0125
γ 26	730.74 4	1.91 12	0.0297
γ 27	739.18 8	0.76 8	0.0120
γ 28	766.68 4	4.1 3	0.0670
γ 29	816.38 7	0.52 5	0.0091
γ 30	847.025 25	95.41 23	1.72
γ 31	857.29 3	6.96 20	0.127
γ 32	864.0 3	0.19 3	0.0035
γ 33	884.090 25	65.3 10	1.23
γ 34	922.6 3	0.14 3	0.0028

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
134I β⁻ Decay (52.6 m 5) (Continued)			
γ 35	947.86 4	4.04 20	0.0815
γ 36	966.90 5	0.35 4	0.0073
γ 37	974.67 4	4.7 4	0.0971
γ 38	1040.25 10	1.91 19	0.0423
γ 41	1072.55 3	15.3 8	0.349
γ 43	1100.07 12	0.69 6	0.0161
γ 44	1103.18 12	0.73 6	0.0170
γ 45	1136.16 4	9.7 5	0.236
γ 46	1159.10 8	0.35 3	0.0087
γ 47	1164.0 3	0.13 3	0.0033
γ 49	1190.03 8	0.35 3	0.0089
γ 51	1239.0 3	0.21 6	0.0055
γ 53	1269.49 5	0.56 4	0.0152
γ 54	1322.4 3	0.10 4	0.0030
γ 55	1336.00 20	0.14 3	0.0041
γ 56	1352.62 8	0.45 4	0.0129
γ 59	1414.3 5	0.22 6	0.0066
γ 60	1428.2 3	0.17 4	0.0052
γ 61	1431.35 25	0.17 4	0.0052
γ 62	1455.24 5	2.29 15	0.0710
γ 63	1470.00 7	0.77 5	0.0242
γ 64	1505.5 4	0.11 4	0.0037
γ 65	1541.51 7	0.51 4	0.0166
γ 66	1613.80 5	4.36 24	0.150
γ 67	1629.24 8	0.26 4	0.0089
γ 68	1644.25 7	0.40 5	0.0140
γ 69	1655.19 10	0.23 3	0.0081
γ 70	1741.49 5	2.67 19	0.0991
γ 71	1806.84 4	5.7 4	0.220
γ 74	1925.88 10	0.181 19	0.0074
γ 75	2020.6 3	0.172 19	0.0074
γ 77	2159.9 3	0.21 3	0.0097
γ 80	2312.40 20	0.24 3	0.0117
γ 83	2467.4 3	0.153 19	0.0080

20 weak γ's omitted:
Eγ(avg) = 1787.2; ΣIγ = 1.33%

• 134Cs β⁻ Decay (2.062 y 5) I (min) = 0.10%
%β⁻ Decay = 99.9997 1
%EC Decay = 0.0003 1

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.67	0.66 5	≈0
ce-K- 5	531.874 15	0.125 1	0.0014
ce-K- 6	567.258 15	0.491 15	0.0059
ce-K- 7	758.404 22	0.220 7	0.0036
β⁻ 1 max	88.5 4		
avg	23.06 11	27.40 13	0.0135
β⁻ 2 max	415.1 4		
avg	123.40 14	2.48 5	0.0065
β⁻ 3 max	657.9 4		
avg	210.11 15	70.1 5	0.314
total β⁻ avg	156.8 3	100.0 6	0.334

2 weak β's omitted:
Eβ(avg) = 335.3; ΣIβ = 0.05%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray $K\alpha_2$	31.8171 3	0.214 8	0.0001
X-ray $K\alpha_1$	32.1936 3	0.396 15	0.0003
X-ray Kβ	36.4	0.144 6	0.0001
γ 3	475.35 5	1.46 4	0.0148
γ 4	563.227 15	8.38 5	0.101
γ 5	569.315 15	15.43 11	0.187
γ 6	604.699 15	97.6 3	1.26
γ 7	795.845 22	85.4 4	1.45
γ 8	801.932 22	8.73 4	0.149
γ 9	1038.57 3	1.000 10	0.0221
γ 10	1167.94 3	1.80 3	0.0448
γ 11	1365.15 3	3.04 4	0.0884

2 weak γ's omitted:
Eγ(avg) = 276.9; ΣIγ = 0.04%

• 134Cs IT Decay (2.90 h 1) I (min) = 0.10%
Feeds 134Cs (2.062 y)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.55	133 5	0.0100
ce-L- 1	5.546 20	77.3 13	0.0091
ce-M- 1	10.043 20	15.9 10	0.0034
ce-NOP- 1	11.029 20	5.2 4	0.0012
Auger-K	25.5	3.7 5	0.0020
ce-K- 2	91.44 3	34.7 8	0.0676
ce-K- 3	102.70 3	0.4 3	0.0010
ce-L- 2	121.71 3	40.4 8	0.105
ce-M- 2	126.20 3	9.0 3	0.0242
ce-NOP- 2	127.19 3	2.27 7	0.0062
ce-L- 3	132.97 3	0.27 17	0.0008
X-ray L	4.29	16 5	0.0015
γ 1	11.260 20	0.94 7	0.0002
X-ray $K\alpha_2$	30.6251 3	8.9 3	0.0058
X-ray $K\alpha_1$	30.9728 3	16.6 5	0.0109
X-ray Kβ	35	5.95 19	0.0044
γ 2	127.42 3	12.9 3	0.0350

• 135I β⁻ Decay (6.61 h 1) I (min) = 0.10%
% Feeding to 135Xe (9.11 h) = 83.5 5
% Feeding to 135Xe (15.36 m) = 16.5 5

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.43	0.220 17	≈0
ce-K- 7	185.941 15	0.150 14	0.0006
ce-K- 11	253.890 16	0.121 5	0.0007
β⁻ 1 max	240 30		
avg	66 10	0.140 13	0.0002
β⁻ 2 max	240 30		
avg	68 10	0.126 13	0.0002
β⁻ 3 max	260 30		
avg	74 10	0.140 23	0.0002
β⁻ 4 max	300 30		
avg	86 10	1.08 6	0.0020
β⁻ 5 max	340 30		
avg	98 10	0.91 4	0.0019
β⁻ 6 max	350 30		
avg	103 10	1.39 6	0.0030
β⁻ 7 max	460 30		
avg	138 11	4.73 14	0.0139
β⁻ 8 max	480 30		
avg	145 11	7.33 21	0.0226
β⁻ 9 max	620 30		
avg	196 12	1.57 7	0.0066
β⁻10 max	670 30		
avg	213 12	1.10 5	0.0050
β⁻11 max	740 30		
avg	243 12	7.9 3	0.0409
β⁻12 max	820 30		
avg	272 12	0.61 4	0.0035

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
β-13 max	920 30		
avg	313 12	8.7 3	0.0580
β-14 max	1030 30		
avg	359 13	21.8 5	0.167
β-15 max	1150 30		
avg	405 13	7.9 3	0.0681
β-16 max	1250 30		
avg	451 13	7.4 3	0.0711
β-17 max	1260 30		
avg	454 13	0.10 5	0.0010
β-18 max	1450 30		
avg	535 13	23.6 4	0.269
β-19 max	1580 30		
avg	591 14	1.2 8	0.0151
β-20 max	2180 30		
avg	858 14	1.9 6	0.0347
total β- avg	369 16	99.8 14	0.784

4 weak β's omitted:
Eβ(avg) = 207.2; ΣIβ = 0.15%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
X-ray Kα₁	29.7790 10	0.127 8	≈0
γ 7	220.502 15	1.75 6	0.0082
γ 8	229.72 3	0.232 9	0.0011
γ 10	264.26 9	0.184 7	0.0010
γ 11	288.451 16	3.09 12	0.0190
γ 12	290.27 4	0.303 21	0.0019
γ 19	361.85 14	0.19 3	0.0014
γ 20	403.03 4	0.232 9	0.0020
γ 21	414.83 3	0.300 18	0.0027
γ 22	417.63 3	3.52 12	0.0313
γ 23	429.93 3	0.303 23	0.0028
γ 24	433.741 19	0.552 24	0.0051
γ 25	451.63 3	0.315 18	0.0030
γ 28	546.557 16	7.12 24	0.0829
γ 29	575.97 8	0.129 23	0.0016
γ 32	649.85 4	0.45 3	0.0063
γ 36	690.13 6	0.129 15	0.0019
γ 37	707.92 5	0.66 6	0.0099
γ 38	785.48 5	0.152 20	0.0025
γ 40	797.71 8	0.17 3	0.0029
γ 42	836.804 16	6.67 24	0.119
γ 44	961.46	0.15 3	0.0030
γ 45	972	0.89 6	0.0184
γ 46	972.6	1.20 6	0.0249
γ 47	995.09 10	0.15 3	0.0033
γ 48	1038.760 21	7.9 3	0.175
γ 50	1101.58 4	1.60 6	0.0376
γ 51	1124.00 4	3.60 12	0.0863
γ 52	1131.511 18	22.5 8	0.543
γ 54	1159.90 20	0.103 23	0.0025
γ 55	1169.04 4	0.87 4	0.0217
γ 58	1240.470 20	0.90 4	0.0238
γ 60	1260.409 17	28.6 4	0.768
γ 66	1367.89 4	0.61 4	0.0177
γ 68	1448.35 10	0.31 3	0.0097
γ 69	1457.56 3	8.6 3	0.268
γ 70	1502.79 4	1.07 5	0.0343
γ 72	1566.41 3	1.29 6	0.0430
γ 73	1678.03 3	9.5 4	0.341
γ 74	1706.46 3	4.09 18	0.149
γ 76	1791.20 3	7.70 25	0.294
γ 77	1830.69 4	0.58 3	0.0225
γ 79	1927.30 3	0.295 15	0.0121
γ 82	2045.88 4	0.87 4	0.0379
γ 87	2255.46 3	0.61 3	0.0294
γ 89	2408.65 4	0.95 5	0.0489

46 weak γ's omitted:
Eγ(avg) = 1073.4; ΣIγ = 1.49%

• ^{135}Xe β⁻ Decay (9.11 h 2)   I(min) = 0.10%

Feeds ^{135}Cs (2.3E6 y)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	3.55	5.3 3	0.0004
Auger-K	25.5	0.60 7	0.0003
ce-K- 3	213.809 15	5.68 7	0.0259
ce-L- 3	244.080 15	0.92 19	0.0048
ce-MNO- 3	248.577 15	0.23 5	0.0012
β- 1 max	97 9		
avg	25.3 25	0.123 4	≈0
β- 2 max	551 9		
avg	171 4	3.13 10	0.0114
β- 3 max	751 9		
avg	246 4	0.585 17	0.0031
β- 4 max	909 9		
avg	308 4	96.1 5	0.630
total β- avg	303 4	100.0 6	0.645

1 weak β's omitted:
Eβ(avg) = 48.0; ΣIβ = 0.08%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
X-ray L	4.29	0.66 18	≈0
X-ray Kα₂	30.6251 3	1.45 4	0.0009
X-ray Kα₁	30.9728 3	2.68 6	0.0018
X-ray Kβ	35	0.961 24	0.0007
γ 1	158.197 18	0.289 10	0.0010
γ 3	249.794 15	89.9 3	0.478
γ 4	358.39 4	0.220 9	0.0017
γ 6	407.990 20	0.358 13	0.0031
γ 9	608.185 16	2.89 9	0.0375

8 weak γ's omitted:
Eγ(avg) = 684.3; ΣIγ = 0.21%

• ^{135}Xe IT Decay (15.36 m 14)   I(min) = 0.10%

%IT Decay = 99.9964
Feeds ^{135}Xe (9.11 h)
%β⁻ Decay = 0.0036

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	3.43	14.9 9	0.0011
Auger-K	24.6	1.7 3	0.0009
ce-K- 1	492.000 17	15.2 4	0.159
ce-L- 1	521.108 17	2.89 8	0.0321
ce-MNO- 1	525.419 17	0.95 3	0.0107
X-ray L	4.1	1.7 5	0.0001
X-ray Kα₂	29.4580 10	3.84 15	0.0024
X-ray Kα₁	29.7790 10	7.1 3	0.0045
X-ray Kβ	33.6	2.54 10	0.0018
γ 1	526.561 17	81.0 5	0.908

• ^{135}Cs β⁻ Decay (2.3E6 y 3)   I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
β- 1 max	205 5		
avg	56.3 15	100	0.120

● ^{135}Ba IT Decay (28.7 h 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.67	63 4	0.0050
Auger-K	26.4	5.9 16	0.0033
ce-K- 1	230.797 10	59.9 7	0.294
ce-L- 1	262.249 10	18.7 5	0.104
ce-M- 1	266.945 10	4.19 12	0.0238
ce-NOP- 1	267.985 10	1.20 4	0.0068
X-ray L	4.47	8.6 22	0.0008
X-ray $K\alpha_2$	31.8171 3	15.3 6	0.0104
X-ray $K\alpha_1$	32.1936 3	28.3 10	0.0194
X-ray $K\beta$	36.4	10.3 4	0.0080
γ 1	268.238 10	16.0 4	0.0914

● ^{136}I β^- Decay (83 s 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	380 100		
avg	110 40	0.54 4	0.0013
β- 2 max	800 100		
avg	270 40	0.200 20	0.0012
β- 3 max	870 100		
avg	290 40	0.10 3	0.0006
β- 4 max	900 100		
avg	300 40	0.24 3	0.0015
β- 5 max	950 100		
avg	320 40	0.170 20	0.0012
β- 6 max	1170 100		
avg	410 50	0.110 20	0.0010
β- 7 max	1200 100		
avg	430 50	0.31 3	0.0028
β- 8 max	1240 100		
avg	440 50	0.13 3	0.0012
β- 9 max	1390 100		
avg	510 50	0.25 6	0.0027
β-10 max	1680 100		
avg	630 50	0.25 3	0.0034
β-11 max	1980 100		
avg	770 50	0.52 9	0.0085
β-12 max	2050 100		
avg	800 50	0.17 3	0.0029
β-13 max	2460 100		
avg	990 50	0.157 24	0.0033
β-14 max	2530 100		
avg	1020 50	0.38 3	0.0083
β-15 max	2550 100		
avg	1030 50	1.38 7	0.0303
β-16 max	2730 100		
avg	1110 50	4.91 16	0.116
β-17 max	3130 100		
avg	1300 50	0.19 8	0.0053
β-18 max	3790 100		
avg	1600 50	0.24 7	0.0082
β-19 max	4020 100		
avg	1710 50	0.33 5	0.0120
β-20 max	4130 100		
avg	1770 50	4.8 4	0.181
β-21 max	4150 100		
avg	1770 50	1.17 10	0.0441
β-22 max	4370 100		
avg	1880 50	35.4 19	1.42
β-23 max	4440 100		
avg	1890 50	2.83 18	0.114
β-24 max	4590 100		
avg	1980 50	6.3 4	0.266
β-25 max	4710 100		
avg	2040 50	10.4 7	0.452
β-26 max	5690 100		
avg	2500 50	30.4 19	1.62
total β-			
avg	1980 60	102 3	4.31

9 weak β's omitted:
Σβ(avg) = 459.3; ΣIβ= 0.28%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 1	219.33 15	0.85 7	0.0040
γ 2	240.50 20	0.24 5	0.0012
γ 3	270.2 3	0.22 6	0.0012
γ 4	309.10 20	0.35 4	0.0023
γ 5	344.72 10	2.50 21	0.0183
γ 6	362.5 4	0.132 21	0.0010
γ 7	381.37 6	0.86 9	0.0070
γ 8	396.00 20	0.44 6	0.0037
γ 9	431.38 12	0.21 7	0.0019
γ 10	434.18 11	0.83 7	0.0076
γ 11	597.80 20	0.37 5	0.0048
γ 12	682.7 3	0.19 3	0.0028
γ 13	812.63 8	0.9 3	0.0156
γ 14	865.5 3	0.67 6	0.0123
γ 15	976.50 20	2.78 21	0.0577
γ 16	994.20 20	1.68 10	0.0356
γ 17	1057.4 4	0.30 5	0.0067
γ 18	1101.4 3	0.50 8	0.0117
γ 19	1178.6 3	0.23 4	0.0057
γ 20	1222.6 4	0.16 3	0.0042
γ 21	1246.84 10	2.36 13	0.0627
γ 22	1313.02 10	69.4 6	1.94
γ 23	1321.08 10	25.8 19	0.726
γ 24	1399.9 5	0.11 3	0.0033
γ 25	1536.41 10	1.35 8	0.0441
γ 26	1555.97 15	0.49 4	0.0161
γ 27	1583.50 20	0.26 4	0.0089
γ 28	1624.8 3	0.24 4	0.0084
γ 29	1635.20 20	0.39 5	0.0135
γ 30	1639.8 5	0.19 5	0.0068
γ 32	1666.0 4	0.18 3	0.0064
γ 33	1686.1 3	0.32 4	0.0115
γ 34	1689.0 3	0.27 4	0.0097
γ 35	1709.40 20	0.72 5	0.0263
γ 36	1738.1 3	0.17 3	0.0062
γ 37	1820.0 3	0.22 3	0.0086
γ 39	1962.2 3	2.37 14	0.0992
γ 40	1968.4 4	0.17 3	0.0073
γ 41	1979.6 3	0.139 21	0.0059
γ 42	2039.2 4	0.17 3	0.0072
γ 44	2227.9 5	0.11 3	0.0053
γ 45	2289.60 20	10.8 6	0.528
γ 48	2382.7 3	0.22 3	0.0113
γ 49	2414.60 20	7.1 4	0.364
γ 50	2427.8 3	0.19 3	0.0097
γ 51	2480.4 4	0.14 3	0.0073
γ 52	2548.2 4	0.13 3	0.0072
γ 54	2601.8 9	0.12 7	0.0069
γ 55	2634.20 20	7.0 4	0.393
γ 58	2828.5 3	0.104 14	0.0063
γ 60	2868.90 20	4.1 4	0.250
γ 62	2956.30 20	0.75 5	0.0472
γ 63	2979.1 3	0.32 3	0.0203
γ 65	3141.1 3	0.72 5	0.0483
γ 66	3195.4 4	0.173 21	0.0118
γ 68	3211.8 3	0.53 4	0.0366
γ 70	3349.2 3	0.201 21	0.0144
γ 73	3626.4 4	0.173 14	0.0134
γ 75	3634.6 5	0.125 14	0.0097
γ 76	3673.9 4	0.173 14	0.0136
γ 83	4063.9 4	0.173 21	0.0150
γ 85	4269.50 20	0.368 21	0.0334
γ 87	4473.8 3	0.139 14	0.0132
γ 95	4739.1 5	0.111 14	0.0112

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 99	4889.3 4	0.153 21	0.0159
γ 100	4929.4 3	0.119 13	0.0125
γ 108	5608.0 4	0.15 4	0.0182
γ 109	5800.5 4	0.13 3	0.0163
γ 114	6104.2 6	0.14 3	0.0180

51 weak γ's omitted:
Eγ(avg) = 4128.8; ΣIγ = 2.42%

● ^{136}Cs β^- Decay (13.16 d 3) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.67	20.7 13	0.0016
Auger-K	26.4	1.9 5	0.0011
ce-K- 1	29.47 5	7.3 7	0.0046
ce-K- 2	48.85 5	1.84 11	0.0019
ce-L- 1	60.92 5	1.04 9	0.0014
ce-MNO- 1	65.62 5	0.267 22	0.0004
ce-K- 3	72.22 10	0.377 22	0.0006
ce-L- 2	80.30 5	0.253 15	0.0004
ce-L- 3	103.67 10	0.154 9	0.0003
ce-K- 4	115.78 5	2.38 9	0.0059
ce-K- 5	126.45 5	4.97 19	0.0134
ce-K- 6	129.09 10	0.141 15	0.0004
ce-K- 7	139.11 5	0.551 19	0.0016
ce-L- 4	147.23 5	0.673 25	0.0021
ce-MNO- 4	151.93 5	0.181 4	0.0006
ce-L- 5	157.90 5	3.98 15	0.0134
ce-M- 5	162.60 5	0.89 4	0.0031
ce-NOP- 5	163.64 5	0.233 9	0.0008
ce-K- 10	236.21 4	0.158 6	0.0008
ce-K- 14	303.13 5	1.21 4	0.0078
ce-L- 14	334.58 5	0.208 7	0.0015
ce-K- 18	781.06 4	0.241 8	0.0040
ce-K- 19	1010.63 7	0.112 4	0.0024
β- 1 max	174.4 20		
avg	47.2 6	2.49 10	0.0025
β- 2 max	191.6 20		
avg	52.3 6	0.21 3	0.0002
β- 3 max	341.0 20		
avg	98.8 7	95.1 18	0.200
β- 4 max	681.5 20		
avg	219.0 8	2.2 18	0.0103
total β-			
avg	100.1 8	100 3	0.213
X-ray L	4.47	2.8 8	0.0003
X-ray Kα$_2$	31.8171 3	4.95 24	0.0034
X-ray Kα$_1$	32.1936 3	9.1 5	0.0063
X-ray Kβ	36.4	3.32 16	0.0026
γ 1	66.91 5	12.5 10	0.0178
γ 2	86.29 5	6.3 3	0.0115
γ 3	109.66 10	0.409 20	0.0010
γ 4	153.22 5	7.46 16	0.0243
γ 5	163.89 5	4.61 10	0.0161
γ 6	166.53 10	0.63 3	0.0022
γ 7	176.55 5	13.56 20	0.0510
γ 8	187.25 10	0.60 6	0.0024
γ 10	273.65 4	12.66 20	0.0738
γ 13	319.87 10	0.60 6	0.0041
γ 14	340.57 5	48.5 5	0.351
γ 16	507.21 10	0.98 5	0.0106
γ 18	818.50 4	99.700 10	1.74
γ 19	1048.07 7	79.6 8	1.78
γ 20	1235.34 5	19.7 8	0.519

8 weak γ's omitted:
Eγ(avg) = 787.2; ΣIγ = 0.33%

● ^{137}Xe β^- Decay (3.83 m 1) I(min) = 0.10%
Feeds ^{137}Cs

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.55	0.29 5	≈0
ce-K- 3	419.505 3	0.36 6	0.0032
β- 1 max	1494 23		
avg	553 10	0.72 7	0.0085
β- 2 max	2276 23		
avg	902 11	0.136 16	0.0026
β- 3 max	2561 23		
avg	1032 11	0.38 4	0.0084
β- 4 max	2769 23		
avg	1128 11	0.172 20	0.0041
β- 5 max	3495 23		
avg	1465 11	0.64 7	0.0200
β- 6 max	3889 23		
avg	1649 11	30 3	1.05
β- 7 max	4344 23		
avg	1862 11	67 3	2.66
total β-			
avg	1774 11	100 5	3.76

25 weak β's omitted:
Eβ(avg) = 783.5; ΣIβ = 0.57%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray Kα$_1$	30.9728 3	0.17 3	0.0001
γ 1	298.00 7	0.117 14	0.0007
γ 2	393.35 6	0.138 16	0.0012
γ 3	455.490 3	31 3	0.298
γ 11	848.95 6	0.61 7	0.0111
γ 13	982.25 5	0.206 23	0.0043
γ 20	1119.33 6	0.105 12	0.0025
γ 27	1273.23 10	0.22 3	0.0061
γ 35	1576.75 10	0.101 13	0.0034
γ 37	1612.52 6	0.123 15	0.0042
γ 46	1783.43 6	0.41 5	0.0155
γ 77	2849.80 10	0.181 19	0.0110

83 weak γ's omitted:
Eγ(avg) = 1490.6; ΣIγ = 1.31%

● ^{137}Cs β^- Decay (30.17 y 3) I(min) = 0.10%
% Feeding to ^{137}Ba (2.522 m) = 94.6 5

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	511.6 9		
avg	156.8 4	94.6 5	0.316
β- 2 max	1173.2 9		
avg	415.2 4	5.4 5	0.0478
total β-			
avg	170.8 5	100.0 7	0.364

● ^{137}Ba IT Decay (2.552 m 2) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.67	7.6 5	0.0006
Auger-K	26.4	0.80 22	0.0004
ce-K- 1	624.208 5	8.08 22	0.107
ce-L- 1	655.660 5	1.46 4	0.0204
ce-MNO- 1	660.356 5	0.480 14	0.0068
X-ray L	4.47	1.0 3	≈0
X-ray Kα$_2$	31.8171 3	2.07 9	0.0014
X-ray Kα$_1$	32.1936 3	3.82 16	0.0026
X-ray Kβ	36.4	1.39 6	0.0011
γ 1	661.649 5	89.98 24	1.27

● ^{138}Xe β^- Decay (14.13 m 5) I (min) = 0.10%
Feeds ^{138}Cs (32.2 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	3.55	49 4	0.0037
ce-M- 1	3.63 5	32 5	0.0025
ce-NOP- 1	4.62 5	10.6 17	0.0010
ce-L- 2	5.14 5	51 3	0.0056
ce-M- 2	9.63 5	10.4 6	0.0021
ce-NOP- 2	10.62 5	3.43 20	0.0008
Auger-K	25.5	0.42 6	0.0002
ce-K- 5	117.77 3	1.61 25	0.0040
ce-L- 5	148.04 3	0.34 16	0.0011
ce-K- 7	206.58 5	0.241 11	0.0011
ce-K- 8	222.33 5	1.80 9	0.0085
ce-L- 8	252.60 5	0.29 6	0.0016
ce-K- 14	360.45 5	0.108 13	0.0008
ce-K- 17	398.51 5	0.27 4	0.0023
β- 1 max	230 50		
avg	64 16	0.227 17	0.0003
β- 2 max	250 50		
avg	70 16	0.46 4	0.0007
β- 3 max	400 50		
avg	119 17	3.06 13	0.0078
β- 4 max	480 50		
avg	145 18	9.5 4	0.0293
β- 5 max	710 50		
avg	231 20	32.6 13	0.160
β- 6 max	720 50		
avg	233 20	0.28 3	0.0014
β- 7 max	950 50		
avg	323 21	0.23 3	0.0016
β- 8 max	1370 50		
avg	498 22	0.16 3	0.0017
β- 9 max	1530 50		
avg	571 22	0.19 4	0.0023
β-10 max	1790 50		
avg	682 23	0.27 4	0.0039
β-11 max	2290 50		
avg	908 23	20.1 9	0.389
β-12 max	2330 50		
avg	925 23	13.8 7	0.272
β-13 max	2480 50		
avg	996 23	5.1 10	0.108
β-14 max	2730 50		
avg	1099 23	5 5	0.117
β-15 max	2720 50		
avg	1107 23	9 7	0.212
total β-			
avg	610 40	100 9	1.31

3 weak β's omitted:
Eβ(avg) = 637.2; ΣIβ = 0.17%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
X-ray L	4.29	6.1 17	0.0006
γ 1	4.85 5	0.19 3	≈0
γ 2	10.85 5	0.70 4	0.0002
X-ray $K\alpha_2$	30.6251 3	1.03 7	0.0007
X-ray $K\alpha_1$	30.9728 3	1.90 13	0.0013
X-ray Kβ	35	0.68 5	0.0005
γ 5	153.75 3	5.95 25	0.0195
γ 7	242.56 5	3.50 14	0.0181
γ 8	258.31 5	31.5 13	0.173
γ 9	282.51 6	0.428 20	0.0026
γ 12	335.28 9	0.107 11	0.0008
γ 13	371.44 5	0.50 3	0.0040
γ 14	396.43 5	6.3 3	0.0532
γ 15	401.36 5	2.17 13	0.0186
γ 17	434.49 5	20.3 9	0.188
γ 18	500.22 6	0.362 18	0.0039
γ 19	530.07 7	0.252 16	0.0028
γ 21	537.76 13	0.117 17	0.0013
γ 23	555.95 9	0.117 14	0.0014
γ 24	568.53 6	0.306 19	0.0037
γ 27	588.84 8	0.123 11	0.0015
γ 30	654.08 8	0.145 14	0.0020
γ 47	865.82 7	0.296 22	0.0055
γ 49	869.35 6	0.62 4	0.0115
γ 50	896.87 12	0.132 14	0.0025
γ 52	912.51 7	0.328 22	0.0064
γ 53	917.13 6	0.92 4	0.0180
γ 54	936.36 11	0.135 14	0.0027
γ 55	941.25 8	0.230 18	0.0046
γ 60	1093.87 9	0.41 3	0.0095
γ 61	1098.77 11	0.214 18	0.0050
γ 62	1102.24 17	0.107 14	0.0025
γ 63	1114.29 10	1.47 9	0.0350
γ 64	1141.64 9	0.51 4	0.0125
γ 65	1145.44 18	0.132 20	0.0032
γ 80	1571.84 16	0.26 3	0.0089
γ 82	1614.57 18	0.24 3	0.0081
γ 84	1768.26 13	16.7 7	0.630
γ 87	1812.54 18	0.180 20	0.0069
γ 88	1850.86 13	1.42 7	0.0561
γ 90	1925.36 14	0.56 4	0.0231
γ 91	2004.75 14	5.35 23	0.229
γ 92	2015.82 14	12.3 5	0.526
γ 94	2079.17 14	1.44 7	0.0639
γ 95	2252.26 14	2.29 11	0.110
γ 97	2321.90 16	0.62 4	0.0307
γ 99	2475.26 16	0.312 20	0.0164
γ 101	2497.56 17	0.173 14	0.0092

57 weak γ's omitted:
Eγ(avg) = 1118.6; ΣIγ = 2.66%

● ^{138}Cs β^- Decay (32.2 m 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	3.67	0.93 12	≈0
Auger-K	26.4	0.10 3	≈0
ce-K- 2	100.66 6	0.58 10	0.0012
ce-L- 2	132.11 6	0.14 7	0.0004
ce-K- 6	190.32 6	0.133 4	0.0005
ce-K- 14	425.344 5	0.317 13	0.0029
β- 1 max	700 40		
avg	226 16	0.257 25	0.0012
β- 2 max	820 40		
avg	273 16	0.163 14	0.0009
β- 3 max	1090 40		
avg	380 17	0.100 8	0.0008
β- 4 max	1250 40		
avg	447 17	0.19 3	0.0018
β- 5 max	1390 40		
avg	509 18	0.48 6	0.0052
β- 6 max	1410 40		
avg	514 18	0.204 25	0.0022
β- 7 max	1640 40		
avg	614 18	0.30 3	0.0039
β- 8 max	1680 40		
avg	634 18	0.43 7	0.0058
β- 9 max	1960 40		
avg	759 18	0.227 14	0.0037
β-10 max	1990 40		
avg	771 18	0.171 20	0.0028
β-11 max	2090 40		
avg	815 18	0.273 20	0.0047
β-12 max	2170 40		
avg	850 19	0.34 3	0.0062

(Continued)

Radiation Type		Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β-13	max	2280 40		
	avg	902 19	0.169 24	0.0032
β-14	max	2340 40		
	avg	929 19	0.65 4	0.0129
β-15	max	2400 40		
	avg	956 19	0.20 4	0.0041
β-16	max	2450 40		
	avg	979 19	0.37 20	0.0077
β-17	max	2480 40		
	avg	992 19	0.20 5	0.0042
β-18	max	2550 40		
	avg	1025 19	1.60 8	0.0349
β-19	max	2690 40		
	avg	1090 19	8.8 3	0.204
β-20	max	2750 40		
	avg	1115 19	1.68 8	0.0399
β-21	max	2880 40		
	avg	1179 19	44.1 10	1.11
β-22	max	2910 40		
	avg	1193 19	0.66 6	0.0168
β-23	max	3020 40		
	avg	1243 19	7.3 3	0.193
β-24	max	3110 40		
	avg	1284 19	12.8 4	0.350
β-25	max	3430 40		
	avg	1433 19	13.8 7	0.421
β-26	max	3890 40		
	avg	1649 19	4.4 18	0.155
total β-				
	avg	1218 20	100.2 23	2.60

6 weak β's omitted:
Eβ(avg) = 679.6; ΣIβ = 0.29%

Radiation Type		Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray	L	4.47	0.13 4	≈0
X-ray	$K\alpha_2$	31.8171 3	0.26 3	0.0002
X-ray	$K\alpha_1$	32.1936 3	0.49 5	0.0003
X-ray	Kβ	36.4	0.177 18	0.0001
γ	1	112.60 13	0.130 23	0.0003
γ	2	138.10 6	1.49 9	0.0044
γ	3	191.96 6	0.50 4	0.0021
γ	4	193.89 8	0.328 24	0.0014
γ	5	212.32 8	0.175 14	0.0008
γ	6	227.76 6	1.51 5	0.0073
γ	7	324.90 8	0.290 19	0.0020
γ	9	363.93 8	0.244 24	0.0019
γ	10	365.29 13	0.191 23	0.0015
γ	12	408.98 6	4.66 12	0.0406
γ	13	421.59 7	0.427 24	0.0038
γ	14	462.785 5	30.7 8	0.303
γ	15	516.74 12	0.43 5	0.0047
γ	16	546.94 7	10.8 3	0.125
γ	19	683.59 15	0.108 14	0.0016
γ	23	766.10 12	0.146 15	0.0024
γ	24	773.31 10	0.233 19	0.0038
γ	25	782.08 9	0.33 3	0.0055
γ	31	871.80 8	5.11 16	0.0949
γ	32	880.8 3	0.11 3	0.0021
γ	33	935.03 12	0.181 17	0.0036
γ	36	1009.78 8	29.8 8	0.642
γ	38	1054.32 15	0.159 20	0.0036
γ	39	1147.22 9	1.24 8	0.0304
γ	40	1199.15 24	0.17 3	0.0043
γ	41	1203.69 13	0.40 4	0.0102
γ	42	1264.94 16	0.137 17	0.0037
γ	43	1343.59 9	1.14 6	0.0328
γ	46	1415.68 13	0.37 4	0.0110
γ	47	1435.86 9	76.3 20	2.33
γ	48	1445.04 25	0.97 20	0.0298
γ	49	1495.63 23	0.18 4	0.0058
γ	50	1555.31 10	0.366 24	0.0121
γ	51	1614.09 20	0.137 23	0.0047
γ	52	1717.1 3	0.107 23	0.0039
γ	53	1727.68 18	0.111 13	0.0041
γ	55	1778.25 23	0.137 23	0.0052
γ	60	2023.93 20	0.118 16	0.0051
γ	61	2062.34 17	0.111 12	0.0049
γ	64	2210.7 4	0.21 7	0.0101
γ	65	2218.00 10	15.2 4	0.717
γ	67	2499.4 3	0.17 5	0.0089
γ	69	2583.15 13	0.239 16	0.0131
γ	71	2639.59 13	7.6 3	0.429
γ	72	2731.12 15	0.120 8	0.0070
γ	78	3339.01 25	0.151 10	0.0107
γ	80	3366.98 25	0.227 14	0.0163

39 weak γ's omitted:
Eγ(avg) = 1613.2; ΣIγ = 1.62%

● ^{139}Cs β^- Decay (9.40 m 12) I (min) = 0.10%
Feeds ^{139}Ba

Radiation Type		Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1	max	538 7		
	avg	166 3	0.15 10	0.0005
β- 2	max	740 7		
	avg	241 3	0.16 7	0.0008
β- 3	max	840 7		
	avg	280 3	0.10 4	0.0006
β- 4	max	1207 7		
	avg	429 3	0.13 8	0.0012
β- 5	max	1210 7		
	avg	430 3	0.13 5	0.0012
β- 6	max	1356 7		
	avg	493 3	0.10 7	0.0011
β- 7	max	1555 7		
	avg	578 3	0.23 10	0.0028
β- 8	max	1598 7		
	avg	597 3	0.56 21	0.0071
β- 9	max	1672 7		
	avg	630 3	0.53 21	0.0071
β-10	max	1674 7		
	avg	631 3	0.12 5	0.0016
β-11	max	1823 7		
	avg	696 4	0.15 6	0.0022
β-12	max	1854 7		
	avg	710 4	1.3 5	0.0197
β-13	max	1985 7		
	avg	769 4	0.10 4	0.0016
β-14	max	2030 7		
	avg	789 4	0.29 11	0.0049
β-15	max	2093 7		
	avg	817 4	0.8 3	0.0139
β-16	max	2114 7		
	avg	827 4	0.12 5	0.0021
β-17	max	2166 7		
	avg	850 4	0.21 8	0.0038
β-18	max	2183 7		
	avg	858 4	0.16 8	0.0029
β-19	max	2255 7		
	avg	890 4	0.27 11	0.0051
β-20	max	2271 7		
	avg	898 4	0.31 12	0.0059
β-21	max	2316 7		
	avg	918 4	0.29 11	0.0057
β-22	max	2327 7		
	avg	923 4	0.36 14	0.0071
β-23	max	2353 7		
	avg	935 4	0.12 5	0.0024
β-24	max	2505 7		
	avg	1005 4	0.15 6	0.0032

(Continued)

^{139}Cs β^- Decay (9.40 m 12) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β-25 max	2523 7		
avg	1013 4	0.45 17	0.0097
β-26 max	2583 7		
avg	1040 4	0.38 15	0.0084
β-27 max	2783 7		
avg	1132 4	0.38 16	0.0092
β-28 max	2896 7		
avg	1184 4	0.24 10	0.0061
β-29 max	2921 7		
avg	1196 4	6.3 24	0.160
β-30 max	4204 7		
avg	1794 4	84 6	3.21
total β-			
avg	1656 5	100 7	3.52

30 weak β's omitted:
Eβ(avg) = 508.4; ΣIβ = 1.27%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 20	454.66 6	0.13 5	0.0013
γ 24	531.98 4	0.21 9	0.0024
γ 29	567.72 5	0.13 6	0.0016
γ 37	627.24 3	1.5 6	0.0206
γ 54	827.52 7	0.11 5	0.0019
γ 61	929.18 6	0.23 9	0.0046
γ 63	946.46 8	0.10 9	0.0020
γ 80	1190.42 6	0.18 7	0.0047
γ 84	1283.23 5	7 3	0.197
γ 85	1306.09 11	0.11 4	0.0029
γ 86	1308.13 6	0.37 15	0.0104
γ 88	1321.77 6	0.23 9	0.0066
γ 93	1410.58 7	0.15 6	0.0045
γ 94	1420.66 6	0.8 3	0.0242
γ 107	1620.74 6	0.42 16	0.0144
γ 109	1680.72 6	0.60 23	0.0217
γ 111	1698.66 7	0.18 7	0.0064
γ 122	1877.45 7	0.34 13	0.0136
γ 123	1887.57 7	0.22 9	0.0088
γ 124	1904.50 7	0.12 5	0.0050
γ 125	1933.48 7	0.24 10	0.0101
γ 130	2020.76 25	0.13 7	0.0056
γ 134	2089.91 9	0.14 6	0.0061
γ 136	2110.91 6	0.66 25	0.0295
γ 139	2173.98 7	0.20 8	0.0093
γ 147	2349.92 6	0.56 22	0.0281
γ 150	2380.66 7	0.19 8	0.0095
γ 155	2531.84 7	0.42 16	0.0225
γ 156	2605.75 6	0.24 10	0.0135
γ 157	2649.32 7	0.17 7	0.0094
γ 161	2847.63 8	0.10 7	0.0061
γ 172	3464.34 9	0.11 5	0.0080
γ 174	3665.61 8	0.14 10	0.0107

148 weak γ's omitted:
Eγ(avg) = 1569.5; ΣIγ = 3.87%

• ^{139}Ba β^- Decay (83.1 m 8) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.8	3.2 10	0.0003
Auger-K	27.4	0.34 15	0.0002
ce-K- 1	126.928 7	3.6 12	0.0098
ce-L- 1	159.587 7	0.49 16	0.0017
ce-MNO- 1	164.492 7	0.13 5	0.0005
β- 1 max	885 5		
avg	297.4 20	0.32 10	0.0020
β- 2 max	2140 5		
avg	837.0 23	22 7	0.392
β- 3 max	2306 5		
avg	912.0 23	78 5	1.52
total β-			
avg	893.2 23	100 9	1.91

14 weak β's omitted:
Eβ(avg) = 304.7; ΣIβ = 0.06%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	4.65	0.48 18	≈0
X-ray Kα₂	33.03410 2	0.9 3	0.0007
X-ray Kα₁	33.44180 2	1.7 6	0.0012
X-ray Kβ	37.8	0.63 21	0.0005
γ 1	165.853 7	17 6	0.0613
γ 12	1420.50 20	0.28 8	0.0085

26 weak γ's omitted:
Eγ(avg) = 1271.1; ΣIγ = 0.11%

• ^{139}Ce EC Decay (137.66 d 13) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.8	88 5	0.0072
Auger-K	27.4	8.2 23	0.0048
ce-K- 1	126.928 7	16.8 4	0.0454
ce-L- 1	159.587 7	2.25 7	0.0076
ce-M- 1	164.492 7	0.466 14	0.0016
ce-NOP- 1	165.583 7	0.129 4	0.0005
X-ray L	4.65	13 4	0.0013
X-ray Kα₂	33.03410 2	22.5 8	0.0158
X-ray Kα₁	33.44180 2	41.4 15	0.0295
X-ray Kβ	37.8	15.2 6	0.0122
γ 1	165.853 7	80.35 8	0.284

• ^{140}Ba β^- Decay (12.789 d 6) I (min) = 0.10%
Feeds ^{140}La

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.8	98 16	0.0080
ce-L- 1	7.58 5	51 13	0.0082
ce-M- 1	12.49 5	10 3	0.0028
ce-NOP- 1	13.58 5	3.4 9	0.0010
ce-L- 2	23.70 5	61 12	0.0306
Auger-K	27.4	0.19 6	0.0001
ce-M- 2	28.61 5	12.5 25	0.0076
ce-NOP- 2	29.70 5	4.1 9	0.0026
ce-K- 5	123.72 5	1.60 23	0.0042
ce-L- 5	156.37 5	0.22 3	0.0007
ce-K- 6	265.915 20	0.20 3	0.0011
ce-K- 10	498.40 8	0.27 4	0.0028
β- 1 max	454 10		
avg	136 4	26 4	0.0753
β- 2 max	567 10		
avg	177 4	10.2 14	0.0385
β- 3 max	872 10		
avg	306 4	4.4 7	0.0287
β- 4 max	991 10		
avg	340 4	37 4	0.268
β- 5 max	1005 10		
avg	357 4	22 6	0.167
total β-			
avg	272 5	100 9	0.578

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	4.65	15 5	0.0015
γ 1	13.85 5	1.2 3	0.0003
γ 2	29.97 5	14 3	0.0090
X-ray $K\alpha_2$	33.03410 2	0.53 7	0.0004
X-ray $K\alpha_1$	33.44180 2	0.98 12	0.0007
X-ray Kβ	37.8	0.36 5	0.0003
γ 4	132.84 12	0.21 4	0.0006
γ 5	162.64 5	6.7 10	0.0233
γ 6	304.840 20	4.5 6	0.0293
γ 7	423.70 3	3.2 5	0.0293
γ 8	437.55 3	2.0 3	0.0186
γ 9	467.57 5	0.15 3	0.0015
γ 10	537.32 8	25 4	0.292

1 weak γ's omitted:
Eγ(avg) = 118.8; ΣIγ = 0.07%

• ^{140}La β^- Decay (40.22 h 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	4	1.71 12	0.0001
ce-L- 1	18.046 4	0.25 3	≈0
Auger-K	28.4	0.16 5	≈0
ce-K- 3	28.473 6	0.19 4	0.0001
ce-K- 4	68.974 6	0.15 3	0.0002
ce-K- 5	90.678 8	0.24 5	0.0005
ce-K- 10	288.325 12	0.81 3	0.0050
ce-L- 10	322.219 12	0.107 4	0.0007
ce-K- 15	446.586 19	0.440 15	0.0042
β- 1 max	1213.1 21		
avg	438.2 9	0.64 5	0.0060
β- 2 max	1238.8 20		
avg	441.1 9	11.11 17	0.104
β- 3 max	1244.4 20		
avg	443.5 9	5.89 10	0.0556
β- 4 max	1279.3 20		
avg	458.2 9	1.19 10	0.0116
β- 5 max	1296.2 21		
avg	465.3 9	5.63 8	0.0558
β- 6 max	1348.2 20		
avg	487.4 9	44.5 6	0.462
β- 7 max	1412.3 20		
avg	514.7 9	5.08 11	0.0557
β- 8 max	1677.0 20		
avg	629.5 9	20.7 8	0.278
β- 9 max	2164.0 20		
avg	846.2 9	5.2 9	0.0937
total β-			
avg	526.9 10	100.1 14	1.12

5 weak β's omitted:
Eβ(avg) = 328.9; ΣIβ = 0.16%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	4.84	0.25 6	≈0
X-ray $K\alpha_2$	34.27890 2	0.472 24	0.0003
X-ray $K\alpha_1$	34.71970 2	0.87 5	0.0006
X-ray Kβ	39.3	0.322 17	0.0003
γ 4	109.417 6	0.19 4	0.0004
γ 5	131.121 8	0.55 4	0.0015
γ 6	173.550 11	0.12 5	0.0005
γ 7	241.966 12	0.43 6	0.0022
γ 8	266.551 14	0.49 6	0.0028
γ 10	328.768 12	20.5 3	0.144
γ 12	432.53 3	2.94 4	0.0271
γ 15	487.029 19	45.5 7	0.473
γ 17	751.79 8	4.40 9	0.0705
γ 18	815.85 7	23.5 5	0.408
γ 19	867.82 14	5.63 8	0.104
γ 20	919.63 15	2.88 9	0.0565
γ 21	925.24 9	7.09 11	0.140
γ 23	950.9 3	0.53 5	0.0108
γ 24	1596.49 24	95.49 7	3.25
γ 27	2348.8 6	0.851 18	0.0426
γ 29	2521.7 5	3.46 8	0.186
γ 31	2547.1 8	0.104 3	0.0056

16 weak γ's omitted:
Eγ(avg) = 1208.0; ΣIγ = 0.42%

• ^{141}Ba β^- Decay (18.27 m 7) I (min) = 0.10%

Feeds ^{141}La

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	3.8	6.7 6	0.0005
Auger-K	27.4	0.71 21	0.0004
ce-K- 4	151.30 8	7.6 6	0.0244
ce-L- 4	183.95 8	1.01 8	0.0039
ce-MNO- 4	188.86 8	0.266 19	0.0011
β- 1 max	560 50		
avg	174 19	0.62 7	0.0023
β- 2 max	590 50		
avg	184 19	0.24 4	0.0009
β- 3 max	640 50		
avg	205 19	0.17 4	0.0007
β- 4 max	650 50		
avg	208 19	0.82 14	0.0036
β- 5 max	810 50		
avg	269 20	0.65 7	0.0037
β- 6 max	850 50		
avg	283 20	0.48 6	0.0029
β- 7 max	1100 50		
avg	386 21	2.26 16	0.0186
β- 8 max	1160 50		
avg	408 21	4.1 3	0.0356
β- 9 max	1190 50		
avg	420 21	2.60 16	0.0233
β-10 max	1290 50		
avg	463 22	2.51 18	0.0248
β-11 max	1400 50		
avg	511 22	2.32 19	0.0253
β-12 max	1460 50		
avg	538 22	0.21 5	0.0024
β-13 max	1530 50		
avg	566 22	6.7 5	0.0808
β-14 max	1600 50		
avg	599 22	0.39 8	0.0050
β-15 max	1840 50		
avg	703 23	0.34 7	0.0051
β-16 max	1860 50		
avg	711 23	1.58 17	0.0239
β-17 max	1960 50		
avg	758 23	3.7 3	0.0597
β-18 max	2040 50		
avg	791 23	0.19 6	0.0032
β-19 max	2100 50		
avg	819 23	12.6 7	0.220
β-20 max	2200 50		
avg	863 23	2.13 18	0.0392
β-21 max	2200 50		
avg	866 23	0.54 16	0.0100
β-22 max	2380 50		
avg	947 23	24.5 13	0.494
β-23 max	2560 50		
avg	1029 23	19.0 16	0.416
β-24 max	2840 50		
avg	1156 23	12 4	0.295
total β-			
avg	840 30	101 5	1.80

(Continued)

^{141}Ba β^- Decay (18.27 m 7) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	4.65	1.00 25	≈0
X-ray Kα$_2$	33.03410 2	1.95 16	0.0014
X-ray Kα$_1$	33.44180 2	3.6 3	0.0026
X-ray Kβ	37.8	1.32 11	0.0011
γ 1	112.94 9	0.99 8	0.0024
γ 2	162.96 12	0.47 5	0.0016
γ 3	180.50 9	0.52 5	0.0020
γ 4	190.22 8	49 4	0.197
γ 7	276.99 8	24.6 16	0.145
γ 9	304.24 8	26.6 17	0.172
γ 10	343.71 8	15.0 10	0.110
γ 11	349.35 20	0.30 6	0.0022
γ 12	364.38 10	0.61 6	0.0048
γ 13	381.31 22	0.121 25	0.0010
γ 14	389.78 9	1.39 10	0.0116
γ 16	457.58 8	5.1 4	0.0493
γ 17	462.15 8	5.1 4	0.0498
γ 18	467.26 8	5.8 4	0.0576
γ 20	522.19 18	0.46 6	0.0051
γ 21	524.20 20	0.43 6	0.0048
γ 22	527.42 13	0.40 5	0.0045
γ 25	561.9 5	0.10 4	0.0012
γ 26	572.09 19	0.27 4	0.0033
γ 27	572.09 19	0.27 4	0.0033
γ 29	599.28 19	0.25 4	0.0032
γ 30	608.91 18	0.26 4	0.0033
γ 31	625.23 8	3.45 23	0.0460
γ 32	636.05 20	0.30 5	0.0040
γ 33	641.38 16	0.38 5	0.0052
γ 34	647.88 8	5.9 4	0.0818
γ 35	670.04 24	0.19 4	0.0027
γ 36	674.2 10	0.11 12	0.0016
γ 37	675.7 5	0.23 12	0.0033
γ 38	685.7 6	0.14 6	0.0021
γ 39	687.8 7	0.11 5	0.0016
γ 40	698.5 4	0.30 12	0.0044
γ 41	700.0 5	0.22 12	0.0033
γ 42	704.80 14	0.32 4	0.0047
γ 43	739.10 8	4.5 3	0.0712
γ 45	753.9 5	0.10 4	0.0016
γ 46	762.2 4	0.15 4	0.0024
γ 47	778.2 5	0.11 4	0.0019
γ 49	805.4 5	0.10 4	0.0018
γ 50	826.34 19	0.35 5	0.0061
γ 51	831.72 9	1.60 12	0.0283
γ 52	832.6 8	0.17 10	0.0030
γ 54	867.9 4	0.16 4	0.0029
γ 55	876.29 8	3.60 24	0.0671
γ 56	880.6 3	0.21 5	0.0039
γ 58	908.8 6	0.13 5	0.0025
γ 59	929.47 10	0.73 6	0.0145
γ 60	943.25 12	0.77 7	0.0154
γ 62	981.63 13	0.82 8	0.0172
γ 63	996.6 4	0.13 4	0.0028
γ 64	1012.3 6	0.11 4	0.0023
γ 65	1034.49 24	0.31 5	0.0069
γ 66	1040.4 7	0.10 5	0.0023
γ 67	1046.32 21	0.36 6	0.0081
γ 68	1094.0 3	0.23 5	0.0054
γ 69	1160.8 5	0.25 10	0.0062
γ 70	1160.84 9	0.97 11	0.0240
γ 71	1197.47 8	4.9 4	0.124
γ 72	1224.79 16	0.43 5	0.0113
γ 73	1235.5 4	0.15 4	0.0040
γ 74	1264.20 14	0.87 9	0.0233
γ 75	1273.64 19	0.54 7	0.0148
γ 76	1278.24 16	0.69 8	0.0189
γ 77	1309.1 7	0.25 12	0.0069
γ 78	1311.2 3	0.63 15	0.0176
γ 79	1323.72 10	1.00 8	0.0281
γ 80	1345.27 25	0.23 4	0.0067
γ 81	1357.5 5	0.17 5	0.0048
γ 82	1376.99 14	0.74 8	0.0218
γ 83	1405.59 25	0.29 5	0.0086
γ 84	1436.84 13	0.87 8	0.0266
γ 85	1458.56 14	0.71 8	0.0222
γ 86	1501.82 21	0.33 5	0.0104
γ 88	1550.55 19	0.33 4	0.0108
γ 89	1568.81 25	0.27 5	0.0089
γ 94	1653.95 12	0.79 7	0.0277
γ 95	1682.35 10	1.41 11	0.0507
γ 96	1713.23 22	0.18 3	0.0066
γ 98	1735.6 4	0.19 4	0.0072
γ 99	1740.83 21	0.33 5	0.0123
γ 100	1795.85 18	0.51 6	0.0195
γ 104	1912.7 4	0.136 25	0.0055
γ 106	1990.3 3	0.19 3	0.0082
γ 107	2026.56 23	0.40 5	0.0172
γ 111	2136.7 4	0.117 20	0.0053
γ 112	2164.7 3	0.165 25	0.0076
γ 115	2278.9 5	0.102 25	0.0050
γ 116	2469.0 4	0.19 4	0.0102

28 weak γ's omitted:
Eγ(avg) = 1252.0; ΣIγ = 1.73%

• ^{141}La β^- Decay (3.94 h 5) I (min) = 0.10%
Feeds ^{141}Ce

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	740 30		
avg	239 12	0.120 10	0.0006
β- 2 max	1080 30		
avg	373 13	2.61 18	0.0207
β- 3 max	2430 30		
avg	967 14	97	2.00
total β-			
avg	948 15	99.99 18	2.02

13 weak β's omitted:
Eβ(avg) = 125.4; ΣIβ = 0.26%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
γ 14	1354.52 9	2.62 18	0.0756
γ 19	1693.31 11	0.118 10	0.0043

25 weak γ's omitted:
Eγ(avg) = 1678.7; ΣIγ = 0.31%

• ^{141}Ce β^- Decay (32.50 d 4) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	4	16.3 9	0.0014
Auger-K	29.4	1.6 5	0.0010
ce-K- 1	103.449 10	18.8 6	0.0414
ce-L- 1	138.605 10	2.594 22	0.0077
ce-M- 1	143.929 10	0.542 17	0.0017
ce-NOP- 1	145.135 10	0.149 5	0.0005
β- 1 max	434.6 15		
avg	129.6 6	70.5 6	0.195
β- 2 max	580.0 15		
avg	180.7 6	29.5 6	0.114
total β-			
avg	144.7 7	100.0 9	0.308

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	5	2.7 4	0.0003
X-ray $K\alpha_2$	35.55020 2	4.88 22	0.0037
X-ray $K\alpha_1$	36.02630 2	8.9 4	0.0069
X-ray Kβ	40.7	3.36 15	0.0029
γ 1	145.440 10	48.4 4	0.150

● ^{142}Ba β^- Decay (10.70 m 10) I (min) = 0.10%
Feeds ^{142}La

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	3.8	26 8	0.0021
Auger-K	27.4	2.0 7	0.0012
ce-K- 3	38.68 10	22 5	0.0177
ce-L- 3	71.33 10	11 8	0.0161
ce-M- 3	76.24 10	2.3 19	0.0037
ce-NOP- 3	77.33 10	0.6 5	0.0010
β− 1 max	740 100		
avg	240 40	12.6 21	0.0644
β− 2 max	920 100		
avg	310 40	0.16 8	0.0011
β− 3 max	1000 100		
avg	340 40	40 7	0.290
β− 4 max	1120 100		
avg	390 50	18 4	0.150
β− 5 max	1330 100		
avg	480 50	0.44 14	0.0045
β− 6 max	1390 100		
avg	510 50	0.30 7	0.0033
β− 7 max	1410 100		
avg	510 50	0.71 17	0.0077
β− 8 max	1610 100		
avg	600 50	0.37 14	0.0047
β− 9 max	1770 100		
avg	670 50	4.6 10	0.0656
β−10 max	1770 100		
avg	670 50	3.1 6	0.0442
β−11 max	1900 100		
avg	730 50	0.27 7	0.0042
β−12 max	2050 100		
avg	790 50	0.16 10	0.0027
β−13 max	2120 100		
avg	830 50	18 14	0.318
total β− avg	460 50	99 17	0.960
X-ray L	4.65	3.8 15	0.0004
X-ray $K\alpha_2$	33.03410 2	5.5 12	0.0039
X-ray $K\alpha_1$	33.44180 2	10.2 21	0.0073
X-ray Kβ	37.8	3.8 8	0.0030
γ 1	69.4 3	0.36 6	0.0005
γ 2	76.8 6	0.89 13	0.0015
γ 3	77.60 10	9.6 14	0.0159
γ 4	122.89 8	0.93 19	0.0024
γ 5	154.22 9	0.52 11	0.0017
γ 6	162.00 20	0.11 8	0.0004
γ 7	176.82 8	1.5 3	0.0056
γ 8	216.30 10	0.20 6	0.0009
γ 9	222.60 10	0.27 7	0.0013
γ 10	231.52 4	10.1 21	0.0500
γ 11	242.70 20	0.16 8	0.0008
γ 12	255.12 4	18 3	0.0967
γ 13	269.33 9	0.68 14	0.0039
γ 14	283.9 3	0.18 8	0.0011
γ 15	286.20 10	0.93 20	0.0056
γ 16	309.02 5	2.3 5	0.0149
γ 17	334.80 10	1.2 3	0.0089
γ 18	337.10 20	0.25 7	0.0018
γ 19	346.7 5	0.14 8	0.0011
γ 20	363.80 5	3.9 8	0.0303
γ 21	379.10 10	0.46 10	0.0037
γ 22	417.8 3	0.34 9	0.0030
γ 23	425.03 6	5.0 11	0.0451
γ 24	432.3 3	0.98 21	0.0090
γ 25	434.4 4	0.30 7	0.0028
γ 26	448.1 5	0.21 7	0.0020
γ 27	457.30 20	0.39 10	0.0038
γ 28	473.40 20	0.30 7	0.0031
γ 29	488.3 5	0.11 8	0.0011
γ 30	513.3 5	0.23 10	0.0025
γ 32	537.5 5	0.11 8	0.0012
γ 33	558.3 3	0.30 7	0.0036
γ 34	590.7 3	0.25 7	0.0031
γ 35	599.84 8	1.6 3	0.0205
γ 36	604.2 3	0.32 9	0.0041
γ 37	769.40 20	0.61 12	0.0099
γ 38	786.4 3	0.25 8	0.0042
γ 39	792.2 4	0.21 8	0.0036
γ 40	823.4 3	0.41 10	0.0072
γ 41	840.23 7	3.0 7	0.0542
γ 43	894.90 10	11.0 20	0.210
γ 44	948.75 6	8.9 18	0.180
γ 45	1000.86 5	7.8 16	0.167
γ 46	1032.8 3	0.48 10	0.0106
γ 47	1078.48 5	9.3 20	0.213
γ 48	1093.62 6	2.2 5	0.0514
γ 49	1122.6 3	0.30 7	0.0072
γ 50	1126.54 8	1.5 3	0.0367
γ 51	1148.3 3	0.39 8	0.0096
γ 52	1202.20 10	5.3 11	0.137
γ 53	1204.06 8	14 3	0.352
γ 54	1283.4 5	0.16 8	0.0044
γ 55	1379.90 10	3.4 7	0.0999

2 weak γ's omitted:
Eγ(avg) = 685.1; ΣIγ = 0.16%

● ^{142}La β^- Decay (95.4 m 18) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	4	0.191 17	≈0
ce-K- 11	600.73 3	0.250 14	0.0032
β− 1 max	474 6		
avg	143.3 21	1.5 3	0.0046
β− 2 max	542 6		
avg	167.1 22	0.10 6	0.0004
β− 3 max	667 6		
avg	212.7 23	0.26 11	0.0012
β− 4 max	798 6		
avg	262.6 24	0.58 16	0.0032
β− 5 max	800 6		
avg	263.5 24	0.58 19	0.0033
β− 6 max	842 6		
avg	279.6 24	1.2 3	0.0071
β− 7 max	884 6		
avg	296.4 24	1.5 3	0.0095
β− 8 max	904 6		
avg	304.2 24	4.3 5	0.0279
β− 9 max	905 6		
avg	304.6 24	1.7 3	0.0110
β−10 max	1047 6		
avg	361.9 25	0.63 17	0.0049
β−11 max	1058 6		
avg	366.1 25	1.8 4	0.0140
β−12 max	1097 6		
avg	382.1 25	2.5 4	0.0203
β−13 max	1517 6		
avg	560 3	1.36 24	0.0162
β−14 max	1775 6		
avg	673 3	1.31 25	0.0188

(Continued)

^{142}La β^- Decay (95.4 m 18) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β−15 max	1821 6		
avg	693 3	8.1 7	0.120
β−16 max	1850 6		
avg	706 3	3.7 5	0.0556
β−17 max	1974 6		
avg	761 3	20.1 19	0.326
β−18 max	2119 6		
avg	826 3	21.5 20	0.378
β−19 max	2153 6		
avg	841 3	2.0 4	0.0358
β−20 max	2330 6		
avg	921 3	6.9 10	0.135
β−21 max	2513 6		
avg	1004 3	2.1 5	0.0449
β−22 max	2864 6		
avg	1165 3	0.8 7	0.0199
β−23 max	2981 6		
avg	1219 3	3.0 12	0.0779
β−24 max	3876 6		
avg	1634 3	5.2 17	0.181
β−25 max	4517 6		
avg	1910 3	7 5	0.285
total β−			
avg	848 4	100 7	1.80
X-ray Kα$_1$	34.71970 2	0.119 8	≈0
γ 1	106.1 4	0.16 11	0.0004
γ 2	174.1 4	0.10 6	0.0004
γ 3	367.30 20	0.10 6	0.0008
γ 4	393.7 3	0.10 6	0.0009
γ 5	420.80 10	0.26 11	0.0024
γ 6	433.34 7	0.42 16	0.0039
γ 7	514.7 3	0.16 11	0.0017
γ 8	532.00 20	0.16 11	0.0018
γ 9	578.09 4	1.36 22	0.0168
γ 10	619.50 10	0.16 6	0.0021
γ 11	641.17 3	52.5 25	0.717
γ 12	861.57 7	2.0 4	0.0366
γ 13	878.2 3	0.21 11	0.0039
γ 14	894.85 4	9.4 12	0.179
γ 15	946.5 3	0.10 6	0.0021
γ 16	962.2 13	0.42 16	0.0086
γ 17	991.2 3	0.10 6	0.0022
γ 18	1006.70 20	0.26 11	0.0056
γ 19	1011.38 6	4.4 6	0.0939
γ 20	1039.2 3	0.10 6	0.0023
γ 21	1043.68 7	3.0 4	0.0677
γ 22	1061.80 20	0.16 11	0.0036
γ 23	1070.3 3	0.16 11	0.0036
γ 24	1074.2 3	0.10 6	0.0024
γ 25	1088.90 15	0.26 11	0.0061
γ 26	1112.6 3	0.10 6	0.0025
γ 27	1116.7 3	0.10 6	0.0025
γ 28	1130.60 15	0.52 16	0.0126
γ 29	1144.50 20	0.16 11	0.0038
γ 30	1160.16 6	1.9 3	0.0480
γ 31	1174.3 3	0.16 11	0.0039
γ 32	1190.90 20	0.42 16	0.0107
γ 33	1231.5 5	0.31 11	0.0083
γ 34	1233.11 8	2.0 4	0.0538
γ 35	1242.3 3	0.21 11	0.0056
γ 36	1264.7 3	0.10 6	0.0028
γ 37	1270.1 4	0.10 6	0.0028
γ 38	1288.0 3	0.10 6	0.0029
γ 39	1323.20 20	0.37 11	0.0104
γ 40	1332.3 4	0.10 6	0.0030
γ 41	1354.6 5	0.10 6	0.0030
γ 42	1362.95 5	2.4 4	0.0686
γ 43	1373.6 7	0.21 11	0.0061
γ 44	1389.30 10	0.47 16	0.0140
γ 45	1395.30 20	0.21 11	0.0062
γ 46	1402.20 20	0.16 11	0.0047
γ 47	1445.5 3	0.16 11	0.0048
γ 48	1455.1 3	0.10 6	0.0033
γ 49	1493.70 20	0.16 11	0.0050
γ 50	1516.30 20	0.47 16	0.0153
γ 51	1535.5 3	0.26 11	0.0086
γ 52	1540.20 15	0.52 11	0.0172
γ 53	1545.80 10	3.3 5	0.109
γ 54	1618.20 20	0.31 11	0.0109
γ 55	1651.4 3	0.21 11	0.0074
γ 56	1688.1 3	0.26 11	0.0094
γ 57	1722.90 15	1.7 3	0.0617
γ 58	1752.4 7	0.10 6	0.0039
γ 59	1756.42 7	3.3 5	0.124
γ 60	1768.0 5	0.21 11	0.0079
γ 61	1771.0 5	0.21 11	0.0079
γ 62	1793.8 8	0.10 6	0.0040
γ 63	1806.3 5	0.16 11	0.0061
γ 64	1817.1 6	0.10 6	0.0041
γ 65	1885.4 7	0.58 16	0.0232
γ 66	1901.32 8	8.7 8	0.353
γ 67	1923.0 3	0.26 11	0.0108
γ 68	1933.5 5	0.16 11	0.0065
γ 69	1948.2 4	0.52 16	0.0218
γ 70	1960.6 5	0.16 11	0.0066
γ 71	2004.20 15	1.05 22	0.0448
γ 72	2025.50 14	1.36 22	0.0589
γ 73	2038.70 20	1.10 22	0.0479
γ 74	2050.40 20	0.52 16	0.0229
γ 75	2055.17 7	2.9 4	0.129
γ 76	2076.90 20	0.73 17	0.0325
γ 77	2086.10 20	0.42 16	0.0187
γ 78	2100.40 20	1.05 22	0.0470
γ 79	2126.2 3	0.37 16	0.0166
γ 80	2139.30 20	0.58 16	0.0263
γ 81	2180.30 20	0.58 16	0.0268
γ 82	2187.20 10	5.8 8	0.271
γ 83	2290.5 6	0.37 16	0.0179
γ 84	2358.40 20	0.84 17	0.0422
γ 85	2364.4 3	0.47 16	0.0238
γ 86	2397.72 10	16.3 18	0.831
γ 87	2419.5 4	0.21 11	0.0108
γ 88	2459.4 4	0.42 16	0.0220
γ 89	2513.2 6	0.16 11	0.0084
γ 90	2532.3 7	0.10 6	0.0057
γ 91	2539.4 5	0.79 17	0.0426
γ 92	2542.65 9	11.2 16	0.608
γ 93	2663.5 3	0.79 17	0.0447
γ 94	2666.80 15	1.9 3	0.107
γ 95	2672.6 4	0.21 11	0.0120
γ 96	2782.3 4	0.31 11	0.0187
γ 97	2800.8 4	0.63 16	0.0376
γ 98	2818.10 10	0.84 22	0.0504
γ 99	2828.60 20	0.26 11	0.0158
γ 100	2970.0 7	0.79 17	0.0498
γ 101	2972.00 20	3.3 4	0.209
γ 102	2991.7 5	0.10 6	0.0067
γ 103	2999.90 20	0.52 16	0.0335
γ 104	3007.1 5	0.21 11	0.0135
γ 105	3012.90 20	0.73 17	0.0472
γ 106	3022.3 7	0.10 6	0.0068
γ 107	3034.30 20	0.58 16	0.0373
γ 108	3046.90 20	0.42 16	0.0273
γ 109	3075.9 3	0.16 11	0.0103
γ 110	3155.0 3	0.21 11	0.0141
γ 111	3181.0 3	0.31 11	0.0213
γ 112	3236.70 20	0.31 11	0.0217
γ 113	3242.4 3	0.21 11	0.0145
γ 114	3273.2 3	0.16 11	0.0110
γ 115	3314.70 20	1.36 22	0.0964

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 116	3401.9 3	0.31 11	0.0228
γ 117	3459.30 20	0.37 16	0.0271
γ 118	3612.10 20	0.89 22	0.0687
γ 119	3632.70 20	1.15 22	0.0894
γ 120	3719.10 20	0.31 11	0.0250
γ 121	3850.4 3	0.26 11	0.0215

● ^{142}Pr β⁻ Decay (19.13 h 4) I (min) = 0.10%
%β⁻ Decay = 99.9836 8
%EC Decay = 0.0164 8

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	583 3		
avg	181.5 10	3.7 5	0.0143
β- 2 max	2159 3		
avg	832.8 12	96.3 5	1.71
total β- avg	808.5 13	100.0 7	1.72

1 weak β's omitted:
Eβ(avg) = 19.2; ΣIβ = 0.03%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 2	1575.75 5	3.7 5	0.124

1 weak γ's omitted:
Eγ(avg) = 508.8; ΣIγ = 0.02%

● ^{143}Ce β⁻ Decay (33.0 h 2) I (min) = 0.10%
Feeds ^{143}Pr

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	4	59 8	0.0051
ce-K- 1	15.3744 12	66 10	0.0215
Auger-K	29.4	5.8 19	0.0036
ce-L- 1	50.5302 12	9.3 14	0.0100
ce-M- 1	55.8540 13	2.0 3	0.0023
ce-NOP- 1	57.0605 14	0.53 8	0.0006
ce-K- 6	189.57 3	0.20 4	0.0008
ce-K- 7	251.271 21	2.20 21	0.0118
ce-L- 7	286.427 21	0.34 4	0.0021
β- 1 max	57 4		
avg	14.7 11	0.38 5	0.0001
β- 2 max	295 4		
avg	83.6 13	0.51 8	0.0009
β- 3 max	517 4		
avg	158.2 15	1.42 17	0.0048
β- 4 max	564 4		
avg	175.0 15	0.39 6	0.0015
β- 5 max	733 4		
avg	237.4 16	12.1 14	0.0612
β- 6 max	1104 4		
avg	384.6 17	48 5	0.393
β- 7 max	1398 4		
avg	507.5 17	38 11	0.411
total β- avg	405.7 19	101 13	0.873

3 weak β's omitted:
Eβ(avg) = 51.7; ΣIβ = 0.19%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	5	9.6 19	0.0010
X-ray Kα₂	35.55020 2	18 3	0.0134
X-ray Kα₁	36.02630 2	32 5	0.0249
X-ray Kβ	40.7	12.2 18	0.0105
γ 1	57.3650 10	11.8 17	0.0144
γ 4	169.0 10	0.29 5	0.0011
γ 5	216.0 10	0.21 3	0.0009
γ 6	231.56 3	2.0 3	0.0099
γ 7	293.262 21	42 4	0.262
γ 8	338.0 10	0.29 4	0.0021
γ 9	350.59 5	3.4 5	0.0251
γ 15	433.02 7	0.13 4	0.0012
γ 16	439.0 10	0.118 17	0.0011
γ 18	490.36 7	2.0 3	0.0206
γ 22	587.28 15	0.24 5	0.0030
γ 24	664.55 10	5.2 8	0.0743
γ 26	721.96 11	5.1 7	0.0788
γ 31	880.39 13	0.92 13	0.0173
γ 38	1102.98 18	0.37 7	0.0086

26 weak γ's omitted:
Eγ(avg) = 610.6; ΣIγ = 0.89%

● ^{143}Pr β⁻ Decay (13.56 d 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	935.3 19		
avg	315.6 8	100	0.672

● ^{143}Pm EC Decay (265 d 10) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	4.23	72 4	0.0065
Auger-K	30.5	6.6 20	0.0043
ce-K- 1	698.41 4	0.141 10	0.0021
X-ray L	5.23	12.7 18	0.0014
X-ray Kα₂	36.8474 3	21.7 10	0.0170
X-ray Kα₁	37.3610 3	39.6 18	0.0315
X-ray Kβ	42.3	15.1 7	0.0136
γ 1	741.98 4	38.3 24	0.605

● ^{144}Ce β⁻ Decay (284.3 d 3) I (min) = 0.10%
% Feeding to ^{144}Pr (17.28 m) = 98.57 19
% Feeding to ^{144}Pr (7.2 m) = 1.43 19

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	4	9.7 6	0.0008
ce-K- 3	11.441 10	0.64 6	0.0002
ce-L- 1	26.785 20	1.12 10	0.0006
Auger-K	29.4	0.79 24	0.0005
ce-MNO- 1	32.109 20	0.31 3	0.0002
ce-L- 2	34.10 3	0.82 11	0.0006
ce-K- 5	38.115 5	3.4 3	0.0028
ce-MNO- 2	39.42 3	0.23 3	0.0002
ce-L- 5	73.271 5	0.47 4	0.0007
ce-MNO- 5	78.595 5	0.125 9	0.0002
ce-K- 7	91.553 5	5.3 4	0.0104
ce-L- 7	126.709 5	0.73 6	0.0020
ce-MNO- 7	132.033 5	0.195 13	0.0005
β- 1 max	184.7 20		
avg	50.2 6	19.6 13	0.0210
β- 2 max	238.1 20		
avg	66.1 6	4.7 4	0.0066
β- 3 max	318.2 20		
avg	91.1 7	77.2 15	0.150
total β- avg	82.0 7	101.5 21	0.177

(Continued)

^{144}Ce β^- Decay (284.3 d 3) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
X-ray L	5	1.58 24	0.0002
γ 1	33.620 20	0.283 25	0.0002
X-ray Kα₂	35.55020 2	2.43 15	0.0018
X-ray Kα₁	36.02630 2	4.5 3	0.0034
X-ray Kβ	40.7	1.67 10	0.0015
γ 2	40.93 3	0.39 5	0.0003
γ 5	80.106 5	1.60 12	0.0027
γ 7	133.544 5	10.8 7	0.0307

3 weak γ's omitted:
Eγ(avg) = 67.3; ΣIγ = 0.13%

● ^{144}Pr β^- Decay (17.28 m 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
β− 1 max	810 3		
avg	266.6 12	1.08 5	0.0061
β− 2 max	2300 3		
avg	894.4 13	1.17 5	0.0223
β− 3 max	2996 3		
avg	1221.4 14	97.74 10	2.54
total β−			
avg	1207.2 15	100.00 13	2.57

5 weak β's omitted:
Eβ(avg) = 369.2; ΣIβ = 0.01%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
γ 4	696.490 20	1.48 6	0.0220
γ 9	1489.15 5	0.300 13	0.0095
γ 11	2185.70 6	0.77 4	0.0360

10 weak γ's omitted:
Eγ(avg) = 1058.6; ΣIγ = 0.02%

● ^{144}Pr IT Decay (7.2 m 3) I (min) = 0.10%
%IT Decay = 99.94 4
Feeds ^{144}Pr (17.28 m)
%β^- Decay = 0.06 4

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	4	68.1 22	0.0059
ce-K- 1	17.04 3	33.4 7	0.0121
Auger-K	29.4	2.8 9	0.0018
ce-L- 1	52.20 3	50.2 7	0.0558
ce-M- 1	57.52 3	12.5 3	0.0153
ce-NOP- 1	58.73 3	3.83 11	0.0048
X-ray L	5	11.1 16	0.0012
X-ray Kα₂	35.55020 2	8.7 4	0.0066
X-ray Kα₁	36.02630 2	15.9 6	0.0122
X-ray Kβ	40.7	5.97 23	0.0052

1 weak γ's omitted:
Eγ(avg) = 59.0; ΣIγ = 0.08%

● ^{144}Pm EC Decay (363 d 14) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	4.23	73 4	0.0066
Auger-K	30.5	6.8 21	0.0044
ce-K- 2	433.21 3	0.466 17	0.0043
ce-K- 4	574.44 3	0.561 18	0.0069
ce-K- 6	652.921 20	0.425 13	0.0059
X-ray L	5.23	12.9 18	0.0014
X-ray Kα₂	36.8474 3	22.2 8	0.0174
X-ray Kα₁	37.3610 3	40.5 13	0.0322
X-ray Kβ	42.3	15.4 6	0.0139
γ 1	301.70 20	0.18 4	0.0012
γ 2	476.78 3	42.0 8	0.426
γ 3	582.40 20	0.189 20	0.0023
γ 4	618.01 3	98.6 10	1.30
γ 5	694.00 20	0.55 10	0.0081
γ 6	696.490 20	99.492 15	1.48
γ 7	778.57 6	1.51 5	0.0251
γ 8	814.14 6	0.55 3	0.0095

2 weak γ's omitted:
Eγ(avg) = 897.6; ΣIγ = 0.04%

● ^{145}Pm EC Decay (17.7 y 4) I (min) = 0.10%
%α Decay = 2.8E−7

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	4.23	82 4	0.0074
ce-K- 1	23.63 10	2.31 14	0.0012
ce-K- 2	28.83 10	7.1 5	0.0043
Auger-K	30.5	6.7 20	0.0043
ce-L- 1	60.07 10	3.34 19	0.0043
ce-L- 2	65.27 10	1.73 25	0.0024
ce-M- 1	65.62 10	0.76 5	0.0011
ce-NOP- 1	66.88 10	0.201 13	0.0003
ce-M- 2	70.82 10	0.37 7	0.0006
ce-NOP- 2	72.08 10	0.103 18	0.0002
X-ray L	5.23	14.5 20	0.0016
X-ray Kα₂	36.8474 3	21.7 7	0.0171
X-ray Kα₁	37.3610 3	39.7 12	0.0316
X-ray Kβ	42.3	15.1 5	0.0136
γ 1	67.20 10	0.69 4	0.0010
γ 2	72.40 10	2.31 16	0.0036

● ^{146}Pm EC Decay (2020 d 18) I (min) = 0.10%
%EC Decay = 63.7 20
See also ^{146}Pm β^- Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	4.23	46 4	0.0042
Auger-K	30.5	4.3 14	0.0028
ce-K- 2	410.33 20	0.80 4	0.0070
ce-L- 2	446.77 20	0.134 6	0.0013
X-ray L	5.23	8.2 13	0.0009
X-ray Kα₂	36.8474 3	13.9 10	0.0109
X-ray Kα₁	37.3610 3	25.4 18	0.0202
X-ray Kβ	42.3	9.7 7	0.0087
γ 1	146.2 13	0.21 4	0.0006
γ 2	453.90 20	62.7 20	0.606
γ 3	589.0 10	0.58 9	0.0072
γ 4	735.90 20	22 3	0.344

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)

• ^{146}Pm β^- Decay (2020 d 18) I (min) = 0.10%
%β^- Decay = 36.3 20
See also ^{146}Pm EC Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	4.53	0.103 9	≈0
ce-K- 2	700.30 10	0.144 9	0.0021
β- 1 max	162 3		
avg	43.5 9	2.2 4	0.0020
β- 2 max	795 3		
avg	259.9 12	34.1 19	0.189
total β- avg	246.8 14	36.3 20	0.191
γ 1	633.02 14	2.2 4	0.0297
γ 2	747.13 10	36.1 20	0.575

• ^{147}Nd β^- Decay (10.98 d 1) I (min) = 0.10%
Feeds ^{147}Pm

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	4.38	41.6 23	0.0039
Auger-K	31.5	3.7 12	0.0025
ce-K- 1	45.922 20	48.7 17	0.0477
ce-K- 2	75.30 5	0.31 4	0.0005
ce-L- 1	83.678 20	7.11 14	0.0127
ce-M- 1	89.457 21	1.52 3	0.0029
ce-NOP- 1	90.776 21	0.431 9	0.0008
ce-K- 5	274.227 18	0.102 7	0.0006
ce-K- 10	485.832 22	0.183 11	0.0019
β- 1 max	209.9 9		
avg	57.6 3	2.22 9	0.0027
β- 2 max	364.8 9		
avg	106.1 3	15.3 8	0.0346
β- 3 max	406.5 9		
avg	119.9 3	0.81 7	0.0021
β- 4 max	485.3 9		
avg	146.7 4	0.58 16	0.0018
β- 5 max	804.7 9		
avg	264.0 4	81.1 15	0.456
total β- avg	233.3 5	100.1 18	0.497

1 weak β's omitted:
Eβ(avg) = 59.2; ΣIβ = 0.07%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	5.43	7.9 11	0.0009
X-ray Kα₂	38.1712 5	13.0 6	0.0105
X-ray Kα₁	38.7247 5	23.6 11	0.0194
X-ray Kβ	43.8	9.1 5	0.0084
γ 1	91.106 20	28.0 5	0.0543
γ 2	120.48 5	0.40 5	0.0010
γ 3	196.64 4	0.204 18	0.0009
γ 4	275.374 15	0.80 6	0.0047
γ 5	319.411 18	1.96 12	0.0133
γ 6	398.155 20	0.87 6	0.0074
γ 7	410.48 3	0.140 9	0.0012
γ 8	439.895 22	1.20 9	0.0113
γ 9	489.24 3	0.154 9	0.0016
γ 10	531.016 22	13.1 8	0.149
γ 12	594.80 3	0.266 18	0.0034
γ 14	685.90 4	0.81 6	0.0119

2 weak γ's omitted:
Eγ(avg) = 616.6; ΣIγ = 0.07%

• ^{147}Pm β^- Decay (2.6234 y 2) I (min) = 0.10%
Feeds ^{147}Sm

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	224.7 4		
avg	61.96 12	99.9942 2	0.132

• ^{147}Sm α Decay (1.06E11 y 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
α 1	2247.6 15	100	4.79

• ^{148}Pm β^- Decay (5.37 d 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	4.53	0.130 9	≈0
ce-K- 3	503.44 3	0.182 7	0.0019
β- 1 max	406 9		
avg	120 3	1.36 4	0.0035
β- 2 max	999 9		
avg	340 4	33.3 8	0.241
β- 3 max	1040 9		
avg	356 4	0.235 9	0.0018
β- 4 max	1914 9		
avg	728 4	9.4 3	0.146
β- 5 max	2464 9		
avg	975 4	55.5 11	1.15
total β- avg	726 6	100.0 14	1.55

5 weak β's omitted:
Eβ(avg) = 191.7; ΣIβ = 0.23%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 3	550.27 3	22.0 6	0.258
γ 4	592.83 3	0.353 11	0.0045
γ 5	611.26 3	1.02 3	0.0133
γ 7	874.18 3	0.235 9	0.0044
γ 8	896.42 3	0.981 24	0.0187
γ 10	914.85 3	11.5 3	0.223
γ 15	1465.12 3	22.2 5	0.693

13 weak γ's omitted:
Eγ(avg) = 1293.9; ΣIγ = 0.30%

• ^{148}Pm IT Decay (41.3 d 1) I (min) = 0.10%
%IT Decay = 4.2 6
Feeds ^{148}Pm (5.37 d)
See also ^{148}Pm β^- Decay (41.3 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	4.38	4.9 5	0.0005
ce-K- 2	30.52 10	2.8 4	0.0018
Auger-K	31.5	0.21 8	0.0001
ce-L- 1	54.07 10	3.1 5	0.0035
ce-M- 1	59.85 10	0.87 13	0.0011
ce-NOP- 1	61.17 10	0.24 4	0.0003
ce-L- 2	68.27 10	0.39 6	0.0006
ce-MNO- 2	74.05 10	0.106 16	0.0002
X-ray L	5.43	0.94 15	0.0001
X-ray Kα₂	38.1712 5	0.73 11	0.0006
X-ray Kα₁	38.7247 5	1.32 20	0.0011
X-ray Kβ	43.8	0.51 8	0.0005
γ 2	75.70 10	0.93 14	0.0015

• ^{148}Pm β^- Decay (41.3 d 1) I (min) = 0.10%

%β^- Decay = 95.8 6

See also ^{148}Pm IT Decay (41.3 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	4.53	5.2 3	0.0005
Auger-K	32.6	0.46 15	0.0003
ce-K- 1	51.65 3	3.74 14	0.0041
ce-L- 1	90.74 3	0.604 22	0.0012
ce-MNO- 1	96.76 3	0.168 4	0.0003
ce-K- 2	142.80 3	0.23 4	0.0007
ce-K- 3	241.28 3	0.80 18	0.0041
ce-L- 3	280.37 3	0.139 5	0.0008
ce-K- 7	367.24 3	0.107 4	0.0008
ce-K- 11	503.44 3	0.78 3	0.0084
ce-L- 11	542.53 3	0.130 5	0.0015
ce-K- 16	583.14 3	0.527 17	0.0065
ce-K- 18	678.87 3	0.140 5	0.0020
β- 1 max	407 9		
avg	120 3	54.0 7	0.138
β- 2 max	506 9		
avg	154 4	18.6 3	0.0610
β- 3 max	695 9		
avg	222 4	22.0 4	0.104
β- 4 max	1007 9		
avg	343 4	0.92 22	0.0067
total β-			
avg	152 4	95.5 9	0.310
X-ray L	5.64	1.07 14	0.0001
X-ray $K\alpha_2$	39.5224 3	1.67 8	0.0014
X-ray $K\alpha_1$	40.1181 3	3.03 14	0.0026
X-ray $K\beta$	45.4	1.17 6	0.0011
γ 1	98.48 3	2.47 5	0.0052
γ 2	189.63 3	1.10 3	0.0045
γ 3	288.11 3	12.56 16	0.0771
γ 5	311.63 3	3.92 6	0.0260
γ 6	362.09 3	0.178 18	0.0014
γ 7	414.07 3	18.66 24	0.165
γ 8	432.78 3	5.35 9	0.0493
γ 9	460.57 3	0.418 19	0.0041
γ 10	501.26 3	6.75 10	0.0720
γ 11	550.27 3	94.9 12	1.11
γ 12	553.24 3	0.40 4	0.0047
γ 13	571.95 3	0.214 10	0.0026
γ 14	599.74 3	12.54 17	0.160
γ 15	611.26 3	5.48 11	0.0714
γ 16	629.97 3	89.0 9	1.19
γ 18	725.70 3	32.8 5	0.508
γ 19	915.33 3	17.17 25	0.335
γ 20	1013.81 3	20.3 3	0.438

3 weak γ's omitted:
Eγ(avg) = 714.8; ΣIγ = 0.19%

• ^{149}Nd β^- Decay (1.73 h 1) I (min) = 0.10%

Feeds ^{149}Pm

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	4.38	34.5 22	0.0032
ce-K- 2	13.699 20	1.41 9	0.0004
ce-L- 1	22.57 3	4.8 3	0.0023
ce-M- 1	28.35 3	1.10 7	0.0007
ce-K- 4	29.15 3	3.7 6	0.0023
ce-K- 5	29.48 10	0.49 16	0.0003
ce-NOP- 1	29.67 3	0.361 24	0.0002
ce-K- 6	30.56 4	0.9 4	0.0006
Auger-K	31.5	2.6 9	0.0018
ce-L- 2	51.455 20	0.223 14	0.0002
ce-K- 8	51.823 15	2.21 21	0.0024
ce-L- 4	66.90 3	1.7 4	0.0025
ce-L- 6	68.31 4	0.6 5	0.0008
ce-K- 10	69.137 14	17.1 20	0.0251
ce-M- 4	72.68 3	0.39 9	0.0006
ce-NOP- 4	74.00 3	0.106 24	0.0002
ce-MNO- 6	74.09 4	0.16 14	0.0003
ce-L- 8	89.579 15	0.31 3	0.0006
ce-L- 10	106.893 14	2.6 3	0.0059
ce-K- 16	110.692 10	0.41 5	0.0010
ce-M- 10	112.672 15	0.55 7	0.0013
ce-NOP-10	113.991 15	0.157 18	0.0004
ce-K- 19	143.456 9	0.36 5	0.0011
ce-K- 20	146.843 9	0.100 11	0.0003
ce-K- 21	153.744 9	0.27 3	0.0009
ce-K- 22	162.964 10	0.44 9	0.0015
ce-K- 23	166.123 8	4.4 3	0.0155
ce-L- 19	181.212 9	0.108 14	0.0004
ce-K- 26	195.034 8	2.17 22	0.0090
ce-L- 23	203.879 8	0.65 5	0.0028
ce-MNO-23	209.658 10	0.177 13	0.0008
ce-K- 31	222.508 9	0.52 6	0.0025
ce-K- 32	224.981 8	0.169 20	0.0008
ce-L- 26	232.790 8	0.39 4	0.0019
ce-MNO-26	238.569 10	0.109 11	0.0006
β- 1 max	377 4		
avg	110.0 14	0.154 11	0.0004
β- 2 max	455 4		
avg	136.2 14	0.92 6	0.0027
β- 3 max	1034 4		
avg	354.7 17	19.2 14	0.145
β- 4 max	1151 4		
avg	402.4 17	24.0 19	0.206
β- 5 max	1264 4		
avg	449.2 17	0.94 9	0.0090
β- 6 max	1292 4		
avg	461.1 17	3.9 5	0.0383
β- 7 max	1329 4		
avg	476.6 17	0.55 14	0.0056
β- 8 max	1419 4		
avg	514.7 17	18.9 17	0.207
β- 9 max	1478 4		
avg	539.8 18	26.4 22	0.304
β-10 max	1500 4		
avg	549.5 18	3.0 13	0.0351
total β-			
avg	456.4 18	98 4	0.953

2 weak β's omitted:
Eβ(avg) = 39.5; ΣIβ = 0.02%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	5.43	6.6 9	0.0008
X-ray $K\alpha_2$	38.1712 5	9.1 6	0.0074
X-ray $K\alpha_1$	38.7247 5	16.5 11	0.0136
X-ray $K\beta$	43.8	6.4 5	0.0059
γ 2	58.883 20	1.51 8	0.0019
γ 4	74.33 3	1.25 20	0.0020
γ 5	74.66 10	1.0 3	0.0016
γ 6	75.74 4	0.33 11	0.0005
γ 8	97.007 15	1.52 13	0.0031
γ 10	114.321 14	18.8 21	0.0457
γ 11	116.93 3	0.117 23	0.0003
γ 12	122.416 14	0.231 25	0.0006
γ 13	126.630 19	0.114 13	0.0003
γ 15	139.210 14	0.48 5	0.0014
γ 16	155.876 10	6.0 7	0.0200
γ 17	177.831 19	0.163 14	0.0006
γ 19	188.640 9	1.99 24	0.0080
γ 20	192.027 9	0.59 7	0.0024

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
γ 21	198.928 9	1.44 16	0.0061
γ 22	208.148 10	2.9 4	0.0129
γ 23	211.307 8	27.2 19	0.122
γ 24	213.946 17	0.41 5	0.0019
γ 25	226.846 21	0.16 4	0.0008
γ 26	240.218 8	3.9 4	0.0202
γ 27	245.699 8	1.03 12	0.0054
γ 30	258.064 14	0.38 4	0.0021
γ 31	267.692 9	6.0 7	0.0344
γ 32	270.165 8	10.6 12	0.0610
γ 33	273.25 4	0.23 5	0.0013
γ 34	275.445 13	0.60 12	0.0035
γ 35	276.960 19	0.32 7	0.0019
γ 36	282.455 11	0.61 7	0.0037
γ 37	288.192 12	0.67 8	0.0041
γ 38	294.807 12	0.58 7	0.0036
γ 39	301.133 16	0.38 4	0.0024
γ 40	310.982 14	0.52 5	0.0034
γ 41	326.556 11	4.7 5	0.0324
γ 42	347.833 23	0.18 9	0.0014
γ 43	349.233 10	1.47 16	0.0109
γ 44	360.055 20	0.163 14	0.0013
γ 45	366.637 15	0.66 8	0.0052
γ 46	384.691 18	0.33 4	0.0027
γ 47	423.554 10	9.4 10	0.0849
γ 48	443.550 12	1.50 16	0.0141
γ 50	538.15 7	0.11 4	0.0012
γ 51	540.510 10	7.7 8	0.0883
γ 52	556.43 5	1.2 5	0.0139
γ 55	630.238 21	0.220 25	0.0030
γ 56	635.482 25	0.112 13	0.0015
γ 57	654.831 14	7.3 8	0.102
γ 58	686.933 25	0.103 12	0.0015
γ 59	696.266 25	0.171 19	0.0025
γ 71	808.834 22	0.169 19	0.0029
γ 77	923.876 25	0.114 13	0.0022
γ 81	979.02 4	0.112 13	0.0023
γ 83	1022.78 3	0.120 13	0.0026
γ 97	1234.12 5	0.29 3	0.0077

57 weak γ's omitted:
Eγ(avg) = 634.0; ΣIγ = 1.58%

● ^{149}Pm β^- Decay (53.08 h 5) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	4.53	0.287 24	≈0
ce-L- 1	14.757 11	0.135 21	≈0
ce-K- 9	239.07 5	0.244 18	0.0012
β- 1 max	189 4		
avg	51.4 12	0.126 18	0.0001
β- 2 max	785 4		
avg	256.1 16	3.39 22	0.0185
β- 3 max	1071 4		
avg	369.0 17	96.23 25	0.756
total β-			
avg	364.2 17	100.0 4	0.776

7 weak β's omitted:
Eβ(avg) = 133.4; ΣIβ = 0.25%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
X-ray Kα$_1$	40.1181 3	0.117 9	≈0
γ 9	285.90 5	3.10 20	0.0189
γ 27	859.4 5	0.102 17	0.0019

26 weak γ's omitted:
Eγ(avg) = 598.3; ΣIγ = 0.30%

● ^{151}Pm β^- Decay (28.40 h 4) I (min) = 0.10%

Feeds ^{151}Sm

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
ce-MNO- 1	3.098 4	50.8 25	0.0034
Auger-L	4.53	27.5 15	0.0026
ce-K- 6	16.069 16	0.175 16	≈0
ce-L- 2	17.943 20	1.49 14	0.0006
ce-K- 7	18.053 14	10.0 9	0.0038
ce-K- 8	19.000 14	5.7 6	0.0023
ce-K- 9	22.884 16	1.99 22	0.0010
ce-MNO- 2	23.957 20	0.43 4	0.0002
ce-L- 3	27.41 5	0.62 3	0.0004
ce-K- 10	29.385 18	0.51 5	0.0003
Auger-K	32.6	2.2 7	0.0015
ce-MNO- 3	33.43 5	0.188 8	0.0001
ce-K- 16	53.183 6	3.7 3	0.0042
ce-K- 18	55.099 6	0.290 21	0.0003
ce-L- 7	57.150 14	1.54 15	0.0019
ce-K- 20	58.005 6	4.5 4	0.0056
ce-L- 8	58.097 14	0.82 8	0.0010
ce-L- 9	61.981 16	0.32 4	0.0004
ce-MNO- 7	63.164 14	0.42 4	0.0006
ce-MNO- 8	64.111 14	0.223 20	0.0003
ce-L- 10	68.482 18	0.67 6	0.0010
ce-MNO-10	74.496 18	0.195 17	0.0003
ce-L- 16	92.280 6	0.53 4	0.0010
ce-K- 31	92.451 8	0.286 21	0.0006
ce-K- 33	96.337 11	0.102 16	0.0002
ce-L- 20	97.102 6	0.65 5	0.0013
ce-MNO-16	98.294 6	0.146 11	0.0003
ce-MNO-20	103.116 6	0.180 13	0.0004
ce-K- 42	116.757 14	0.59 4	0.0015
ce-K- 43	120.931 15	0.51 4	0.0013
ce-K- 44	121.55 5	0.30 3	0.0008
ce-K- 46	130.325 9	1.10 7	0.0030
ce-K- 55	162.176 8	0.329 24	0.0011
ce-L- 46	169.422 9	0.173 12	0.0006
ce-K- 60	185.59 3	0.145 15	0.0006
ce-K- 74	228.379 11	0.112 9	0.0005
ce-K- 99	293.247 6	0.211 11	0.0013
β- 1 max	224 10		
avg	62 3	0.159 15	0.0002
β- 2 max	235 10		
avg	65 3	1.04 6	0.0014
β- 3 max	301 10		
avg	85 4	0.32 4	0.0006
β- 4 max	310 10		
avg	88 4	2.35 14	0.0044
β- 5 max	365 10		
avg	106 4	6.2 4	0.0140
β- 6 max	414 10		
avg	122 4	1.15 8	0.0030
β- 7 max	447 10		
avg	133 4	3.16 17	0.0090
β- 8 max	524 10		
avg	160 4	0.205 14	0.0007
β- 9 max	667 10		
avg	212 4	0.75 15	0.0034
β-10 max	698 10		
avg	223 4	0.44 4	0.0021
β-11 max	742 10		
avg	240 4	7.1 4	0.0363
β-12 max	792 10		
avg	259 4	1.95 11	0.0108
β-13 max	843 10		
avg	278 4	42.7 18	0.253
β-14 max	864 10		
avg	287 4	3.33 19	0.0204
β-15 max	881 10		
avg	293 4	1.85 14	0.0115

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
^{151}Pm β^- Decay (28.40 h 4)		(Continued)	
β−16 max	885 10		
avg	295 4	0.19 7	0.0012
β−17 max	979 10		
avg	332 4	2.42 17	0.0171
β−18 max	1020 10		
avg	348 4	1.43 20	0.0106
β−19 max	1020 10		
avg	348 4	8.5 7	0.0630
β−20 max	1083 10		
avg	374 4	3.3 8	0.0263
β−21 max	1118 10		
avg	388 4	2.7 13	0.0223
β−22 max	1188 10		
avg	417 5	10 3	0.0888
total β−			
avg	278 5	102 4	0.601
11 weak β's omitted: Eβ(avg)= 191.3; ΣIβ= 0.32%			
X-ray L	5.64	5.6 8	0.0007
γ 2	25.680 20	0.94 8	0.0005
X-ray $K\alpha_2$	39.5224 3	8.1 4	0.0068
X-ray $K\alpha_1$	40.1181 3	14.6 7	0.0125
X-ray Kβ	45.4	5.7 3	0.0055
γ 6	62.903 16	0.218 19	0.0003
γ 7	64.887 14	1.97 18	0.0027
γ 8	65.834 14	1.17 11	0.0016
γ 9	69.718 16	0.48 5	0.0007
γ 10	76.219 18	0.211 18	0.0003
γ 14	98.04 3	0.37 4	0.0008
γ 16	100.017 6	2.56 19	0.0055
γ 18	101.933 6	1.31 9	0.0028
γ 20	104.839 6	3.55 25	0.0079
γ 31	139.285 8	0.51 4	0.0015
γ 33	143.171 11	0.218 17	0.0007
γ 36	147.55 3	0.149 11	0.0005
γ 40	156.18 5	0.151 15	0.0005
γ 41	162.950 20	0.89 8	0.0031
γ 42	163.591 14	1.63 12	0.0057
γ 43	167.765 15	8.8 7	0.0314
γ 44	168.38 5	0.92 8	0.0033
γ 45	176.54 3	0.87 8	0.0033
γ 46	177.159 9	3.87 24	0.0146
γ 47	186.603 14	0.169 16	0.0007
γ 50	201.959 8	0.94 7	0.0041
γ 51	204.15 3	0.131 11	0.0006
γ 55	209.010 8	1.79 12	0.0080
γ 57	227.204 17	0.34 4	0.0017
γ 60	232.42 3	1.05 10	0.0052
γ 63	236.60 20	0.163 20	0.0008
γ 64	236.70 20	0.20 5	0.0010
γ 65	237.02 3	0.53 10	0.0027
γ 66	240.088 10	3.89 24	0.0199
γ 70	254.300 25	0.165 16	0.0009
γ 71	258.127 11	0.60 5	0.0033
γ 74	275.213 11	7.2 5	0.0420
γ 77	280.102 24	0.227 19	0.0014
γ 78	290.756 10	0.88 7	0.0054
γ 87	306.74 6	0.236 17	0.0015
γ 94	323.946 8	1.21 9	0.0084
γ 96	325.80 10	0.108 15	0.0007
γ 98	329.761 15	0.211 16	0.0015
γ 99	340.081 6	22.9 9	0.166
γ 101	344.913 7	2.18 15	0.0160
γ 104	349.833 22	0.135 15	0.0010
γ 106	353.32 10	0.114 13	0.0009
γ 114	379.87 3	0.97 7	0.0078
γ 121	407.018 25	0.188 14	0.0016
γ 130	440.880 11	1.53 11	0.0144
γ 132	445.693 10	4.1 3	0.0387
γ 134	451.420 20	0.300 22	0.0029
γ 148	490.30 3	0.128 11	0.0013
γ 155	516.25 6	0.202 16	0.0022
γ 162	565.01 6	0.36 3	0.0044
γ 165	574.97 7	0.117 11	0.0014
γ 179	636.23 5	1.47 11	0.0199
γ 180	654.25 7	0.250 19	0.0035
γ 185	668.70 20	0.36 5	0.0052
γ 186	669.20 20	0.29 5	0.0041
γ 187	671.30 6	0.93 7	0.0133
γ 190	704.22 9	0.353 25	0.0053
γ 191	709.29 6	0.149 11	0.0022
γ 192	712.02 8	0.105 8	0.0016
γ 194	717.75 9	4.1 3	0.0630
γ 197	736.13 10	0.49 4	0.0076
γ 199	752.83 10	1.33 9	0.0213
γ 202	769.10 9	0.110 24	0.0018
γ 203	772.80 11	0.96 7	0.0158
γ 204	785.07 8	0.229 19	0.0038
γ 207	807.91 6	0.53 8	0.0091
γ 209	817.650 20	0.17 4	0.0030
γ 212	848.67 7	0.300 22	0.0054
γ 216	877.69 11	0.101 8	0.0019
γ 228	948.71 6	0.36 3	0.0074
162 weak γ's omitted: Eγ(avg)= 428.8; ΣIγ= 4.36%			

• **^{151}Sm β^- Decay (90 y 6)** I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	4.69	0.48 11	≈0
ce-L- 1	13.488 6	0.59 13	0.0002
ce-MNO- 1	19.740 6	0.20 4	≈0
β− 1 max	54.6 6		
avg	13.96 16	0.88 6	0.0003
β− 2 max	76.1 6		
avg	19.68 16	99.12 6	0.0415
total β−			
avg	19.63 16	100.00 9	0.0418
X-ray L	5.85	0.11 3	≈0
1 weak γ's omitted: Eγ(avg)= 21.5; ΣIγ= 0.03%			

• **^{152}Eu EC Decay (13.6 y 2)** I(min) = 0.10%
%(EC + β^+) Decay = 72.2 4
See also ^{152}Eu β^- Decay (13.6 y)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	4.53	73 4	0.0071
Auger-K	32.6	5.7 19	0.0039
ce-K- 1	74.9451 6	19.5 8	0.0311
ce-L- 1	114.0425 6	10.6 4	0.0258
ce-M- 1	120.0565 9	2.43 9	0.0062
ce-NOP- 1	121.4336 10	0.668 25	0.0017
ce-K- 12	197.8585 10	0.609 23	0.0026
ce-L- 12	236.9559 10	0.156 6	0.0008
2 weak β's omitted: Eβ(avg)= 331.5; ΣIβ= 0.04%			

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	5.64	15.0 19	0.0018
X-ray $K\alpha_2$	39.5224 3	20.8 7	0.0175
X-ray $K\alpha_1$	40.1181 3	37.7 12	0.0322
X-ray $K\beta$	45.4	14.6 5	0.0142
γ 1	121.7793 3	28.4 7	0.0737
γ 12	244.6927 8	7.49 16	0.0391
γ 20	295.930 17	0.427 10	0.0027
γ 22	329.35 5	0.125 11	0.0009
γ 30	415.943 13	0.101 9	0.0009
γ 32	443.979 6	2.81 7	0.0266
γ 33	443.98 5	0.30 4	0.0029
γ 36	488.66 3	0.413 11	0.0043
γ 45	564.03 6	0.482 15	0.0058
γ 46	566.410 10	0.129 4	0.0016
γ 51	656.440 10	0.142 5	0.0020
γ 54	674.610 20	0.148 24	0.0021
γ 56	688.630 20	0.837 23	0.0123
γ 58	719.33 7	0.265 20	0.0041
γ 62	810.430 10	0.310 9	0.0054
γ 64	841.540 20	0.161 6	0.0029
γ 65	867.320 10	4.16 14	0.0769
γ 69	919.310 10	0.401 11	0.0079
γ 70	926.250 10	0.255 8	0.0050
γ 72	963.39 5	0.114 16	0.0023
γ 73	964.01 3	14.4 3	0.297
γ 75	1005.17	0.66 6	0.0141
γ 78	1084.91 8	0.246 8	0.0057
γ 79	1085.780 10	10.0 3	0.230
γ 80	1112.020 10	13.3 3	0.315
γ 85	1212.842 15	1.38 4	0.0357
γ 86	1249.80 11	0.178 6	0.0047
γ 87	1292.670 20	0.101 5	0.0028
γ 92	1407.954 10	20.7 5	0.622
γ 95	1457.540 20	0.488 19	0.0151
γ 96	1528.07 7	0.257 15	0.0084

69 weak γ's omitted:
Eγ(avg) = 685.8; ΣIγ = 0.87%

● ^{152}Eu β^- Decay (13.6 y 2) I(min) = 0.10%
%β^- Decay = 27.8 4
Feeds ^{152}Gd
See also ^{152}Eu EC Decay (13.6 y)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	4.84	0.71 4	≈0
ce-K- 8	294.0333 18	0.82 3	0.0052
ce-L- 8	335.8968 18	0.181 6	0.0013
β- 1 max	176 4		
avg	47.5 10	1.78 4	0.0018
β- 2 max	385 4		
avg	112.5 11	2.40 5	0.0058
β- 3 max	696 4		
avg	221.8 13	13.6 3	0.0643
β- 4 max	710 4		
avg	227.0 13	0.23 4	0.0011
β- 5 max	889 4		
avg	295.3 13	0.293 15	0.0018
β- 6 max	1064 4		
avg	364.8 14	0.89 3	0.0069
β- 7 max	1475 4		
avg	535.6 14	8.44 21	0.0963
total β- avg	300.8 19	27.8 4	0.178

6 weak β's omitted:
Eβ(avg) = 74.3; ΣIβ = 0.19%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	6	0.167 20	≈0
X-ray $K\alpha_2$	42.3089 3	0.219 10	0.0002
X-ray $K\alpha_1$	42.9962 3	0.395 17	0.0004
X-ray $K\beta$	48.7	0.156 7	0.0002
γ 8	344.2724 17	26.5 4	0.194
γ 10	367.710 10	0.856 19	0.0067
γ 11	411.111 8	2.21 4	0.0194
γ 15	503.385 12	0.151 4	0.0016
γ 20	586.26 3	0.453 13	0.0057
γ 24	678.580 10	0.469 13	0.0068
γ 27	764.840 20	0.168 7	0.0027
γ 28	778.890 9	12.74 25	0.211
γ 35	1089.680 10	1.68 4	0.0390
γ 36	1109.07 24	0.17 4	0.0039
γ 39	1299.04 3	1.61 4	0.0444

32 weak γ's omitted:
Eγ(avg) = 631.4; ΣIγ = 0.71%

● ^{152}Eu EC Decay (9.32 h 2) I(min) = 0.10%
%(EC + β^+) Decay = 29 3
See also ^{152}Eu β^- Decay (9.32 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	4.53	27 4	0.0026
Auger-K	32.6	2.2 8	0.0015
ce-K- 1	74.9451 6	5.1 10	0.0081
ce-L- 1	114.0425 6	2.8 6	0.0068
ce-M- 1	120.0565 9	0.64 13	0.0016
ce-NOP- 1	121.4336 10	0.18 4	0.0005
X-ray L	5.64	5.5 11	0.0007
X-ray $K\alpha_2$	39.5224 3	7.9 14	0.0066
X-ray $K\alpha_1$	40.1181 3	14.3 25	0.0122
X-ray $K\beta$	45.4	5.5 10	0.0054
γ 1	121.7793 3	7.4 14	0.0193
γ 10	562.920 10	0.23 5	0.0028
γ 17	841.540 20	15 3	0.270
γ 19	961.06 22	0.21 4	0.0043
γ 20	963.39 5	12.4 23	0.255
γ 24	1389.11 7	0.88 17	0.0261

21 weak γ's omitted:
Eγ(avg) = 794.2; ΣIγ = 0.41%

● ^{152}Eu β^- Decay (9.32 h 2) I(min) = 0.10%
%β^- Decay = 71 3
Feeds ^{152}Gd
See also ^{152}Eu EC Decay (9.32 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	550 4		
avg	168.9 12	1.67 25	0.0060
β- 2 max	817 4		
avg	267.5 13	0.131 21	0.0007
β- 3 max	1521 4		
avg	554.1 14	1.8 3	0.0212
β- 4 max	1865 4		
avg	704.1 15	67 3	1.00
total β- avg	686.2 16	71 3	1.03

2 weak β's omitted:
Eβ(avg) = 46.7; ΣIβ = 0.06%

(Continued)

^{152}Eu β^- Decay (9.32 h 2) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
γ 6	344.2724 17	2.5 4	0.0183
γ 18	970.38 3	0.62 10	0.0127
γ 21	1314.670 10	0.98 15	0.0273

21 weak γ's omitted:
Eγ(avg)= 676.7; ΣIγ= 0.32%

• ^{152}Gd α Decay (1.1E14 y) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
α 1	2150 4	100	4.58

• ^{153}Sm β^- Decay (46.7 h 1) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	4.69	54 3	0.0054
ce-L- 2	11.758 20	0.324 10	≈0
ce-K- 5	21.1533 9	23.2 14	0.0104
Auger-K	33.7	4.5 10	0.0032
ce-K- 7	34.8475 10	0.47 8	0.0004
ce-K- 8	40.9648 12	0.34 3	0.0003
ce-K- 10	48.9109 12	0.185 8	0.0002
ce-K- 11	54.6601 12	41.0 15	0.0478
ce-L- 5	61.6203 9	3.79 23	0.0050
ce-M- 5	67.8723 10	0.83 5	0.0012
ce-NCP- 5	69.3121 11	0.233 14	0.0003
ce-L- 7	75.3145 10	0.22 4	0.0004
ce-MNO- 7	81.5665 11	0.133 20	0.0002
ce-L- 11	95.1271 12	6.17 23	0.0125
ce-M- 11	101.3791 12	1.34 5	0.0029
ce-NCP-11	102.8189 13	0.385 15	0.0008
β− 1 max	632 3		
avg	198.6 11	34.1 17	0.144
β− 2 max	702 3		
avg	224.4 11	44.1 24	0.211
β− 3 max	708 3		
avg	226.5 11	0.55 5	0.0027
β− 4 max	805 3		
avg	263.4 12	21.0 17	0.118
total β−			
avg	223.6 12	100 4	0.476

10 weak β's omitted:
Eβ(avg)= 80.9; ΣIβ= 0.15%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	5.85	11.9 14	0.0015
X-ray Kα₂	40.9019 3	17.3 7	0.0150
X-ray Kα₁	41.5422 3	31.2 12	0.0276
X-ray Kβ	47	12.2 5	0.0122
γ 5	69.6723 8	5.2 3	0.0077
γ 6	75.4220 10	0.194 19	0.0003
γ 7	83.3665 9	0.20 3	0.0004
γ 8	89.4838 11	0.158 13	0.0003
γ 10	97.4299 11	0.718 22	0.0015
γ 11	103.1791 11	28.3 6	0.0622

54 weak γ's omitted:
Eγ(avg)= 422.7; ΣIγ= 0.28%

• ^{153}Gd EC Decay (241.6 d 2) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	4.69	114 6	0.0113
ce-L- 1	6.018 20	0.16 6	≈0
ce-L- 2	11.758 20	0.40 9	≈0
ce-MNO- 2	18.010 20	0.12 3	≈0
ce-K- 3	21.1533 9	11.5 9	0.0052
Auger-K	33.7	9.3 21	0.0067
ce-K- 5	34.8475 10	0.52 7	0.0004
ce-K- 6	40.9648 12	0.16 5	0.0001
ce-K- 7	48.9109 12	8.1 6	0.0084
ce-K- 8	54.6601 12	32.2 23	0.0375
ce-L- 3	61.6203 9	1.88 15	0.0025
ce-M- 3	67.8723 10	0.41 4	0.0006
ce-NCP- 3	69.3121 11	0.115 9	0.0002
ce-L- 5	75.3145 10	0.25 3	0.0004
ce-L- 7	89.3779 12	1.20 9	0.0023
ce-L- 8	95.1271 12	4.8 4	0.0098
ce-MNO- 7	95.6299 12	0.329 20	0.0007
ce-M- 8	101.3791 12	1.05 8	0.0023
ce-NCP- 8	102.8189 13	0.302 22	0.0007
X-ray L	5.85	25 3	0.0031
X-ray Kα₂	40.9019 3	35.8 14	0.0312
X-ray Kα₁	41.5422 3	64.7 23	0.0573
X-ray Kβ	47	25.3 10	0.0254
γ 3	69.6723 8	2.57 19	0.0038
γ 5	83.3665 9	0.22 3	0.0004
γ 7	97.4299 11	31.3 19	0.0650
γ 8	103.1791 11	22.2 15	0.0488

5 weak γ's omitted:
Eγ(avg)= 95.8; ΣIγ= 0.22%

• ^{154}Eu β^- Decay (8.8 y 1) I(min) = 0.10%
%β^- Decay = 99.986 14
%EC Decay = 0.014 4

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	4.84	32.5 16	0.0034
Auger-K	34.9	1.8 6	0.0013
ce-K- 3	72.831 4	26.8 13	0.0416
ce-L- 3	114.694 4	16.8 8	0.0410
ce-M- 3	121.189 4	3.90 19	0.0101
ce-NCP- 3	122.694 4	1.10 6	0.0029
ce-K- 21	197.700 8	0.54 3	0.0023
ce-L- 21	239.563 8	0.149 8	0.0008
β− 1 max	247.4 20		
avg	68.8 6	27.9 10	0.0409
β− 2 max	306.1 20		
avg	86.9 7	0.77 3	0.0014
β− 3 max	321.2 20		
avg	91.7 7	0.149 5	0.0003
β− 4 max	349.8 20		
avg	100.9 7	1.58 6	0.0034
β− 5 max	407.4 21		
avg	119.8 7	0.117 8	0.0003
β− 6 max	435.7 20		
avg	129.3 7	0.281 16	0.0008
β− 7 max	548.6 20		
avg	168.3 7	0.188 6	0.0007
β− 8 max	569.4 20		
avg	175.7 8	36.5 14	0.137
β− 9 max	703.2 20		
avg	224.5 8	0.64 3	0.0031
β−10 max	715.4 20		
avg	229.0 8	0.245 11	0.0012

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β-11 max	839.2 20		
avg	276.0 8	17.4 7	0.102
β-12 max	970.7 20		
avg	327.5 8	2.0 5	0.0140
β-13 max	1151.5 20		
avg	400.4 9	0.29 6	0.0025
β-14 max	1596.0 20		
avg	587.4 9	0.24 20	0.0030
β-15 max	1843.9 20		
avg	695.0 9	11.4 18	0.169
total β-			
avg	225.4 12	100 3	0.480

9 weak β's omitted:
Eβ(avg) = 131.3; ΣIβ = 0.21%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	6	7.6 9	0.0010
X-ray $K\alpha_2$	42.3089 3	7.3 4	0.0065
X-ray $K\alpha_1$	42.9962 3	13.1 7	0.0120
X-ray Kβ	48.7	5.2 3	0.0054
γ 3	123.070 4	40.5 15	0.106
γ 14	188.246 13	0.227 10	0.0009
γ 21	247.939 8	6.60 25	0.0349
γ 46	401.30 5	0.209 10	0.0018
γ 51	444.50 5	0.504 22	0.0048
γ 55	478.26 5	0.217 10	0.0022
γ 68	557.56 5	0.256 11	0.0030
γ 70	582.00 5	0.84 4	0.0104
γ 71	591.81 4	4.83 19	0.0609
γ 78	625.22 5	0.309 15	0.0041
γ 85	676.59 5	0.140 6	0.0020
γ 87	692.41 5	1.69 7	0.0250
γ 89	715.76 5	0.174 9	0.0027
γ 91	723.30 4	19.7 8	0.303
γ 93	756.87 5	4.33 18	0.0698
γ 98	815.55 5	0.465 21	0.0081
γ 100	845.39 5	0.550 25	0.0099
γ 101	850.64 5	0.231 10	0.0042
γ 102	873.19 5	11.5 5	0.214
γ 104	892.73 5	0.461 21	0.0088
γ 106	904.05 5	0.82 4	0.0159
γ 114	996.32 4	10.3 4	0.218
γ 115	1004.76 4	17.9 7	0.383
γ 119	1047.40 10	0.142 5	0.0032
γ 124	1118.50 10	0.103 5	0.0025
γ 126	1128.40 10	0.266 11	0.0064
γ 128	1140.90 10	0.217 10	0.0053
γ 134	1241.60 20	0.131 6	0.0035
γ 135	1246.20 20	0.90 4	0.0238
γ 136	1274.45 9	35.5 13	0.964
γ 151	1494.4 3	0.65 3	0.0207
γ 157	1593.00 20	1.03 12	0.0349
γ 158	1596.53 15	1.85 12	0.0628

131 weak γ's omitted:
Eγ(avg) = 710.5; ΣIγ = 1.58%

• ^{155}Eu β^- Decay (4.96 y 1) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
ce-L- 1	2.024 20	1.2 4	≈0
Auger-L	4.84	34 3	0.0035
ce-MNO- 1	8.519 20	0.35 12	≈0
ce-K- 9	9.7709 19	8.3 6	0.0017
ce-L- 3	10.37 3	14 4	0.0030
ce-L- 4	12.644 20	0.95 9	0.0003
ce-M- 3	16.87 3	3.2 8	0.0011
ce-L- 5	18.137 21	0.49 4	0.0002
ce-NOP- 3	18.37 3	1.04 24	0.0004
ce-MNO- 4	19.139 20	0.29 3	0.0001
ce-L- 6	23.05 5	0.38 14	0.0002
ce-MNO- 5	24.632 21	0.143 11	≈0
ce-MNO- 6	29.55 5	0.12 4	≈0
Auger-K	34.9	1.6 6	0.0012
ce-K- 10	35.823 5	0.40 5	0.0003
ce-K- 11	36.306 3	11.2 8	0.0087
ce-L- 7	36.9216 14	0.6 3	0.0005
ce-MNO- 7	43.4164 14	0.18 8	0.0002
ce-L- 9	51.6344 19	1.67 11	0.0018
ce-K- 12	55.069 3	4.4 4	0.0052
ce-M- 9	58.1292 19	0.369 24	0.0005
ce-NOP- 9	59.6342 20	0.105 7	0.0001
ce-L- 11	78.169 3	1.72 12	0.0029
ce-M- 11	84.664 3	0.37 3	0.0007
ce-NOP-11	86.169 3	0.104 8	0.0002
ce-L- 12	96.932 3	0.66 5	0.0014
ce-MNO-12	103.427 3	0.184 12	0.0004
β- 1 max	100 3		
avg	26.1 8	0.72 8	0.0004
β- 2 max	128 3		
avg	33.9 9	2.2 6	0.0016
β- 3 max	141 3		
avg	37.4 9	46 5	0.0366
β- 4 max	159 3		
avg	42.8 9	26 5	0.0237
β- 5 max	186 3		
avg	50.4 9	7.7 6	0.0083
β- 6 max	246 3		
avg	68.3 9	18 5	0.0262
total β-			
avg	45.2 10	101 9	0.0968
X-ray L	6	8.0 11	0.0010
γ 5	26.513 21	0.318 24	0.0002
X-ray $K\alpha_2$	42.3089 3	6.5 4	0.0058
X-ray $K\alpha_1$	42.9962 3	11.7 6	0.0107
γ 7	45.2972 13	1.29 10	0.0012
X-ray Kβ	48.7	4.60 23	0.0048
γ 9	60.0100 18	1.11 7	0.0014
γ 10	86.062 5	0.151 18	0.0003
γ 11	86.545 3	30.9 19	0.0570
γ 12	105.308 3	20.7 14	0.0464

7 weak γ's omitted:
Eγ(avg) = 69.3; ΣIγ = 0.18%

• ^{156}Eu β^- Decay (15.19 d 6) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	4.84	23 3	0.0024
Auger-K	34.9	1.0 4	0.0007
ce-K- 1	38.7246 25	14.3 22	0.0118
ce-L- 1	80.5881 25	16.4 25	0.0281
ce-M- 1	87.0829 25	3.8 6	0.0071
ce-NOP- 1	88.5879 25	1.07 17	0.0020
ce-K- 5	148.971 10	0.125 16	0.0004
β- 1 max	183 9		
avg	50 3	4.6 5	0.0049
β- 2 max	248 9		
avg	69 3	2.4 3	0.0035
β- 3 max	250 9		
avg	69 3	0.16 4	0.0002
β- 4 max	266 9		
avg	75 3	11.3 13	0.0181
β- 5 max	332 9		
avg	95 3	0.127 18	0.0003

(Continued)

^{156}Eu β^- Decay (15.19 d 6) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
β− 6 max	426 9		
avg	126 3	6.0 7	0.0161
β− 7 max	487 9		
avg	147 4	32 4	0.100
β− 8 max	501 9		
avg	152 4	0.96 12	0.0031
β− 9 max	507 9		
avg	154 4	0.44 6	0.0014
β−10 max	1087 9		
avg	374 4	2.4 4	0.0191
β−11 max	1211 9		
avg	425 4	5.1 10	0.0462
β−12 max	1285 9		
avg	456 4	4.5 7	0.0437
β−13 max	1404 9		
avg	505 4	1.45 19	0.0156
β−14 max	2453 9		
avg	966 4	27 9	0.556
total β−			
avg	394 9	99 10	0.828

5 weak β's omitted:
Eβ(avg) = 44.6; ΣIβ = 0.20%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
X-ray L	6	5.4 9	0.0007
X-ray Kα₂	42.3089 3	3.8 6	0.0035
X-ray Kα₁	42.9962 3	6.9 11	0.0063
X-ray Kβ	48.7	2.7 5	0.0028
γ 1	88.9637 24	9.0 14	0.0171
γ 5	199.210 10	0.79 10	0.0034
γ 14	434.40 9	0.22 3	0.0020
γ 15	472.70 6	0.147 18	0.0015
γ 16	490.34 6	0.182 23	0.0019
γ 21	599.47 5	2.3 3	0.0295
γ 23	646.29 5	7.1 8	0.0976
γ 26	709.86 5	0.92 11	0.0138
γ 27	723.47 5	6.0 7	0.0928
γ 30	797.73 6	0.110 18	0.0019
γ 31	811.77 5	10.4 11	0.180
γ 32	820.36 5	0.160 20	0.0028
γ 35	841.10 9	0.23 4	0.0040
γ 36	858.36 12	0.126 19	0.0023
γ 37	865.98 12	0.16 4	0.0029
γ 38	867.01 8	1.40 20	0.0259
γ 43	944.35 7	1.39 17	0.0280
γ 44	947.46 15	0.31 10	0.0063
γ 45	960.50 8	1.62 20	0.0332
γ 46	961.0 6	0.16 4	0.0032
γ 47	969.83 6	0.39 5	0.0080
γ 48	1011.87 5	0.34 5	0.0073
γ 50	1027.39 8	0.120 17	0.0026
γ 52	1040.44 7	0.53 7	0.0118
γ 54	1065.14 5	5.2 6	0.119
γ 55	1075.99 20	0.37 8	0.0086
γ 56	1079.16 5	4.9 7	0.112
γ 59	1129.47 7	0.142 19	0.0034
γ 60	1140.51 5	0.30 4	0.0072
γ 61	1153.47 7	7.2 11	0.176
γ 62	1154.09 5	5.3 7	0.130
γ 63	1156.0 3	0.14 3	0.0035
γ 66	1169.12 5	0.29 4	0.0073
γ 69	1230.71 6	8.9 10	0.234
γ 70	1242.42 5	6.8 8	0.179
γ 72	1277.43 5	3.2 4	0.0874
γ 73	1366.41 5	1.76 20	0.0512
γ 75	1682.11 23	0.30 6	0.0108
γ 76	1857.42 11	0.25 4	0.0101
γ 77	1877.03 14	1.73 20	0.0690
γ 78	1937.68 10	2.14 25	0.0884
γ 79	1946.34 13	0.189 25	0.0078
γ 80	1965.95 12	4.2 5	0.176
γ 81	2026.61 10	3.5 4	0.153
γ 82	2032.51 12	0.130 18	0.0056
γ 83	2097.68 10	4.3 5	0.191
γ 85	2116.49 13	0.126 16	0.0057
γ 88	2180.91 11	2.4 3	0.113
γ 89	2186.71 11	4.0 6	0.184
γ 90	2205.38 13	1.00 12	0.0469
γ 94	2269.90 12	1.12 13	0.0543

47 weak γ's omitted:
Eγ(avg) = 1102.7; ΣIγ = 1.59%

● ^{157}Tb EC Decay (150 y 30) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	4.84	60 5	0.0062
Auger-K	34.9	0.7 4	0.0005
X-ray L	6	14.1 19	0.0018
X-ray Kα₂	42.3089 3	2.7 14	0.0024
X-ray Kα₁	42.9962 3	4.8 24	0.0044
X-ray Kβ	48.7	1.9 10	0.0020

● ^{157}Dy EC Decay (8.06 h 8) I (min) = 0.10%
Feeds ^{157}Tb

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	5	71 4	0.0076
ce-K- 1	8.82 7	3.6 23	0.0007
ce-K- 2	31.01 4	1.9 5	0.0012
Auger-K	36	5.6 20	0.0043
ce-L- 1	52.11 7	0.6 4	0.0007
ce-MNO- 1	58.85 7	0.17 11	0.0002
ce-L- 2	74.30 4	0.27 7	0.0004
ce-K- 7	274.16 20	1.08 5	0.0063
ce-L- 7	317.45 20	0.149 7	0.0010
X-ray L	6.27	17.8 20	0.0024
X-ray Kα₂	43.7441 3	23.5 12	0.0219
X-ray Kα₁	44.4816 3	42.3 20	0.0400
X-ray Kβ	50.4	16.8 8	0.0180
γ 1	60.82 7	0.5 3	0.0006
γ 2	83.01 4	0.58 15	0.0010
γ 4	182.20 20	1.65 16	0.0064
γ 5	265.34 21	0.18 4	0.0010
γ 7	326.16 20	94 3	0.652

21 weak γ's omitted:
Eγ(avg) = 593.8; ΣIγ = 0.47%

● ^{159}Gd β^- Decay (18.56 h 8) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	5	13 4	0.0014
ce-K- 1	6.004 10	16 6	0.0020
ce-K- 2	27.51 12	0.12 5	≈0
Auger-K	36	1.0 5	0.0008
ce-L- 1	49.292 10	2.7 10	0.0028
ce-M- 1	56.032 10	0.60 22	0.0007
ce-NOP- 1	57.602 10	0.17 6	0.0002

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
β^- 1 max	611.2 18		
avg	190.4 7	9 3	0.0365
β^- 2 max	626.5 18		
avg	196.0 7	0.22 8	0.0009
β^- 3 max	916.7 18		
avg	305.7 7	21 8	0.137
β^- 4 max	974.7 18		
avg	328.6 8	70 10	0.490
total β^-			
avg	310.9 8	100 14	0.664

4 weak β's omitted: Eβ(avg) = 97.6; ΣIβ = 0.08%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
X-ray L	6.27	3.3 11	0.0004
X-ray $K\alpha_2$	43.7441 3	4.3 16	0.0040
X-ray $K\alpha_1$	44.4816 3	8 3	0.0073
X-ray $K\beta$	50.4	3.1 11	0.0033
γ 1	58.000 10	1.8 7	0.0022
γ 5	226.00 4	0.16 6	0.0008
γ 10	348.17 8	0.17 6	0.0012
γ 11	363.56 3	8 3	0.0650

14 weak γ's omitted: Eγ(avg) = 364.0; ΣIγ = 0.21%

• ^{160}Tb β^- Decay (72.3 d 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	5.16	40.2 22	0.0044
ce-K- 1	32.9995 21	21.1 14	0.0149
Auger-K	37.2	1.3 4	0.0011
ce-L- 1	77.7422 21	31.7 21	0.0524
ce-M- 1	84.7412 21	7.5 5	0.0136
ce-NOP- 1	86.3717 21	2.07 14	0.0038
ce-K- 4	143.246 7	0.82 5	0.0025
ce-K- 5	161.857 8	0.126 7	0.0004
ce-L- 4	187.989 7	0.315 17	0.0013
ce-K- 10	244.784 5	0.401 24	0.0021
β^- 1 max	299.0 17		
avg	84.6 6	0.218 14	0.0004
β^- 2 max	434.5 17		
avg	128.6 6	4.40 21	0.0121
β^- 3 max	447.0 17		
avg	132.8 6	0.93 5	0.0026
β^- 4 max	474.8 17		
avg	142.3 6	9.4 4	0.0285
β^- 5 max	545.8 17		
avg	166.9 6	3.31 15	0.0118
β^- 6 max	568.7 17		
avg	175.0 6	45.6 20	0.170
β^- 7 max	677.7 17		
avg	214.4 7	0.170 21	0.0008
β^- 8 max	784.4 17		
avg	254.3 7	5.8 5	0.0314
β^- 9 max	867.3 17		
avg	286.0 7	24.6 14	0.150
β^-10 max	1549.6 17		
avg	565.2 8	0.38 15	0.0046
β^-11 max	1746.6 17		
avg	649.9 8	5 4	0.0692
total β^-			
avg	226.3 8	100 5	0.481

1 weak β's omitted: Eβ(avg) = 167.6; ΣIβ = 0.01%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
X-ray L	6.5	10.7 12	0.0015
X-ray $K\alpha_2$	45.2078 4	6.0 4	0.0058
X-ray $K\alpha_1$	45.9984 4	10.8 7	0.0106
X-ray $K\beta$	52	4.3 3	0.0048
γ 1	86.7880 20	13.3 8	0.0246
γ 4	197.035 7	4.90 21	0.0206
γ 5	215.646 8	3.71 17	0.0171
γ 10	298.573 5	27.1 14	0.172
γ 11	309.557 18	0.82 4	0.0054
γ 12	337.32 3	0.332 23	0.0024
γ 15	392.494 23	1.28 7	0.0107
γ 18	682.33 5	0.55 4	0.0080
γ 19	765.28 5	1.93 10	0.0314
γ 20	872.03 6	0.179 17	0.0033
γ 21	879.364 18	28.5 11	0.534
γ 22	962.295 20	9.0 6	0.185
γ 23	966.151 20	24.2 11	0.499
γ 24	1002.87 4	0.97 6	0.0207
γ 26	1102.61 4	0.52 4	0.0123
γ 27	1115.12 4	1.50 7	0.0357
γ 28	1177.934 24	14.4 8	0.362
γ 29	1199.89 4	2.36 12	0.0602
γ 31	1271.85 3	7.0 4	0.190
γ 34	1312.16 5	2.85 16	0.0797

14 weak γ's omitted: Eγ(avg) = 651.4; ΣIγ = 0.51%

• ^{162}Gd β^- Decay (9.7 m 10) I (min) = 0.10%

Feeds ^{162}Tb

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	5	23 5	0.0025
ce-L- 1	30.09 20	28 7	0.0182
ce-M- 1	36.83 20	6.2 14	0.0048
ce-NOP- 1	38.40 20	2.0 5	0.0017
ce-K- 2	350.8 3	0.318 19	0.0024
ce-K- 3	389.6 3	0.30 4	0.0025
β^- 1 max	960 100		
avg	320 40	100	0.682
X-ray L	6.27	5.8 14	0.0008
γ 1	38.80 20	6.5 15	0.0053
X-ray $K\alpha_2$	43.7441 3	0.164 12	0.0002
X-ray $K\alpha_1$	44.4816 3	0.294 20	0.0003
X-ray $K\beta$	50.4	0.117 8	0.0001
γ 2	402.8 3	46.2 24	0.396
γ 3	441.6 3	53 6	0.500

• ^{162}Tb β^- Decay (7.76 m 10) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	5.16	35.5 21	0.0039
ce-K- 1	26.8715 21	15.7 12	0.0090
Auger-K	37.2	1.1 4	0.0009
ce-L- 1	71.6142 21	28.5 22	0.0435
ce-M- 1	78.6132 21	6.8 5	0.0114
ce-NOP- 1	80.2437 21	1.85 14	0.0032
ce-K- 2	131.216 3	0.54 4	0.0015
ce-K- 3	131.500 5	0.72 6	0.0020
ce-L- 2	175.959 3	0.221 16	0.0008
ce-L- 3	176.243 5	0.104 8	0.0004
ce-K- 4	206.281 6	1.65 12	0.0072
ce-L- 4	251.024 6	0.234 18	0.0013
ce-K- 9	753.74 8	0.169 10	0.0027
ce-K- 13	834.41 8	0.124 8	0.0022

(Continued)

^{162}Tb β^- Decay (7.76 m 10) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
β− 1 max	750 80		
avg	240 30	0.136 8	0.0007
β− 2 max	780 80		
avg	250 30	0.164 10	0.0009
β− 3 max	840 80		
avg	270 40	0.315 20	0.0018
β− 4 max	1250 80		
avg	440 40	0.133 14	0.0012
β− 5 max	1380 80		
avg	490 40	96 6	1.00
β− 6 max	2530 80		
avg	980 40	0.4	0.0083
total β−			
avg	490 40	97 6	1.02

8 weak β's omitted:
Eβ(avg)= 235.6; ΣIβ= 0.22%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
X-ray L	6.5	9.4 11	0.0013
X-ray Kα2	45.2078 4	5.1 4	0.0049
X-ray Kα1	45.9984 4	9.1 6	0.0089
X-ray Kβ	52	3.64 24	0.0040
γ 1	80.6600 20	8.5 6	0.0146
γ 2	185.005 3	2.65 17	0.0105
γ 3	185.289 5	14.2 11	0.0560
γ 4	260.070 6	79 6	0.436
γ 5	543.2 6	0.106 13	0.0012
γ 6	622.52 10	0.88 5	0.0116
γ 7	697.35 10	2.54 13	0.0377
γ 9	807.53 8	42.1 22	0.724
γ 12	882.32 8	13.2 7	0.248
γ 13	888.20 8	38.1 20	0.720
γ 18	1067.55 10	0.55 3	0.0124
γ 28	1287.6 5	0.152 18	0.0042
γ 34	1610.7 3	0.140 8	0.0048

34 weak γ's omitted:
Eγ(avg)= 1453.3; ΣIγ= 1.14%

● ^{165}Dy β^- Decay (2.334 h 6) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
ce-K- 2	2.246 5	0.15 3	≈0
Auger-L	5.33	7.5 9	0.0008
Auger-K	38.4	0.55 22	0.0004
ce-K- 7	39.082 3	9.3 13	0.0077
ce-L- 7	85.306 3	1.50 20	0.0027
ce-MNO- 7	92.572 3	0.43 6	0.0008
ce-K- 29	306.062 20	0.19 3	0.0013
β− 1 max	205 4		
avg	56.1 12	0.152 19	0.0002
β− 2 max	290 4		
avg	81.7 13	1.67 21	0.0029
β− 3 max	1190 4		
avg	414.1 16	14.6 19	0.129
β− 4 max	1285 4		
avg	453.1 17	83.4 21	0.805
total β−			
avg	440.2 18	100 3	0.937

10 weak β's omitted:
Eβ(avg)= 165.4; ΣIβ= 0.15%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
X-ray L	6.72	2.1 4	0.0003
X-ray Kα2	46.6997 4	2.6 4	0.0026
X-ray Kα1	47.5467 4	4.6 6	0.0047
X-ray Kβ	53.9	1.86 25	0.0021
γ 7	94.700 3	3.6 5	0.0072
γ 27	279.763 12	0.50 7	0.0030
γ 29	361.680 20	0.84 11	0.0065
γ 39	545.834 20	0.162 20	0.0019
γ 41	565.718 20	0.128 16	0.0015
γ 46	633.415 20	0.57 7	0.0077
γ 50	715.328 20	0.53 7	0.0081

55 weak γ's omitted:
Eγ(avg)= 641.4; ΣIγ= 0.67%

● ^{166}Dy β^- Decay (81.6 h 2) I(min) = 0.10%
Feeds ^{166}Ho (26.80 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	5.33	63 9	0.0071
ce-L- 1	18.833 5	14 4	0.0055
ce-M- 1	26.099 5	3.0 8	0.0017
ce-K- 3	26.8523 21	50 12	0.0288
ce-NCP- 1	27.791 5	1.0 3	0.0006
Auger-K	38.4	2.9 13	0.0024
ce-L- 2	44.8450 8	16.9 19	0.0161
ce-M- 2	52.1109 10	4.1 5	0.0045
ce-NCP- 2	53.8035 11	1.11 12	0.0013
ce-L- 3	73.0758 21	7.5 17	0.0117
ce-M- 3	80.3417 21	1.7 4	0.0028
ce-NCP- 3	82.0343 22	0.48 11	0.0008
β− 1 max	58 5		
avg	14.9 14	1.09 12	0.0003
β− 2 max	402 5		
avg	117.5 17	92 7	0.230
β− 3 max	484 5		
avg	145.3 18	7 7	0.0217
total β−			
avg	118.3 18	100 10	0.252

1 weak β's omitted:
Eβ(avg)= 29.1; ΣIβ= 0.01%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
X-ray L	6.72	18 3	0.0025
γ 1	28.227 5	1.0 3	0.0006
X-ray Kα2	46.6997 4	14 3	0.0135
X-ray Kα1	47.5467 4	24 6	0.0245
X-ray Kβ	53.9	9.8 22	0.0112
γ 2	54.2392 7	0.70 8	0.0008
γ 3	82.4700 20	13 3	0.0227
γ 6	371.75 3	0.49 6	0.0039
γ 7	425.99 3	0.54 7	0.0049

2 weak γ's omitted:
Eγ(avg)= 333.9; ΣIγ= 0.07%

● ^{166}Ho β^- Decay (26.80 h 2) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	5.5	25.7 16	0.0030
ce-K- 1	23.104 5	10.6 8	0.0052
Auger-K	39.7	0.58 23	0.0005
ce-L- 1	70.838 5	24.5 18	0.0370
ce-M- 1	78.382 5	5.9 5	0.0099
ce-NOP- 1	80.140 5	1.62 12	0.0028

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β⁻ 1 max	191.8 17		
avg	52.1 5	0.304 8	0.0003
β⁻ 2 max	394.4 17		
avg	115.0 6	0.95 5	0.0023
β⁻ 3 max	1773.7 17		
avg	651.1 7	48 4	0.666
β⁻ 4 max	1854.3 17		
avg	693.8 8	51 4	0.754
total β⁻			
avg	665.7 8	100 6	1.42

3 weak β's omitted:
Eβ(avg) = 77.6; ΣIβ = 0.04%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	7	7.7 8	0.0011
X-ray Kα₂	48.2211 4	2.86 22	0.0029
X-ray Kα₁	49.1277 4	5.1 4	0.0053
X-ray Kβ	55.7	2.07 16	0.0025
γ 1	80.589 5	6.2 4	0.0106
γ 8	1379.43 6	0.93 5	0.0273
γ 12	1581.89 8	0.183 6	0.0062
γ 13	1662.44 8	0.121 4	0.0043

11 weak γ's omitted:
Eγ(avg) = 1182.2; ΣIγ = 0.08%

• ^{166}Ho β⁻ Decay (1.20E3 y 18) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	5.5	71 3	0.0083
ce-K- 2	23.104 5	21.7 11	0.0107
ce-K- 3	37.16 3	0.34 15	0.0003
Auger-K	39.7	2.2 9	0.0019
ce-K- 5	61.55 3	0.18 7	0.0002
ce-K- 6	63.67 3	0.24 10	0.0003
ce-L- 2	70.838 5	50.2 25	0.0757
ce-M- 2	78.382 5	12.2 6	0.0203
ce-NOP- 2	80.140 5	3.33 17	0.0057
ce-L- 3	84.90 3	0.18 13	0.0003
ce-L- 6	111.41 3	0.10 5	0.0002
ce-K- 12	126.930 6	15.0 6	0.0406
ce-K- 15	158.39 3	0.337 17	0.0011
ce-L- 12	174.664 6	7.1 3	0.0263
ce-M- 12	182.208 6	1.68 7	0.0065
ce-NOP-12	183.966 6	0.464 19	0.0018
ce-L- 15	206.13 3	0.131 7	0.0006
ce-K- 18	222.964 8	1.82 9	0.0087
ce-K- 19	243.258 20	0.188 10	0.0010
ce-L- 18	270.699 8	0.55 3	0.0032
ce-MNO-18	278.243 8	0.163 7	0.0010
ce-K- 28	472.32 3	0.108 6	0.0011
ce-K- 38	654.20 4	0.122 6	0.0017
ce-K- 44	752.82 4	0.249 10	0.0040
β⁻ 1 max	32 3		
avg	8.0 7	17.2 6	0.0029
β⁻ 2 max	72 3		
avg	18.7 7	73.4 25	0.0292
β⁻ 3 max	304 3		
avg	85.9 9	0.404 22	0.0007
β⁻ 4 max	483 3		
avg	144.9 9	0.9 5	0.0028
β⁻ 5 max	643 3		
avg	201.3 10	2.13 25	0.0091
β⁻ 6 max	948 3		
avg	316.4 11	1.12 10	0.0075
β⁻ 7 max	1314 3		
avg	464.1 11	3.4 11	0.0336
total β⁻			
avg	41.0 18	99 3	0.0860

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	7	21.2 20	0.0031
X-ray Kα₂	48.2211 4	10.9 5	0.0112
X-ray Kα₁	49.1277 4	19.3 8	0.0202
X-ray Kβ	55.7	7.9 4	0.0094
γ 2	80.589 5	12.7 5	0.0218
γ 3	94.65 3	0.160 9	0.0003
γ 5	119.04 3	0.161 9	0.0004
γ 6	121.16 3	0.245 12	0.0006
γ 12	184.415 6	72.6 19	0.285
γ 13	190.711 25	0.221 12	0.0009
γ 14	214.76 5	0.425 19	0.0019
γ 15	215.88 3	2.57 10	0.0118
γ 16	231.28 4	0.206 12	0.0010
γ 17	259.716 20	1.05 4	0.0058
γ 18	280.450 8	29.6 12	0.177
γ 19	300.744 20	3.72 15	0.0238
γ 20	339.78 8	0.170 12	0.0012
γ 21	365.777 16	2.42 10	0.0188
γ 23	410.941 25	11.1 5	0.0972
γ 24	451.524 25	2.92 12	0.0281
γ 25	464.83 4	1.20 5	0.0119
γ 26	496.70 10	0.22 6	0.0023
γ 28	529.81 3	9.5 4	0.107
γ 29	571.00 3	5.47 22	0.0665
γ 30	594.37 3	0.56 3	0.0071
γ 31	611.52 7	1.42 6	0.0184
γ 34	644.45 10	0.155 15	0.0021
γ 35	670.51 4	5.35 21	0.0764
γ 36	691.21 5	1.36 6	0.0200
γ 38	711.69 4	54.1 21	0.820
γ 39	712.40 20	0.22 7	0.0033
γ 40	736.67 9	0.367 20	0.0058
γ 41	752.27 4	12.1 5	0.193
γ 42	778.82 4	3.03 12	0.0502
γ 44	810.31 4	57.1 22	0.986
γ 45	830.56 4	9.7 4	0.171
γ 46	875.64 5	0.72 3	0.0134
γ 47	950.94 6	2.69 11	0.0546
γ 49	1120.31 7	0.237 12	0.0057
γ 50	1146.82 7	0.197 11	0.0048
γ 51	1241.44 6	0.83 3	0.0219
γ 52	1282.12 7	0.179 10	0.0049
γ 53	1400.72 8	0.498 20	0.0149
γ 54	1427.05 8	0.484 20	0.0147

14 weak γ's omitted:
Eγ(avg) = 416.6; ΣIγ = 0.63%

• ^{169}Er β⁻ Decay (9.40 d 2) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-MNO- 1	6.094 8	45 5	0.0058
β⁻ 1 max	341.8 15		
avg	97.9 5	45 5	0.0938
β⁻ 2 max	350.2 15		
avg	100.6 5	55 5	0.118
total β⁻			
avg	99.4 5	100 7	0.212
γ 1	8.401 8	0.156 18	≈0

• ^{169}Yb EC Decay (31.97 d 5) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
ce-K- 3	3.729 7	39.9 18	0.0032
Auger-L	5.67	160 9	0.0193
ce-MNO- 1	6.094 8	95 3	0.0123
ce-L- 2	10.63 5	9.3 5	0.0021
ce-M- 2	18.44 5	2.07 11	0.0008
ce-NOP- 2	20.28 5	0.68 4	0.0003
ce-K- 4	34.223 7	8.37 25	0.0061
Auger-K	40.9	10 4	0.0088
ce-K- 5	50.387 7	34.9 9	0.0375
ce-L- 3	53.003 7	7.1 4	0.0081
ce-K- 7	58.797 7	1.33 6	0.0017
ce-M- 3	60.812 7	1.58 7	0.0021
ce-NOP- 3	62.647 7	0.429 19	0.0006
ce-K- 8	71.130 7	6.0 3	0.0092
ce-L- 4	83.497 7	1.45 5	0.0026
ce-MNO- 4	91.306 7	0.420 13	0.0008
ce-L- 5	99.661 7	5.64 15	0.0120
ce-M- 5	107.470 7	1.26 4	0.0029
ce-L- 7	108.071 7	1.37 6	0.0032
ce-NOP- 5	109.305 7	0.368 10	0.0009
ce-MNO- 7	115.880 7	0.425 11	0.0010
ce-K- 10	117.820 7	10.3 3	0.0258
ce-L- 8	120.404 7	5.2 3	0.0132
ce-M- 8	128.213 7	1.25 7	0.0034
ce-NOP- 8	130.048 7	0.348 18	0.0010
ce-K- 12	138.563 7	12.7 5	0.0376
ce-L- 10	167.094 7	1.84 5	0.0065
ce-M- 10	174.903 7	0.416 11	0.0015
ce-NOP-10	176.738 7	0.119 4	0.0004
ce-L- 12	187.837 7	2.10 7	0.0084
ce-M- 12	195.646 7	0.468 16	0.0019
ce-NOP-12	197.481 7	0.134 5	0.0006
ce-K- 19	248.340 7	0.524 20	0.0028
ce-L- 19	297.614 7	0.151 6	0.0010
X-ray L	7.18	51 7	0.0077
γ 1	8.401 8	0.330 15	≈0
γ 2	20.75 5	0.213 11	≈0
X-ray Kα$_2$	49.7726 4	52.8 18	0.0560
X-ray Kα$_1$	50.7416 4	93 3	0.101
X-ray Kβ	57.5	38.3 14	0.0469
γ 3	63.119 7	43.7 15	0.0588
γ 4	93.613 7	2.66 8	0.0053
γ 5	109.777 7	17.4 5	0.0406
γ 7	118.187 7	1.88 5	0.0047
γ 8	130.520 7	11.1 5	0.0307
γ 10	177.210 7	21.4 6	0.0809
γ 12	197.953 7	34.9 12	0.147
γ 14	240.30 10	0.122 7	0.0006
γ 15	261.072 7	1.77 10	0.0098
γ 19	307.730 7	10.81 25	0.0708

32 weak γ's omitted:
Eγ(avg) = 344.1; ΣIγ = 0.18%

• ^{170}Tm β^- Decay (128.6 d 3) I (min) = 0.10%

%β^- Decay = 99.854 2
%EC Decay = 0.146 2

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	5.84	12.1 8	0.0015
ce-K- 1	22.921 7	4.7 3	0.0023
Auger-K	42.2	0.23 10	0.0002
ce-L- 1	73.767 7	12.2 7	0.0192
ce-M- 1	81.855 7	3.01 18	0.0052
ce-NOP- 1	83.766 7	0.83 5	0.0015
β- 1 max	883.6 9		
avg	290.4 4	24.0 10	0.148
β- 2 max	967.9 9		
avg	323.1 4	76.0 10	0.523
total β- avg	315.3 4	100.0 15	0.671
X-ray L	7.42	4.0 6	0.0006
X-ray Kα$_2$	51.3540 5	1.27 8	0.0014
X-ray Kα$_1$	52.3889 5	2.25 14	0.0025
X-ray Kβ	59.4	0.93 6	0.0012
γ 1	84.253 7	3.26 16	0.0058

• ^{171}Er β^- Decay (7.52 h 3) I (min) = 0.10%

Feeds ^{171}Tm

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
ce-L- 2	2.269 8	6.2 9	0.0003
ce-MNO- 1	2.718 6	91 5	0.0052
Auger-L	5.67	46 3	0.0055
ce-MNO- 2	10.078 8	1.8 3	0.0004
ce-K- 3	26.21 10	0.242 18	0.0001
Auger-K	40.9	2.5 10	0.0022
ce-K- 4	52.231 4	39.2 23	0.0436
ce-K- 5	57.266 6	1.69 9	0.0021
ce-K- 6	64.627 4	5.7 3	0.0078
ce-L- 4	101.505 4	6.4 4	0.0137
ce-L- 5	106.540 6	1.78 9	0.0040
ce-M- 4	109.314 4	1.42 7	0.0033
ce-NOP- 4	111.149 4	0.414 24	0.0010
ce-L- 6	113.901 4	5.3 3	0.0129
ce-M- 5	114.349 6	0.430 22	0.0010
ce-NOP- 5	116.184 6	0.121 6	0.0003
ce-M- 6	121.710 4	1.29 7	0.0033
ce-NOP- 6	123.545 4	0.360 20	0.0009
ce-K- 14	236.511 14	0.486 20	0.0024
ce-K- 15	248.901 18	0.99 4	0.0052
ce-L- 15	298.175 18	0.144 6	0.0009
β- 1 max	205.4 12		
avg	56.0 4	0.333 15	0.0004
β- 2 max	491.8 12		
avg	147.6 5	0.50 3	0.0016
β- 3 max	577.4 12		
avg	177.4 5	2.18 8	0.0082
β- 4 max	814.5 12		
avg	264.5 5	0.188 17	0.0011
β- 5 max	1065.5 12		
avg	362.2 5	94 4	0.725
β- 6 max	1485.4 12		
avg	534.7 5	2.30 20	0.0262
total β- avg	359.5 6	100 4	0.763

7 weak β's omitted:
Eβ(avg) = 182.0; ΣIβ = 0.18%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
X-ray L	7.18	14.4 20	0.0022
X-ray Kα$_2$	49.7726 4	13.1 7	0.0139
X-ray Kα$_1$	50.7416 4	23.2 13	0.0250
X-ray Kβ	57.5	9.5 6	0.0116
γ 4	111.621 4	20.5 10	0.0487
γ 5	116.656 6	2.30 10	0.0057
γ 6	124.017 4	9.1 4	0.0240
γ 10	210.60 3	0.64 3	0.0029
γ 11	237.14 4	0.302 14	0.0015
γ 12	277.43 5	0.58 3	0.0034
γ 14	295.901 14	28.9 12	0.182

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 15	308.291 18	64 3	0.423
γ 17	371.96 9	0.257 13	0.0020
γ 33	670.70 20	0.252 9	0.0036
γ 35	676.1 3	0.285 11	0.0041
γ 41	784.10 20	0.240 9	0.0040
γ 42	796.60 20	0.640 24	0.0109
γ 47	907.7 4	0.635 23	0.0123

50 weak γ's omitted:
Eγ(avg) = 535.2; ΣIγ = 1.09%

• ^{171}Tm β^- Decay (1.92 y 1) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-K- 1	5.386 7	1.076 7	0.0001
Auger-L	5.84	1.23 6	0.0002
ce-L- 1	56.232 7	0.747 10	0.0009
ce-MNO- 1	64.320 7	0.230 1	0.0003
β- 1 max	30.0 10		
avg	7.6 3	2.2	0.0004
β- 2 max	96.7 10		
avg	25.2 3	97.8	0.0525
total β- avg	24.8 4	100	0.0529
X-ray L	7.42	0.41 5	≈0
X-ray Kα$_2$	51.3540 5	0.293 8	0.0003
X-ray Kα$_1$	52.3889 5	0.516 13	0.0006
X-ray Kβ	59.4	0.213 6	0.0003
γ 1	66.718 7	0.158	0.0002

• ^{175}Yb β^- Decay (4.19 d 1) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	6	3.1 4	0.0004
Auger-K	43.5	0.19 9	0.0002
ce-K- 1	50.489 4	3.6 5	0.0039
ce-K- 2	74.342 6	0.116 21	0.0002
ce-L- 1	102.933 4	0.86 11	0.0019
ce-MNO- 1	111.312 4	0.26 4	0.0006
ce-K- 6	333.008 20	0.24 4	0.0017
β- 1 max	71.6 15		
avg	18.4 4	10.3 13	0.0040
β- 2 max	354.1 15		
avg	101.7 5	3.3 5	0.0071
β- 3 max	467.9 15		
avg	139.2 5	86.5 17	0.256
total β- avg	125.5 7	100.1 22	0.268
X-ray L	7.66	1.08 17	0.0002
X-ray Kα$_2$	52.9650 5	1.09 14	0.0012
X-ray Kα$_1$	54.0698 5	1.91 24	0.0022
X-ray Kβ	61.3	0.79 10	0.0010
γ 1	113.803 4	1.88 25	0.0046
γ 2	137.656 6	0.104 19	0.0003
γ 3	144.861 5	0.34 6	0.0010
γ 5	282.517 14	3.0 4	0.0182
γ 6	396.322 20	6.5 8	0.0549

1 weak γ's omitted:
Eγ(avg) = 251.5; ΣIγ = 0.09%

• ^{177}Lu β^- Decay (6.71 d 1) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	6.18	8.8 6	0.0012
ce-K- 1	6.2952 21	0.116 8	≈0
Auger-K	44.8	0.27 12	0.0003
ce-K- 2	47.601 3	5.2 4	0.0053
ce-L- 2	101.681 3	7.0 5	0.0152
ce-M- 2	110.351 3	1.74 11	0.0041
ce-NOP- 2	112.414 3	0.50 4	0.0012
ce-K- 4	143.010 7	0.59 7	0.0018
ce-L- 4	197.090 7	0.100 15	0.0004
β- 1 max	175.8 10		
avg	47.3 3	12.3 5	0.0124
β- 2 max	384.1 10		
avg	111.3 4	9.0 12	0.0213
β- 3 max	497.1 10		
avg	148.9 4	78.7 14	0.250
total β- avg	133.0 5	100.0 20	0.283

1 weak β's omitted:
Eβ(avg) = 78.2; ΣIβ = 0.05%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	7.9	3.3 4	0.0005
X-ray Kα$_2$	54.6114 8	1.63 11	0.0019
X-ray Kα$_1$	55.7902 8	2.85 18	0.0034
X-ray Kβ	63.2	1.20 8	0.0016
γ 1	71.6460 20	0.161 9	0.0002
γ 2	112.952 3	6.4 4	0.0153
γ 4	208.361 7	11.0 4	0.0488
γ 5	249.686 25	0.212 14	0.0011
γ 6	321.313 9	0.219 14	0.0015

1 weak γ's omitted:
Eγ(avg) = 136.7; ΣIγ = 0.05%

• ^{177}Lu IT Decay (160.10 d 18) I(min) = 0.10%

%IT Decay = 21.5 12
Feeds ^{177}Lu (6.71 d)
See also ^{177}Lu β^- Decay (160.10 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	6	25.1 18	0.0032
Auger-K	43.5	0.9 4	0.0008
ce-K- 1	52.52 4	1.41 16	0.0016
ce-K- 2	58.306 3	9.0 10	0.0112
ce-K- 3	83.851 5	3.2 4	0.0058
ce-L- 1	104.96 4	14.4 16	0.0323
ce-K- 4	108.549 6	2.8 5	0.0065
ce-L- 2	110.750 3	2.2 3	0.0053
ce-M- 1	113.34 4	3.8 5	0.0091
ce-NOP- 1	115.32 4	1.07 12	0.0026
ce-M- 2	119.129 3	0.53 7	0.0013
ce-NOP- 2	121.114 3	0.146 18	0.0004
ce-K- 5	132.254 7	0.37 6	0.0010
ce-L- 3	136.295 5	0.71 9	0.0021
ce-MNO- 3	144.674 5	0.208 24	0.0006
ce-K- 6	154.779 7	0.91 14	0.0030
ce-L- 4	160.993 6	0.58 7	0.0020
ce-MNO- 4	169.372 6	0.172 22	0.0006
ce-K- 7	205.479 8	0.248 25	0.0011
ce-L- 6	207.223 7	0.164 24	0.0007
ce-K- 8	255.708 8	0.47 5	0.0026
ce-L- 8	308.152 8	0.144 15	0.0009
ce-K- 10	350.340 10	0.38 4	0.0028

(Continued)

^{177}Lu IT Decay (160.10 d 18) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	7.66	8.8 12	0.0014
X-ray $K\alpha_2$	52.9650 5	5.1 4	0.0058
X-ray $K\alpha_1$	54.0698 5	9.0 6	0.0104
X-ray $K\beta$	61.3	3.8 3	0.0049
γ 1	115.83 4	0.68 8	0.0017
γ 2	121.620 3	5.9 6	0.0152
γ 3	147.165 5	3.6 4	0.0112
γ 4	171.863 6	4.9 5	0.0179
γ 5	195.568 7	0.86 11	0.0036
γ 6	218.093 7	3.0 5	0.0139
γ 7	268.793 8	3.4 4	0.0194
γ 8	319.022 8	10.3 10	0.0699
γ 9	367.428 10	3.0 3	0.0232
γ 10	413.654 10	16.4 16	0.144

• ^{177}Lu β^- Decay (160.10 d 18) I (min) = 0.10%

%β^- Decay = 78.5 12

See also ^{177}Lu IT Decay (160.10 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-L- 1	2.8893 4	23.4 14	0.0014
Auger-L	6.18	125 7	0.0164
ce-K- 4	6.2952 21	0.64 7	≈0
ce-MNO- 1	11.5591 4	7.5 5	0.0018
ce-K- 6	39.993 5	32.9 16	0.0280
ce-L- 2	43.879 20	0.31 7	0.0003
Auger-K	44.8	5.6 24	0.0054
ce-K- 7	47.601 3	17.7 12	0.0179
ce-L- 4	60.3753 21	0.121 15	0.0002
ce-K- 9	63.144 5	23.6 16	0.0318
ce-K- 10	71.379 6	0.77 13	0.0012
ce-K- 11	80.24 6	0.101 13	0.0002
ce-K- 12	87.939 4	16.8 12	0.0316
ce-L- 6	94.073 5	6.8 4	0.0137
ce-K- 13	94.57 8	0.24 13	0.0005
ce-L- 7	101.681 3	23.6 17	0.0512
ce-M- 6	102.743 5	1.59 8	0.0035
ce-NOP- 6	104.806 5	0.468 23	0.0010
ce-K- 14	109.052 6	8.3 6	0.0192
ce-M- 7	110.351 3	5.8 4	0.0137
ce-K- 15	111.70 8	0.235 20	0.0006
ce-NOP- 7	112.414 3	1.68 11	0.0040
ce-L- 9	117.224 5	4.6 3	0.0114
ce-L- 10	125.459 6	0.62 8	0.0017
ce-M- 9	125.894 5	1.05 8	0.0028
ce-NOP- 9	127.957 5	0.310 21	0.0008
ce-MNO-10	134.129 6	0.196 23	0.0006
ce-K- 17	138.743 7	6.0 5	0.0177
ce-L- 12	142.019 4	3.12 22	0.0094
ce-K- 18	143.010 7	3.3 5	0.0101
ce-L- 13	148.65 8	0.13 3	0.0004
ce-K- 19	149.080 7	2.49 19	0.0079
ce-M- 12	150.689 4	0.72 5	0.0023
ce-NOP-12	152.752 4	0.211 15	0.0007
ce-K- 20	163.09 6	4.4 3	0.0151
ce-L- 14	163.132 6	1.46 10	0.0051
ce-K- 21	168.495 7	0.62 5	0.0022
ce-MNO-14	171.802 6	0.43 3	0.0016
ce-K- 23	184.34 3	0.56 5	0.0022
ce-L- 17	192.823 7	1.03 8	0.0042
ce-L- 18	197.090 7	0.56 9	0.0023
ce-MNO-17	201.493 7	0.304 22	0.0013
ce-L- 19	203.160 7	0.41 3	0.0018
ce-MNO-18	205.760 7	0.165 22	0.0007
ce-MNO-19	211.830 7	0.120 9	0.0005
ce-K- 24	216.436 8	0.92 7	0.0042
ce-L- 20	217.17 6	2.01 15	0.0093
ce-L- 21	222.575 7	0.277 20	0.0013
ce-M- 20	225.84 6	0.49 4	0.0023
ce-NOP-20	227.90 6	0.138 10	0.0007
ce-K- 28	231.10 8	0.31 3	0.0015
ce-L- 23	238.42 3	0.232 19	0.0012
ce-K- 33	262.335 9	0.76 6	0.0043
ce-L- 24	270.516 8	0.334 24	0.0019
ce-MNO-24	279.186 8	0.103 7	0.0006
ce-L- 28	285.18 8	0.106 10	0.0006
ce-K- 35	313.155 9	0.84 7	0.0056
ce-L- 33	316.415 9	0.238 17	0.0016
ce-K- 37	353.179 11	0.47 4	0.0035
ce-L- 35	367.235 9	0.230 17	0.0018
ce-L- 37	407.259 11	0.118 9	0.0010
β^- 1 max	151.8 10		
avg	40.5 3	78.5 12	0.0677
X-ray L	7.9	46 6	0.0078
X-ray $K\alpha_2$	54.6114 8	33.4 12	0.0388
γ 2	55.150 20	1.20 25	0.0014
X-ray $K\alpha_1$	55.7902 8	58.4 19	0.0695
X-ray $K\beta$	63.2	24.5 9	0.0330
γ 4	71.6460 20	0.89 10	0.0014
γ 6	105.344 5	12.0 6	0.0269
γ 7	112.952 3	21.5 15	0.0517
γ 8	117.01 4	0.24 3	0.0006
γ 9	128.495 5	15.3 11	0.0417
γ 10	136.730 6	1.37 15	0.0040
γ 11	145.59 6	0.90 11	0.0028
γ 12	153.290 4	18.0 12	0.0588
γ 13	159.92 8	0.60 8	0.0020
γ 14	174.403 6	12.6 9	0.0468
γ 15	177.05 8	3.5 3	0.0131
γ 17	204.094 7	14.3 10	0.0621
γ 18	208.361 7	61 4	0.272
γ 19	214.431 7	6.6 5	0.0302
γ 20	228.44 6	37.2 24	0.181
γ 21	233.846 7	5.6 4	0.0281
γ 23	249.686 25	6.1 5	0.0326
γ 24	281.787 8	14.1 9	0.0843
γ 25	283.42 13	0.52 8	0.0031
γ 26	291.42 10	1.01 11	0.0063
γ 27	292.51 10	0.80 10	0.0050
γ 28	296.45 8	5.4 5	0.0341
γ 29	299.03 10	1.72 15	0.0109
γ 30	305.52 8	1.74 17	0.0113
γ 31	313.69 8	1.38 12	0.0092
γ 32	321.313 9	1.39 13	0.0095
γ 33	327.686 9	17.5 12	0.122
γ 34	341.64 8	1.79 18	0.0130
γ 35	378.506 9	27.9 19	0.225
γ 36	385.02 8	2.94 24	0.0241
γ 37	418.530 11	20.1 14	0.179
γ 38	426.29 10	0.41 6	0.0037
γ 39	465.96 12	2.33 20	0.0231

5 weak γ's omitted:
Eγ(avg) = 167.1; ΣIγ = 0.19%

• ^{181}Hf β^- Decay (42.39 d 8) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-MNO- 1	1.19 10	5 3	0.0001
ce-MNO- 2	3.50 3	0.47 11	≈0
Auger-L	6.35	37.6 21	0.0051
Auger-K	46.2	1.4 6	0.0014
ce-K- 3	65.604 20	20.7 10	0.0289
ce-K- 4	68.834 20	7.4 5	0.0109
ce-K- 5	69.44 4	1.06 22	0.0016

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
ce-L- 3	121.338 20	24.3 12	0.0627
ce-L- 4	124.568 20	1.43 9	0.0038
ce-L- 5	125.18 4	0.20 5	0.0005
ce-M- 3	130.312 20	6.0 3	0.0168
ce-NOP- 3	132.454 20	1.75 9	0.0049
ce-MNO- 4	133.542 20	0.431 25	0.0012
ce-K- 6	278.43 20	0.66 3	0.0039
ce-L- 6	334.17 20	0.206 10	0.0015
ce-K- 8	414.61 10	1.508 16	0.0133
ce-L- 8	470.35 10	0.344 3	0.0034
ce-MNO- 8	479.32 10	0.104	0.0011
β− 1 max	403 4		
avg	117.5 13	7 3	0.0175
β− 2 max	407 4		
avg	118.7 13	93 3	0.235
total β− avg	118.6 13	100 5	0.253
X-ray L	8.15	14.6 17	0.0025
X-ray Kα$_2$	56.2770 10	8.6 4	0.0103
X-ray Kα$_1$	57.5320 10	15.0 7	0.0184
X-ray Kβ	65.2	6.3 3	0.0088
γ 3	133.020 20	41.7 16	0.118
γ 4	136.250 20	5.2 3	0.0152
γ 5	136.86 4	0.76 14	0.0022
γ 6	345.85 20	17.2 6	0.126
γ 7	476.00 20	0.42 9	0.0042
γ 8	482.03 10	82.8 8	0.851
γ 9	615.5 5	0.143 6	0.0019

3 weak γ's omitted:
Eγ(avg)= 522.6; ΣIγ= 0.03%

• ^{181}W EC Decay (120.95 d 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
ce-MNO- 1	3.50 3	80 30	0.0063
Auger-L	6.35	57 4	0.0078
Auger-K	46.2	3.0 13	0.0029
γ 1	6.21 3	0.99 20	0.0001
X-ray L	8.15	22 3	0.0039
X-ray Kα$_2$	56.2770 10	18.7 6	0.0224
X-ray Kα$_1$	57.5320 10	32.6 9	0.0400
X-ray Kβ	65.2	13.8 5	0.0191

2 weak γ's omitted:
Eγ(avg)= 147.7; ΣIγ= 0.14%

• ^{182}Ta β$^-$ Decay (114.74 d 8) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	6.53	59 3	0.0082
ce-K- 5	15.155 7	16.3 6	0.0053
ce-L- 1	19.637 7	1.03 10	0.0004
ce-MNO- 1	28.917 7	0.31 3	0.0002
ce-K- 6	30.579 7	12.6 6	0.0082
ce-L- 2	30.614 7	0.138 10	≈0
ce-K- 8	44.144 7	4.88 21	0.0046
Auger-K	45.7	1.6 8	0.0016
ce-L- 3	53.621 7	6.5 4	0.0074
ce-L- 4	55.649 7	6.7 4	0.0079
ce-M- 3	62.901 7	1.48 9	0.0020
ce-M- 4	64.929 7	1.52 9	0.0021
ce-NOP- 3	65.126 7	0.45 3	0.0006
ce-NOP- 4	67.154 7	0.436 25	0.0006
ce-L- 5	72.580 7	4.08 14	0.0063
ce-M- 5	81.860 7	0.96 4	0.0017
ce-K- 10	82.903 7	0.76 4	0.0013
ce-NOP- 5	84.085 7	0.287 10	0.0005
ce-K- 11	86.858 7	0.268 13	0.0005
ce-L- 6	88.004 7	32.5 16	0.0609
ce-M- 6	97.284 7	8.2 4	0.0169
ce-NOP- 6	99.509 7	2.39 12	0.0051
ce-L- 8	101.569 7	1.03 5	0.0022
ce-K- 12	109.865 7	1.66 15	0.0039
ce-MNO- 8	110.849 7	0.314 14	0.0007
ce-K- 13	128.823 7	0.262 14	0.0007
ce-L- 10	140.328 7	0.126 9	0.0004
ce-K- 14	152.578 7	0.304 12	0.0010
ce-K- 15	159.791 8	0.430 21	0.0015
ce-L- 12	167.290 7	0.459 22	0.0016
ce-MNO-12	176.570 7	0.142 7	0.0005
ce-L- 13	186.248 7	0.167 9	0.0007
ce-K- 16	194.544 8	0.293 15	0.0012
ce-L- 15	217.216 8	0.223 11	0.0010
ce-L- 16	251.969 8	0.127 7	0.0007
ce-K- 25	1051.75 3	0.104 5	0.0023
β− 1 max	258 3		
avg	71.6 9	28.9 10	0.0441
β− 2 max	301 3		
avg	84.8 9	0.128 7	0.0002
β− 3 max	324 3		
avg	91.9 10	2.4 7	0.0047
β− 4 max	368 3		
avg	106.0 10	0.696 24	0.0016
β− 5 max	437 3		
avg	128.6 10	21.0 9	0.0575
β− 6 max	480 3		
avg	142.9 10	2.3 3	0.0070
β− 7 max	522 3		
avg	157.2 10	40.8 25	0.137
β− 8 max	590 3		
avg	180.7 11	3.2 22	0.0123
total β− avg	124.7 11	99 4	0.264
X-ray L	8.4	25 3	0.0045
γ 1	31.737 7	0.80 8	0.0005
γ 2	42.714 7	0.245 16	0.0002
X-ray Kα$_2$	57.9817 5	10.4 4	0.0129
X-ray Kα$_1$	59.31820 1	18.1 6	0.0229
γ 3	65.721 7	2.80 16	0.0039
X-ray Kβ	67.2	7.7 3	0.0110
γ 4	67.749 7	42.3 21	0.0611
γ 5	84.680 7	2.74 9	0.0049
γ 6	100.104 7	14.1 5	0.0300
γ 8	113.669 7	1.90 8	0.0046
γ 9	116.417 7	0.441 18	0.0011
γ 10	152.428 7	7.17 24	0.0233
γ 11	156.383 7	2.72 10	0.0091
γ 12	179.390 7	3.18 14	0.0122
γ 13	198.348 7	1.51 7	0.0064
γ 14	222.103 7	7.6 3	0.0358
γ 15	229.316 8	3.64 14	0.0178
γ 16	264.069 8	3.64 14	0.0205
γ 19	927.99 7	0.623 20	0.0123
γ 20	959.74 7	0.350 12	0.0072
γ 21	1001.68 7	2.09 6	0.0447
γ 23	1044.43 9	0.237 8	0.0053
γ 24	1113.38 10	0.441 18	0.0105
γ 25	1121.28 3	35.0 9	0.836
γ 27	1157.30 20	0.63 14	0.0155
γ 28	1158.10 20	0.35 11	0.0086
γ 30	1189.05 4	16.3 5	0.413

(Continued)

^{182}Ta β^- Decay (114.74 d 8) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
γ 31	1221.418 25	27.1 8	0.704
γ 32	1223.9	0.21 4	0.0055
γ 33	1230.97 3	11.5 4	0.302
γ 34	1257.47 5	1.49 5	0.0400
γ 35	1273.75 6	0.651 20	0.0177
γ 36	1289.17 7	1.35 4	0.0372
γ 37	1342.72 6	0.252 8	0.0072
γ 38	1373.80 7	0.220 7	0.0064

9 weak γ's omitted:
Eγ(avg)= 943.0; ΣIγ= 0.40%

• ^{182}Re EC Decay (12.7 h 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	6.53	104 7	0.0145
ce-K- 5	15.155 7	15.8 16	0.0051
ce-L- 1	19.637 7	0.94 10	0.0004
ce-MNO- 1	28.917 7	0.29 3	0.0002
ce-K- 6	30.579 7	12.8 12	0.0083
ce-L- 2	30.614 7	0.130 17	≈0
ce-K- 8	44.144 7	1.07 18	0.0010
Auger-K	45.7	4.7 21	0.0046
ce-L- 3	53.621 7	0.58 8	0.0007
ce-L- 4	55.649 7	6.2 5	0.0073
ce-MNO- 3	62.901 7	0.172 22	0.0002
ce-M- 4	64.929 7	1.41 12	0.0020
ce-NOP- 4	67.154 7	0.40 4	0.0006
ce-L- 5	72.580 7	3.9 4	0.0061
ce-M- 5	81.860 7	0.93 10	0.0016
ce-K- 10	82.903 7	0.71 8	0.0013
ce-NOP- 5	84.085 7	0.28 3	0.0005
ce-L- 6	88.004 7	33 3	0.0622
ce-M- 6	97.284 7	8.3 8	0.0173
ce-NOP- 6	99.509 7	2.44 22	0.0052
ce-L- 8	101.569 7	0.23 4	0.0005
ce-K- 12	109.865 7	0.12 4	0.0003
ce-L- 10	140.328 7	0.117 15	0.0004
ce-K- 15	159.791 8	0.25 6	0.0009
ce-L- 15	217.216 8	0.13 3	0.0006
ce-K- 17	400.73 20	0.113 13	0.0010
β+ 1 max	1738 20		
avg	789 9	1.8 5	0.0303

2 weak β's omitted:
Eβ(avg)= 254.4; ΣIβ= 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	8.4	45 5	0.0080
γ 1	31.737 7	0.73 8	0.0005
γ 2	42.714 7	0.23 3	0.0002
X-ray Kα$_2$	57.9817 5	30.0 18	0.0371
X-ray Kα$_1$	59.31820 1	52 3	0.0660
γ 3	65.721 7	0.25 4	0.0003
X-ray Kβ	67.2	22.2 14	0.0318
γ 4	67.749 7	39 3	0.0566
γ 5	84.680 7	2.6 3	0.0048
γ 6	100.104 7	14.4 12	0.0306
γ 8	113.669 7	0.41 7	0.0010
γ 9	116.417 7	0.35 10	0.0009
γ 10	152.428 7	6.7 8	0.0217
γ 11	156.383 7	0.41 10	0.0014
γ 12	179.390 7	0.24 7	0.0009
γ 13	198.348 7	0.18 3	0.0008
γ 14	222.103 7	0.67 8	0.0032
γ 15	229.316 8	2.1 5	0.0104
γ 16	264.069 8	0.26 5	0.0015
γ 17	470.26 20	1.98 22	0.0198
γ 18	536.04 20	0.21 4	0.0024
γ 19	555.0 10	0.11 4	0.0013
γ 20	598.56 20	0.40 5	0.0051
γ 21	649.73 20	0.35 7	0.0049
γ 22	734.53 20	0.38 5	0.0060
γ 23	787.11 20	0.26 4	0.0043
γ 24	800.0 10	0.15 4	0.0026
γ 25	810.24 20	0.38 7	0.0066
γ 26	835.98 20	0.48 7	0.0085
γ 28	894.85 20	2.11 22	0.0401
γ 29	900.80 20	0.35 7	0.0067
γ 30	927.99 7	0.51 7	0.0101
γ 31	959.74 7	0.38 7	0.0078
γ 32	1001.68 7	0.220 17	0.0047
γ 33	1044.43 9	0.179 24	0.0040
γ 34	1121.28 3	31.9 16	0.762
γ 35	1157.30 20	0.70 20	0.0173
γ 37	1180.70 20	0.22 7	0.0056
γ 38	1189.05 4	15.2 10	0.384
γ 39	1221.418 25	24.7 13	0.642
γ 41	1230.97 3	1.31 10	0.0343
γ 42	1257.47 5	1.40 10	0.0376
γ 43	1273.75 6	0.54 7	0.0147
γ 44	1289.17 7	1.21 9	0.0333
γ 45	1294.2	0.175 21	0.0048
γ 46	1373.80 7	0.188 25	0.0055
γ 56	1771.00 20	0.29 4	0.0108
γ 57	1818.80 20	0.105 11	0.0041
γ 59	1870.9 5	0.29 3	0.0117
γ 63	1957.3 4	0.46 4	0.0192
γ 65	2016.2 5	0.78 8	0.0336
γ 67	2047.3 5	0.118 17	0.0051
γ 68	2057.4 5	0.83 14	0.0363
γ 76	2207.7 5	0.102 11	0.0048

29 weak γ's omitted:
Eγ(avg)= 1790.1; ΣIγ= 0.89%
Maximum γ±-intensity = 3.79%

• ^{182}Re EC Decay (64.0 h 5) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	6.53	167 10	0.0232
ce-L- 2	7.740 20	7.27 23	0.0012
ce-K- 9	15.155 7	15.9 11	0.0051
ce-MNO- 2	17.020 20	2.202 13	0.0008
ce-L- 3	19.637 7	0.55 6	0.0002
ce-L- 4	27.000 20	3.1 7	0.0018
ce-MNO- 3	28.917 7	0.168 17	0.0001
ce-K- 10	30.579 7	13.0 11	0.0085
ce-L- 5	30.614 7	0.157 13	0.0001
ce-MNO- 4	36.280 20	0.93 20	0.0007
ce-K- 11	37.625 20	3.1 3	0.0025
ce-K- 12	39.025 20	2.15 23	0.0018
ce-K- 15	44.144 7	11.3 8	0.0106
Auger-K	45.7	8 4	0.0076
ce-K- 16	46.892 7	0.103 10	0.0001
ce-L- 6	48.460 20	0.30 18	0.0003
ce-L- 7	53.621 7	6.1 6	0.0070
ce-L- 8	55.649 7	3.5 3	0.0041
ce-K- 17	61.275 20	11.9 11	0.0156
ce-M- 7	62.901 7	1.40 14	0.0019
ce-K- 19	64.245 20	4.05 13	0.0055
ce-M- 8	64.929 7	0.79 7	0.0011
ce-NOP- 7	65.126 7	0.42 5	0.0006
ce-NOP- 8	67.154 7	0.227 19	0.0003
ce-L- 9	72.580 7	4.0 3	0.0062
ce-K- 21	78.095 20	0.86 11	0.0014

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
ce-K- 22	79.295 20	1.57 17	0.0027
ce-K- 23	79.915 20	1.08 13	0.0018
ce-K- 25	81.605 20	0.42 6	0.0007
ce-M- 9	81.860 7	0.94 6	0.0016
ce-K- 26	82.903 7	0.88 8	0.0016
ce-NOP- 9	84.085 7	0.280 19	0.0005
ce-K- 27	84.425 20	0.23 9	0.0004
ce-K- 28	86.858 7	0.73 4	0.0013
ce-L- 10	88.004 7	34 3	0.0629
ce-K- 29	90.585 20	0.19 6	0.0004
ce-L- 11	95.050 20	1.40 12	0.0028
ce-L- 12	96.450 20	0.53 8	0.0011
ce-M- 10	97.284 7	8.4 7	0.0175
ce-NOP-10	99.509 7	2.47 20	0.0052
ce-K- 30	99.645 20	10.5 3	0.0222
ce-L- 15	101.569 7	2.38 17	0.0051
ce-K- 31	103.355 20	2.84 13	0.0062
ce-M- 11	104.330 20	0.34 3	0.0008
ce-MNO-12	105.730 20	0.163 22	0.0004
ce-NOP-11	106.555 20	0.101 9	0.0002
ce-K- 32	108.915 20	0.154 12	0.0004
ce-K- 33	109.865 7	1.52 16	0.0036
ce-M- 15	110.849 7	0.56 4	0.0013
ce-NOP-15	113.074 7	0.168 12	0.0004
ce-L- 17	118.700 20	2.66 24	0.0067
ce-L- 18	119.220 20	0.107 4	0.0003
ce-K- 36	120.075 20	0.17 12	0.0004
ce-L- 19	121.670 20	0.76 3	0.0020
ce-K- 37	121.835 20	4.92 12	0.0128
ce-M- 17	127.980 20	0.62 6	0.0017
ce-K- 38	128.823 7	0.71 4	0.0019
ce-NOP-17	130.205 20	0.188 17	0.0005
ce-MNO-19	130.950 20	0.229 9	0.0006
ce-L- 21	135.520 20	0.25 3	0.0007
ce-L- 22	136.720 20	0.48 5	0.0014
ce-L- 23	137.340 20	0.190 22	0.0006
ce-K- 41	138.695 20	0.229 20	0.0007
ce-L- 25	139.030 20	0.105 12	0.0003
ce-K- 42	139.895 20	0.16 9	0.0005
ce-L- 26	140.328 7	0.146 14	0.0004
ce-L- 28	144.283 7	0.119 6	0.0004
ce-K- 43	144.775 20	0.49 5	0.0015
ce-MNO-22	146.000 20	0.149 14	0.0005
ce-K- 44	146.195 20	0.104 10	0.0003
ce-K- 45	147.995 20	0.135 10	0.0004
ce-K- 46	152.095 20	0.250 19	0.0008
ce-K- 47	152.578 7	0.34 4	0.0011
ce-K- 48	156.645 20	1.25 6	0.0042
ce-L- 30	157.070 20	1.70 5	0.0057
ce-K- 49	159.791 8	2.95 12	0.0100
ce-L- 31	160.780 20	0.488 22	0.0017
ce-M- 30	166.350 20	0.387 11	0.0014
ce-L- 33	167.290 7	0.42 3	0.0015
ce-NOP-30	168.575 20	0.117 4	0.0004
ce-MNO-31	170.060 20	0.145 10	0.0005
ce-MNO-33	176.570 7	0.131 9	0.0005
ce-K- 50	177.925 20	0.47 4	0.0018
ce-L- 37	179.260 20	0.78 3	0.0030
ce-L- 38	186.248 7	0.453 24	0.0018
ce-K- 51	186.905 20	2.88 15	0.0115
ce-MNO-37	188.540 20	0.232 6	0.0009
ce-K- 52	194.544 8	0.303 13	0.0013
ce-MNO-38	195.528 7	0.145 7	0.0006
ce-K- 53	206.755 20	0.644 25	0.0028
ce-K- 54	211.895 20	0.394 17	0.0018
ce-L- 48	214.070 20	0.208 12	0.0009
ce-K- 55	217.055 20	0.487 23	0.0023
ce-L- 49	217.216 8	1.53 6	0.0071
ce-M- 49	226.496 8	0.378 15	0.0018
ce-NOP-49	228.721 8	0.110 5	0.0005
ce-K- 58	230.955 20	0.31 8	0.0015
ce-L- 50	235.350 20	0.221 18	0.0011

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
ce-L- 51	244.330 20	0.453 24	0.0024
ce-L- 52	251.969 8	0.132 6	0.0007
ce-MNO-51	253.610 20	0.134 6	0.0007
ce-L- 53	264.180 20	0.265 11	0.0015
ce-L- 54	269.320 20	0.159 7	0.0009
ce-K- 61	269.545 20	0.233 10	0.0013
ce-L- 55	274.480 20	0.193 9	0.0011
ce-K- 64	281.545 20	0.394 14	0.0024
ce-L- 64	338.970 20	0.126 5	0.0009
X-ray L	8.4	71 8	0.0128
γ 3	31.737 7	0.43 5	0.0003
γ 4	39.100 20	0.30 7	0.0002
γ 5	42.714 7	0.278 22	0.0003
X-ray $K\alpha_2$	57.9817 5	49.9 16	0.0616
X-ray $K\alpha_1$	59.31820 1	86.8 25	0.110
γ 6	60.560 20	0.11 7	0.0001
γ 7	65.721 7	2.6 3	0.0037
X-ray $K\beta$	67.2	36.9 12	0.0528
γ 8	67.749 7	22.0 18	0.0318
γ 9	84.680 7	2.67 18	0.0048
γ 10	100.104 7	14.5 11	0.0310
γ 11	107.150 20	1.37 11	0.0031
γ 12	108.550 20	0.77 7	0.0018
γ 13	110.40 20	0.100	0.0002
γ 14	111.07 5	0.203 18	0.0005
γ 15	113.669 7	4.4 3	0.0106
γ 16	116.417 7	0.49 5	0.0012
γ 17	130.800 20	7.3 7	0.0202
γ 18	131.320 20	0.160	0.0004
γ 19	133.770 20	2.46 7	0.0070
γ 20	145.400 20	0.64 7	0.0020
γ 21	147.620 20	0.88 9	0.0028
γ 22	148.820 20	1.71 13	0.0054
γ 23	149.440 20	0.88 9	0.0028
γ 24	150.25 5	0.49 5	0.0016
γ 25	151.130 20	0.43 5	0.0014
γ 26	152.428 7	8.3 7	0.0271
γ 27	153.950 20	0.24 9	0.0008
γ 28	156.383 7	7.4 3	0.0247
γ 29	160.110 20	0.231 18	0.0008
γ 30	169.170 20	11.7 3	0.0420
γ 31	172.880 20	3.48 15	0.0128
γ 32	178.440 20	2.20 15	0.0084
γ 33	179.390 7	2.93 20	0.0112
γ 34	187.34 5	0.31 4	0.0012
γ 35	188.54 5	0.128 13	0.0005
γ 36	189.600 20	0.38 17	0.0016
γ 37	191.360 20	7.69 18	0.0314
γ 38	198.348 7	4.08 18	0.0172
γ 39	203.330 20	0.45 5	0.0019
γ 40	205.950 20	0.49 7	0.0022
γ 41	208.220 20	0.60 5	0.0027
γ 42	209.420 20	0.47 5	0.0021
γ 43	214.300 20	1.07 9	0.0049
γ 44	215.720 20	0.75 7	0.0034
γ 45	217.520 20	3.18 22	0.0148
γ 46	221.620 20	6.2 5	0.0293
γ 47	222.103 7	8.3 9	0.0394
γ 48	226.170 20	3.25 15	0.0156
γ 49	229.316 8	25.0 7	0.122
γ 50	247.450 20	4.9 4	0.0258
γ 51	256.430 20	10.0 5	0.0549
γ 52	264.069 8	3.76 11	0.0212
γ 53	276.280 20	9.02 22	0.0531
γ 54	281.420 20	5.79 18	0.0347
γ 55	286.580 20	7.5 3	0.0459
γ 56	295.67 10	0.19 7	0.0012
γ 57	300.000 20	1.2 3	0.0078
γ 58	300.480 20	1.6 4	0.0105
γ 59	313.900 20	0.60 5	0.0040
γ 60	323.440 20	1.90 11	0.0131

(Continued)

^{182}Re EC Decay (64.0 h 5) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
γ 61	339.070 20	5.60 16	0.0404
γ 62	342.040 20	1.03 9	0.0075
γ 63	345.400 20	0.47 5	0.0035
γ 64	351.070 20	10.32 18	0.0772
γ 65	357.120 20	0.51 5	0.0039
γ 67	927.99 7	0.36 4	0.0071
γ 68	943.01 20	0.22 4	0.0044
γ 69	959.74 7	0.19 4	0.0040
γ 70	1001.68 7	2.41 9	0.0515
γ 71	1044.43 9	0.278 11	0.0062
γ 72	1076.30 20	10.2 3	0.234
γ 73	1088.20 20	0.192 18	0.0045
γ 74	1113.38 10	4.57 9	0.108
γ 75	1121.28 3	21.37 12	0.510
γ 76	1157.30 20	0.384 2	0.0095
γ 77	1158.10 20	0.855 5	0.0211
γ 78	1180.70 20	0.545 22	0.0137
γ 79	1189.05 4	8.76 22	0.222
γ 80	1221.418 25	16.52 24	0.430
γ 81	1223.9	0.185 1	0.0048
γ 82	1230.97 3	14.4 3	0.378
γ 83	1257.47 5	1.03 5	0.0277
γ 84	1273.75 6	0.92 5	0.0249
γ 86	1289.17 7	0.737 16	0.0202
γ 87	1292.00 20	0.227 22	0.0062
γ 88	1294.20 20	1.58 5	0.0436
γ 89	1331.00 20	0.35 3	0.0100
γ 90	1342.72 6	2.69 7	0.0770
γ 91	1373.80 7	0.288 11	0.0084
γ 92	1387.40 8	0.26 3	0.0076
γ 93	1410.10 10	0.278 15	0.0083
γ 94	1427.30 20	9.45 18	0.287
γ 95	1439.40 20	0.156 11	0.0048

8 weak γ's omitted:
Eγ(avg)= 1073.6; ΣIγ= 0.40%

● ^{183}Re EC Decay (70 d 2) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	6.53	140 8	0.0194
ce-K- 4	13.3930 21	1.34 6	0.0004
ce-K- 5	15.1860 21	5.7 3	0.0018
ce-L- 1	28.8760 11	0.23 6	0.0001
ce-K- 6	29.5540 21	2.45 11	0.0015
ce-L- 2	34.3839 11	52.3 16	0.0383
ce-K- 9	38.4070 21	6.82 23	0.0056
ce-K- 10	40.204 3	8.9 3	0.0076
ce-L- 3	40.4952 21	10.5 5	0.0091
ce-MNO- 2	43.6641 11	16.0 5	0.0148
Auger-K	45.7	5.4 24	0.0052
ce-M- 3	49.7754 21	2.44 10	0.0026
ce-NOP- 3	52.0000 21	0.73 3	0.0008
ce-L- 4	70.8182 21	0.60 3	0.0009
ce-L- 5	72.6112 21	1.00 5	0.0015
ce-K- 12	74.604 5	0.166 8	0.0003
ce-MNO- 4	80.0984 21	0.191 8	0.0003
ce-MNO- 5	81.8914 21	0.299 16	0.0005
ce-L- 6	86.9792 21	6.5 3	0.0121
ce-K- 13	91.004 4	0.180 8	0.0003
ce-K- 14	91.817 5	0.36 5	0.0007
ce-K- 15	92.798 5	21.9 6	0.0432
ce-L- 9	95.8322 21	1.26 5	0.0026
ce-M- 6	96.2594 21	1.64 8	0.0034
ce-L- 10	97.629 3	1.49 6	0.0031
ce-NOP- 6	98.4840 21	0.482 22	0.0010
ce-MNO- 9	105.1124 21	0.379 14	0.0008
ce-M- 10	106.909 3	0.339 13	0.0008
ce-NOP-10	109.134 3	0.104 4	0.0002
ce-K- 16	123.118 6	0.130 6	0.0003
ce-K- 19	139.2870 21	1.38 8	0.0041
ce-L- 13	148.429 4	0.162 7	0.0005
ce-L- 15	150.223 5	4.07 11	0.0130
ce-M- 15	159.503 5	0.94 3	0.0032
ce-NOP-15	161.728 5	0.283 8	0.0010
ce-K- 23	176.5370 21	0.423 17	0.0016
ce-L- 19	196.7122 21	0.241 7	0.0010
ce-K- 24	222.198 7	0.196 8	0.0009
X-ray L	8.4	60 7	0.0107
γ 2	46.4837 10	7.98 21	0.0079
γ 3	52.5950 20	2.22 9	0.0025
X-ray $K\alpha_2$	57.9817 5	34.2 11	0.0423
X-ray $K\alpha_1$	59.31820 1	59.5 17	0.0752
X-ray Kβ	67.2	25.3 8	0.0362
γ 4	82.9180 20	0.254 9	0.0004
γ 5	84.7110 20	0.88 5	0.0016
γ 6	99.0790 20	2.69 9	0.0057
γ 9	107.9320 20	2.18 7	0.0050
γ 10	109.729 3	2.90 10	0.0068
γ 12	144.129 5	0.116 4	0.0004
γ 13	160.529 4	0.590 17	0.0020
γ 14	161.342 5	0.36 5	0.0012
γ 15	162.323 5	23.4 6	0.0808
γ 16	192.643 6	0.257 9	0.0011
γ 18	205.085 7	0.111 5	0.0005
γ 19	208.8120 20	2.98 8	0.0132
γ 20	209.879 13	0.263 10	0.0012
γ 21	244.266 3	0.412 14	0.0021
γ 22	245.239 6	0.26 4	0.0013
γ 23	246.0620 20	1.32 5	0.0069
γ 24	291.723 7	3.17 8	0.0197
γ 25	313.021 5	0.415 15	0.0028
γ 26	353.998 5	0.536 17	0.0040

7 weak γ's omitted:
Eγ(avg)= 254.0; ΣIγ= 0.19%

● ^{184}Re EC Decay (38.0 d 5) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	6.53	81 5	0.0113
ce-K- 1	41.682 7	12.5 7	0.0111
Auger-K	45.7	4.0 18	0.0039
ce-L- 1	99.107 7	24.3 13	0.0514
ce-M- 1	108.387 7	6.1 4	0.0141
ce-NOP- 1	110.612 7	1.80 10	0.0042
ce-K- 7	183.320 10	0.27 3	0.0011
ce-L- 7	240.745 10	0.125 12	0.0006
ce-K- 15	722.542 22	0.223 10	0.0034
ce-K- 17	833.757 19	0.172 8	0.0031
X-ray L	8.4	35 4	0.0062
X-ray $K\alpha_2$	57.9817 5	25.5 10	0.0315
X-ray $K\alpha_1$	59.31820 1	44.3 17	0.0560
X-ray Kβ	67.2	18.8 8	0.0270
γ 1	111.207 7	17.1 8	0.0406
γ 7	252.845 10	3.0 3	0.0162
γ 11	539.220 25	0.327 19	0.0038
γ 12	641.915 20	1.94 6	0.0265
γ 14	769.778 17	0.67 3	0.0109
γ 15	792.067 22	37.5 12	0.632
γ 16	894.760 19	15.6 5	0.297
γ 17	903.282 19	37.9 12	0.729

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 20	1022.63 3	0.52 4	0.0112
γ 23	1275.11 3	0.119 7	0.0032
γ 26	1386.33 3	0.103 6	0.0030

16 weak γ's omitted:
Eγ(avg) = 787.3; ΣIγ = 0.29%

● ^{184}Re EC Decay (169 d 8) I(min) = 0.10%
%EC Decay = 25.3 6
See also ^{184}Re IT Decay (169 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	6.53	41.3 24	0.0057
ce-K- 3	17.927 10	0.106 9	≈0
ce-K- 4	21.745 10	1.06 9	0.0005
ce-K- 5	41.682 7	4.3 4	0.0038
ce-L- 1	43.178 5	8.8 11	0.0081
Auger-K	45.7	1.3 6	0.0013
ce-L- 2	51.615 15	7.5 13	0.0082
ce-M- 1	52.458 5	2.00 24	0.0022
ce-NOP- 1	54.683 5	0.61 8	0.0007
ce-M- 2	60.895 15	1.9 4	0.0024
ce-NOP- 2	63.120 15	0.54 10	0.0007
ce-L- 4	79.170 10	0.42 4	0.0007
ce-MNO- 4	88.450 10	0.132 11	0.0002
ce-K- 9	91.744 15	5.8 4	0.0114
ce-L- 5	99.107 7	8.4 7	0.0177
ce-M- 5	108.387 7	2.11 18	0.0049
ce-NOP- 5	110.612 7	0.62 6	0.0015
ce-K- 10	145.801 12	0.123 9	0.0004
ce-K- 11	147.022 12	1.33 9	0.0042
ce-L- 9	149.169 15	1.25 8	0.0040
ce-MNO- 9	158.449 15	0.379 25	0.0013
ce-K- 14	183.320 10	0.99 7	0.0039
ce-L- 11	204.447 12	0.74 5	0.0032
ce-MNO-11	213.727 12	0.237 15	0.0011
ce-L- 14	240.745 10	0.45 3	0.0023
ce-K- 15	248.483 10	0.101 6	0.0005
ce-MNO-14	250.025 10	0.143 9	0.0008
X-ray L	8.4	17.7 19	0.0032
γ 1	55.278 5	2.4 3	0.0028
X-ray Kα₂	57.9817 5	8.5 3	0.0105
X-ray Kα₁	59.31820 1	14.8 5	0.0187
γ 2	63.715 15	0.38 7	0.0005
X-ray Kβ	67.2	6.29 23	0.0090
γ 3	87.452 10	0.244 19	0.0005
γ 4	91.270 10	0.260 19	0.0005
γ 5	111.207 7	5.9 5	0.0140
γ 6	124.060 20	0.152 12	0.0004
γ 9	161.269 15	6.6 4	0.0228
γ 10	215.326 12	2.84 18	0.0130
γ 11	216.547 12	9.6 6	0.0444
γ 12	226.748 10	1.51 10	0.0073
γ 14	252.845 10	10.9 7	0.0588
γ 15	318.008 10	5.9 4	0.0398
γ 17	384.250 12	3.20 19	0.0262
γ 18	536.674 15	3.37 20	0.0386
γ 20	641.915 20	0.352 23	0.0048
γ 21	769.778 17	0.240 21	0.0039
γ 22	792.067 22	3.77 23	0.0637
γ 23	857.25 3	0.166 11	0.0030
γ 24	894.760 19	2.81 19	0.0536
γ 25	903.282 19	3.82 23	0.0734
γ 26	920.933 21	8.3 5	0.163
γ 28	1022.63 3	0.184 19	0.0040
γ 29	1110.08 3	0.60 5	0.0141
γ 30	1173.77 3	1.24 10	0.0310

7 weak γ's omitted:
Eγ(avg) = 647.4; ΣIγ = 0.27%

● ^{184}Re IT Decay (169 d 8) I(min) = 0.10%
%IT Decay = 74.7 6
Feeds ^{184}Re (38.0 d)
See also ^{184}Re EC Decay (169 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	6.7	70 4	0.0100
ce-K- 1	11.60 4	1.41 6	0.0003
ce-K- 2	33.053 7	49.5 25	0.0349
Auger-K	47	2.1 10	0.0021
ce-L- 1	70.75 4	50.4 20	0.0759
ce-M- 1	80.35 4	16.8 7	0.0287
ce-NOP- 1	82.65 4	5.50 22	0.0097
ce-L- 2	92.202 7	9.1 4	0.0179
ce-M- 2	101.797 7	2.11 9	0.0046
ce-NOP- 2	104.104 7	0.65 3	0.0014
X-ray L	8.65	31 4	0.0058
X-ray Kα₂	59.7179 6	14.1 8	0.0179
X-ray Kα₁	61.1403 6	24.4 13	0.0318
X-ray Kβ	69.3	10.4 6	0.0154
γ 2	104.729 7	13.3 6	0.0296

● ^{185}W β^- Decay (75.1 d 3) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β− 1 max	432.4 10		
avg	126.8 4	99.921 9	0.270

1 weak β's omitted:
Eβ(avg) = 96.9; ΣIβ = 0.08%

1 weak γ's omitted:
Eγ(avg) = 125.4; ΣIγ = 0.02%

● ^{185}Os EC Decay (93.6 d 5) I(min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	6.7	57 4	0.0082
Auger-K	47	3.1 14	0.0031
ce-K- 2	53.682 3	0.781 11	0.0009
ce-L- 1	58.7863 21	0.5 3	0.0006
ce-MNO- 1	68.3813 21	0.15 8	0.0002
ce-K- 3	91.176 7	0.611 10	0.0012
ce-L- 2	112.831 3	0.133 2	0.0003
ce-K- 4	162.481 9	0.152 3	0.0005
ce-K- 6	574.440 9	0.757 24	0.0093
ce-L- 6	633.589 9	0.157 5	0.0021
X-ray L	8.65	26 3	0.0047
X-ray Kα₂	59.7179 6	21.0 6	0.0267
X-ray Kα₁	61.1403 6	36.4 9	0.0474
X-ray Kβ	69.3	15.5 5	0.0229
γ 1	71.3130 20	0.25 13	0.0004
γ 2	125.358 3	0.346 5	0.0009
γ 3	162.852 7	0.556 8	0.0019
γ 4	234.157 9	0.412 7	0.0021
γ 5	592.066 10	1.315 14	0.0166
γ 6	646.116 9	80.2 7	1.10
γ 7	717.424 12	4.08 4	0.0624
γ 11	874.813 13	6.54 7	0.122
γ 12	880.272 19	4.95 5	0.0928

4 weak γ's omitted:
Eγ(avg) = 910.0; ΣIγ = 0.06%

• ^{186}Re EC Decay (90.64 h 9) I (min) = 0.10%

%EC Decay = 6.8 20

See also ^{186}Re β^- Decay (90.64 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	6.53	4.5 11	0.0006
Auger-K	45.7	0.25 14	0.0002
ce-K- 1	52.77 10	0.42 14	0.0005
ce-L- 1	110.20 10	0.64 22	0.0015
ce-MNO- 1	119.48 10	0.21 7	0.0005
X-ray L	8.4	1.9 5	0.0003
X-ray Kα$_2$	57.9817 5	1.6 5	0.0020
X-ray Kα$_1$	59.31820 1	2.8 9	0.0035
X-ray Kβ	67.2	1.2 4	0.0017
γ 1	122.30 10	0.70 23	0.0018

• ^{186}Re β^- Decay (90.64 h 9) I (min) = 0.10%

%β^- Decay = 93.2 20

Feeds ^{186}Os

See also ^{186}Re EC Decay (90.64 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	6.88	6.5 8	0.0009
Auger-K	48.3	0.16 8	0.0002
ce-K- 1	63.286 8	4.2 7	0.0056
ce-L- 1	124.189 8	6.1 10	0.0161
ce-M- 1	134.108 8	1.54 25	0.0044
ce-NOP- 1	136.503 8	0.47 8	0.0014
β- 1 max	939.4 18		
avg	308.8 7	22 4	0.145
β- 2 max	1076.6 18		
avg	362.0 7	71 4	0.547
total β-			
avg	349.3 7	93 6	0.692

2 weak β's omitted:
Eβ(avg) = 87.1; ΣIβ = 0.06%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	9	3.0 5	0.0006
X-ray Kα$_2$	61.4867 7	1.16 19	0.0015
X-ray Kα$_1$	63.0005 7	2.0 4	0.0027
X-ray Kβ	71.4	0.86 14	0.0013
γ 1	137.157 8	9.5 15	0.0278

5 weak γ's omitted:
Eγ(avg) = 702.2; ΣIγ = 0.06%

• ^{186}Os α Decay (2.0E15 y 11) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
α 1	2756 3	100	5.87

• ^{187}W β^- Decay (23.83 h 9) I (min) = 0.10%

Feeds ^{187}Re

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
ce-K- 7	0.384 10	8.7 5	≈0
ce-MNO- 1	4.1683 4	3.5 6	0.0003
Auger-L	6.7	19.3 13	0.0028
ce-L- 3	16.70 3	0.107 25	≈0
ce-L- 4	23.70 6	0.42 8	0.0002
ce-L- 6	31.13 6	0.13 14	≈0
ce-MNO- 4	33.30 6	0.134 25	≈0
ce-K- 12	42.074 20	0.251 15	0.0002
Auger-K	47	1.1 5	0.0011
ce-L- 7	59.533 10	1.67 10	0.0021
ce-K- 14	62.544 10	17.6 9	0.0234
ce-MNO- 7	69.128 10	0.49 3	0.0007
ce-L- 14	121.693 10	2.99 13	0.0077
ce-M- 14	131.288 10	0.69 3	0.0019
ce-NOP-14	133.595 10	0.210 9	0.0006
ce-K- 19	134.61 3	0.396 22	0.0011
ce-K- 28	407.854 10	0.427 22	0.0037
ce-L- 28	467.003 10	0.109 6	0.0011
ce-K- 39	546.694 10	0.17 3	0.0020
β- 1 max	433.1 18		
avg	127.0 6	0.484 20	0.0013
β- 2 max	448.0 18		
avg	131.9 6	0.67 3	0.0019
β- 3 max	495.9 18		
avg	148.0 7	0.20 18	0.0006
β- 4 max	539.6 18		
avg	163.0 7	4.3 3	0.0149
β- 5 max	626.7 18		
avg	193.5 7	58.7 23	0.242
β- 6 max	687.0 18		
avg	215.1 7	5.5 6	0.0252
β- 7 max	694.1 18		
avg	217.6 7	3.5 6	0.0162
β- 8 max	800.7 18		
avg	256.8 7	0.10 4	0.0005
β- 9 max	1178.3 18		
avg	401.7 7	2.3 9	0.0197
β-10 max	1312.5 18		
avg	457.1 8	25.1 24	0.244
total β-			
avg	263.8 9	101 4	0.567

7 weak β's omitted:
Eβ(avg) = 55.7; ΣIβ = 0.02%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	8.65	8.7 10	0.0016
X-ray Kα$_2$	59.7179 6	7.6 4	0.0097
X-ray Kα$_1$	61.1403 6	13.2 6	0.0172
X-ray Kβ	69.3	5.6 3	0.0083
γ 7	72.060 10	11.9 5	0.0183
γ 14	134.220 10	9.5 4	0.0270
γ 19	206.29 3	0.152 8	0.0007
γ 22	246.180 10	0.127 7	0.0007
γ 28	479.530 10	23.4 10	0.239
γ 31	511.760 10	0.69 3	0.0075
γ 32	551.550 10	5.44 23	0.0639
γ 37	589.09 3	0.130 6	0.0016
γ 39	618.370 10	6.7 3	0.0884
γ 40	625.520 10	1.16 5	0.0155
γ 44	685.810 10	29.2 13	0.426
γ 46	745.210 20	0.318 14	0.0051
γ 48	772.870 20	4.40 19	0.0725
γ 53	864.550 10	0.359 16	0.0066
γ 54	879.43 5	0.151 7	0.0028

44 weak γ's omitted:
Eγ(avg) = 276.2; ΣIγ = 0.42%

• ^{187}Re β^- Decay (4.7E10 y 8) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	2.64 4		
avg	0.661 10	100	0.0014

● ^{188}W β^- Decay (69.4 d 5) I (min) = 0.10%
Feeds ^{188}Re

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	6.7	0.20 4	≈0
ce-L- 1	51.056 3	0.29 5	0.0003
β- 1 max	58 3		
avg	14.9 8	0.84 5	0.0003
β- 2 max	285 3		
avg	89.9 10	0.14 8	0.0003
β- 3 max	349 3		
avg	99.7 10	99.01 9	0.210
total β-			
avg	99.0 11	100.00 13	0.211
γ 1	63.583 3	0.108 17	0.0001
γ 5	227.082 7	0.220 13	0.0011
γ 6	290.669 13	0.399 23	0.0025

3 weak γ's omitted:
Eγ(avg) = 165.2; ΣIγ = 0.02%

● ^{188}Re β^- Decay (16.98 h 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	6.88	6.5 5	0.0010
Auger-K	48.3	0.19 9	0.0002
ce-K- 1	81.159 10	4.9 3	0.0085
ce-L- 1	142.062 10	5.6 4	0.0168
ce-M- 1	151.981 10	1.41 9	0.0046
ce-NOP- 1	154.376 10	0.422 25	0.0014
β- 1 max	178.6 9		
avg	48.1 3	0.108 7	0.0001
β- 2 max	354.3 9		
avg	101.3 3	0.187 10	0.0004
β- 3 max	657.2 9		
avg	204.0 4	0.52 3	0.0023
β- 4 max	1033.4 9		
avg	345.1 4	0.64 3	0.0047
β- 5 max	1486.7 9		
avg	527.5 4	1.61 14	0.0181
β- 6 max	1964.7 9		
avg	728.6 4	25.3 13	0.393
β- 7 max	2119.7 9		
avg	795.1 4	71.4 15	1.21
total β-			
avg	764.2 5	100.0 20	1.63

10 weak β's omitted:
Eβ(avg) = 141.1; ΣIβ = 0.26%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	9	3.1 4	0.0006
X-ray $K\alpha_2$	61.4867 7	1.36 9	0.0018
X-ray $K\alpha_1$	63.0005 7	2.35 15	0.0032
X-ray Kβ	71.4	1.01 7	0.0015
γ 1	155.030 10	15.0 8	0.0494
γ 5	477.96 3	1.04 6	0.0106
γ 10	633.1 3	1.26 13	0.0169
γ 11	635.0 5	0.15 5	0.0020
γ 12	672.51 3	0.111 6	0.0016
γ 15	829.51 3	0.411 22	0.0073
γ 17	931.32 3	0.565 25	0.0112

35 weak γ's omitted:
Eγ(avg) = 1133.6; ΣIγ = 0.72%

● ^{190}Os IT Decay (9.9 m 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	6.88	71 4	0.0104
ce-L- 1	25.9320 4	74.2 6	0.0410
ce-MNO- 1	35.8515 4	25.8 6	0.0197
Auger-K	48.3	0.8 4	0.0008
ce-K- 2	112.85 3	14.3 4	0.0344
ce-L- 2	173.76 3	11.7 3	0.0433
ce-M- 2	183.68 3	2.93 9	0.0115
ce-NOP- 2	186.07 3	0.88 3	0.0035
ce-K- 3	287.22 5	3.54 10	0.0217
ce-L- 3	348.12 5	1.20 4	0.0089
ce-MNO- 3	358.04 5	0.382 11	0.0029
ce-K- 4	428.68 8	1.66 5	0.0152
ce-L- 4	489.58 8	0.421 13	0.0044
ce-MNO- 4	499.50 8	0.139 4	0.0015
ce-K- 5	542.21 14	1.07 3	0.0124
ce-L- 5	603.11 14	0.235 7	0.0039
X-ray L	9	33 4	0.0064
X-ray $K\alpha_2$	61.4867 7	5.70 18	0.0075
X-ray $K\alpha_1$	63.0005 7	9.8 3	0.0132
X-ray Kβ	71.4	4.23 14	0.0064
γ 2	186.725 25	70.2 6	0.279
γ 3	361.09 5	94.88 14	0.730
γ 4	502.55 8	97.78 7	1.05
γ 5	616.08 14	98.62 4	1.29

1 weak γ's omitted:
Eγ(avg) = 38.9; ΣIγ = 0.10%

● ^{190}Ir EC Decay (11.78 d 10) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	6.88	69 12	0.0101
ce-K- 1	24.06 15	0.27 21	0.0001
Auger-K	48.3	3.5 17	0.0036
ce-L- 1	84.96 15	0.17 11	0.0003
ce-K- 2	112.85 3	10.1 6	0.0244
ce-K- 4	122.98 15	1.4 6	0.0037
ce-K- 5	124.21 20	0.33 5	0.0009
ce-K- 7	134.04 6	0.12 9	0.0004
ce-K- 8	134.04 6	0.176 25	0.0005
ce-K- 9	149.94 5	0.147 10	0.0005
ce-L- 2	173.76 3	8.2 5	0.0305
ce-M- 2	183.68 3	2.08 12	0.0081
ce-L- 4	183.88 15	0.40 5	0.0016
ce-L- 5	185.11 20	0.24 3	0.0009
ce-NOP- 2	186.07 3	0.62 4	0.0025
ce-MNO- 4	193.80 15	0.125 15	0.0005
ce-L- 8	194.94 6	0.119 17	0.0005
ce-K- 14	214.35 10	0.25 15	0.0011
ce-K- 15	220.88 12	0.38 4	0.0018
ce-L- 15	281.78 12	0.163 17	0.0010
ce-K- 16	287.22 5	0.460 24	0.0028
ce-K- 17	297.37 5	0.780 24	0.0049
ce-K- 20	323.49 6	0.183 10	0.0013
ce-K- 21	333.35 6	0.144 25	0.0010
ce-K- 22	333.35 6	0.84 17	0.0060
ce-L- 16	348.12 5	0.157 8	0.0012
ce-L- 17	358.27 5	0.251 11	0.0019
ce-L- 22	394.25 6	0.211 22	0.0018
ce-K- 31	444.68 7	0.191 11	0.0018
ce-K- 32	484.11 6	0.382 20	0.0039
ce-K- 33	495.43 7	0.354 16	0.0037
ce-K- 34	531.27 7	0.427 23	0.0048

1 weak β's omitted:
Eβ(avg) = 370.0; ΣIβ = 0.03%

(Continued)

^{190}Ir EC Decay (11.78 d 10) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	9	32 6	0.0061
X-ray $K\alpha_2$	61.4867 7	25 4	0.0324
X-ray $K\alpha_1$	63.0005 7	43 7	0.0573
X-ray Kβ	71.4	18 3	0.0279
γ 2	186.725 25	49.7 24	0.198
γ 3	190.52 20	0.127 24	0.0005
γ 4	196.85 15	3.2 4	0.0136
γ 5	198.08 20	1.84 23	0.0077
γ 6	199.3 3	0.22 7	0.0009
γ 7	207.91 6	0.32 11	0.0014
γ 8	207.91 6	1.12 16	0.0050
γ 9	223.81 5	3.54 20	0.0169
γ 10	235.50 12	0.40 4	0.0020
γ 12	248.2 3	0.114 20	0.0006
γ 13	282.93 6	0.45 9	0.0027
γ 14	288.22 10	1.56 14	0.0095
γ 15	294.75 12	6.2 6	0.0386
γ 16	361.09 5	12.3 5	0.0949
γ 17	371.24 5	21.6 6	0.171
γ 18	380.03 12	1.92 11	0.0156
γ 20	397.36 6	6.2 3	0.0525
γ 21	407.22 6	4.3 7	0.0375
γ 22	407.22 6	22.7 13	0.197
γ 23	420.63 12	1.56 8	0.0139
γ 25	431.62 7	2.59 17	0.0238
γ 26	447.81 8	2.42 15	0.0231
γ 27	477.8 3	1.73 20	0.0176
γ 28	485.23 20	0.69 16	0.0071
γ 29	490.76 7	0.74 5	0.0077
γ 30	502.55 8	1.19 8	0.0127
γ 31	518.55 7	32.2 14	0.355
γ 32	557.98 6	28.5 12	0.339
γ 33	569.30 7	27.0 12	0.327
γ 34	605.14 7	37.8 17	0.487
γ 35	615.39 15	0.44 3	0.0058
γ 36	628.4 3	0.71 9	0.0095
γ 37	630.91 16	2.8 4	0.0374
γ 38	631	0.80 22	0.0107
γ 39	656.02 8	1.10 8	0.0154
γ 41	690.04 8	0.27 3	0.0039
γ 43	726.22 8	3.59 15	0.0555
γ 45	740.19 14	0.184 16	0.0029
γ 47	768.57 8	2.10 11	0.0343
γ 48	821.78 14	0.307 22	0.0054
γ 49	828	0.54 13	0.0095
γ 50	828.99 7	3.3 3	0.0580
γ 51	839.14 12	1.08 6	0.0193
γ 52	916.75 25	0.119 14	0.0023
γ 56	1036.05 20	2.29 15	0.0505
γ 58	1133.77 20	0.41 3	0.0098
γ 59	1147.3 3	0.125 14	0.0031
γ 62	1200.24 12	0.417 25	0.0107
γ 63	1324.30 18	0.46 6	0.0129
γ 65	1386.95 12	0.147 12	0.0043
γ 66	1397.24 14	0.143 12	0.0042

16 weak γ's omitted:
Eγ(avg) = 823.7; ΣIγ = 0.79%

● ^{190}Ir IT Decay (1.2 h) I (min) = 0.10%
Feeds ^{190}Ir (11.78 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	7	47.0 22	0.0071
ce-L- 1	12.8815 3	70.2 6	0.0193
ce-MNO- 1	23.1263 7	29.8 6	0.0147
X-ray L	9.18	23.2 22	0.0045

● ^{190}Ir EC Decay (3.2 h 2) I (min) = 0.10%
%EC Decay = 94.9
Feeds ^{190}Os (9.9 m)
See also ^{190}Ir IT Decay (3.2 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	6.88	52 5	0.0077
Auger-K	48.3	2.9 14	0.0030
X-ray L	9	25 3	0.0047
X-ray $K\alpha_2$	61.4867 7	20.5 14	0.0269
X-ray $K\alpha_1$	63.0005 7	35.4 24	0.0475
X-ray Kβ	71.4	15.2 11	0.0231

● ^{190}Ir IT Decay (3.2 h 2) I (min) = 0.10%
%IT Decay = 5.1
Feeds ^{190}Ir (1.2 h)
See also ^{190}Ir EC Decay (3.2 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	7	2.50 12	0.0004
ce-K- 2	72.5890 5	1.10 3	0.0017
ce-L- 2	135.2815 3	2.85 4	0.0082
ce-M- 2	145.5263 7	0.862 21	0.0027
ce-NOP- 2	148.0099 4	0.284 9	0.0009
X-ray L	9.18	1.23 12	0.0002
X-ray $K\alpha_2$	63.2867 7	0.306 10	0.0004
X-ray $K\alpha_1$	64.8956 7	0.527 17	0.0007
X-ray Kβ	73.6	0.227 8	0.0004

2 weak γ's omitted:
Eγ(avg) = 148.7; ΣIγ = 0.01%

● ^{191}Os β^- Decay (15.4 d 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-K- 3	6.287 7	0.17 3	≈0
Auger-L	7	87 5	0.0132
ce-L- 1	28.431 10	71.1 6	0.0431
ce-L- 2	33.63 3	0.311 12	0.0002
ce-MNO- 1	38.676 10	28.9 6	0.0238
ce-MNO- 2	43.88 3	0.105 2	≈0
Auger-K	49.6	2.2 11	0.0023
ce-K- 4	53.289 7	57.5 15	0.0653
ce-L- 3	68.979 7	0.106 19	0.0002
ce-L- 4	115.981 7	12.3 4	0.0305
ce-M- 4	126.226 7	2.93 9	0.0079
ce-NOP- 4	128.710 7	0.909 25	0.0025
β- 1 max	139 3		
avg	36.7 9	100	0.0782
X-ray L	9.18	43 4	0.0084
X-ray $K\alpha_2$	63.2867 7	16.0 6	0.0216
X-ray $K\alpha_1$	64.8956 7	27.6 9	0.0381
X-ray Kβ	73.6	11.9 5	0.0186
γ 4	129.400 7	25.9 6	0.0714

3 weak γ's omitted:
Eγ(avg) = 73.2; ΣIγ = 0.04%

- ^{191}Os IT Decay (13.03 h 21) I (min) = 0.10%
  Feeds ^{191}Os (15.4 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
ce-K- 1	0.509 10	7.2 7	≈0
Auger-L	6.88	49.6 23	0.0073
Auger-K	48.3	0.28 14	0.0003
ce-L- 1	61.412 10	67.0 7	0.0876
ce-MNO- 1	71.331 10	25.8 6	0.0392
X-ray L	9	23.3 22	0.0044
X-ray $K\alpha_2$	61.4867 7	1.99 20	0.0026
X-ray $K\alpha_1$	63.0005 7	3.4 4	0.0046
X-ray Kβ	71.4	1.48 15	0.0023

1 weak γ's omitted:
Eγ(avg) = 74.4; ΣIγ = 0.06%

- ^{191}Pt EC Decay (2.71 d 6) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
ce-K- 4	6.287 7	30 8	0.0040
Auger-L	7	102 11	0.0153
ce-K- 5	9.04 8	0.28 24	≈0
ce-K- 6	20.406 9	19 5	0.0083
ce-L- 1	28.431 10	0.72 19	0.0004
ce-L- 3	36.17 3	0.38 14	0.0003
ce-MNO- 1	38.676 10	0.29 8	0.0002
ce-MNO- 3	46.42 3	0.12 5	0.0001
Auger-K	49.6	5 3	0.0055
ce-K- 7	53.289 7	6.6 17	0.0075
ce-K- 9	64.773 15	0.13 6	0.0002
ce-L- 4	68.979 7	19 5	0.0278
ce-L- 5	71.73 8	0.23 17	0.0003
ce-M- 4	79.224 7	4.7 13	0.0080
ce-NOP- 4	81.708 7	1.4 4	0.0025
ce-L- 6	83.098 9	3.4 9	0.0060
ce-M- 6	93.343 9	0.79 20	0.0016
ce-NOP- 6	95.827 9	0.25 7	0.0005
ce-K- 10	96.079 20	3.7 10	0.0077
ce-K- 11	102.85 3	0.81 23	0.0018
ce-K- 12	111.58 4	0.26 7	0.0006
ce-L- 7	115.981 7	1.4 4	0.0035
ce-M- 7	126.226 7	0.34 9	0.0009
ce-NOP- 7	128.710 7	0.10 3	0.0003
ce-K- 16	143.54 5	0.11 3	0.0003
ce-L- 10	158.771 20	0.61 16	0.0020
ce-L- 11	165.54 3	0.18 5	0.0006
ce-MNO-10	169.016 20	0.18 5	0.0007
ce-K- 21	192.60 8	0.13 4	0.0005
ce-K- 23	275.06 3	0.54 14	0.0032
ce-K- 24	283.77 3	0.88 23	0.0053
ce-K- 28	333.329 20	0.84 22	0.0060
ce-L- 24	346.46 3	0.14 4	0.0010
ce-K- 31	380.36 5	0.24 7	0.0019
ce-L- 28	396.021 20	0.13 4	0.0011
ce-K- 35	462.76 5	0.58 16	0.0057
X-ray L	9.18	50 7	0.0098
X-ray $K\alpha_2$	63.2867 7	38 4	0.0511
X-ray $K\alpha_1$	64.8956 7	65 7	0.0902
X-ray Kβ	73.6	28 3	0.0442
γ 4	82.398 7	5.0 13	0.0088
γ 6	96.517 9	3.4 9	0.0069
γ 7	129.400 7	3.0 8	0.0082
γ 10	172.190 20	3.3 9	0.0123
γ 11	178.96 3	1.0 3	0.0039
γ 12	187.69 4	0.42 11	0.0017
γ 14	208.96 15	0.14 5	0.0006
γ 16	219.65 5	0.82 21	0.0039
γ 17	221.74 8	0.12 4	0.0005
γ 19	223.67 8	0.11 3	0.0005
γ 20	267.92 8	0.78 21	0.0044
γ 21	268.71 8	1.6 5	0.0094
γ 23	351.17 3	3.5 9	0.0259
γ 24	359.88 3	6.0 16	0.0460
γ 28	409.440 20	8.0 20	0.0698
γ 31	456.47 5	3.4 9	0.0327
γ 35	538.87 5	14 4	0.157
γ 36	541.64 10	0.37 10	0.0042
γ 38	576.46 8	0.12 3	0.0014
γ 40	587.95 8	0.14 4	0.0017
γ 42	624.06 6	1.4 4	0.0187

28 weak γ's omitted:
Eγ(avg) = 404.2; ΣIγ = 0.79%

- ^{192}Ir EC Decay (74.02 d 18) I (min) = 0.10%
  %EC Decay = 4.69 10
  See also ^{192}Ir β^- Decay (74.02 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	6.88	3.11 19	0.0005
Auger-K	48.3	0.16 8	0.0002
ce-K- 2	131.9247 5	0.52 3	0.0015
ce-L- 2	192.8275 4	0.365 18	0.0015
ce-MNO- 2	202.7470 4	0.118 5	0.0005
X-ray L	9	1.46 15	0.0003
X-ray $K\alpha_2$	61.4867 7	1.13 4	0.0015
X-ray $K\alpha_1$	63.0005 7	1.96 7	0.0026
X-ray Kβ	71.4	0.84 3	0.0013
γ 1	201.306 7	0.467 22	0.0020
γ 2	205.79549	3.29 13	0.0144
γ 3	283.257 17	0.261 15	0.0016
γ 5	374.476 7	0.73 3	0.0058
γ 7	484.5780 4	3.16 11	0.0326
γ 8	489.06 3	0.398 15	0.0042

3 weak γ's omitted:
Eγ(avg) = 423.1; ΣIγ = 0.08%

- ^{192}Ir β^- Decay (74.02 d 18) I (min) = 0.10%
  %β^- Decay = 95.31 10
  See also ^{192}Ir EC Decay (74.02 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	7.24	7.6 5	0.0012
Auger-K	51	0.35 13	0.0004
ce-K- 1	57.951 3	0.12 5	0.0001
ce-L- 1	122.466 3	0.130 11	0.0003
ce-K- 2	217.5634 8	1.924 14	0.0089
ce-K- 3	230.0621 8	1.790 25	0.0088
ce-K- 4	238.1131 8	4.47 14	0.0226
ce-L- 2	282.0783 5	0.88 3	0.0053
ce-MNO- 2	292.6622 9	0.286 1	0.0018
ce-L- 3	294.5770 5	0.772 5	0.0048
ce-L- 4	302.6280 5	1.95 6	0.0126
ce-MNO- 3	305.1609 10	0.251 1	0.0016
ce-M- 4	313.2119 10	0.484 15	0.0032
ce-NOP- 4	315.7859 7	0.148 5	0.0010
ce-K- 6	389.6767 8	1.02 4	0.0085
ce-L- 6	454.1916 5	0.295 10	0.0028
ce-K- 10	526.0194 9	0.151 7	0.0017

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)

^{192}Ir β^- Decay (74.02 d 18) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	256 4		
avg	70.8 12	5.65 9	0.0085
β- 2 max	536 4		
avg	161.2 14	41.4 3	0.142
β- 3 max	672 4		
avg	208.9 15	48.3 8	0.215
β- 4 max	845 4		
avg	275.9 15	0.40 23	0.0024
total β- avg	180.2 16	95.8 9	0.368

2 weak β's omitted:
Eβ(avg) = 24.9; ΣIβ= 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	9.44	4.1 5	0.0008
X-ray Kα2	65.1220 20	2.63 7	0.0037
X-ray Kα1	66.8320 20	4.52 11	0.0064
X-ray Kβ	75.7	1.97 6	0.0032
γ 1	136.346 3	0.181 9	0.0005
γ 2	295.95825 1	29.02 15	0.183
γ 3	308.45689 1	29.68 13	0.195
γ 4	316.50789 1	82.85 24	0.559
γ 5	416.460 8	0.664 13	0.0059
γ 6	468.0715 3	48.1 8	0.479
γ 8	588.5845 7	4.57 9	0.0573
γ 10	604.4142 5	8.20 25	0.106
γ 11	612.4650 8	5.34 13	0.0696
γ 12	884.514 12	0.302 6	0.0057

5 weak γ's omitted:
Eγ(avg) = 871.7; ΣIγ= 0.10%

• ^{193}Os β^- Decay (30.0 h 3) I (min) = 0.10%

% Feeding to ^{193}Ir (11.9 d) = 0.35 3

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	7	19.4 12	0.0029
ce-K- 4	20.71 3	0.55 6	0.0002
ce-K- 6	30.882 10	2.72 20	0.0018
Auger-K	49.6	0.49 24	0.0005
ce-L- 2	59.593 7	16.4 10	0.0208
ce-K- 8	62.781 7	8.1 6	0.0108
ce-K- 9	66.019 8	0.140 18	0.0002
ce-M- 2	69.838 7	4.07 25	0.0061
ce-NOP- 2	72.322 7	1.23 8	0.0019
ce-L- 4	83.40 3	0.104 11	0.0002
ce-L- 6	93.574 10	0.47 4	0.0009
ce-MNO- 6	103.819 10	0.144 11	0.0003
ce-K- 11	103.92 3	0.14 3	0.0003
ce-K- 12	105.70 3	0.183 21	0.0004
ce-L- 8	125.473 7	1.59 11	0.0042
ce-M- 8	135.718 7	0.37 3	0.0011
ce-NOP- 8	138.202 7	0.116 8	0.0003
ce-K- 19	204.32 3	0.36 3	0.0016
ce-K- 23	245.45 3	0.255 20	0.0013
ce-K- 32	311.35 4	0.149 12	0.0010
ce-K- 38	384.38 3	0.256 14	0.0021

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	392 5		
avg	113.3 17	0.35 4	0.0008
β- 2 max	420 5		
avg	122.4 17	0.55 4	0.0014
β- 3 max	437 5		
avg	128.0 17	0.104 13	0.0003
β- 4 max	573 5		
avg	174.0 18	0.74 7	0.0027
β- 5 max	575 5		
avg	174.7 18	2.43 19	0.0090
β- 6 max	672 5		
avg	208.9 18	8.0 5	0.0356
β- 7 max	770 5		
avg	244.7 19	0.79 7	0.0041
β- 8 max	952 5		
avg	313.0 20	2.02 25	0.0135
β- 9 max	993 5		
avg	328.8 20	12.6 10	0.0882
β-10 max	1059 5		
avg	354.4 20	19.4 14	0.146
β-11 max	1132 5		
avg	383.1 20	53 3	0.432
total β- avg	344.9 21	100 4	0.735

4 weak β's omitted:
Eβ(avg) = 68.1; ΣIβ= 0.04%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	9.18	9.6 10	0.0019
X-ray Kα2	63.2867 7	3.57 19	0.0048
X-ray Kα1	64.8956 7	6.1 3	0.0085
γ 2	73.012 7	3.48 22	0.0054
X-ray Kβ	73.6	2.65 14	0.0042
γ 4	96.82 3	0.100 10	0.0002
γ 6	106.993 10	0.64 5	0.0015
γ 8	138.892 7	4.3 3	0.0128
γ 11	180.03 3	0.184 22	0.0007
γ 12	181.81 3	0.196 23	0.0008
γ 16	219.13 5	0.280 25	0.0013
γ 18	251.62 4	0.220 20	0.0012
γ 19	280.43 3	1.26 9	0.0075
γ 20	288.79 5	0.144 14	0.0009
γ 21	298.83 5	0.188 19	0.0012
γ 23	321.56 3	1.29 9	0.0088
γ 28	361.81 5	0.30 3	0.0023
γ 32	387.46 4	1.28 9	0.0105
γ 36	420.30 5	0.168 15	0.0015
γ 38	460.49 3	4.00 20	0.0392
γ 39	484.25 5	0.172 15	0.0018
γ 47	557.36 8	1.32 14	0.0157
γ 48	559.26 8	0.49 6	0.0059

44 weak γ's omitted:
Eγ(avg) = 400.7; ΣIγ= 0.67%

• ^{193}Ir IT Decay (11.9 d 5) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
ce-K- 1	4.16 4	0.507 15	≈0
Auger-L	7	45.9 21	0.0069
ce-L- 1	66.85 4	68.1 7	0.0970
ce-M- 1	77.10 4	23.5 5	0.0386
ce-NOP- 1	79.58 4	7.93 22	0.0134
X-ray L	9.18	22.6 21	0.0044
X-ray Kα2	63.2867 7	0.141 6	0.0002
X-ray Kα1	64.8956 7	0.242 9	0.0003
X-ray Kβ	73.6	0.105 4	0.0002

• ^{193}Pt EC Decay (50 y 9) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	7	45.8 21	0.0069
X-ray L	9.18	22.6 21	0.0044

● ^{193}Pt IT Decay (4.33 d 3) I (min) = 0.10%
Feeds ^{193}Pt (50 y)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
ce-NOP- 1	0.9200 21100		0.0020
Auger-L	7.24	47 3	0.0072
ce-MNO- 2	9.338 8	99.260 20	0.0197
Auger-K	51	0.57 21	0.0006
ce-K- 3	57.11 3	15.5 4	0.0189
ce-L- 3	121.62 3	59.6 7	0.154
ce-M- 3	132.20 3	18.6 5	0.0524
ce-NOP- 3	134.78 3	6.25 18	0.0179
X-ray L	9.44	25 3	0.0051
γ 2	12.634 8	0.736 22	0.0002
X-ray $K\alpha_2$	65.1220 20	4.31 14	0.0060
X-ray $K\alpha_1$	66.8320 20	7.40 23	0.0105
X-ray Kβ	75.7	3.22 11	0.0052
γ 3	135.50 3	0.114 3	0.0003

● ^{194}Ir β^- Decay (19.15 h 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	7.24	0.60 7	≈0
ce-K- 8	215.146 14	0.169 22	0.0008
ce-K- 11	250.053 14	0.65 9	0.0034
ce-L- 11	314.568 14	0.27 4	0.0018
β− 1 max	453.6 20		
avg	133.4 7	0.34 5	0.0010
β− 2 max	628.9 20		
avg	193.4 7	0.173 22	0.0007
β− 3 max	739.1 20		
avg	233.0 8	0.56 7	0.0028
β− 4 max	771.8 20		
avg	244.9 8	0.62 8	0.0032
β− 5 max	983.8 20		
avg	324.7 8	1.77 22	0.0122
β− 6 max	1328.3 20		
avg	454.0 8	0.30 4	0.0029
β− 7 max	1629.0 20		
avg	583.9 9	1.34 21	0.0167
β− 8 max	1922.6 20		
avg	707.2 9	9.2 12	0.139
β− 9 max	2251.0 20		
avg	847.5 9	85.4 19	1.54
total β− avg	807.8 10	100.0 23	1.72

15 weak β's omitted:
Eβ(avg) = 123.5; ΣIβ = 0.29%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	9.44	0.32 5	≈0
X-ray $K\alpha_2$	65.1220 20	0.227 25	0.0003
X-ray $K\alpha_1$	66.8320 20	0.39 5	0.0006
X-ray Kβ	75.7	0.169 19	0.0003
γ 8	293.541 14	2.6 4	0.0160
γ 9	300.741 14	0.35 5	0.0022
γ 11	328.448 14	13.1 17	0.0916
γ 17	589.179 17	0.140 18	0.0018
γ 21	621.971 19	0.34 5	0.0044
γ 22	645.146 20	1.17 15	0.0161
γ 32	938.71 3	0.60 8	0.0120
γ 39	1150.78 5	0.60 8	0.0146
γ 42	1183.52 5	0.30 4	0.0077
γ 56	1468.89 5	0.191 25	0.0060

76 weak γ's omitted:
Eγ(avg) = 1092.6; ΣIγ = 0.88%

● ^{194}Ir β^- Decay (171 d 11) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	7.24	22.8 16	0.0035
ce-K- 1	33.3 5	5.6 3	0.0039
Auger-K	51	0.64 23	0.0007
ce-L- 1	97.8 5	16.9 10	0.0352
ce-M- 1	108.4 5	4.37 24	0.0101
ce-K- 3	110.7152 7	0.32 6	0.0007
ce-NOP- 1	111.0 5	1.34 8	0.0032
ce-L- 3	175.2301 4	0.29 6	0.0011
ce-K- 6	250.053 14	4.58 13	0.0244
ce-K- 7	260.4 5	2.51 16	0.0139
ce-K- 8	312.4 5	0.414 25	0.0028
ce-L- 6	314.568 14	1.90 6	0.0127
ce-L- 7	324.9 5	1.01 7	0.0070
ce-M- 6	325.152 14	0.473 14	0.0033
ce-NOP- 6	327.726 14	0.145 4	0.0010
ce-MNO- 7	335.5 5	0.326 18	0.0023
ce-K- 10	404.46 3	1.93 12	0.0166
ce-L- 10	468.98 3	0.54 4	0.0054
ce-MNO-10	479.56 3	0.172 9	0.0018
ce-K- 11	484.0 5	0.49 3	0.0051
ce-K- 12	484.0 5	0.190 12	0.0020
ce-K- 13	522.1 5	0.77 5	0.0085
ce-L- 11	548.5 5	0.122 7	0.0014
ce-L- 13	586.6 5	0.180 11	0.0023
ce-K- 16	609.4 5	0.55 4	0.0071
ce-L- 16	673.9 5	0.119 7	0.0017
β− 1 max	252.5 22		
avg	69.7 7	100	0.148
X-ray L	9.44	12.3 15	0.0025
X-ray $K\alpha_2$	65.1220 20	4.81 15	0.0067
X-ray $K\alpha_1$	66.8320 20	8.26 23	0.0118
X-ray Kβ	75.7	3.59 12	0.0058
γ 1	111.7 5	8.9 4	0.0212
γ 3	189.1	1.6 3	0.0064
γ 5	324.0 5	2	0.0138
γ 6	328.448 14	92.90 20	0.650
γ 7	338.8 5	55 3	0.397
γ 8	390.8 5	35.1 18	0.292
γ 10	482.86 3	97 5	0.998
γ 11	562.4 5	34.7 17	0.416
γ 12	562.4 5	35.2 18	0.422
γ 13	600.5 5	62 3	0.793
γ 16	687.8 5	59 3	0.864
γ 17	1011.8 5	3.60 20	0.0776

5 weak γ's omitted:
Eγ(avg) = 356.8; ΣIγ = 0.19%

● ^{194}Au EC Decay (39.5 h 5) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	7.24	54 4	0.0084
ce-L- 1	35.7701 4	0.19 6	0.0001
Auger-K	51	3.0 11	0.0033
ce-K- 7	62.1452 7	0.130 15	0.0002
ce-K- 8	73.4352 7	0.100 14	0.0002
ce-K- 10	85.5552 7	0.168 18	0.0003
ce-K- 26	215.146 14	0.74 4	0.0034
ce-K- 29	250.053 14	3.15 11	0.0168
ce-L- 26	279.661 14	0.348 22	0.0021
ce-MNO-26	290.245 14	0.114 7	0.0007
ce-L- 29	314.568 14	1.31 5	0.0088
ce-MNO-29	325.152 14	0.424 7	0.0029

(Continued)

^{194}Au EC Decay (39.5 h 5) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β+ 1 max	1159 15		
avg	535 7	0.64 4	0.0073
β+ 2 max	1487 15		
avg	679 7	1.02 8	0.0148
total β+			
avg	623 7	1.66 9	0.0220
X-ray L	9.44	29 4	0.0059
X-ray Kα$_2$	65.1220 20	22.8 7	0.0316
X-ray Kα$_1$	66.8320 20	39.1 10	0.0556
X-ray Kβ	75.7	17.0 5	0.0274
γ 10	164	0.128 13	0.0004
γ 16	203.01 10	0.34 4	0.0015
γ 24	290.76	0.11 3	0.0007
γ 26	293.541 14	11.2 6	0.0698
γ 27	300.741 14	0.92 8	0.0059
γ 28	318.14 8	0.33 6	0.0022
γ 29	328.448 14	63.8 10	0.446
γ 30	364.867 15	1.54 10	0.0120
γ 33	449.36 7	0.172 13	0.0016
γ 34	482.86 3	1.19 7	0.0122
γ 35	528.76	1.72 3	0.0194
γ 36	530.17 3	0.56 5	0.0063
γ 39	589.179 17	0.264 16	0.0033
γ 40	593.35	0.351 6	0.0044
γ 41	594.291 19	0.166 20	0.0021
γ 42	607.54 8	0.319 20	0.0041
γ 43	621.29 15	0.80 13	0.0106
γ 44	621.971 19	1.47 12	0.0194
γ 45	645.146 20	2.31 12	0.0317
γ 46	668.27 10	0.116 8	0.0017
γ 51	703.54 5	0.45 4	0.0067
γ 52	736.23 15	0.133 11	0.0021
γ 53	810.65 8	0.20 3	0.0034
γ 55	843.89	0.134 20	0.0024
γ 57	855.8	0.11 4	0.0020
γ 60	889.98 4	0.17 5	0.0031
γ 62	925.26 6	0.31 3	0.0060
γ 63	938.71 3	1.19 7	0.0239
γ 64	948.29 4	2.37 13	0.0478
γ 65	1000.12 4	0.22 5	0.0046
γ 68	1038.56 8	0.33 5	0.0072
γ 69	1048.58 5	0.90 6	0.0201
γ 71	1104.06 5	2.16 12	0.0509
γ 72	1119.7 4	0.13 3	0.0032
γ 74	1150.78 5	1.46 9	0.0358
γ 75	1156.61 6	0.45 5	0.0112
γ 76	1175.34 5	2.10 12	0.0525
γ 77	1183.52 5	0.66 7	0.0167
γ 80	1218.76 5	1.19 7	0.0308
γ 82	1291.7	0.11 3	0.0032
γ 83	1293.67 6	0.18 5	0.0049
γ 84	1302.29 8	0.28 4	0.0078
γ 85	1308.15 12	0.16 3	0.0044
γ 87	1339.6 3	0.31 16	0.0087
γ 88	1342.16 6	1.25 11	0.0357
γ 89	1421.65 7	0.34 4	0.0104
γ 90	1431.4 3	0.15 4	0.0047
γ 92	1441.78 14	0.191 20	0.0059
γ 93	1450.23 11	0.338 20	0.0104
γ 94	1463.45 10	0.77 20	0.0239
γ 95	1468.89 5	6.8 4	0.212
γ 97	1487.05 8	0.14 4	0.0044
γ 98	1492.18 13	0.19 3	0.0059
γ 99	1500.5	0.402 21	0.0128
γ 104	1562.8 3	0.33 3	0.0108
γ 106	1592.4	1.1 6	0.0368
γ 107	1593.5	0.6 4	0.0217
γ 108	1595.77 10	1.9 6	0.0629
γ 109	1602.01 10	0.26 4	0.0087
γ 110	1617.73 15	0.22 4	0.0075
γ 111	1622.20 8	0.198 20	0.0068
γ 112	1632.86 15	0.246 17	0.0085
γ 113	1670.72 10	0.181 17	0.0064
γ 114	1675.7 3	0.144 17	0.0051
γ 115	1689.70 20	0.18 3	0.0064
γ 116	1715.23 6	0.71 6	0.0261
γ 118	1735.31 10	0.30 3	0.0111
γ 123	1785.47 7	0.41 5	0.0155
γ 124	1797.31 8	0.61 6	0.0232
γ 125	1803	0.19 6	0.0074
γ 126	1805.75 9	0.19 6	0.0071
γ 129	1829.41 10	0.249 20	0.0097
γ 130	1835.33 7	0.42 3	0.0165
γ 132	1885.9	1.85 20	0.0743
γ 133	1887	1.59 20	0.0641
γ 135	1911.30 15	0.134 13	0.0055
γ 136	1924.18 5	2.11 12	0.0863
γ 137	1958.74 20	0.172 20	0.0072
γ 138	1969.65 7	0.46 3	0.0193
γ 140	2043.67 6	3.83 20	0.167
γ 145	2114.20 14	0.281 10	0.0126
γ 147	2215.5	0.179 13	0.0084
γ 149	2312.01 15	0.177 11	0.0087

70 weak γ's omitted:
Eγ(avg) = 1020.2; ΣIγ = 2.33%
Maximum γ±-intensity = 3.32%

• ^{195}Pt IT Decay (4.02 d 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-L- 1	6.0201 4	0.135 6	≈0
Auger-L	7.24	136 9	0.0209
ce-MNO- 1	16.6040 9	0.104 5	≈0
ce-L- 3	16.996 6	68.6 25	0.0248
ce-K- 4	20.485 20	66 4	0.0286
ce-MNO- 3	27.580 6	21.1 9	0.0124
Auger-K	51	3.0 11	0.0032
ce-K- 5	51.11 20	13.4 6	0.0145
ce-K- 6	51.362 20	1.33 9	0.0015
ce-L- 4	85.000 20	11.6 8	0.0209
ce-M- 4	95.584 20	2.68 15	0.0054
ce-NOP- 4	98.158 20	0.85 5	0.0018
ce-L- 5	115.62 20	60.7 22	0.149
ce-L- 6	115.877 20	2.70 18	0.0067
ce-M- 5	126.20 20	19.0 9	0.0512
ce-M- 6	126.461 20	0.69 5	0.0019
ce-NOP- 5	128.78 20	6.4 3	0.0177
ce-NOP- 6	129.035 20	0.213 14	0.0006
X-ray L	9.44	73 9	0.0147
γ 3	30.876 6	2.27 11	0.0015
X-ray Kα$_2$	65.1220 20	22.4 12	0.0310
X-ray Kα$_1$	66.8320 20	38.3 19	0.0546
X-ray Kβ	75.7	16.7 9	0.0269
γ 4	98.880 20	11.3 7	0.0239
γ 6	129.757 20	2.81 17	0.0078

6 weak γ's omitted:
Eγ(avg) = 174.4; ΣIγ = 0.21%

• ^{195}Au EC Decay (183 d 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	7.24	105 8	0.0162
ce-L- 1	16.996 6	22.6 12	0.0082
ce-K- 2	20.485 20	63 4	0.0274
ce-MNO- 1	27.580 6	6.9 4	0.0041
Auger-K	51	3.9 14	0.0042
ce-K- 3	51.362 20	0.386 19	0.0004
ce-L- 2	85.000 20	11.1 7	0.0201
ce-M- 2	95.584 20	2.56 15	0.0052
ce-NOP- 2	98.158 20	0.81 5	0.0017
ce-L- 3	115.877 20	0.78 4	0.0019
ce-MNO- 3	126.461 20	0.263 10	0.0007
X-ray L	9.44	57 7	0.0114
γ 1	30.876 6	0.75 4	0.0005
X-ray Kα₂	65.1220 20	29.0 14	0.0402
X-ray Kα₁	66.8320 20	49.7 22	0.0707
X-ray Kβ	75.7	21.6 11	0.0349
γ 2	98.880 20	10.9 7	0.0229
γ 3	129.757 20	0.81 3	0.0023

2 weak γ's omitted:
Eγ(avg) = 206.1; ΣIγ = 0.02%

• ^{195}Au IT Decay (30.6 s 2) I (min) = 0.10%
Feeds ^{195}Au (183 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	7.42	62 4	0.0098
ce-L- 1	42.45 3	71.5 6	0.0646
ce-L- 2	47.11 3	1.50 15	0.0015
Auger-K	52.4	0.9 4	0.0010
ce-M- 1	53.38 3	21.2 5	0.0241
ce-NOP- 1	56.04 3	6.81 19	0.0081
ce-M- 2	58.04 3	0.37 4	0.0005
ce-NOP- 2	60.70 3	0.116 12	0.0001
ce-K- 3	119.66 4	0.27 3	0.0007
ce-K- 4	181.03 4	23.5 7	0.0905
ce-L- 3	186.03 4	0.241 25	0.0010
ce-K- 5	237.88 10	0.22 3	0.0011
ce-L- 4	247.40 4	4.41 13	0.0233
ce-M- 4	258.33 4	1.03 3	0.0057
ce-NOP- 4	260.99 4	0.324 10	0.0018
ce-L- 5	304.25 10	0.139 20	0.0009
X-ray L	9.7	35 4	0.0072
γ 2	61.46 3	0.163 17	0.0002
X-ray Kα₂	66.9895 8	6.68 25	0.0095
X-ray Kα₁	68.8037 8	11.4 4	0.0167
X-ray Kβ	78	5.00 19	0.0083
γ 3	200.38 4	1.56 15	0.0067
γ 4	261.75 4	68.2 7	0.380

2 weak γ's omitted:
Eγ(avg) = 196.7; ΣIγ = 0.07%

• ^{196}Au EC Decay (6.183 d 10) I (min) = 0.10%
%EC Decay = 93.07 17
See also ^{196}Au β^- Decay (6.183 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	7.24	52 4	0.0080
Auger-K	51	2.9 11	0.0032
ce-K- 2	254.64 5	1.20 3	0.0065
ce-K- 3	277.34 5	3.56 11	0.0210
ce-L- 2	319.15 5	0.459 18	0.0031
ce-MNO- 2	329.73 5	0.148 4	0.0010
ce-L- 3	341.85 5	1.35 4	0.0098
ce-M- 3	352.43 5	0.334 10	0.0025
ce-NOP- 3	355.01 5	0.103 3	0.0008
X-ray L	9.44	28 4	0.0056
X-ray Kα₂	65.1220 20	22.0 5	0.0305
X-ray Kα₁	66.8320 20	37.7 7	0.0537
X-ray Kβ	75.7	16.4 4	0.0265
γ 2	333.03 5	23.1 6	0.164
γ 3	355.73 5	87.72 22	0.665
γ 13	1091.40 20	0.150 7	0.0035

12 weak γ's omitted:
Eγ(avg) = 543.0; ΣIγ = 0.17%

• ^{196}Au β^- Decay (6.183 d 10) I (min) = 0.10%
%β^- Decay = 6.93 17
See also ^{196}Au EC Decay (6.183 d)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-K- 1	342.99 8	0.186 8	0.0014
β- 1 max	258 4		
avg	71.3 12	6.93 17	0.0105
γ 1	426.09 8	6.66 17	0.0604

• ^{197}Pt β^- Decay (18.3 h 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	7.42	37 3	0.0059
Auger-K	52.4	0.12 6	0.0001
ce-L- 1	62.9992 21	54.6 24	0.0732
ce-M- 1	73.9271 21	13.2 6	0.0208
ce-NOP- 1	76.5932 21	4.15 19	0.0068
ce-K- 2	110.70 3	3.3 3	0.0079
ce-L- 2	177.07 3	0.57 5	0.0022
ce-MNO- 2	188.00 3	0.174 15	0.0007
β- 1 max	450.2 6		
avg	132.13 20	7.9 7	0.0222
β- 2 max	641.6 6		
avg	197.67 22	82 4	0.345
β- 3 max	719.0 6		
avg	225.32 22	11 3	0.0509
total β-			
avg	195.43 22	100 5	0.418
X-ray L	9.7	20.8 25	0.0043
X-ray Kα₂	66.9895 8	0.93 9	0.0013
X-ray Kα₁	68.8037 8	1.60 14	0.0023
γ 1	77.3520 20	17.0 7	0.0280
X-ray Kβ	78	0.70 7	0.0012
γ 2	191.42 3	3.5 3	0.0142
γ 3	268.73 3	0.27 4	0.0016

● ^{197}Pt IT Decay (94.4 m 8) I (min) = 0.10%
%IT Decay = 96.7 10
Feeds ^{197}Pt (18.3 h)
See also ^{197}Pt β^- Decay (94.4 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	7.24	90 6	0.0138
ce-L- 1	39.07 5	71.7 10	0.0596
ce-M- 1	49.65 5	18.4 6	0.0194
Auger-K	51	1.8 7	0.0020
ce-NOP- 1	52.23 5	5.59 17	0.0062
ce-K- 2	268.11 20	48.6 9	0.278
ce-L- 2	332.62 20	27.1 7	0.192
ce-M- 2	343.20 20	7.26 22	0.0531
ce-NOP- 2	345.78 20	2.30 8	0.0170
X-ray L	9.44	48 6	0.0097
γ 1	52.95 5	1.07 4	0.0012
X-ray Kα$_2$	65.1220 20	13.5 4	0.0188
X-ray Kα$_1$	66.8320 20	23.2 6	0.0330
X-ray Kβ	75.7	10.1 3	0.0163
γ 2	346.50 20	11.4 4	0.0842

● ^{197}Pt β^- Decay (94.4 m 8) I (min) = 0.10%
%β^- Decay = 3.3 10
See also ^{197}Pt IT Decay (94.4 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	7.42	2.0 5	0.0003
ce-K- 2	49.70 7	0.11 4	0.0001
ce-L- 2	116.07 7	2.2 7	0.0056
ce-M- 2	127.00 7	0.62 19	0.0017
ce-NOP- 2	129.66 7	0.20 6	0.0005
ce-K- 4	198.29 5	0.72 22	0.0031
ce-L- 4	264.66 5	0.13 4	0.0007
β- 1 max	709.1 7		
avg	221.76 23	3.3 10	0.0156
X-ray L	9.7	1.1 3	0.0002
X-ray Kα$_2$	66.9895 8	0.23 7	0.0003
X-ray Kα$_1$	68.8037 8	0.40 11	0.0006
X-ray Kβ	78	0.17 5	0.0003
γ 2	130.42 7	0.11 4	0.0003
γ 4	279.01 5	2.3 8	0.0139

3 weak γ's omitted:
Eγ(avg) = 194.6; ΣIγ = 0.04%

● ^{197}Hg EC Decay (64.14 h 5) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	7.42	89 7	0.0141
Auger-K	52.4	2.7 13	0.0030
ce-L- 1	62.9992 21	59 3	0.0797
ce-M- 1	73.9271 21	14.4 7	0.0227
ce-NOP- 1	76.5932 21	4.51 21	0.0074
ce-K- 2	110.70 3	0.48 5	0.0011
X-ray L	9.7	50 6	0.0104
X-ray Kα$_2$	66.9895 8	20.7 13	0.0295
X-ray Kα$_1$	68.8037 8	35.4 22	0.0518
γ 1	77.3520 20	18.5 8	0.0305
X-ray Kβ	78	15.5 10	0.0257
γ 2	191.42 3	0.50 6	0.0020

1 weak γ's omitted:
Eγ(avg) = 268.7; ΣIγ = 0.04%

● ^{197}Hg EC Decay (23.8 h 1) I (min) = 0.10%
%EC Decay = 7.0 10
See also ^{197}Hg IT Decay (23.8 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	7.42	7.7 8	0.0012
ce-K- 2	49.70 7	0.23 4	0.0002
Auger-K	52.4	0.25 12	0.0003
ce-L- 2	116.07 7	4.8 7	0.0118
ce-M- 2	127.00 7	1.31 20	0.0035
ce-NOP- 2	129.66 7	0.42 7	0.0012
ce-K- 4	198.29 5	1.53 23	0.0065
ce-L- 4	264.66 5	0.27 4	0.0015
X-ray L	9.7	4.3 6	0.0009
X-ray Kα$_2$	66.9895 8	1.91 22	0.0027
X-ray Kα$_1$	68.8037 8	3.3 4	0.0048
X-ray Kβ	78	1.43 17	0.0024
γ 2	130.42 7	0.23 4	0.0006
γ 4	279.01 5	5.0 8	0.0296

3 weak γ's omitted:
Eγ(avg) = 194.6; ΣIγ = 0.10%

● ^{197}Hg IT Decay (23.8 h 1) I (min) = 0.10%
%IT Decay = 93.0 10
Feeds ^{197}Hg (64.14 h)
See also ^{197}Hg β^- Decay (23.8 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	7.6	70 5	0.0113
ce-K- 1	50.78 5	14.3 4	0.0155
Auger-K	53.8	1.2 7	0.0014
ce-K- 2	81.87 7	20.6 6	0.0358
ce-L- 1	119.04 5	33.2 8	0.0842
ce-M- 1	130.32 5	8.6 3	0.0240
ce-NOP- 1	133.08 5	2.72 9	0.0077
ce-L- 2	150.13 7	51.1 9	0.163
ce-M- 2	161.41 7	15.7 4	0.0540
ce-NOP- 2	164.17 7	5.36 16	0.0187
X-ray L	10	43 5	0.0091
X-ray Kα$_2$	68.8950 20	9.8 3	0.0143
X-ray Kα$_1$	70.8190 20	16.6 5	0.0251
X-ray Kβ	80.3	7.31 24	0.0125
γ 1	133.88 5	34.0 8	0.0971
γ 2	164.97 7	0.274 9	0.0010

● ^{198}Au β^- Decay (2.696 d 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	7.6	2.08 16	0.0003
ce-K- 1	328.7021 9	2.87 9	0.0201
ce-L- 1	396.9651 11	1.02 3	0.0086
ce-MNO- 1	408.2428 12	0.333	0.0029
β- 1 max	284.8 7		
avg	79.41 22	1.32 6	0.0022
β- 2 max	960.7 7		
avg	314.6 3	98.65 14	0.661
total β- avg	311.5 3	99.99 16	0.664

1 weak β's omitted:
Eβ(avg) = 467.2; ΣIβ = 0.03%

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	10	1.27 15	0.0003
X-ray Kα₂	68.8950 20	0.81 4	0.0012
X-ray Kα₁	70.8190 20	1.37 6	0.0021
X-ray Kβ	80.3	0.602 25	0.0010
γ 1	411.80441 1	95.51 12	0.838
γ 2	675.8874 7	1.06 5	0.0153
γ 3	1087.663 24	0.229 20	0.0053

● ^{199}Au β^- Decay (3.139 d 7) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	7.6	21.8 16	0.0035
ce-L- 1	34.986 7	2.92 14	0.0022
ce-MNO- 1	46.263 7	0.91 5	0.0009
Auger-K	53.8	0.6 4	0.0007
ce-K- 2	75.273 7	10.9 5	0.0175
ce-K- 3	125.099 7	6.4 3	0.0171
ce-L- 2	143.536 7	17.0 8	0.0519
ce-M- 2	154.813 7	4.38 19	0.0144
ce-NOP- 2	157.575 7	1.38 6	0.0046
ce-L- 3	193.362 7	1.19 7	0.0049
ce-MNO- 3	204.639 7	0.367 16	0.0016
β- 1 max	244.8 10		
avg	67.3 3	20.5 8	0.0294
β- 2 max	294.6 10		
avg	82.4 3	66.2 20	0.116
β- 3 max	453.0 10		
avg	132.9 4	13 3	0.0368
total β-			
avg	85.9 4	100 4	0.182
X-ray L	10	13.3 15	0.0028
γ 1	49.825 7	0.328 15	0.0003
X-ray Kα₂	68.8950 20	4.84 20	0.0071
X-ray Kα₁	70.8190 20	8.2 4	0.0124
X-ray Kβ	80.3	3.62 15	0.0062
γ 2	158.375 7	36.8 11	0.124
γ 3	208.201 7	8.4 4	0.0370

● ^{200}Tl EC Decay (26.1 h 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	7.6	53 5	0.0086
ce-K- 3	33.41 15	0.49 16	0.0004
Auger-K	53.8	2.9 17	0.0033
ce-K- 4	54.398 20	0.12 10	0.0001
ce-K- 5	57.796 12	0.25 21	0.0003
ce-L- 1	62.018 5	0.24 21	0.0003
ce-K- 9	65.398 6	0.11 10	0.0002
ce-K- 10	68.830 5	0.18 14	0.0003
ce-K- 13	81.442 6	0.21 15	0.0004
ce-K- 25	168.867 7	0.12 8	0.0004
ce-K- 33	206.323 9	0.175 16	0.0008
ce-K- 52	284.840 10	3.41 11	0.0207
ce-L- 52	353.103 10	1.37 5	0.0103
ce-M- 52	364.380 10	0.344 11	0.0027
ce-NOP-52	367.142 10	0.107 4	0.0008
ce-K-104	496.198 17	0.197 12	0.0021
ce-K-152	745.17 4	0.229 13	0.0036
ce-K-169	1122.65 7	0.24 4	0.0057
β+ 1 max	1064 8		
avg	495 4	0.32 3	0.0034

1 weak β's omitted:
Eβ(avg) = 660.0; ΣIβ= 0.05%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	10	33 4	0.0069
X-ray Kα₂	68.8950 20	23.6 9	0.0347
X-ray Kα₁	70.8190 20	40.2 15	0.0606
X-ray Kβ	80.3	17.7 7	0.0302
γ 3	116.51 15	0.11 4	0.0003
γ 5	140.898 12	0.17 7	0.0005
γ 10	151.932 5	0.15 4	0.0005
γ 13	164.544 6	0.21 4	0.0007
γ 25	251.969 7	0.38 6	0.0021
γ 33	289.425 9	0.52 5	0.0032
γ 38	309.209 8	0.26 4	0.0017
γ 52	367.942 10	87.3 5	0.684
γ 56	387.345 9	0.16 3	0.0013
γ 80	476.815 13	0.32 4	0.0033
γ 93	521.41 7	0.25 4	0.0028
γ 104	579.300 17	13.8 7	0.170
γ 106	591.66 3	0.29 6	0.0036
γ 111	612.12 3	0.24 4	0.0032
γ 114	628.80 3	1.00 8	0.0134
γ 124	661.36 3	2.28 13	0.0321
γ 125	688.94 3	0.11 4	0.0017
γ 130	701.56 3	1.29 10	0.0193
γ 133	711.70 5	0.27 4	0.0041
γ 146	783.71 4	0.57 18	0.0095
γ 147	787.10 4	1.03 18	0.0173
γ 152	828.27 4	10.8 7	0.191
γ 155	886.20 4	2.03 13	0.0382
γ 156	898.56 7	0.62 5	0.0119
γ 164	1147.20 8	0.12 4	0.0030
γ 165	1167.1 3	0.10 4	0.0026
γ 166	1180.5 3	0.11 4	0.0029
γ 168	1202.35 7	0.11 3	0.0029
γ 169	1205.75 7	29.9 18	0.769
γ 170	1225.44 8	3.36 21	0.0877
γ 171	1254.14 10	0.93 7	0.0250
γ 172	1262.96 8	0.79 7	0.0211
γ 174	1273.52 10	3.32 21	0.0900
γ 175	1291.11 11	0.60 6	0.0166
γ 177	1350.35 16	0.148 14	0.0043
γ 178	1363.20 20	3.4 4	0.0989
γ 179	1366.8 7	0.9 3	0.0254
γ 181	1407.64 11	1.45 14	0.0435
γ 182	1477.78 14	0.152 14	0.0048
γ 183	1514.90 10	4.0 3	0.130
γ 185	1570.45 15	0.27 5	0.0091
γ 188	1604.50 14	1.17 10	0.0400
γ 191	1718.35 14	0.33 3	0.0121
γ 193	1759.15 14	0.18 4	0.0069
γ 198	1906.30 18	0.114 10	0.0046

164 weak γ's omitted:
Eγ(avg) = 771.5; ΣIγ= 3.12%
Maximum γ±-intensity = 0.75%

● ^{201}Tl EC Decay (73.06 h 22) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-NOP- 1	0.770 20	11.3 12	0.0002
Auger-L	7.6	73 6	0.0117
ce-L- 2	15.76 3	8.1 9	0.0027
ce-L- 3	17.35 3	7.0 8	0.0026
ce-MNO- 2	27.04 3	2.5 3	0.0015
ce-MNO- 3	28.63 3	2.17 23	0.0013
ce-K- 4	52.24 4	7.5 6	0.0083
Auger-K	53.8	3.3 20	0.0038
ce-K- 5	82.78 7	0.240 24	0.0004
ce-K- 6	84.33 7	15.4 8	0.0277
ce-L- 4	120.50 4	1.27 9	0.0033
ce-MNO- 4	131.78 4	0.39 3	0.0011

(Continued)

^{201}Tl EC Decay (73.06 h 22) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
ce-L- 6	152.59 7	2.62 14	0.0085
ce-M- 6	163.87 7	0.61 3	0.0021
ce-NOP- 6	166.63 7	0.196 10	0.0007
X-ray L	10	44 5	0.0095
γ 2	30.60 3	0.220 23	0.0001
γ 3	32.19 3	0.220 23	0.0002
X-ray $K\alpha_2$	68.8950 20	27.4 12	0.0401
X-ray $K\alpha_1$	70.8190 20	46.5 19	0.0702
X-ray $K\beta$	80.3	20.5 9	0.0350
γ 4	135.34 4	2.65 19	0.0076
γ 5	165.88 7	0.160 13	0.0006
γ 6	167.43 7	10.0 5	0.0357

• ^{202}Tl EC Decay (12.23 d 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	7.6	51 4	0.0083
Auger-K	53.8	2.8 17	0.0032
ce-K- 1	356.458 10	2.38 8	0.0181
ce-L- 1	424.721 10	0.79 3	0.0071
ce-MNO- 1	435.998 10	0.256 3	0.0024
X-ray L	10	31 4	0.0067
X-ray $K\alpha_2$	68.8950 20	22.8 7	0.0335
X-ray $K\alpha_1$	70.8190 20	38.8 11	0.0586
X-ray $K\beta$	80.3	17.1 6	0.0292
γ 1	439.560 10	91.5 10	0.857
γ 2	520.13 7	0.9 3	0.0101
γ 3	959.7 4	0.12 3	0.0024

• ^{203}Hg β^- Decay (46.60 d 5) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	7.78	10.8 9	0.0018
Auger-K	55.2	0.6 3	0.0007
ce-K- 1	193.659 5	16.9 8	0.0697
ce-L- 1	263.842 5	4.35 13	0.0244
ce-M- 1	275.485 5	1.06 3	0.0062
ce-NOP- 1	278.343 5	0.340 10	0.0020
β^- 1 max	212.2 20		
avg	57.7 6	100	0.123
X-ray L	10.3	7.2 8	0.0016
X-ray $K\alpha_2$	70.8319 9	4.75 25	0.0072
X-ray $K\alpha_1$	72.8715 9	8.0 4	0.0125
X-ray $K\beta$	82.6	3.55 19	0.0063
γ 1	279.189 5	77.3 8	0.460

• ^{203}Pb EC Decay (52.02 h 5) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	7.78	59 5	0.0097
Auger-K	55.2	3.1 15	0.0037
ce-K- 1	193.659 5	16.8 8	0.0694
ce-L- 1	263.842 5	4.32 7	0.0243
ce-M- 1	275.485 5	1.052 14	0.0062
ce-NOP- 1	278.343 5	0.338 5	0.0020
ce-K- 2	315.785 12	0.50 3	0.0034
X-ray L	10.3	39 5	0.0086
X-ray $K\alpha_2$	70.8319 9	26.6 7	0.0402
X-ray $K\alpha_1$	72.8715 9	45.1 10	0.0701
X-ray $K\beta$	82.6	20.0 6	0.0351
γ 1	279.189 5	76.8 8	0.457
γ 2	401.315 12	3.30 16	0.0282
γ 3	680.502 15	0.67 8	0.0097

• ^{204}Tl EC Decay (3.779 y 10) I (min) = 0.10%

%EC Decay = 2.58 6

See also ^{204}Tl β^- Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	7.6	1.24 10	0.0002
X-ray L	10	0.76 9	0.0002
X-ray $K\alpha_2$	68.8950 20	0.425 15	0.0006
X-ray $K\alpha_1$	70.8190 20	0.723 25	0.0011
X-ray $K\beta$	80.3	0.318 12	0.0005

• ^{204}Tl β^- Decay (3.779 y 10) I (min) = 0.10%

%β^- Decay = 97.42 6

See also ^{204}Tl EC Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β^- 1 max	763.40 20		
avg	243.93 7	97.42 6	0.506

• ^{204}Pb IT Decay (66.9 m 1) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	8	7.1 5	0.0012
Auger-K	56.7	0.29 12	0.0004
ce-K- 2	286.74 10	3.70 12	0.0226
ce-L- 2	358.88 10	1.61 5	0.0123
ce-M- 2	370.89 10	0.406 13	0.0032
ce-NOP- 2	373.85 10	0.131 4	0.0010
ce-K- 5	811.15 10	0.648 20	0.0112
ce-K- 6	823.74 15	4.83 15	0.0847
ce-L- 5	883.29 10	0.133 4	0.0025
ce-L- 6	895.88 15	2.83 9	0.0539
ce-MNO- 6	907.89 15	0.911 3	0.0176
X-ray L	10.6	4.9 5	0.0011
X-ray $K\alpha_2$	72.8042 9	2.58 8	0.0040
X-ray $K\alpha_1$	74.9694 9	4.36 12	0.0070
X-ray $K\beta$	84.9	1.94 6	0.0035
γ 1	289.25 15	0.172 22	0.0011
γ 2	374.74 10	94.11 17	0.751
γ 3	622.2 7	0.22 3	0.0029
γ 5	899.15 10	99.164 25	1.90
γ 6	911.74 15	91.1 3	1.77

2 weak γ's omitted:
$E\gamma$(avg) = 779.7; $\Sigma I\gamma$ = 0.06%

• ^{205}Pb EC Decay (1.51E7 y 4) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	7.78	34.0 23	0.0056
X-ray L	10.3	22.7 23	0.0050

● ^{206}Bi EC Decay (6.243 d 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	8	70 5	0.0120
Auger-K	56.7	3.6 15	0.0044
ce-K- 5	70.60 10	0.174 17	0.0003
ce-K- 6	96.02 3	22.2 5	0.0453
ce-K- 10	146.26 7	0.170 9	0.0005
ce-L- 6	168.16 3	3.84 14	0.0138
ce-K- 11	174.71 5	1.57 3	0.0058
ce-M- 6	180.17 3	0.900 17	0.0035
ce-NOP- 6	183.13 3	0.296 6	0.0012
ce-L- 8	186.58 3	0.106 11	0.0004
ce-K- 13	225.67 7	0.116 5	0.0006
ce-L- 11	246.85 5	0.270 5	0.0014
ce-K- 15	255.51 3	5.58 10	0.0304
ce-K- 18	310.00 3	1.81 6	0.0120
ce-L- 15	327.65 3	0.973 15	0.0068
ce-MNO-15	339.66 3	0.302 5	0.0022
ce-L- 18	382.14 3	0.309 10	0.0025
ce-K- 25	409.06 4	1.428 15	0.0124
ce-K- 26	428.18 4	1.94 7	0.0176
ce-K- 27	449.45 4	2.15 6	0.0206
ce-L- 25	481.20 4	0.242 8	0.0025
ce-L- 26	500.32 4	1.21 4	0.0129
ce-MNO-26	512.33 4	0.399 4	0.0044
ce-L- 27	521.59 4	0.369 7	0.0041
ce-K- 31	532.48 5	0.295 8	0.0033
ce-MNO-27	533.60 4	0.121 2	0.0014
ce-K- 32	544.25 5	0.217 7	0.0025
ce-K- 39	715.10 5	0.799 24	0.0122
ce-L- 39	787.24 5	0.174 6	0.0029
ce-K- 42	793.01 5	0.449 15	0.0076
ce-K- 43	807.12 5	0.318 10	0.0055
ce-K- 46	930.63 8	0.111 4	0.0022
X-ray L	10.6	49 5	0.0110
X-ray $K\alpha_2$	72.8042 9	32.1 7	0.0497
X-ray $K\alpha_1$	74.9694 9	54.1 10	0.0865
X-ray Kβ	84.9	24.0 6	0.0435
γ 6	184.02 3	15.8 3	0.0620
γ 10	234.26 7	0.241 12	0.0012
γ 11	262.71 5	3.02 5	0.0169
γ 13	313.67 7	0.359 10	0.0024
γ 15	343.51 3	23.4 3	0.171
γ 17	386.20 7	0.516 10	0.0042
γ 18	398.00 3	10.74 10	0.0910
γ 22	452.84 8	0.156 8	0.0015
γ 25	497.06 4	15.31 15	0.162
γ 26	516.18 4	40.7 4	0.448
γ 27	537.45 4	30.5 3	0.349
γ 29	576.36 10	0.112 10	0.0014
γ 30	581.97 8	0.485 25	0.0060
γ 31	620.48 5	5.76 6	0.0761
γ 32	632.25 5	4.47 5	0.0602
γ 33	657.16 5	1.91 3	0.0267
γ 35	739.24 8	0.157 8	0.0025
γ 36	754.96 7	0.527 10	0.0085
γ 38	784.58 7	0.536 10	0.0090
γ 39	803.10 5	98.89 3	1.69
γ 41	841.28 7	0.186 9	0.0033
γ 42	881.01 5	66.2 7	1.24
γ 43	895.12 5	15.65 16	0.298
γ 46	1018.63 8	7.59 8	0.165
γ 50	1098.26 7	13.50 15	0.316
γ 51	1142.37 10	0.111 5	0.0027
γ 53	1194.69 8	0.277 15	0.0070
γ 54	1202.58 10	0.105 6	0.0027
γ 58	1332.33 10	0.282 15	0.0080
γ 59	1405.01 8	1.434 25	0.0429
γ 62	1496.18 8	0.176 10	0.0056
γ 63	1560.30 8	0.378 20	0.0126
γ 64	1565.34 8	0.304 15	0.0101
γ 66	1595.27 8	5.01 6	0.170
γ 67	1718.70 7	31.8 4	1.17
γ 68	1844.49 10	0.569 25	0.0223
γ 69	1878.65 8	2.01 4	0.0803
γ 70	1903.56 10	0.349 15	0.0142
γ 75	2599.60 20	0.130 10	0.0072

37 weak γ's omitted:
Eγ(avg) = 928.7; ΣIγ = 1.24%

● ^{207}Tl β^- Decay (4.77 m 2) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	524 6		
avg	156.3 21	0.25 5	0.0008
β- 2 max	1422 6		
avg	494.1 25	99.75 5	1.05
total β- avg	493 3	100.00 7	1.05
γ 3	897.83 3	0.24 4	0.0046

● ^{207}Bi EC Decay (33.4 y 8) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	8	52 4	0.0088
Auger-K	56.7	2.5 10	0.0030
ce-K- 2	481.665 20	1.55 5	0.0159
ce-L- 2	553.809 20	0.435 13	0.0051
ce-MNO- 2	565.819 20	0.1436 1	0.0017
ce-K- 4	975.615 20	7.04 23	0.146
ce-L- 4	1047.759 20	1.78 6	0.0398
ce-MNO- 4	1059.769 20	0.587 8	0.0132

1 weak β's omitted:
Eβ(avg) = 386.0; ΣIβ = 0.04%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	10.6	36 4	0.0081
X-ray $K\alpha_2$	72.8042 9	21.8 6	0.0338
X-ray $K\alpha_1$	74.9694 9	36.8 9	0.0588
X-ray Kβ	84.9	16.3 5	0.0296
γ 2	569.670 20	97.72 7	1.19
γ 3	897.83 3	0.147 10	0.0028
γ 4	1063.620 20	74.9 10	1.70
γ 5	1442.20 20	0.147 20	0.0045
γ 6	1770.23 4	6.84 20	0.258

● ^{208}Tl β^- Decay (3.053 m 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	8	4.2 4	0.0007
Auger-K	56.7	0.23 10	0.0003
ce-K- 1	123.40 15	0.162 20	0.0004
ce-K- 2	145.36 15	0.13 10	0.0004
ce-K- 3	164.61 10	0.27 20	0.0010
ce-K- 4	189.347 10	3.05 17	0.0123
ce-L- 4	261.490 10	0.52 3	0.0029
ce-MNO- 4	273.500 10	0.162 8	0.0009
ce-K- 6	422.84 8	1.88 8	0.0169
ce-L- 6	494.98 8	0.317 14	0.0033
ce-K- 7	495.134 23	1.28 5	0.0135
ce-MNO- 6	506.99 8	0.104 5	0.0011
ce-L- 7	567.278 23	0.350 12	0.0042

(Continued)

^{208}Tl β^- Decay (3.053 m 3) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-MNO- 7	579.288 23	0.115 2	0.0014
ce-K- 15	772.37 8	0.280 10	0.0046
ce-K- 27	2526.66 10	0.160 5	0.0086
β− 1 max	812 4		
avg	257.8 15	0.222 16	0.0012
β− 2 max	867 4		
avg	278.2 15	0.164 13	0.0010
β− 3 max	1031 4		
avg	340.2 16	2.92 24	0.0212
β− 4 max	1072 4		
avg	356.0 16	0.58 5	0.0044
β− 5 max	1283 4		
avg	438.7 16	23.2 11	0.217
β− 6 max	1517 4		
avg	532.5 17	22.7 6	0.257
β− 7 max	1794 4		
avg	646.5 17	49.3 18	0.679
total β−			
avg	558.8 18	99.3 22	1.18

6 weak β's omitted:
Eβ(avg)= 223.5; ΣIβ= 0.20%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	10.6	2.9 3	0.0007
X-ray Kα$_2$	72.8042 9	2.03 9	0.0031
X-ray Kα$_1$	74.9694 9	3.43 15	0.0055
X-ray Kβ	84.9	1.52 7	0.0028
γ 1	211.40 15	0.170 20	0.0008
γ 2	233.36 15	0.31 3	0.0015
γ 3	252.61 10	0.80 5	0.0043
γ 4	277.351 10	6.8 3	0.0401
γ 6	510.84 8	21.6 9	0.235
γ 7	583.139 23	84.2 14	1.05
γ 11	722.04 12	0.203 14	0.0031
γ 13	763.13 8	1.64 9	0.0266
γ 15	860.37 8	12.46 21	0.228
γ 17	927.60 20	0.125 11	0.0025
γ 18	982.70 20	0.197 15	0.0041
γ 19	1093.90 20	0.37 4	0.0086
γ 27	2614.66 10	99.800 10	5.56

14 weak γ's omitted:
Eγ(avg)= 840.4; ΣIγ= 0.36%

● ^{208}Bi EC Decay (3.68E5 y 4) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	8	45 4	0.0076
Auger-K	56.7	1.4 6	0.0017
ce-K- 1	2526.66 10	0.160 5	0.0086
X-ray L	10.6	31 3	0.0070
X-ray Kα$_2$	72.8042 9	12.3 4	0.0191
X-ray Kα$_1$	74.9694 9	20.8 6	0.0332
X-ray Kβ	84.9	9.2 3	0.0167
γ 1	2614.66 10	99.800 10	5.56

● ^{209}Tl β^- Decay (2.20 m 7) I (min) = 0.10%
Feeds ^{209}Pb

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	8	12.5 10	0.0021
ce-K- 1	29.207 21	18.3 5	0.0114
Auger-K	56.7	0.7 3	0.0008
ce-L- 1	101.350 21	3.54 10	0.0076
ce-M- 1	113.360 21	0.831 25	0.0020
ce-NOP- 1	116.317 21	0.266 8	0.0007
ce-K- 2	377.06 3	2.36 7	0.0190
ce-L- 2	449.20 3	0.799 24	0.0076
ce-MNO- 2	461.21 3	0.263 8	0.0026
ce-K- 3	1478.95 6	0.234 7	0.0074
β− 1 max	1825 15		
avg	659 7	100	1.40
X-ray L	10.6	8.7 9	0.0020
X-ray Kα$_2$	72.8042 9	5.88 19	0.0091
X-ray Kα$_1$	74.9694 9	9.9 3	0.0159
X-ray Kβ	84.9	4.41 15	0.0080
γ 1	117.211 21	77.0 5	0.192
γ 2	465.065 25	96.58 10	0.957
γ 3	1566.95 6	99.689 9	3.33

● ^{209}Pb β^- Decay (3.253 h 14) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β− 1 max	644.6 12		
avg	197.6 5	100	0.421

● ^{209}Po α Decay (102 y 5) I (min) = 0.10%
%α Decay = 99.74 3
Feeds ^{205}Pb
See also ^{209}Po EC Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-NOP- 1	1.434 7	50 50	0.0015
ce-K- 3	172.50 5	0.129 15	0.0005
α 1	4617 5	0.565 14	0.0555
α 2	4882 3	99.17 4	10.31
γ 3	260.50 5	0.262 13	0.0015

9 weak γ's omitted:
Eγ(avg)= 266.1; ΣIγ= 0.09%

● ^{209}Po EC Decay (102 y 5) I (min) = 0.10%
%EC Decay = 0.26 3
See also ^{209}Po α Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	8.15	0.119 15	≈0
γ 1	896.40 20	0.25 3	0.0049

● ^{210}Tl β^- Decay (1.30 m 3) I (min) = 0.10%
Feeds ^{210}Pb

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	8	18 6	0.0031
ce-K- 1	10 30	2.1 11	0.0004
Auger-K	56.7	0.29 13	0.0003
ce-L- 1	80 30	20 10	0.0345
ce-M- 1	90 30	5 3	0.0104
ce-NOP- 1	100 30	1.7 9	0.0035
ce-K- 2	210.0 10	5.3 7	0.0236
ce-K- 3	268 10	0.9 5	0.0052
ce-L- 2	282.1 10	3.1 4	0.0187
ce-M- 2	294.1 10	0.80 11	0.0050
ce-NOP- 2	297.1 10	0.26 4	0.0016
ce-L- 3	340 10	0.15 8	0.0011
ce-K- 7	711.70 10	0.807 25	0.0122
ce-L- 7	783.84 10	0.176 6	0.0029
β- 1 max	1320 100		
avg	450 40	25	0.240
β- 2 max	1870 100		
avg	680 50	56	0.811
β- 3 max	2340 100		
avg	870 50	19	0.352
total β-			
avg	660 50	100	1.40
X-ray L	10.6	13 5	0.0028
X-ray Kα$_2$	72.8042 9	2.5 4	0.0040
X-ray Kα$_1$	74.9694 9	4.3 7	0.0069
X-ray Kβ	84.9	1.9 3	0.0035
γ 1	100 30	4.0 20	0.0082
γ 2	298.0 10	79 10	0.503
γ 3	356 10	4.0 20	0.0300
γ 4	382 10	3.0 20	0.0242
γ 5	480 20	2.0 10	0.0202
γ 6	670 20	2.0 10	0.0282
γ 7	799.70 10	98.96 5	1.69
γ 8	860 30	6.9 20	0.127
γ 9	910 30	3.0 20	0.0575
γ 10	1060 20	12 5	0.268
γ 11	1110 20	6.9 20	0.164
γ 12	1210 20	17 4	0.434
γ 13	1310 20	21 5	0.580
γ 14	1410 20	4.9 20	0.149
γ 15	1490 20	2.0 10	0.0628
γ 16	1540 30	2.0 10	0.0649
γ 17	1590 30	2.0 10	0.0670
γ 18	1650 30	2.0 10	0.0696
γ 19	2010 30	6.9 20	0.297
γ 20	2090 30	4.9 20	0.220
γ 21	2280 30	3.0 20	0.144
γ 22	2360 30	8 3	0.398
γ 23	2430 30	9 3	0.461

● ^{210}Pb β^- Decay (22.26 y 22) I (min) = 0.10%
%β^- Decay = 99.9999983 3
Feeds ^{210}Bi (5.013 d)
%α Decay = 0.0000017 3

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	8.15	34 3	0.0058
ce-L- 1	30.115 15	57.9 21	0.0372
ce-MNO- 1	42.504 15	18.1 4	0.0164
β- 1 max	16.5 5		
avg	4.14 13	80.2 16	0.0071
β- 2 max	63.0 5		
avg	16.13 14	19.8 16	0.0068
total β-			
avg	6.51 18	100.0 23	0.0139
X-ray L	10.8	24.3 25	0.0056
γ 1	46.503 15	4.05 8	0.0040

● ^{210}Bi β^- Decay (5.013 d 5) I (min) = 0.10%
%β^- Decay = 99.99987 1
Feeds ^{210}Po
%α Decay = 0.00013 1

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	1161.4 10		
avg	389.0 4	99.9998	0.829

● ^{210}Po α Decay (138.378 d 7) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
α 1	5304.51 7	99.9989	11.30

● ^{211}Pb β^- Decay (36.1 m 2) I (min) = 0.10%
Feeds ^{211}Bi

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	8.15	0.38 8	≈0
ce-L- 1	49.032 14	0.31 10	0.0003
ce-K- 11	314.317 10	0.24 7	0.0016
ce-K- 12	336.552 10	0.20 6	0.0014
β- 1 max	264 6		
avg	72.8 18	0.66 19	0.0010
β- 2 max	541 6		
avg	161.9 21	5.0 15	0.0172
β- 3 max	968 6		
avg	315.6 23	1.3 4	0.0087
β- 4 max	1373 6		
avg	473.3 24	93.0 20	0.938
total β-			
avg	453 3	100 3	0.965

5 weak β's omitted:
Eβ(avg) = 70.9; ΣIβ = 0.09%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	10.8	0.28 6	≈0
X-ray Kα$_2$	74.8148 10	0.12 3	0.0002
X-ray Kα$_1$	77.1079 10	0.21 5	0.0003
γ 11	404.843 10	2.9 9	0.0254
γ 12	427.078 10	1.3 4	0.0120
γ 22	704.59 3	0.37 11	0.0055
γ 23	766.47 3	0.54 16	0.0088
γ 24	831.96 3	2.9 9	0.0507

28 weak γ's omitted:
Eγ(avg) = 517.6; ΣIγ = 0.47%

● ^{211}Bi α Decay (2.13 m 2) I (min) = 0.10%
%α Decay = 99.727 4
Feeds ^{207}Tl
See also ^{211}Bi β^- Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	7.78	1.57 12	0.0003
ce-K- 1	265.54 5	2.66 8	0.0151
ce-L- 1	335.72 5	0.462 15	0.0033
ce-MNO- 1	347.37 5	0.142 5	0.0011
α 1	6278.8 6	16.23 20	2.17
α 2	6623.1 6	83.50 20	11.78
X-ray L	10.3	1.05 12	0.0002
X-ray Kα₂	70.8319 9	0.75 3	0.0011
X-ray Kα₁	72.8715 9	1.27 5	0.0020
X-ray Kβ	82.6	0.560 20	0.0010
γ 1	351.07 5	12.94 18	0.0968

● ^{211}Bi β^- Decay (2.13 m 2) I (min) = 0.10%
%β^- Decay = 0.273 4
Feeds ^{211}Po (0.516 s)
See also ^{211}Bi α Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	579 6		
avg	174.6 21	0.273 4	0.0010

● ^{211}Po α Decay (0.516 s 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
α 1	6570.0 25	0.537 19	0.0751
α 2	6892.8 18	0.546 19	0.0802
α 3	7450.4 16	98.92 3	15.70
γ 2	569.670 20	0.538 19	0.0065
γ 3	897.83 3	0.52 4	0.0100

● ^{211}At α Decay (7.214 h 7) I (min) = 0.10%
%α Decay = 41.7 2
Feeds ^{207}Bi
See also ^{211}At EC Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
α 1	5867.0 20	41.70 20	5.21

● ^{211}At EC Decay (7.214 h 7) I (min) = 0.10%
%EC Decay = 58.3 2
Feeds ^{211}Po (0.516 s)
See also ^{211}At α Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	8.33	26.1 20	0.0046
Auger-K	59.7	1.3 7	0.0017
X-ray L	11	19.7 20	0.0047
X-ray Kα₂	76.862 5	12.7 3	0.0208
X-ray Kα₁	79.290 5	21.3 4	0.0359
X-ray Kβ	89.8	9.55 22	0.0183
γ 1	687.00 10	0.245 16	0.0036

● ^{212}Pb β^- Decay (10.643 h 12) I (min) = 0.10%
Feeds ^{212}Bi

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	8.15	21.4 18	0.0037
ce-K- 1	24.664 6	3.48 11	0.0018
Auger-K	58.2	1.2 6	0.0015
ce-L- 1	98.802 6	0.61 3	0.0013
ce-MNO- 1	111.191 6	0.192 6	0.0005
ce-K- 3	148.099 6	33.1 13	0.104
ce-K- 4	209.561 10	1.34 6	0.0060
ce-L- 3	222.238 6	5.71 22	0.0271
ce-M- 3	234.626 6	1.35 5	0.0067
ce-NOP- 3	237.687 6	0.451 17	0.0023
ce-L- 4	283.699 10	0.232 10	0.0014
β- 1 max	158 4		
avg	41.9 11	5.22 15	0.0047
β- 2 max	334 4		
avg	94.4 12	85.1 20	0.171
β- 3 max	573 4		
avg	172.7 13	9.9 20	0.0364
total β- avg	99.4 13	100 3	0.212
X-ray L	10.8	15.5 16	0.0036
X-ray Kα₂	74.8148 10	10.7 5	0.0170
X-ray Kα₁	77.1079 10	18.0 7	0.0296
X-ray Kβ	87.3	8.0 4	0.0149
γ 1	115.190 6	0.602 18	0.0015
γ 3	238.625 6	44.6 10	0.227
γ 4	300.087 10	3.41 10	0.0218

2 weak γ's omitted:
Eγ(avg)= 176.7; ΣIγ= 0.05%

● ^{212}Bi α Decay (60.55 m 6) I (min) = 0.10%
%α Decay = 35.93 6
Feeds ^{208}Tl
See also ^{212}Bi β^- Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	7.78	11.5 9	0.0019
ce-L- 1	24.510 5	19.1 8	0.0100
ce-MNO- 1	36.153 5	5.92 24	0.0046
ce-K- 4	202.54 7	0.118 8	0.0005
α 1	5607.1 3	0.402	0.0481
α 2	5768.1 3	0.600 8	0.0737
α 3	6050.77 7	25.22 9	3.25
α 4	6090.06 8	9.63 9	1.25

4 weak α's omitted:
Eα(avg)= 5612.7; ΣIα= 0.07%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	10.3	7.7 9	0.0017
γ 1	39.857 5	1.02 4	0.0009
γ 4	288.07 7	0.317 17	0.0019
γ 6	327.96 10	0.130 11	0.0009
γ 8	452.83 10	0.348 18	0.0034

5 weak γ's omitted:
Eγ(avg)= 379.5; ΣIγ= 0.09%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)

● ^{212}Bi β^- Decay (60.55 m 6) I (min) = 0.10%
%β^- Decay = 64.07 6
Feeds ^{212}Po
See also ^{212}Bi α Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-K- 1	634.06 10	0.125 5	0.0017

3 weak α's omitted:
Eα(avg)=10367.5; ΣIα= 0.01%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	440 4		
avg	128.1 13	1.17 5	0.0032
β- 2 max	567 4		
avg	170.3 14	0.43 3	0.0016
β- 3 max	625 4		
avg	190.6 14	3.44 10	0.0140
β- 4 max	733 4		
avg	228.7 15	2.61 7	0.0127
β- 5 max	1519 4		
avg	530.7 17	8.0 3	0.0904
β- 6 max	2246 4		
avg	831.6 17	48.4 3	0.857
total β-			
avg	717.3 21	64.1 5	0.979

1 weak β's omitted:
Eβ(avg)= 129.7; ΣIβ= 0.05%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 1	727.17 10	11.8 3	0.183
γ 2	785.46 7	1.97 5	0.0329
γ 3	893.43 9	0.652 20	0.0124
γ 4	952.10 10	0.313 18	0.0064
γ 6	1078.62 10	0.95 3	0.0219
γ 7	1512.75 10	0.56 5	0.0179
γ 8	1620.62 10	2.75 10	0.0949
γ 9	1679.5 5	0.121 20	0.0043
γ 11	1806.0 5	0.20 4	0.0076

2 weak γ's omitted:
Eγ(avg)= 1074.0; ΣIγ= 0.03%

● ^{212}Po α Decay (2.98E–7 s 3) I (min) = 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
α 1	8784.90 12	100	18.71

● ^{213}Bi α Decay (45.65 m 5) I (min) = 0.10%
%α Decay = 2.16 11
Feeds ^{209}Tl
See also ^{213}Bi β^- Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
α 1	5549 10	0.16 4	0.0189
α 2	5870 6	2.00 11	0.250
γ 1	323.81 5	0.13 3	0.0009

● ^{213}Bi β^- Decay (45.65 m 5) I (min) = 0.10%
%β^- Decay = 97.84 11
Feeds ^{213}Po
See also ^{213}Bi α Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	8.33	2.4 3	0.0004
Auger-K	59.7	0.13 7	0.0002
ce-K- 1	199.75 10	0.34 6	0.0014
ce-K- 2	347.315 21	4.1 4	0.0302
ce-L- 2	423.481 23	0.72 7	0.0065
ce-MNO- 2	436.271 21	0.226 21	0.0021
β- 1 max	320 10		
avg	90 3	1.06 10	0.0020
β- 2 max	980 10		
avg	319 4	32 3	0.217
β- 3 max	1127 10		
avg	376 4	0.70 19	0.0056
β- 4 max	1420 10		
avg	491 4	64 3	0.669
total β-			
avg	430 5	98 5	0.894
X-ray L	11	1.83 23	0.0004
X-ray Kα2	76.862 5	1.25 12	0.0020
X-ray Kα1	79.290 5	2.10 19	0.0035
X-ray Kβ	89.8	0.94 9	0.0018
γ 1	292.86 10	0.74 13	0.0046
γ 2	440.420 20	28.0 25	0.262
γ 3	659.81 10	0.148 19	0.0021
γ 4	807.36 4	0.44 4	0.0076
γ 5	1100.14 6	0.48 5	0.0112

● ^{213}Po α Decay (4.2E–6 s 8) I (min) = 0.10%
Feeds ^{209}Pb

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
α 1	8377 5	99.996 1	17.84

● ^{214}Pb β^- Decay (26.8 m) I (min) = 0.10%
Feeds ^{214}Bi

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	8.15	18.6 15	0.0032
ce-L- 1	36.838 14	10.7 6	0.0084
ce-M- 1	49.227 14	2.51 13	0.0026
ce-NOP- 1	52.288 14	0.84 5	0.0009
Auger-K	58.2	0.7 4	0.0008
ce-K- 5	151.455 8	5.29 16	0.0171
ce-K- 6	168.26 6	0.19 14	0.0007
ce-K- 8	204.687 8	7.5 4	0.0326
ce-L- 5	225.593 8	0.92 3	0.0044
ce-MNO- 5	237.982 8	0.290 9	0.0015
ce-K- 12	261.395 8	9.1 6	0.0506
ce-L- 8	278.825 8	1.34 5	0.0079
ce-M- 8	291.214 8	0.316 11	0.0020
ce-NOP- 8	294.275 8	0.105 4	0.0007
ce-L- 12	335.533 8	1.60 7	0.0114
ce-M- 12	347.922 8	0.376 13	0.0028
ce-NOP-12	350.983 8	0.125 5	0.0009
β- 1 max	185 12		
avg	50 4	2.55 8	0.0027
β- 2 max	490 12		
avg	145 4	0.83 6	0.0026

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
^{214}Pb β⁻ Decay (26.8 m) (Continued)			
β⁻ 3 max	672 12		
avg	207 5	48.0 14	0.212
β⁻ 4 max	729 12		
avg	227 5	42.5 12	0.205
β⁻ 5 max	1024 12		
avg	337 5	6.3 20	0.0452
total β⁻			
avg	219 6	100 3	0.468
X-ray L	10.8	13.5 14	0.0031
γ 1	53.226 14	1.11 6	0.0013
X-ray $K\alpha_2$	74.8148 10	6.21 23	0.0099
X-ray $K\alpha_1$	77.1079 10	10.5 4	0.0172
X-ray Kβ	87.3	4.67 18	0.0087
γ 5	241.981 8	7.49 21	0.0386
γ 6	258.79 6	0.553 25	0.0030
γ 7	274.53 5	0.33 5	0.0019
γ 8	295.213 8	19.2 6	0.121
γ 12	351.921 8	37.2 11	0.279
γ 13	462.10 20	0.17 3	0.0017
γ 14	480.42 8	0.340 20	0.0035
γ 15	487.08 8	0.441 18	0.0046
γ 17	533.69 8	0.190 15	0.0022
γ 20	580.15 4	0.365 18	0.0045
γ 21	785.910 20	1.10 4	0.0183
γ 22	839.025 15	0.59 3	0.0105

9 weak γ's omitted:
Eγ(avg) = 280.7; ΣIγ = 0.33%

● ^{214}Bi β⁻ Decay (19.9 m 4) I (min) = 0.10%
%β⁻ Decay = 99.979 1
Feeds ^{214}Po
%α Decay = 0.021 1

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	8.33	0.69 6	0.0001
ce-K- 30	516.207 8	0.69 3	0.0076
ce-L- 30	592.373 13	0.195 8	0.0025
ce-K- 78	1027.182 11	0.192 12	0.0042
ce-K- 98	1322.695 4	0.385 17	0.0109
β⁻ 1 max	541 12		
avg	162 4	0.41 3	0.0014
β⁻ 2 max	551 12		
avg	165 4	0.211 15	0.0007
β⁻ 3 max	575 12		
avg	173 5	0.118 11	0.0004
β⁻ 4 max	762 12		
avg	239 5	0.11 3	0.0006
β⁻ 5 max	764 12		
avg	240 5	0.205 21	0.0010
β⁻ 6 max	788 12		
avg	248 5	1.07 5	0.0057
β⁻ 7 max	822 12		
avg	261 5	2.81 13	0.0156
β⁻ 8 max	977 12		
avg	318 5	0.56 4	0.0038
β⁻ 9 max	1003 12		
avg	328 5	0.14 5	0.0010
β⁻10 max	1061 12		
avg	350 5	0.336 22	0.0025
β⁻11 max	1066 12		
avg	352 5	5.61 17	0.0421
β⁻12 max	1077 12		
avg	357 5	0.89 4	0.0068
β⁻13 max	1122 12		
avg	374 5	0.43 6	0.0034
β⁻14 max	1151 12		
avg	385 5	4.43 15	0.0363
β⁻15 max	1181 12		
avg	397 5	0.144 9	0.0012
β⁻16 max	1253 12		
avg	425 5	2.50 8	0.0226
β⁻17 max	1259 12		
avg	427 5	1.50 6	0.0136
β⁻18 max	1275 12		
avg	434 5	1.19 5	0.0110
β⁻19 max	1380 12		
avg	475 5	1.59 7	0.0161
β⁻20 max	1423 12		
avg	492 5	8.34 23	0.0874
β⁻21 max	1505 12		
avg	525 5	17.7 5	0.198
β⁻22 max	1527 12		
avg	534 5	0.256 18	0.0029
β⁻23 max	1540 12		
avg	539 5	17.9 5	0.206
β⁻24 max	1609 12		
avg	567 5	0.88 12	0.0106
β⁻25 max	1727 12		
avg	615 5	3.38 12	0.0443
β⁻26 max	1855 12		
avg	668 5	1.01 6	0.0144
β⁻27 max	1892 12		
avg	684 5	7.86 24	0.115
β⁻28 max	1995 12		
avg	726 5	0.22 6	0.0034
β⁻29 max	2661 12		
avg	1007 6	0.6 3	0.0129
β⁻30 max	3270 12		
avg	1269 6	17.2 22	0.465
total β⁻			
avg	632 6	100.0 24	1.35

18 weak β's omitted:
Eβ(avg) = 158.6; ΣIβ = 0.36%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
X-ray L	11	0.52 6	0.0001
X-ray $K\alpha_2$	76.862 5	0.360 13	0.0006
X-ray $K\alpha_1$	79.290 5	0.603 20	0.0010
X-ray Kβ	89.8	0.271 10	0.0005
γ 1	273.7 4	0.18 3	0.0010
γ 11	387.0 3	0.37 6	0.0030
γ 12	389.1 3	0.41 5	0.0034
γ 15	405.74 3	0.168 11	0.0014
γ 16	426.5 5	0.11 3	0.0010
γ 18	454.77 12	0.320 16	0.0031
γ 19	469.69 12	0.133 9	0.0013
γ 20	474.38 10	0.118 13	0.0012
γ 30	609.312 7	46.3 12	0.601
γ 39	665.453 22	1.57 7	0.0222
γ 44	703.11 4	0.474 23	0.0071
γ 46	719.86 3	0.405 23	0.0062
γ 51	752.84 3	0.133 11	0.0021
γ 52	768.356 10	5.04 15	0.0825
γ 53	786.1 4	0.32 10	0.0053
γ 55	806.174 18	1.23 5	0.0212
γ 57	821.18 3	0.151 17	0.0026
γ 61	904.25 25	0.106 14	0.0020
γ 63	934.061 12	3.21 10	0.0638
γ 65	964.08 3	0.385 22	0.0079
γ 73	1051.96 3	0.317 16	0.0071
γ 75	1069.96 8	0.286 21	0.0065
γ 78	1120.287 10	15.1 5	0.361
γ 80	1133.66 3	0.256 18	0.0062
γ 81	1155.190 20	1.70 7	0.0418
γ 83	1207.68 3	0.462 22	0.0119

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
γ 86	1238.110 12	5.94 17	0.157
γ 87	1280.960 20	1.48 7	0.0404
γ 88	1303.76 8	0.121 12	0.0034
γ 93	1377.669 12	4.11 13	0.120
γ 94	1385.31 3	0.78 4	0.0230
γ 96	1401.50 4	1.39 6	0.0415
γ 97	1407.98 4	2.49 8	0.0746
γ 102	1509.228 15	2.22 7	0.0714
γ 103	1538.50 6	0.41 6	0.0136
γ 104	1543.32 6	0.36 5	0.0117
γ 105	1583.22 4	0.72 4	0.0243
γ 106	1594.73 8	0.266 21	0.0091
γ 107	1599.31 6	0.336 22	0.0114
γ 110	1661.28 6	1.15 5	0.0409
γ 111	1683.99 4	0.237 21	0.0085
γ 112	1729.595 15	2.97 11	0.109
γ 113	1764.494 14	15.8 5	0.595
γ 116	1838.36 5	0.385 22	0.0151
γ 117	1847.420 25	2.09 7	0.0823
γ 118	1873.16 6	0.227 21	0.0091
γ 120	1896.3 3	0.178 21	0.0072
γ 132	2118.55 3	1.17 4	0.0530
γ 136	2204.22 4	4.98 16	0.234
γ 142	2293.36 12	0.326 22	0.0159
γ 151	2447.86 10	1.56 5	0.0813

131 weak γ's omitted:
Eγ(avg) = 1158.0; ΣIγ = 3.51%

● ^{214}Po α Decay (1.637E–4 s 2) I (min) = 0.10%
Feeds ^{210}Pb

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
α 1	7687.09 6	99.989	16.37

2 weak α's omitted:
Eα(avg) = 6892.4; ΣIα = 0.01%

2 weak γ's omitted:
Eγ(avg) = 797.3; ΣIγ = 0.01%

● ^{215}Po α Decay (0.001778 s 5) I (min) = 0.10%
%α Decay = 99.99977 2
Feeds ^{211}Pb
%β⁻ Decay = 0.00023 2

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
α 1	7386.4 8	99.9437	15.72

2 weak α's omitted:
Eα(avg) = 6954.1; ΣIα = 0.06%

1 weak γ's omitted:
Eγ(avg) = 438.7; ΣIγ = 0.03%

● ^{216}Po α Decay (0.146 s 3) I (min) = 0.10%
Feeds ^{212}Pb

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
α 1	6778.5 5	99.998	14.44

● ^{217}At α Decay (0.0323 s 4) I (min) = 0.10%
Feeds ^{213}Bi

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
α 1	7066 3	99.934 13	15.04

3 weak α's omitted:
Eα(avg) = 6622.3; ΣIα = 0.07%

5 weak γ's omitted:
Eγ(avg) = 594.5; ΣIγ = 0.04%

○ ^{218}Po α Decay (3.05 m) I (min) = 0.10%
%α Decay = 99.980 2
Feeds ^{214}Pb
%β⁻ Decay = 0.020 2

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
α 1	6002.55 9	99.978 2	12.78

○ ^{218}Rn α Decay (0.035 s 5) I (min) = 0.10%
Feeds ^{214}Po

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
α 1	6535.0 20	0.127 5	0.0177
α 2	7133.0 20	99.873 7	15.17
γ 1	609.312 7	0.124 5	0.0016

● ^{219}Rn α Decay (3.96 s 1) I (min) = 0.10%
Feeds ^{215}Po

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	8.33	1.38 12	0.0002
ce-K- 2	37.49 3	0.40 5	0.0003
ce-L- 2	113.65 4	0.111 12	0.0003
ce-K- 4	178.128 11	1.23 10	0.0047
ce-L- 4	254.294 15	0.72 3	0.0039
ce-MNO- 4	267.084 11	0.249 10	0.0014
ce-K- 12	308.706 11	0.230 13	0.0015
ce-L- 12	384.872 15	0.101 6	0.0008
α 1	6424.7	7.5 5	1.03
α 2	6529	0.12	0.0167
α 3	6552.8	12.9 6	1.80
α 4	6819.3 3	79.6 10	11.56

8 weak α's omitted:
Eα(avg) = 6230.7; ΣIα = 0.09%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
X-ray L	11	1.04 11	0.0002
X-ray $K\alpha_2$	76.862 5	0.53 4	0.0009
X-ray $K\alpha_1$	79.290 5	0.88 6	0.0015
X-ray Kβ	89.8	0.395 25	0.0008
γ 2	130.59 3	0.116 12	0.0003
γ 4	271.233 10	10.6 4	0.0612
γ 12	401.811 10	6.5 3	0.0556

19 weak γ's omitted:
Eγ(avg) = 388.4; ΣIγ = 0.20%

● ^{220}Rn α Decay (55.61 s 4) I (min) = 0.10%
Feeds ^{216}Po

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
α 1	6288.29 10	99.903 8	13.38

1 weak α's omitted:
Eα(avg) = 5747.0; ΣIα = 0.10%

1 weak γ's omitted:
Eγ(avg) = 549.7; ΣIγ = 0.10%

● ^{221}Fr α Decay (4.8 m 1) I (min) = 0.10%
Feeds ^{217}At

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
ce-K- 2	3.77 20	0.6 4	≈0
Auger-L	8.52	2.8 4	0.0005
ce-K- 3	22.47 20	0.22 12	0.0001
ce-K- 4	54.27 20	0.11 5	0.0001
ce-L- 2	82.01 21	0.69 19	0.0012
ce-MNO- 2	95.18 20	0.24 7	0.0005
ce-K- 6	121.87 20	1.75 8	0.0045
ce-L- 6	200.11 21	2.17 10	0.0093
ce-M- 6	213.28 20	0.57 3	0.0026
ce-NOP- 6	216.56 20	0.196 9	0.0009
α 1	5938.0 20	0.130 10	0.0164
α 2	5965.0 25	0.100 20	0.0127
α 3	5979.0 20	0.49 3	0.0624
α 4	6075.0 20	0.130 20	0.0168
α 5	6125.5 20	15.10 20	1.97
α 6	6241.8 20	1.35 7	0.179
α 7	6339.8 20	83.4 8	11.26

7 weak α's omitted:
Eα(avg) = 5833.2; ΣIα = 0.12%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	11.4	2.3 3	0.0006
X-ray Kα$_2$	78.950 10	0.77 12	0.0013
X-ray Kα$_1$	81.520 10	1.29 20	0.0022
X-ray Kβ	92.3	0.58 9	0.0011
γ 2	99.50 20	0.16 3	0.0003
γ 6	217.60 20	12.5 4	0.0579
γ 11	412.0 20	0.100 20	0.0009

8 weak γ's omitted:
Eγ(avg) = 211.0; ΣIγ = 0.33%

● ^{222}Rn α Decay (3.8235 d 3) I (min) = 0.10%
Feeds ^{218}Po

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
α 1	5489.7 3	99.920 10	11.68

2 weak α's omitted:
Eα(avg) = 4986.0; ΣIα = 0.08%

1 weak γ's omitted:
Eγ(avg) = 512.0; ΣIγ = 0.08%

● ^{222}Ra α Decay (38.0 s 5) I (min) = 0.10%
Feeds ^{218}Rn

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	8.7	0.126 13	≈0
ce-K- 2	225.82 6	0.163 7	0.0008
ce-L- 2	306.17 7	0.107 5	0.0007
α 1	6235 4	3.05 5	0.405
α 2	6556 5	96.90 10	13.53

3 weak α's omitted:
Eα(avg) = 5807.8; ΣIα = 0.01%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	11.7	0.112 13	≈0
γ 2	324.22 5	2.77 8	0.0191

5 weak γ's omitted:
Eγ(avg) = 499.1; ΣIγ = 0.01%

● ^{223}Fr β^- Decay (21.8 m 4) I (min) = 0.10%
%β^- Decay = 99.994
Feeds ^{223}Ra
%α Decay = 0.006

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
ce-L- 5	1.06 20	4.4 13	≈0
ce-MNO- 1	1.5 3	5.54 25	0.0002
Auger-L	9	34 5	0.0065
ce-L- 7	10.3633 15	1.97 11	0.0004
ce-L- 8	10.673 11	20 4	0.0045
ce-L- 9	12.393 20	4.0 24	0.0011
ce-MNO- 5	15.48 20	1.5 5	0.0005
ce-MNO- 7	24.7780 15	0.63 3	0.0003
ce-MNO- 8	25.088 11	7.0 12	0.0037
ce-MNO- 9	26.808 20	1.4 8	0.0008
ce-L- 13	30.66 10	0.4 3	0.0003
ce-L- 14	30.86 10	16.9 9	0.0111
ce-L- 17	42.26 20	1.8 10	0.0016
ce-MNO-13	45.08 10	0.10 8	≈0
ce-M- 14	45.28 10	4.12 22	0.0040
ce-NOP-14	48.89 10	1.39 8	0.0014
ce-L- 20	49.46 10	5.1 22	0.0053
ce-M- 17	56.68 20	0.49 25	0.0006
ce-NOP-17	60.29 20	0.18 9	0.0002
ce-L- 22	60.56 10	1.17 14	0.0015
ce-M- 20	63.88 10	1.3 6	0.0018
Auger-K	65.9	0.13 8	0.0002
ce-NOP-20	67.49 10	0.46 20	0.0007
ce-K- 28	69.48 20	0.19 17	0.0003
ce-MNO-22	74.98 10	0.38 5	0.0006
ce-L- 25	81.2 5	6.6 8	0.0115
ce-M- 25	95.6 5	1.81 21	0.0037
ce-NOP-25	99.2 5	0.65 8	0.0014
ce-K- 33	101.08 20	1.79 20	0.0039
ce-K- 39	131.0 3	3.2 4	0.0088
ce-L- 33	185.76 20	0.34 4	0.0014
ce-MNO-33	200.18 20	0.112 11	0.0005
ce-L- 39	215.7 3	0.61 7	0.0028
ce-MNO-39	230.1 3	0.197 20	0.0010
β- 1 max	221 3		
avg	60.1 9	0.124 9	0.0002
β- 2 max	322 3		
avg	90.2 9	0.49 5	0.0009
β- 3 max	344 3		
avg	97.1 9	0.108 14	0.0002

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β^- 4 max	778 3		
avg	243.0 10	1.35 10	0.0070
β^- 5 max	813 3		
avg	255.7 11	0.151 25	0.0008
β^- 6 max	913 3		
avg	291.9 11	10.3 9	0.0640
β^- 7 max	1017 3		
avg	330.9 11	17 4	0.120
β^- 8 max	1068 3		
avg	349.9 11	12.7 15	0.0947
β^- 9 max	1097 3		
avg	361.1 11	57 4	0.438
total β^-			
avg	343.0 12	100 6	0.728

12 weak β's omitted:
Eβ(avg) = 208.2; ΣIβ = 0.39%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 1	6.3 3	0.120 6	≈0
X-ray L	12.3	34 5	0.0088
γ 5	20.30 20	0.76 23	0.0003
γ 13	49.90 10	0.8 6	0.0008
γ 14	50.10 10	31.7 14	0.0338
γ 20	68.70 10	0.38 16	0.0006
γ 22	79.80 10	7.6 9	0.0129
X-ray $K\alpha_2$	85.430 10	1.47 13	0.0027
X-ray $K\alpha_1$	88.470 10	2.42 22	0.0046
X-ray Kβ	100	1.11 10	0.0024
γ 25	100.4 5	0.95 11	0.0020
γ 26	134.60 10	0.51 6	0.0015
γ 28	173.40 20	0.127 14	0.0005
γ 30	184.80 20	0.29 4	0.0011
γ 33	205.00 20	1.08 11	0.0047
γ 39	234.9 3	2.8 3	0.0141
γ 52	289.5 3	0.228 25	0.0014
γ 59	319.40 20	0.51 6	0.0035
γ 65	369.4 3	0.101 11	0.0008
γ 104	775.30 20	0.39 5	0.0064

118 weak γ's omitted:
Eγ(avg) = 482.0; ΣIγ = 1.23%

● ^{223}Ra α Decay (11.434 d 2) I (min) = 0.10%
Feeds ^{219}Rn

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-NOP- 1	3.34 5	51.8	0.0037
ce-MNO- 2	5.51 5	12.6873	0.0015
ce-K- 14	8.38 4	0.17 3	≈0
Auger-L	8.7	28 3	0.0052
ce-MNO- 3	9.95 6	12.6746	0.0027
ce-L- 4	13.55 11	1.2 4	0.0003
ce-K- 18	23.915 16	7.37 13	0.0038
ce-MNO- 4	27.12 10	0.42 13	0.0002
ce-K- 20	45.831 16	12.5 3	0.0122
ce-K- 21	55.805 16	18.1 4	0.0215
ce-K- 22	60.230 16	1.97 7	0.0025
Auger-K	62.7	1.5 8	0.0020
ce-K- 27	81.12 7	0.24 3	0.0004
ce-L- 15	92.81 4	0.176 15	0.0003
ce-L- 18	104.27 4	1.38 5	0.0031
ce-M- 18	117.837 12	0.330 6	0.0008
ce-NOP-18	121.222 12	0.115 2	0.0003
ce-L- 20	126.19 4	2.33 5	0.0063
ce-L- 21	136.16 4	3.29 7	0.0095
ce-M- 20	139.753 12	0.554 21	0.0016
ce-L- 22	140.58 4	0.377 9	0.0011
ce-NOP-20	143.138 12	1.93 5	0.0059
ce-M- 21	149.727 12	0.79 3	0.0025
ce-NOP-21	153.112 12	0.272 6	0.0009
ce-MNO-22	154.152 12	0.122 3	0.0004
ce-K- 37	171.058 16	9.04 23	0.0330
ce-K- 40	225.466 16	1.54 8	0.0074
ce-K- 43	239.88 10	0.95 7	0.0049
ce-L- 37	251.41 4	1.66 4	0.0089
ce-M- 37	264.980 12	0.392 9	0.0022
ce-NOP-37	268.365 12	0.135 3	0.0008
ce-K- 48	273.271 20	0.126 10	0.0007
ce-L- 40	305.82 4	0.281 11	0.0018
ce-L- 43	320.23 11	0.174 9	0.0012
ce-K- 56	346.627 17	0.205 11	0.0015
α 1	5288 3	0.16	0.0180
α 2	5339 3	0.13	0.0148
α 3	5367 3	0.13	0.0149
α 4	5435 3	2.27 20	0.263
α 5	5501 3	1.00 15	0.117
α 6	5537 3	9.2 3	1.08
α 7	5606 3	24.2 4	2.89
α 8	5715 3	52.5 8	6.39
α 9	5745.0 20	9.5 6	1.16
α 10	5857.5	0.32 4	0.0399
α 11	5870.0 20	0.85 4	0.106

15 weak α's omitted:
Eα(avg) = 5348.2; ΣIα = 0.29%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	11.7	25 3	0.0062
γ 10	80.19 3	0.200 20	0.0003
X-ray $K\alpha_2$	81.070 20	14.9 4	0.0257
X-ray $K\alpha_1$	83.780 20	24.7 5	0.0441
X-ray Kβ	94.9	11.2 3	0.0226
γ 12	98.234 18	0.45 5	0.0009
γ 18	122.319 10	1.190 20	0.0031
γ 20	144.235 10	3.24 7	0.0100
γ 21	154.209 10	5.58 11	0.0183
γ 22	158.634 10	0.683 14	0.0023
γ 27	179.52 6	0.136 14	0.0005
γ 37	269.462 10	13.6 3	0.0781
γ 38	288.18 3	0.151 7	0.0009
γ 40	323.870 10	3.88 12	0.0268
γ 41	328.38 3	0.195 10	0.0014
γ 43	338.28 10	2.73 12	0.0197
γ 44	342.90 4	0.220 15	0.0016
γ 45	349.80 20	0.34 8	0.0025
γ 48	371.675 15	0.472 24	0.0037
γ 56	445.031 12	1.18 5	0.0112

50 weak γ's omitted:
Eγ(avg) = 292.1; ΣIγ = 1.35%

● ^{224}Ra α Decay (3.62 d 1) I (min) = 0.10%
Feeds ^{220}Rn

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	8.7	0.45 5	≈0
ce-K- 1	142.577 14	0.442 20	0.0013
ce-L- 1	222.93 4	0.490 22	0.0023
ce-MNO- 1	236.499 8	0.174 6	0.0009
α 1	5449	4.9 4	0.569
α 2	5685.56 20	95.1 4	11.52

3 weak α's omitted:
Eα(avg) = 5093.6; ΣIα = 0.02%

(Continued)

^{224}Ra α Decay (3.62 d 1) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	11.7	0.40 5	≈0
X-ray $K\alpha_2$	81.070 20	0.126 7	0.0002
X-ray $K\alpha_1$	83.780 20	0.209 10	0.0004
γ 1	240.981 6	3.95 13	0.0203

4 weak γ's omitted:
Eγ(avg) = 464.9; ΣIγ = 0.02%

● ^{225}Ra β^- Decay (14.8 d 2) I(min) = 0.10%
Feeds ^{225}Ac

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	9.28	15.1 19	0.0030
ce-L- 1	20.16 20	30.9 22	0.0133
ce-MNO- 1	35.00 20	10.1 7	0.0076
β- 1 max	322 12		
avg	90 4	72 5	0.138
β- 2 max	362 12		
avg	103 4	28 5	0.0614
total β-			
avg	94 4	100 7	0.199
X-ray L	12.7	15.8 19	0.0043
γ 1	40.00 20	31.0 20	0.0264

● ^{225}Ac α Decay (10.0 d 1) I(min) = 0.10%
Feeds ^{221}Fr

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
ce-K- 24	7.26 10	2.15 23	0.0003
ce-L- 1	7.36 11	7 4	0.0011
Auger-L	8.9	22 4	0.0042
ce-L- 2	17.96 11	13 3	0.0050
ce-L- 3	19.86 11	6.4 14	0.0027
ce-MNO- 1	21.35 10	2.3 15	0.0011
ce-K- 29	23.66 10	0.17 16	≈0
ce-MNO- 2	31.95 10	4.6 9	0.0032
ce-MNO- 3	33.85 10	2.3 5	0.0016
ce-L- 7	44.26 7	4.8 5	0.0045
ce-L- 8	45.46 11	0.9 4	0.0009
ce-K- 33	48.95 6	0.101 12	0.0001
ce-L- 9	51.16 11	0.15 3	0.0002
ce-L- 11	53.06 11	0.290 25	0.0003
ce-L- 12	54.96 11	0.48 15	0.0006
ce-L- 14	55.76 21	1.3 16	0.0015
ce-K- 35	56.11 6	0.97 12	0.0012
ce-L- 15	56.26 21	0.6 5	0.0007
ce-M- 7	58.25 5	1.14 11	0.0014
ce-MNO- 8	59.45 10	0.32 12	0.0004
ce-NOP- 7	61.75 5	0.40 4	0.0005
ce-L- 16	64.26 4	1.5 10	0.0021
ce-MNO-11	67.05 10	0.106 10	0.0002
ce-L- 17	68.74 7	0.97 10	0.0014
ce-MNO-12	68.95 10	0.18 5	0.0003
ce-M- 14	69.75 20	0.3 5	0.0005
ce-MNO-15	70.25 20	0.22 16	0.0003
ce-NOP-14	73.25 20	0.12 15	0.0002
ce-L- 18	76.26 21	0.44 17	0.0007
ce-L- 19	77.66 21	0.15 3	0.0003
ce-M- 16	78.248 5	0.4 3	0.0007
ce-L- 20	80.91 11	1.58 18	0.0027
ce-L- 21	81.16 11	0.140 17	0.0002
ce-NOP-16	81.747 5	0.13 10	0.0002
ce-L- 22	82.16 11	0.188 6	0.0003
ce-MNO-17	82.73 5	0.31 4	0.0006
ce-L- 24	89.76 11	0.66 8	0.0013
ce-MNO-18	90.25 20	0.14 6	0.0003
ce-K- 40	94.55 8	0.17 5	0.0003
ce-M- 20	94.90 10	0.38 5	0.0008
ce-NOP-20	98.40 10	0.135 15	0.0003
ce-MNO-24	103.75 10	0.225 25	0.0005
ce-L- 35	138.61 7	0.195 20	0.0006
α 1	5286 3	0.230 10	0.0259
α 2	5444 3	0.130 10	0.0151
α 3	5553 4	0.10	0.0118
α 4	5579 3	1.20 10	0.143
α 5	5608 3	1.10 10	0.131
α 6	5636.2 20	4.4 3	0.528
α 7	5681.0 20	1.40 20	0.169
α 8	5722.6 25	2.9 5	0.353
α 9	5731.0 20	10.00 10	1.22
α 10	5791 4	8.6	1.06
α 11	5792 3	18.1 20	2.23
α 12	5829.0 20	51.6 15	6.41

24 weak α's omitted:
Eα(avg) = 5450.4; ΣIα = 0.38%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	12	21 4	0.0054
γ 7	62.90 5	0.55 5	0.0007
γ 13	73.83 5	0.32 3	0.0005
γ 16	82.9	0.15 4	0.0003
X-ray $K\alpha_2$	83.230 20	1.02 9	0.0018
X-ray $K\alpha_1$	86.100 20	1.68 15	0.0031
γ 17	87.38 5	0.29 3	0.0005
γ 18	94.90 20	0.16 6	0.0003
X-ray Kβ	97.5	0.77 7	0.0016
γ 20	99.55 10	0.65 7	0.0014
γ 21	99.80 10	1.70 20	0.0036
γ 24	108.40 10	0.28 3	0.0006
γ 25	111.50 10	0.32 3	0.0008
γ 28	123.80 10	0.190 20	0.0005
γ 31	138.2	0.20 10	0.0006
γ 32	145.00 20	0.13 3	0.0004
γ 33	150.09 5	0.71 8	0.0023
γ 34	154.00 10	0.19 5	0.0006
γ 35	157.25 5	0.31 3	0.0010
γ 39	188.00 10	0.46 5	0.0018
γ 40	195.69 7	0.140 20	0.0006
γ 46	253.50 7	0.100 10	0.0005
γ 50	452.40 10	0.110 10	0.0011

34 weak γ's omitted:
Eγ(avg) = 165.2; ΣIγ = 0.93%

● ^{226}Ra α Decay (1600 y 7) I(min) = 0.10%
Feeds ^{222}Rn

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	8.7	0.90 9	0.0002
ce-K- 1	87.807 16	0.633 20	0.0012
ce-L- 1	168.16 4	1.20 4	0.0043
ce-M- 1	181.729 12	0.319 10	0.0012
ce-NOP- 1	185.114 12	0.111 4	0.0004
α 1	4601.9 5	5.55 5	0.544
α 2	4784.50 25	94.45 5	9.63

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	11.7	0.80 9	0.0002
X-ray Kα$_2$	81.070 20	0.180 7	0.0003
X-ray Kα$_1$	83.780 20	0.299 11	0.0005
X-ray Kβ	94.9	0.136 6	0.0003
γ 1	186.211 10	3.28 3	0.0130

● ^{226}Th α Decay (30.9 m) I (min) = 0.10%
Feeds ^{222}Ra

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-K- 1	7.20 4	0.98 7	0.0002
Auger-L	9	7.5 9	0.0015
ce-L- 1	91.88 3	14.3 10	0.0280
ce-M- 1	106.30 3	3.9 3	0.0088
ce-NOP- 1	109.91 3	1.41 10	0.0033
α 1	6025 5	0.205 8	0.0263
α 2	6040 5	0.187 6	0.0241
α 3	6100 5	1.27 5	0.165
α 4	6234 5	22.80 20	3.03
α 5	6338 5	75.5 3	10.19
X-ray L	12.3	7.5 9	0.0020
X-ray Kα$_2$	85.430 10	0.281 20	0.0005
X-ray Kα$_1$	88.470 10	0.46 4	0.0009
X-ray Kβ	100	0.212 16	0.0005
γ 1	111.12 3	3.29 20	0.0078
γ 2	131.02 5	0.278 13	0.0008
γ 4	190.30 5	0.109 6	0.0004
γ 5	206.23 5	0.189 8	0.0008
γ 6	242.12 5	0.87 4	0.0045

● ^{227}Ac α Decay (21.773 y 3) I (min) = 0.10%
%α Decay = 1.380 4
Feeds ^{223}Fr
See also ^{227}Ac β^- Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-MNO- 1	8.048 5	0.50 7	≈0
α 1	4938.1 20	0.50 5	0.0523
α 2	4950.5 20	0.68 5	0.0713

17 weak α's omitted:
Eα(avg) = 4836.8; ΣIα = 0.19%

31 weak γ's omitted:
Eγ(avg) = 115.3; ΣIγ = 0.10%

● ^{227}Ac β^- Decay (21.773 y 3) I (min) = 0.10%
%β^- Decay = 98.620 4
Feeds ^{227}Th
See also ^{227}Ac α Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-L- 3	4.03 20	2.2159	0.0002
ce-MNO- 1	4.12 10	41.420 1	0.0036
Auger-L	9.48	1.06 11	0.0002
ce-MNO- 2	10.02 10	6.875	0.0015
ce-MNO- 3	19.32 20	0.7337	0.0003
β- 1 max	19.2 20		
avg	4.8 5	10	0.0010
β- 2 max	34.4 20		
avg	8.7 6	35	0.0065
β- 3 max	43.7 20		
avg	11.1 6	54	0.0128
total β-			
avg	9.6 7	99	0.0203
X-ray L	13	1.15 11	0.0003

3 weak γ's omitted:
Eγ(avg) = 17.4; ΣIγ = 0.04%

● ^{227}Th α Decay (18.718 d 5) I (min) = 0.10%
Feeds ^{223}Ra

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-L- 4	1.06 20	1.1 4	≈0
ce-MNO- 1	1.5 3	0.46	≈0
ce-MNO- 3	3.48 10	3	0.0002
Auger-L	9	42 8	0.0081
ce-K- 57	9.18 10	0.152 21	≈0
ce-L- 6	10.3633 15	0.532 16	0.0001
ce-L- 7	10.673 11	42 13	0.0095
ce-L- 8	12.393 20	14 4	0.0038
ce-MNO- 4	15.48 20	0.40 12	0.0001
ce-L- 12	24.46 20	0.177 24	≈0
ce-MNO- 6	24.7780 15	0.17	≈0
ce-L- 14	24.8633 15	0.7 3	0.0004
ce-L- 16	25.1 5	1.7 16	0.0009
ce-MNO- 7	25.088 11	15 5	0.0078
ce-MNO- 8	26.808 20	5.0 14	0.0028
ce-L- 18	28.96 10	2.1 4	0.0013
ce-L- 20	30.66 10	0.11 9	≈0
ce-L- 21	30.86 10	4.5 3	0.0029
ce-L- 22	31.5 5	1.6 15	0.0011
ce-L- 24	34.9633 15	0.119 4	≈0
ce-L- 26	37.3133 15	0.29 3	0.0002
ce-MNO-14	39.2780 15	0.24 11	0.0002
ce-MNO-16	39.5 5	0.6 6	0.0005
ce-L- 28	42.26 20	6.4 15	0.0058
ce-MNO-18	43.38 10	0.75 11	0.0007
ce-L- 31	43.5 3	0.11 5	0.0001
ce-M- 21	45.28 10	1.09 7	0.0011
ce-M- 22	45.9 5	0.4 5	0.0004
ce-NOP-21	48.89 10	0.369 21	0.0004
ce-L- 35	49.46 10	0.44 14	0.0005
ce-NOP-22	49.5 5	0.16 15	0.0002
ce-MNO-26	51.7280 15	0.103 9	0.0001
ce-L- 38	53.66 10	0.15 11	0.0002
ce-L- 39	54.46 10	0.36 25	0.0004
ce-M- 28	56.68 20	1.7 4	0.0021
ce-NOP-28	60.29 20	0.63 14	0.0008
ce-L- 42	60.56 10	0.31 4	0.0004
ce-MNO-35	63.88 10	0.15 5	0.0002
Auger-K	65.9	0.13 8	0.0002
ce-MNO-39	68.88 10	0.13 10	0.0002
ce-L- 44	74.76 10	0.140 15	0.0002
ce-L- 45	75.96 20	0.107 19	0.0002
ce-L- 49	81.2 5	0.56 12	0.0010
ce-L- 56	93.86 10	0.7 4	0.0014
ce-MNO-49	95.6 5	0.21 5	0.0004
ce-K- 80	101.08 20	0.28 6	0.0006
ce-MNO-56	108.28 10	0.25 15	0.0006
ce-K- 90	131.0 3	0.52 10	0.0014
ce-K- 91	132.08 10	0.57 3	0.0016
ce-K- 94	146.18 10	0.27 23	0.0008
ce-K- 98	152.28 10	0.66 6	0.0021

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
^{227}Th α Decay (18.718 d 5)		(Continued)	
ce-K-111	182.18 10	0.98 6	0.0038
ce-K-115	192.68 20	0.24 3	0.0010
ce-K-118	200.48 20	0.64 6	0.0027
ce-K-121	208.68 20	0.221 24	0.0010
ce-L- 91	216.76 10	0.107 6	0.0005
ce-K-129	230.28 10	0.38 4	0.0019
ce-L- 98	236.96 10	0.72 5	0.0036
ce-MNO-98	251.38 10	0.260 17	0.0014
ce-L-111	266.86 10	0.192 11	0.0011
ce-L-118	285.16 20	0.130 11	0.0008
α 1	5585.9 16	0.176 6	0.0209
α 2	5600.6 18	0.170 17	0.0203
α 3	5613.3 16	0.216 8	0.0258
α 4	5668.0 15	2.06 12	0.249
α 5	5693.0 16	1.50 10	0.182
α 6	5700.8 16	3.63 20	0.441
α 7	5709.0 16	8.2 3	0.997
α 8	5713.2 16	4.89 20	0.595
α 9	5757.06 15	20.3 10	2.49
α 10	5762.3 15	0.228 10	0.0280
α 11	5795.5 15	0.311 5	0.0384
α 12	5807.5 15	1.270 20	0.157
α 13	5866.6	2.42 10	0.302
α 14	5909.9 15	0.174 8	0.0219
α 15	5916.0 15	0.78 3	0.0983
α 16	5959.7 15	3.00 15	0.381
α 17	5977.92 10	23.4 10	2.98
α 18	6008.8 15	2.90 15	0.371
α 19	6038.21 15	24.5 10	3.15
26 weak α's omitted: Eα(avg)= 5562.5; ΣIα= 0.20%			
γ 3	8.30 10	0.14	≈0
X-ray L	12.3	42 8	0.0110
γ 4	20.30 20	0.20 6	≈0
γ 7	29.910 10	0.10 3	≈0
γ 12	43.70 20	0.23 3	0.0002
γ 20	49.90 10	0.20 15	0.0002
γ 21	50.10 10	8.4 4	0.0090
γ 30	62.20 10	0.24 3	0.0003
γ 42	79.80 10	2.00 20	0.0034
X-ray Kα$_2$	85.430 10	1.41 9	0.0026
X-ray Kα$_1$	88.470 10	2.32 14	0.0044
γ 44	94.00 10	1.40 14	0.0028
X-ray Kβ	100	1.06 7	0.0023
γ 56	113.10 10	0.17 10	0.0004
γ 57	113.10 10	0.54 7	0.0013
γ 58	117.20 10	0.180 20	0.0004
γ 65	141.20 10	0.140 10	0.0004
γ 79	204.30 20	0.23 4	0.0010
γ 80	205.00 20	0.17 3	0.0007
γ 81	206.00 20	0.26 4	0.0011
γ 83	210.60 10	1.26 9	0.0057
γ 90	234.9 3	0.46 8	0.0023
γ 91	236.00 10	11.5 5	0.0578
γ 94	250.10 10	0.49 5	0.0026
γ 96	252.50 20	0.11 3	0.0006
γ 97	254.7 3	0.91 12	0.0049
γ 98	256.20 10	6.3 4	0.0344
γ 99	262.90 20	0.100 10	0.0006
γ 104	273.00 20	0.49 7	0.0028
γ 108	281.30 10	0.170 20	0.0010
γ 111	286.10 10	1.60 8	0.0098
γ 115	296.60 20	0.42 4	0.0027
γ 116	299.80 10	1.84 14	0.0117
γ 117	300.3 3	0.28 4	0.0018
γ 118	304.40 20	1.35 11	0.0088
γ 121	312.60 20	0.43 4	0.0029
γ 122	314.80 20	0.42 4	0.0028
γ 128	329.70 10	2.90 16	0.0204
γ 129	334.20 10	1.15 10	0.0082
γ 132	342.40 10	0.34 3	0.0025
γ 135	350.50 20	0.118 12	0.0009
205 weak γ's omitted: Eγ(avg)= 185.0; ΣIγ= 1.73%			

● ^{228}Ra β^- Decay (5.75 y 3) I (min) = 0.10%
Feeds ^{228}Ac

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-MNO- 2	1.668 5	100	0.0036
β- 1 max	38.9 10		
avg	9.9 3	100	0.0211

● ^{228}Ac β^- Decay (6.13 h) I (min) = 0.10%
Feeds ^{228}Th

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	9.48	36 5	0.0073
ce-K- 3	19.43 5	0.75 23	0.0003
ce-L- 1	37.31 5	57 4	0.0454
ce-K- 7	44.5 3	0.13 4	0.0001
ce-M- 1	52.60 5	15.6 9	0.0175
ce-NOP- 1	56.45 5	5.7 4	0.0069
Auger-K	69.2	0.18 15	0.0003
ce-K- 9	74.85 20	5 4	0.0077
ce-L- 2	78.98 8	4.0 16	0.0067
ce-M- 2	94.27 8	1.0 4	0.0019
ce-NOP- 2	98.12 8	0.36 14	0.0007
ce-K- 13	99.63 10	0.30 10	0.0006
ce-L- 3	108.61 5	7.1 22	0.0165
ce-M- 3	123.90 5	2.0 6	0.0052
ce-NOP- 3	127.75 5	0.73 23	0.0020
ce-K- 20	160.58 10	0.14 3	0.0005
ce-L- 9	164.03 20	1.0 7	0.0034
ce-K- 21	169.3 10	0.19 6	0.0007
ce-MNO- 9	179.32 20	0.30 20	0.0011
ce-K- 27	228.67 10	0.26 6	0.0013
ce-K- 28	231.4 3	0.12 10	0.0006
ce-K- 41	353.35 10	0.140 16	0.0011
ce-K- 87	685.05 20	0.15 10	0.0022
ce-K-100	801.42 3	0.252 12	0.0043
ce-K-110	859.46 10	0.135 15	0.0025
β- 1 max	127 7		
avg	33.3 20	0.197 22	0.0001
β- 2 max	193 7		
avg	51.7 20	0.29 4	0.0003
β- 3 max	237 7		
avg	64.6 21	0.160 22	0.0002
β- 4 max	244 7		
avg	66.7 21	0.215 20	0.0003
β- 5 max	377 7		
avg	107.2 22	0.216 25	0.0005
β- 6 max	393 7		
avg	112.3 23	0.37 5	0.0009
β- 7 max	401 7		
avg	114.9 23	0.158 21	0.0004
β- 8 max	413 7		
avg	118.5 23	1.59 20	0.0040

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β− 9 max	449 7		
avg	130.0 23	2.42 11	0.0067
β−10 max	454 7		
avg	131.7 23	1.54 14	0.0043
β−11 max	491 7		
avg	143.8 23	4.9 6	0.0150
β−12 max	494 7		
avg	144.9 23	0.78 8	0.0024
β−13 max	499 7		
avg	146.4 23	1.30 17	0.0041
β−14 max	598 7		
avg	179.6 24	0.26 7	0.0010
β−15 max	606 7		
avg	182.1 24	8 3	0.0310
β−16 max	687 7		
avg	210.0 25	0.22 7	0.0010
β−17 max	793 7		
avg	247 3	0.14 3	0.0007
β−18 max	910 7		
avg	290 3	0.82 12	0.0051
β−19 max	962 7		
avg	309 3	0.19 5	0.0013
β−20 max	969 7		
avg	311 3	3.3 4	0.0219
β−21 max	983 7		
avg	317 3	7 4	0.0473
β−22 max	1014 7		
avg	328 3	6.6 7	0.0461
β−23 max	1046 7		
avg	340 3	0.24 21	0.0017
β−24 max	1115 7		
avg	366 3	3.4 7	0.0265
β−25 max	1121 7		
avg	368 3	0.46 8	0.0036
β−26 max	1158 7		
avg	382 3	0.21 5	0.0017
β−27 max	1168 7		
avg	386 3	32 5	0.263
β−28 max	1193 7		
avg	396 3	0.15 4	0.0013
β−29 max	1618 7		
avg	538 3	0.11 10	0.0013
β−30 max	1741 7		
avg	611 3	12 3	0.156
β−31 max	2079 7		
avg	748 3	8 6	0.127
total β−			
avg	375 4	97 10	0.778

2 weak β's omitted:
Eβ(avg) = 78.8; ΣIβ= 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	13	39 5	0.0108
γ 1	57.78 5	0.501 23	0.0006
X-ray Kα₂	89.9530 20	2.1 10	0.0041
X-ray Kα₁	93.3500 20	3.5 15	0.0069
γ 2	99.45 8	1.3 5	0.0028
X-ray Kβ	105	1.6 7	0.0036
γ 3	129.08 5	2.8 9	0.0076
γ 6	146.1 3	0.21 6	0.0007
γ 7	154.2 3	0.9 3	0.0031
γ 10	191.20 20	0.12 4	0.0005
γ 11	199.70 20	0.33 12	0.0014
γ 12	204.40 20	0.16 6	0.0007
γ 13	209.28 10	4.4 14	0.0198
γ 14	210.0 8	0.216 8	0.0010
γ 20	270.23 10	3.6 8	0.0207
γ 21	279.0 10	0.22 7	0.0013
γ 23	321.7 6	0.24 5	0.0017
γ 24	327.64 10	3.2 7	0.0224
γ 26	332.36 10	0.44 9	0.0031
γ 27	338.32 10	11.4 23	0.0818
γ 28	341.1 3	0.42 12	0.0030
γ 35	409.51 10	2.13 24	0.0186
γ 38	440.3 8	0.14 3	0.0013
γ 41	463.00 10	4.4 5	0.0437
γ 44	478.2 8	0.23 5	0.0023
γ 48	503.6 3	0.20 5	0.0022
γ 49	509.6 10	0.47 12	0.0051
γ 52	523.0 10	0.12 3	0.0013
γ 54	546.3 3	0.21 5	0.0024
γ 56	562.3 5	0.94 15	0.0113
γ 57	570.7 10	0.18 6	0.0022
γ 58	572.1 10	0.16 5	0.0019
γ 59	583.20 20	0.14 5	0.0018
γ 62	623.8 5	0.11 3	0.0015
γ 75	701.5 5	0.19 4	0.0028
γ 76	707.10 20	0.15 5	0.0023
γ 77	727.0 8	0.78 23	0.0120
γ 81	755.18 10	1.05 17	0.0169
γ 82	772.17 10	1.55 23	0.0255
γ 84	782.0 5	0.53 9	0.0088
γ 87	794.70 20	4.6 5	0.0783
γ 91	830.5 3	0.59 7	0.0104
γ 92	835.5 3	1.75 18	0.0311
γ 93	840.0 4	0.94 9	0.0169
γ 99	904.5 3	0.83 9	0.0160
γ 100	911.07 3	27.7 10	0.538
γ 106	944.1 8	0.102 20	0.0021
γ 107	948.0 8	0.116 23	0.0023
γ 108	958.5 5	0.30 7	0.0062
γ 109	964.6 3	5.2 6	0.107
γ 110	969.11 10	16.6 18	0.343
γ 113	987.80 20	0.18 3	0.0038
γ 118	1033.2 3	0.22 4	0.0048
γ 122	1065.1 5	0.141 23	0.0032
γ 123	1095.7 5	0.127 20	0.0030
γ 125	1110.40 20	0.33 6	0.0079
γ 130	1153.6 5	0.152 23	0.0037
γ 135	1246.40 20	0.54 6	0.0143
γ 138	1287.5 5	0.114 18	0.0031
γ 149	1459.30 20	1.00 15	0.0310
γ 152	1495.8 5	1.00 12	0.0318
γ 153	1501.5 5	0.55 6	0.0177
γ 159	1556.9 6	0.19 4	0.0064
γ 161	1580.2 5	0.69 12	0.0233
γ 162	1588.00 20	3.5 6	0.120
γ 164	1624.7 5	0.30 7	0.0105
γ 165	1630.4 4	1.86 8	0.0646
γ 166	1638.0 5	0.53 12	0.0184
γ 167	1666.30 20	0.20 4	0.0071
γ 183	1887.00 20	0.105 23	0.0042

122 weak γ's omitted:
Eγ(avg) = 947.8; ΣIγ= 4.12%

● ^{228}Th α Decay (1.9132 y 9) I (min) = 0.10%
Feeds ^{224}Ra

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	9	9.6 11	0.0019
ce-L- 2	65.134 4	19.1 11	0.0265
ce-M- 2	79.549 4	5.2 3	0.0088
ce-NOP- 2	83.163 4	1.88 11	0.0033
α 1	5175	0.18	0.0198
α 2	5212	0.36	0.0400
α 3	5340.54 15	26.70 20	3.04
α 4	5423.33 22	72.70 20	8.40

5 weak α's omitted:
Eα(avg) = 5138.7; ΣIα= 0.05%

(Continued)

^{228}Th α Decay (1.9132 y 9) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	12.3	9.6 11	0.0025
γ 2	84.371 3	1.21 6	0.0022
γ 3	131.610 4	0.124 6	0.0003
γ 8	215.979 5	0.239 13	0.0011

10 weak γ's omitted:
Eγ(avg) = 172.5; ΣIγ = 0.11%

● ^{229}Th α Decay (7.34E3 y 16) I (min) = 0.10%
Feeds ^{225}Ra

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-K- 14	3.25 5	9.1 3	0.0006
ce-L- 3	6.153 20	48.9 15	0.0064
Auger-L	9	81 9	0.0157
ce-L- 4	12.06 20	7.59 23	0.0019
ce-MNO- 2	12.54 3	24.45	0.0065
ce-MNO- 3	20.568 20	17.243	0.0076
ce-K- 15	20.58 10	8.7 3	0.0038
ce-K- 16	20.78 10	4.33 13	0.0019
ce-L- 5	23.52 3	10.1 3	0.0051
ce-MNO- 4	26.48 20	2.51736	0.0014
ce-K- 17	28.05 5	1.96 6	0.0012
ce-K- 18	33.11 6	8.8 3	0.0062
ce-L- 8	37.36 3	4.28 13	0.0034
ce-MNO- 5	37.94 3	3.44352	0.0028
ce-K- 19	39.03 10	2.05 7	0.0017
ce-K- 20	44.38 20	0.204 7	0.0002
ce-L- 9	48.94 7	1.08 4	0.0011
ce-L- 10	49.66 4	4.66 14	0.0049
ce-K- 22	50.48 7	2.55 8	0.0027
ce-M- 8	51.78 3	1.02 3	0.0011
ce-K- 23	52.56 4	4.16 13	0.0047
ce-NOP- 8	55.39 3	0.362 11	0.0004
ce-L- 11	55.96 7	14.2 5	0.0169
ce-MNO- 9	63.36 7	0.36516	0.0005
ce-M- 10	64.08 4	1.26 4	0.0017
Auger-K	65.9	1.5 9	0.0021
ce-L- 12	67.06 10	2.73 9	0.0039
ce-L- 13	67.20 5	11.6 4	0.0166
ce-NOP-10	67.69 4	0.452 14	0.0007
ce-K- 25	68.98 10	0.626 19	0.0009
ce-M- 11	70.38 7	3.85 12	0.0058
ce-NOP-11	73.99 7	1.38 5	0.0022
ce-K- 27	80.08 10	0.324 10	0.0006
ce-M- 12	81.48 10	0.710 22	0.0012
ce-M- 13	81.62 5	2.78 9	0.0048
ce-NOP-12	85.09 10	0.255 8	0.0005
ce-NOP-13	85.23 5	0.99 3	0.0018
ce-L- 14	87.93 5	1.71 6	0.0032
ce-K- 28	89.71 6	9.3 3	0.0178
ce-M- 14	102.35 5	0.407 13	0.0009
ce-L- 15	105.26 10	1.62 5	0.0036
ce-L- 16	105.46 10	0.808 25	0.0018
ce-NOP-14	105.96 5	0.146 5	0.0003
ce-K- 29	107.05 10	5.19 16	0.0118
ce-L- 17	112.73 5	0.366 11	0.0009
ce-K- 30	114.18 20	0.207 7	0.0005
ce-L- 18	117.79 6	1.65 5	0.0041
ce-M- 15	119.68 10	0.388 12	0.0010
ce-MNO-16	119.88 10	0.262	0.0007
ce-NOP-15	123.29 10	0.138 5	0.0004
ce-L- 19	123.71 10	0.381 12	0.0010
ce-MNO-17	127.15 5	0.118483	0.0003
ce-M- 18	132.21 6	0.392 12	0.0011
ce-L- 22	135.16 7	0.473 15	0.0014
ce-NOP-18	135.82 6	0.140 5	0.0004
ce-L- 23	137.24 4	0.772 24	0.0023
ce-MNO-19	138.13 10	0.1238	0.0004
ce-MNO-22	149.58 7	0.153816	0.0005
ce-MNO-23	151.66 4	0.25	0.0008
ce-L- 25	153.66 10	0.116 4	0.0004
ce-L- 26	160.56 20	0.255 8	0.0009
ce-L- 27	164.76 10	0.104 4	0.0004
ce-L- 28	174.39 6	1.73 6	0.0064
ce-M- 28	188.81 6	0.413 13	0.0017
ce-L- 29	191.73 10	0.97 3	0.0039
ce-NOP-28	192.42 6	0.146 5	0.0006
ce-MNO-29	206.15 10	0.311712	0.0014
α 1	4688	0.15	0.0150
α 2	4761 3	0.63	0.0639
α 3	4797.8 12	1.27	0.130
α 4	4809	0.22	0.0225
α 5	4814.6 12	9.30 8	0.954
α 6	4833	0.29	0.0299
α 7	4837	4.8	0.495
α 8	4845.3 12	56.20 20	5.80
α 9	4861	0.18	0.0186
α 10	4901.0 12	10.20 8	1.06
α 11	4929 3	0.1	0.0115
α 12	4967.5 12	5.97 6	0.632
α 13	4978.5 12	3.17 4	0.336
α 14	5033	0.24	0.0257
α 15	5050	5.2	0.559
α 16	5052	1.6	0.172

12 weak α's omitted:
Eα(avg) = 4765.5; ΣIα = 0.27%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	12.3	81 9	0.0212
γ 2	17.36 3	0.1734	≈0
γ 4	31.30 20	4	0.0027
γ 5	42.76 3	0.1632	0.0001
γ 8	56.60 3	0.3264	0.0004
γ 9	68.18 7	0.1	0.0001
γ 10	68.90 4	0.1122	0.0002
γ 11	75.20 7	0.52	0.0008
X-ray $K\alpha_2$	85.430 10	16.5 4	0.0300
γ 12	86.30 10	0.3774	0.0007
γ 13	86.44 5	3	0.0056
X-ray $K\alpha_1$	88.470 10	27.1 6	0.0511
X-ray Kβ	100	12.4 3	0.0265
γ 14	107.17 5	0.8364	0.0019
γ 15	124.50 10	1.224	0.0032
γ 16	124.70 10	0.612	0.0016
γ 17	131.97 5	0.3264	0.0009
γ 18	137.03 6	1.632	0.0048
γ 19	142.95 10	0.4284	0.0013
γ 20	148.30 20	1.3872	0.0044
γ 22	154.40 7	0.663	0.0022
γ 23	156.48 4	1.122	0.0037
γ 25	172.90 10	0.2244	0.0008
γ 26	179.80 20	0.5	0.0020
γ 27	184.00 10	0.2346	0.0009
γ 28	193.63 6	4.59	0.0189
γ 29	210.97 10	3.264	0.0147
γ 30	218.10 20	0.1428	0.0007

11 weak γ's omitted:
Eγ(avg) = 130.8; ΣIγ = 0.07%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)

● ^{230}Th α Decay (7.7E4 y 3) I (min) = 0.10%
Feeds ^{226}Ra
% Spontaneous Fission ⩽ 5E−11

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	9	8.4 10	0.0016
ce-L- 1	48.4353 25	16.9 11	0.0174
ce-M- 1	62.8500 25	4.6 3	0.0061
ce-NOP- 1	66.464 3	1.64 11	0.0023
α 1	4476	0.12	0.0114
α 2	4621.0 15	23.40 10	2.30
α 3	4687.5 15	76.3 3	7.62

5 weak α's omitted:
Eα(avg) = 4367.8; ΣIα = 0.31%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	12.3	8.4 10	0.0022
γ 1	67.6720 20	0.373 21	0.0005

10 weak γ's omitted:
Eγ(avg) = 168.1; ΣIγ = 0.07%

● ^{230}Pa EC Decay (17.4 d 5) I (min) = 0.10%
%EC Decay = 90.5 6
Feeds ^{230}Th
See also ^{230}Pa β^- Decay
%α Decay = 0.0032 1

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	9.48	55 7	0.0111
ce-L- 1	32.73 5	41 5	0.0283
ce-M- 1	48.02 5	11.1 13	0.0113
ce-NOP- 1	51.87 5	4.1 5	0.0045
Auger-K	69.2	1.6 11	0.0023
ce-L- 2	100.428 20	1.19 21	0.0025
ce-M- 2	115.718 20	0.33 6	0.0008
ce-K- 6	118.3 4	0.32 5	0.0008
ce-NOP- 2	119.570 20	0.121 22	0.0003
ce-K- 20	290.30 10	0.157 14	0.0010
ce-K- 23	334.10 5	1.11 11	0.0079
ce-K- 26	353.95 10	0.157 16	0.0012
ce-L- 23	423.28 5	0.219 21	0.0020
ce-K- 37	514.8 3	0.18 6	0.0020
ce-K- 38	525.25 20	0.12 3	0.0014
X-ray L	13	60 7	0.0165
γ 1	53.20 5	0.24 3	0.0003
X-ray $K\alpha_2$	89.9530 20	18.8 16	0.0360
X-ray $K\alpha_1$	93.3500 20	30.7 25	0.0610
X-ray Kβ	105	14.2 12	0.0317
γ 2	120.900 20	0.34 6	0.0009
γ 13	316.80 20	0.16 3	0.0011
γ 18	380.15 10	0.30 6	0.0024
γ 19	397.80 20	1.85 17	0.0156
γ 20	399.95 10	0.62 5	0.0053
γ 22	440.8 10	0.11 4	0.0010
γ 23	443.75 5	5.4 5	0.0513
γ 25	454.95 5	6.2 5	0.0600
γ 26	463.60 10	0.81 8	0.0080
γ 29	508.0 10	0.22 11	0.0024
γ 30	508.20 5	3.5 3	0.0382
γ 31	518.50 10	1.95 17	0.0216
γ 32	556.00 10	0.20 3	0.0023
γ 33	571.10 10	1.07 9	0.0130
γ 34	581.80 20	0.130 14	0.0016
γ 36	619.69 10	0.163 25	0.0022
γ 41	728.23 7	1.87 15	0.0291
γ 43	781.35 5	1.47 12	0.0244
γ 46	898.65 10	5.8 5	0.110
γ 47	918.50 10	8.1 7	0.159
γ 48	951.95 10	28.8 20	0.584
γ 49	953.0 10	0.16 4	0.0033
γ 50	956.3 3	1.6 3	0.0321
γ 51	959.3 3	0.49 12	0.0100
γ 54	1009.60 20	1.07 9	0.0230
γ 55	1026.05 10	1.44 12	0.0316
γ 56	1074.68 10	0.74 6	0.0170

28 weak γ's omitted:
Eγ(avg) = 537.2; ΣIγ = 0.92%

● ^{230}Pa β^- Decay (17.4 d 5) I (min) = 0.10%
%β^- Decay = 9.5 6
Feeds ^{230}U
See also ^{230}Pa EC Decay
%α Decay = 0.0032 1

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	9.89	3.0 7	0.0006
ce-L- 1	29.99 5	6.8 12	0.0044
ce-M- 1	46.20 5	1.9 4	0.0018
ce-NOP- 1	50.31 5	0.70 13	0.0008
β- 1 max	192 5		
avg	51.6 15	0.20 4	0.0002
β- 2 max	507 5		
avg	148.7 17	9.3 16	0.0295
total β-			
avg	146.1 18	9.5 16	0.0297

1 weak β's omitted:
Eβ(avg) = 36.2; ΣIβ = 0.05%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	13.6	3.8 8	0.0011
γ 4	314.8 3	0.106 20	0.0007

5 weak γ's omitted:
Eγ(avg) = 297.6; ΣIγ = 0.17%

● ^{230}U α Decay (20.8 d) I (min) = 0.10%
Feeds ^{226}Th

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	9.48	11.3 15	0.0023
ce-L- 1	51.73 4	23.4 17	0.0257
ce-M- 1	67.02 4	6.4 5	0.0092
ce-NOP- 1	70.87 4	2.37 18	0.0036
ce-L- 3	133.76 3	0.146 13	0.0004
α 1	5662.6 7	0.26 3	0.0314
α 2	5667.2 7	0.38 4	0.0459
α 3	5817.7 7	32.00 20	3.97
α 4	5888.5 7	67.4 4	8.45

3 weak α's omitted:
Eα(avg) = 5583.9; ΣIα = 0.01%

(Continued)

^{230}U α Decay (20.8 d) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	13	12.2 15	0.0034
γ 1	72.20 4	0.60 4	0.0009
γ 3	154.23 3	0.126 11	0.0004
γ 7	230.37 5	0.122 10	0.0006

8 weak γ's omitted:
Eγ(avg)= 169.9; ΣIγ= 0.08%

• ^{231}Th β^- Decay (25.52 h 1) I(min) = 0.10%
Feeds ^{231}Pa

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
ce-MNO- 1	3.8331 16	0.49 11	≈0
ce-L- 5	4.535 20	49 4	0.0047
ce-MNO- 2	4.8831 16	0.75 9	≈0
Auger-L	9.68	60 8	0.0124
ce-MNO- 3	11.8331 16	40 30	0.0092
ce-MNO- 4	12.7031 16	29 17	0.0077
ce-MNO- 5	20.273 20	16.7 14	0.0072
ce-L- 7	22.98 17	0.17 16	≈0
ce-K- 25	23.079 21	0.50 9	0.0002
ce-K- 29	33.339 21	0.11 4	≈0
ce-L- 8	37.465 20	55 4	0.0436
ce-L- 9	42.76 3	0.6 3	0.0005
ce-L- 10	47.40 10	0.31 8	0.0003
ce-K- 30	50.519 21	0.60 8	0.0006
ce-M- 8	53.203 20	15.1 10	0.0171
ce-NOP- 8	57.183 20	5.6 4	0.0068
ce-MNO- 9	58.49 3	0.20 10	0.0003
ce-L- 12	60.135 20	8 3	0.0102
ce-L- 13	61.005 20	2.37 21	0.0031
ce-L- 14	63.105 20	14.5 18	0.0195
ce-MNO-10	63.13 10	0.12 3	0.0002
ce-L- 15	68.845 20	0.114 10	0.0002
ce-M- 12	75.873 20	2.0 8	0.0033
ce-M- 13	76.743 20	0.57 5	0.0009
ce-L- 17	78.175 20	0.54 5	0.0009
ce-M- 14	78.843 20	3.7 7	0.0062
ce-NOP-12	79.853 20	0.8 4	0.0013
ce-NOP-13	80.723 20	0.210 18	0.0004
ce-NOP-14	82.823 20	0.84 15	0.0015
ce-MNO-17	93.913 20	0.189 17	0.0004
ce-L- 25	114.575 20	0.114 13	0.0003
ce-L- 30	142.015 20	0.129 10	0.0004
β- 1 max	141.7 18		
avg	37.4 5	2.7 4	0.0022
β- 2 max	170.8 18		
avg	45.5 5	0.32 22	0.0003
β- 3 max	205.5 18		
avg	55.4 6	15 4	0.0177
β- 4 max	214.8 18		
avg	58.1 6	1.25 24	0.0015
β- 5 max	287.6 18		
avg	79.6 6	49 22	0.0831
β- 6 max	304.8 18		
avg	84.8 6	35 20	0.0632
β- 7 max	311.3 18		
avg	86.8 6	0.41 11	0.0008
total β-			
avg	76.4 7	100 30	0.169

4 weak β's omitted:
Eβ(avg)= 33.4; ΣIβ= 0.12%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	13.3	71 8	0.0200
γ 3	17.2	0.19 14	≈0
γ 5	25.640 20	14.7 12	0.0080
γ 8	58.570 20	0.48 3	0.0006
γ 11	72.780 20	0.248 18	0.0004
γ 12	81.240 20	0.88 6	0.0015
γ 13	82.110 20	0.40 4	0.0007
γ 14	84.210 20	6.4 5	0.0115
γ 15	89.950 20	0.93 7	0.0018
X-ray Kα$_2$	92.2870 20	0.35 4	0.0007
X-ray Kα$_1$	95.8680 20	0.57 6	0.0012
γ 17	99.280 20	0.119 9	0.0003
γ 18	102.270 20	0.41 4	0.0009
X-ray Kβ	108	0.26 3	0.0006
γ 30	163.120 20	0.153 11	0.0005

37 weak γ's omitted:
Eγ(avg)= 114.3; ΣIγ= 0.57%

• ^{231}Pa α Decay (3.276E4 y 11) I(min) = 0.10%
Feeds ^{227}Ac
% Spontaneous Fission ⩽ 3E–10

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
ce-L- 3	3.760 18	0.755	≈0
ce-L- 4	4.86 11	0.668 20	≈0
ce-L- 5	5.70 7	13.7 5	0.0017
ce-L- 6	7.520 21	25.1 8	0.0040
Auger-L	9.28	42 5	0.0082
ce-L- 7	10.11 3	20.2 21	0.0044
ce-MNO- 2	13.898 5	41.664	0.0123
ce-L- 11	18.36 3	8.0 9	0.0031
ce-MNO- 3	18.598 5	0.24	≈0
ce-MNO- 4	19.70 10	0.214	≈0
ce-MNO- 5	20.54 6	4.356	0.0019
ce-MNO- 6	22.358 12	8.4537	0.0040
ce-L- 16	24.32 3	1.80 22	0.0009
ce-MNO- 7	24.948 21	6.9 7	0.0037
ce-L- 17	26.53 3	0.140 5	≈0
ce-L- 19	32.90 3	1.50 17	0.0011
ce-MNO-11	33.198 21	2.6 3	0.0018
ce-L- 22	37.26 11	0.7 6	0.0005
ce-L- 23	37.35 4	4.3 5	0.0034
ce-MNO-16	39.158 21	0.57 7	0.0005
ce-L- 25	43.83 4	3.3 4	0.0031
ce-M- 19	47.738 21	0.36 4	0.0004
ce-NOP-19	51.471 21	0.131 15	0.0001
ce-MNO-22	52.10 10	0.25 20	0.0003
ce-M- 23	52.19 3	1.17 13	0.0013
ce-L- 29	54.34 5	0.79 10	0.0009
ce-NOP-23	55.92 3	0.42 5	0.0005
ce-L- 30	57.52 4	0.39 5	0.0005
ce-M- 25	58.67 3	0.89 10	0.0011
ce-NOP-25	62.40 3	0.32 4	0.0004
ce-MNO-29	69.18 4	0.29 4	0.0004
ce-L- 31	77.04 4	0.79 9	0.0013
ce-L- 32	81.08 5	0.24 4	0.0004
ce-L- 33	82.7 4	0.30 11	0.0005
ce-MNO-31	91.88 3	0.29 3	0.0006
ce-K- 52	193.32 6	1.51 8	0.0062
ce-K- 59	223.315 6	0.66 11	0.0031
ce-L- 52	280.24 7	0.281 15	0.0017
ce-L- 59	310.230 18	0.122 20	0.0008
α 1	4631.0 20	0.10	0.0099
α 2	4642.0 20	0.10	0.0099
α 3	4680.0 20	1.5	0.150
α 4	4712.0 20	1	0.100
α 5	4736.0 20	8.4	0.847

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
α 6	4851.0 20	1.4	0.145
α 7	4933.0 20	3	0.315
α 8	4950	22.8	2.40
α 9	4974.0 20	0.4	0.0424
α 10	4984.0 20	1.4	0.149
α 11	5011.0 20	25.4	2.71
α 12	5028	20	2.14
α 13	5030.5 20	2.5	0.268
α 14	5057.3 20	11	1.18

6 weak α's omitted:
Eα(avg) = 4706.2; ΣIα= 0.07%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	12.7	43 5	0.0117
γ 2	18.9	0.35	0.0001
γ 6	27.360 10	9.3	0.0054
γ 11	38.200 20	0.149 15	0.0001
γ 17	46.370 20	0.208 2	0.0002
X-ray Kα$_2$	87.670 10	0.62 4	0.0012
X-ray Kα$_1$	90.884 6	1.02 7	0.0020
X-ray Kβ	102	0.47 3	0.0010
γ 45	255.80 7	0.101 6	0.0006
γ 47	260.22 8	0.173 11	0.0010
γ 51	283.67 6	1.60 10	0.0097
γ 52	300.08 6	2.30 10	0.0147
γ 54	302.67 6	2.30 10	0.0148
γ 59	330	1.30 20	0.0091
γ 60	340.81 7	0.165 8	0.0012
γ 64	357.16 7	0.173 10	0.0013

76 weak γ's omitted:
Eγ(avg) = 165.5; ΣIγ= 1.45%

• ^{231}U EC Decay (4.2 d 1) I (min) = 0.10%

Feeds ^{231}Pa

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-MNO- 1	3.8331 16	0.52	≈0
ce-L- 4	4.535 20	39.8 12	0.0038
Auger-L	9.68	84 10	0.0174
ce-MNO- 2	11.8331 16	0.17	≈0
ce-MNO- 3	12.7031 16	1	0.0003
ce-MNO- 4	20.273 20	13.68	0.0059
ce-L- 6	37.465 20	50.6 16	0.0404
ce-L- 7	47.40 10	0.299 9	0.0003
ce-M- 6	53.203 20	13.9 5	0.0158
ce-NOP- 6	57.183 20	5.15 16	0.0063
ce-L- 8	60.135 20	0.13 5	0.0002
ce-L- 9	61.005 20	0.113	0.0001
ce-L- 10	63.105 20	15.8 15	0.0213
ce-MNO- 7	63.13 10	0.11275	0.0002
Auger-K	70.8	1.4 10	0.0021
ce-M- 10	78.843 20	4.0 7	0.0067
ce-NOP-10	82.823 20	0.91 14	0.0016
X-ray L	13.3	99 10	0.0280
γ 4	25.640 20	12	0.0066
γ 6	58.570 20	0.44	0.0005
γ 10	84.210 20	7	0.0126
X-ray Kα$_2$	92.2870 20	17.3 21	0.0340
X-ray Kα$_1$	95.8680 20	28 4	0.0575
X-ray Kβ	108	13.1 16	0.0300
γ 18	217.94 3	0.8	0.0037
γ 19	236.01 3	0.18	0.0009

17 weak γ's omitted:
Eγ(avg) = 178.4; ΣIγ= 0.22%

• ^{232}Th α Decay (1.405E10 y 6) I (min) = 0.10%

Feeds ^{228}Ra
% Spontaneous Fission < 1E−9

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	9	8.4 14	0.0016
ce-L- 1	39.8 10	16.7 22	0.0141
ce-M- 1	54.2 10	4.5 6	0.0052
ce-NOP- 1	57.8 10	1.62 22	0.0020
ce-L- 2	105.7633 15	0.11 5	0.0002
α 1	3830	0.20 8	0.0163
α 2	3953	23 3	1.94
α 3	4010 5	77 3	6.58
X-ray L	12.3	8.4 14	0.0022
γ 1	59.0 10	0.19 3	0.0002

1 weak γ's omitted:
Eγ(avg) = 125.0; ΣIγ= 0.04%

• ^{232}U α Decay (72 y 2) I (min) = 0.10%

Feeds ^{228}Th
% Spontaneous Fission = 9E−11 7

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	9.48	11.1 14	0.0022
ce-L- 1	37.31 5	22.9 14	0.0182
ce-M- 1	52.60 5	6.3 4	0.0070
ce-NOP- 1	56.45 5	2.29 14	0.0028
ce-L- 2	108.61 5	0.174 11	0.0004
α 1	5139.0 20	0.280 20	0.0306
α 2	5263.54 9	31.2 4	3.50
α 3	5320.30 14	68.6 4	7.77
X-ray L	13	12.0 14	0.0033
γ 1	57.78 5	0.201 10	0.0002

14 weak γ's omitted:
Eγ(avg) = 142.0; ΣIγ= 0.07%

• ^{233}Th β^- Decay (22.3 m 1) I (min) = 0.10%

Feeds ^{233}Pa

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-MNO- 1	1.31 5	52 8	0.0015
ce-MNO- 2	2.85 5	16.3	0.0010
ce-L- 4	8.268 11	5.85 18	0.0010
Auger-L	9.68	8.1 10	0.0017
ce-MNO- 3	12.03 5	0.12	≈0
ce-MNO- 4	24.006 11	2	0.0010
ce-L- 7	36.05 4	7.02 21	0.0054
ce-M- 7	51.78 4	1.93 6	0.0021
ce-L- 10	53.60 20	1.1 8	0.0013
ce-NOP- 7	55.76 4	0.713 22	0.0008
ce-L- 12	65.398 20	3.05 22	0.0042
ce-K- 29	66.40 20	0.104 4	0.0001
ce-M- 10	69.33 20	0.31 21	0.0005
ce-NOP-10	73.31 20	0.11 8	0.0002
ce-K- 32	77.94 8	0.357 11	0.0006
ce-M- 12	81.136 20	0.74 5	0.0013
ce-NOP-12	85.116 20	0.262 17	0.0005
ce-K- 63	346.60 20	0.343 11	0.0025

(Continued)

^{233}Th β^- Decay (22.3 m 1) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	260.4 21		
avg	71.5 7	0.25	0.0004
β- 2 max	433.6 21		
avg	125.0 7	0.5	0.0014
β- 3 max	480.7 21		
avg	140.2 7	1.6	0.0048
β- 4 max	659.7 21		
avg	200.3 8	0.23	0.0010
β- 5 max	691.3 21		
avg	211.2 8	1.7	0.0076
β- 6 max	790.6 21		
avg	246.1 8	0.29	0.0015
β- 7 max	797.4 21		
avg	248.6 8	1.2	0.0064
β- 8 max	1076.0 21		
avg	350.5 8	1.9	0.0142
β- 9 max	1150.5 21		
avg	378.5 8	13	0.105
β-10 max	1238.6 21		
avg	412.1 8	51	0.448
β-11 max	1245.2 21		
avg	414.6 8	30	0.265
total β-			
avg	394.3 9	101.852	0.855

3 weak β's omitted:
Eβ(avg) = 227.9; ΣIβ = 0.17%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	13.3	9.6 10	0.0027
γ 4	29.373 10	2.5	0.0016
γ 12	86.503 20	2.7	0.0050
γ 13	88.04 16	0.3	0.0006
X-ray Kα2	92.2870 20	0.232 7	0.0005
γ 14	94.66 5	0.8	0.0016
X-ray Kα1	95.8680 20	0.378 10	0.0008
X-ray Kβ	108	0.175 6	0.0004
γ 25	162.50 6	0.17	0.0006
γ 26	162.5	0.15	0.0005
γ 27	169.17 5	0.34	0.0012
γ 28	170.7 3	0.13	0.0005
γ 32	190.54 8	0.13	0.0005
γ 33	195.096 20	0.16	0.0007
γ 49	359.90 20	0.12	0.0009
γ 60	441.0 3	0.23	0.0022
γ 61	447.7 3	0.15	0.0014
γ 63	459.20 20	1.4	0.0137
γ 66	490.8 3	0.17	0.0018
γ 68	499.0 3	0.2	0.0022
γ 78	595.20 20	0.16	0.0020
γ 83	669.80 20	0.68	0.0097
γ 96	764.4 4	0.12	0.0020
γ 111	890.1 5	0.14	0.0027

110 weak γ's omitted:
Eγ(avg) = 484.7; ΣIγ = 1.88%

● ^{233}Pa β^- Decay (27.0 d 1) I (min) = 0.10%
Feeds ^{233}U

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
ce-L- 2	6.78 5	17.1 21	0.0025
Auger-L	9.89	38 6	0.0081
ce-MNO- 1	11.7120 4	1.949 21	0.0005
ce-L- 3	18.593 10	9 6	0.0037
ce-MNO- 2	22.99 5	5.8 8	0.0028
ce-MNO- 3	34.802 10	3.5 21	0.0026
ce-L- 6	36.1426 3	0.122 4	≈0
ce-L- 7	53.523 10	10.7 8	0.0122
ce-L- 8	64.833 10	10.6 14	0.0147
ce-M- 7	69.732 10	2.59 18	0.0039
Auger-K	72.6	0.8 6	0.0013
ce-NOP- 7	73.839 10	0.94 7	0.0015
ce-M- 8	81.042 10	2.6 4	0.0045
ce-L- 10	82.103 20	2.7 5	0.0048
ce-NOP- 8	85.149 10	0.95 12	0.0017
ce-M- 10	98.312 20	0.67 11	0.0014
ce-NOP-10	102.419 20	0.24 4	0.0005
ce-K- 15	184.51 3	5.6 4	0.0220
ce-K- 16	196.37 3	29.4 10	0.123
ce-K- 17	224.89 4	2.3 5	0.0108
ce-L- 15	278.36 3	1.09 7	0.0065
ce-L- 16	290.22 3	5.71 19	0.0353
ce-MNO-15	294.57 3	0.359 18	0.0023
ce-K- 20	300.15 4	0.167 24	0.0011
ce-M- 16	306.43 3	1.37 5	0.0090
ce-NOP-16	310.54 3	0.502 16	0.0033
ce-L- 17	318.74 4	0.47 7	0.0032
ce-MNO-17	334.95 4	0.158 22	0.0011

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	156.5 24		
avg	41.5 7	24.3 12	0.0215
β- 2 max	173.8 24		
avg	46.3 7	15.7 20	0.0155
β- 3 max	231.8 24		
avg	63.0 7	28 4	0.0376
β- 4 max	260.4 24		
avg	71.4 8	33 4	0.0502
total β-			
avg	58.0 8	101 7	0.125

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	13.6	49 7	0.0142
γ 7	75.280 10	1.26 8	0.0020
γ 8	86.590 10	1.89 24	0.0035
X-ray Kα2	94.6650 20	10.8 4	0.0219
X-ray Kα1	98.4390 20	17.6 7	0.0368
γ 10	103.860 20	0.74 8	0.0016
X-ray Kβ	111	8.2 3	0.0193
γ 13	271.48 8	0.30 4	0.0018
γ 15	300.12 3	6.6 4	0.0424
γ 16	311.98 3	38.6 4	0.257
γ 17	340.50 4	4.5 5	0.0328
γ 18	375.45 4	0.62 12	0.0049
γ 19	398.62 8	1.27 16	0.0108
γ 20	415.76 4	1.62 16	0.0144

10 weak γ's omitted:
Eγ(avg) = 120.5; ΣIγ = 0.21%

● ^{233}U α Decay (1.592E5 y 7) I (min) = 0.10%
Feeds ^{229}Th

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
ce-L- 2	4.80 12	0.20 4	≈0
ce-L- 5	8.68 9	0.73 15	0.0001
Auger-L	9.48	3.6 11	0.0007
ce-L- 10	22.01 3	5.8 21	0.0027
ce-MNO- 5	23.97 9	0.23 5	0.0001
ce-L- 15	34.27 5	0.54 11	0.0004
ce-MNO-10	37.30 3	2.1 8	0.0016
ce-MNO-15	49.56 5	0.19 4	0.0002
ce-L- 22	51.37 4	0.102 21	0.0001
ce-L- 36	76.67 5	0.20 4	0.0003

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
α 1	4729	1.6	0.162
α 2	4754	0.163	0.0165
α 3	4783.5 12	13.20 20	1.34
α 4	4796	0.28	0.0286
α 5	4824.2 12	84.4 5	8.67

26 weak α's omitted:
Eα(avg) = 4673.6; ΣIα = 0.28%

X-ray L	13	3.9 12	0.0011

149 weak γ's omitted:
Eγ(avg) = 114.5; ΣIγ = 0.18%

● ^{234}Th β^- Decay (24.10 d 3) I (min) = 0.10%
Feeds ^{234}Pa (1.17 m)

ce-L- 2	8.385 20	4.4 4	0.0008
Auger-L	9.68	8.1 10	0.0017
ce-MNO- 1	14.653 20	1.7 5	0.0005
ce-MNO- 2	24.123 20	1.58 14	0.0008
ce-L- 4	41.755 20	0.35 6	0.0003
ce-L- 5	42.185 20	1.18 10	0.0011
ce-MNO- 4	57.493 20	0.120 21	0.0001
ce-M- 5	57.923 20	0.289 24	0.0004
ce-NOP- 5	61.903 20	0.101 9	0.0001
ce-L- 10	71.275 11	11.5 10	0.0175
ce-L- 11	71.695 20	0.30 3	0.0005
ce-M- 10	87.013 11	2.78 24	0.0052
ce-NOP-10	90.993 11	1.02 9	0.0020
β− 1 max	75.8 20		
avg	19.5 6	2.0 5	0.0008
β− 2 max	95.8 20		
avg	24.8 6	6.8 7	0.0036
β− 3 max	96.2 20		
avg	24.9 6	18.5 15	0.0098
β− 4 max	188.6 20		
avg	50.6 6	72.5 20	0.0781
total β−			
avg	43.5 7	100 3	0.0924
X-ray L	13.3	9.6 11	0.0027
γ 5	63.290 20	3.8 3	0.0051
γ 10	92.380 10	2.72 22	0.0054
γ 11	92.800 20	2.69 21	0.0053
γ 15	112.81 5	0.242 19	0.0006

13 weak γ's omitted:
Eγ(avg) = 76.8; ΣIγ = 0.13%

● ^{234}Pa β^- Decay (6.70 h 5) I (min) = 0.10%
Feeds ^{234}U

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-K- 11	9.8 3	0.22 7	≈0
Auger-L	9.89	89 13	0.0188
ce-L- 1	12.54 4	6.03 18	0.0016
ce-K- 12	15.59 20	4.24 13	0.0014
ce-K- 13	18.76 14	1.73 6	0.0007
ce-L- 2	21.723 10	64.9 20	0.0300
ce-L- 3	23.43 5	4.93 15	0.0025
ce-K- 15	24.69 20	2.7 4	0.0014
ce-K- 16	28.4 5	1.2 12	0.0007
ce-MNO- 1	28.75 4	2.2	0.0013
ce-L- 4	36.44 6	1.13 4	0.0009
ce-K- 18	37.09 3	1.51 13	0.0012
ce-MNO- 2	37.932 10	23.7456	0.0192
ce-MNO- 3	39.64 5	1.8	0.0015
ce-L- 5	41.24 20	1.05 8	0.0009
ce-L- 6	45.34 7	2.47 8	0.0024
ce-M- 4	52.65 6	0.312 10	0.0004
ce-K- 21	55.09 20	2.1 5	0.0024
ce-NOP- 4	56.76 6	0.116 4	0.0001
ce-MNO- 5	57.45 20	0.346 22	0.0004
ce-L- 8	57.93 8	3.51 11	0.0043
ce-K- 22	59.0 3	0.4 4	0.0005
ce-M- 6	61.55 7	0.674 21	0.0009
ce-NOP- 6	65.66 7	0.249 8	0.0003
ce-K- 23	70.39 20	6.5 10	0.0098
Auger-K	72.6	1.2 9	0.0018
ce-M- 8	74.14 8	0.97 3	0.0015
ce-K- 24	78.0 3	1.8 3	0.0029
ce-L- 9	78.103 10	48.6 15	0.0809
ce-NOP- 8	78.25 8	0.364 11	0.0006
ce-K- 25	80.79 20	1.00 3	0.0017
ce-L- 10	81.65 10	1.03 3	0.0018
ce-K- 26	84.09 20	1.3 4	0.0023
ce-K- 27	85.37 5	0.18 5	0.0003
ce-K- 28	87.4 3	1.08 19	0.0020
ce-M- 9	94.312 10	13.5 4	0.0270
ce-M- 10	97.86 10	0.286 9	0.0006
ce-NOP- 9	98.419 10	5.09 16	0.0107
ce-NOP-10	101.97 10	0.108 4	0.0002
ce-L- 11	103.6 3	3.5 11	0.0078
ce-K- 30	104.2 3	0.41 21	0.0009
ce-L- 12	109.44 20	0.96 3	0.0022
ce-K- 31	110.8 4	5.46 17	0.0129
ce-K- 32	111.59 20	10.3 3	0.0244
ce-L- 13	112.61 14	0.338 11	0.0008
ce-L- 15	118.54 20	1.66 20	0.0042
ce-M- 11	119.9 3	1.0 3	0.0025
ce-L- 16	122.2 5	0.57 14	0.0015
ce-NOP-11	124.0 3	0.37 12	0.0010
ce-MNO-12	125.65 20	0.3162	0.0008
ce-L- 17	128.4426 3	0.314 10	0.0009
ce-MNO-13	128.82 14	0.112	0.0003
ce-K- 33	129.59 20	1.4 3	0.0038
ce-L- 18	130.94 3	9.8 8	0.0273
ce-K- 34	133.29 20	0.136 15	0.0004
ce-M- 15	134.75 20	0.44 6	0.0013
ce-MNO-16	138.5 5	0.20 6	0.0006
ce-NOP-15	138.86 20	0.165 19	0.0005
ce-M- 18	147.15 3	2.71 22	0.0085
ce-L- 21	148.94 20	0.41 9	0.0013
ce-NOP-18	151.26 3	1.01 9	0.0033
ce-L- 22	152.8 3	0.16 4	0.0005
ce-K- 36	156.49 20	1.13 4	0.0038
ce-K- 37	159.9 8	0.16 15	0.0005
ce-L- 23	164.24 20	1.28 20	0.0045
ce-MNO-21	165.15 20	0.13 3	0.0005
ce-L- 24	171.8 3	0.34 6	0.0013
ce-L- 25	174.64 20	0.193 6	0.0007
ce-L- 26	177.94 20	0.25 8	0.0010
ce-K- 41	178.1 3	1.79 15	0.0068
ce-L- 27	179.22 5	0.48 14	0.0019
ce-M- 23	180.45 20	0.31 5	0.0012
ce-L- 28	181.2 3	0.54 9	0.0021
ce-NOP-23	184.56 20	0.113 18	0.0004
ce-MNO-24	188.1 3	0.113 19	0.0005
ce-MNO-27	195.43 5	0.18 5	0.0008
ce-K- 43	196.8939 16	0.13 11	0.0005
ce-MNO-28	197.5 3	0.19 4	0.0008
ce-L- 31	204.6 4	1.85 6	0.0081
ce-L- 32	205.44 20	2.00 6	0.0088
ce-K- 47	215.0 4	0.22 19	0.0010
ce-M- 31	220.9 4	0.474 15	0.0022

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
^{234}Pa β^- Decay (6.70 h 5)		(Continued)	
ce-M- 32	221.65 20	0.484 15	0.0023
ce-L- 33	223.44 20	0.27 6	0.0013
ce-NOP-31	225.0 4	0.174 6	0.0008
ce-NOP-32	225.76 20	0.176 6	0.0008
ce-L- 36	250.34 20	0.220 7	0.0012
ce-K- 49	254.2 4	1.42 16	0.0077
ce-K- 50	256.8 4	0.51 8	0.0028
ce-L- 41	271.9 3	0.51 5	0.0030
ce-MNO-41	288.2 3	0.178 14	0.0011
ce-K- 56	343.2 3	0.185 14	0.0014
ce-L- 49	348.0 4	0.27 3	0.0020
ce-L- 50	350.6 4	0.105 17	0.0008
ce-K- 66	398.1 5	0.15 13	0.0012
ce-K- 69	412.4 10	0.11 4	0.0010
ce-K- 73	450.3 10	0.16 7	0.0015
ce-K- 74	453.1 5	0.459 14	0.0044
ce-K- 75	453.9 5	1.63 5	0.0157
ce-K- 81	495.9 6	0.10 5	0.0011
ce-L- 75	547.7 5	0.312 10	0.0036
ce-MNO-75	564.0 5	0.1	0.0012
ce-K- 99	577.1 5	0.14 5	0.0017
ce-K-100	583.4 5	0.41 3	0.0051
ce-K-105	617.4 5	0.67 7	0.0088
ce-K-119	680.7 5	0.14 10	0.0021
ce-K-120	688.7 7	0.184 6	0.0027
ce-K-122	692.64 15	0.186 6	0.0027
ce-K-123	694.4 7	0.152	0.0022
ce-K-127	710.7 6	0.14 10	0.0021
ce-L-105	711.2 5	0.128 13	0.0019
ce-K-136	767.63 4	0.13 5	0.0021
ce-K-141	810.4 8	0.109 20	0.0019
ce-K-144	833.3939 16	0.20 13	0.0035
β^- 1 max	64 5		
avg	16.3 14	0.47	0.0002
β^- 2 max	326 5		
avg	91.0 16	1.2	0.0023
β^- 3 max	396 5		
avg	112.7 16	0.98	0.0024
β^- 4 max	424 5		
avg	121.9 16	4	0.0104
β^- 5 max	445 5		
avg	128.6 17	2	0.0058
β^- 6 max	469 5		
avg	136.3 17	2.3	0.0067
β^- 7 max	484 5		
avg	141.0 17	24	0.0721
β^- 8 max	484 5		
avg	141.2 17	11	0.0331
β^- 9 max	514 5		
avg	150.8 17	4.2	0.0135
β^-10 max	654 5		
avg	198.1 18	16	0.0675
β^-11 max	711 5		
avg	217.6 18	3.8	0.0176
β^-12 max	932 5		
avg	296.6 19	0.96	0.0061
β^-13 max	1115 5		
avg	364.3 19	7.7	0.0597
β^-14 max	1138 5		
avg	372.9 19	2.3	0.0183
β^-15 max	1183 5		
avg	390.0 19	10	0.0831
β^-16 max	1238 5		
avg	410.7 19	6.2	0.0542
β^-17 max	1244 5		
avg	413.3 20	1.7	0.0150
β^-18 max	1259 5		
avg	418.9 20	0.8	0.0071

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
total β^- avg	223.6 22	99.7	0.475
X-ray L	13.6	114 13	0.0329
γ 2	43.480 10	0.1224	0.0001
γ 5	63.00 20	3.26 21	0.0044
γ 7	69.9	0.2346	0.0003
γ 8	79.69 8	0.1224	0.0002
X-ray $K\alpha_2$	94.6650 20	15.7 7	0.0317
X-ray $K\alpha_1$	98.4390 20	25.4 10	0.0533
γ 9	99.860 10	4.9	0.0104
γ 10	103.41 10	0.1224	0.0003
X-ray Kβ	111	11.8 5	0.0280
γ 11	125.4 3	1.0 3	0.0027
γ 12	131.20 20	20.4	0.0570
γ 13	134.37 14	0.2142	0.0006
γ 14	137.7 5	0.153	0.0004
γ 15	140.30 20	0.92 11	0.0027
γ 16	144.0 5	0.36 5	0.0011
γ 17	150.2	0.2	0.0007
γ 18	152.70 3	6.8 5	0.0222
γ 19	159.1 4	0.71 21	0.0024
γ 21	170.70 20	0.51 11	0.0019
γ 22	174.6 3	0.20 5	0.0008
γ 23	186.00 20	2.0 3	0.0081
γ 24	193.6 3	0.61 11	0.0025
γ 26	199.70 20	0.49 16	0.0021
γ 27	200.98 5	1.1 3	0.0048
γ 28	203.0 3	1.22 21	0.0053
γ 30	219.8 3	0.20 11	0.0010
γ 31	226.4 4	6	0.0290
γ 32	227.20 20	5.6	0.0271
γ 33	245.20 20	0.92 21	0.0048
γ 34	248.90 20	2.9 3	0.0151
γ 35	267.1 8	0.1734	0.0010
γ 36	272.10 20	1	0.0059
γ 37	275.5 8	0.27 9	0.0016
γ 39	286.1 8	0.1428	0.0009
γ 40	289.6 8	0.1122	0.0007
γ 41	293.7 3	4.0 3	0.0249
γ 42	309.6 8	0.1	0.0007
γ 43	312.5	0.3	0.0020
γ 44	316.3 8	0.1224	0.0008
γ 45	320.7 8	0.1224	0.0008
γ 46	328	0.3	0.0021
γ 47	330.6 4	0.612	0.0043
γ 48	351.9 3	0.61 11	0.0046
γ 49	369.8 4	3.0 3	0.0233
γ 50	372.4 4	1.33 21	0.0105
γ 51	409.8 4	0.41 21	0.0036
γ 52	416.3	0.1	0.0009
γ 53	426.8 4	0.6 3	0.0056
γ 55	446.5 5	0.1224	0.0012
γ 56	458.8 3	1.53 11	0.0150
γ 57	461.8 10	0.1632	0.0016
γ 58	467.5 10	0.4 3	0.0041
γ 59	472.1 10	0.2448	0.0025
γ 60	473.5 10	0.1836	0.0019
γ 61	478.7 10	0.3	0.0031
γ 62	480.4 8	0.41 11	0.0042
γ 63	482.5 7	0.31 11	0.0031
γ 64	498.9 10	0.1	0.0011
γ 65	506.8 5	1.6 3	0.0176
γ 66	513.7 5	1.33 21	0.0145
γ 67	520.2 5	0.612	0.0068
γ 68	521.0 5	0.918	0.0102
γ 69	528.0 10	0.61 21	0.0069
γ 70	533.2 10	0.2	0.0023
γ 71	537.1 10	0.1632	0.0019
γ 72	557.0 10	0.2652	0.0031
γ 73	565.9 10	1.4 3	0.0172
γ 74	568.7 5	3	0.0371

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
γ 75	569.5 5	11	0.132
γ 76	574.0 10	2	0.0249
γ 77	585.8 8	0.153	0.0019
γ 79	596.6 5	0.51 21	0.0065
γ 80	602.8 5	0.9 4	0.0118
γ 81	611.5 6	0.8 4	0.0106
γ 82	616.2 5	0.2	0.0027
γ 83	623.6 5	0.82 21	0.0108
γ 84	627.5 5	0.82 21	0.0109
γ 85	630.6 10	0.4	0.0055
γ 86	634.5 10	0.3	0.0041
γ 87	639.7 10	0.2	0.0028
γ 88	643.2 10	0.2	0.0028
γ 89	646.0 10	0.3	0.0042
γ 90	653.7 6	0.9 4	0.0128
γ 91	655.0 8	0.61 21	0.0085
γ 92	658.0 5	0.9 4	0.0129
γ 93	660.6 10	0.3	0.0043
γ 94	664.8 10	1.3 4	0.0188
γ 95	666.7 6	1.6 4	0.0232
γ 96	669.9 5	1.4 4	0.0204
γ 97	683.3 8	0.2448	0.0036
γ 98	687.0 20	0.2856	0.0042
γ 99	692.7 5	1.5 5	0.0226
γ 100	699.0 5	4.7 3	0.0699
γ 101	706.1 3	3.2 7	0.0476
γ 103	711.2 8	0.2	0.0031
γ 104	713.8 8	0.16 5	0.0025
γ 105	733.0 5	8.8 9	0.137
γ 106	738.0 8	1.0 4	0.0160
γ 107	742.81 3	2.4 8	0.0387
γ 108	746.5 8	0.1326	0.0021
γ 109	755.6 10	1.4 8	0.0230
γ 110	760.0 10	0.1632	0.0026
γ 111	766.360 20	0.3	0.0050
γ 113	768.7 10	0.5712	0.0094
γ 114	777.9 10	0.2	0.0034
γ 115	780.7 6	1.1 4	0.0187
γ 116	783.1 10	0.5	0.0085
γ 117	786.27 3	1.4 4	0.0239
γ 118	793.6 10	1.53	0.0259
γ 119	796.3 5	3.9 5	0.0657
γ 120	804.3 7	0.4	0.0070
γ 121	805.6 3	3.4 5	0.0578
γ 124	812.5 15	0.5	0.0088
γ 125	819.6 6	2.7 5	0.0463
γ 127	826.3 6	4.1 9	0.0718
γ 128	831.6 8	5.6 8	0.0994
γ 129	841.9 10	0.1428	0.0026
γ 130	844.0 10	0.51 21	0.0092
γ 131	851.70 10	0.1224	0.0022
γ 132	872.9 10	0.1224	0.0023
γ 133	876.4 8	4.1 21	0.0762
γ 134	880.5	1	0.0191
γ 135	880.51 4	12.24	0.230
γ 136	883.24 4	12 4	0.230
γ 137	899.0 5	4.2 9	0.0801
γ 138	904.37 15	0.51 21	0.0098
γ 139	920	0.41 21	0.0080
γ 140	925.0 10	3	0.0583
γ 141	926.0 8	11.2 21	0.221
γ 142	926.72 15	9 3	0.181
γ 143	946.00 3	12 7	0.247
γ 144	949	8.16	0.165
γ 145	960.0 10	0.1	0.0021
γ 146	966.0 5	0.612	0.0126
γ 147	978.8 10	1.4 8	0.0298
γ 148	980.5 5	3	0.0639
γ 149	980.5 5	2	0.0426
γ 151	984.0 10	1.9 7	0.0406
γ 152	1022.6 8	0.6 3	0.0133
γ 153	1028.3 8	0.8 3	0.0179
γ 154	1044.9	0.5	0.0114
γ 155	1074.6 10	0.25 9	0.0058
γ 156	1083.2 8	0.76 11	0.0177
γ 157	1108.5 8	0.31 11	0.0072
γ 158	1122.3 8	0.51 11	0.0122
γ 159	1126.0 6	0.82 11	0.0196
γ 160	1153.1 7	0.31 11	0.0075
γ 161	1171.3 8	0.24 10	0.0061
γ 162	1208	0.3	0.0079
γ 163	1217.5 10	0.38 7	0.0098
γ 164	1229	0.3	0.0080
γ 165	1240.5 8	0.5 3	0.0135
γ 166	1251	0.3	0.0082
γ 167	1277.4 8	0.20 8	0.0056
γ 168	1292.7 8	0.61 21	0.0169
γ 169	1353.3 6	1.7 5	0.0500
γ 170	1358.5 10	0.1224	0.0035
γ 171	1394.1 5	3.1 10	0.0909
γ 172	1399.7 10	0.23 5	0.0070
γ 173	1427.5 10	0.20 4	0.0062
γ 174	1446.0 8	0.41 11	0.0126
γ 175	1452.7 10	1.02 21	0.0316
γ 176	1460	0.3	0.0095
γ 177	1493.7 10	0.20 7	0.0065
γ 178	1516	0.4	0.0132
γ 179	1549.4 10	0.10 4	0.0034
γ 180	1579.7 10	0.17 9	0.0058
γ 181	1585.4 10	0.25 11	0.0086
γ 182	1593.8 8	0.61 21	0.0208
γ 183	1627.9 10	0.15 3	0.0053
γ 184	1638.0 10	0.41 21	0.0142
γ 185	1656 3	0.153	0.0054
γ 186	1668.5 10	1.22 21	0.0435
γ 187	1686.2 10	0.51 21	0.0183
γ 188	1694.6 8	1.2 5	0.0442
γ 189	1699.8 10	0.15 5	0.0055
γ 191	1737.6 7	0.10 5	0.0038
γ 192	1741.7 10	0.10 5	0.0038
γ 194	1756	0.255	0.0095
γ 196	1772.3 15	0.10 8	0.0039
γ 197	1797.3 10	0.31 11	0.0117
γ 202	1890.1 10	0.19 7	0.0078
γ 203	1897.1 10	0.15 4	0.0062
γ 204	1905	0.2856	0.0116
γ 205	1926.0 6	0.51 21	0.0209

27 weak γ's omitted:
Eγ(avg) = 955.6; ΣIγ = 1.01%

● ^{234}Pa IT Decay (1.17 m 3) I(min) = 0.10%
%IT Decay = 0.160 18
Feeds ^{234}Pa (6.70 h)
See also ^{234}Pa β^- Decay (1.17 m)

ce-L- 1	52.815 20	0.111 13	0.0001

1 weak γ's omitted:
Eγ(avg) = 73.9; ΣIγ = 0.01%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)

● ^{234}Pa β^- Decay (1.17 m 3) I (min) = 0.10%
%β Decay = 99.840 18
Feeds ^{234}U
See also ^{234}Pa IT Decay (1.17 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	9.89	0.35 5	≈0
ce-L- 1	21.723 10	0.476 15	0.0002
ce-MNO- 1	37.932 10	0.1743	0.0001
ce-K- 64	694.4 7	0.3992	0.0059
β− 1 max	1236 5		
avg	410.2 19	0.74	0.0065
β− 2 max	1471 5		
avg	500.8 20	0.62	0.0066
β− 3 max	2281 5		
avg	825.4 21	98.6	1.73
total β−			
avg	819.2 21	100.14782	1.75

19 weak β's omitted:
Eβ(avg) = 208.8; ΣIβ = 0.19%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	13.6	0.44 5	0.0001
X-ray $K\alpha_2$	94.6650 20	0.115 2	0.0002
X-ray $K\alpha_1$	98.4390 20	0.187 4	0.0004
γ 57	766.410 20	0.207 8	0.0034
γ 82	1001.03 3	0.5890 1	0.0126

125 weak γ's omitted:
Eγ(avg) = 926.2; ΣIγ = 0.37%

● ^{234}U α Decay (2.445E5 y 10) I (min) = 0.10%
Feeds ^{230}Th
% Spontaneous Fission = 1.2E−9 6

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	9.48	9.7 14	0.0020
ce-L- 1	32.73 5	20.1 18	0.0140
ce-M- 1	48.02 5	5.5 5	0.0056
ce-NOP- 1	51.87 5	2.02 19	0.0022
ce-L- 2	100.428 20	0.139 15	0.0003
α 1	4604.7 20	0.24 3	0.0235
α 2	4723.7 20	27.4 15	2.76
α 3	4775.8 20	72.4 20	7.36
X-ray L	13	10.5 14	0.0029
γ 1	53.20 5	0.118 10	0.0001

9 weak γ's omitted:
Eγ(avg) = 121.4; ΣIγ = 0.04%

● ^{235}U α Decay (7.038E8 y 5) I (min) = 0.10%
Feeds ^{231}Th
% Spontaneous Fission < 4.2E−8

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	9.48	29 10	0.0058
ce-L- 2	11.0779 5	18 19	0.0042
ce-MNO- 1	14.4077 3	68 4	0.0209
ce-L- 3	20.9 3	1.2 8	0.0005
ce-L- 4	21.49 15	19.6 10	0.0090
ce-MNO- 2	26.3677 3	7 7	0.0037
ce-L- 5	30.83 10	4 3	0.0027
ce-L- 6	33.6279 5	1.74 22	0.0012
ce-K- 16	34.109 20	1.72 15	0.0013
ce-MNO- 3	36.2 3	0.4 3	0.0003
ce-MNO- 4	36.78 15	6.7 5	0.0052
ce-K- 18	41.289 20	0.20 19	0.0002
ce-M- 5	46.12 10	1.1 9	0.0011
ce-M- 6	48.9177 3	0.45 7	0.0005
ce-NOP- 5	49.97 10	0.4 3	0.0004
ce-L- 7	52.23 20	4.15 13	0.0046
ce-NOP- 6	52.7705 4	0.163 24	0.0002
ce-K- 19	53.699 20	0.57 6	0.0007
ce-M- 7	67.52 20	1.13 4	0.0016
Auger-K	69.2	0.23 16	0.0003
ce-NOP- 7	71.37 20	0.419 13	0.0006
ce-K- 22	73.05 20	0.6 6	0.0009
ce-K- 23	74.064 5	4.96 15	0.0078
ce-L- 10	75.618 20	0.87 12	0.0014
ce-L- 11	88.668 20	0.107 15	0.0002
ce-MNO-10	90.908 20	0.33 5	0.0006
ce-K- 26	92.469 20	1.1 10	0.0022
ce-K- 27	95.660 10	0.33 3	0.0007
ce-L- 13	99.5279 5	0.521 7	0.0011
ce-MNO-13	114.8177 3	0.196 5	0.0005
ce-L- 16	123.288 20	0.37 3	0.0010
ce-MNO-16	138.578 20	0.120 10	0.0004
ce-L- 19	142.878 20	0.118 11	0.0004
ce-L- 22	162.23 20	0.22 3	0.0008
ce-L- 23	163.243 5	1.00 3	0.0035
ce-MNO-23	178.533 5	0.32778	0.0012
ce-L- 26	181.648 20	0.38 5	0.0015
ce-MNO-26	196.938 20	0.133 14	0.0006
α 1	4150 5	0.90 20	0.0796
α 2	4217 3	5.7 6	0.512
α 3	4219 6	0.9	0.0809
α 4	4271 5	0.4	0.0364
α 5	4325	4.6 5	0.424
α 6	4344	1.5	0.139
α 7	4364 5	11	1.02
α 8	4370 4	6	0.558
α 9	4396 3	55 3	5.15
α 10	4414 4	2.10 20	0.197
α 11	4435 5	0.7	0.0661
α 12	4502.0 20	1.70 20	0.163
α 13	4556.0 20	4.2 3	0.408
α 14	4598.0 20	5.0 5	0.490
X-ray L	13	31 11	0.0086
γ 7	72.70 20	0.1	0.0002
X-ray $K\alpha_2$	89.9530 20	2.7 4	0.0052
X-ray $K\alpha_1$	93.3500 20	4.5 6	0.0089
X-ray Kβ	105	2.1 3	0.0046
γ 11	109.140 20	1.50 20	0.0035
γ 13	120	0.15	0.0004
γ 15	140.77 8	0.22 3	0.0007
γ 16	143.760 20	10.5 8	0.0322
γ 19	163.350 20	4.7 4	0.0164
γ 22	182.70 20	0.40 5	0.0016
γ 23	185.715 5*	54	0.211
γ 24	194.940 10	0.59 6	0.0024
γ 26	202.120 20	1.00 10	0.0043
γ 27	205.311 10	4.7 4	0.0206
γ 29	221.380 20	0.100 10	0.0005

42 weak γ's omitted:
Eγ(avg) = 190.3; ΣIγ = 0.92%

*Correction made in September 1983 printing.

● ^{235}Np EC Decay (396.1 d 12) I (min) = 0.10%
%EC Decay = 99.9986 2
Feeds ^{235}U
%α Decay = 0.0014 2

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	9.89	30 4	0.0062
X-ray L	13.6	38 5	0.0109
X-ray Kα₂	94.6650 20	0.51 15	0.0010
X-ray Kα₁	98.4390 20	0.83 24	0.0017
X-ray Kβ	111	0.39 11	0.0009

● ^{236}U α Decay (2.3415E7 y 14) I (min) = 0.10%
Feeds ^{232}Th

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	9.48	9.2 17	0.0019
ce-L- 1	28.897 9	19 3	0.0117
ce-MNO- 1	44.187 9	6.9 11	0.0065
ce-L- 2	92.278 15	0.159 7	0.0003
α 1	4332 8	0.260 10	0.0240
α 2	4445 5	26 4	2.46
α 3	4494 3	74 4	7.08
X-ray L	13	10.0 18	0.0028

2 weak γ's omitted:
Eγ(avg) = 68.2; ΣIγ = 0.11%

● ^{236}Np EC Decay (1.15E5 y 12) I (min) = 0.10%
%EC Decay = 91.1 20
Feeds ^{236}U
See also ^{236}Np β⁻ Decay (1.15E5 y)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	9.89	103 15	0.0217
ce-L- 1	23.485 6	66.6 16	0.0333
ce-MNO- 1	39.694 6	24.4 8	0.0206
ce-K- 3	44.704 9	5.85 22	0.0056
Auger-K	72.6	1.6 12	0.0024
ce-L- 2	82.476 5	60.6 15	0.106
ce-M- 2	98.685 5	16.8 6	0.0352
ce-NOP- 2	102.792 5	6.32 23	0.0138
ce-L- 3	138.553 8	31.7 12	0.0937
ce-M- 3	154.762 8	8.8 4	0.0290
ce-NOP- 3	158.869 8	3.28 13	0.0111
X-ray L	13.6	131 15	0.0380
γ 1	45.242 6	0.152 6	0.0001
X-ray Kα₂	94.6650 20	20.7 5	0.0417
X-ray Kα₁	98.4390 20	33.6 7	0.0703
γ 2	104.233 5	7.47 25	0.0166
X-ray Kβ	111	15.6 4	0.0369
γ 3	160.310 8	27.6 6	0.0943

● ^{236}Np β⁻ Decay (1.15E5 y 12) I (min) = 0.10%
%β⁻ Decay = 8.9 20
Feeds ^{236}Pu
See also ^{236}Np EC Decay (1.15E5 y)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	10.3	5.9 15	0.0013
ce-L- 1	21.50 10	6.5 15	0.0030
ce-K- 3	38 6	0.3 3	0.0002
ce-MNO- 1	38.67 10	2.4 6	0.0020
ce-L- 2	77 3	6.0 14	0.0099
ce-M- 2	94 3	1.7 4	0.0034
ce-NOP- 2	98 3	0.65 15	0.0014
ce-L- 3	137 6	2.0 21	0.0058
ce-M- 3	154 6	0.6 6	0.0018
ce-NOP- 3	158 6	0.21 22	0.0007
β- 1 max	195 5		
avg	52.3 15	5 5	0.0056
β- 2 max	355 3		
avg	105.6 9	5 5	0.0112
total β-			
avg	78.9 15	10 7	0.0168
X-ray L	14.3	8.8 20	0.0027
γ 2	100 3	0.52 12	0.0011
X-ray Kα₁	103.76 5	0.13 14	0.0003
γ 3	160 6	1.4 15	0.0049

1 weak γ's omitted:
Eγ(avg) = 44.6; ΣIγ = 0.01%

● ^{236}Np EC Decay (22.5 h 4) I (min) = 0.10%
%EC Decay = 52 1
Feeds ^{236}U
See also ^{236}Np β⁻ Decay (22.5 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	9.89	20 3	0.0042
ce-L- 1	23.485 6	5.4 3	0.0027
ce-MNO- 1	39.694 6	1.96 12	0.0017
Auger-K	72.6	0.9 7	0.0013
ce-K- 4	526.72 10	0.155 16	0.0017
X-ray L	13.6	26 3	0.0074
X-ray Kα₂	94.6650 20	11.26 24	0.0227
X-ray Kα₁	98.4390 20	18.2 4	0.0382
X-ray Kβ	111	8.50 20	0.0201
γ 4	642.33 10	1.38 8	0.0189
γ 5	687.52 10	0.367 21	0.0054

3 weak γ's omitted:
Eγ(avg) = 304.6; ΣIγ = 0.03%

● ^{236}Np β⁻ Decay (22.5 h 4) I (min) = 0.10%
%β⁻ Decay = 48 1
Feeds ^{236}Pu
See also ^{236}Np EC Decay (22.5 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/µCi-h)
Auger-L	10.3	2.4 4	0.0005
ce-L- 1	21.50 10	6.06 23	0.0028
ce-MNO- 1	38.67 10	2.24 5	0.0018

(Continued)

^{236}Np β^- Decay (22.5 h 4) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β− 1 max	491 8		
avg	143 3	8.3	0.0253
β− 2 max	536 8		
avg	158 3	39.7	0.134
total β−			
avg	155 3	48	0.159
X-ray L	14.3	3.6 4	0.0011

1 weak γ's omitted:
Eγ(avg) = 44.6; ΣIγ= 0.01%

• ^{236}Pu α Decay (2.851 y 8) I (min) = 0.10%
Feeds ^{232}U
% Spontaneous Fission = 8.1E−8 23

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	9.89	10.2 15	0.0022
ce-L- 1	25.89 5	23.3 7	0.0128
ce-MNO- 1	42.10 5	8.5 3	0.0077
α 1	5614	0.18	0.0215
α 2	5721.9 10	31.8 9	3.88
α 3	5770.1 10	68.1 8	8.37
X-ray L	13.6	13.0 15	0.0038

7 weak γ's omitted:
Eγ(avg) = 60.9; ΣIγ= 0.08%

• ^{237}U β^- Decay (6.75 d 1) I (min) = 0.10%
Feeds ^{237}Np

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-L- 2	3.9182 14	15.3 18	0.0013
ce-MNO- 1	8.087 21	53.4 20	0.0092
Auger-L	10	52 9	0.0111
ce-L- 3	10.778 10	16 7	0.0036
ce-MNO- 2	20.622 4	5.2 7	0.0023
ce-L- 6	20.996 10	4.1 5	0.0018
ce-MNO- 3	27.482 11	5.3 23	0.0031
ce-L- 7	28.58 3	0.12 6	≈0
ce-L- 8	37.1102 14	29 4	0.0231
ce-MNO- 6	37.700 11	1.45 15	0.0012
ce-L- 9	42.403 20	0.36 4	0.0003
ce-K- 14	45.93 4	0.370 18	0.0004
ce-M- 8	53.814 4	7.2 10	0.0083
ce-NOP- 8	58.0363 13	2.6 4	0.0032
ce-MNO- 9	59.107 21	0.120 13	0.0002
Auger-K	74.3	1.2 9	0.0019
ce-K- 15	89.33 4	55.0 21	0.105
ce-K- 17	115.72 6	0.116 9	0.0003
ce-L- 14	142.183 20	2.09 10	0.0063
ce-K- 18	148.86 5	0.56 4	0.0018
ce-M- 14	158.887 21	0.58 3	0.0019
ce-NOP-14	163.109 20	0.220 11	0.0008
ce-L- 15	185.578 23	11.1 5	0.0439
ce-M- 15	202.282 24	2.71 11	0.0117
ce-NOP-15	206.504 23	1.01 4	0.0044
ce-L- 18	245.11 3	0.181 11	0.0009
β− 1 max	148.5 11		
avg	39.2 3	0.185 14	0.0002
β− 2 max	150.8 11		
avg	39.9 3	0.248 16	0.0002
β− 3 max	187.0 11		
avg	50.1 4	3.4 3	0.0036
β− 4 max	238.0 11		
avg	64.8 4	53.1 20	0.0733
β− 5 max	251.9 11		
avg	68.8 4	43.7 19	0.0640
total β−			
avg	65.9 4	101 3	0.141
γ 1	13.810 20	0.103 4	≈0
X-ray L	13.9	71 9	0.0211
γ 2	26.3450 10	2.28 24	0.0013
γ 3	33.205 10	0.11 5	≈0
γ 7	51.01 3	0.21 10	0.0002
γ 8	59.5370 10	34 4	0.0431
γ 9	64.830 20	1.18 13	0.0016
X-ray $K\alpha_2$	97.08 4	16.3 7	0.0337
X-ray $K\alpha_1$	101.07 4	26.3 11	0.0567
X-ray Kβ	114	12.3 6	0.0299
γ 14	164.610 20	1.86 7	0.0065
γ 15	208.005 23	22.0 5	0.0976
γ 18	267.54 3	0.723 21	0.0041
γ 20	332.350 20	1.22 6	0.0086
γ 24	370.93 3	0.112 7	0.0009

13 weak γ's omitted:
Eγ(avg) = 262.9; ΣIγ= 0.25%

• ^{237}Np α Decay (2.14E6 y 1) I (min) = 0.10%
Feeds ^{233}Pa
% Spontaneous Fission ⩽ 2E−10

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-MNO- 1	1.31 5	2.5 5	≈0
ce-MNO- 2	2.85 5	4.8 7	0.0003
ce-K- 17	5.08 3	1.6 4	0.0002
ce-L- 4	8.268 11	33 6	0.0058
Auger-L	9.68	50 8	0.0104
ce-MNO- 3	12.03 5	25 7	0.0065
ce-K- 19	21.63 4	0.3 3	0.0001
ce-MNO- 4	24.006 11	11.1 20	0.0057
ce-K- 21	30.61 3	2.4 4	0.0016
ce-L- 6	36.05 4	54 8	0.0415
ce-K- 22	38.77 4	1.17 22	0.0010
ce-L- 7	41.4 5	0.6 5	0.0006
ce-L- 8	42.83 6	1.2 4	0.0011
ce-L- 9	49.65 10	0.5 4	0.0005
ce-M- 6	51.78 4	14.8 21	0.0164
ce-NOP- 6	55.76 4	5.5 8	0.0065
ce-MNO- 7	57.1 5	0.23 18	0.0003
ce-M- 8	58.56 6	0.34 9	0.0004
ce-NOP- 8	62.54 6	0.13 4	0.0002
ce-MNO- 9	65.38 10	0.16 14	0.0002
ce-L- 11	65.398 20	14.2 18	0.0198
Auger-K	70.8	0.13 9	0.0002
ce-M- 11	81.136 20	3.5 5	0.0060
ce-L- 14	85.02 5	0.41 7	0.0007
ce-NOP-11	85.116 20	1.22 15	0.0022
ce-L- 15	86.8954 18	0.21 5	0.0004
ce-L- 17	96.58 3	0.4C 8	0.0008
ce-MNO-14	100.75 5	0.155 23	0.0003
ce-MNO-17	112.31 3	0.14 3	0.0003
ce-L- 19	113.13 4	0.13 4	0.0003
ce-L- 21	122.10 3	0.52 8	0.0013
ce-L- 22	130.27 4	0.26 5	0.0007
ce-MNO-21	137.84 3	0.172 25	0.0005

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
α 1	4581.1 20	0.40 4	0.0390
α 2	4598.7 20	0.34 4	0.0333
α 3	4639.5 20	6.18 12	0.611
α 4	4659.2 20	0.57	0.0566
α 5	4664.1 20	3.32 10	0.330
α 6	4694.5 20	0.48 20	0.0480
α 7	4708.3 20	1	0.100
α 8	4712.4	0.126	0.0126
α 9	4766.1 15	8 3	0.812
α 10	4771.1 15	25 6	2.54
α 11	4788.1 15	47 9	4.79
α 12	4803.4 20	1.56	0.160
α 13	4817.4 20	2.5 4	0.257
α 14	4862.9 20	0.24	0.0249
α 15	4871 3	0.3	0.0311
α 16	4873.1 20	2.60 20	0.270

5 weak α's omitted:
Eα(avg) = 4587.3; ΣIα = 0.19%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
X-ray L	13.3	59 8	0.0168
γ 4	29.373 10	14.0 25	0.0088
γ 5	46.53 4	0.140 25	0.0001
γ 6	57.15 4	0.42 6	0.0005
γ 11	86.503 20	12.6 13	0.0232
γ 12	88.04 16	0.16 3	0.0003
X-ray Kα$_2$	92.2870 20	1.58 18	0.0031
γ 13	94.66 5	0.83 13	0.0017
X-ray Kα$_1$	95.8680 20	2.6 3	0.0053
X-ray Kβ	108	1.20 14	0.0027
γ 17	117.68 3	0.17 3	0.0004
γ 21	143.208 25	0.42 6	0.0013
γ 22	151.37 4	0.25 4	0.0008
γ 35	195.096 20	0.21 3	0.0009
γ 41	212.415 25	0.16 3	0.0007

38 weak γ's omitted:
Eγ(avg) = 163.6; ΣIγ = 1.05%

• ^{237}Pu EC Decay (45.3 d 2) I (min) = 0.10%

%EC Decay = 99.995 2
Feeds ^{237}Np
%α Decay = 0.005 2

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
ce-L- 1	3.9182 14	1.61 15	0.0001
Auger-L	10	38 6	0.0082
ce-L- 2	10.778 10	11.7 9	0.0027
ce-MNO- 1	20.622 4	0.55 6	0.0002
ce-MNO- 2	27.482 11	3.9 3	0.0023
ce-L- 6	37.1102 14	2.82 24	0.0022
ce-M- 6	53.814 4	0.70 6	0.0008
ce-NOP- 6	58.0363 13	0.246 22	0.0003
Auger-K	74.3	0.9 7	0.0015
X-ray L	13.9	53 6	0.0156
γ 1	26.3450 10	0.240 16	0.0001
γ 6	59.5370 10	3.28 20	0.0042
X-ray Kα$_2$	97.08 4	12.8 6	0.0264
X-ray Kα$_1$	101.07 4	20.6 9	0.0444
X-ray Kβ	114	9.7 5	0.0235

10 weak γ's omitted:
Eγ(avg) = 33.2; ΣIγ = 0.08%

• ^{238}U α Decay (4.468E9 y 3) I (min) = 0.10%

Feeds ^{234}Th
% Spontaneous Fission = 5.4E–5 8

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	9.48	8.2 17	0.0016
ce-L- 1	29.08 6	17 3	0.0104
ce-MNO- 1	44.37 6	6.1 11	0.0058
ce-L- 2	90 7	0.15 5	0.0003
α 1	4039 5	0.23 7	0.0198
α 2	4147 5	23 4	2.03
α 3	4196 5	77 4	6.88
X-ray L	13	8.8 18	0.0024

2 weak γ's omitted:
Eγ(avg) = 66.4; ΣIγ = 0.10%

• ^{238}Np β$^-$ Decay (2.117 d 2) I (min) = 0.10%

Feeds ^{238}Pu

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	10.3	25 4	0.0055
ce-L- 1	20.98 3	60 3	0.0266
ce-MNO- 1	38.15 3	22.0 11	0.0178
ce-L- 2	78.783 20	2.24 11	0.0038
ce-M- 2	95.947 20	0.63 3	0.0013
ce-L- 4	97.04 5	0.262 17	0.0005
ce-NOP- 2	100.321 20	0.241 11	0.0005
ce-K- 26	862.63 5	0.228 9	0.0042
ce-K- 28	906.72 5	0.154 11	0.0030
β- 1 max	89.3 11		
avg	23.0 3	0.48 3	0.0002
β- 2 max	222.0 11		
avg	60.0 4	10.8 5	0.0138
β- 3 max	263.4 11		
avg	72.2 4	42.4 15	0.0652
β- 4 max	306.4 11		
avg	85.1 4	0.51 3	0.0009
β- 5 max	308.9 12		
avg	85.8 4	0.17 7	0.0003
β- 6 max	329.1 11		
avg	91.9 4	1.21 6	0.0024
β- 7 max	1247.8 11		
avg	412.4 5	45 3	0.395
total β-			
avg	223.2 9	101 4	0.479

2 weak β's omitted:
Eβ(avg) = 204.4; ΣIβ = 0.12%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
X-ray L	14.3	37 4	0.0114
γ 1	44.08 3	0.102 6	≈0
X-ray Kα$_2$	99.55 5	0.111 5	0.0002
γ 2	101.880 20	0.209 8	0.0005
X-ray Kα$_1$	103.76 5	0.179 8	0.0004
γ 13	561.15 7	0.102 6	0.0012
γ 17	882.63 3	0.76 5	0.0143
γ 18	918.69 4	0.51 3	0.0101
γ 19	923.980 20	2.48 14	0.0487
γ 21	936.61 6	0.331 19	0.0066
γ 23	941.38 5	0.45 3	0.0091
γ 24	962.77 3	0.61 4	0.0125

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
^{238}Np β⁻ Decay (2.117 d 2) (Continued)			
γ 26	984.450 20	23.8 6	0.499
γ 27	1025.870 20	8.2 5	0.179
γ 28	1028.540 20	17.4 11	0.381
16 weak γ's omitted: Eγ(avg) = 503.9; ΣIγ = 0.54%			
• ^{238}Pu α Decay (87.75 y 3) I (min) = 0.10%			
Feeds ^{234}U			
% Spontaneous Fission = 1.84E−7 6			
Auger-L	9.89	9.1 14	0.0019
ce-L- 2	21.723 10	20.7 11	0.0096
ce-MNO- 2	37.932 10	7.6 4	0.0061
α 1	5357.7	0.10 3	0.0114
α 2	5456.5 4	28.3 6	3.29
α 3	5499.21 20	71.6 6	8.39
X-ray L	13.6	11.6 14	0.0034
35 weak γ's omitted: Eγ(avg) = 55.3; ΣIγ = 0.05%			
• ^{239}U β⁻ Decay (23.40 m 5) I (min) = 0.10%			
Feeds ^{239}Np			
ce-L- 1	8.67 15	7.0 4	0.0013
Auger-L	10	9.6 14	0.0021
ce-L- 2	20.6732 9	1.94 9	0.0009
ce-L- 3	21.107 4	3.72 23	0.0017
ce-MNO- 1	25.38 15	2.41 18	0.0013
ce-MNO- 2	37.377 4	0.68 4	0.0005
ce-MNO- 3	37.811 5	1.24 7	0.0010
ce-L- 6	48.7732 9	0.103 5	0.0001
ce-L- 7	52.243 4	10.1 6	0.0112
ce-M- 7	68.947 5	2.49 13	0.0037
ce-NOP- 7	73.169 4	0.88 5	0.0014
β⁻ 1 max	302 3		
avg	83.7 8	0.2	0.0004
β⁻ 2 max	422 3		
avg	120.9 8	0.24	0.0006
β⁻ 3 max	447 3		
avg	128.8 8	0.26	0.0007
β⁻ 4 max	604 3		
avg	180.5 9	0.25	0.0010
β⁻ 5 max	1148 3		
avg	375.8 10	2.8	0.0224
β⁻ 6 max	1191 3		
avg	392.0 10	68 3	0.568
β⁻ 7 max	1265.8 25		
avg	420.3 10	28 3	0.251
total β⁻			
avg	396.4 10	100 5	0.845
17 weak β's omitted: Eβ(avg) = 177.5; ΣIβ = 0.28%			
X-ray L	13.9	13.3 15	0.0039
γ 3	43.534 3	4.27 23	0.0040
γ 7	74.670 3	48.0 20	0.0763
γ 11	117.66 3	0.139 6	0.0003
γ 64	662.24 3	0.178 8	0.0025
γ 75	748.08 4	0.101 5	0.0016
γ 84	819.22 4	0.144 6	0.0025
γ 87	844.10 4	0.158 7	0.0028
111 weak γ's omitted: Eγ(avg) = 611.2; ΣIγ = 0.92%			
• ^{239}Np β⁻ Decay (2.355 d 4) I (min) = 0.10%			
Feeds ^{239}Pu			
ce-MNO- 1	1.927 4	62 5	0.0025
ce-K- 13	2.60 5	0.119 21	≈0
Auger-L	10.3	41 7	0.0090
ce-MNO- 2	12.4671 14	7 3	0.0019
ce-L- 3	21.566 6	6.4 17	0.0029
ce-L- 4	26.315 5	9.5 22	0.0053
ce-L- 5	34.176 5	25 4	0.0180
ce-L- 6	34.2028 16	0.10 8	≈0
ce-L- 7	38.383 5	0.34 6	0.0003
ce-MNO- 3	38.730 6	2.2 6	0.0018
ce-MNO- 4	43.479 5	3.4 8	0.0032
ce-L- 8	44.744 8	6.6 17	0.0063
ce-M- 5	51.340 5	6.9 10	0.0075
ce-MNO- 7	55.547 5	0.116 18	0.0001
ce-NOP- 5	55.714 4	2.6 4	0.0031
ce-K- 15	59.90 5	0.45 6	0.0006
ce-M- 8	61.908 8	1.8 5	0.0024
ce-NOP- 8	66.282 7	0.70 18	0.0010
Auger-K	76	1.0 11	0.0016
ce-L- 11	83.033 11	5 5	0.0088
ce-L- 12	83.40 3	0.42 8	0.0007
ce-K- 16	87.93 5	8.9 8	0.0166
ce-M- 11	100.197 10	1.4 14	0.0029
ce-MNO-12	100.57 3	0.16 3	0.0003
ce-K- 17	104.57 5	0.58 9	0.0013
ce-NOP-11	104.571 10	0.5 5	0.0011
ce-K- 18	106.37 5	23.0 14	0.0522
ce-K- 19	132.59 10	0.16 3	0.0004
ce-K- 20	151.02 9	0.102 14	0.0003
ce-K- 21	155.79 5	17.2 5	0.0571
ce-L- 16	186.653 11	1.78 15	0.0071
ce-L- 17	203.286 13	0.139 18	0.0006
ce-M- 16	203.817 10	0.43 4	0.0019
ce-L- 18	205.087 13	4.6 3	0.0202
ce-NOP-16	208.191 10	0.161 13	0.0007
ce-M- 18	222.251 12	1.13 8	0.0053
ce-NOP-18	226.625 12	0.42 3	0.0020
ce-L- 21	254.507 16	3.47 10	0.0188
ce-M- 21	271.671 16	0.847 25	0.0049
ce-NOP-21	276.045 16	0.316 9	0.0019
β⁻ 1 max	209.6 19		
avg	56.5 6	1.96 19	0.0024
β⁻ 2 max	329.8 19		
avg	92.1 6	35 7	0.0687
β⁻ 3 max	391.3 19		
avg	111.2 6	7.1 22	0.0168
β⁻ 4 max	435.9 19		
avg	125.3 6	52 8	0.139
β⁻ 5 max	713.5 19		
avg	217.8 7	4.0 20	0.0186
total β⁻			
avg	115.0 7	100 11	0.245
4 weak β's omitted: Eβ(avg) = 59.8; ΣIβ = 0.03%			

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	14.3	62 8	0.0188
γ 4	49.412 4	0.100 22	0.0001
γ 5	57.273 4	0.151 21	0.0002
γ 7	61.480 4	0.96 15	0.0013
X-ray $K\alpha_2$	99.55 5	14.7 6	0.0312
X-ray $K\alpha_1$	103.76 5	23.7 10	0.0523
γ 11	106.130 10	22.7 13	0.0513
X-ray Kβ	117	11.1 5	0.0277
γ 15	181.715 10	0.111 15	0.0004
γ 16	209.750 10	3.24 25	0.0145
γ 17	226.383 12	0.34 5	0.0016
γ 18	228.184 12	10.7 7	0.0521
γ 19	254.41 8	0.100 18	0.0005
γ 21	277.604 16	14.1 4	0.0834
γ 22	285.41 3	0.78 8	0.0047
γ 24	315.88 4	1.59 11	0.0107
γ 26	334.30 5	2.03 18	0.0145

26 weak γ's omitted:
Eγ(avg) = 151.5; ΣIγ = 0.39%

● ^{239}Pu α Decay (24131 y 16) I(min) = 0.10%
Feeds ^{235}U
% Spontaneous Fission = 4.4E−10 13

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-MNO- 2	7.3920 4	19.0 12	0.0030
ce-L- 3	8.33 10	0.18 17	≈0
Auger-L	9.89	3.5 6	0.0007
ce-L- 4	16.93 3	2.8 6	0.0010
ce-L- 6	24.46 5	0.11 10	≈0
ce-L- 8	29.86 3	4.78 21	0.0030
ce-MNO- 4	33.14 3	1.00 24	0.0007
ce-M- 8	46.07 3	1.32 6	0.0013
ce-NOP- 8	50.18 3	0.493 22	0.0005
α 1	5104.6 10	11.50 20	1.25
α 2	5142.9 8	15.10 20	1.65
α 3	5155.4 7	73.3 7	8.05

20 weak α's omitted:
Eα(avg) = 5007.5; ΣIα = 0.11%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	13.6	4.4 6	0.0013

173 weak γ's omitted:
Eγ(avg) = 112.9; ΣIγ = 0.05%

● ^{240}U β^- Decay (14.1 h 2) I(min) = 0.10%
Feeds ^{240}Np (7.4 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	10	31 5	0.0067
ce-L- 2	21.67 7	74.3 6	0.0343
ce-MNO- 2	38.38 7	24.0 5	0.0196
β^- 1 max	440 60		
avg	125 20	100	0.266
X-ray L	13.9	43 5	0.0128
γ 2	44.10 7	1.65 5	0.0015

● ^{240}Np β^- Decay (65 m 3) I(min) = 0.10%
Feeds ^{240}Pu

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	10.3	73 12	0.0160
ce-L- 1	19.727 9	73.0 6	0.0307
ce-K- 4	25.38 5	6 6	0.0030
ce-K- 5	30.81 5	1.67 5	0.0011
ce-MNO- 1	36.891 9	27.0 6	0.0212
ce-K- 8	70.9 3	12 12	0.0184
ce-L- 2	75.763 13	62.5 7	0.101
Auger-K	76	0.6 7	0.0009
ce-M- 2	92.927 13	17.5 5	0.0347
ce-NOP- 2	97.301 13	6.70 19	0.0139
ce-L- 4	124.1028 16	2.4 4	0.0064
ce-L- 5	129.533 20	14.1 5	0.0389
ce-M- 4	141.2671 14	0.64 14	0.0019
ce-NOP- 4	145.6414 8	0.24 6	0.0007
ce-M- 5	146.697 20	3.95 12	0.0123
ce-K- 9	149.0 3	6 5	0.0185
ce-NOP- 5	151.071 20	1.50 5	0.0048
ce-L- 8	169.6 3	4.4 4	0.0159
ce-K- 11	173.18 5	0.688 21	0.0025
ce-K- 12	185.18 5	0.105 4	0.0004
ce-M- 8	186.8 3	1.150 7	0.0046
ce-NOP- 8	191.1 3	0.432 6	0.0018
ce-L- 9	247.7 3	1.8 5	0.0092
ce-M- 9	264.9 3	0.44 10	0.0025
ce-NOP- 9	269.2 3	0.17 4	0.0010
ce-L- 11	271.9028 16	0.136 4	0.0008
ce-L- 12	283.9028 16	0.127 4	0.0008
ce-K- 15	326.4 3	0.240 8	0.0017
ce-K- 20	444.58 21	2.7 22	0.0255
ce-K- 22	479.28 5	0.167 5	0.0017
ce-L- 20	543.30 20	0.6 4	0.0072
ce-MNO-20	560.47 20	0.22 11	0.0026
ce-K- 33	865.94 8	0.12 8	0.0021
β^- 1 max	780 60		
avg	241 22	100	0.513
X-ray L	14.3	109 13	0.0333
γ 1	42.824 8	0.11124	0.0001
γ 2	98.860 13	5	0.0107
X-ray $K\alpha_2$	99.55 5	9 4	0.0181
X-ray $K\alpha_1$	103.76 5	14 7	0.0303
X-ray Kβ	117	6 3	0.0161
γ 3	134.6	0.37	0.0011
γ 4	147.2	1.4	0.0044
γ 5	152.630 20	8.343	0.0271
γ 6	175	6	0.0225
γ 7	182.6	0.927	0.0036
γ 8	192.7 3	6.767	0.0278
γ 9	270.8 3	8.343	0.0481
γ 10	280.20 20	0.37	0.0022
γ 11	295	0.6489	0.0041
γ 12	307	1.4	0.0091
γ 15	448.2 3	16.686	0.159
γ 16	462.2	1.4	0.0137
γ 17	467.4	2	0.0203
γ 18	507.20 10	1.854	0.0200
γ 20	566.40 20	26.883	0.324
γ 22	601	20.4	0.261
γ 23	606.10 7	1.5759	0.0203
γ 24	847	4.635	0.0836
γ 25	867.40 20	8.343	0.154
γ 26	884.9	3.7	0.0699
γ 27	888.80 5	1.1124	0.0211
γ 28	896.5 5	13	0.248
γ 29	915.98 9	1.4	0.0271
γ 30	959.1 3	2.3175	0.0473
γ 32	973.90 20	21.32	0.442

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
^{240}Np β^- Decay (65 m 3) (Continued)			
γ 33	987.76 6	4.635	0.0975
γ 34	1074.4	0.927	0.0212
γ 35	1088.5 3	0.4635	0.0107
γ 36	1131.30 20	0.6489	0.0156
γ 38	1163	0.6489	0.0161
γ 39	1167.6 6	4.635	0.115
γ 40	1180.3 3	0.6489	0.0163
γ 42	1223.2 3	0.4635	0.0121

7 weak γ's omitted:
Eγ(avg) = 422.7; ΣIγ= 0.20%

● ^{240}Np IT Decay (7.4 m 2) I(min) = 0.10%
%IT Decay = 0.11 3
Feeds ^{240}Np (65 m)
See also ^{240}Np β^- Decay (7.4 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-MNO- 1	14.277 4	0.11 3	≈0

● ^{240}Np β^- Decay (7.4 m 2) I(min) = 0.10%
%β⁻ Decay = 99.89 3
Feeds ^{240}Pu
See also ^{240}Np IT Decay (7.4 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	10.3	22 9	0.0049
ce-L- 1	19.727 9	54 21	0.0225
ce-MNO- 1	36.891 9	20 8	0.0156
ce-L- 3	75.763 13	2.1 4	0.0034
ce-M- 3	92.927 13	0.58 11	0.0012
ce-NOP- 3	97.301 13	0.22 4	0.0005
ce-L- 4	166.40 10	0.164 14	0.0006
ce-K- 18	432.78 9	0.213 13	0.0020
ce-K- 19	475.58 9	0.104 6	0.0010
ce-K- 29	738.88 5	0.1262	0.0020
β- 1 max	480 60		
avg	138 20	0.235 20	0.0007
β- 2 max	550 60		
avg	163 20	0.342 24	0.0012
β- 3 max	570 60		
avg	169 21	2.22 13	0.0080
β- 4 max	580 60		
avg	174 21	0.205 22	0.0008
β- 5 max	620 60		
avg	186 21	0.57 4	0.0023
β- 6 max	670 60		
avg	203 21	0.378 24	0.0016
β- 7 max	700 60		
avg	213 21	0.21 3	0.0010
β- 8 max	1020 60		
avg	327 23	0.62 5	0.0043
β- 9 max	1150 60		
avg	376 23	1.18 7	0.0095
β-10 max	1170 60		
avg	384 23	1.45 6	0.0119
β-11 max	1210 60		
avg	398 23	3.50 13	0.0297
β-12 max	1250 60		
avg	413 23	2.65 11	0.0233
β-13 max	1510 60		
avg	514 24	31.9 13	0.349
β-14 max	2070 60		
avg	733 25	52 3	0.812
total β-			
avg	600 30	98 4	1.26

7 weak β's omitted:
Eβ(avg) = 214.8; ΣIβ= 0.33%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	14.3	34 13	0.0103
γ 2	66.50 10	0.27 3	0.0004
γ 3	98.860 13	0.17 3	0.0004
X-ray $K\alpha_2$	99.55 5	0.129 5	0.0003
X-ray $K\alpha_1$	103.76 5	0.208 8	0.0005
γ 4	189.50 10	0.250 20	0.0010
γ 5	251.46 7	0.96 7	0.0051
γ 6	263.35 7	1.17 8	0.0066
γ 10	302.98 7	1.12 6	0.0072
γ 16	507.20 10	0.79 4	0.0085
γ 18	554.60 7	22.4 11	0.264
γ 19	597.40 7	12.5 6	0.159
γ 20	606.10 7	0.74 5	0.0095
γ 22	758.62 8	1.19 6	0.0192
γ 23	789.59 10	0.210 20	0.0035
γ 24	813.43 14	0.211 25	0.0037
γ 25	817.88 11	1.24 6	0.0216
γ 27	841.11 10	0.166 12	0.0030
γ 28	857.46 10	0.47 3	0.0086
γ 32	900.46 11	0.130 20	0.0025
γ 33	910.09 10	0.170 20	0.0033
γ 34	915.98 9	1.04 6	0.0203
γ 35	928.59 10	0.170 20	0.0034
γ 36	938.04 10	1.29 5	0.0257
γ 37	942.37 11	0.110 20	0.0022
γ 40	961.64 11	0.144 10	0.0029
γ 64	1445.30 10	0.36 3	0.0111
γ 66	1488.20 10	0.210 20	0.0066
γ 67	1496.90 10	1.31 7	0.0417
γ 69	1539.64 9	0.79 10	0.0259
γ 76	1633.26 10	0.144 15	0.0050

54 weak γ's omitted:
Eγ(avg) = 1020.0; ΣIγ= 1.26%

● ^{240}Pu α Decay (6569 y 6) I(min) = 0.10%
Feeds ^{236}U
% Spontaneous Fission = 4.95E–6 20

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	9.89	8.7 13	0.0018
ce-L- 1	23.485 6	19.7 7	0.0098
ce-MNO- 1	39.694 6	7.20 8	0.0061
α 1	5123.43 23	26.39 21	2.88
α 2	5168.30 15	73.5 4	8.09

3 weak α's omitted:
Eα(avg) = 5017.0; ΣIα= 0.07%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	13.6	11.0 13	0.0032

9 weak γ's omitted:
Eγ(avg) = 54.3; ΣIγ= 0.05%

● ^{241}Pu β^- Decay (14.4 y 2) I (min) = 0.10%
%β^- Decay = 99.99755 8
Feeds ^{241}Am
%α Decay = 0.00245 8

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β- 1 max	20.81 20		
avg	5.23 5	99.9975	0.0111

● ^{241}Am α Decay (432.2 y 5) I (min) = 0.10%
Feeds ^{237}Np
% Spontaneous Fission = 3.77E–10 8

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
ce-L- 2	3.9182 14	16.1 12	0.0013
Auger-L	10	31 5	0.0067
ce-L- 5	10.778 10	14.8 17	0.0034
ce-L- 7	20.30 5	1.6 4	0.0007
ce-MNO- 2	20.622 4	5.5 6	0.0024
ce-L- 8	20.996 10	9.1 10	0.0040
ce-MNO- 5	27.482 11	5.0 6	0.0029
ce-L- 10	33.133 20	0.89 12	0.0006
ce-MNO- 7	37.01 5	0.59 12	0.0005
ce-L- 12	37.1102 14	30.9 19	0.0244
ce-MNO- 8	37.700 11	3.2 4	0.0026
ce-MNO-10	49.837 21	0.33 4	0.0003
ce-M- 12	53.814 4	7.6 5	0.0088
ce-NOP-12	58.0363 13	2.69 19	0.0033
ce-L- 18	76.543 20	0.27 6	0.0004
ce-MNO-18	93.247 21	0.104 22	0.0002
α 1	5388.0 10	1.40 20	0.161
α 2	5442.98 13	12.8C 20	1.48
α 3	5485.74 12	85.2 8	9.96
α 4	5512.0 20	0.20 5	0.0235
α 5	5544.3 3	0.34 5	0.0402

20 weak α's omitted:
Eα(avg) = 5308.2; ΣIα= 0.03%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	13.9	43 5	0.0126
γ 2	26.3450 10	2.40 10	0.0013
γ 5	33.205 10	0.106 11	≈0
γ 12	59.5370 10	35.9 6	0.0455

137 weak γ's omitted:
Eγ(avg) = 69.2; ΣIγ= 0.18%

● ^{242}Pu α Decay (3.758E5 y 26) I (min) = 0.10%
Feeds ^{238}U
% Spontaneous Fission = 5.50E–4 6

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	9.89	7.2 12	0.0015
ce-L- 1	23.158 13	16.3 15	0.0080
ce-MNO- 1	39.367 13	6.0 5	0.0050
α 1	4856.3 12	22.4 20	2.32
α 2	4900.6 12	78 3	8.14

2 weak α's omitted:
Eα(avg) = 4752.5; ΣIα= 0.10%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	13.6	9.1 13	0.0026

3 weak γ's omitted:
Eγ(avg) = 56.5; ΣIγ= 0.04%

● ^{242}Am EC Decay (16.02 h 2) I (min) = 0.10%
%EC Decay = 17.3 3
Feeds ^{242}Pu
See also ^{242}Am β^- Decay (16.02 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	10.3	8.4 13	0.0019
ce-L- 1	21.448 10	7.7 3	0.0035
ce-MNO- 1	38.612 10	2.84 13	0.0023
Auger-K	76	0.3 3	0.0004
X-ray L	14.3	12.7 14	0.0039
X-ray Kα$_2$	99.55 5	3.66 17	0.0078
X-ray Kα$_1$	103.76 5	5.9 3	0.0130
X-ray Kβ	117	2.77 13	0.0069

1 weak γ's omitted:
Eγ(avg) = 44.5; ΣIγ= 0.01%

● ^{242}Am β^- Decay (16.02 h 2) I (min) = 0.10%
%β^- Decay = 82.7 3
Feeds ^{242}Cm
See also ^{242}Am EC Decay (16.02 h)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	10.7	11.1 22	0.0025
ce-L- 1	17.67 11	31 3	0.0116
ce-MNO- 1	35.86 11	11.4 12	0.0087
β- 1 max	619.0 18		
avg	184.8 6	42 4	0.165
β- 2 max	661.2 18		
avg	199.0 7	41 5	0.174
total β- avg	191.8 7	83 7	0.339
X-ray L	15	20 3	0.0063

1 weak γ's omitted:
Eγ(avg) = 42.2; ΣIγ= 0.04%

● ^{242}Am α Decay (152 y 7) I (min) = 0.10%
%α Decay = 0.476 14
Feeds ^{238}Np
See also ^{242}Am IT Decay (152 y)
% Spontaneous Fission = 1.6E–8 6

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	10	0.28 11	≈0
ce-L- 3	26.94 3	0.122 6	≈0
ce-L- 7	45.4732 9	0.30 23	0.0003
ce-L- 10	64.2732 9	0.237 10	0.0003
α 1	5205	0.424 13	0.0470

10 weak α's omitted:
Eα(avg) = 5227.5; ΣIα= 0.05%

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
^{242}Am α Decay (152 y 7) (Continued)			
X-ray L	13.9	0.38 14	0.0001
γ 3	49.37 3	0.195 6	0.0002
21 weak γ's omitted: Eγ(avg) = 108.3; ΣIγ = 0.16%			
• ^{242}Am IT Decay (152 y 7) I (min) = 0.10%			
%IT Decay = 99.524 14			
Feeds ^{242}Am (16.02 h)			
See also ^{242}Am α Decay (152 y)			
% Spontaneous Fission = 1.6E−8 6			
Auger-L	10.5	18 3	0.0041
ce-L- 1	24.82 6	48.3 7	0.0255
ce-MNO- 1	42.50 6	51.3 7	0.0464
X-ray L	14.6	30 3	0.0093
• ^{242}Cm α Decay (163.2 d 4) I (min) = 0.10%			
Feeds ^{238}Pu			
% Spontaneous Fission = 6.8E−6 7			
Auger-L	10.3	7.7 14	0.0017
ce-L- 1	20.98 3	19.2 19	0.0086
ce-MNO- 1	38.15 3	7.1 7	0.0058
α 1	6069.63 12	25.9 5	3.35
α 2	6112.92 8	74.1 5	9.65
6 weak α's omitted: Eα(avg) = 5948.5; ΣIα = 0.04%			
X-ray L	14.3	11.5 16	0.0035
9 weak γ's omitted: Eγ(avg) = 59.2; ΣIγ = 0.04%			
• ^{243}Pu β⁻ Decay (4.956 h 3) I (min) = 0.10%			
Feeds ^{243}Am			
ce-L- 2	10.194 17	2.17 20	0.0005
Auger-L	10.5	7.3 16	0.0016
ce-L- 3	17.99 20	0.77 10	0.0003
ce-L- 4	18.4 5	9.0 9	0.0035
ce-MNO- 2	27.875 12	0.80 7	0.0005
ce-L- 5	30.194 17	3 3	0.0019
ce-MNO- 3	35.68 20	0.26 4	0.0002
ce-MNO- 4	36.1 5	3.1 3	0.0024
ce-M- 5	47.875 12	0.9 7	0.0009
ce-NCP- 5	52.384 20	0.3 3	0.0004
ce-L- 7	60.19 20	3.7 4	0.0048
ce-L- 8	72.6 4	0.21 4	0.0003
ce-M- 7	77.88 20	0.93 9	0.0015
ce-NCP- 7	82.38 20	0.33 3	0.0006
ce-K- 14	256.7 3	0.32 4	0.0017
β⁻ 1 max	116 4		
avg	30.3 11	1.23 14	0.0008
β⁻ 2 max	473 4		
avg	136.9 13	0.25 17	0.0007
β⁻ 3 max	486 4		
avg	141.0 13	4 4	0.0132
β⁻ 4 max	498 4		
avg	145.1 13	29 3	0.0896
β⁻ 5 max	540 4		
avg	158.7 14	6 4	0.0203
β⁻ 6 max	582 4		
avg	172.7 14	59 4	0.217
total β⁻ avg	160.6 15	100 8	0.342
2 weak β's omitted: Eβ(avg) = 13.9; ΣIβ = 0.02%			
X-ray L	14.6	11.9 21	0.0037
γ 3	41.80 20	0.76 10	0.0007
γ 6	67	0.23 12	0.0003
γ 7	84.00 20	23.0 20	0.0412
X-ray Kα₁	106.49 3	0.147 19	0.0003
γ 10	109.30 20	0.161 22	0.0004
γ 13	356.4 3	0.131 17	0.0010
γ 14	381.7 3	0.55 7	0.0045
13 weak γ's omitted: Eγ(avg) = 137.2; ΣIγ = 0.18%			
• ^{243}Am α Decay (7.38E3 y 4) I (min) = 0.10%			
Feeds ^{239}Np			
ce-L- 1	8.67 15	40 30	0.0074
Auger-L	10	28 14	0.0061
ce-L- 2	20.6732 9	7.8 4	0.0034
ce-L- 3	21.107 4	4.8 5	0.0022
ce-MNO- 1	25.38 15	15 12	0.0078
ce-L- 5	32.9732 9	0.85 5	0.0006
ce-MNO- 2	37.377 4	2.74 14	0.0022
ce-MNO- 3	37.811 5	1.61 14	0.0013
ce-MNO- 5	49.677 4	0.317 15	0.0003
ce-L- 6	52.243 4	13.9 8	0.0154
ce-M- 6	68.947 5	3.42 19	0.0050
ce-NCP- 6	73.169 4	1.21 7	0.0019
ce-L- 8	76.0732 9	0.106 6	0.0002
α 1	5181.0 10	1	0.121
α 2	5233.5 10	10.6	1.18
α 3	5275.4 10	87.9	9.88
α 4	5321.0 10	0.12	0.0136
α 5	5350.0 10	0.16	0.0182
8 weak α's omitted: Eα(avg) = 5032.0; ΣIα = 0.02%			
X-ray L	13.9	39 19	0.0116
γ 3	43.534 3	5.5 5	0.0051
γ 6	74.670 3	66 3	0.105
γ 7	86.72 7	0.34 4	0.0006
γ 9	117.66 3	0.55 9	0.0014
γ 10	142.18 15	0.125 15	0.0004
9 weak γ's omitted: Eγ(avg) = 48.4; ΣIγ = 0.16%			

● ^{243}Cm α Decay (28.5 y 2) I (min) = 0.10%
%α Decay = 99.76
Feeds ^{239}Pu
%EC Decay = 0.24

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-MNO- 1	1.927 4	67.8368	0.0028
Auger-L	10.3	41 7	0.0089
ce-MNO- 2	12.4671 14	7	0.0019
ce-L- 3	21.566 6	8.5 15	0.0039
ce-L- 4	26.315 5	9.5 20	0.0053
ce-L- 5	34.176 5	22.9 18	0.0167
ce-L- 6	34.2028 16	1.8 14	0.0013
ce-MNO- 3	38.730 6	2.9 5	0.0024
ce-MNO- 4	43.479 5	3.4 8	0.0031
ce-L- 8	44.744 8	9.99 9	0.0095
ce-M- 5	51.340 5	6.4 5	0.0070
ce-M- 6	51.3671 14	0.5 4	0.0006
ce-NCP- 5	55.714 4	2.43 19	0.0029
ce-NCP- 6	55.7414 8	0.20 16	0.0002
ce-MNO- 8	61.908 8	2.79 7	0.0037
ce-NCP- 8	66.282 7	1.06 3	0.0015
Auger-K	76	1.0 10	0.0016
ce-L- 12	83.40 3	0.148 5	0.0003
ce-K- 14	87.93 5	9.0 4	0.0168
ce-K- 15	106.37 5	22.7 7	0.0515
ce-K- 16	132.59 10	0.172 16	0.0005
ce-K- 17	151.02 9	0.105 14	0.0003
ce-K- 18	155.79 5	17.0 5	0.0565
ce-L- 14	186.653 11	1.80 8	0.0072
ce-M- 14	203.817 10	0.438 19	0.0019
ce-L- 15	205.087 13	4.56 13	0.0199
ce-NCP-14	208.191 10	0.163 7	0.0007
ce-M- 15	222.251 12	1.11 5	0.0053
ce-NCP-15	226.625 12	0.413 17	0.0020
ce-L- 18	254.507 16	3.44 10	0.0186
ce-M- 18	271.671 16	0.839 25	0.0049
ce-NCP-18	276.045 16	0.313 9	0.0018
α 1	5639 3	0.14	0.0168
α 2	5682 3	0.2	0.0241
α 3	5686 3	1.6	0.193
α 4	5741.6 10	11.4724	1.40
α 5	5784.5 10	73.3236	9.03
α 6	5876 3	0.6	0.0749
α 7	5993 3	5.58656	0.713
α 8	6010 3	1.0	0.128
α 9	6057 3	4.68872	0.605
α 10	6067 3	1.5	0.193

19 weak α's omitted:
Eα(avg) = 5700.1; ΣIα = 0.34%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	14.3	61 7	0.0185
γ 3	44.663 5	0.120 20	0.0001
γ 5	57.273 4	0.140 10	0.0002
γ 8	67.841 7	0.14	0.0002
X-ray $K\alpha_2$	99.55 5	14.3 5	0.0303
X-ray $K\alpha_1$	103.76 5	23.0 7	0.0508
γ 11	106.130 10	0.259 20	0.0006
X-ray Kβ	117	10.8 4	0.0269
γ 14	209.750 10	3.29 10	0.0147
γ 15	228.184 12	10.6 3	0.0514
γ 16	254.41 8	0.110 10	0.0006
γ 18	277.604 16	14.0 4	0.0826
γ 19	285.41 3	0.728 20	0.0044

14 weak γ's omitted:
Eγ(avg) = 167.0; ΣIγ = 0.33%

● ^{244}Pu α Decay (8.26E7 y 9) I (min) = 0.10%
%α Decay = 99.875 6
Feeds ^{240}U
% Spontaneous Fission = 0.125 6

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	9.89	6.2 9	0.0013
ce-L- 1	22.2 10	14.2 6	0.0067
ce-MNO- 1	38.5 10	5.19 25	0.0043
α 1	4546.0 10	19.4 8	1.88
α 2	4589.0 10	80.5 8	7.87
X-ray L	13.6	7.9 10	0.0023

1 weak γ's omitted:
Eγ(avg) = 44.0; ΣIγ = 0.03%

● ^{244}Am β^- Decay (10.1 h 1) I (min) = 0.10%
Feeds ^{244}Cm

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	10.7	66 11	0.0150
ce-L- 1	18.37 11	72.7 6	0.0284
ce-K- 3	25.7 10	3.18 9	0.0017
ce-MNO- 1	36.56 11	27.2 6	0.0212
ce-L- 2	74.87 11	68.3 6	0.109
Auger-K	79.6	0.15 16	0.0003
ce-M- 2	93.06 11	19.3 5	0.0383
ce-NCP- 2	97.71 11	7.59 21	0.0158
ce-L- 3	129.5 10	34.4 5	0.0949
ce-M- 3	147.7 10	9.7 3	0.0306
ce-NCP- 3	152.3 10	3.79 11	0.0123
ce-L- 4	181 4	0.143 3	0.0006
ce-K- 6	617.7 10	4.2 3	0.0555
ce-L- 6	721.5 10	0.93 4	0.0143
ce-MNO- 6	739.7 10	0.308 16	0.0048
ce-K- 7	771.7 10	0.339 12	0.0056
ce-L- 7	875.5 10	0.100 3	0.0019
β⁻ 1 max	387.0 23		
avg	109.6 7	100	0.233
X-ray L	15	117 11	0.0374
γ 2	99.40 10	4.83 14	0.0102
X-ray $K\alpha_2$	104.61 5	2.26 11	0.0050
X-ray $K\alpha_1$	109.29 5	3.61 16	0.0084
X-ray Kβ	123	1.71 9	0.0045
γ 3	154.0 10	18	0.0590
γ 4	206 4	0.26	0.0011
γ 5	540.0 20	0.38	0.0044
γ 6	746.0 10	67	1.06
γ 7	900.0 10	28	0.537

1 weak γ's omitted:
Eγ(avg) = 42.9; ΣIγ = 0.09%

● ^{244}Cm α Decay (18.11 y 2) I (min) = 0.10%
Feeds ^{240}Pu
% Spontaneous Fission = 1.347E–4 2

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	10.3	6.9 11	0.0015
ce-L- 1	19.727 9	17.20 21	0.0072
ce-MNO- 1	36.891 9	6.37 16	0.0050

(Continued)

^{244}Cm α Decay (18.11 y 2) (*Continued*)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
α 1	5762.84 3	23.60 20	2.90
α 2	5804.96 5	76.40 20	9.45

6 weak α's omitted:
Eα(avg) = 5633.0; ΣIα = 0.03%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	14.3	10.3 11	0.0031

16 weak γ's omitted:
Eγ(avg) = 56.9; ΣIγ = 0.03%

● ^{245}Pu β^- Decay (10.57 h 4) I (min) = 0.10%
Feeds ^{245}Am

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-L- 1	4.2 10	2.0 12	0.0002
Auger-L	10.5	11 3	0.0024
ce-MNO- 1	21.9 10	0.7 4	0.0003
Auger-K	77.8	0.5 6	0.0009
ce-K- 3	155.29 21	1.2 4	0.0041
ce-K- 6	183.11 21	4.2 15	0.0163
ce-K- 8	202.31 21	18 8	0.0756
ce-K- 11	223.73 21	0.4 4	0.0020
ce-K- 13	251.58 21	1.7 6	0.0092
ce-L- 3	256.48 20	0.31 9	0.0017
ce-MNO- 3	274.16 20	0.11 3	0.0006
ce-L- 6	284.30 20	0.9 3	0.0057
ce-MNO- 6	301.98 20	0.32 9	0.0021
ce-L- 8	303.50 20	4.0 13	0.0262
ce-K- 21	303.51 21	0.13 11	0.0008
ce-M- 8	321.18 20	1.0 3	0.0068
ce-L- 11	324.92 20	0.10 6	0.0007
ce-NOP- 8	325.69 20	0.38 11	0.0026
ce-L- 13	352.77 20	0.36 11	0.0027
ce-K- 29	366.50 21	0.10 3	0.0008
ce-MNO-13	370.45 20	0.12 4	0.0010
ce-K- 36	435.03 21	0.18 5	0.0017
ce-K- 42	505.04 21	0.35 13	0.0037
β- 1 max	70 30		
avg	19 8	0.12 3	≈0
β- 2 max	150 30		
avg	39 9	0.68 19	0.0006
β- 3 max	190 30		
avg	52 9	1.7 4	0.0019
β- 4 max	240 30		
avg	64 9	1.1 4	0.0015
β- 5 max	270 30		
avg	75 9	3.1 8	0.0050
β- 6 max	300 30		
avg	84 9	8.3 19	0.0149
β- 7 max	340 30		
avg	95 10	2.5 6	0.0051
β- 8 max	370 30		
avg	105 10	15 4	0.0335
β- 9 max	930 30		
avg	295 11	57 8	0.358
β-10 max	1210 30		
avg	398 12	11 9	0.0933
total β-			
avg	240 15	100 13	0.514
X-ray L	14.6	17 5	0.0054
γ 1	28.0 10	0.7 4	0.0004
X-ray Kα₂	102.05 3	7.5 22	0.0164
X-ray Kα₁	106.49 3	12 4	0.0274
X-ray Kβ	120	5.7 17	0.0146
γ 3	280.29 20	1.4 4	0.0082
γ 6	308.11 20	5.2 13	0.0343
γ 8	327.31 20	27 7	0.188
γ 10	341.00 20	0.11 3	0.0008
γ 11	348.73 20	1.0 3	0.0076
γ 13	376.58 20	3.4 9	0.0274
γ 15	387.88 20	0.31 10	0.0025
γ 17	395.87 20	0.11 5	0.0009
γ 18	411.74 20	0.52 13	0.0046
γ 21	428.51 20	0.56 14	0.0051
γ 23	445.34 20	0.32 9	0.0031
γ 29	491.50 20	2.9 8	0.0302
γ 31	514.60 20	0.18 6	0.0020
γ 33	525.08 20	0.29 8	0.0032
γ 36	560.03 20	5.8 14	0.0687
γ 38	591.6 3	0.18 6	0.0023
γ 40	598.8 3	0.13 5	0.0016
γ 41	624.4 4	0.23 7	0.0031
γ 42	630.04 20	2.9 8	0.0386
γ 45	657.2 7	0.14 8	0.0020
γ 46	660.20 20	0.90 24	0.0127
γ 48	669.28 20	0.36 10	0.0051
γ 53	707.98 20	0.29 9	0.0043
γ 55	730.40 20	0.20 6	0.0031
γ 57	737.96 20	0.23 8	0.0037
γ 58	740.2 7	0.14 7	0.0023
γ 59	743.70 20	0.16 5	0.0026
γ 62	762.73 20	0.76 19	0.0123
γ 63	766.59 15	0.38 10	0.0062
γ 64	776.66 20	0.22 6	0.0036
γ 66	786.54 20	0.40 11	0.0066
γ 67	796.37 20	0.27 10	0.0046
γ 68	799.87 20	1.7 5	0.0285
γ 69	817.04 20	0.90 22	0.0157
γ 72	833.14 20	0.56 14	0.0099
γ 74	840.56 20	1.4 4	0.0245
γ 75	859.53 20	0.54 14	0.0099
γ 76	868.8 4	0.13 5	0.0023
γ 78	874.16 20	0.14 5	0.0027
γ 81	887.14 20	0.76 19	0.0143
γ 84	910.46 20	1.5 4	0.0286
γ 89	938.40 20	1.1 3	0.0216
γ 90	941.0 10	0.27 19	0.0054
γ 93	957.59 20	1.0 3	0.0213
γ 97	975.0 10	0.27 19	0.0056
γ 98	977.20 20	0.41 21	0.0086
γ 101	987.60 20	1.4 4	0.0295
γ 102	996.0 3	0.22 6	0.0046
γ 104	1005.1 3	0.29 13	0.0062
γ 105	1007.31 20	0.43 15	0.0093
γ 106	1013.2 3	0.11 5	0.0023
γ 107	1018.33 20	1.1 3	0.0238
γ 108	1023.32 20	0.58 17	0.0126

66 weak γ's omitted:
Eγ(avg) = 762.0; ΣIγ = 2.35%

● ^{245}Am β^- Decay (122.4 m 13) I (min) = 0.10%
Feeds ^{245}Cm

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	10.7	6.2 12	0.0014
ce-L- 1	18.28 8	4.0 10	0.0015
ce-L- 2	30.20 8	0.88 20	0.0006
ce-MNO- 1	36.47 8	1.3 3	0.0010
ce-MNO- 2	48.39 8	0.34 8	0.0003
Auger-K	79.6	0.25 25	0.0004
ce-K- 4	112.94 11	0.61 20	0.0015
ce-K- 5	124.59 7	11.5 12	0.0306
ce-K- 6	167.58 7	0.26 9	0.0009

(*Continued*)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
ce-L- 4	216.67 11	0.14 4	0.0007
ce-L- 5	228.32 6	2.40 24	0.0117
ce-M- 5	246.51 6	0.59 6	0.0031
ce-NOP- 5	251.16 6	0.223 22	0.0012
β- 1 max	600.3 21		
avg	178.5 7	7.0 14	0.0266
β- 2 max	643.2 21		
avg	192.9 7	15.6 19	0.0641
β- 3 max	896.1 21		
avg	281.0 8	77.4 23	0.463
total β-			
avg	260.1 8	100 4	0.554
X-ray L	15	11.0 14	0.0035
X-ray Kα$_2$	104.61 5	3.6 4	0.0081
X-ray Kα$_1$	109.29 5	5.8 6	0.0135
X-ray Kβ	123	2.7 3	0.0072
γ 4	241.20 10	0.34 8	0.0018
γ 5	252.85 5	6.1 6	0.0329
γ 6	295.84 5	0.22 7	0.0014

3 weak γ's omitted:
Eγ(avg) = 95.9; ΣIγ = 0.10%

● ^{245}Cm α Decay (8.5E3 y 1) I (min) = 0.10%
Feeds ^{241}Pu

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	10.3	42 17	0.0093
ce-K- 2	11.2 10	30 40	0.0075
ce-L- 1	18.9 10	47 24	0.0188
ce-MNO- 1	36.1 10	17 9	0.0131
ce-K- 3	52.2 10	15 15	0.0171
Auger-K	76	0.9 12	0.0015
ce-L- 2	109.9 10	16 7	0.0382
ce-M- 2	127.1 10	4.3 19	0.0115
ce-NOP- 2	131.4 10	1.6 8	0.0046
ce-L- 3	150.9 10	6.0 19	0.0194
ce-M- 3	168.1 10	1.6 5	0.0056
ce-NOP- 3	172.4 10	0.60 20	0.0022
α 1	5234.6	0.32	0.0357
α 2	5303.8	5	0.561
α 3	5362	93.18	10.64
α 4	5488.7	0.83	0.0970
α 5	5529.2	0.58	0.0683

4 weak α's omitted:
Eα(avg) = 5318.9; ΣIα = 0.12%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
X-ray L	14.3	64 24	0.0194
γ 1	42.0 10	0.12 12	0.0001
X-ray Kα$_2$	99.55 5	14 11	0.0289
X-ray Kα$_1$	103.76 5	22 17	0.0484
X-ray Kβ	117	10 8	0.0257
γ 2	133.0 10	6.3 21	0.0178
γ 3	174.0 10	6.4 20	0.0237

● ^{246}Pu β$^-$ Decay (10.85 d 2) I (min) = 0.10%
Feeds ^{246}Am (25.0 m)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
β- 1 max	75 10		
avg	19 3	0.8	0.0003
β- 2 max	150 10		
avg	40 3	73	0.0622
β- 3 max	330 10		
avg	92 3	27	0.0529
total β-			
avg	54 4	100.8	0.115
γ 2	27.580 20	4.2 5	0.0025
γ 3	43.810 20	30.0 15	0.0280
γ 4	66.600 20	0.306 21	0.0004
γ 5	75.640 20	0.22 3	0.0003
γ 8	179.940 20	11.6 6	0.0446
γ 10	216.55 4	0.135 21	0.0006
γ 11	223.750 20	28.2 21	0.134
γ 13	255.54 3	0.276 21	0.0015

6 weak γ's omitted:
Eγ(avg) = 202.9; ΣIγ = 0.30%

● ^{246}Am β$^-$ Decay (25.0 m 2) I (min) = 0.10%
Feeds ^{246}Cm

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
ce-L- 1	10.27 4	3.9 4	0.0009
Auger-L	10.7	22 4	0.0050
ce-L- 2	18.32 4	51.8 9	0.0202
ce-MNO- 1	28.464 18	1.45 19	0.0009
ce-MNO- 2	36.516 19	19.4 6	0.0151
ce-K- 8	42.76 12	0.15 16	0.0001
ce-L- 5	74.67 21	2.39 20	0.0038
ce-M- 5	92.86 20	0.67 6	0.0013
ce-NOP- 5	97.51 20	0.265 22	0.0006
ce-K- 11	108.97 6	0.17 16	0.0004
ce-K- 12	110.38 6	0.18 17	0.0004
ce-K- 13	115.77 6	0.8 7	0.0019
ce-K- 16	133.47 7	0.14 13	0.0004
ce-K- 20	141.81 6	1.37 8	0.0042
ce-L- 13	219.50 5	0.25 7	0.0012
ce-L- 20	245.54 5	0.311 13	0.0016
ce-MNO-20	263.73 4	0.107 4	0.0006
ce-K- 98	623.80 6	0.118 8	0.0016
ce-K-104	670.54 6	0.131 5	0.0019
β- 1 max	520 50		
avg	152 17	0.283 12	0.0009
β- 2 max	620 50		
avg	185 17	0.167 21	0.0007
β- 3 max	630 50		
avg	188 17	0.427 16	0.0017
β- 4 max	640 50		
avg	191 17	0.361 11	0.0015
β- 5 max	670 50		
avg	201 18	0.66 4	0.0028
β- 6 max	680 50		
avg	205 18	1.00 3	0.0044
β- 7 max	700 50		
avg	211 18	0.209 7	0.0009
β- 8 max	700 50		
avg	212 18	0.967 25	0.0044
β- 9 max	710 50		
avg	214 18	1.85 6	0.0084
β-10 max	770 50		
avg	238 18	1.67 4	0.0085
β-11 max	850 50		
avg	264 18	0.118 12	0.0007
β-12 max	930 50		
avg	294 18	1.13 25	0.0071
β-13 max	950 50		
avg	301 19	4.8 8	0.0308

(Continued)

^{246}Am β^- Decay (25.0 m 2) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
β-14 max	980 50		
avg	312 19	0.279 9	0.0019
β-15 max	1050 50		
avg	337 19	0.49 18	0.0035
β-16 max	1170 50		
avg	382 19	1.90 19	0.0155
β-17 max	1180 50		
avg	383 19	0.192 16	0.0016
β-18 max	1200 50		
avg	390 19	14.9 9	0.124
β-19 max	1220 50		
avg	400 19	37.6 12	0.320
β-20 max	1420 50		
avg	477 20	7.0 5	0.0711
β-21 max	1460 50		
avg	490 20	16.3 6	0.170
β-22 max	2160 50		
avg	723 20	0.6 3	0.0092
β-23 max	2260 50		
avg	804 20	7	0.120
total β-			
avg	426 21	100.6 20	0.913

30 weak β's omitted:
Eβ(avg) = 215.2; ΣIβ = 0.69%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
X-ray L	15	39 4	0.0125
γ 5	99.20 20	0.167 13	0.0004
X-ray Kα$_2$	104.61 5	0.88 23	0.0020
X-ray Kα$_1$	109.29 5	1.4 4	0.0033
X-ray Kβ	123	0.67 17	0.0018
γ 11	237.23 4	0.144 8	0.0007
γ 12	238.64 3	0.147 8	0.0007
γ 13	244.03 3	0.68 3	0.0036
γ 16	261.73 5	0.157 6	0.0009
γ 20	270.07 3	1.03 4	0.0059
γ 23	287.78 3	0.129 5	0.0008
γ 45	401.68 3	0.266 9	0.0023
γ 64	493.46 4	0.108 4	0.0011
γ 80	602.54 6	0.234 13	0.0030
γ 83	649.48 4	0.369 14	0.0051
γ 87	684.28 5	0.588 22	0.0086
γ 88	698.27 5	0.117 8	0.0017
γ 89	717.24 5	0.254 11	0.0039
γ 90	724.79 4	0.214 8	0.0033
γ 93	734.41 4	1.17 4	0.0183
γ 94	745.05 4	0.237 8	0.0038
γ 98	752.06 4	0.82 4	0.0132
γ 99	759.59 4	0.645 22	0.0104
γ 102	781.28 6	0.169 13	0.0028
γ 104	798.80 4	24.9 3	0.424
γ 108	833.60 4	1.79 6	0.0318
γ 115	986.03 4	0.96 4	0.0202
γ 117	1036.00 4	12.7 4	0.281
γ 120	1062.04 4	17.2 4	0.389
γ 121	1078.86 4	27.9 11	0.641
γ 122	1081.40 6	0.249 3	0.0057
γ 123	1085.15 6	1.53 5	0.0355
γ 127	1124.29 4	0.261 11	0.0063
γ 136	1206.96 4	0.149 6	0.0038
γ 139	1249.79 4	0.149 6	0.0040
γ 141	1274.72 4	0.269 9	0.0073
γ 149	1348.81 4	0.121 5	0.0035
γ 158	1479.43 4	0.229 8	0.0072
γ 163	1529.00 7	0.224 11	0.0073
γ 169	1550.94 9	0.27 3	0.0090
γ 177	1590.68 5	0.52 4	0.0177
γ 179	1604.14 5	0.102 4	0.0035
γ 181	1618.80 4	0.116 5	0.0040
γ 183	1637.95 5	0.162 20	0.0056
γ 185	1661.63 5	0.227 8	0.0080
γ 190	1737.94 5	0.112 8	0.0041

202 weak γ's omitted:
Eγ(avg) = 914.7; ΣIγ = 2.96%

• ^{246}Cm α Decay (4.75E3 y 5) I(min) = 0.10%
%α Decay = 99.97386 5
Feeds ^{242}Pu
% Spontaneous Fission = 0.02614 5

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	10.3	6.1 10	0.0013
ce-L- 1	21.448 10	15.3 8	0.0070
ce-MNO- 1	38.612 10	5.6 3	0.0046
α 1	5343	21.0 10	2.39
α 2	5386	79.0 10	9.06
X-ray L	14.3	9.2 11	0.0028

1 weak γ's omitted:
Eγ(avg) = 44.5; ΣIγ = 0.03%

• ^{247}Cm α Decay (1.56E7 y 5) I(min) = 0.10%
Feeds ^{243}Pu

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	10.3	4.0 7	0.0009
ce-L- 2	34.8028 16	5.83 7	0.0043
ce-M- 2	51.9671 14	1.60 17	0.0018
ce-NOP- 2	56.3414 8	0.61 8	0.0007
ce-K- 6	153.28 21	0.4 4	0.0012
ce-K- 7	156.2 8	0.13 3	0.0004
ce-K- 8	165.6 3	2.2 7	0.0078
ce-K- 10	211.2 10	0.14 14	0.0006
ce-L- 6	252.00 20	0.10 5	0.0006
ce-L- 8	264.3 3	0.44 14	0.0025
ce-K- 13	280.8 3	1.29 12	0.0077
ce-MNO- 8	281.5 3	0.14 5	0.0008
ce-L- 13	379.5 3	0.245 22	0.0020
α 1	4818 4	4.7 3	0.482
α 2	4868 4	71.0 10	7.36
α 3	4941 4	1.60 20	0.168
α 4	4983 4	2.00 20	0.212
α 5	5145 4	1.20 20	0.132
α 6	5210 4	5.7 5	0.633
α 7	5265 4	13.8 7	1.55
X-ray L	14.3	5.9 8	0.0018
X-ray Kα$_2$	99.55 5	1.20 23	0.0025
X-ray Kα$_1$	103.76 5	1.9 4	0.0043
X-ray Kβ	117	0.91 18	0.0023
γ 6	275.10 20	0.52 19	0.0030
γ 7	278.0 8	3.4 7	0.0201
γ 8	287.4 3	2.0 3	0.0122
γ 10	333.0 10	0.34 17	0.0024
γ 11	346.0 8	1.3	0.0096
γ 13	402.6 3	72 6	0.617

7 weak γ's omitted:
Eγ(avg) = 116.1; ΣIγ = 0.11%

● ^{248}Cm α Decay (3.39E5 y 3) I(min) = 0.10%
%α Decay = 91.74 3
Feeds ^{244}Pu
% Spontaneous Fission = 8.26 3

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	10.3	4.8 8	0.0011
ce-L- 1	21.1 4	12.11 17	0.0054
ce-MNO- 1	38.3 4	4.49 11	0.0037
α 1	5035.06 25	16.54 18	1.77
α 2	5078.58 25	75.1 4	8.13
1 weak α's omitted: Eα(avg) = 4931.1; ΣIα = 0.07%			
X-ray L	14.3	7.3 8	0.0022
2 weak γ's omitted: Eγ(avg) = 56.2; ΣIγ = 0.03%			

● ^{248}Cf α Decay (333.5 d 28) I(min) = 0.10%
%α Decay = 99.9971 3
Feeds ^{244}Cm
% Spontaneous Fission = 0.0029 3

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	10.7	4.4 8	0.0010
ce-L- 1	18.37 11	12.4 4	0.0048
ce-MNO- 1	36.56 11	4.62 17	0.0036
α 1	6220	17.0 5	2.25
α 2	6260 30	83.0 5	11.07
X-ray L	15	7.9 8	0.0025
1 weak γ's omitted: Eγ(avg) = 42.9; ΣIγ = 0.02%			

● ^{249}Cm β⁻ Decay (64.15 m 3) I(min) = 0.10%
Feeds ^{249}Bk

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
ce-MNO- 1	2.26 11	99.976 3	0.0048
ce-L- 2	5.57 6	0.255 23	≈0
Auger-L	10.9	0.19 5	≈0
ce-L- 5	59.92 8	0.11 6	0.0001
ce-K- 14	237.18 8	0.122 23	0.0006
ce-K- 22	428.81 8	0.13 3	0.0012
β⁻ 1 max	238 9		
avg	65 3	0.36 3	0.0005
β⁻ 2 max	257 9		
avg	70 3	1.80 15	0.0027
β⁻ 3 max	331 9		
avg	92 3	1.04 8	0.0020
β⁻ 4 max	522 9		
avg	153 3	0.49 5	0.0016
β⁻ 5 max	891 9		
avg	279 4	96.27 15	0.572
total β⁻			
avg	272 5	99.96 24	0.579

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
X-ray L	15.3	0.38 7	0.0001
X-ray Kα₁	112.14 5	0.120 17	0.0003
γ 14	368.76 6	0.350 20	0.0027
γ 22	560.39 6	0.84 6	0.0100
γ 24	621.87 6	0.182 13	0.0024
γ 25	634.31 6	1.50 10	0.0203
γ 26	652.80 6	0.143 10	0.0020
21 weak γ's omitted: Eγ(avg) = 389.9; ΣIγ = 0.24%			

● ^{249}Bk β⁻ Decay (320 d 6) I(min) = 0.10%
%β⁻ Decay = 99.99855 8
Feeds ^{249}Cf
%α Decay = 0.00145 8
% Spontaneous Fission = 4.7E–8 2

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
β⁻ 1 max	126.4 19		
avg	33.0 6	99.9985	0.0703

● ^{249}Cf α Decay (350.6 y 21) I(min) = 0.10%
Feeds ^{245}Cm
% Spontaneous Fission = 5.2E–7 2

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/μCi-h)
Auger-L	10.7	17 4	0.0039
ce-L- 2	18.28 8	2.61 18	0.0010
ce-L- 4	30.20 8	34 4	0.0221
ce-L- 5	30.20 4	0.73 13	0.0005
ce-MNO- 2	36.47 8	0.85 5	0.0007
ce-L- 6	41.34 16	0.7 5	0.0006
ce-L- 8	42.18 16	1.3 3	0.0012
ce-M- 4	48.39 8	9.5 12	0.0098
ce-MNO- 5	48.394 18	0.28 4	0.0003
ce-NOP- 4	53.04 8	3.7 5	0.0042
ce-MNO- 6	59.53 16	0.26 20	0.0003
ce-M- 8	60.37 16	0.37 10	0.0005
ce-NOP- 8	65.02 16	0.14 4	0.0002
Auger-K	79.6	0.15 15	0.0003
ce-L- 11	97.0 4	0.26 8	0.0005
ce-K- 14	112.94 11	0.40 9	0.0010
ce-K- 15	124.59 7	5.16 21	0.0137
ce-K- 18	167.58 7	0.171 9	0.0006
ce-K- 20	205.18 7	0.428 19	0.0019
ce-L- 15	228.32 6	1.08 5	0.0052
ce-MNO-15	246.51 6	0.363 14	0.0019
ce-K- 21	259.69 7	1.34 6	0.0074
ce-L- 21	363.42 6	0.265 12	0.0020
α 1	5694.0 20	0.2	0.0243
α 2	5759.7 10	3.66	0.449
α 3	5783.5	0.26	0.0320
α 4	5813.5 10	84.4	10.45
α 5	5849.5 10	1	0.130
α 6	5903.4 10	2.79	0.351
α 7	5946.2 10	4	0.507
α 8	6072.1 10	0.24	0.0310
α 9	6139.5 7	1.1	0.145
α 10	6194.0 7	2.17	0.286
22 weak α's omitted: Eα(avg) = 5662.3; ΣIα = 0.14%			

(Continued)

^{249}Cf α Decay (350.6 y 21) (Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
X-ray L	15	30 4	0.0097
γ 4	54.73 7	0.211 10	0.0002
γ 9	92.30 5	0.297 12	0.0006
X-ray $K\alpha_2$	104.61 5	2.19 9	0.0049
X-ray $K\alpha_1$	109.29 5	3.5C 14	0.0081
X-ray Kβ	123	1.66 8	0.0044
γ 14	241.20 10	0.224 8	0.0012
γ 15	252.85 5	2.73 11	0.0147
γ 17	266.73 5	0.75 3	0.0042
γ 18	295.84 5	0.143 6	0.0009
γ 20	333.44 5	15.5 5	0.110
γ 21	387.95 5	66.0 20	0.545

26 weak γ's omitted:
Eγ(avg) = 283.7; ΣIγ = 0.43%

● ^{250}Cm α Decay (~6.9E3 y) I (min) = 0.10%
%α Decay = 25 (Systematics)
Feeds ^{246}Pu
See also ^{250}Cm β^- Decay
% Spontaneous Fission = 61 (Systematics)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
α 1	5190 50	25	2.76

● ^{250}Cm β^- Decay (~6.9E3 y) I (min) = 0.10%
%β⁻ Decay = 14 (Systematics)
Feeds ^{250}Bk
See also ^{250}Cm α Decay
% Spontaneous Fission = 61 (Systematics)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
β⁻ 1 max	37 12		
avg	9 4	14	0.0027

● ^{250}Bk β^- Decay (3.222 h 5) I (min) = 0.10%
Feeds ^{250}Cf

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	11.2	15 4	0.0035
ce-L- 1	16.2 5	42.8 6	0.0147
ce-MNO- 1	35.4 5	16.2 4	0.0122
ce-L- 2	72.2 5	2.14 7	0.0033
ce-M- 2	91.4 5	0.610 24	0.0012
ce-NCP- 2	96.4 5	0.243 10	0.0005
ce-K- 5	853.99 16	0.519 18	0.0094
ce-K- 7	896.79 16	0.376 12	0.0072
ce-L- 5	962.94 16	0.152 5	0.0031
ce-L- 7	1005.74 16	0.1C7 4	0.0023
β⁻ 1 max	709 4		
avg	214.4 14	5.89 15	0.0269
β⁻ 2 max	748 4		
avg	228.0 14	83.1 11	0.404
β⁻ 3 max	1780 4		
avg	574.4 15	5.5	0.0673
β⁻ 4 max	1737 4		
avg	594.1 16	5.5	0.0696
total β⁻			
avg	266.4 16	100.0 12	0.567

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
X-ray L	15.7	31 4	0.0104
γ 2	98.2 5	0.120 5	0.0003
X-ray $K\alpha_2$	109.87 5	0.262 10	0.0006
X-ray $K\alpha_1$	115.07 5	0.415 14	0.0010
X-ray Kβ	129	0.199 9	0.0005
γ 3	889.98 15	1.64 5	0.0311
γ 4	929.28 15	1.37 5	0.0271
γ 5	988.96 15	45.1 7	0.950
γ 6	1028.58 15	4.39 12	0.0961
γ 7	1031.76 15	35.1 4	0.771

1 weak γ's omitted:
Eγ(avg) = 42.2; ΣIγ = 0.04%

● ^{250}Cf α Decay (13.08 y 9) I (min) = 0.10%
%α Decay = 99.923 3
Feeds ^{246}Cm
% Spontaneous Fission = 0.077 3

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	10.7	4.4 8	0.0010
ce-L- 1	18.32 4	12.0 9	0.0047
ce-MNO- 1	36.516 19	4.5 4	0.0035
ce-L- 2	74.67 21	0.2C4 1	0.0003
α 1	5890	0.29976	0.0376
α 2	5989.1 6	16.2 12	2.07
α 3	6030.8 6	83.4 12	10.72
X-ray L	15	7.8 10	0.0025

3 weak γ's omitted:
Eγ(avg) = 76.6; ΣIγ = 0.03%

● ^{251}Bk β^- Decay (57.0 m 17) I (min) = 0.10%
Feeds ^{251}Cf

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
β⁻ 1 max	1120		
avg	360.46	100	0.768

● ^{251}Cf α Decay (9.0E2 y 4) I (min) = 0.10%
Feeds ^{247}Cm

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	10.7	34 7	0.0076
ce-L- 1	37.0 3	13 5	0.0102
ce-K- 8	48.34 11	3.0 3	0.0031
ce-M- 1	55.2 3	3.2 13	0.0037
ce-NCP- 1	59.8 3	1.2 5	0.0015
Auger-K	79.6	1.1 11	0.0018
ce-K- 10	98.7 10	50 9	0.105
ce-L- 5	110.47 4	0.348 11	0.0008
ce-MNO- 5	128.664 18	0.137	0.0004
ce-L- 8	152.07 11	18.8 17	0.0608
ce-M- 8	170.26 11	5.3 5	0.0191
ce-NCP- 8	174.91 11	2.05 19	0.0076
ce-L- 10	202.5 10	19 4	0.0831
ce-M- 10	220.7 10	5.1 10	0.0242
ce-NCP-10	225.3 10	2.0 4	0.0096

(Continued)

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
α 1	5501 5	0.30 10	0.0352
α 2	5566.0 20	1.50 20	0.178
α 3	5603 7	0.22	0.0263
α 4	5632.0 10	4.5 10	0.540
α 5	5648.0 10	3.5 13	0.421
α 6	5677.0 10	35.0 10	4.23
α 7	5738 7	1.0 3	0.122
α 8	5762 3	3.8 4	0.466
α 9	5793.0 10	2.0 3	0.247
α 10	5814 4	4.2 4	0.520
α 11	5852.0 10	27.0 10	3.37
α 12	5943 4	0.60 10	0.0760
α 13	6014 3	11.6 5	1.49
α 14	6074 3	2.7 3	0.349
X-ray L	15	60 9	0.0190
γ 1	61.5 3	0.56 22	0.0007
γ 2	68	0.2	0.0003
γ 3	73	0.3	0.0005
γ 4	83	0.10	0.0002
X-ray Kα$_2$	104.61 5	15 3	0.0345
X-ray Kα$_1$	109.29 5	25 5	0.0575
X-ray Kβ	123	11.7 20	0.0307
γ 5	135	0.10	0.0003
γ 6	144	0.10	0.0003
γ 7	154	0.2	0.0007
γ 8	176.60 10	17.7 15	0.0666
γ 9	214	0.2	0.0009
γ 10	227.0 10	6.3 11	0.0305
γ 11	255	0.2	0.0011
γ 12	262	0.2	0.0011
γ 13	266.0 3	0.50 20	0.0028
γ 14	270	0.2	0.0012
γ 15	285.00 20	1.4 3	0.0085
γ 16	291.0 3	0.40 20	0.0025

● ^{252}Cf α Decay (2.639 y 5) I (min) = 0.10%
%α Decay = 96.908 8
Feeds ^{248}Cm
% Spontaneous Fission = 3.092 8

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	10.7	4.1 7	0.0009
ce-L- 1	18.87 5	11.22 23	0.0045
ce-MNO- 1	37.06 4	4.18 13	0.0033
ce-L- 2	76.07 4	0.16 3	0.0003
α 1	5976.6	0.23 4	0.0296
α 2	6075.7 5	15.2 3	1.97
α 3	6118.3 5	81.6 3	10.63
X-ray L	15	7.3 7	0.0023

2 weak γ's omitted:
Eγ(avg) = 68.2; ΣIγ = 0.03%

● ^{253}Cf α Decay (17.81 d 8) I (min) = 0.10%
%α Decay = 0.31 4
Feeds ^{249}Cm
See also ^{253}Cf β^- Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-L- 1	24 7	0.21 3	0.0001
ce-MNO- 1	43 7	0.101 14	≈0
α 1	5979 5	0.29 4	0.0374

1 weak α's omitted:
Eα(avg) = 5921.0; ΣIα = 0.02%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	15	0.134 22	≈0

● ^{253}Cf β^- Decay (17.81 d 8) I (min) = 0.10%
%β^- Decay = 99.69 4
Feeds ^{253}Es
See also ^{253}Cf α Decay

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β- 1 max	287 10		
avg	79 3	99.69 4	0.168

● ^{253}Es α Decay (20.467 d 24) I (min) = 0.10%
Feeds ^{249}Bk
% Spontaneous Fission = 8.7E−6 3

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
ce-MNO- 1	2.26 11	2.7 3	0.0001
ce-L- 2	5.57 6	1.37 15	0.0002
Auger-L	10.9	2.4 6	0.0005
ce-L- 3	16.52 6	4.6 5	0.0016
ce-L- 4	17.71 5	0.71 8	0.0003
ce-MNO- 2	24.29 6	0.45 5	0.0002
ce-L- 5	26.68 5	0.233 25	0.0001
ce-MNO- 3	35.24 6	1.55 16	0.0012
ce-MNO- 4	36.43 4	0.234 24	0.0002
α 1	6498.0 20	0.260 10	0.0360
α 2	6540.0 20	0.850 20	0.118
α 3	6552.0 20	0.710 20	0.0991
α 4	6592.0 20	6.60 10	0.927
α 5	6594	0.7	0.0983
α 6	6624	0.8	0.113
α 7	6632.73 5	89.80 20	12.69

21 weak α's omitted:
Eα(avg) = 6358.7; ΣIα = 0.27%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	15.3	4.6 6	0.0015

72 weak γ's omitted:
Eγ(avg) = 203.0; ΣIγ = 0.14%

● ^{254}Cf α Decay (60.5 d 2) I (min) = 0.10%
%α Decay = 0.310 16
% Spontaneous Fission = 99.690 16

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
α 1	5834 5	0.257 15	0.0320

1 weak α's omitted:
Eα(avg) = 5792.0; ΣIα = 0.05%

● ^{254}Es α Decay (275.7 d 5) I (min) = 0.10%
Feeds ^{250}Bk

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
ce-MNO- 2	1.755 18	96.1 10	0.0036
ce-L- 3	9.13 11	21.9 7	0.0043
ce-L- 4	10.23 11	50.1 5	0.0109
Auger-L	10.9	51 11	0.0118
ce-L- 5	17.33 11	72.8 19	0.0269
ce-MNO- 3	27.85 11	8.1 8	0.0048
ce-MNO- 4	28.95 11	19.9 5	0.0123
ce-MNO- 5	36.05 11	27 3	0.0207
ce-L- 6	37.7 20	0.73 8	0.0006
ce-L- 7	44.43 11	0.712 8	0.0007
ce-L- 8	45.13 11	2.136 21	0.0021
ce-L- 9	55.53 11	0.704 6	0.0008
ce-MNO- 6	56.5 20	0.246 25	0.0003
ce-L- 10	59.83 11	0.700 8	0.0009
ce-MNO- 7	63.15 11	0.27 3	0.0004
ce-M- 8	63.85 11	0.59 7	0.0008
ce-NCP- 8	68.65 11	0.23 3	0.0003
ce-MNO- 9	74.25 11	0.27 3	0.0004
ce-MNO-10	78.55 11	0.27 3	0.0005
α 1	6048 5	0.16	0.0206
α 2	6105.0 20	0.340 20	0.0442
α 3	6266.0 20	0.22 4	0.0294
α 4	6275	0.140 20	0.0187
α 5	6347.0 20	0.75 5	0.101
α 6	6358.6 20	2.6 3	0.352
α 7	6415.8 20	1.80 10	0.246
α 8	6428.8 20	93.1 10	12.75
α 9	6476	0.23 4	0.0317

9 weak α's omitted:
Eα(avg) = 6225.8; ΣIα = 0.22%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
X-ray L	15.3	99 11	0.0322
γ 5	42.60 10	0.14 12	0.0001
γ 6	63.0 20	2.00 20	0.0027
γ 19	316.0 20	0.15	0.0010

20 weak γ's omitted:
Eγ(avg) = 221.8; ΣIγ = 0.44%

● ^{254}Es α Decay (39.3 h 2) I (min) = 0.10%
%α Decay = 0.33 1
Feeds ^{250}Bk
See also ^{254}Es β^- Decay (39.3 h)
%EC Decay = 0.078 7

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
α 1	6382.0 20	0.247 9	0.0336

11 weak α's omitted:
Eα(avg) = 6452.9; ΣIα = 0.08%

15 weak γ's omitted:
Eγ(avg) = 159.4; ΣIγ = 0.23%

● ^{254}Es β^- Decay (39.3 h 2) I (min) = 0.10%
%β^- Decay = 99.59 1
Feeds ^{254}Fm
See also ^{254}Es α Decay (39.3 h)
%EC Decay = 0.078 7

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	11.6	16 6	0.0039
ce-L- 2	17.40 3	50 7	0.0185
ce-MNO- 2	37.782 16	19.2 25	0.0154
ce-L- 3	76.77 3	3.4 5	0.0055
ce-M- 3	97.154 17	0.98 13	0.0020
ce-NCP- 3	102.406 24	0.40 5	0.0009
ce-K- 5	442.35 6	0.111 13	0.0010
ce-K- 6	506.83 6	0.89 10	0.0096
ce-K- 7	546.71 6	0.35 4	0.0041
ce-K- 8	551.81 6	0.68 8	0.0079
ce-L- 6	621.21 6	0.42 5	0.0056
ce-MNO- 6	641.59 6	0.140 15	0.0019
ce-L- 7	661.09 6	0.154 17	0.0022
ce-L- 8	666.19 6	0.30 4	0.0042
β- 1 max	437 6		
avg	124.7 17	19.0 19	0.0505
β- 2 max	477 6		
avg	137.3 18	67 6	0.196
β- 3 max	1126 6		
avg	360.6 20	13 8	0.0999
total β-			
avg	164.2 20	99 11	0.346
X-ray L	16.4	40 8	0.0140
γ 3	104.360 12	0.21 3	0.0005
X-ray $K\alpha_2$	115.32 4	0.60 4	0.0015
X-ray $K\alpha_1$	121.10 4	0.95 7	0.0024
X-ray Kβ	136	0.46 4	0.0013
γ 4	544.46 5	1.07 13	0.0124
γ 5	584.32 5	3.4 4	0.0428
γ 6	648.80 5	34 4	0.475
γ 7	688.68 5	14.8 16	0.217
γ 8	693.78 5	29 3	0.434

2 weak γ's omitted:
Eγ(avg) = 45.0; ΣIγ = 0.06%

● ^{254}Fm α Decay (3.240 h 2) I (min) = 0.10%
%α Decay = 99.9408 2
Feeds ^{250}Cf
% Spontaneous Fission = 0.0592 2

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ µCi-h)
Auger-L	11.2	3.7 9	0.0009
ce-L- 1	16.2 5	10.9 8	0.0037
ce-MNO- 1	35.4 5	4.1 3	0.0031
ce-L- 2	72.2 5	0.62 7	0.0010
ce-MNO- 2	91.4 5	0.25 3	0.0005
α 1	7050	0.90 10	0.135
α 2	7147	14.0 10	2.13
α 3	7189 5	84.9 10	13.01
X-ray L	15.7	7.8 10	0.0026

2 weak γ's omitted:
Eγ(avg) = 84.9; ΣIγ = 0.05%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)

● ^{255}Es α Decay (39.8 d 12) I (min) = 0.10%
%α Decay = 8.0 4
Feeds ^{251}Bk
See also ^{255}Es β^- Decay
% Spontaneous Fission = 0.0041 2

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	10.9	0.29 7	≈0
ce-L- 1	14.73 4	0.72 5	0.0002
ce-L- 2	22.73 4	0.146 8	≈0
ce-MNO- 1	33.455 18	0.27 3	0.0002
α 1	6213	0.200 10	0.0265
α 2	6260	0.78 4	0.105
α 3	6299.5 15	7.0 4	0.941
X-ray L	15.3	0.57 7	0.0002

● ^{255}Es β^- Decay (39.8 d 12) I (min) = 0.10%
%β^- Decay = 92.0 4
Feeds ^{255}Fm
See also ^{255}Es α Decay
% Spontaneous Fission = 0.0041 2

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
β^- 1 max	280		
avg	76.69	92.0 4	0.150

● ^{255}Fm α Decay (20.07 h 7) I (min) = 0.10%
Feeds ^{251}Cf
% Spontaneous Fission = 2.4E−5 10

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
Auger-L	11.2	28 7	0.0068
ce-MNO- 1	16.246 25	27 6	0.0092
ce-MNO- 2	18.069 24	93	0.0358
ce-L- 3	21.81 4	10.3 12	0.0048
ce-L- 4	31.88 4	4.3 6	0.0029
ce-L- 5	32.46 4	23.0 8	0.0159
ce-L- 6	33.98 4	4.2 10	0.0030
ce-MNO- 3	41.075 24	3.9 4	0.0034
ce-L- 8	47.03 5	0.50 4	0.0005
ce-M- 4	51.147 24	1.07 16	0.0012
ce-M- 5	51.722 24	5.7 3	0.0063
ce-M- 6	53.249 24	1.07 24	0.0012
ce-L- 9	54.90 6	11.9 4	0.0139
ce-L- 10	55.46 4	34.4 11	0.0407
ce-NCP- 4	56.092 25	0.42 7	0.0005
ce-NCP- 5	56.667 25	2.20 10	0.0027
ce-NCP- 6	58.194 25	0.41 10	0.0005
ce-L- 11	59.98 11	0.15 8	0.0002
ce-MNO- 8	66.29 4	0.171 12	0.0002
ce-M- 9	74.16 6	3.37 11	0.0053
ce-M- 10	74.72 3	9.8 3	0.0156
ce-NCP- 9	79.11 6	1.35 4	0.0023
ce-NCP-10	79.67 3	3.91 12	0.0066
α 1	6807.0 20	0.110 6	0.0159
α 2	6892.0 20	0.620 10	0.0910
α 3	6963.0 20	5.04 6	0.747
α 4	6983.0 20	0.130 10	0.0193
α 5	7022.0 20	93.4 3	13.97
α 6	7080.0 20	0.40 3	0.0603

16 weak α's omitted:
Eα(avg)= 6923.4; ΣIα= 0.34%

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
X-ray L	15.7	60 7	0.0202
γ 1	23.001 17	0.15 3	≈0
γ 2	24.824 15	0.2	0.0001
γ 4	57.902 15	0.1	0.0001
γ 5	58.477 15	0.67	0.0008
γ 6	60.004 15	0.120 20	0.0002
γ 9	80.92 5	0.27	0.0005
γ 10	81.477 20	0.8	0.0014

42 weak γ's omitted:
Eγ(avg)= 142.8; ΣIγ= 0.15%

● ^{256}Fm α Decay (157.6 m 13) I (min) = 0.10%
%α Decay = 8.1 3
Feeds ^{252}Cf
% Spontaneous Fission = 91.9 3

Radiation Type	Energy (keV)	Intensity (%)	Δ(g-rad/ μCi-h)
α 1	6915 5	8.1 3	1.19