Health Studies on

ROCKY FLATS

PHASE I: HISTORICAL PUBLIC EXPOSURES

PROJECT TASK 8

R E P O R T

Dose Assessment for Historical Contaminant Releases from Rocky Flats

SEPTEMBER 1994

ChemRisk

Colorado Department of Public Health and Environment

Prepared by ChemRisk for the Colorado Department of Public Health and Environment

PROJECT TASK 8 REPORT
DOSE ASSESSMENT FOR HISTORICAL CONTAMINANT RELEASES FROM ROCKY FLATS

SEPTEMBER 1994

Prepared for:

The Colorado Department of Public Health and Environment
Health Studies on Rocky Flats, A-3
4300 Cherry Creek Drive South
Denver, Colorado 80220
(303) 692-2640 or 692-2700

Prepared by:

ChemRisk®
A Division of McLaren/Hart
1135 Atlantic Avenue
Alameda, California 94501

This document was produced as a team effort by the following ChemRisk employees:

Project Manager:

Stephen R. Ripple, Chief Health Scientist

Administrative Support:

Angélica Perea

Cynthia Jenkins

Principal Authors:

Gregory P. Brorby, Senior Health Scientist

Dante diTommaso, Assistant Health Scientist

David Ting, Associate Health Scientist

John E. Buddenbaum, Senior Health Scientist

Keith H. Lee, Assistant Health Scientist

Thomas E. Widner, Principal Health Scientist

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

APPENDICES

LIST OF FIGURES

LIST OF FIGURES
(Continued)

LIST OF TABLES

PROJECT BACKGROUND

The U.S. Atomic Energy Commission (AEC) announced its decision on March 23, 1951 to build the Rocky Flats Plant. The plant was built to increase the quantity and quality of the nation's nuclear arsenal and has played an important role in the U.S. nuclear weapons complex in the years that have followed. Early plant operations were for the most part kept behind a "cloak of secrecy," with the main off-site concern being centered around two fire incidents in 1957 and 1969 that received public attention, an inadvertent release of tritium to surface waters in 1973, and a waste storage practice (waste oil drum storage at the site of the 903 Pad) that resulted in the spread of contamination to nearby soil during the late sixties. After the 1969 fire, the public learned for the first time that plutonium had been released routinely and accidently from the plant. In 1984, the site was proposed to be a Superfund site, and in 1989, it was included on the National Priorities List for cleanup of environmental contamination.

Public concern came to a high point in June 1989 when approximately 100 FBI and U.S. Environmental Protection Agency (EPA) agents raided the plant seeking documentation of alleged criminal acts and mismanagement. The Department of Energy (DOE) subsequently suspended plutonium processing to review and upgrade the plant's safety systems. Following the raid, Colorado's Governor Roy Romer negotiated with Energy Secretary Admiral James Watkins to secure funding for closer scrutiny of the plant's activities by the state and for health studies to address the public's concern of potential adverse health effects.

In June 1989, an Agreement in Principle was signed by Governor Romer and Secretary Watkins that included DOE funding for increased environmental surveillance and oversight, remediation, emergency preparedness measures, accelerated cleanup in areas of imminent threat, and health studies. This report is one of the products of Phase I of the health studies known as the Rocky Flats Toxicologic Review and Dose Reconstruction Project, which is being conducted by ChemRisk under contract to the Colorado Department of Health (now the Colorado Department of Public Health and Environment).

The Rocky Flats Toxicologic Review and Dose Reconstruction Project

The primary purpose of this project is to reconstruct potential doses of the contaminants of concern which might have been received by off-site individuals as a result of past Rocky Flats Plant operations. Two points should be emphasized regarding the project scope. First, this project is designed to address exposures from historical operations, not to estimate doses from present and future operations or anticipate future exposure potentials. Second, this project is concerned with doses to individuals off the plant site, as opposed to occupational exposures to plant workers. Information pertaining to workplace exposures or control devices will in general only be considered if it is also relevant to prediction of off-site releases or exposures. The period of interest for this study begins in 1953 when production related emissions began and covers the period through 1989.

The technical tasks associated with the Phase I Health Studies are listed in Figure 1. The first several tasks focused on the development of an understanding of potential health impacts of contaminants released from the Rocky Flats Plant through a comprehensive look at all the materials and their quantities used at the plant since 1952.

1. Identify Chemicals & Radionuclides Used
2. Select Materials of Concern
3. Reconstruct History of Operations
4. Identify Release Points
5. Estimate Releases
6. Select and Model Exposure Pathways
7. Characterize Land Uses and Demographics
8. Perform Dose Assessment

FIGURE 1: TASKS OF THE ROCKY FLATS TOXICOLOGIC REVIEW AND DOSE RECONSTRUCTION PROJECT

Task 1 involved identification of chemicals and radionuclides used on the Rocky Flats site. Unlike some similar dose reconstruction studies that have been undertaken for federal nuclear facilities, this project is concerned with not only radionuclide emissions, but also releases of hazardous chemicals and mixed wastes containing both radioactive and non-radioactive components. To identify materials used on the site, the ChemRisk team first reviewed radioactive source registries and inventories and chemical inventories produced by plant staff. Chemical inventories listed thousands of chemicals present in very small quantities and some chemicals used in very large quantities. Examples range from 4 milliliters of vinyl chloride kept in a laboratory refrigerator to over 400,000 pounds of nitric acid used at the plant each year. Classified and unclassified records were also reviewed for evidence of other materials used on the Rocky Flats site. The result of Task 1 was a list of over 8,000 materials used on the site (ChemRisk, 1991a).

The objective of **Task 2** was to select chemicals and radionuclides most likely to have posed an off-site human health hazard under historical routine plant operations. Radionuclides that have been included as contaminants of potential concern are those that were handled in substantial quantity, were associated with production activities, were found in forms that were likely to be released, or were found to be present in plant effluents or in the environment.

For chemicals, a three-stage screening process was developed to narrow down the list of contaminants of potential concern. In the first stage, 629 compounds were identified for further, more refined screening based on their known toxicologic properties, Rocky Flats release histories, or reported inventory quantities. A second stage of screening was performed to roughly estimate if the quantity of a chemical on-site was sufficient to pose an off-site health hazard. Forty-six potential chemicals of concern emerged from Stage 2 Screening. In the final stage of screening, these chemicals were individually evaluated to determine the likelihood of their release, potential quantity of release based on actual storage and usage practices, likely routes of release, and known behavior in the environment.

Using both qualitative and quantitative screening criteria, and taking into account preliminary knowledge of actual storage and usage practices, 32 contaminants of potential concern were identified in Task 2 that could have been associated with off-site health impacts from normal operations of the Rocky Flats Plant (ChemRisk, 1991b). The initial list of contaminants of potential concern was subject to continuing review. As the work progressed, newly identified compounds were evaluated for possible addition to the list of contaminants of concern.

Concurrent with the identification of materials used on the Rocky Flats site, **Task 3** activities sought to document the history of operations at the facility as it might relate to off-site exposures, and **Task 4** activities sought to characterize emission points for radionuclide and chemical releases to the environment (ChemRisk, 1992). Tasks 3 and 4 of the Rocky Flats Toxicologic Review and Dose Reconstruction Project involved extensive investigation and collection of information describing past operations of the Rocky Flats Plant. The objectives of the historical investigations were to:

- Document the basic history of the Rocky Flats facility, outlining its physical development and its historical mission,

- Document the nature of historical uses of the contaminants of potential concern identified in Task 2,

- Identify any significant historical uses of materials not evaluated as part of the Task 2 selection of contaminants of potential concern,

- Identify potential points of significant releases of materials of concern to air, surface water, or soil,

- Support work in Tasks 5 and 6 by characterizing the potential for significant uncontrolled radionuclide emissions from normal operations in the past that may have gone undetected by effluent monitoring systems, and,

- Identify any accidents, incidents, or waste disposal practices that resulted in contaminant releases with significant potential for off-site transport, also in support of Tasks 5 and 6.

Tasks 3 and 4 investigations consisted of an extensive campaign of document reviews and personnel interviews targeting active and retired Rocky Flats employees, local citizens, and other interested parties. The major outcomes of the investigations are an understanding of the historical uses of the contaminants of potential concern, identification of accidents that warrant detailed evaluation, and documentation of the nature of associated emission points.

The objective of Task 5 was to develop historical release estimates for the routine releases and events selected for detail study. This task was divided into the following categories:

- Routine radioactive airborne emissions,

- Routine nonradioactive airborne emissions,

- Routine surface water emissions, and

- Nonroutine contaminant releases.

Historical investigations carried out in Tasks 3, 4 and 5 resulted in the identification of the contaminants listed in Table 1 as the subject of quantitative evaluation.

The historical airborne radioactive effluent monitoring program at the plant was reviewed and evaluated to establish the utility of the data for dose reconstruction. Uncertainties in the monitoring data associated with the sampling and analytic practices at the plant were carefully characterized. The review indicated that the effluent monitoring data reported by the plant provided a good basis for estimating airborne releases from the facility provided the identified uncertainties were incorporated in the estimates. One notable exception was the plant's data for uranium emissions prior to 1961, which are under-reported in plant summary documents. The uranium emissions for this period were recalculated using raw data from plant log books.

TABLE 1: CONTAMINANTS SELECTED FOR QUANTITATIVE EVALUATION

SOLVENTS	METALS	OTHERS
Carbon Tetrachloride	Americium-241	Tritium
Chloroform	Beryllium	
Methylene Chloride	Plutonium-239/240	
Tetrachloroethylene	Uranium-234/235 (enriched)	
1,1,1-Trichloroethane	Uranium-238 (depleted)	
Trichloroethylene		

The effluent monitoring data were used as the basis for establishing quantitative annual estimates of routine releases of the radioactive materials of concern. Monitoring data for routine airborne emissions of nonradioactive materials are available only for beryllium, and these data served as the basis for the release estimates of this metal. Routine monitoring for organic solvents of concern was not performed by the plant. Estimates of the plausible ranges of historical emissions for these materials were developed using various types of documentation (*e.g.,* Air Pollution Emissions Notifications, special studies conducted by the plant, and inventory quantities) and information obtained from personnel interviews.

Review of information regarding routine contaminant releases to surface water from the plant indicated relatively limited availability of data to directly quantify the releases. Those data that are available were used to examine whether plant releases measurably increased the radioactivity present in water from potentially impacted reservoirs and drinking water. While the data review suggested that it is plausible that plant-related releases may, during some periods of time, have measurably increased gross alpha radioactivity in the waters of the receiving reservoirs, the resulting measured levels were similar to levels found in other, unaffected reservoirs in the area. For tritium, some measured increases were clearly attributable to Rocky Flats.

Information and data associated with releases of contaminants from the plant for major nonroutine release events (1957 and 1969 fires and 903 Pad) were identified in the Task 5 report. The data and information on these accidental events are very limited. As a result, the analysis of these events requires the use of a number of estimates that introduce uncertainties that are accounted for in the final results. The products of Task 5 efforts are historical contaminant release estimates for contaminants routinely released by the plant and information and data regarding accidental releases requiring further analyses in Task 6 to predict historical contaminant concentrations in environmental media.

Project **Task 6** began the process of evaluating how plant releases traveled off-site and could have resulted in exposure of the public by predicting the concentrations of the contaminants in environmental media such as air, soil and foodstuffs (ChemRisk, 1994a). Based on the nature of contaminant releases, physical properties of the contaminants, local hydrogeology and land-use information, the following exposure pathways were identified to be important in Task 6:

- Inhalation of airborne contaminants due to direct release or soil resuspension,
- Incidental ingestion of contaminated soil,
- Consumption of contaminated vegetables, milk and beef, and
- Ingestion of contaminated drinking water.

An exposure model capable of evaluating these exposure pathways was developed in Task 6.

One of the primary objectives of Task 6 was to predict the concentrations of contaminants in the air in areas around the plant site so that the amount of contaminant that could have been inhaled by people, deposited on the ground that people could come in contact with, and taken up by vegetation or grazing animals that could be eaten by people could be estimated. Air concentrations were estimated for routine releases of contaminants using computer models and information on the meteorological conditions at the site (such as wind speed and direction) and the conditions and size of the contaminant release (such as height of the stack, temperature of the exhaust air, and amount of contaminant).

A somewhat different technical approach was required to predict contaminant concentrations in off-site areas that resulted from accidental releases. Since there were no or incomplete direct measurements of associated emissions, information to support evaluation of these accidental releases was pieced together from the conditions that were reported during the accident and from monitoring data in the form of air, soil or vegetation samples taken during or shortly after the event. Computer air dispersion models were used to determine, under the estimated conditions of the accidental release, the size of the release that would have been necessary to produce the contamination that was measured at the few locations where air, soil or vegetation samples were taken. The model was then used to predict the likely concentrations of contaminants at other locations where the public could have been exposed. In some cases, model predictions were compared to environmental sampling data that were not used in the initial estimate of the size the release. These comparisons tested the accuracy of the models in predicting environmental concentrations and added to the confidence placed in the modeling.

The results of Task 6 provide the basis for making estimates of the environmental concentrations of contaminants released from the plant from routine operations, accidents, and resuspension to the air from the soil and the identification of the pathways that these contaminants were most likely to have traveled in reaching the public. These are critical pieces of information needed to calculate the doses of contaminants that the public in the vicinity of Rocky Flats would have received as a result of past plant activities. This information is used in Task 8 to calculate doses to the public.

Areas within several miles of Rocky Flats have changed in terms of land use and development since the plant first began operations in 1953. The objective of Project **Task 7** was to identify land uses and populations near the Rocky Flats plant during the period of operations from 1953 to 1989 (ChemRisk, 1994b). The task emphasized identification of the locations of nearby residents that would be most highly exposed and the approximate sizes of populations living near the plant. The use of the lands and waters surrounding the plant were also examined, because this can influence the pathways through which contaminants can migrate and ultimately reach people. Typically, land uses of interest include the raising of crops for human consumption, grazing land and hay produced as feed for cattle consumed by people, or the presence of dairies and drinking water or irrigation reservoirs.

A relatively limited amount of detail about land uses and populations was collected for this first phase of the health studies through personal interviews with long-term landowners and review of census data, historical topographical maps produced by the United States Geological Survey, aerial photographs, deed books and county assessor files to establish land ownership and land use, and county and local government records. A number of other types of federal, state and local agency records were also explored for useful information.

The Task 7 work provides preliminary population information that would be required for the purposes of an epidemiological study, but additional information would ultimately be needed for such studies. The work does not provide detailed agricultural production information. Based on the contaminants released by the plant, food-related pathways are known to have made only a minor contribution to the total exposure of the public to contaminants released by the plant.

The last technical task is Project **Task 8**. This task, which is the subject of this report, combines the information produced in preceding tasks on the amount of contaminants that were either estimated to be present or measured in the environment from plant releases with the exposure model developed in Task 6 to estimate radiation and chemical doses potentially received by the public. Dose estimates and the uncertainty in these estimates are provided for each of the contaminants listed in Table 1. While the endpoint of the Phase I studies are these dose estimates, and one of the purposes of Phase II is to thoroughly examine what these doses mean in terms of health risk, Task 8 provides some initial interpretations of the doses in terms of health risk in order to provide some perspective on the meaning of the results of Phase I.

EXECUTIVE SUMMARY

This report represents the final step in the complex process of estimating the radiation and chemical doses received by the public as a result of contaminant releases from the Rocky Flats Plant in the past. Each major step of the investigative and analytic process is represented by a project task and is documented in a task report. The results presented in this Task 8 report rely on the findings of previous reports which:

- Identify radionuclides and chemicals used historically at the plant (Task 1),
- Select those having the highest potential for producing off-site health effects (Task 2),
- Document the history of plant operations and points of release related primarily to the selected contaminants (Tasks 3 and 4),
- Quantify contaminant releases (Task 5),
- Predict off-site concentrations of contaminants from both routine and key accidental releases and define an exposure pathway model for calculating dose (Task 6), and
- Identify historical locations of populations and land-uses in the vicinity of the plant to evaluate plausible exposure pathways (Task 7).

The doses predicted in this report should be considered preliminary, because further investigations of the dominant sources of past exposure, and the consequent health risks, are being explored in Phase II of the Health Studies. These investigations are designed to identify additional information and explore alternative approaches to the analyses, particularly of the largest accidental releases. The Phase II investigations could lead to changes in the estimated doses or refinements in the estimates of uncertainty.

Task 8 required an extremely large number of calculations to produce dose estimates and their associated uncertainties. The purpose of the Task 8 report is to describe and document the calculational methods employed, tabulate the results of the thousands of calculations performed, and provide some interpretation of the results. A more thorough interpretation of the predicted doses in terms of health hazard or risk characterization is one of the objectives of the Phase II Health Studies work. This Task 8 report provides:

- A basic description of the concepts of chemical and radiation dose used in the assessment. For radiation, dose is expressed as effective dose, and for chemicals, dose refers to the amount of material taken up by the body.

- A description of the characteristics of the exposed individual defined for the dose calculations. This individual is an adult exposed via all the identified potentially complete environmental exposure pathways with exposure-related characteristics typical of the nation's population.

- A discussion of the potential differences in the dose to individuals who differ in age, activity level, duration and times of exposure, and amount of locally grown food consumed.

- A description of the exposure domain or area for which calculations were performed. The domain included the non-mountainous populated areas between 2 and 10 miles from the center of the plant and three discrete locations associated with population centers up to 20 miles from the plant in the cities of Longmont, Lakewood, and Denver.

- The division of the exposure domain into sectors over which exposures are predicted to be relatively uniform.

- The approach to using the products of previous ChemRisk project reports to estimate air and soil concentrations within each sector or at the exposure points selected for calculating dose.

- The approach used to estimate dose and uncertainty using Monte Carlo techniques.

Although the methods and results of the dose calculations are summarized in over 200 pages of tables and figures in appendices to this report, the main body of the report presents selected results in graphical form to facilitate the interpretation of the dose calculations. Direct comparisons can be made among the radiation doses to evaluate the relative importance of the health hazards posed by the various radionuclides that have been released from the plant. However, estimates of health risk are required to make any evaluation of the relative health hazards posed by chemicals, or to compare the health hazards posed by chemicals to those posed by radionuclides. Therefore, a number of preliminary health risk estimates have been calculated for these comparisons. The uncertainties associated with the translation of dose to risk and those inherent in the dose conversion factors for radionuclides are to be addressed by the Phase II studies and have not been included in any of the results presented in this report. The comparisons and evaluations provided in the Task 8 report support the following general conclusions:

- Airborne release from buildings or contaminated soil (*i.e.*, resuspension) has been the dominant mechanism of contaminant release from the plant and, as a result, doses and, therefore, risks decrease with increasing distance from the site. The highest doses are predicted for areas southeast of the plant, which is the predominant downwind direction.

- Inhalation exposure has been the dominant exposure pathway for contaminants released to the air, with doses from other pathways being at least 10 times and in many cases over 1,000 times smaller.

- The highest predicted radiation doses are associated with the direct release of plutonium from the 903 Pad to the areas southeast of the plant during the period of 1965 to 1969. The 95 percent confidence bound is provided for each of the dose estimates and represents the range of values that we are confident includes the true, but unknown value. The best estimate of the doses to persons living between the plant buffer zone boundary and 10 miles southeast of the plant during the years of direct release from the 903 Pad range between 9.1 microsieverts (μSv) and 72 μSv (between 0.91 mrem and 7.2 mrem). The uncertainty associated with these best-estimates is about a factor of seven. Therefore, the 95 percent confidence bound about the best estimate of the range of doses to an individual that was present in the area between the plant buffer zone boundary and 10 miles southeast of the plant would range between 1.3 and 500 μSv. The estimated cancer risk associated with the best estimate of the doses ranges from about 1 in 1.5 million to 1 in 190,000.

- The second highest predicted radiation doses are associated with releases of plutonium from the 1957 fire. The best estimate of the highest doses along the center-line of the contaminant plume from the fire between 3 and 8 miles from the center of the plant is approximately 12 to 18 μSv. The uncertainty associated with this best-estimates is large, due to lack of information and data regarding this release, and is in the range of a factor of 38 (*i.e.*, the 95 percent confidence bound ranges from one-thirty-eighth of the best estimate to 38 times the best estimate). The estimated cancer risks associated with the best estimates of the doses along the center-line of the contaminant plume are between approximately 1 in 1.1 million and 1 in 760,000.

- The best estimates of the radiation doses from exposure to 37 years of routine releases of plutonium from the plant are over 25 times smaller than those for the 903 Pad releases in the areas to the southeast of the plant. The uncertainty associated with the best-estimates of doses from routine plutonium emissions is about a factor of 2.

- The highest predicted lifetime cancer risk for 37 years of release of chemicals is associated with carbon tetrachloride. The cancer risk associated with estimated carbon tetrachloride releases range from one in 2.9 million to one in 670,000 for the area of highest exposure to the southeast of the plant between the buffer zone boundary and ten miles from the center of the plant. The uncertainty associated with these estimates is about a factor of 1.3.

The radiation doses predicted from the measured increases in surface waterborne radioactivity in Broomfield drinking water were on the order of 4 to 40 μSv per year for those few years during which waterborne radioactivity appeared to rise above more typical background levels. These years included: 1) an increase of 1.5 pCi L^{-1} in gross alpha concentrations in Great Western Reservoir and Broomfield drinking water in 1966 concurrent with increased releases of radioactivity to Walnut Creek by the plant, 2) observed increases of up to 0.15 pCi L^{-1} in the concentration of Pu-239/240 in 1973 concurrent with plant holding pond reconstruction activities, and 3) increases of up to 8100 pCi L^{-1} due to a documented release of tritium during 1973 and 1974. These water pathway-related dose estimates represent relatively simple screening analyses, because the data related to waterborne releases of contaminants and measured changes in radioactivity in receiving reservoirs are limited. With the exception of tritium, it is possible that the observed increases could have been due to other sources of radiation in the environment, since the measured increases were similar to those seen in other unaffected water bodies during other time periods.

Appendices to this report provide detailed information on some of the calculational approaches of the study. A large portion of the appendices is made up of tables containing the dose estimates for the airborne release of 12 contaminants (*i.e.*, americium-241, depleted uranium, enriched uranium, plutonium-239/240, tritium, beryllium, carbon tetrachloride, chloroform, methylene chloride, tetrachloroethylene, 1,1,1-trichloroethane and trichloroethylene) over part or all of the 37-year operational history of the plant on an annual basis or for specific events for as many as 25 exposure locations and 10 exposure pathways.

The events associated with the largest releases of contaminants that would have led to the largest health hazards are also those for which information and data are most limited. This situation leads to the relatively large uncertainties quoted above. As a result, the following activities are those that should receive high priority as part of the Phase II follow-up to Phase I work:

- The development of alternative approaches to estimating the releases of radioactive contaminants from the 903 Pad and the 1957 fire, which were the dominant release events identified by Phase I. These releases came from complex events for which limited data are available. The use of alternative scientific approaches to the evaluation of these releases could yield further insights into the potential health hazards that these events may have posed.

- The identification of additional environmental data that could be used to establish whether the predicted exposures are consistent with actual measurements taken in the environment.

In addition, the further characterization of releases of chemicals and radionuclides to surface water should be pursued, because limited information was identified in Phase I on either the release of liquid contaminants from the plant or the degree of contamination present in the nearby reservoirs and related drinking waters.

This page intentionally left blank

1.0 INTRODUCTION

The objective of Task 8 of the Toxicologic Review and Dose Reconstruction Project was to estimate chemical and radiation doses that a person residing near the Rocky Flats Plant between 1953 and 1989 could have received as a result of plant operations, including accidents. Dose estimates are determined in this assessment based on the evaluation of an adult with a particular set of exposure characteristics. Since chemical and radiation doses received by an individual depend upon where, when, and how long the person was exposed, actual doses received by a specific individual will differ to some extent from those calculated for the adult described in this assessment. Nevertheless, the dose estimates provided in this report can serve as an indication of the likely magnitude of chemical and radiation doses an individual would have received during the operational history of the plant.

The dose assessment is a synthesis of information and analyses completed in project tasks 1 through 7. Efforts in Tasks 1 through 5 of the project have resulted in the identification of contaminants to be addressed by this dose reconstruction. Contaminants that are the subject of this quantitative evaluation with regard to historical emissions are listed in Table 1-1. The list includes six organic solvents, one nonradioactive metal, three radioactive metallic elements and their isotopes, and tritium, the radioactive form of hydrogen.

TABLE 1-1

CONTAMINANTS OF CONCERN FOR THE DOSE RECONSTRUCTION PROJECT

Solvents	Metals	Others
Carbon Tetrachloride	Americium-241	Tritium
Chloroform	Beryllium	
Methylene Chloride	Plutonium-239/240	
Tetrachloroethylene	Uranium-234/235 (enriched)	
1,1,1-Trichloroethane	Uranium-238 (depleted)	
Trichloroethylene		

Air dispersion model results from Task 6 and information about the historical land-use and population density around Rocky Flats from Task 7 are used to define exposure locations. Relevant human exposure pathways were identified in Task 6 based on the nature of release, physical properties of the contaminants of concern, local hydrogeology, and representative locations and activities of the exposed population. Contaminant concentrations in air, soil and food products at locations of interest are derived from release estimates developed in Task 5 and air dispersion model results from Task 6. Finally, all of this information is brought together in an exposure model that was introduced in the Task 6 report to produce estimates of chemical and radiation dose.

The quality of dose estimates provided in this report is directly related to the quality and quantity of information found or developed in previous tasks. Potential doses received through each of the environmental exposure pathways are calculated for routine and accidental airborne releases based on the information developed in Tasks 5 and 6. Doses associated with radioactivity that has been measured in nearby surface water reservoirs or drinking waters are also examined in this report. However, the lack of information regarding releases of contaminants to surface water and the similarity of the measured radioactivity in Great Western Reservoir and Standley Lake and their related drinking waters to that found in other reservoirs and drinking waters has led to the limited evaluation of this pathway. In this report, only a screening-level dose assessment is performed for surface waterborne releases.

The Rocky Flats Dose Reconstruction Project focuses on past exposures. It is based on past material usage and release information, environmental monitoring data, and model predictions. There are uncertainties associated with this information and, as a result, with the predicted results. Efforts have been made throughout the project to identify and quantify these uncertainties. This was done primarily by choosing a best estimate for a particular parameter (*e.g.*, predicted air concentration) and defining the magnitude of uncertainty about that estimate (*i.e.*, the range within which there is a high degree of confidence that the true but unknown value lies). The overall uncertainty in estimated doses is determined by combining individual uncertainties associated with each parameter used in dose calculations. Several techniques are available for propagating uncertainties. One common method, known as Monte Carlo simulation, is used throughout this report. The use of Monte Carlo simulation and other techniques to determine the overall uncertainty in a dose estimate is discussed in detail in this report.

For the purpose of giving perspective to the estimated doses, potential health risks associated with some of the dose estimates are also provided in this report. The potential for noncancer chronic health effects from exposure to 1,1,1-trichloroethane, the only material of concern not considered to be a carcinogen, was evaluated by comparing the estimated dose with the reference dose for this compound. Theoretical excess lifetime cancer risks as a result of exposure to routine and accidental releases of carcinogenic chemicals and radionuclides are determined by using standard risk factors. Since all of these health effects or risk evaluations are considered preliminary, no additional sources of uncertainty are included as part of this evaluation process. A more thorough evaluation of the conversion of dose to risk will be performed as part of the Phase II Health Studies now underway.

Using information gathered in this project, Radiological Assessments Corporation, the Phase II contractor, will further investigate the primary sources of contaminant exposure for the public and describe the potential health risks associated with these exposures.

This page intentionally left blank.

2.0 CHEMICAL AND RADIATION DOSES

Dose assessment is a process through which chemical and radiation doses received by an exposed individual or population are determined. For chemicals, it means the determination of the amount of chemical that enters the human body; for radionuclides, it means the estimation of the effect of interaction between radiation and the human body. Generally, dose is not measured directly; it is calculated from contaminant concentrations or measurements of radiation in the environment using mathematical models describing the uptake and distribution of the contaminant or radiation energy in the body. In this report, the methods used to determine chemical and radiation doses for an individual residing in the vicinity of Rocky Flats between 1953 and 1989 are described. However, before describing the methods, it is first necessary to define chemical dose, radiation dose, and assumed characteristics of the exposed individual.

2.1 Definition of Chemical Dose

In this assessment, chemical dose is defined as the total amount of a contaminant taken in by an individual (*i.e.*, entering the body through openings such as the mouth or nostrils) through all exposure routes (*e.g.*, inhalation, water and food ingestion, and incidental soil ingestion) over a period of time. In reality, not all of the material inhaled or ingested is absorbed, although the absorption efficiency will depend on the chemical and route of exposure. For the volatile organic chemicals of concern, inhalation is the only relevant exposure route. Researchers have reported that 30 to 80 percent of inhaled material is absorbed into the blood stream for several volatile organic chemicals, while the remaining portion is exhaled (ATSDR, 1989a-d). It should be noted, however, that these studies evaluated occupational exposure to concentrations in the range of 100 parts per million or more, which are significantly higher than those associated with historical releases of volatile organics from Rocky Flats (*e.g.*, 1 part per billion or less). The absorption efficiency at these lower concentrations is more likely to be at the upper end of the range reported for occupational exposures. In the absence of conclusive data to the contrary, 100 percent absorption has been assumed in this assessment for tetrachloroethylene, 1,1,1-trichloroethane, and trichloroethylene. As a result, we have assumed that 100 percent of the inhaled quantities of these materials were absorbed.

In contrast, the extent of absorption of inhaled carbon tetrachloride, chloroform, and methylene chloride can be characterized based on experimental results. Evidence suggests that inhalation absorption of carbon tetrachloride may vary from 30 to 65 percent (CDHS, 1988; USEPA, 1984). For the purposes of this study, an inhalation absorption efficiency of 65 percent was used for carbon tetrachloride dose calculations. An inhalation absorption efficiency for chloroform of 65 percent was calculated by the USEPA based on results of previous studies (USEPA, 1985). For the purposes of this study, an inhalation absorption efficiency of 65 percent was used for chloroform dose calculations. A study of the uptake of methylene chloride following inhalation by human subjects indicated absorption of from 70 to 75 percent (ATSDR, 1989c). For the purposes of this study, an inhalation absorption efficiency of 75 percent was used in methylene chloride dose calculations.

Both ingestion and inhalation routes of exposure are applicable to beryllium. In the case of inhalation exposure, it is estimated that about 10 to 50 percent of the inhaled particles are deposited in the pulmonary region of the lung (Hinds, 1982). The remaining particles are either exhaled or removed from the upper portions of the respiratory tract by various mechanisms and ingested. With regard to ingestion exposures, beryllium is not well absorbed through the oral route. Although there are no human data about the absorption efficiency of beryllium following oral exposure, several investigators have found that less than 1 percent of ingested beryllium was absorbed through the stomach and intestine of laboratory animals (ATSDR, 1988). In this assessment, it was assumed that 50 percent of inhaled beryllium and 1 percent of ingested beryllium is absorbed into the body.

Because cancer slope factors represent estimates of the risk per unit "dose", where dose is actually the daily *intake* of the contaminant per unit body weight, it is not appropriate to include absorption efficiencies when translating concentrations of contaminants in the environment to risks of cancer incidence. The absorption efficiencies mentioned above for several of the chemicals of concern have not been included in the illustrative risk evaluations performed in this study and described in Section 5 of this report.

2.2 Definition of Radiation Dose

Radiation dose is conceptually different from chemical dose. It includes not only the amount of a radionuclide taken up by an exposed person, but also the fraction of the radionuclide that is actually absorbed into the body and the effect of radiation on cells and tissues of the human body. Although there are many radionuclides, there are four main types of ionizing radiation: neutrons, alpha particles, beta particles and gamma rays, and they all can cause adverse effects on biological tissues by imparting their energy to cellular substances (*e.g.*, proteins and DNA). The absorbed dose is defined as the mean energy imparted by ionizing radiation per unit mass of tissue. The International System of Units (SI) unit of absorbed dose is the joule per kilogram ($J\ kg^{-1}$), which is given the special name "gray" (Gy). Until recently, the most common unit of absorbed dose was the "rad." One gray is equal to 100 rad.

Since deleterious effects of all types of ionizing radiation are caused by energy absorption, it is possible to devise a unifying system to quantify tissue damage for the many radionuclides that exist. Such a system has been developed by the International Commission on Radiological Protection (ICRP). In this system, which takes into account the varying degrees to which different radiations cause biological damage, dose equivalents for specific organs and effective dose equivalents (related to whole body dose) were initially used in quantifying radiation dose. Recently, the designations for organ-specific and effective dose equivalents were changed to "equivalent dose" and "effective dose", respectively (ICRP, 1990). A brief discussion of the meaning of several relevant radiation dosimetry terms is presented in Appendix A. Equivalent and effective doses are expressed in sieverts (Sv) under the SI system or in "rem" in historical units. Similar to the relationship between grays and rads, one sievert is equal to 100 rem.

For the purpose of this assessment, radiation dose is expressed in terms of effective dose, because it provides a single measure of radiation hazard that is consistent with the current understanding of human health risks caused by radiation exposure. In order to illustrate the relationship between equivalent dose and effective dose, some limited organ dose determinations are also presented in this report (see Section 3.6). Effective dose is generally determined by multiplying the amount of a radionuclide taken into the body of the exposed individual by an appropriate pathway-specific dose conversion factor (DCF). For external exposure pathways, *e.g.,* air immersion and ground exposure, effective dose is the product of the concentration of a radionuclide in air or on the ground and the appropriate DCF.

DCFs can be obtained from a number of sources, and are often re-evaluated as more information becomes available. In addition, there are usually multiple DCFs given for each radionuclide for inhalation and ingestion exposures, to account for different chemical compositions and physical properties of materials. The DCFs used in this assessment are presented in Table 2-1. The rationale used to select these values is presented in Appendix B.

As shown in Table 2-1, some of the DCFs used in this assessment are represented by single values (*i.e.*, point estimates), and some are represented by uniform distributions between two values. A formal uncertainty analysis of DCFs is beyond the scope of this evaluation, and will be addressed in Phase II of the Health Studies. However, as discussed in the Task 5 report and in Appendix B, it appears that forms of uranium and plutonium with varying chemical properties were present at Rocky Flats. To account for the possibility that uranium and plutonium associated with Rocky Flats emissions may have experienced varying rates of clearance from the lung, the inhalation DCFs for enriched uranium, depleted uranium, and plutonium-239/240 are represented by uniform distributions between values corresponding to slightly soluble (Class W) and insoluble (Class Y) compounds of uranium-234, uranium-238, and plutonium-239.

TABLE 2-1: DOSE FACTORS FOR RADIONUCLIDES OF CONCERN

Radionuclide	Lung Clearance Class[a]/ GI Uptake Factors[b]	Inhalation ($Sv\ Bq^{-1}$)	Ingestion ($Sv\ Bq^{-1}$)	Ground Exposure ($Sv\ y^{-1}\ Bq^{-1}\ cm^{2}$)	Air Immersion ($Sv\ y^{-1}\ Bq^{-1}\ cm^{3}$)
Tritium (H-3)	Water Vapor, $f_1 = 1$	1.6×10^{-11}	1.6×10^{-11}	Not Applicable	Not Applicable
Enriched Uranium	W to Y $f_1 = 0.002$ to 0.05	2.1×10^{-6} to 3.6×10^{-5} uniform distribution	7.1×10^{-9} to 7.7×10^{-8} uniform distribution	2.4×10^{-7}	2.4×10^{-4}
Depleted Uranium	W to Y $f_1 = 0.002$ to 0.05	1.9×10^{-6} to 3.2×10^{-5} uniform distribution	6.4×10^{-9} to 6.9×10^{-8} uniform distribution	1.7×10^{-7}	1.1×10^{-4}
Plutonium-239/240	W to Y $f_1 = 0.001$	8.4×10^{-5} to 1.2×10^{-4} uniform distribution	9.7×10^{-7}	1.2×10^{-7} to 2.5×10^{-7} uniform distribution	1.3×10^{-4} to 1.5×10^{-4} uniform distribution
Americium-241	W $f_1 = 0.001$	1.1×10^{-4}	8.9×10^{-7}	8.7×10^{-6}	2.6×10^{-2}

[a] Lung clearance classes indicate relative magnitudes of half-times for removal of compounds from the lungs. D indicates half-times on the order of days, W indicates half-times on the order of weeks, and Y indicates half-times on the order of year.

[b] GI uptake factors (f_1 values) represent the fraction of ingested radionuclide that is taken up from the gastrointestinal tract to the blood.

References: Plutonium, americium, and tritium ingestion and inhalation factors: ICRP Publication No. 56 (ICRP, 1990).
Uranium ingestion and inhalation factors: Federal Guidance Report No. 11 (USEPA, 1988).
Ground exposure and air immersion factors: Federal Guidance Report No. 12 (USEPA, 1993).

To account for the possibility that uranium associated with Rocky Flats emissions may have experienced varying fractional uptakes from the gastrointestinal tract to the blood, ingestion DCFs for enriched and depleted uranium are represented by uniform distributions between values corresponding to fractional uptake values of 0.2 percent and 5 percent. Because DCFs for plutonium are given for only a single fractional uptake class (f_1 = 0.1 percent), the ingestion DCF for plutonium-239/240 is represented by a point estimate.

The plutonium in Rocky Flats emissions that is represented as plutonium-239/240 contained both Pu-239 and Pu-240. To account for implications of this fact on exposures from contaminated ground surfaces and from immersion in contaminated air, associated DCFs are represented by uniform distributions between DCF values for Pu-239 and Pu-240.

2.3 Characteristics of the Exposed Individual

Chemical and radiation doses determined in the dose assessment are very much dependent on how the exposed individual is defined in terms of inhalation rate, ingestion rates of water and food, exposure patterns and dietary habits. For the purpose of this evaluation, the exposed individual is assumed to have the following characteristics:

- An adult resident.
- Exposed through all pathways identified in the Task 6 report (summarized later in this report in Table 3-1).
- Air, water, food and incidental soil intake rates typical of those reported for the nation's population.
- Exposure characteristics, such as exposure frequency and the fraction of food that is contaminated, typical of those reported for the nation's population.

A more detailed description of exposure characteristics that define the adult resident modeled in this report is provided in Appendix C.

Human populations are diverse and heterogeneous; they consist of individuals belonging to different age groups with different physiological and exposure characteristics. Since exposure characteristics and time of exposure of a specific individual can vary from those being modeled in this assessment, actual doses received by that individual are also expected to be different. Some of the factors that may affect the magnitude of the differences in dose estimates are discussed in the following sections.

Age

The age at which a specific individual was exposed may result in a higher or lower dose than that estimated for the adult modeled in this assessment. For example, the volume of air inhaled by adults is generally higher than that of children. The range of inhalation rates observed in a human population based on survey results has been published by the U.S. EPA and is presented in Table 2-2. It indicates that for a given activity level, inhalation rates of children and adults are similar, but they are substantially higher than the inhalation rate of an infant. If we assume an adult or a child spends 16 hours performing light activity and 8 hours resting, their average inhalation rate would be about 5 to 8 times higher than an infant who spends 8 hours in light activity and 16 hours resting. The difference in inhalation rate is expected to be even greater if an adult performs moderate or heavy activity. As a result, inhalation dose of the adult estimated in this report can be as much as 5 to 8 times higher than that of an infant.

TABLE 2-2

SUMMARY OF HUMAN INHALATION RATES FOR ADULTS, CHILDREN, AND INFANTS BY ACTIVITY LEVEL ($m^3\ hr^{-1}$)[a]

	Resting	Light	Moderate	Heavy
Infants, 0-3 months	0.05	0.2[b]	NA	NA
Child, age 6	0.4	0.8	2.0	2.4
Child, age 10	0.4	1.0	3.2	4.2
Average adult	0.5	0.6	2.1	3.9

NA Not Available
[a] USEPA, 1989, unless otherwise noted
[b] NCRP Report No. 76 (1984)

Similar to inhalation rates, the amounts of water and food ingested daily by adults are also generally higher than those for children. Estimates of average daily intake of various foods for several age groups have been compiled by the National Council on Radiation Protection and Measurements (NCRP, 1984). Some of these estimates have been reproduced in Table 2-3. In most cases, the intake rate for an adult is approximately 2 times greater than for a young child and often up to a factor of 10 greater than for an infant. In a few cases, however, the intake rates for an infant or young child are equal to or greater than that of an adult (*e.g.*, milk ingestion).

Another factor that will affect the magnitude of an ingestion dose is the fraction of material absorbed by the gastrointestinal tract (f_1). Gastrointestinal absorption of some radionuclides may be higher by up to a factor of 10 for newborns and infants than for adults (ICRP, 1989). A higher absorption factor is generally associated with a higher ingestion DCF. These absorption rate differences are based on animal studies in which increased absorption and intestinal retention in newborns were observed. This enhanced gut absorption progressively decreases with increasing age, reaching adult values by about the time of weaning in most cases. Therefore, the ICRP report suggests that, for most radionuclides, the f_1 values for the adult can be applied to children of 1 year of age or older.

A higher ingestion DCF for infants generally does not result in a higher estimate of radiation dose, because it is counterbalanced by lower intake rates of water and food. Milk ingestion is an exception, because an infant consumes more milk than an adult. Therefore, with the exception of the milk ingestion pathway, ingestion doses for the adult modeled in this report are likely to be higher than those of a child or infant.

TABLE 2-3
ESTIMATES OF AVERAGE DAILY INTAKE OF VARIOUS FOODS BY AGE[a]

Food	Age (Years)		
	Infant (<1)	Child (1-11)	Adult (>18)
Milk, fluid (ml d^{-1})	696	542	261
Beef (g d^{-1})	7	38	86
Vegetables, leafy (mixtures) (g d^{-1})	2	20	50
Grain (flour equivalent) (g d^{-1})	21	87	97

[a] Reference: NCRP Report No. 76 (1984).

Activity Levels

In addition to age, the activity level of an individual can also affect the magnitude of the estimated dose. For example, inhalation rate can vary significantly even for two persons within the same age group. For example, a manual worker who spends most of the day performing moderate to heavy activity is likely to have an inhalation rate 2 to 3 times higher than a person who spends most of the day resting or performing light activity. Contaminant dose received by an individual as a result of inhalation exposure is directly proportional to inhalation rate. Therefore, the inhalation dose of an adult resident provided in this report can be 2 to 3 times lower than that of an outdoor worker.

Exposure Characteristics and Food Sources

Doses of chemicals and radionuclides received by individuals within an age group can also be different due to different exposure durations and exposure characteristics. In this assessment, the exposed person is assumed to be a resident in the vicinity of Rocky Flats who was exposed to contaminants in the environment for a great portion of the day. Dose estimates associated with inhalation exposure determined for this person are likely to be up to a factor of 3 higher than that of an office worker who worked at the same location, but was only exposed 8 hours a day. Furthermore, homegrown vegetables and beef and milk products raised locally are assumed to constitute a significant portion of the adult resident's diet in this report. Dose estimates associated with food ingestion pathways determined in this report are also likely to be higher than for those individuals who rely mostly on products grown or raised outside of the contaminated area.

Time of Exposure

Another factor that can affect the amount of chemical and radiation dose received by an individual is the time of exposure. Over the operational history of the plant, there have been several accidental releases and changes in the amount of chemicals and radionuclides released into the atmosphere as a result of routine operations. For example, annual emission rates of plutonium and uranium isotopes were higher in the 1960s than the 1970s. A person who was exposed at a particular location in the vicinity of Rocky Flats between 1961 and 1970 is likely to have received a higher radiation dose than someone who lived at the same location between 1971 and 1980.

In conclusion, there are many ways in which intake rates, activity levels, exposure duration, exposure characteristics and time of exposure of individuals in a population can differ. The dose estimates determined in this report can therefore only be used to indicate the doses likely to have been received by an individual with the intake, behavior, and exposure characteristics that we have identified. For other individuals, doses may be up to a factor of 10 higher or lower than those determined in this report.

3.0 AIRBORNE RELEASES

Routine operations at Rocky Flats in the past resulted in the release of all of the contaminants shown in Table 1-1 to the atmosphere. For the radionuclides and beryllium, these routine releases were measured in the plant's exhaust air by an elaborate monitoring system. A critical review of the data from this system formed the basis of the annual release estimates developed for these materials in the Task 5 report (ChemRisk, 1994c). For the remaining contaminants, all volatile organic compounds, routine releases were not monitored, and a variety of sources of information were relied upon to estimate a range of release quantities believed to include the actual amount of chemical that the plant released for a particular year.

Contaminants were also released to the atmosphere as a result of three major accidents: the 903 Pad release, the 1957 fire and the 1969 fire. Estimates of contaminant releases associated with these accidents were developed in Task 6 based on environmental monitoring data.

Chemical and radiation doses to a defined individual associated with routine and accidental airborne contaminant releases from the plant are estimated by performing the following activities:

(1) Defining where people may come into contact with contaminants (exposure points),
(2) Identifying how people may come into contact with contaminants (human exposure routes),
(3) Estimating contaminant concentrations in air, soil and food at locations where human exposure takes place (exposure point concentrations), and
(4) Developing an exposure model.

Figure 3-1 shows the relationship of these four steps in the dose assessment. Information used in this process has been developed in project tasks 1 through 7. Human exposure pathways considered important to the Rocky Flats area were identified in Task 6. An exposure model was constructed in Task 6 for the identified pathways that is used in this task to determine chemical and radiation doses received by the exposed individual. Contaminant concentrations in air, soil and food products at the exposure points are determined from release estimates developed in Task 5 and air transport model results presented in Task 6. Since there are uncertainties associated with the release information and model predictions, efforts have been made throughout the project to identify and quantify these uncertainties. In the following sections, the approach and methodology for performing each step in the dose estimating process are presented, including

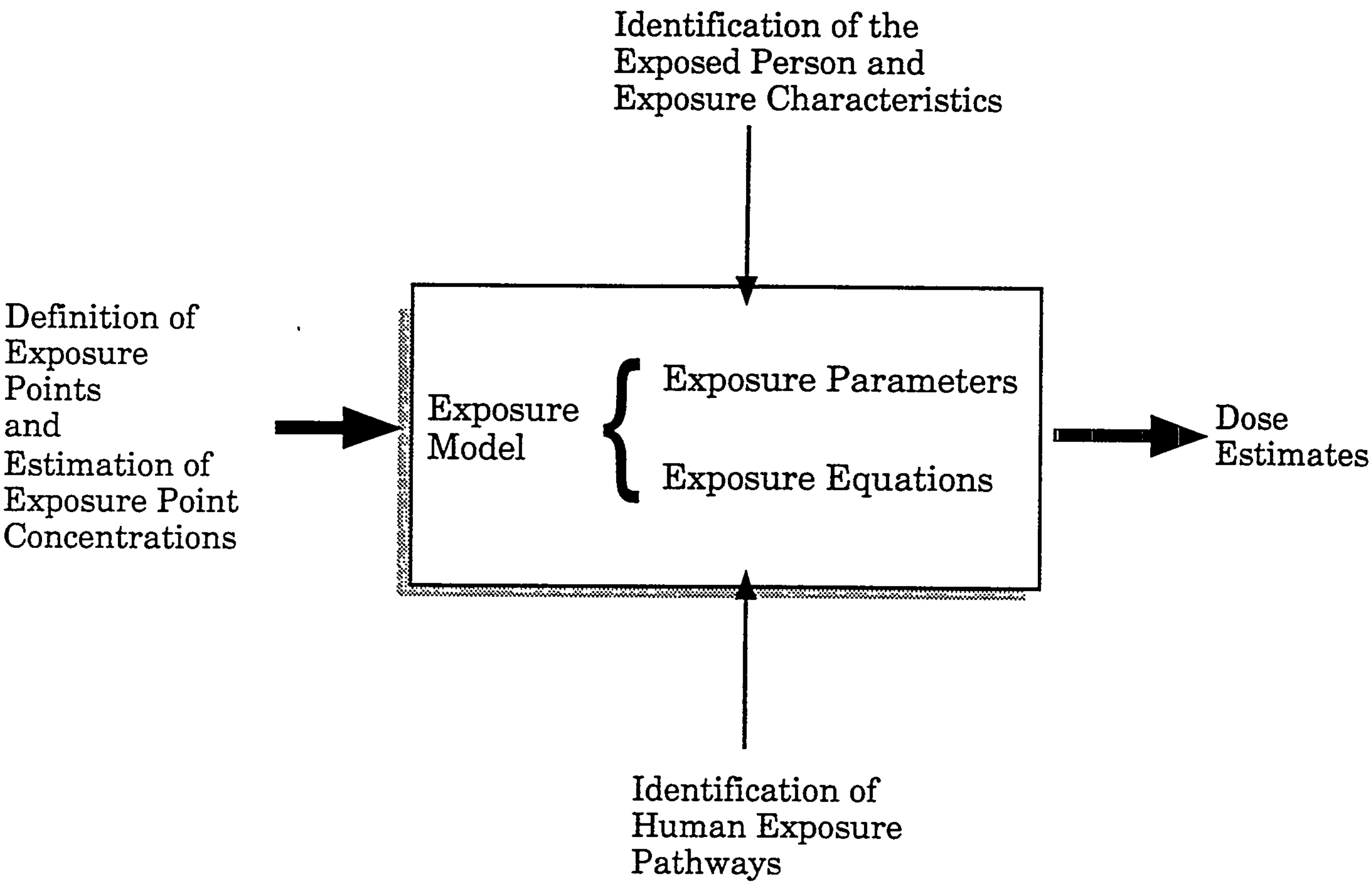


FIGURE 3-1
ESSENTIAL STEPS IN THE DOSE ASSESSMENT

sources of information and bases for all assumptions. Where helpful, examples are provided to illustrate the dose estimating process. More specific and detailed descriptions, including equations and numerical results, are provided in a series of appendices to this report.

3.1 Definition of Exposure Points

An exposure point is the location where an individual comes into contact with contaminated media such as air, soil, water and food. The identification of exposure points is important, because the dose received by an individual depends greatly on where the individual is exposed. For example, contaminant concentrations in air and soil in areas downwind or close to the plant are generally higher than in other areas. As airborne contaminants are transported away from the plant, air concentrations decrease due to dilution and deposition onto the ground or other objects. Also, because contaminants in off-site soil were deposited from the air, concentration patterns of contaminants in these two media are similar. Therefore, an individual located downwind or close to Rocky Flats is likely to have received a higher dose through inhalation and soil ingestion than another person who is upwind or far away from the source. For food stuffs, it is the location where the food was grown as well as consumed that must be considered. Vegetables grown in one location may be consumed by someone at the same location, but they can also be transported away from where the vegetables were grown and consumed by individuals at several different locations. For the purpose of this assessment, the location where food stuffs are grown or raised is assumed to be the same location where the food is consumed. The exposure points used in this dose assessment are defined below.

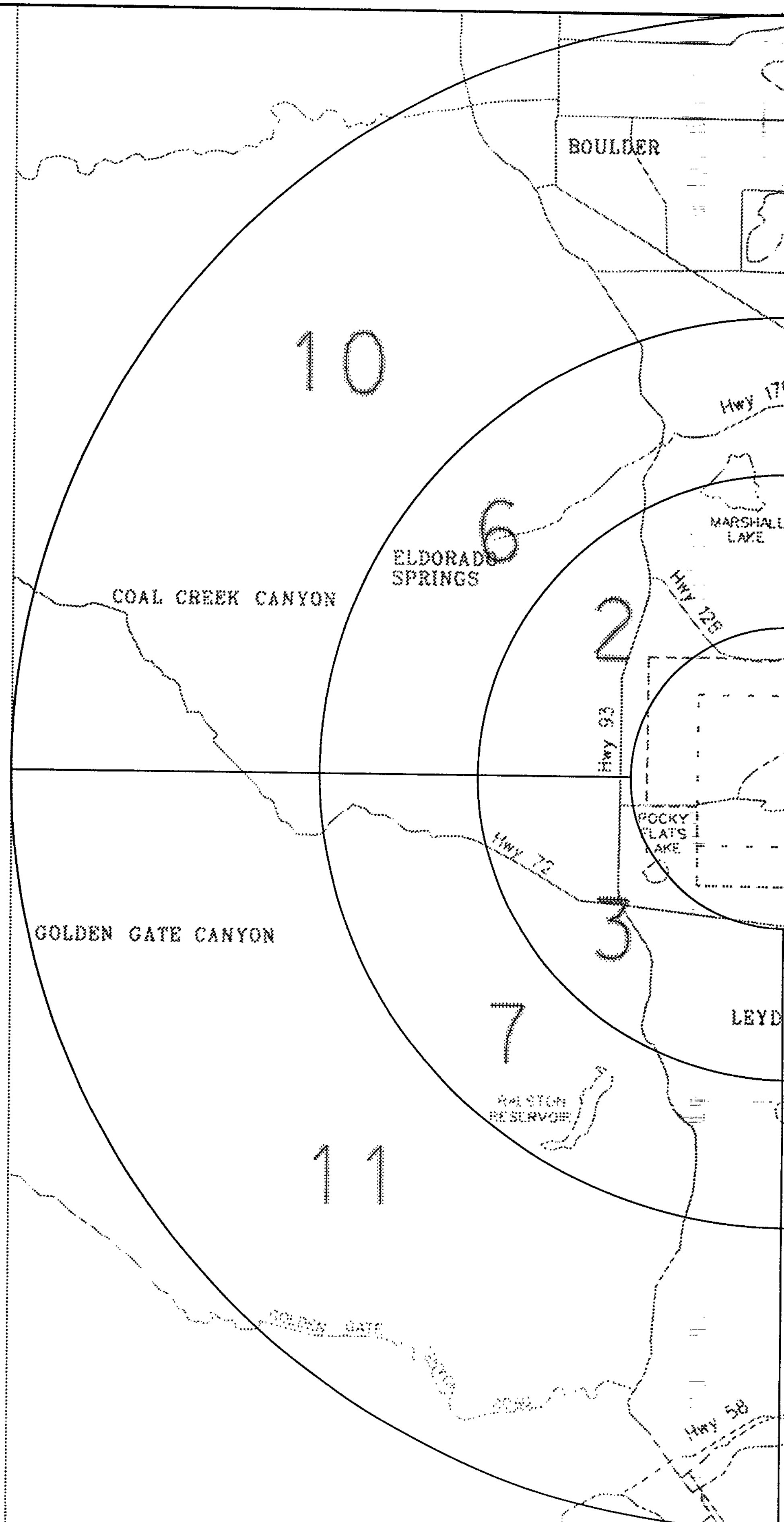
There are many locations where individuals around Rocky Flats could have been exposed during the operational history of the plant. A study area that represents the area most highly impacted by historical plant releases was identified and then divided into smaller areas over which potential exposure is expected to have been relatively uniform. For the purpose of this evaluation, an area between 2 and 10 miles from the center of the plant was considered the primary study area. However, to the west of the plant, the study area extends only as far as the dramatic increase in elevation associated with the front range of the Rocky Mountains, which occurs approximately 4 miles due west from the center of the plant.

This primary study area was chosen, because 1) land-use information from the Task 7 report indicates that few people ever lived less than two miles from the center of the plant or in the mountainous areas directly west of the plant, 2) air dispersion models used for these analyses do not accurately predict contaminant concentrations in the mountainous areas, and 3) the accuracy of currently available air dispersion models has only been validated for distances up to about 10 miles and their accuracy is believed to be reduced at greater distances (typically models are believed to overestimate concentrations at distances greater than 10 miles). The study area from 2-10 miles encompasses over 300-square miles and represents a large number of possible exposure locations. This study area was therefore partitioned into smaller geographical areas, or sectors, within which contaminant concentrations in various environmental media are assumed to be the same as those calculated for a single point in the center of the sector (*i.e.,* the centroid).

The size of the sectors used for the study is dependent on the nature of the airborne contaminant release, which influences its distribution in the environment. For example, routine releases occurred throughout the year and were subjected to the full range of environmental conditions at the site that tend to fairly uniformly distribute contaminants in the vicinity of the plant. Similarly, releases from the 903 Pad are believed to have occurred over a period of 5 years, and were distributed in all directions, but predominantly to the southeast of the plant. Consequently, the study area can be divided into relatively uniform sectors in all directions around the plant for the evaluation of these releases. In contrast, the 1957 and 1969 fires both lasted less than 20 hours and were influenced by specific, short-term meteorological conditions. The distribution of contaminants from these two release events is more irregular, requiring the use of a different approach.

For the evaluation of routine airborne releases, the study area was divided into 12 sectors (Figure 3-2). In order to assess the variation of predicted air concentrations within each sector, the predicted air concentration at the centroid of each particular sector was compared to the predicted air concentrations at each corner of that sector. An example of this comparison is shown in Figure 3-3. For the routine releases, the variation within the 12 sectors is generally a factor of 2 to 3. Since it was expected that the variation within sectors would be somewhat higher for the 903 Pad releases, the 12 sectors were further divided into 24 subsectors (Figure 3-4). The variation within these subsectors is generally within a factor of 3 or 4. A detailed evaluation of the variability within the identified sectors and subsectors is presented in Appendix D.

For the 1957 and 1969 fires, the variation between predicted values at the centroid and the corners of the sector often exceeded a factor of 50, even after dividing the primary study area into 24 subsectors (see Appendix D). This level of variation suggested that, even within a relatively small subsector, one individual may have been greatly affected by releases from the fires while another person located in the same sector just one-quarter to one-half mile away may have been largely unaffected. Instead of further dividing the subsectors to decrease the variation, we have chosen to characterize the exposures that would have occurred along the center-line of the predicted contaminant plume(s) (*i.e.*, the highest concentrations at a particular distance from the source).



ChemRisk
A Division of McLaren/Hart

RkyF794H/3-02.dgn; Rev: 07-20-94

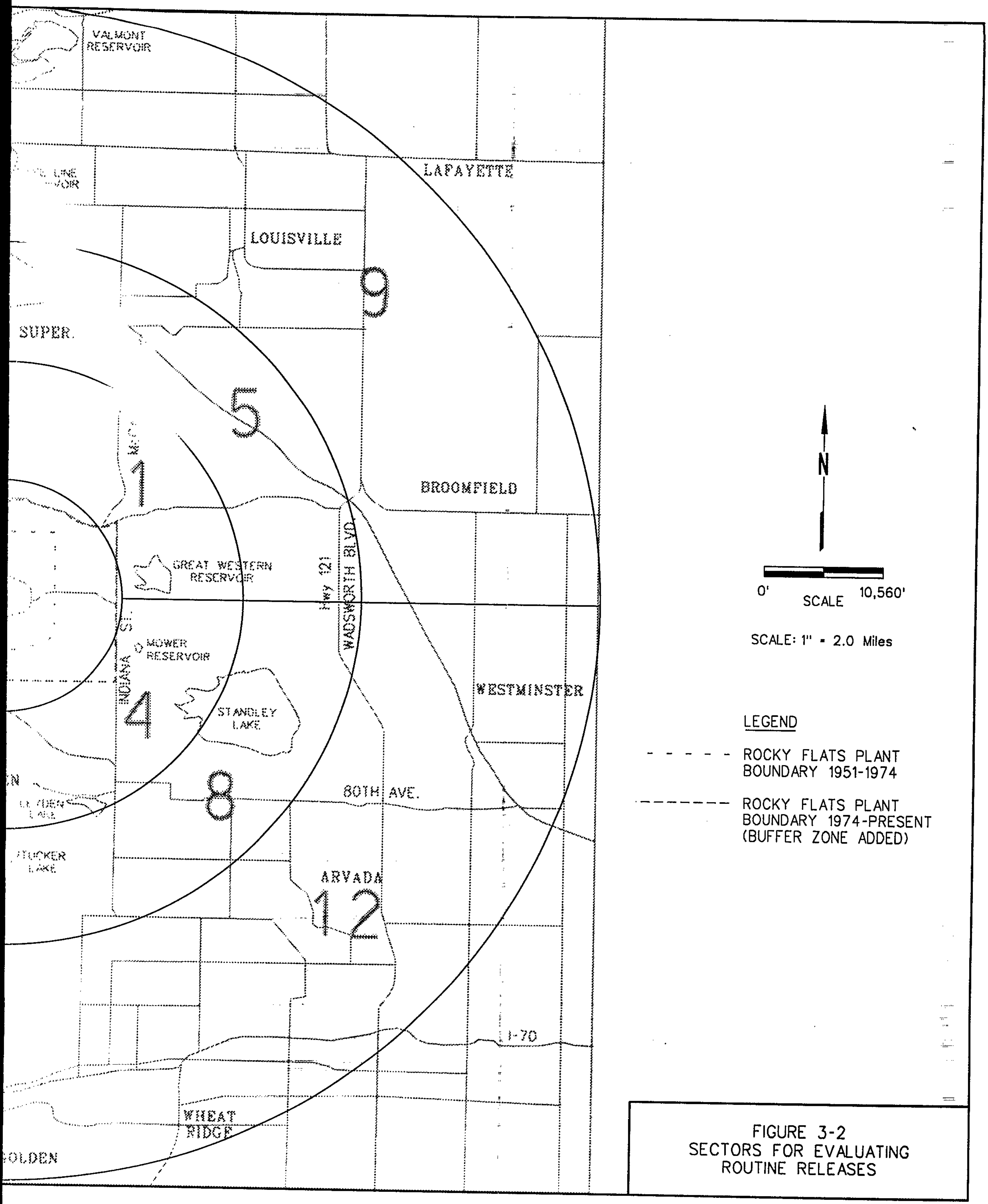


FIGURE 3-2
SECTORS FOR EVALUATING ROUTINE RELEASES

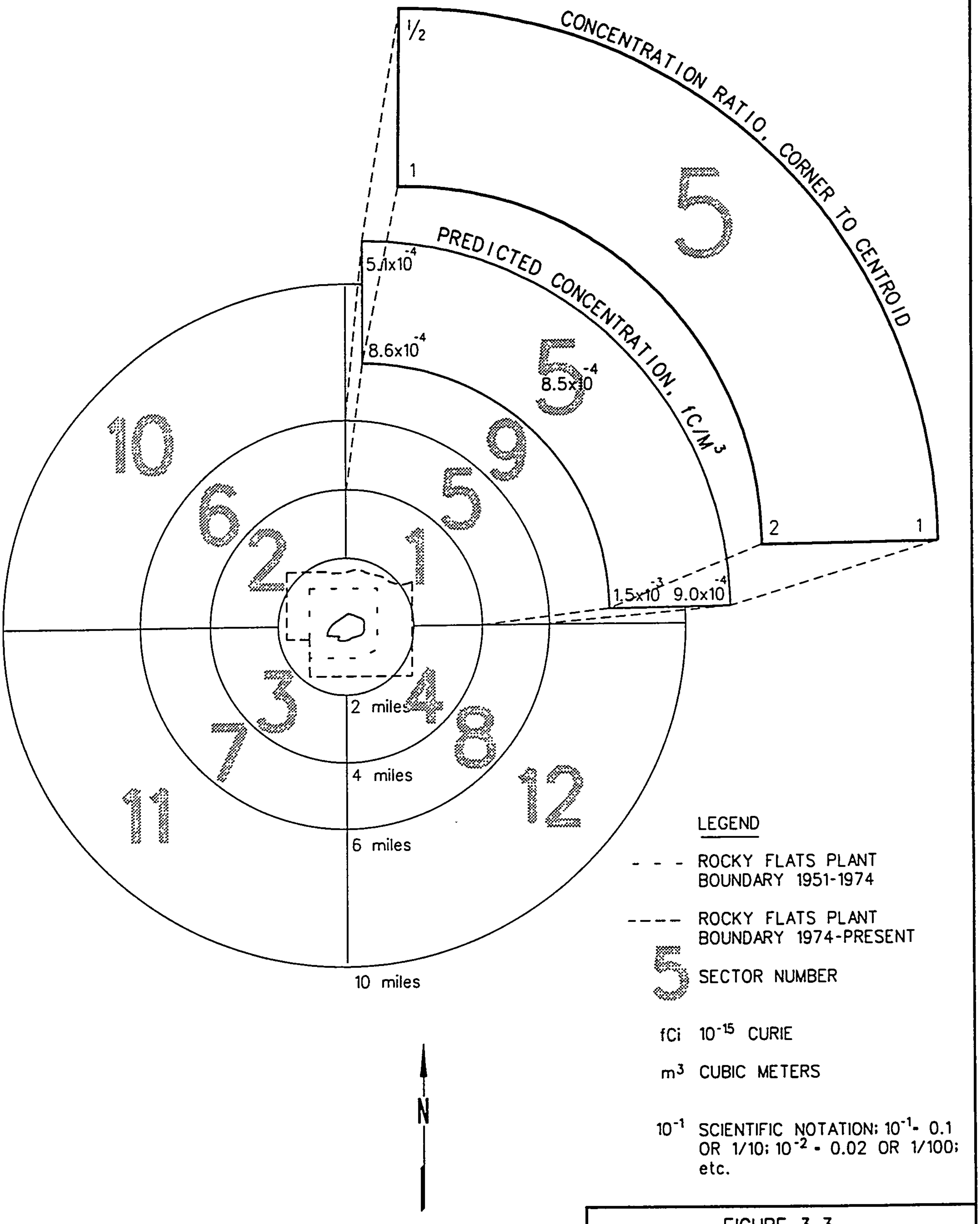
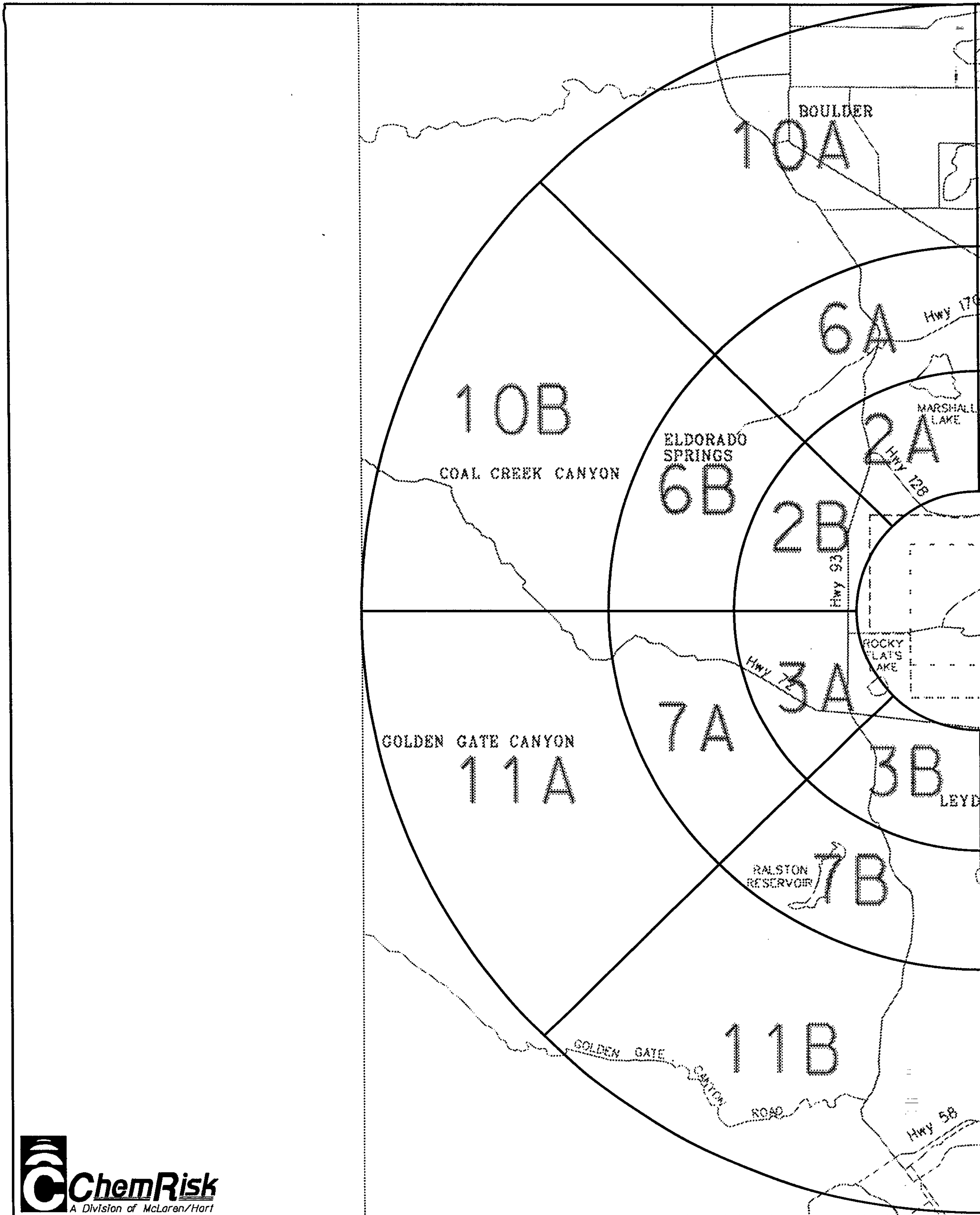


FIGURE 3-3
VARIATION OF PREDICTED AIR CONCENTRATIONS WITHIN A SECTOR-ROUTINE RELEASE OF PLUTONIUM-239/240

ChemRisk
A Division of McLaren/Hart

RkyF893H/3-03.dgn; Rev: 10-04-93

This page intentionally left blank.



RkyF794H/3-04.dgn; Rev: 07-20-94

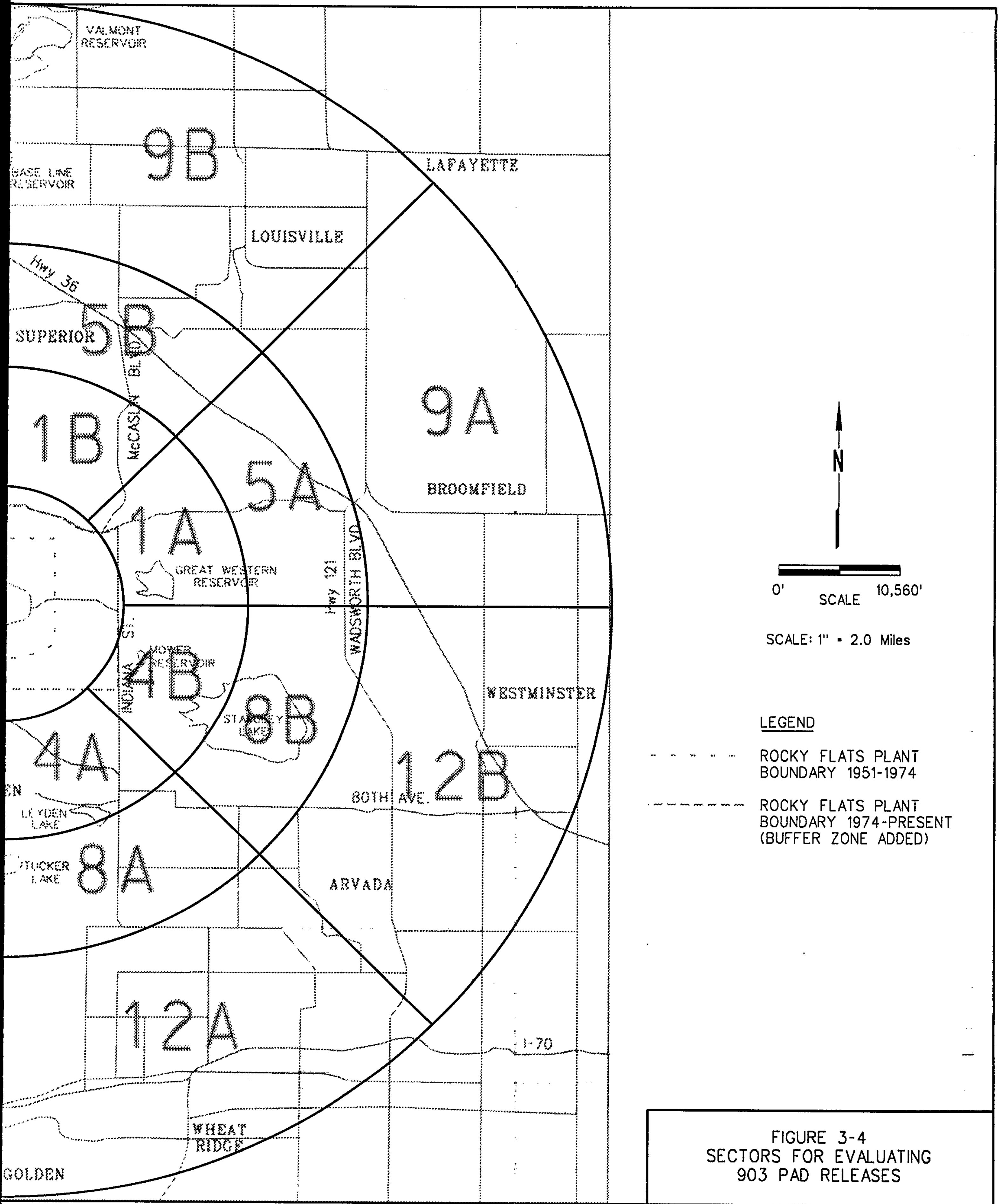
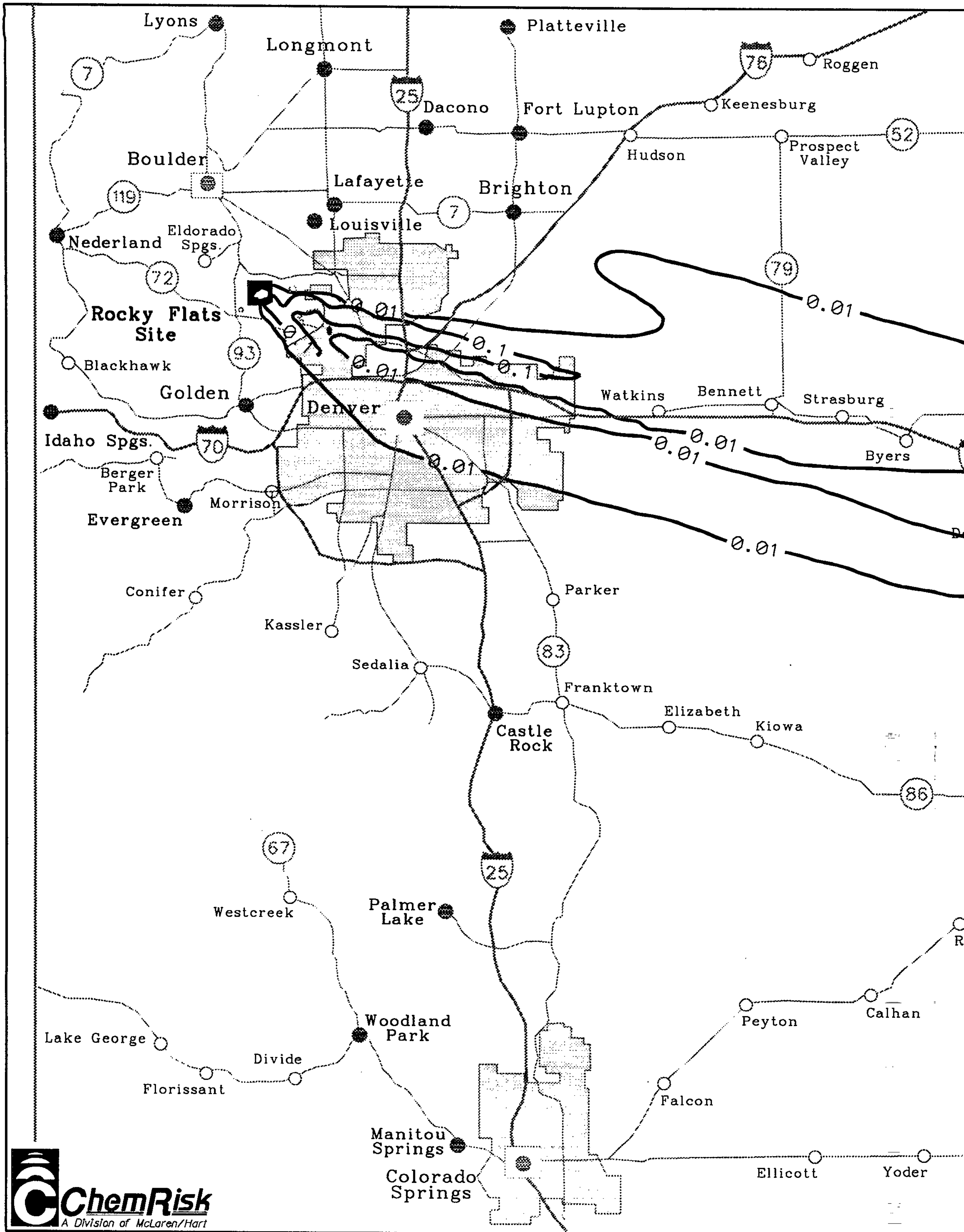


FIGURE 3-4
SECTORS FOR EVALUATING
903 PAD RELEASES

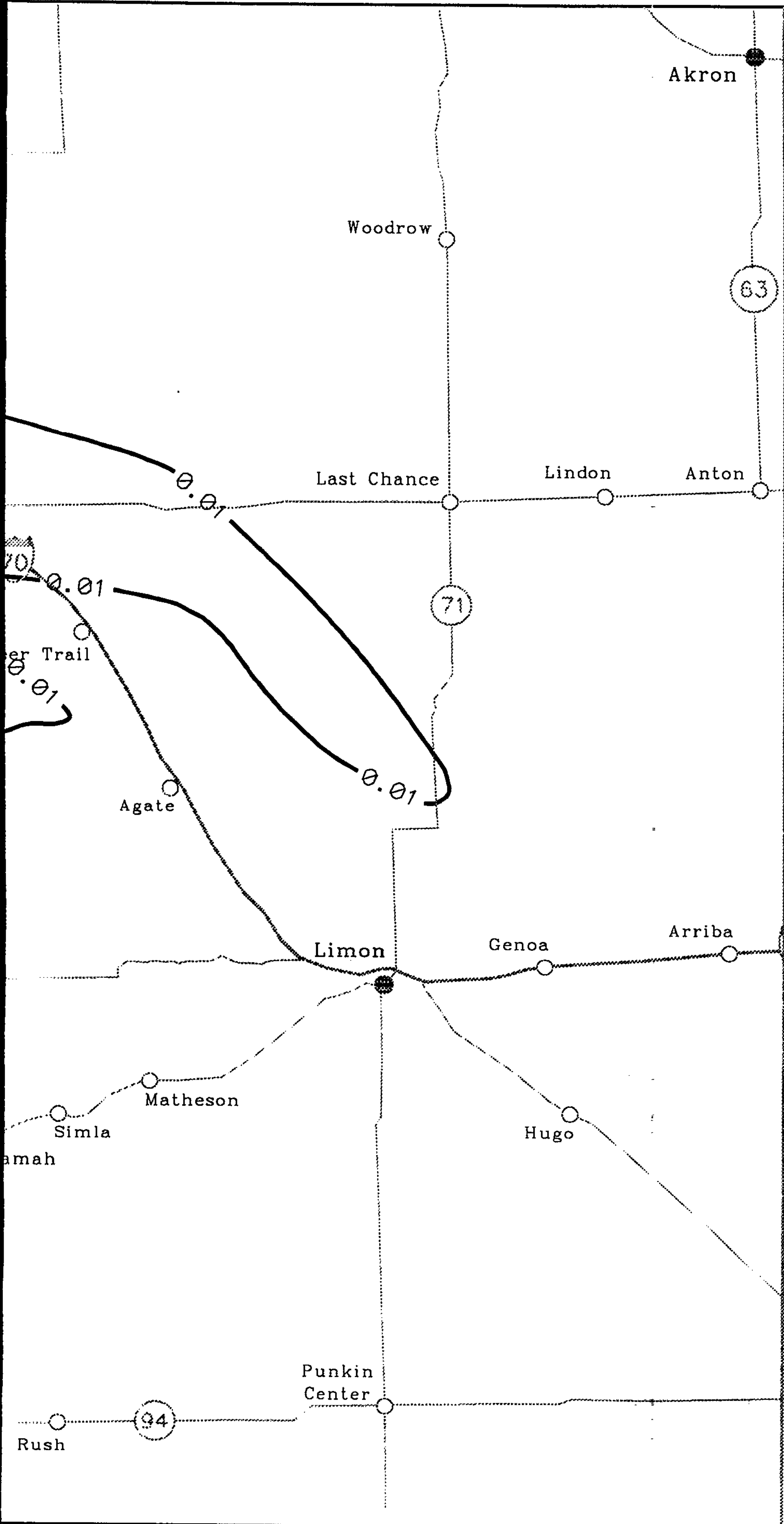
Figure 3-5 shows an extended view of the predicted concentration isopleths for the 1957 fire. This figure clearly shows two isopleths extending to the east and southeast from the plant. When looking at this figure, it is important to keep in mind that our confidence in the model predictions decreases considerably for distances greater than 10 miles from the plant. Figure 3-6 shows the predicted concentration isopleths within the identified study area and the identified exposure locations for which doses are calculated along the center-line of each plume. Figure 3-7 shows an extended view of the predicted concentration isopleths for the 1969 fire.The concentrations of the isopleths shown are the same (*i.e.*, 0.1 and 0.01 pCi m^{-3}) as those shown for the 1957 fire. By comparing Figure 3-7 to Figure 3-5, it is clear that, for a given concentration, emissions from the 1957 fire extended further than those from the 1969 fire. Figure 3-8 shows the predicted concentration isopleths within the study area and the exposure locations for which doses are calculated for evaluating releases from the 1969 fire.

Another factor that had to be considered when selecting exposure locations was terrain. As discussed in the Task 6 report, all of the air dispersion models used in this assessment are designed to predict off-site airborne concentrations at elevations approximately equal to or below the release source. The areas directly north, east, and south of Rocky Flats within the 10-mile study area are characterized by a series of hills, valleys and gulches, but are generally at or below the elevation of the release sources. However, the front range of the Rocky Mountains lies approximately four miles west of Rocky Flats. Sudden changes in altitude of 1000 feet or more are not uncommon in this area. As a result, the model predictions generated in the Task 6 report for areas greater than 4 miles due west of Rocky Flats are not used for this dose assessment. Figure 3-9 shows the identified sectors and subsectors in relation to the front range. As can be seen in the figure, portions of Sectors 6, 7, 10 and 11, designated for the evaluation of routine airborne releases, lie within the front range. As such, the dose estimates for these sectors based on the predicted airborne concentration at the centroid are assumed to apply only to those portions that lie outside the dramatic change in elevation associated with the front range. For the evaluation of releases from the 903 Pad, Subsectors 6B, 7A, 10A and 11B also partially lie within the front range. Similar to the routine releases, dose estimates for these subsectors based on the predicted airborne concentration at the centroid are assumed to apply only to those portions that lie outside the front range. Dose estimates are not determined for the two subsectors, 10B and 11A, lying completely within the front range. The contaminant plumes for releases from the 1957 fire are predicted to have extended east and southeast from the plant and do not include the areas in the front range. For the 1969 fire, one of the contaminant plumes extended southwest from the plant, and the furthest exposure point identified along this plume falls within the front range. As such, a dose estimate was not determined for this location.

This page intentionally left blank



RkyF794H/RF3-05.dgn; Rev: 9-12-94



N

0' SCALE 52,800'

SCALE: 1" = 10 Miles

LEGEND

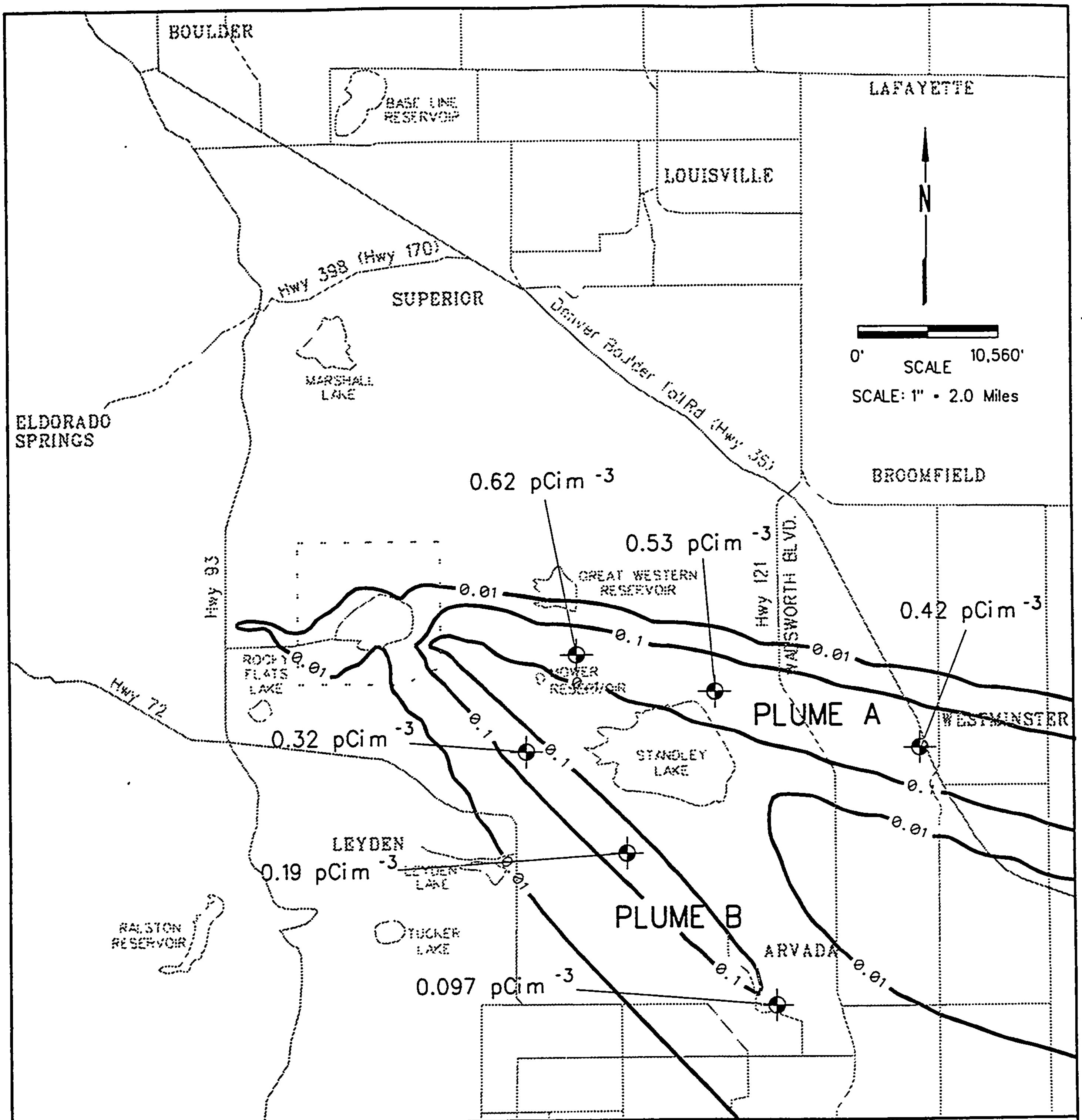
ISOPLETH CONCENTRATION LINES, pCi/m $^{-3}$

pCi 10^{-12} CURIE

m^3 CUBIC METERS

NOTE:
AIR DISPERSION MODELS USED TO PREDICT AIR CONCENTRATIONS ARE GENERALLY CONSIDERED TO BE ACCURATE UP TO DISTANCES OF APPROXIMATELY 10 MILES. AT DISTANCES GREATER THAN 10 MILES, PREDICTIONS ARE BELIEVED TO OVERESTIMATE ACTUAL AIR CONCENTRATIONS.

FIGURE 3-5
PREDICTED AIR CONCENTRATIONS
FOR EVALUATING THE 1957 FIRE



LEGEND

- - - - - ROCKY FLATS PLANT BOUNDARY 1951-1974

ISOPLETH CONCENTRATION LINES, pCi m $^{-3}$

EXPOSURE LOCATIONS

pCi 10^{-12} CURIE

m^3 CUBIC METERS

ChemRisk
A Division of McLaren/Hart

FIGURE 3-6
EXPOSURE LOCATIONS FOR EVALUATING THE 1957 FIRE

RkyE794H/RF3-06.dgn; Rev: 07-28-94

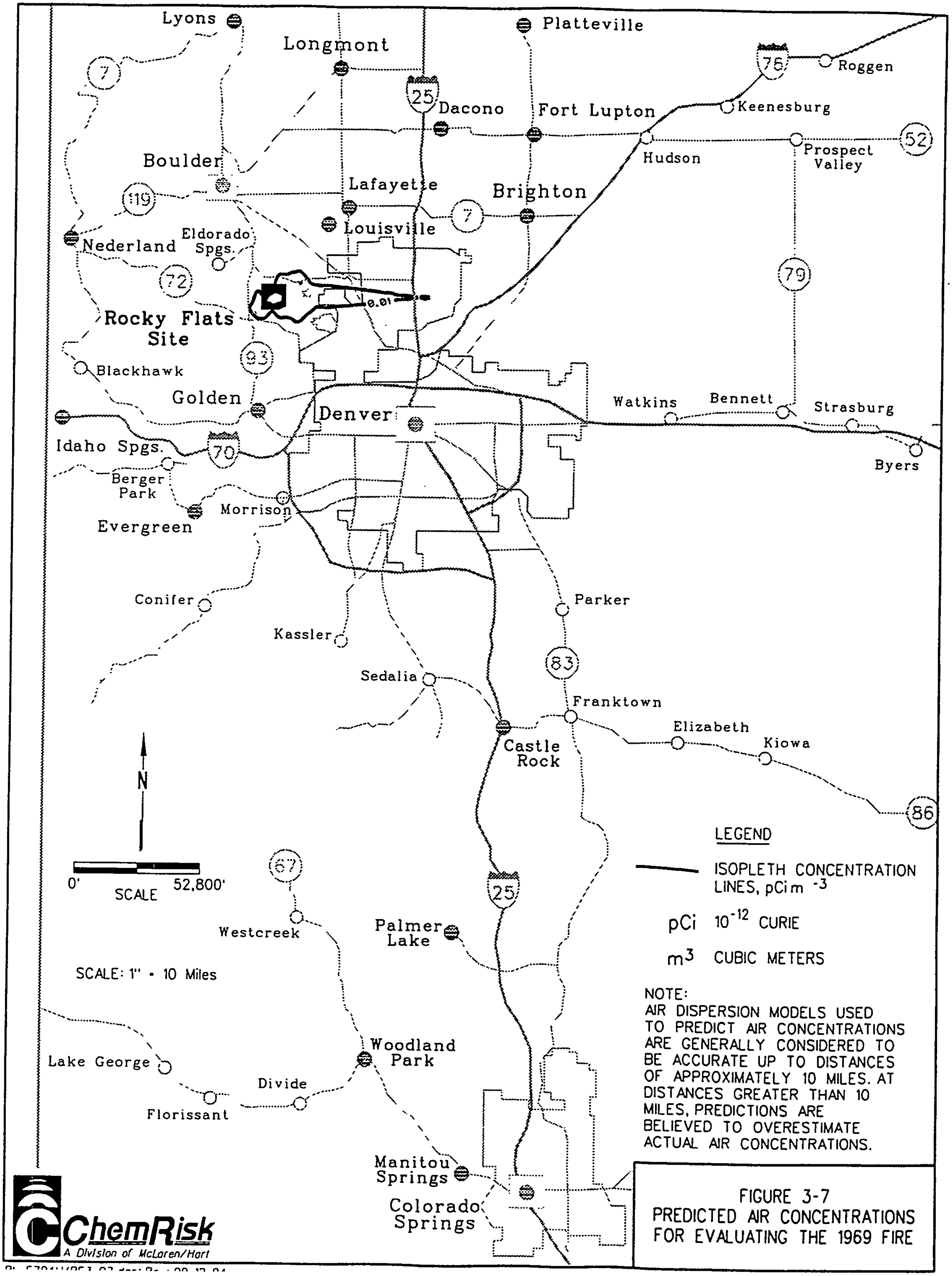


FIGURE 3-7
PREDICTED AIR CONCENTRATIONS
FOR EVALUATING THE 1969 FIRE

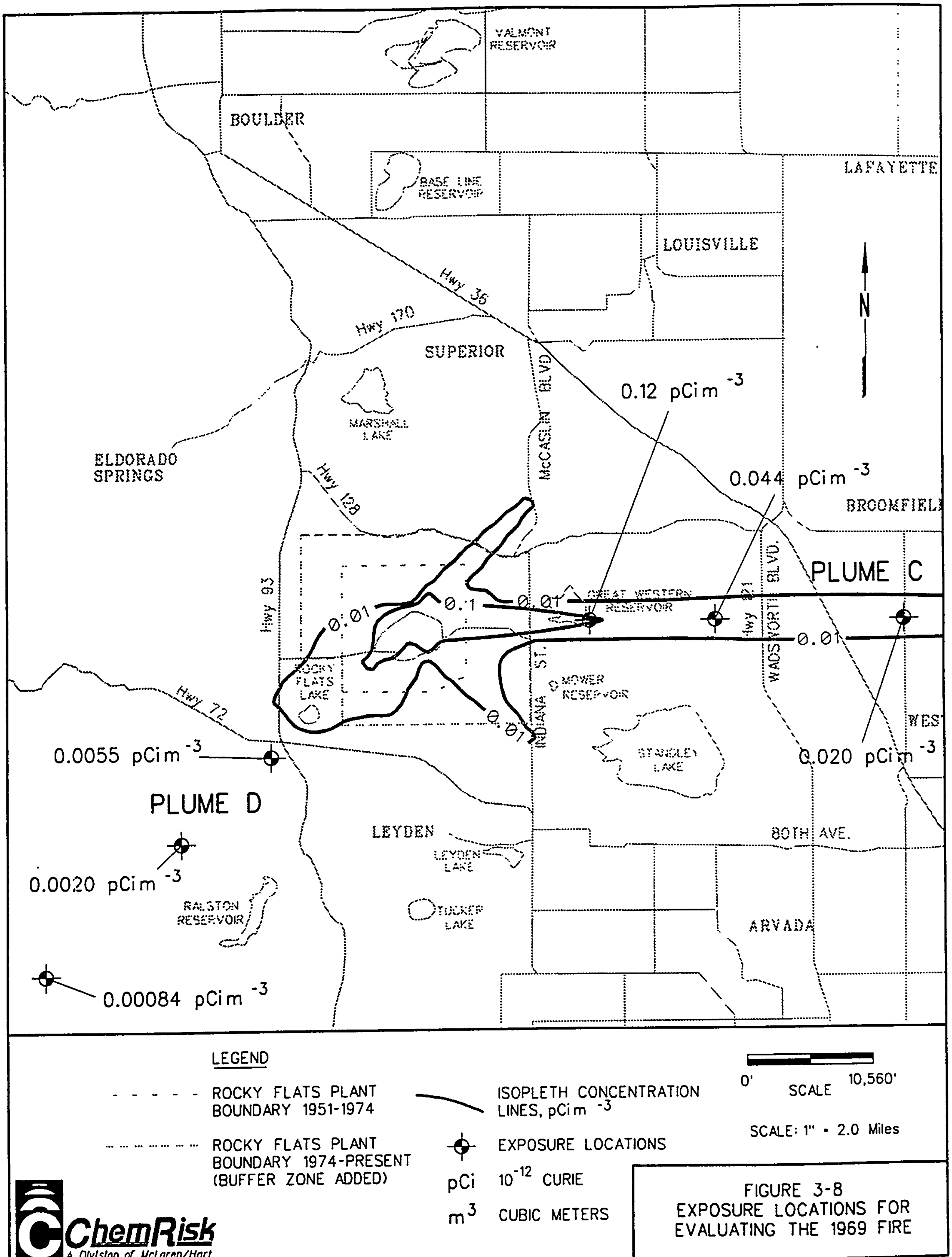
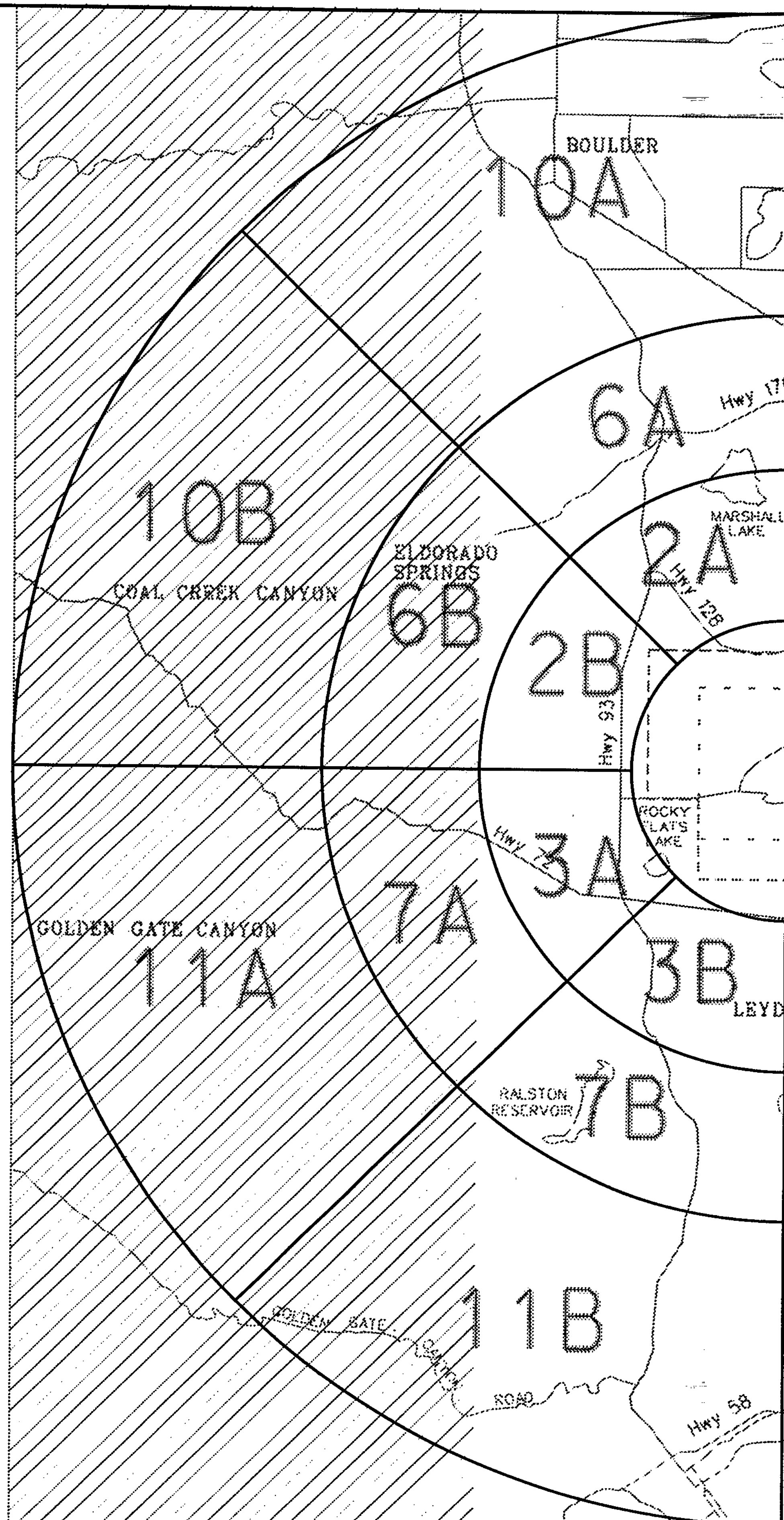


FIGURE 3-8
EXPOSURE LOCATIONS FOR EVALUATING THE 1969 FIRE

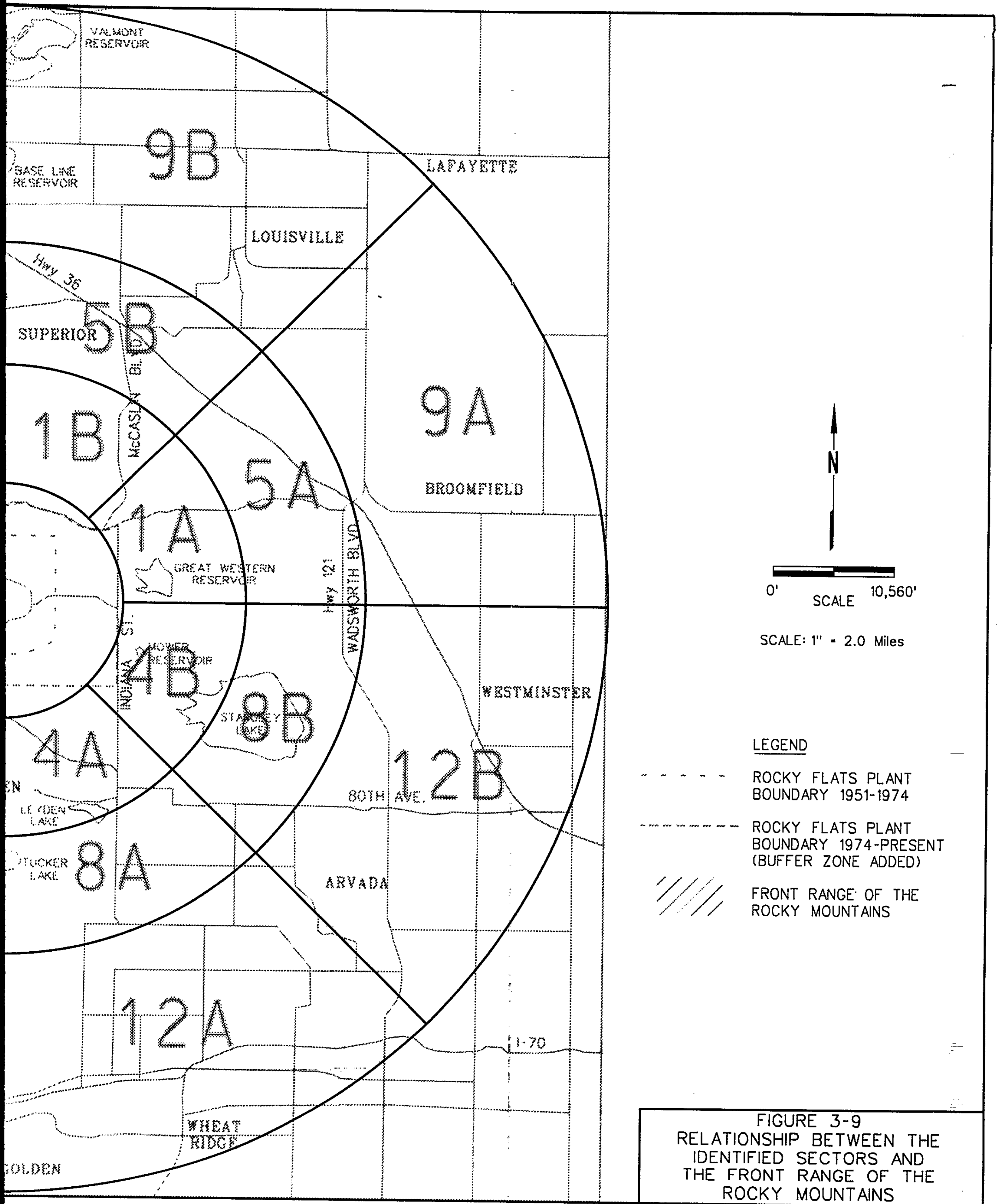
RkyF794H/3-08.dgn; Rev: 07-28-94

This page intentionally left blank.



ChemRisk A Division of McLaren/Hart

RkyF794H/3-09.dgn; Rev: 07-21-94



LEGEND

ROCKY FLATS PLANT BOUNDARY 1951-1974

ROCKY FLATS PLANT BOUNDARY 1974-PRESENT (BUFFER ZONE ADDED)

FRONT RANGE OF THE ROCKY MOUNTAINS

FIGURE 3-9
RELATIONSHIP BETWEEN THE IDENTIFIED SECTORS AND THE FRONT RANGE OF THE ROCKY MOUNTAINS

In addition to the sector centroid locations, three "remote" population centers beyond the 10-mile study area were also selected for the purpose of exposure evaluation. Even though the reliability of the air dispersion model results will decrease beyond 10 miles (*i.e.*, the model is believed to overestimate the actual contaminant concentrations), the addition of these points allows us to make some statements with regard to the potential exposure of the large populations in the vicinity of Rocky Flats. Ten population centers, Arvada, Boulder, Broomfield, Golden, Lafayette, Leyden, Louisville, Superior, Westminster, and Wheat Ridge, are located partially or totally within the study area and exposures can therefore be estimated for these areas using the previously defined sectors.

Additional exposure points were selected in the cities of Denver, Lakewood, and Longmont. These cities are shown in Figure 3-10, and the distances and directions from Rocky Flats of the selected exposure points are given below:

Denver:	16 miles southeast of the plant (corresponds approximately to the Denver Civic Center)
Lakewood:	12 miles south-southeast of the plant (corresponds approximately to Sunset Park, which is north of the Denver Federal Center)
Longmont:	20 miles north of the plant (corresponds approximately to Sunset Park, which is south of 9th Avenue)

3.2 Identification of Human Exposure Pathways

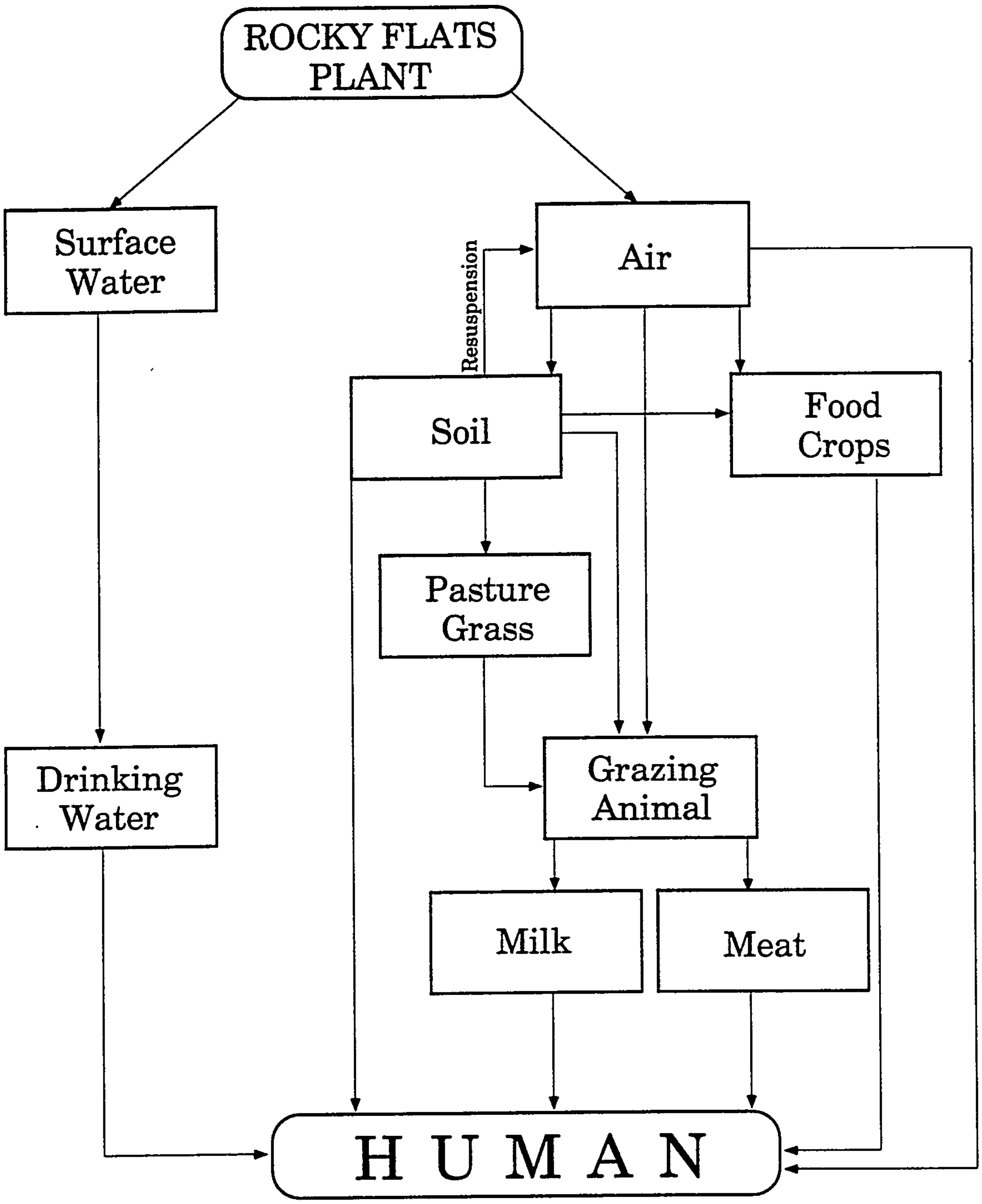
Human exposure pathways are the routes through which an individual may come into contact with a radionuclide or chemical in the environment. Exposure pathways that are relevant to the Rocky Flats region were identified in Task 6 and are shown graphically in Figure 3-11. The process of identifying important pathways considered the nature of release, hydrogeology of the site, chemical and physical properties of the contaminants of concern, migration potential of the contaminants in the environment, and the life-style and activities of the exposed population. As explained in the Task 6 report, not all identified exposure pathways are relevant to all contaminants of concern. For example, immersion and ground exposure are only applicable to radionuclides which emit gamma radiation and food-related pathways are only applicable to non-volatile materials. Exposure pathways that are quantitatively evaluated in the dose assessment for each of the contaminants of concern are listed in Table 3-1.

Map Source: U.S.G.S.- Denver, Colorado revised 1978 and
Greeley, Colorado; Wyoming revised 1976

Rev 09-20-93
RkyFlts/8-93/3-10

ChemRisk
A Division of McLaren/Hart

FIGURE 3-10
REMOTE EXPOSURE
POINT LOCATIONS



Rev. 09-20-93
Rky F893H/Fig 3-11

ChemRisk
A Division of McLaren/Hart

FIGURE 3-11
RELEVANT ENVIRONMENTAL EXPOSURE PATHWAYS AT ROCKY FLATS

TABLE 3-1

POTENTIALLY IMPORTANT PATHWAYS FOR THE CONTAMINANTS OF CONCERN

Air Medium

Pathway	Material of Concern
Air - Humans (Inhalation)	Solvents, Be, Am, Pu, U, Tritium
Air - Humans (Immersion)	Am, Pu, U
Air - Livestock - Humans (Ingestion)	Be, Am, Pu, U
Air - Vegetation - Humans (Ingestion)	Be, Am, Pu, U
Air - Vegetation - Livestock - Humans (Ingestion)	Be, Am, Pu, U

Surface Water Medium

Pathway	Material of Concern
Water - Humans (Ingestion)	Pu, U, Tritium

Soil/Sediment Media

Pathway	Material of Concern
Soil/Sediment - Humans (Ingestion)	Be, Am, Pu, U
Soil/Sediment - Humans (Ground Exposure)	Am, Pu, U
Soil - Livestock - Humans (Ingestion)	Be, Am, Pu, U
Soil - Vegetation - Humans (Ingestion)	Be, Am, Pu, U
Soil - Vegetation - Livestock - Humans (Ingestion)	Be, Am, Pu, U
Soil/Sediment - Air - Humans (Inhalation)	Be, Am, Pu, U
Soil/Sediment - Air - Humans (Immersion)	Am, Pu, U

Solvents = Carbon Tetrachloride, Chloroform, Methylene Chloride, Tetrachloroethylene, 1,1,1-Trichloroethane, Trichloroethylene
Am = Americium-241
Be = Beryllium
Pu = Plutonium-239, 240
U = Uranium-234, 235, 238

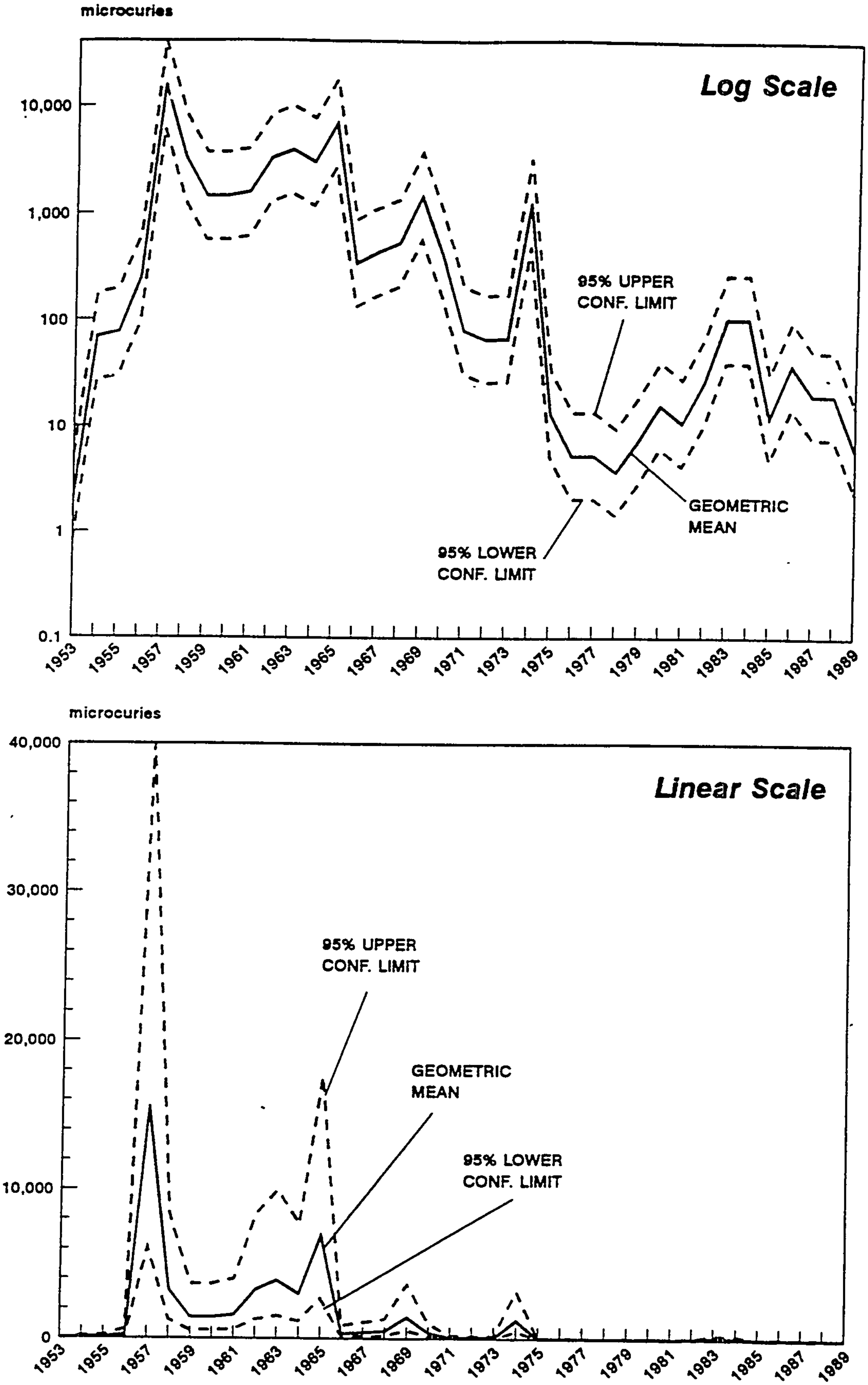
3.3 Estimation of Exposure Point Concentrations

As described in the previous section, many exposure pathways were identified as potentially important for the contaminants released by the plant and warrant further study. However, to quantitatively evaluate the identified pathways, contaminant concentrations in the appropriate environmental media must be determined. For instance, contaminant concentrations in air are necessary for the evaluation of inhalation and immersion exposures, while the contaminant concentrations in soil are necessary for the evaluation of ground exposure, incidental soil ingestion and various food ingestion pathways. In this section, the determination of contaminant concentrations in air and soil at the identified exposure points is discussed.

During the 1950s and 1960s, ambient air monitoring efforts at the plant were sporadic and focused mainly on alpha emitting radionuclides such as plutonium-239/240 and uranium-234/235. Some limited monitoring of tritium and beryllium occurred, but virtually no monitoring data are available on the organic solvents. Furthermore, as most of the sampling locations do not coincide with the exposure points defined in Section 3.1 and contaminant concentrations in air would be expected to change over distance, the dose assessment in this report relies on air dispersion model predictions. Two different approaches were used to model routine and accidental airborne releases; they are discussed separately in the following sections.

3.3.1 Determination of Air and Soil Concentrations Associated with Routine Airborne Releases

Off-site air concentrations for routine releases are predicted based on the estimated annual emission rates of the contaminants of concern. Over the operational history of the plant, there have been changes in production rate, weapon design and material usage, and improvements in contaminant control technology. With these changes, there were corresponding changes in the magnitude of airborne releases of chemicals and radionuclides. Figure 3-12 graphically presents estimated annual emissions of plutonium to the atmosphere due to routine operations from 1953 to 1989 (ChemRisk, 1994c). The highest release occurred in 1965 and is about 100 to 1000 times higher than releases between 1971 and 1989. Similar but less dramatic changes in annual emission rates are also observed for other contaminants of concern. In order to reflect this temporal change in emission rates, annual average contaminant concentrations in air and soil are determined in this dose assessment.



ChemRisk
A Division of McLaren/Hart

FIGURE 3-12
AIRBORNE RELEASE ESTIMATES AND UNCERTAINTIES - PLUTONIUM ALPHA
(μCi)

Off-site air concentrations at various exposure points are predicted for each of the 37 years. For each contaminant, the annual average air concentration at an exposure point in a particular year can be calculated by scaling the result of air dispersion modeling that was based on a unit release rate of 1 mCi y^{-1} or g y^{-1} by the actual annual emission rate for that year (*i.e.*, the source term). There are uncertainties in both the dispersion model predictions and contaminant source terms that must be carried through to the predicted air concentration. A technique for propagating multiple uncertainties, known as Monte Carlo simulation, is used to accomplish this. A more complete description of error propagation and Monte Carlo simulation is presented in Section 3.5.

Soil concentrations are estimated using the predicted contaminant concentrations in air and a deposition model that considers both dry and wet deposition. Since there is additional uncertainty in the deposition model, Monte Carlo simulation is again used in producing estimates of soil concentrations and associated uncertainties.

For the purpose of this dose assessment, a contaminant deposited onto the ground surface is considered to be in either a surface soil compartment or a bulk soil compartment. In each case, deposited contaminants are assumed to be uniformly distributed within that compartment. In the surface soil compartment, all of the deposited material is assumed to be confined to a layer of soil that extends from the ground surface to a depth of 1 cm. Contaminants in surface soil (in pCi kg^{-1} for radionuclides or $\mu g\ kg^{-1}$ for chemicals) are considered to be available for soil ingestion, milk and beef ingestion and exposure pathways related to soil resuspension. Radionuclides in the surface soil compartment are also considered to be associated with the ground exposure pathway.

The bulk soil compartment is considered to include the root system of a plant and is defined as the soil layer that extends from the ground surface to a depth of 25 cm. Contaminants in bulk soil (in pCi kg^{-1} for radionuclides or $\mu g\ kg^{-1}$ for chemicals) are considered to be relevant to the calculation of doses associated with wheat, vegetable, milk and beef ingestion.

During routine airborne releases, contaminants were continuously deposited onto the ground, resulting in a gradual build-up of contaminant concentrations in both the surface soil and bulk soil compartments. In reality, contaminants are also slowly removed from the soil layers by the action of water infiltration and other transport mechanisms. However, because of the extremely low water solubilities of americium, beryllium, plutonium and uranium, infiltration loss of these materials from the surface and bulk soil compartments is not considered in this evaluation. This assumption will tend to overestimate contaminant concentrations in soil and leads to an overestimation of doses received through soil-related exposure pathways. The determination of contaminant concentrations in air and soil at various exposure points is discussed in detail in Appendix E.

3.3.2 Determination of Air and Soil Concentrations from Accidental Airborne Releases

The approach to the evaluation of accidents differs from that used for routine releases. Each accident is evaluated as a single event with a dose estimate associated with the accidental release itself and another dose estimate associated with exposure to the residual contamination in the environment after the release ended. For example, for a given location, a single dose estimate will be provided for the 1957 fire (Sv/event). However, even though the 1957 fire lasted only 13.5 hours, it is assumed that plutonium particles that deposited onto the ground surface as a result of the accident stayed on the ground surface indefinitely. Under this assumption, a person can be exposed to the deposited material through soil-related exposure pathways in 1970 or even 1980. Furthermore, because it is conservatively assumed that the deposited plutonium was not removed by any loss mechanism, soil concentrations do not change with time. As a result, pathway-specific doses determined for 1970 and 1980 would be the same. For this reason, radiation doses associated with exposures after the actual accident release ended are presented on a yearly basis (Sv/year) and can be applied to any year after the accident. The one exception to this rule is americium-241, since the concentration of this material continues to increase with time as a result of the decay of plutonium-241.

The method of estimating contaminant concentrations in air and soil as a result of the accidents, *i.e.,* the 1957 fire, the 1969 fire and the 903 Pad, is also different from the method used for routine airborne releases. As described in the Task 6 report, the quantity of contaminant released in each accident was determined by using air dispersion models and air, soil and/or vegetation monitoring data collected during and immediately after the event. The predicted air concentrations at various exposure points were determined based on the estimated source terms and can be used directly in the dose assessment.

The 1957 and 1969 fires lasted less than 20 hours. Because of the relatively short duration of these release events, only inhalation exposure is considered relevant in the evaluation of off-site exposures during the event itself. Soil-related exposure pathways, such as soil ingestion and ingestion of agricultural products, become relevant after the fires were extinguished. In order to address these other pathways, plutonium-239/240 concentrations in soil resulting from the two fires must be determined. As was the case for routine airborne releases, a deposition model is used in conjunction with the predicted air concentrations. Investigations of the meteorological conditions during the fires show that there was no rain or snow during either fire. As a result, the deposition model used for these two events does not consider wet deposition. A detailed description of the determination of soil concentrations as a result of the 1957 and 1969 fires is presented in Appendix F.

As discussed in the Task 6 report, the Fugitive Dust Model (FDM) provides both air and soil concentration predictions associated with the 903 Pad release. As with the modeling results for the 1957 and 1969 fires, the predicted air concentrations can be used directly in the dose assessment. However, the soil concentrations predicted by the model are areal concentrations (*i.e.,* in pCi m^{-2}) and are not consistent with the surface soil and bulk soil compartments described above. As a result, a series of calculations was performed to convert the modeling results to the appropriate units. These calculations are described in detail in Appendices G (plutonium-239/240) and H (americium-241).

3.4 The Project Exposure Model

Chemical and radiation dose estimates provided in this report are determined through the use of an exposure model. The model initially described in the Task 6 report is used in this task to predict the movement of contaminants among environmental media and uptake of contaminants by humans. It includes all of the exposure pathways that were identified as being potentially important for the contaminants released from Rocky Flats. The exposure pathways associated with contaminants released into the air include inhalation, immersion, ground exposure, ingestion of agricultural and dairy products raised in contaminated areas and incidental ingestion of contaminated soil. As mentioned previously, not all pathways are applicable to all contaminants. The same can be said for the different release events. Table 3-2 presents exposure pathways that are evaluated for each release event.

TABLE 3-2

EXPOSURE PATHWAYS EVALUATED FOR VARIOUS RELEASE EVENTS

Routine airborne release of radionuclides • Immersion and inhalation exposure to direct releases and resuspended soil particles • Soil ingestion • Ground exposure • Wheat, vegetable, beef and milk ingestion
Routine airborne release of chemicals • Inhalation
Airborne release of radionuclides from the 1957 and 1969 fires • Inhalation exposure during the accident
Airborne release of radionuclides directly from the 903 Pad (1965 - 1969) • Immersion and inhalation exposure to direct release and resuspended soil particles • Soil ingestion • Ground exposure • Wheat, vegetable, beef and milk ingestion
Airborne release of radionuclides (resuspension) after the covering of the 903 Pad (1970 - 1989), after the 1957 fire, and after the 1969 fire. • Immersion and inhalation exposure to resuspended soil particles • Soil ingestion • Ground exposure • Wheat, vegetable, beef and milk ingestion

In the exposure model, every exposure pathway is represented by an equation. For example, human uptake of an airborne contaminant through inhalation is modeled by an equation that takes into account the predicted contaminant concentration in air, the inhalation rate of the exposed individual, the fraction and length of time the person is exposed to contaminated air and how much time the person is indoors or outdoors. As discussed in Section 2.2, when the contaminant is a radionuclide, the exposure equation also includes a dose conversion factor to convert the intake of the contaminant to radiation dose. Exposure equations used in this task for the determination of chemical and radiation doses are presented in Appendix I. Although the exposure model identifies equations for all pathways, only those that are applicable are used when evaluating a particular contaminant or release event.

Input parameters, such as inhalation rate and fraction of time exposed, are essential components of an exposure pathway. However, there is often considerable uncertainty in estimating the values of input parameters. Instead of assigning a single value to a parameter, probability distributions are used in this assessment to describe most of the input parameters. For example, the volume of air inhaled by an adult is estimated to be somewhere between 9 and 29 m^3 d^{-1} with a most probable value (*i.e.,* a best estimate) of 20 m^3 d^{-1}. The probability distribution for the volume of air inhaled is graphically presented in Figure 3-13. Probability distributions assigned to other parameters based on site-specific information, scientific literature values or subjective judgements of experts are tabulated in Appendix J. The uncertainties of the parameters, as quantified by probability distributions, can be propagated through the exposure equations to provide an estimate of uncertainty in the final dose estimate. This process is discussed in detail in the following section.

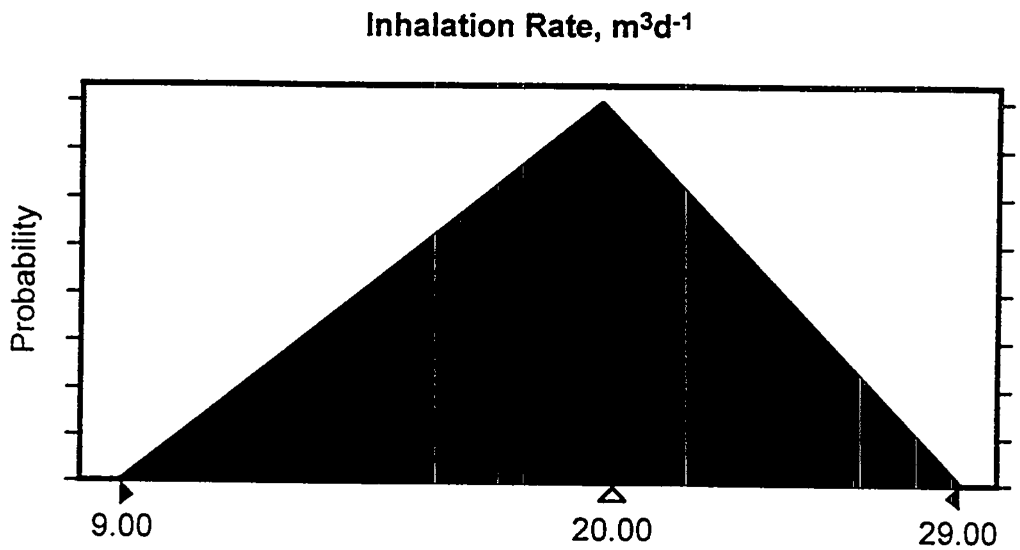
3.5 Estimation of Chemical and Radiation Doses and Associated Uncertainties

In this assessment, dose estimates are determined using the predicted contaminant concentrations in air and soil as described in Section 3.3 and the exposure model described in Section 3.4. However, since some uncertainty is associated with the predicted air and soil concentrations and parameters of the exposure model, the determination cannot be carried out by simple arithmetic. Several techniques are available for propagating uncertainties. A technique called Monte Carlo simulation, which is most frequently used in this assessment to propagate uncertainties, is briefly described in this section. A more detailed description of Monte Carlo simulation is provided in Appendix K.

A simple equation like the one shown below can be used to illustrate how Monte Carlo simulation may be used to propagate uncertainties in the input parameters of the equation.

$$A = B \times C$$

When the exact values of parameters B and C are known, A can be calculated by simply multiplying B by C. This is also known as a point estimate or deterministic calculation, because it produces a single value of A. However, when there are uncertainties associated with parameters B and C, A cannot be determined by multiplying B by C. Figure 3-14 shows how Monte Carlo simulation can be used to propagate the uncertainties in B and C



LEGEND

▶ Upper or Lower Bound

△ Best Estimate

m^3 Cubic Meters

ChemRisk
A Division of McLaren/Hart

FIGURE 3-13
PROBABILITY DISTRIBUTION
ASSIGNED TO INHALATION RATE

RkyF894H/3-13 Rev 09-12-94

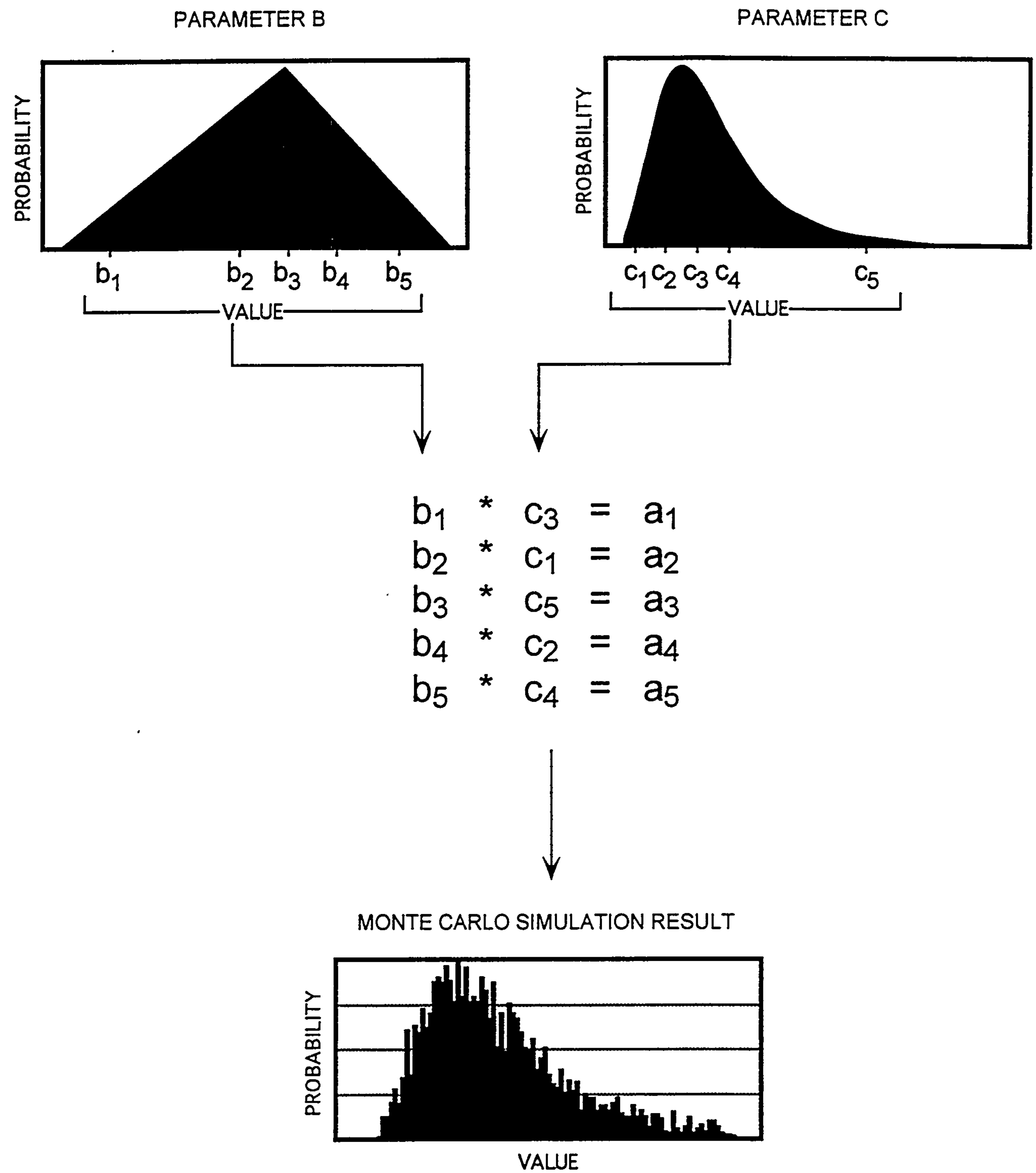


FIGURE 3-14
SCHEMATIC REPRESENTATION
OF MONTE CARLO SIMULATION

through the equation and produce a probability distribution of A. The process can be divided into three steps. First, many values of each parameter are selected according to the probability distribution of the parameter.

Second, the selected values of parameter B are randomly paired with the selected values of parameter C. Lastly, the paired values are multiplied together consistent with the equation to produce an estimate of A. For example, if 500 pairs of parameter B and C are selected, Monte Carlo simulation would produce 500 estimates of A. These estimates can be arranged numerically to provide a probability distribution of A as shown in Figure 3-14.

3.6 Dose Estimates Associated with Airborne Releases

The dose estimates associated with airborne releases from the Rocky Flats Plant are presented in a series of tables in Appendix L. The dose estimates for routinely released materials are presented first, followed by the dose estimates for materials released from the 903 Pad and the 1957 and 1969 fires. As discussed in the preceding sections, there are uncertainties associated with the predicted air and soil concentrations and the parameters of the exposure model. These uncertainties were propagated through the exposure equations to provide an estimate of the uncertainty in the final dose estimates. The process results in a distribution of dose estimates that can be characterized by the geometric mean (GM) and the geometric standard deviation (GSD) of the distribution. For the purposes of this analysis, the best estimate of dose is represented by the GM. The uncertainty in the best estimate is dependent on the GSD, and can be represented by lower and upper bounds. These bounds describe our level of confidence that the true but unknown value is within the described range. The 95 percent confidence interval about the best estimate (*i.e.*, we are 95 percent confident that the true but unknown dose estimate falls within this interval) is equal to the best estimate multiplied the square of the GSD, *i.e.*, GM $\times$ GSD^2 (upper bound), and the best estimate divided by the square of the GSD, *i.e.*, GM $\div$ GSD^2 (lower bound).

As discussed in Section 2.2, the radiation doses presented in this analysis are expressed in terms of effective dose. This represents the overall health impact of radiation on the human body and is based on certain assumptions regarding doses to specific organs and their potential health consequences (see Appendix A). Radiation dose can also be calculated for individual organs (*i.e.*, equivalent dose). Organ-specific doses can be significantly different from whole body doses for certain radionuclides that target a particular organ in the body, *e.g.*, radioiodine and the thyroid. In other cases, a radionuclide does not target one specific organ, and radiation doses to different organs are reflected in a weighted fashion in the effective dose. A discussion of the relationship between equivalent doses to 21 organs from inhalation and ingestion of plutonium-239 and associated effective doses is provided in Appendix M. Equivalent doses for specific organs are generally no more than a factor of ten greater than the effective dose, and the equivalent doses for the remaining organs are generally equal to or less than the effective dose. This relative similarity between equivalent doses and the effective dose is also observed for the other radionuclides evaluated in this report.

The dose assessment results presented in Appendix L describe the range of estimated chemical and radiation doses received by the exposed individual described in Section 2.3 through as many as 10 pathways at up to 25 locations as a result of airborne releases of 12 contaminants over part or all of the 37-year operational history of the plant. There are many ways to summarize or evaluate this vast quantity of information. The following sections suggest several ways to interpret and understand the results.

3.6.1 Interpretation of Results

One approach to understanding a large volume of data is to graphically compare or summarize the data such that literally thousands of numbers are condensed into a more digestible form. The following interpretations of the Phase I results depend on comparisons of the estimated dose associated with one pathway or contaminant with another dose for the same contaminant or any other contaminant. Since a unifying system has been developed for quantifying doses of radionuclides, radiation doses can be summed across routes of exposure and contaminants. The same cannot be said for the chemical doses presented in this report. As discussed in Section 2.1, chemical dose is expressed in terms of the amount of contaminant taken up by an individual over a period of time. Unfortunately, the chemical dose associated with one pathway cannot generally be summed with the chemical dose for another pathway, since a chemical may be more or less toxic through a particular route of exposure. Similarly, the chemical dose associated with one contaminant cannot be summed with the chemical dose for another contaminant, because one chemical may be more or less toxic than another. As a result, the magnitude of a chemical dose for a particular pathway or a particular contaminant may not be proportional to the potential health hazard it poses. Because of this limitation, the chemical doses presented in the tables in Appendix L cannot be further summarized until some measure of toxicity is taken into account. With the exception of some illustrations of risk or health hazards presented later in the report, further interpretation of the chemical doses is beyond the scope of these Phase I studies and the interpretation of these doses will be addressed in detail as part of Phase II of the health studies.

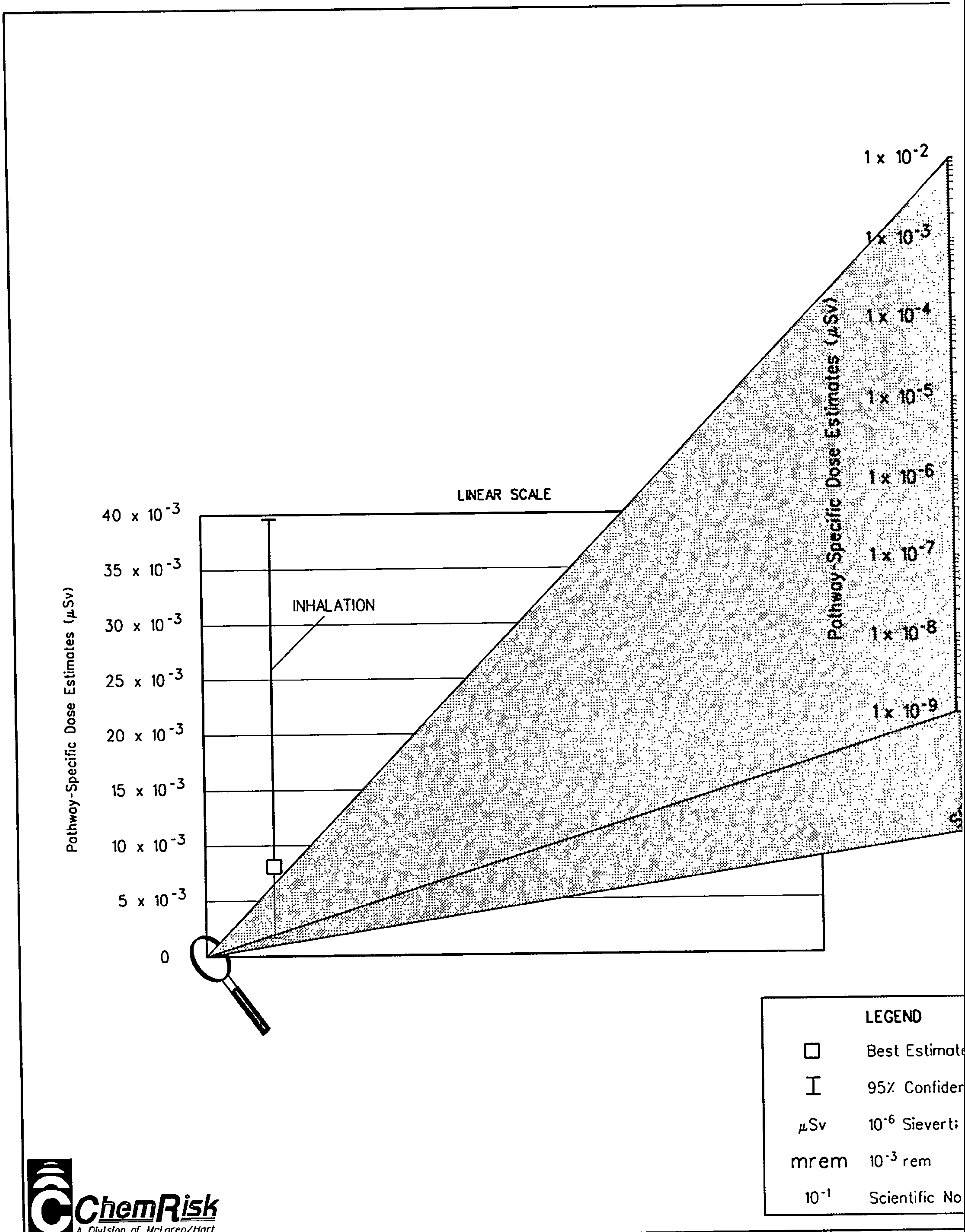
3.6.1.1 Relative Importance of Exposure Pathways

One potentially important question that can be answered by the Phase I results is the relative importance of the various exposure pathways identified for radionuclides. While 10 pathways were identified in the Task 6 report as being complete for the radionuclides, in many cases only one or two exposure pathways are the dominant contributors to the total dose received. Figure 3-15 represents the dose estimates associated with the routine release of plutonium-239/240 in 1960 for the centroid of Sector 12. This sector is located southeast of the plant, the primary downwind direction, and corresponds to an area where a considerable number of people could have been exposed.

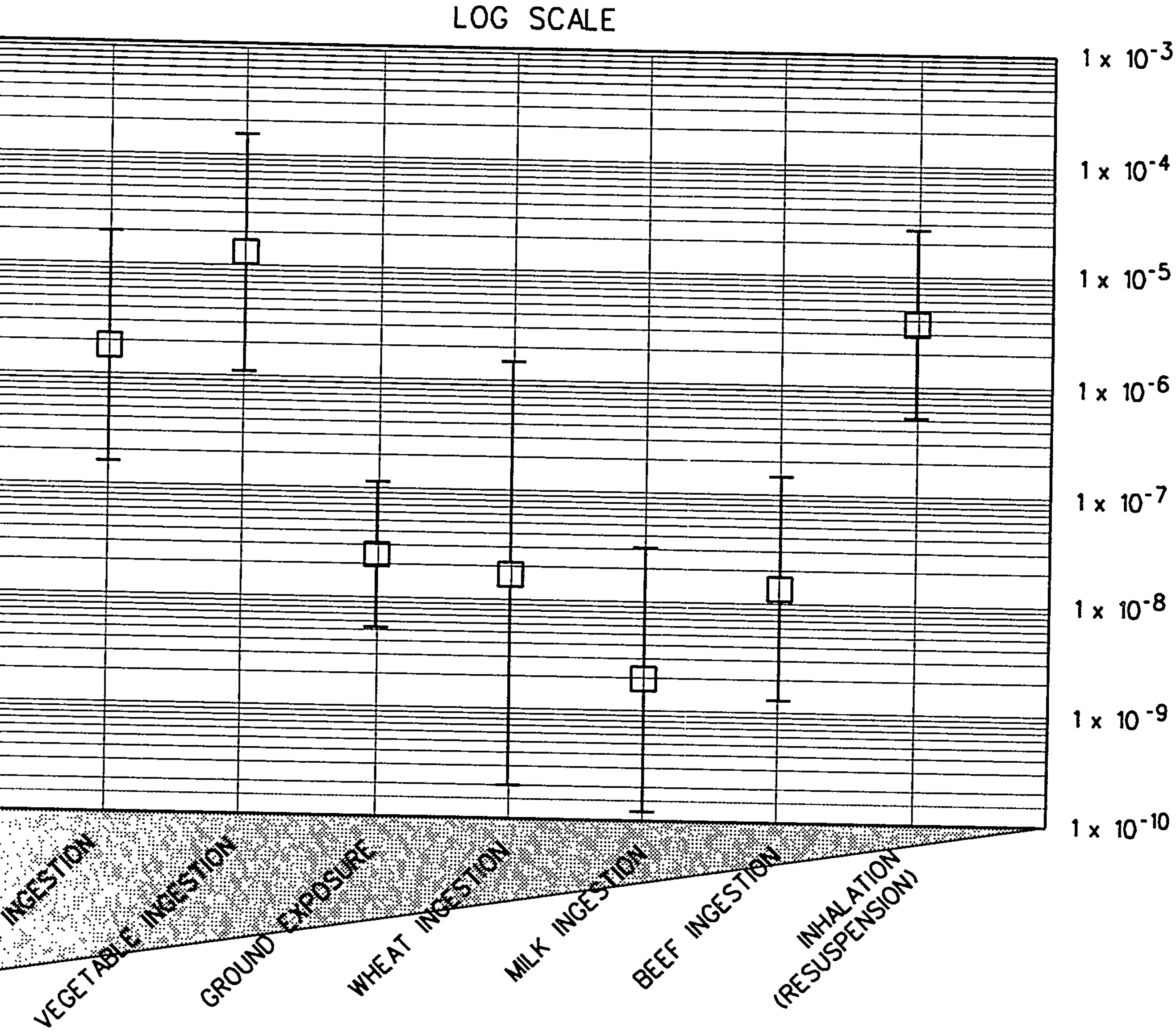
Since the predicted dose estimates span several orders of magnitude (an order of magnitude is the same as a factor of 10), the data are presented in two ways. The graph on the left-hand side of Figure 3-15 shows the pathway-specific doses in what is referred to as linear scale, while the graph on the right-hand side of the figure shows some of the pathway-specific doses in what is referred to as logarithmic (or log) scale. The numbers on the y-axis (vertical axis) are expressed in terms of scientific notation, a system in which a number is expressed as a product of a number and the appropriate power of 10. For example, 1×10^{-1} is the same as one-tenth (0.1), 1×10^{-2} is the same as one-hundredth (0.01), and so on. Scientific notation allows us to present very small or very large numbers in a neat and concise way (*e.g.*, 1×10^{-10} vs. 0.0000000001 or 1×10^{10} vs. 10,000,000,000). The primary unit of radiation dose used in this assessment is the sievert (see Section 2.2). The radiation doses presented in this and subsequent figures are expressed as microsieverts (μSv); 1 μSv is the same as 1×10^{-6} Sv. Until recently, radiation doses were most commonly expressed in terms of millirem (mrem). 1 μSv is the same as 0.1 mrem.

Beginning with the left-hand graph, the best estimate of the inhalation dose is approximately 8.1×10^{-3} μSv, which is the same as 0.0084 μSv, and the lower and upper bounds are approximately 1.7×10^{-3} (0.0017) μSv and 39×10^{-3} (0.039) μSv, respectively. The dose estimates for the remaining pathways are so small in comparison to those for inhalation that they appear to be equal to zero on the linear scale. Although this graph is sufficient to demonstrate that the inhalation pathway clearly dominates over the doses for the other pathways, it does not provide any information as to how much lower the other dose estimates are in comparison to inhalation.

The log-scale graph on the right-hand side of Figure 3-15 represents a "blow-up" of the doses for all of the pathways except inhalation. Log scale allow us to show data that span several orders of magnitude on the same graph. As can be seen in this portion of the figure, the next largest pathway is vegetable ingestion. By comparing the data presented on both sides



Rky794H/3-15.dgn; Rev: 09-12-94



Interval About The Best Estimate

v - 0.1 mrem

n; 10^{-1} - 0.1 or 1/10; 10^{-1} - 0.01 or 1/100; etc.

FIGURE 3-15
LINEAR/LOG SCALE ILLUSTRATION OF PATHWAY-SPECIFIC DOSES ASSOCIATED WITH ROUTINE AIRBORNE RELEASE OF PLUTONIUM-239/240-SECTOR 12 (1960)

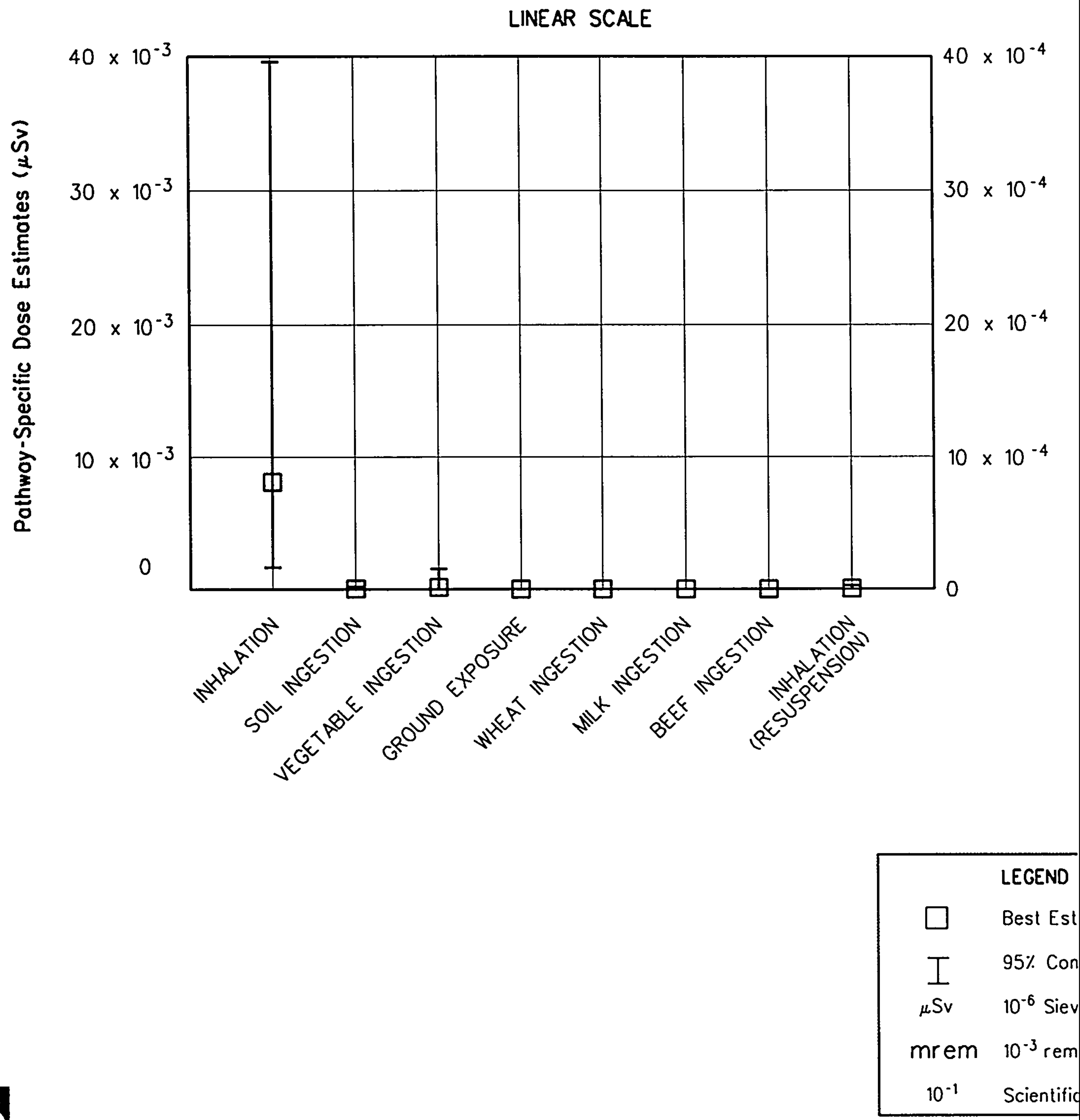
of the figure, we can see that the best estimate of vegetable ingestion dose is approximately 1.3×10^{-4} (0.00013) μSv or a factor of 62 lower than the best estimate of inhalation dose.

Figure 3-16 presents the same information shown in Figure 3-15, but in a slightly different format. In this figure, the pathway-specific doses are again presented in both linear and log scales; however, the log scale is not shown as a "blow-up" from the linear scale, but as an entirely separate graph. Another difference is that the estimate of inhalation dose is presented in both scales. This presentation format makes it a little bit easier to compare the dominant pathway to the other pathways, so this format is used in all subsequent figures presenting this type of information. Regardless of the format, both of these figures clearly indicate that the inhalation pathway dominates the total dose from the routine release of plutonium-239/240 during 1960. Inhalation contributes over 95 percent of the total dose to an individual in Sector 12 during 1960. It is important to keep in mind, however, that the relative importance of exposure pathways can change over time.

Figure 3-17 presents the dose estimates for the same sector for routine plutonium-239/240 releases during 1970 and 1980. By comparing the graphs presented in Figures 3-16 and 3-17, one can see that the relative importance of the soil-related pathways is increasing while the relative importance of the inhalation pathway is decreasing between 1960 and 1980. For example, as stated previously, the inhalation dose in 1960 was approximately 62 times higher than the next highest dose for vegetable ingestion. For 1970, inhalation dose in Sector 12 is approximately 29 times higher than the next highest pathway, that for inhalation of resuspended soil particles. By 1980, the inhalation dose (approximately 9.2×10^{-5} μSv) is less than 13 percent higher than the next highest dose (approximately 8.2×10^{-5} μSv for inhalation of resuspended soil particulates). This change in relative importance is due to the fact that the airborne release of plutonium-239/240 decreased dramatically over time and we have assumed that the removal of contaminants from soil is so low (*i.e.*, assumed no loss from soil) that the concentration of plutonium-239/240 in soil continued to increase over time as a result of deposition.

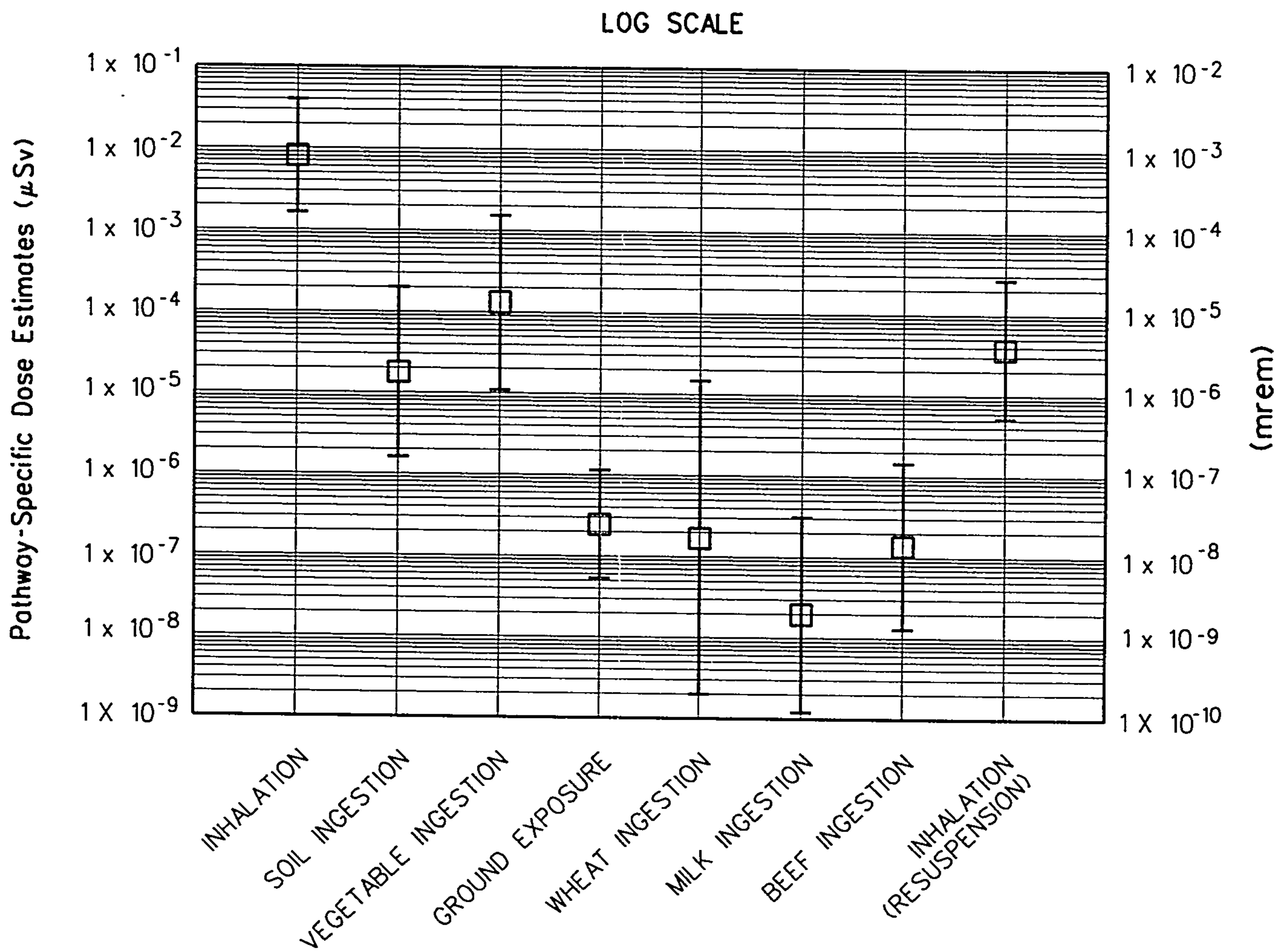
Just as the relative importance of exposure pathways can change over time for a single material, the relative importance of particular pathways may differ between contaminants. Figure 3-18 presents the pathway-specific dose estimates associated with the routine release of plutonium-239/240 and enriched uranium in 1960 for the centroid of Sector 12. As can be seen in the figure, the only significant pathway for both materials is inhalation; however, the relative magnitude of the remaining pathways differ. Looking at the log scale portion of the figure, vegetable ingestion is the next largest contributor to dose for plutonium-239/240 followed closely by inhalation of resuspended soil particulates. Both of these pathways are approximately 2 orders of magnitude lower than inhalation.

This page intentionally left blank.



ChemRisk
A Division of McLaren/Hart

Rky794H/3-16.dgn; Rev: 09-12-94



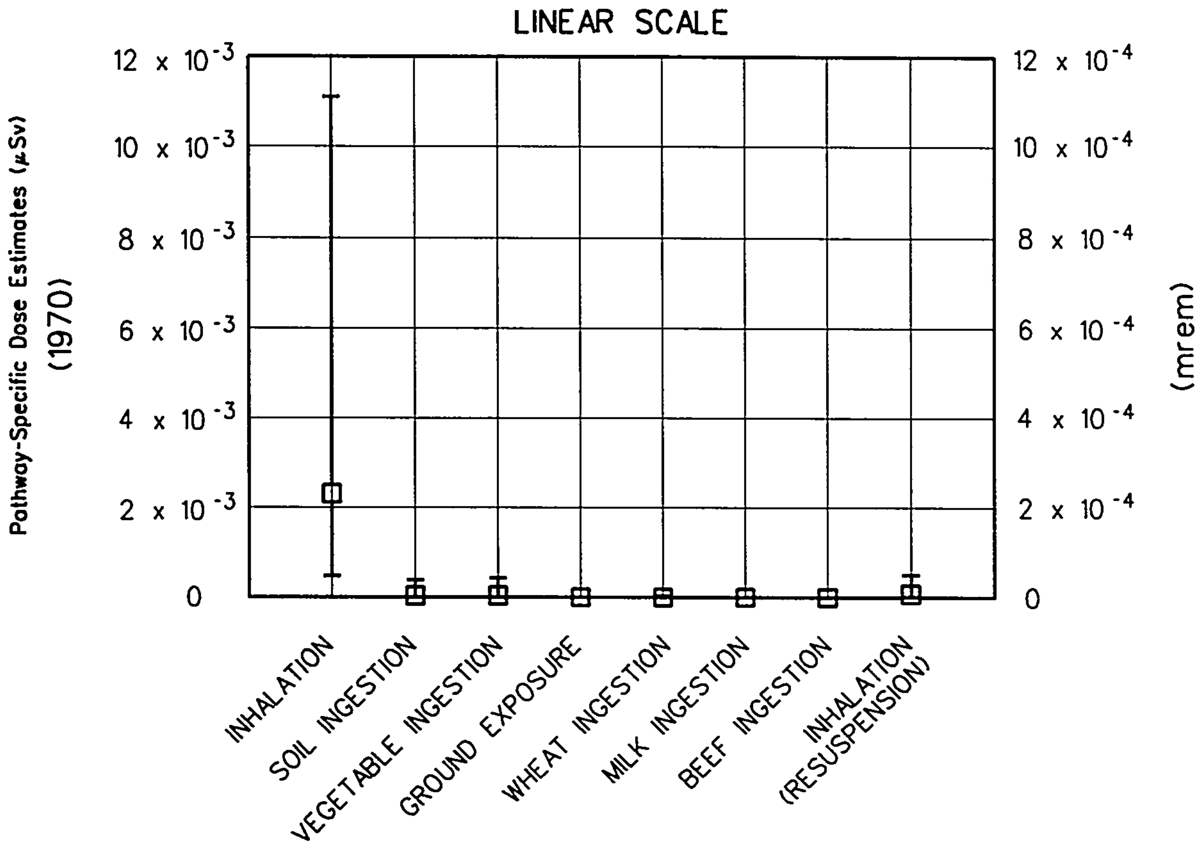
ate

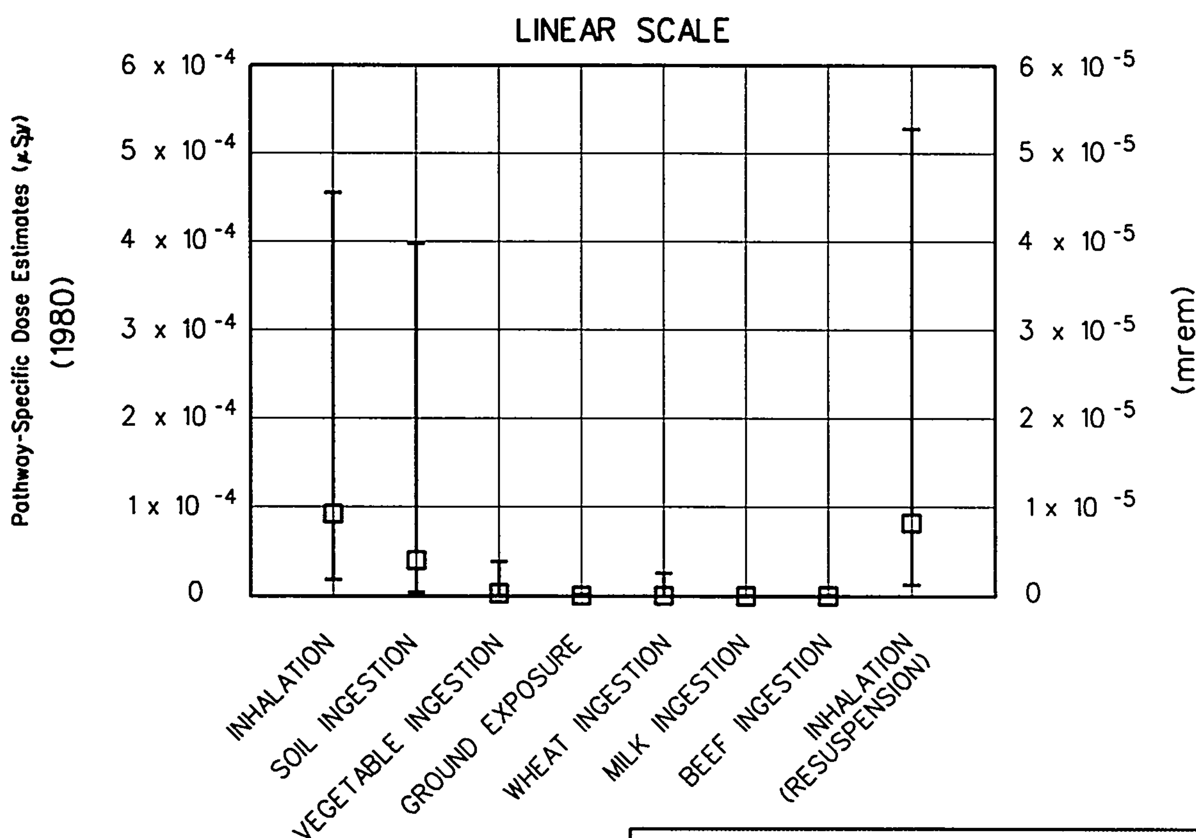
ence Interval About The Best Estimate

; 1μSv = 0.1 mrem

otation; 10^{-1} = 0.1 or 1/10; 10^{-1} = 0.01 or 1/100; etc.

FIGURE 3-16
PATHWAY-SPECIFIC DOSES ASSOCIATED WITH ROUTINE AIRBORNE RELEASE OF PLUTONIUM-239/240-SECTOR 12 (1960)





LEGEND

□ Best Estimate

I 95% Confidence Interval About The Best Estimate

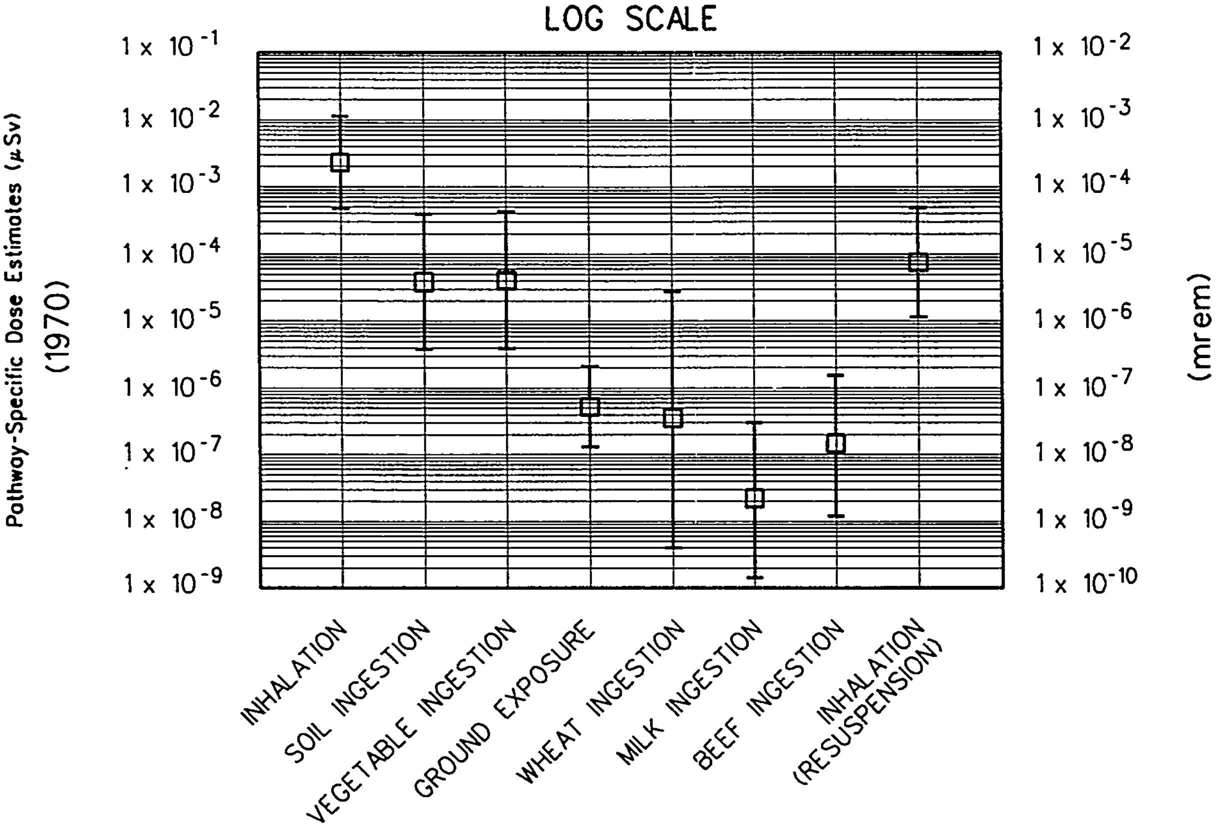
μSv 10

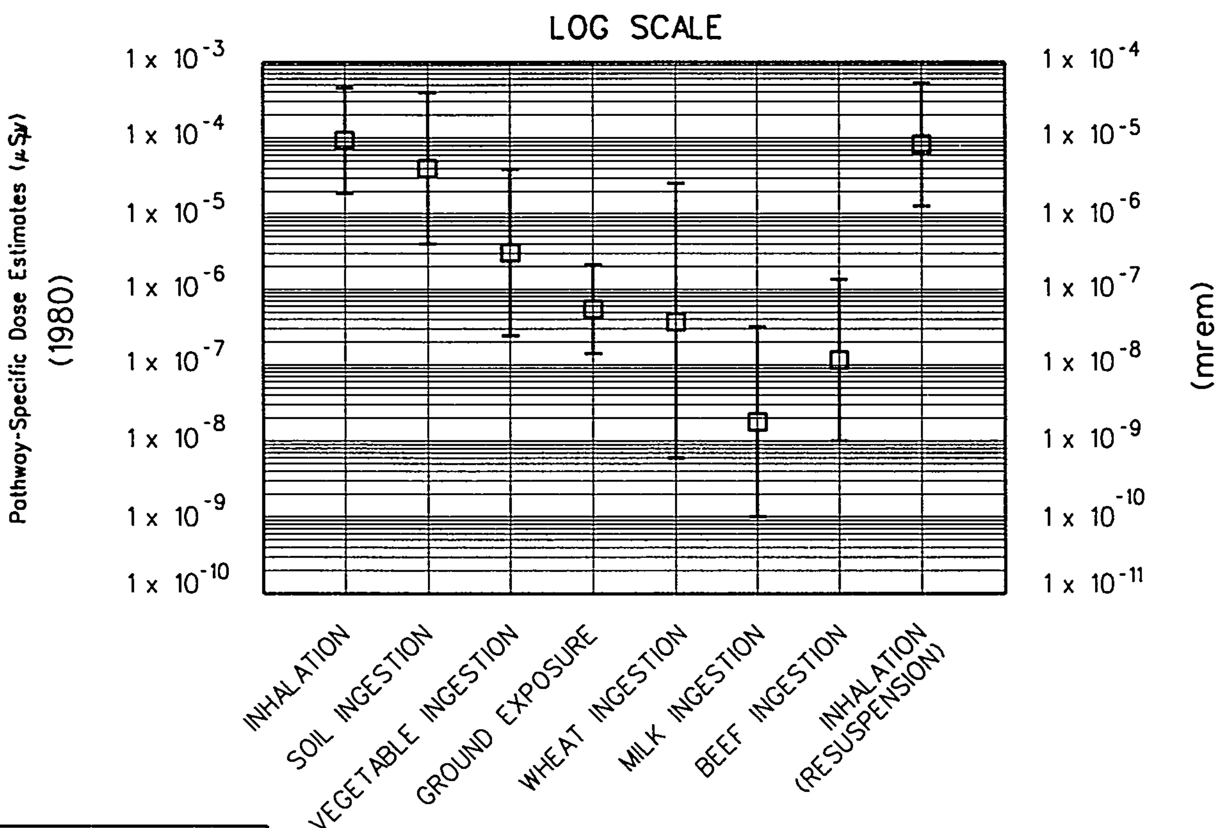
mrem 10

10^{-1} Sc 1/

ChemRisk
A Division of McLaren/Hart

Rky794H/3-17.dgn; Rev: 09-13-94



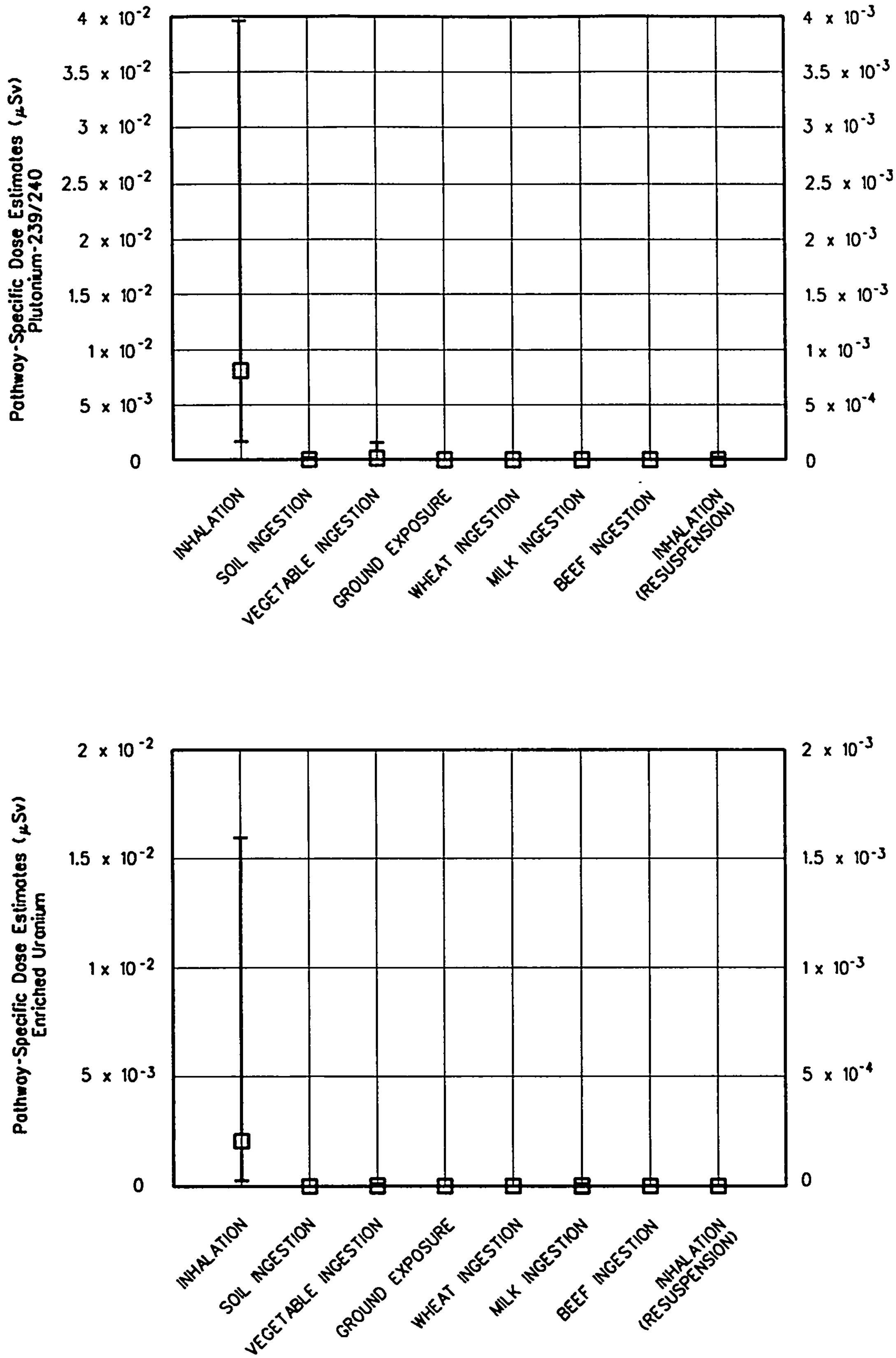


Sievert; 1μSv - 0.1 mrem

rem

ntific Notation; 10^{-1} - 0.1 or
; 10^{-1} - 0.01 or 1/100; etc.

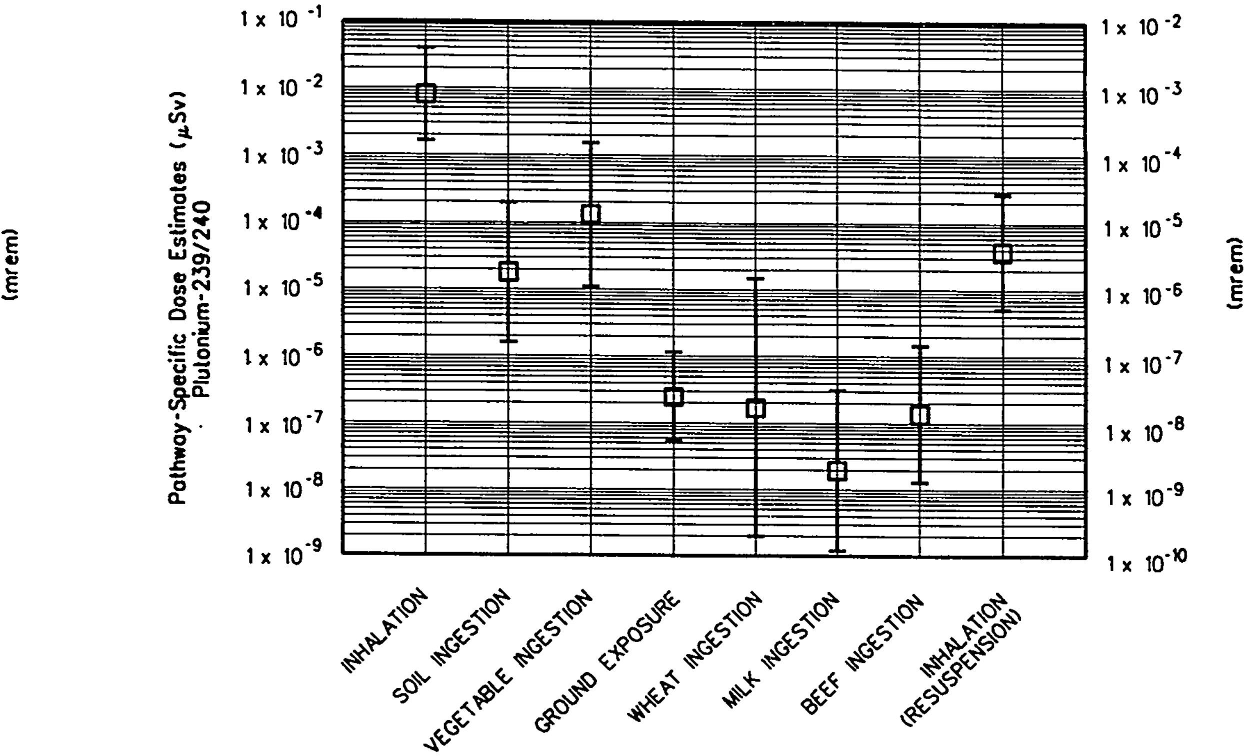
FIGURE 3-17
PATHWAY-SPECIFIC DOSES ASSOCIATED WITH
ROUTINE AIRBORNE RELEASE OF
PLUTONIUM-239/240-SECTOR 12 (1970 AND 1980)

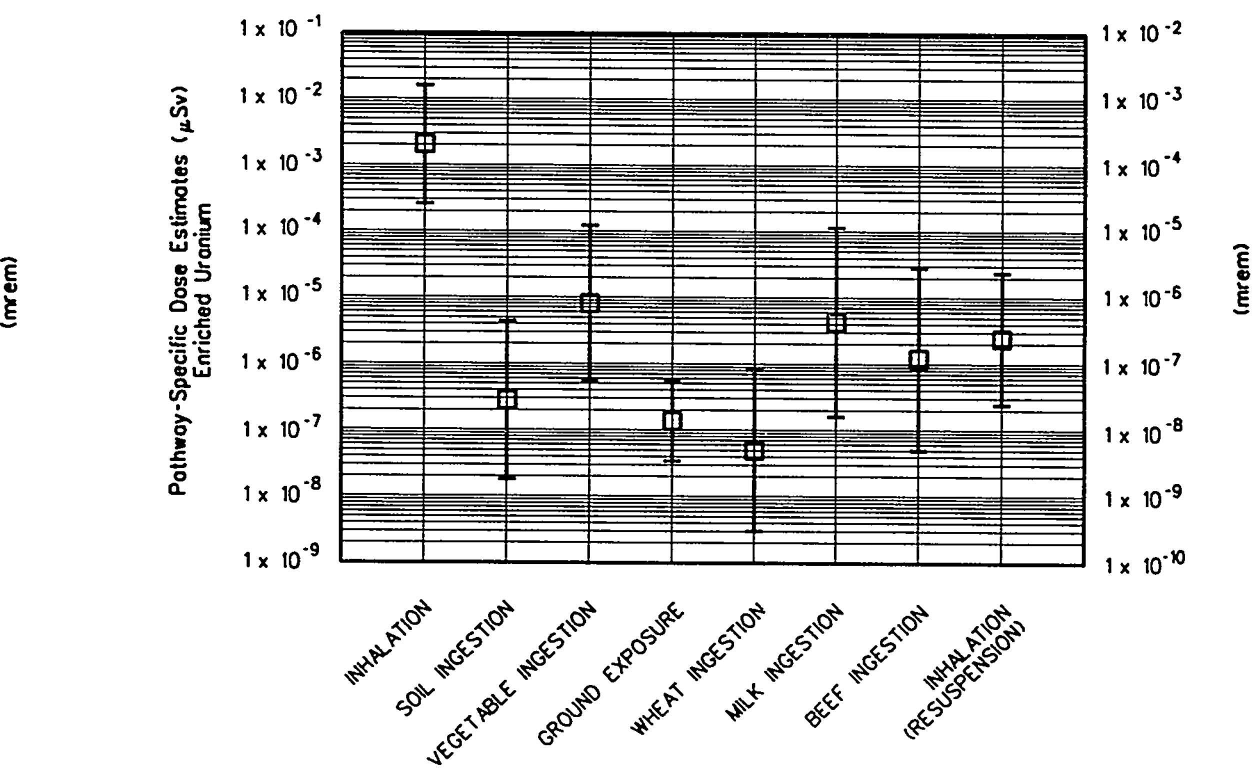


LEGEND		µSv
□	Best Estimate	mrem
I	95% Confidence Interval About The Best Estimate	10^{-1}

ChemRisk
A Division of McLaren/Hart

Rky794H/3-18.dgn; Rev: 09-21-94





^{6} Sievert; 1μSv = 0.1 mrem

^{3} rem

entific Notation; 10^{-1} = 0.1 or
0; 10^{-2} = 0.01 or 1/100; etc.

FIGURE 3-18
PATHWAY-SPECIFIC DOSES ASSOCIATED WITH
ROUTINE AIRBORNE RELEASE OF
PLUTONIUM-239/240
AND ENRICHED URANIUM - SECTOR 12 (1960)

For enriched uranium, vegetable ingestion is the next largest contributor to dose and is approximately 2 orders of magnitude lower than inhalation, followed by milk ingestion, which is about a factor of 2 lower than vegetable ingestion.

3.6.1.2 Magnitude of Doses Relative to Proximity to the Rocky Flats Plant

The above comparisons were based on dose estimates for a particular location. Another question that can be addressed by the Phase I results is how the magnitude of the dose estimates differs at different locations and distances from Rocky Flats. Figure 3-19 presents total dose estimates through all pathways associated with the release of plutonium-239/240 from the 903 Pad over 1965–1969 for all 22 subsectors and the 3 remote locations. Doses are reported in terms of the best estimate of the dose, in microsieverts (μSv), with the 95 percent confidence interval about the best estimate in parentheses. As can be seen in the figure, the dose estimates decrease with increasing distance from the site. For example, the best estimate of dose for one of the innermost sectors, Sector 4B, is 72 μSv. Moving away from the plant in an east-southeasterly direction, the best estimate of dose for Sector 8B is 24 μSv, and, still further away from the plant, the best estimate of dose for Sector 12B is 9.1 μSv. Also, for a given distance, the dose estimates are highest east-southeast of the plant, which is the primary downwind direction.

3.6.1.3 Relative Importance of Materials or Events

Just as one or two pathways may be dominant over other pathways, the dose associated with one or more contaminants or events may be the dominant contributors to the total dose received from all contaminants and events combined. Figure 3-20 presents the highest dose estimates for a particular year (routine releases) or period (accidents) for the southeast quadrant (*i.e.,* Sector 12 for routine releases, Sector 12B for 903 Pad and the east trending plumes for the 1957 and 1969 fires). As can be seen in the figure, releases of plutonium-239/240 and americium-241 from the 903 Pad and from the 1957 fire appear to dominate over the routine releases and the 1969 fire in this quadrant. Since releases from the 903 Pad and the 1957 fire traveled primarily southeast from the plant, this relationship will not necessarily be the same for the other three quadrants.

If the 37 annual radiation doses associated with the routine releases are summed, comparisons can be made to assess the potential relative contributions of individual radionuclides and/or release events to the total dose a person present throughout the entire period of plant operations could have received. Figure 3-21 presents the total doses for each of the routinely released radionuclides and for the three accidents for the same locations described previously for Figure 3-20.

This page intentionally left blank.

DENVER
(15 MILES SOUTHEAST
OF THE PLANT)

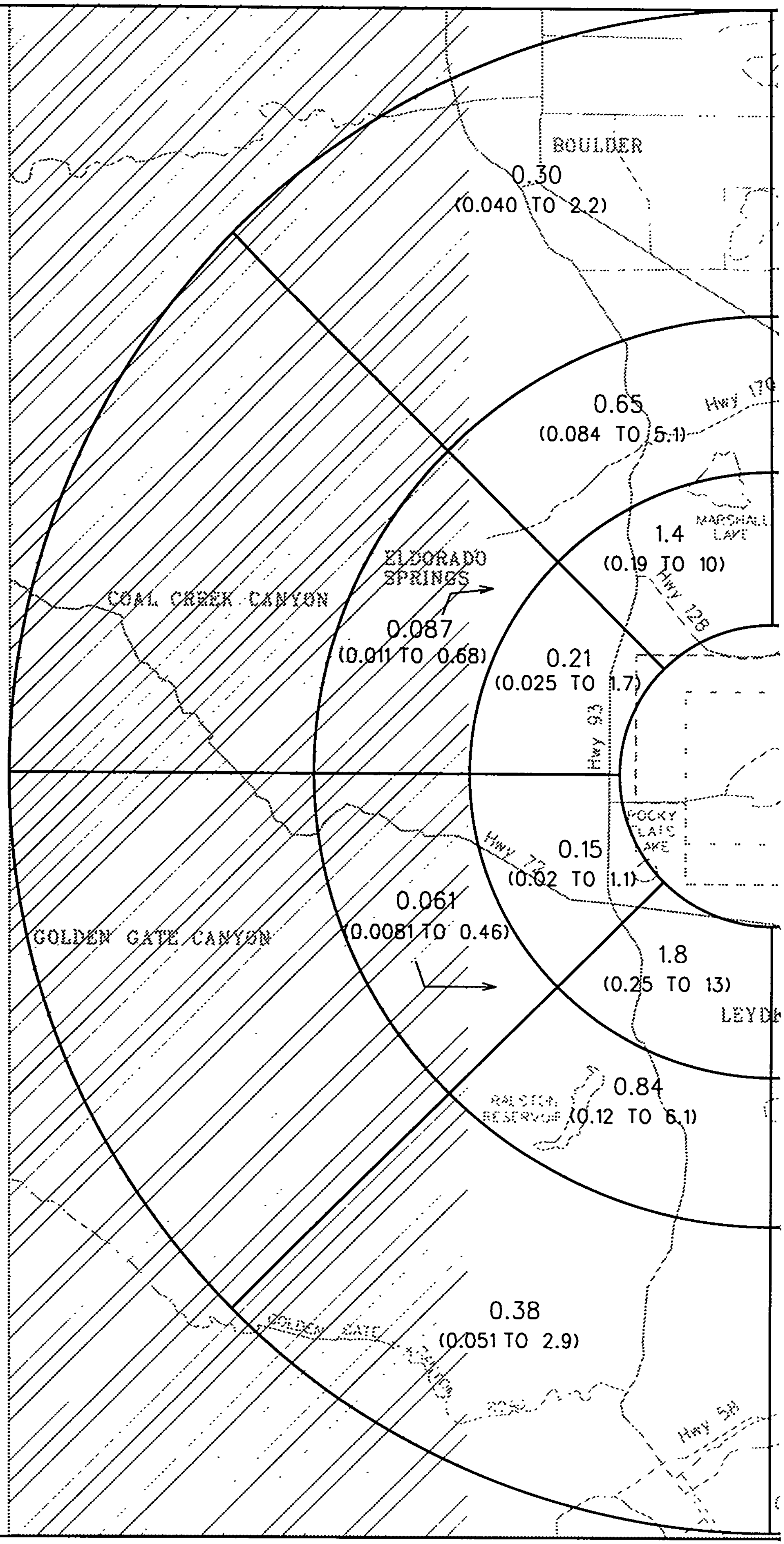
0.78
(0.10 TO 5.8)

LAKEWOOD
(12 MILES SOUTH-SOUTHEAST
OF THE PLANT)

0.34
(0.044 TO 2.6)

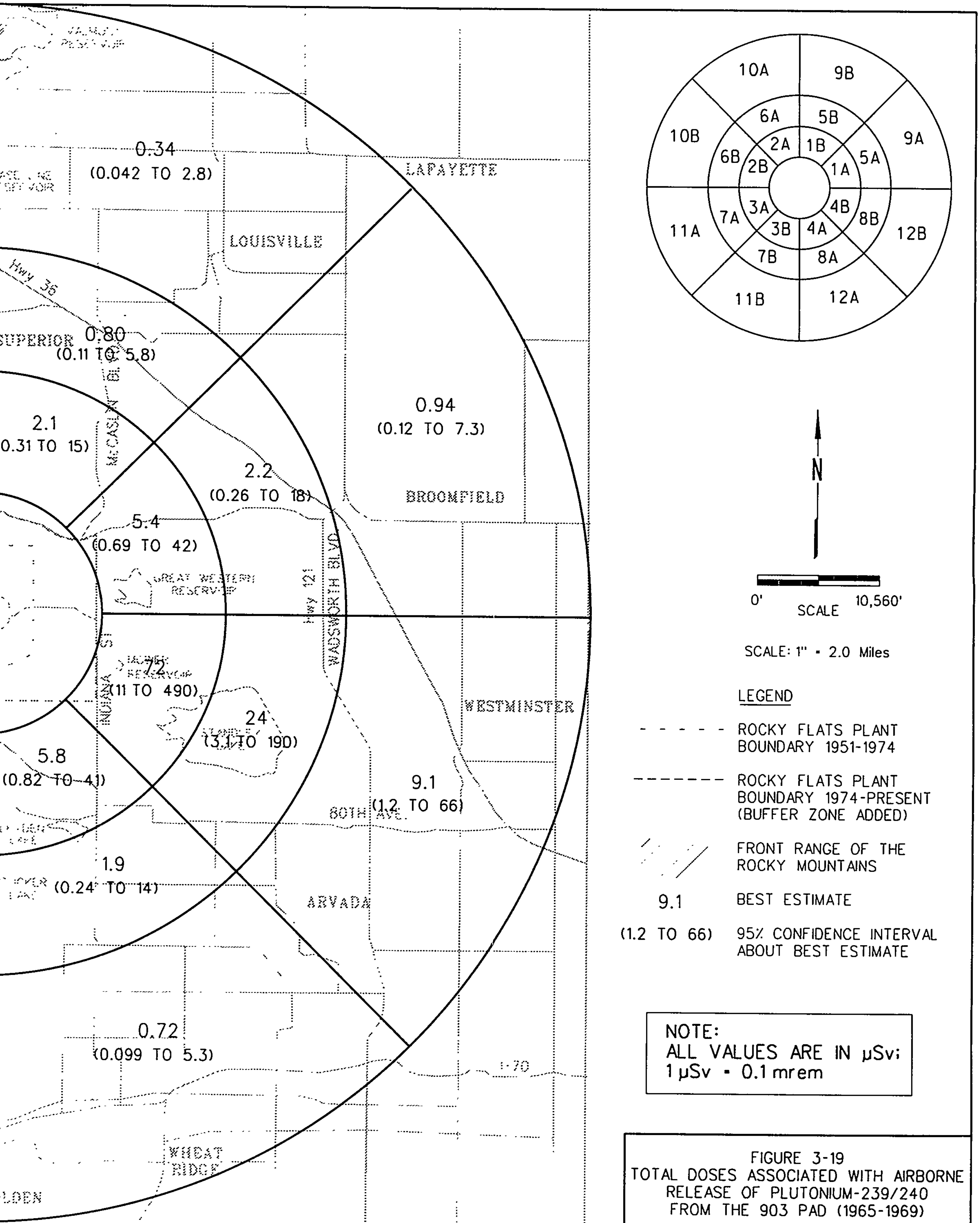
LONGMONT
(20 MILES NORTH
OF THE PLANT)

0.075
(0.010 TO 0.55)



ChemRisk
A Division of McLaren/Hart

RkyF794H/3-19.dgn; Rev: 07-28-94



SCALE: 1" = 2.0 Miles

LEGEND

- - - - - ROCKY FLATS PLANT BOUNDARY 1951-1974

------- ROCKY FLATS PLANT BOUNDARY 1974-PRESENT (BUFFER ZONE ADDED)

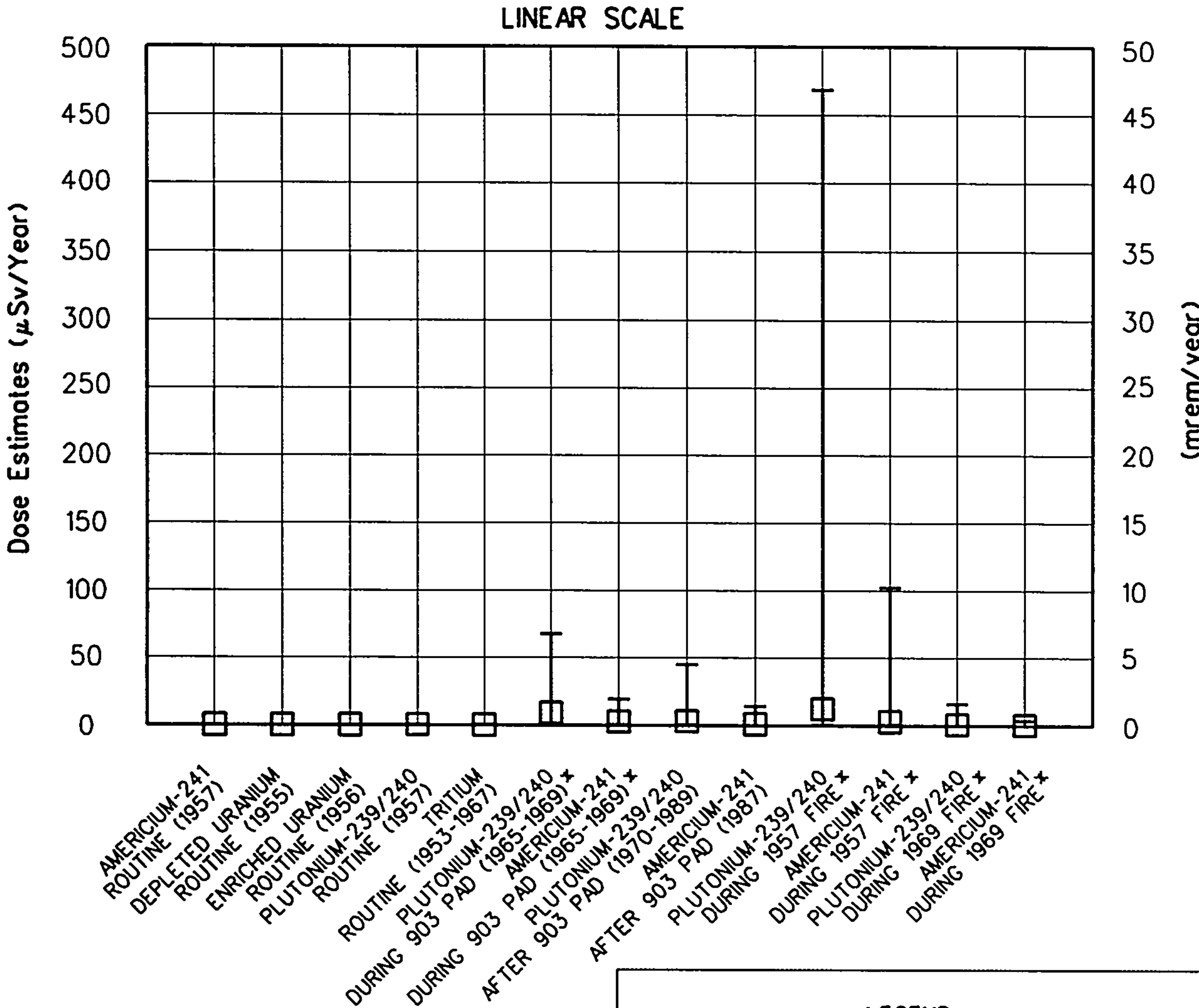
FRONT RANGE OF THE ROCKY MOUNTAINS

9.1 BEST ESTIMATE

(1.2 TO 66) 95% CONFIDENCE INTERVAL ABOUT BEST ESTIMATE

NOTE:
ALL VALUES ARE IN μSv;
1 μSv = 0.1 mrem

FIGURE 3-19
TOTAL DOSES ASSOCIATED WITH AIRBORNE RELEASE OF PLUTONIUM-239/240 FROM THE 903 PAD (1965-1969)



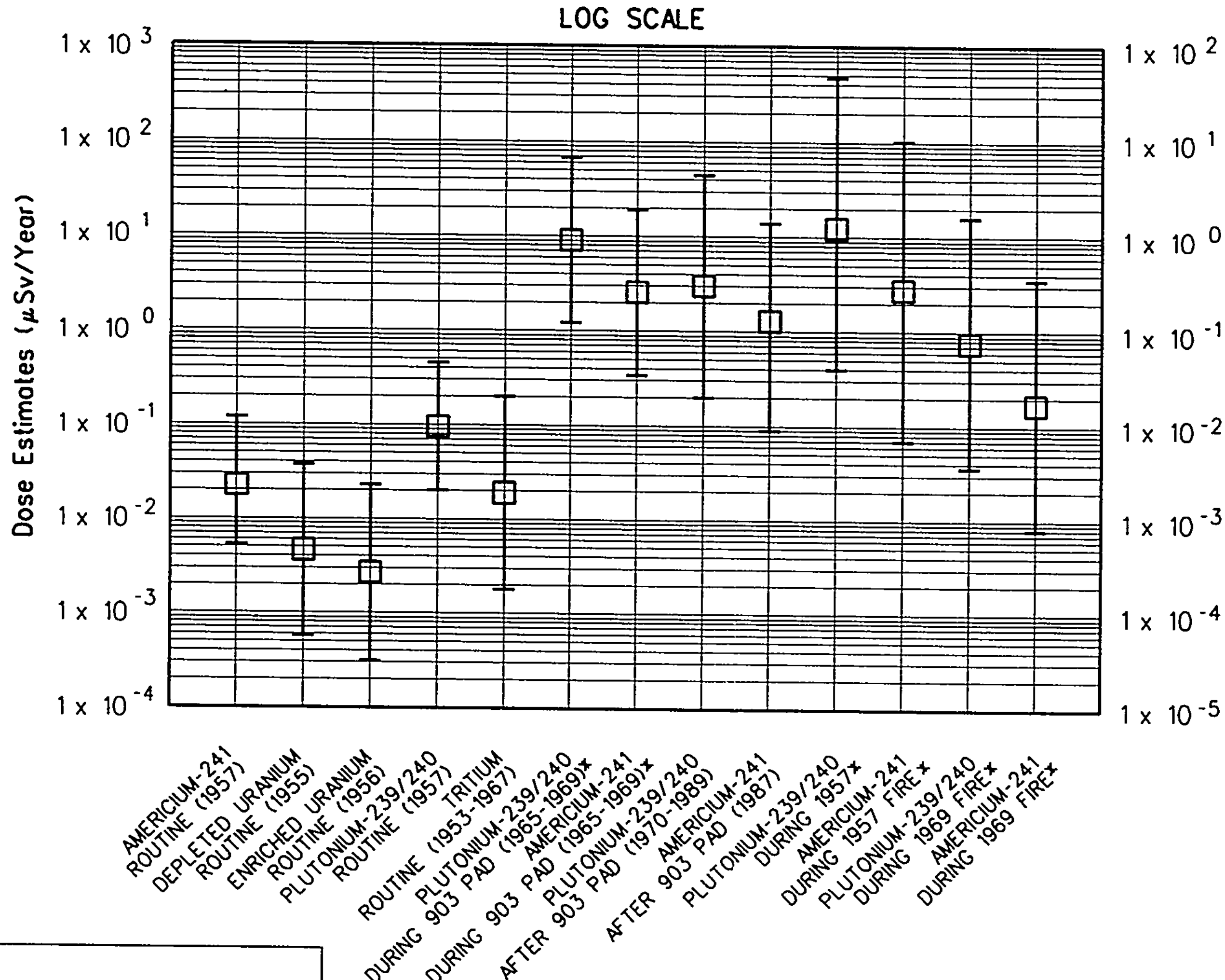
LEGEND

□	Best Estimate
I	95% Confidence Interval About Th
μSv	10^{-6} Sievert; 1μSv = 0.1 mrem
mrem	10^{-3} rem
10^{-1}	Scientific Notation; 10^{-1} = 0.1 or 1
*	μSv/event

Exposure Location: Sector 12 (Routine); Sector 12B Plume A-8 miles (1957 Fire); Plu

ChemRisk
A Division of McLaren/Hart

Rky794H/3-20.dgn; Rev: 09-13-94

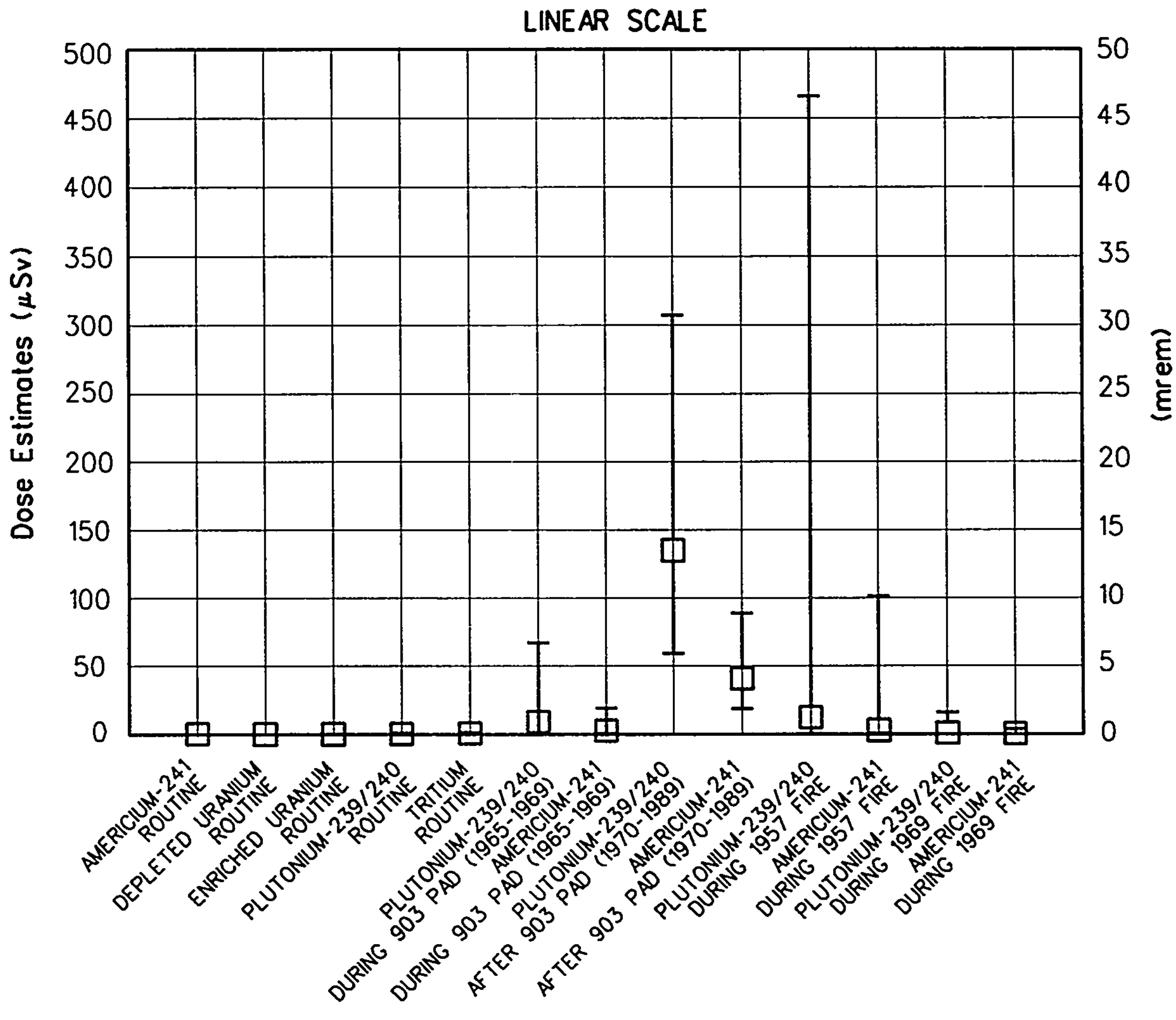


Best Estimate

0; 10^{-1} = 0.01 or 1/100; etc.

03) Pad;
C-8 miles (1969 Fire)

FIGURE 3-20
HIGHEST DOSES (SINGLE YEAR OR EVENT) ASSOCIATED WITH AIRBORNE RELEASE OF RADIONUCLIDES FROM THE ROCKY FLATS PLANT

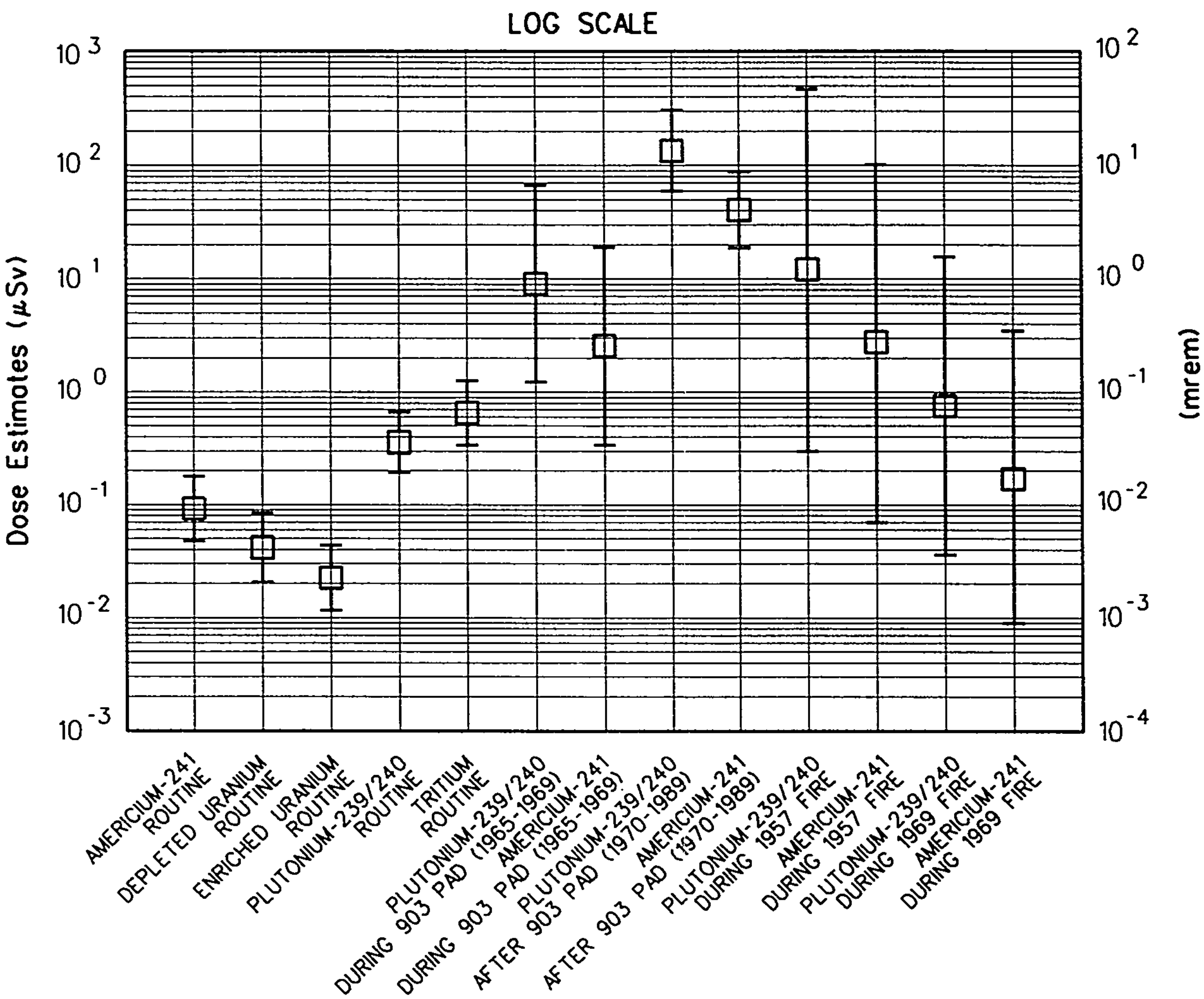


LEGEND

□	Best Estim
I	95% Confid
μSv	10^{-6} Siever
mrem	10^{-3} rem
10^{-1}	Scientific I
Exposure Location:	Sector 12 Plume A-8

ChemRisk
A Division of McLaren/Hart

Rky794H/3-21.dgn, Rev: 01-03-95



e

nce Interval About The Best Estimate

1μSv • 0.1 mrem

tation; 10^{-1} • 0.1 or 1/10; 10^{-1} • 0.01 or 1/100; etc.

Routine); Sector 12B (903 Pad);
miles (1957 Fire); Plume C-8 miles (1969 Fire)

FIGURE 3-21
TOTAL DOSES ASSOCIATED WITH AIRBORNE
RELEASE OF RADIONUCLIDES FROM
THE ROCKY FLATS PLANT (1953-1989)

Based on the results provided here, airborne release of plutonium-239/240 of 903 Pad origin during the period of 1970 to 1989 represents the largest contributor to the total dose that an individual living southeast of Rocky Flats during its entire operational history might have received. Other major contributors to the total dose are americium-241 of 903 Pad origin during the same period, plutonium-239/240 released during the 1957 fire, and plutonium-239/240 released directly from the 903 Pad between 1965 and 1969.

This page intentionally left blank.

4.0 SURFACE WATERBORNE RELEASES

Past plant operations resulted in the release of contaminants into plant holding ponds and creeks that feed into off-site reservoirs and could have resulted in off-site exposures through surface water. A detailed review of the history of the surface waters surrounding Rocky Flats has been provided in the Task 5 report and is only briefly summarized below.

As discussed in the Task 5 report, available effluent data on surface waterborne releases from Rocky Flats were insufficient to develop direct estimate of release (ChemRisk, 1994c). In addition, the metals of concern have extremely low water solubilities and are likely to be transported with suspended soil particles and sediments rather than being found dissolved in the water. Transport of contaminants on suspended sediments is affected by episodic events such as mechanical disturbances and periods of high flow rate. Modeling of such events requires the knowledge of time and duration of releases, amount of water in the system, and associated flow rates. This type of information is generally not available in sufficient detail to carry out modeling of sediment transport for Rocky Flats. Because of the lack of release data to support modeling and relatively large uncertainties associated with modeling of sediment transport, historical reservoir and drinking water monitoring data collected from cities near Rocky Flats are used to evaluate exposures associated with surface waterborne releases.

The detailed evaluation of surface water contamination in the Task 5 report involved analysis of raw water monitoring data for Great Western Reservoir and Standley Lake and drinking water monitoring data for the cities of Broomfield and Westminster. As discussed in the Task 5 report, tritium concentrations in Broomfield drinking water were above background levels as a result of documented release events. In single-year fluctuations, the elevation of tritium concentration as measured by beta activity was as much as 8,100 pCi L^{-1} (in 1973) and 5,000 pCi L^{-1} (in 1974). It was also concluded that there were occasional occurrences of elevated gross alpha radioactivity in Broomfield and Westminster drinking water. However, these single-year fluctuations of alpha activity were not inconsistent with levels often found in drinking water supplies unaffected by Rocky Flats releases, and it has not been established that the fluctuations in alpha radioactivity in Broomfield and Westminster drinking water were related to activities at Rocky Flats. Finally, there were insufficient data to make similar comparisons for beryllium.

4.1 Screening Dose Assessment of Surface Waterborne Releases

In order to evaluate the possible importance of annual fluctuations in radioactivity in surface waters, a screening dose assessment is performed. Based on the largest increases in radioactivity in drinking water identified for a few isolated years in the Task 5 and Task 6 reports, radiation doses associated with one-year exposures to contaminated drinking water are calculated.

In this assessment, it is assumed that an adult resided in an area serviced by Great Western Reservoir was exposed to the contaminants in surface water through the drinking water ingestion pathway. Dose received through ingestion of drinking water is determined by the exposure equation and parameters presented in Appendix I and J. For the purpose of this evaluation, it is conservatively assumed that the resident consumed 2 liters of contaminated water a day, 365 days a year. Because of these conservative assumptions, dose estimates calculated in this section are likely to overestimate the actual doses received by the exposed population.

The results of this screening-level evaluation are presented in Table 4-1. Radiation doses associated with one-year exposure to plutonium-239/240 and tritium contaminated drinking water are about 4 μSv. These doses are considerably lower than the highest doses associated with plant releases that are estimated for the areas between 2 and 10 miles southeast of the plant during the 903 Pad or 1957 fire releases.

TABLE 4-1

SCREENING-LEVEL DOSE ESTIMATES ASSOCIATED WITH SURFACE WATERBORNE RELEASES

Contaminant in Drinking Water	Year	Elevation of Radioactivity in Water (pCi L^{-1})	DCF for Ingestion (Sv Bq^{-1})[a]	Estimated Dose (Sv)
Gross alpha activity	1966	1.5	9.7×10^{-7} [b]	3.9×10^{-5}
Plutonium-239/240	1973	0.15	9.7×10^{-7}	3.9×10^{-6}
Tritium	1973	8100	1.6×10^{-11}	3.5×10^{-6}

a DCF = Dose Conversion Factor, obtained from ICRP, 1990.

b The elevated gross alpha activities measured in drinking water samples are assumed to be associated with plutonium-239/240. This is a conservative assumption. Because a lower dose estimate would be calculated if the gross alpha activity is assumed to be either enriched or depleted uranium.

NOTES:

1) pCi = 10^{-12} curie
2) L = liter
3) Sv = Sievert; 1 Sv = 100 rem
4) Bq = Becquerel; 1 curie = 3.7×10^{10} Bq

5.0 ILLUSTRATIVE RISK EVALUATION

The previous sections of this report have presented the methods used to estimate chemical and radiation doses that a person residing near Rocky Flats between 1953 and 1989 could have received as a result of plant operations, including accidents. Radiological Assessments Corporation, the Phase II contractor, will use this and other information that they independently gather to further rigorously investigate the primary sources of contaminant exposure for the public and describe potential health risks associated with these exposures. The purpose of this section is to illustrate how dose estimates, such as those presented in this report, can be used to describe potential health risks. It should be noted that several areas of uncertainty related to estimating potential health risks were beyond the scope of Phase I and have not been taken into account in this illustrative evaluation. As such, the selected examples presented in this report can only be construed as preliminary estimates of potential health risks posed by Rocky Flats.

The methods for estimating risk from chemical and radiation doses are different and are described separately in the following sections.

5.1 Determination of Risks of Cancer and Other Chronic Health Effects from Exposure to Chemicals

In this report, chemical dose is described simply as the amount of contaminant taken into the body (*e.g.*, milligrams or mg). In the field of chemical risk assessment, chemical dose is more commonly presented in terms of an amount of contaminant taken in per unit body weight per unit time (*i.e.*, milligrams per kilogram per day or mg kg^{-1} d^{-1}). In this form, chemical dose is more accurately described as a dose rate. Toxicity criteria have been developed by several regulatory agencies that can be used to translate estimates of chemical dose into estimates of health risk or hazard. Different criteria are used to evaluate noncarcinogenic and carcinogenic chemicals. The bases for these criteria are briefly described below.

For noncarcinogenic chemicals, an assessment of the potential for an exposed individual to experience adverse health effects is based on the comparison of the estimated chemical dose (or dose rate) to a "reference dose" (RfD). RfDs, which are also expressed in terms of mg kg^{-1} d^{-1}, are criteria intended to represent the highest dose of a chemical that is not expected to cause adverse health effects over a lifetime of daily exposure (USEPA, 1992). RfDs are generally based on the results of long-term animal studies and multiple safety factors that are used to extrapolate animal data to humans. It should be noted that there is considerable uncertainty associated with the application of multiple safety factors and the resulting RfDs are likely to be very conservative (Calabrese and Gilbert, 1993); however, a detailed analysis of the magnitude of this uncertainty is beyond the scope of Phase I.

The potential for historical releases of beryllium from the Rocky Flats Plant to have caused berylliosis in off-site individuals is not addressed by the analysis in this report. However, Phase II of the study will further examine the off-site risk. It is known that chronic low-level exposure that does not cause acute inflammation of the lungs can cause berylliosis in susceptible individuals. Berylliosis produces scar tissue in the lung, interfering with normal gas exchange. The risks of this effect of beryllium exposure are uncertain at the time. Because berylliosis is an immunologic response, the threshold level that produces effects varies among individuals. a reference concentration limit of 0.01 $\mu g\ m^{-3}$ was recommended for community air by the U.S. Atomic Energy Commission (USAEC) in 1949 based upon findings in the environment of a beryllium production facility. Current EPA regulations limit industrial emissions to levels that produce 30-day average concentrations that do not exceed that value (ATSDR, 1988).

For carcinogenic chemicals, an estimate of excess lifetime cancer risk (incidence) is the product of the chemical dose and the carcinogenic potency slope factor (SF). The SF, which is expressed in units of $(mg\ kg^{-1}\ d^{-1})^{-1}$, is defined as the 95 percent upper confidence limit of the probability of a carcinogenic response per unit daily intake of a chemical over 70 years. SFs are also generally based on long-term animal studies and the application of a very conservative model used to predict the relationship between dose and cancer risk.

For the purpose of the illustrations presented in this report, chemical toxicity criteria developed by the U.S. EPA are used. These values are presented in Table 5-1. There is considerable uncertainty in both RfDs and SFs. As stated previously, an evaluation of these uncertainties is beyond the scope of Phase I and is therefore not addressed in this report.

5.2 Determination of Cancer Risk from Radiation Exposure

Radiation dose has been expressed in this report in terms of effective dose, the units of which are joules per kilogram, with the special name sievert (Sv). As described previously, this expression of radiation dose provides a single measure of radiation hazard that is consistent with the current understanding of human health risks caused by radiation exposure. Effective dose can be converted to an estimate of cancer risk by multiplying it by a whole body risk factor. Our knowledge of the relationship between radiation dose and adverse health effects is primarily based on past human exposure studies. They include the epidemiological studies on the survivors of the nuclear weapon attacks, on patients exposed to radiation for medical treatment or diagnosis, and on some groups of workers exposed to radiation at work. The magnitude of the whole body risk factor has been and continues to be debated within the scientific community. As new information becomes available, it may change our current understanding of the relationship between radiation exposure and cancer risks.

TABLE 5-1

TOXICITY CRITERIA FOR THE CHEMICALS OF CONCERN

Noncarcinogenic Chemicals	Reference Dose[a] ($mg\ kg^{-1}\ d^{-1}$)	
	Oral	Inhalation
1,1,1-trichloroethane	NA	0.3

Carcinogenic Chemicals	Slope Factor[b] ($mg\ kg^{-1}\ d^{-1})^{-1}$	
	Oral	Inhalation
Beryllium	4.3	8.4
Carbon tetrachloride	NA	0.053
Chloroform	NA	0.081
Methylene chloride	NA	0.0017
Tetrachloroethylene	NA	0.002[c]
Trichloroethylene	NA	0.006[c]

NA Not Applicable

a USEPA, 1992.
b USEPA, 1993, unless otherwise noted.
c Office of Health and Environmental Assessment, USEPA, Washington, D.C. (personal communication)

Suggested values for a whole body risk factor have been published in "Health Effects of Exposure to Low Levels of Ionizing Radiation—BEIR V" (NRC, 1990) and "1990 Recommendations of the International Commission on Radiological Protection" (ICRP, 1990). The BEIR V states that:

> "...the population-weighted average lifetime excess risk of death from cancer following an acute dose equivalent to all body organs of 0.1 Sv (0.1 Gy of low-LET radiation) is estimated to be 0.8 percent..." (NRC, 1990).

The report cautions that this risk factor of 0.8 percent per 0.1 Sv, or 8 percent Sv^{-1}, can be reduced by a factor of two when radiation dose is incurred over a long period of time such as environmental exposures. This factor can be raised by a factor of two if radiation exposure occurred at a very young age. The BEIR V report does not provide a conversion factor for cancer incidence.

In their 1990 recommendations, the ICRP suggested that the risk conversion factor for cancer fatalities for the whole population, including children, is 5 percent Sv^{-1} (ICRP, 1990). For non-fatal cancers and severe hereditary effects, the commission suggested a conversion factor of 1 percent Sv^{-1} and 1.3 percent Sv^{-1}, respectively. For the purpose of the illustrations presented in this report, the sum of the risk factors for fatal and non-fatal cancers and severe hereditary effects suggested by the ICRP, or 7.3 percent Sv^{-1}, was used.

An alternative method for determining cancer risks from radiation exposure has been developed by the USEPA. In this method, which is analogous to the USEPA's method for evaluating carcinogenic chemicals, the theoretical excess cancer risk associated with exposure to a particular radionuclide is calculated by multiplying the estimated intake (in pCi) by the SF (in risk per pCi) of the radionuclide. SFs for many radionuclides are presented in the USEPA's "Health Effects Assessment Summary Tables" (1992). Cancer risks determined using the USEPA method are generally lower than those determined in this report.

5.3 Illustrations of Risk or Hazard

The following series of figures illustrate risk estimates for some of the chemical and radiation doses presented in this report. It should again be noted that the uncertainties associated with several aspects of this process are beyond the scope of Phase I and will be addressed rigorously by the Phase II contractor. The uncertainty in the risk estimates shown in these figures is therefore based solely on the uncertainties in the air and soil concentrations and the exposure model that was described in detail in earlier sections of this report. As such, these risk estimates can only be considered very preliminary estimates of the risk posed by Rocky Flats.

Figures 5-1 through 5-3 present risk estimates for the 903 Pad (highest best estimate of risk = 5.2×10^{-6}), 1957 fire (highest estimate of risk = 1.3×10^{-6}) and 1969 fire (highest best estimate of risk = 3.3×10^{-7}), respectively, for each applicable exposure location. These estimates are based on the radiation doses estimated for the event itself. Figure 5-4 presents risk estimates associated with routine release of plutonium-239/240 during 1965, the year of highest estimated emissions of this material from the plant for the 12 sectors and 3 remote exposure locations. This radionuclide was chosen for this illustration because it is associated with the highest dose estimates of all of the routinely released radionuclides (see Figure 3-21).

Figure 5-5 presents risk estimates associated with routine releases of plutonium-239/240 over the entire operational history of the plant for Sector 12. Figures 5-4 and 5-5 can be used in concert to roughly estimate risks for other sectors and other years. For example, as shown in Figure 5-4, the best estimate of risk for Sector 12 in 1965 is approximately 3.0×10^{-9}. Figure 5-5 indicates that the best estimate of risk for Sector 12 in 1966 is approximately 1.6×10^{-10}, or about

DENVER
(16 MILES SOUTHEAST OF THE PLANT)

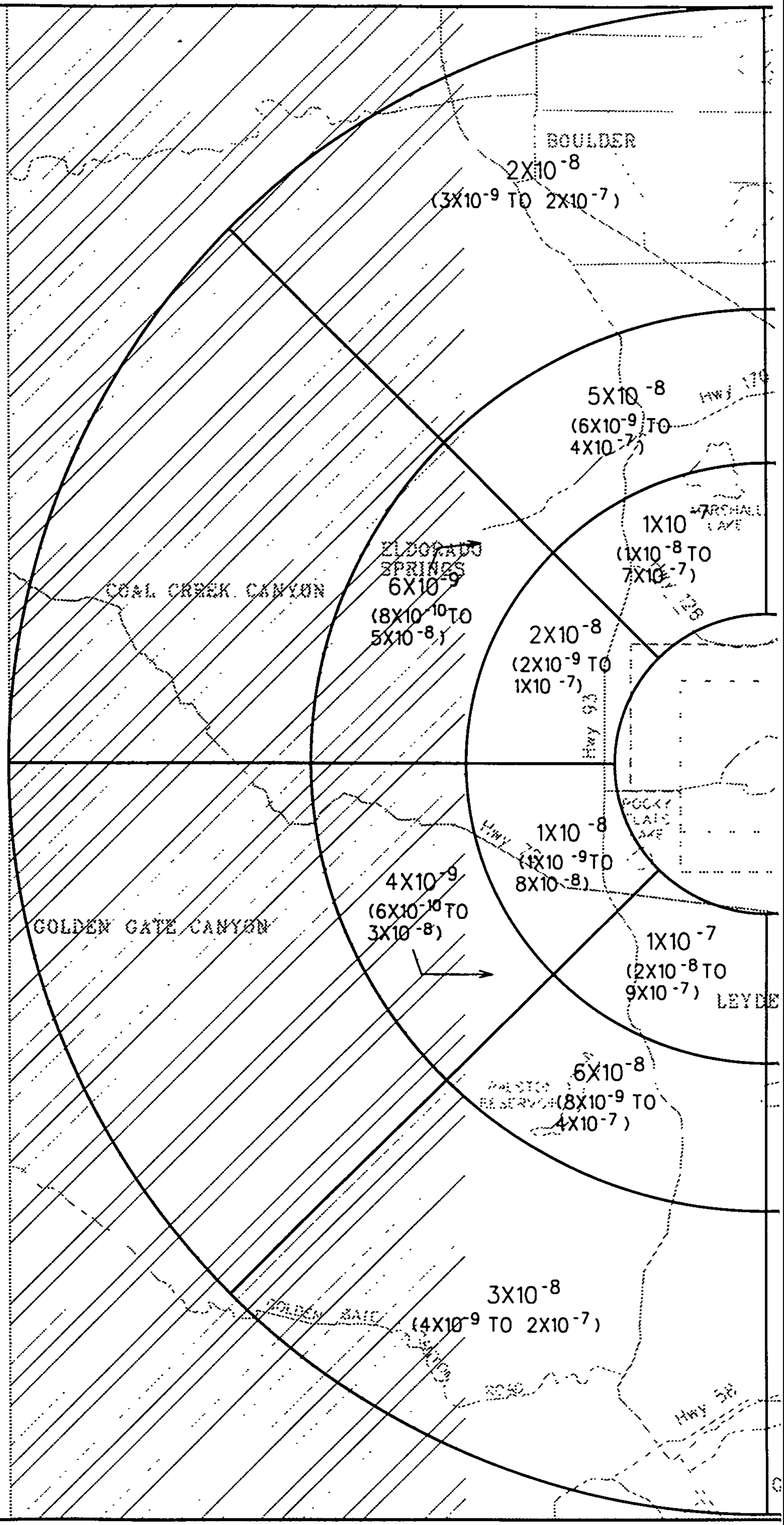
$6X10^{-8}$
($8X10^{-8}$ TO $4X10^{-7}$)

LAKEWOOD
(12 MILES SOUTH-SOUTHEAST OF THE PLANT)

$2X10^{-8}$
($3X10^{-9}$ TO $4X10^{-8}$)

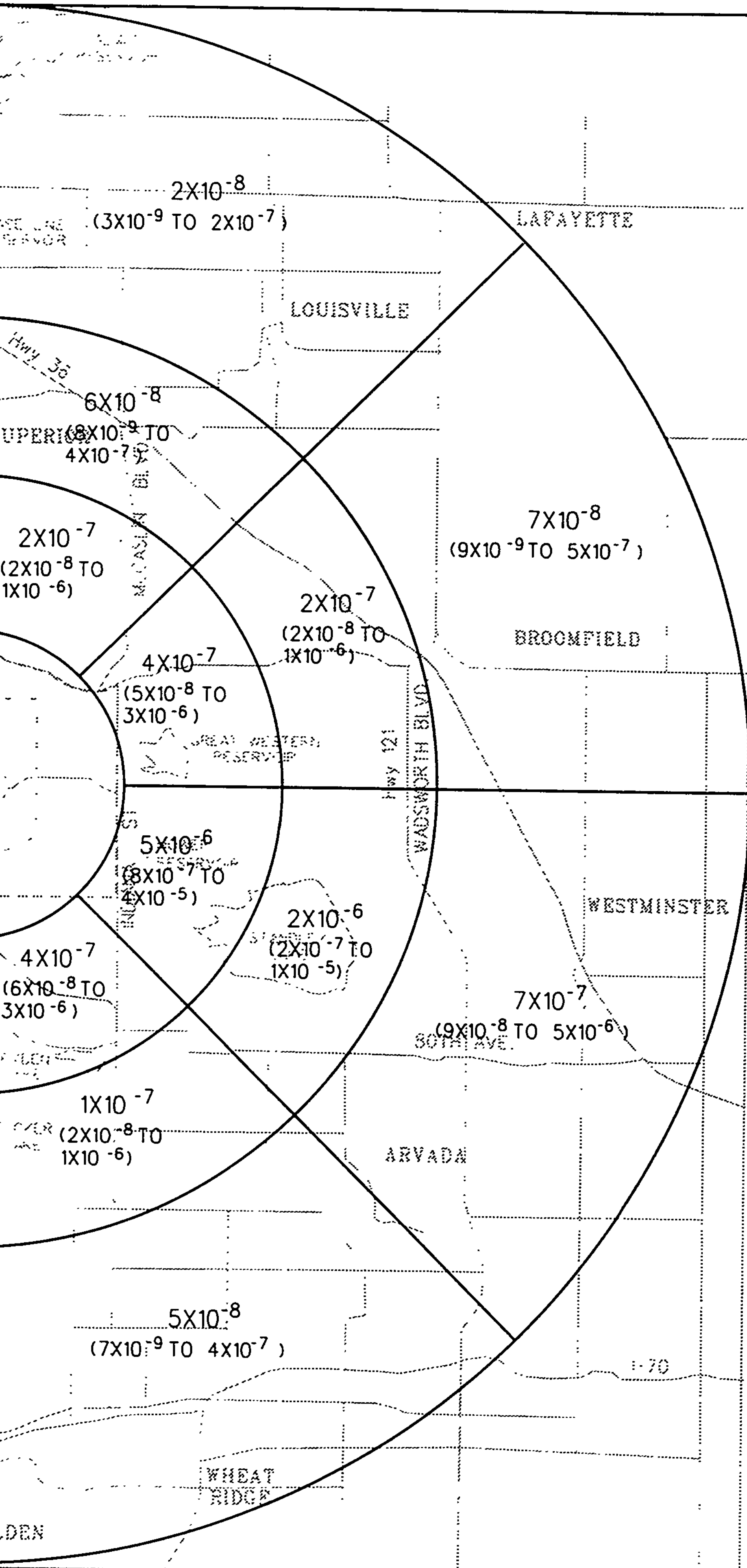
LONGMONT
(20 MILES NORTH OF THE PLANT)

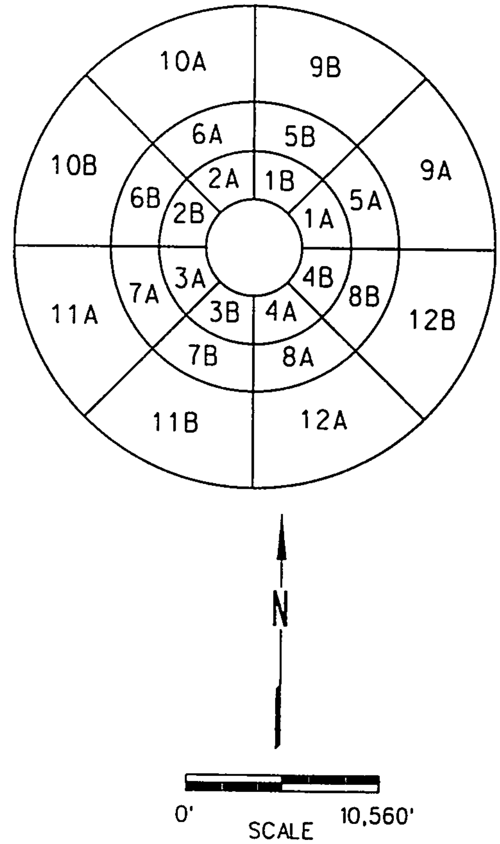
$5X10^{-9}$
($8X10^{-10}$ TO $4X10^{-8}$)



ChemRisk
A Division of McLaren/Hart

RkyF794H/5-01 dgn; Rev: 07-28-94





SCALE: 1" = 2.0 Miles

LEGEND

- - - - - ROCKY FLATS PLANT BOUNDARY 1951-1974

------- ROCKY FLATS PLANT BOUNDARY 1974-PRESENT (BUFFER ZONE ADDED)

FRONT RANGE OF THE ROCKY MOUNTAINS

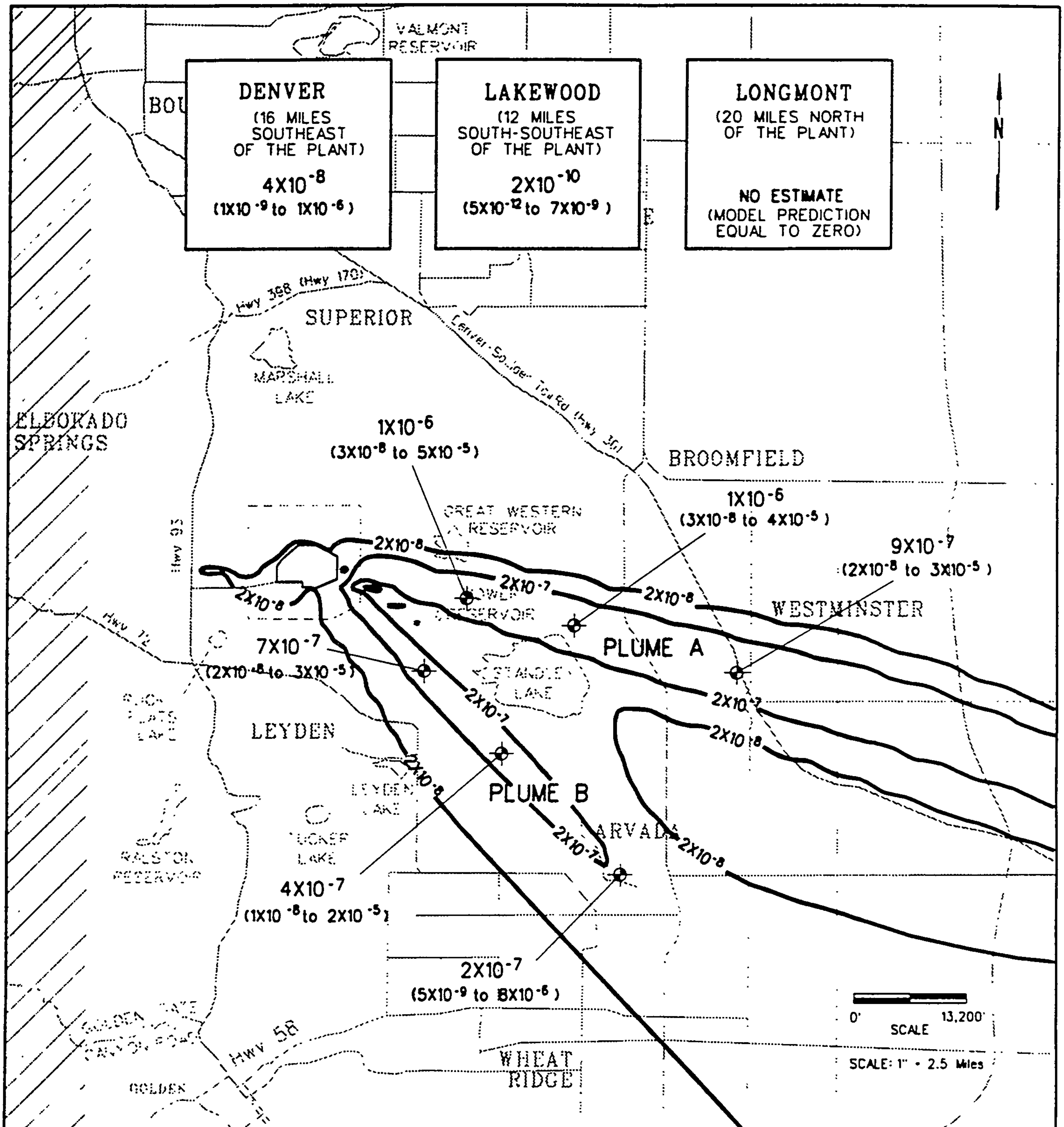
$7X10^{-7}$ BEST ESTIMATE

($9X10^{-8}$ TO $5X10^{-6}$) 95% CONFIDENCE INTERVAL ABOUT BEST ESTIMATE

10^{-1} SCIENTIFIC NOTATION: 10^{-1} = 0.1 OR 1/10; 10^{-2} = 0.02 OR 1/100; etc.

NOTE:
CANCER RISK FOR RADIONUCLIDES INCLUDES THE RISK OF FATAL AND NON-FATAL CANCER AND SEVERE HEREDITARY EFFECTS, AS DEFINED BY THE ICRP (1990)

FIGURE 5-1
PRELIMINARY CANCER RISK ESTIMATES ASSOCIATED WITH AIRBORNE RELEASE OF PLUTONIUM-239/240 FROM THE 903 PAD (1965-1969)



LEGEND

- - - - ROCKY FLATS PLANT BOUNDARY 1951-1974

/ / / FRONT RANGE OF THE ROCKY MOUNTAINS

RISK ISOPLETH LINES

EXPOSURE LOCATIONS

$2X10^{-7}$ ← ESTIMATE

$(5X10^{-9}$ to $8X10^{-6})$ ← 95% CONFIDENCE INTERVAL ABOUT ESTIMATE

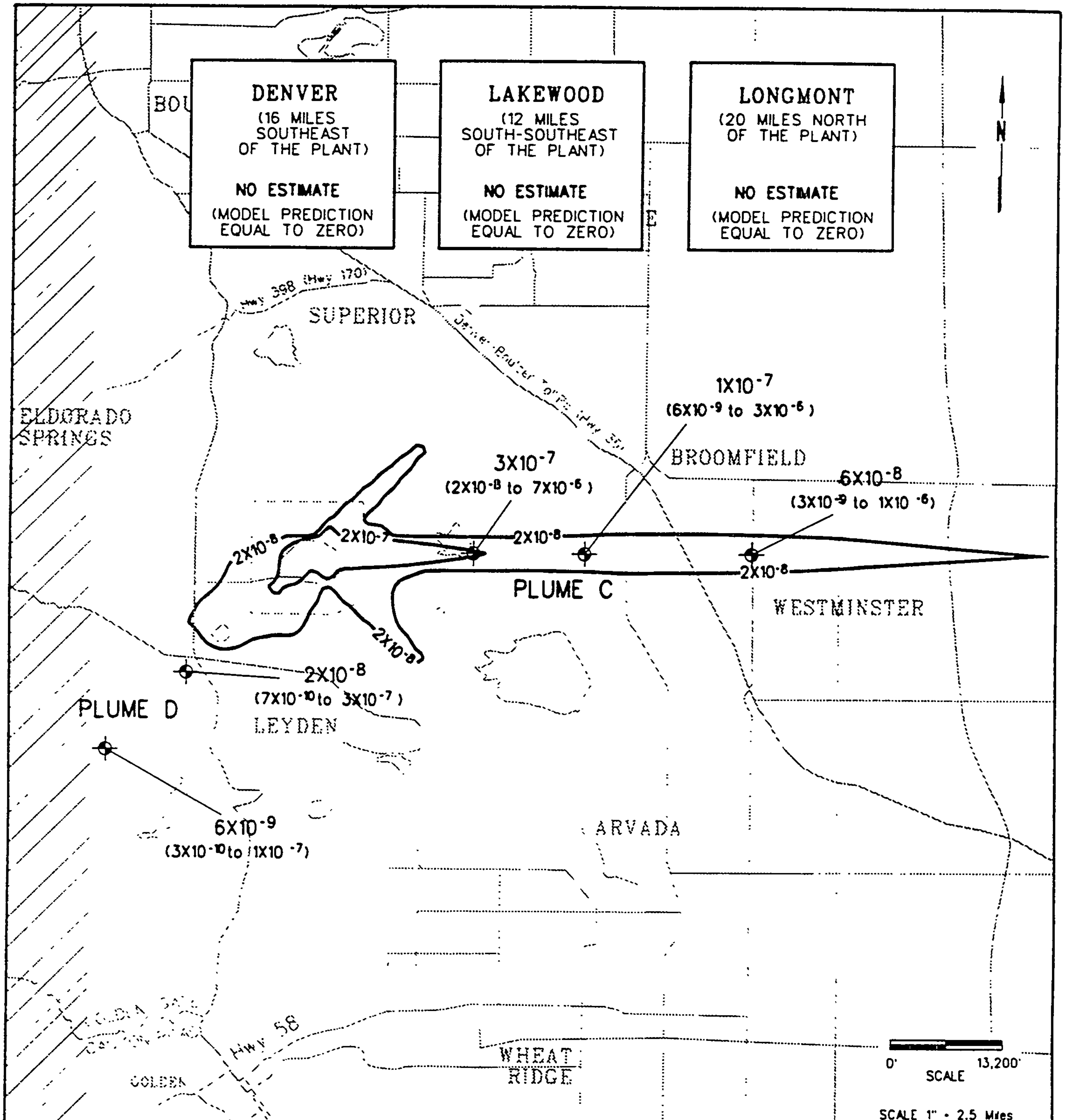
NOTE:
CANCER RISK FOR RADIONUCLIDES INCLUDES THE RISK OF FATAL AND NON-FATAL CANCER AND SEVERE HEREDITARY EFFECTS, AS DEFINED BY THE ICRP (1990).

10^{-1} IS SCIENTIFIC NOTATION: 10^{-1} = 0.1 OR 1/10; 10^{-2} = 0.01 OR 1/100; ETC.

ChemRisk
A Division of McLaren/Hart

FIGURE 5-2
PRELIMINARY CANCER RISK ESTIMATES ASSOCIATED WITH THE AIRBORNE RELEASE OF PLUTONIUM-239/240 AS A RESULT OF THE 1957 FIRE

RkyF794H/5-02.dgn, Rev: 07-21-94



LEGEND

- - - - - ROCKY FLATS PLANT BOUNDARY 1951-1974

FRONT RANGE OF THE ROCKY MOUNTAINS

RISK ISOPLETH LINES

EXPOSURE LOCATIONS

$6X10^{-9}$ ← BEST ESTIMATE
$(3X10^{-10}$ to $1X10^{-7})$

95% CONFIDENCE INTERVAL ABOUT BEST ESTIMATE

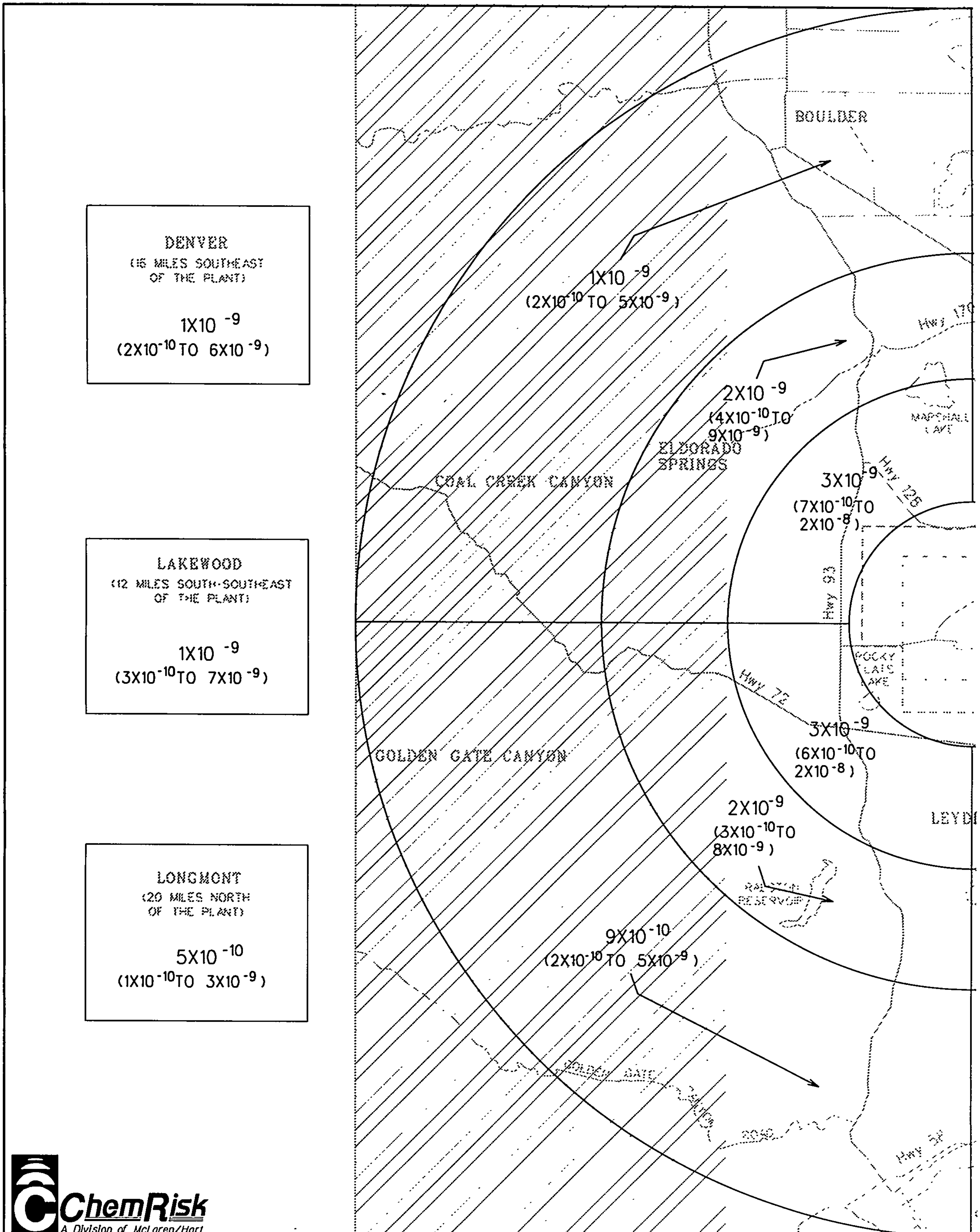
NOTE:
CANCER RISK FOR RADIONUCLIDES INCLUDES THE RISK OF FATAL AND NON-FATAL CANCER AND SEVERE HEREDITARY EFFECTS, AS DEFINED BY THE ICRP (1990).

10^{-1} IS SCIENTIFIC NOTATION: 10^{-1} = 0.1 OR 1/10; 10^{-2} = 0.01 OR 1/100; ETC.

ChemRisk
A Division of McLaren/Hart

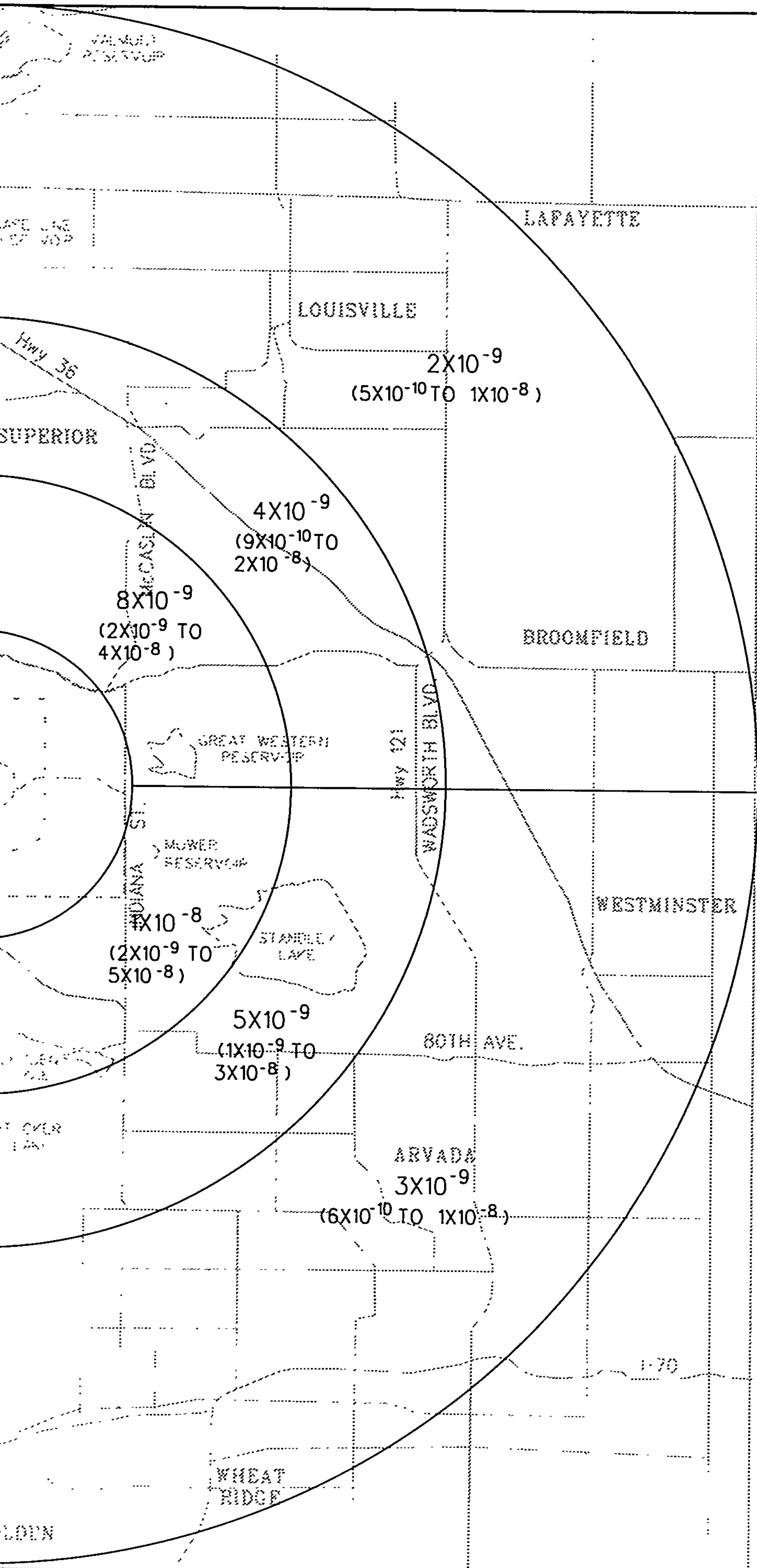
FIGURE 5-3
PRELIMINARY CANCER RISK ESTIMATES ASSOCIATED WITH THE AIRBORNE RELEASE OF PLUTONIUM-239/240 AS A RESULT OF THE 1969 FIRE

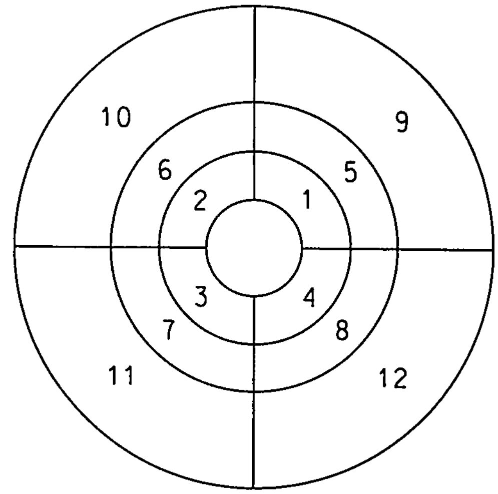
RkyF794h/5-03.dgn. Rev 07-21-94



ChemRisk
A Division of McLaren/Hart

RkyF794H/5-04.dgn; Rev 07-28-94





N

0'
SCALE
10,560'

SCALE: 1" = 2.0 Miles

LEGEND

ROCKY FLATS PLANT BOUNDARY 1951-1974

ROCKY FLATS PLANT BOUNDARY 1974-PRESENT (BUFFER ZONE ADDED)

FRONT RANGE OF THE ROCKY MOUNTAINS

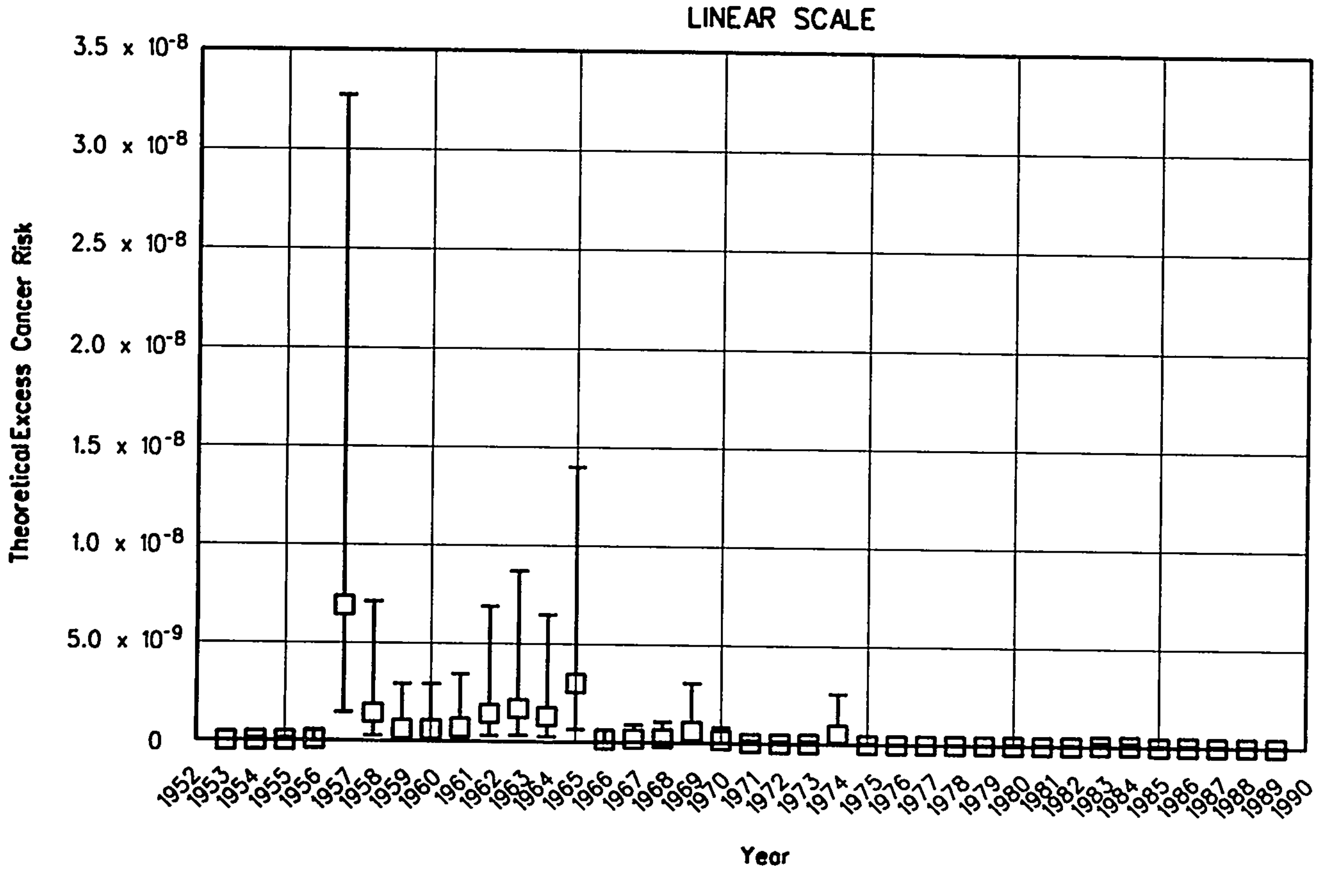
$3X10^{-9}$ BEST ESTIMATE

$(6X10^{-10}$ TO $1X10^{-8})$ 95% CONFIDENCE INTERVAL ABOUT BEST ESTIMATE

10^{-1} SCIENTIFIC NOTATION; 10^{-1} = 0.1 OR 1/10; 10^{-2} = 0.02 OR 1/100; etc.

NOTE:
CANCER RISK FOR RADIONUCLIDES INCLUDES THE RISK OF FATAL AND NON-FATAL CANCER AND SEVERE HEREDITARY EFFECTS, AS DEFINED BY THE ICRP (1990)

FIGURE 5-4
PRELIMINARY CANCER RISK ESTIMATES ASSOCIATED WITH ONE-YEAR EXPOSURE TO ROUTINE AIRBORNE RELEASE OF PLUTONIUM-239/240 (1965)



LEGEND

Best Esti

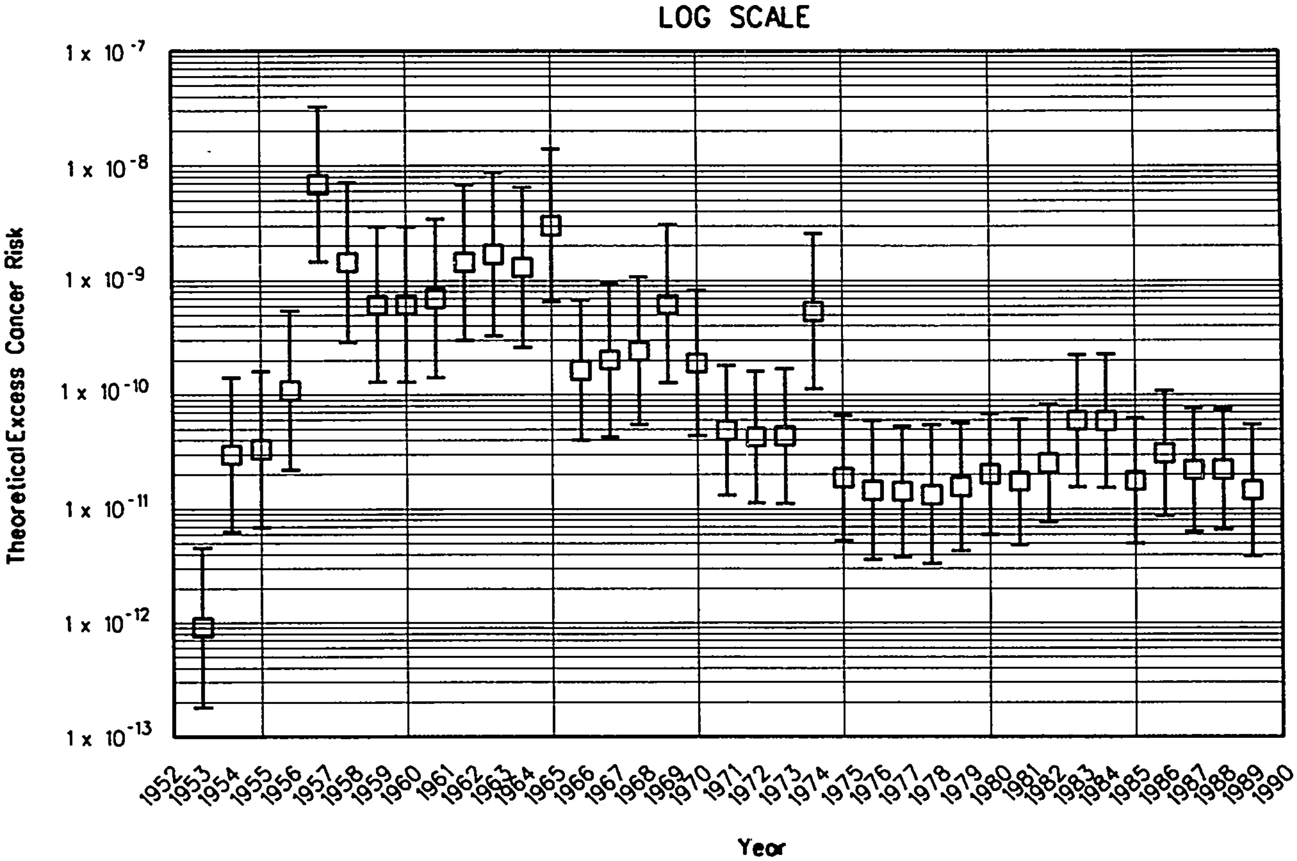
95% Con

10^{-1} Scientific

Note: Ca
nor

ChemRisk
A Division of McLaren/Hart

Rky794H/5-5.dgn; Rev: 09-21-94



ate

dence Interval About The Best Estimate

Notation; 10^{-1} = 0.1 or 1/10; 10^{-2} = 0.01 or 1/100; etc.

cer risk for chemicals includes the risk of fatal and
fatal cancer

FIGURE 5-5
PRELIMINARY EXCESS LIFETIME CANCER RISK ESTIMATES ASSOCIATED WITH ONE YEAR EXPOSURE TO ROUTINE AIRBORNE RELEASE OF PLUTONIUM-239/240 - SECTOR 12 (1953-1989)

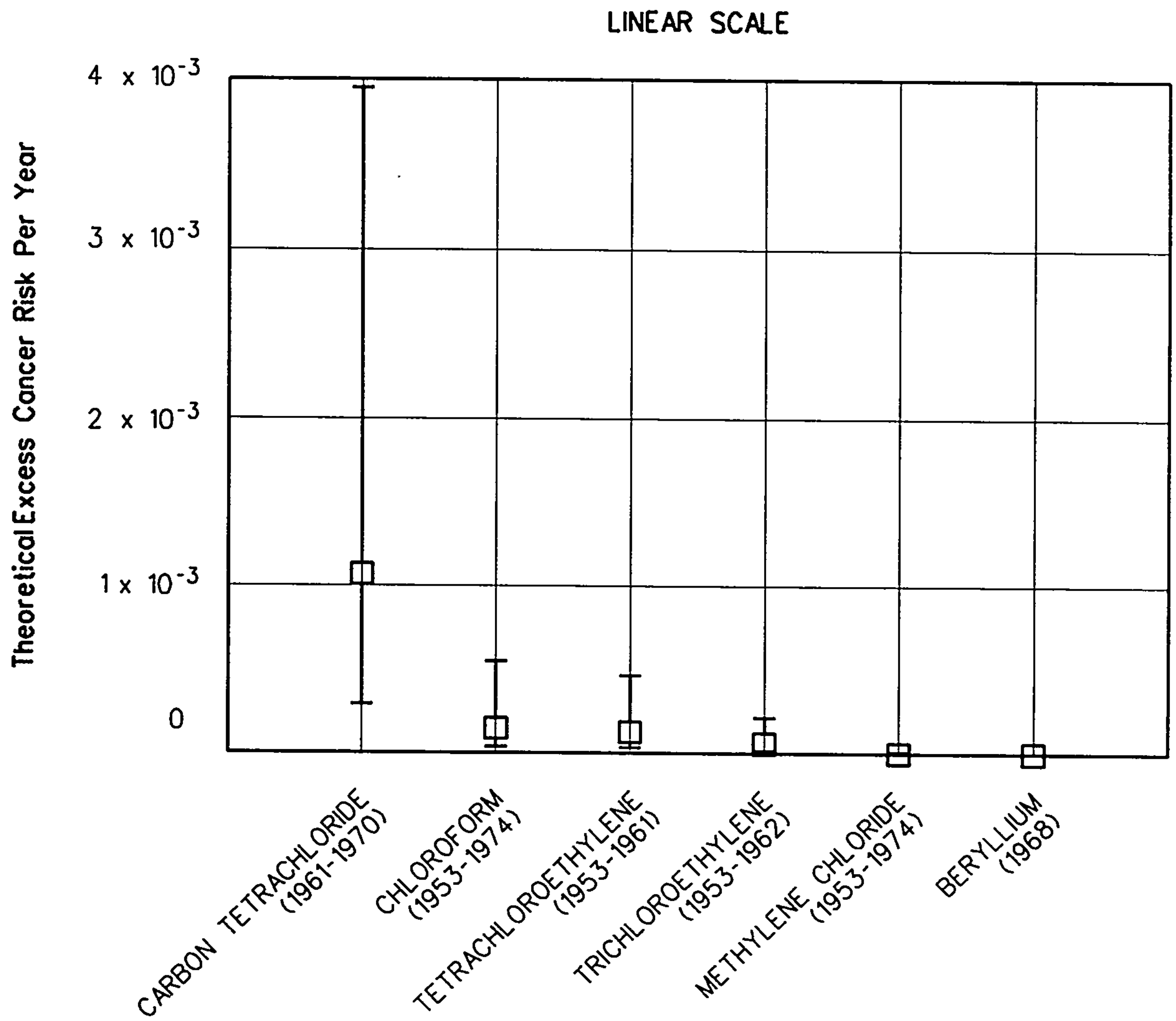
a factor of 20 lower than for 1965. The best estimate of risk for any other sector in 1966 will also be approximately a factor of 20 lower than the value presented in Figure 5-4. Similar extrapolations can be made for any other year throughout the history of the plant.

The highest single-year risk estimates for the routinely released chemicals were calculated as shown in Appendix N for Sector 12 and are presented in Figure 5-6. Based on this illustration, carbon tetrachloride is associated with the highest risk estimates for a one-year exposure. Figure 5-7 presents single-year risk estimates associated with the routine release of carbon tetrachloride during the period of 1961 through 1970, the period associated with the highest releases of this contaminant, for the 12 sectors and 3 remote exposure locations. Figure 5-8 presents risk estimates associated with the routine release of carbon tetrachloride for each of the 37 years for Sector 12. As with the previous example of routine releases of plutonium-239/240, Figures 5-7 and 5-8 can be used to determine risk estimates for other sectors in other years. Figure 5-9 presents the total 37-year risk estimates associated with the routine release of carbon tetrachloride over the entire operational history of the plant.

The last figure, Figure 5-10, presents the annual dose estimates associated with the routine release of 1,1,1-trichloroethane, the only contaminant of concern not considered to be a carcinogen. Also included in the figure is the RfD for this contaminant. As stated earlier, the accepted method for evaluating exposure to noncarcinogenic chemicals is a comparison between the calculated dose and the RfD. When the calculated dose, in mg kg^{-1} d^{-1}, is below the RfD, the exposure is not expected to cause any adverse health effects.

The figures presented in this section have illustrated how chemical and radiation doses can be converted to estimates of health risk or hazard. These figures have been constructed purely for illustrative purposes, and the values can only be considered as very preliminary estimates of the risks posed by Rocky Flats. In the coming months, the Phase II contractor will be rigorously investigating the source and magnitude of uncertainties in the risk estimation process.

This page intentionally left blank.



LEGEND

□ Best Estir

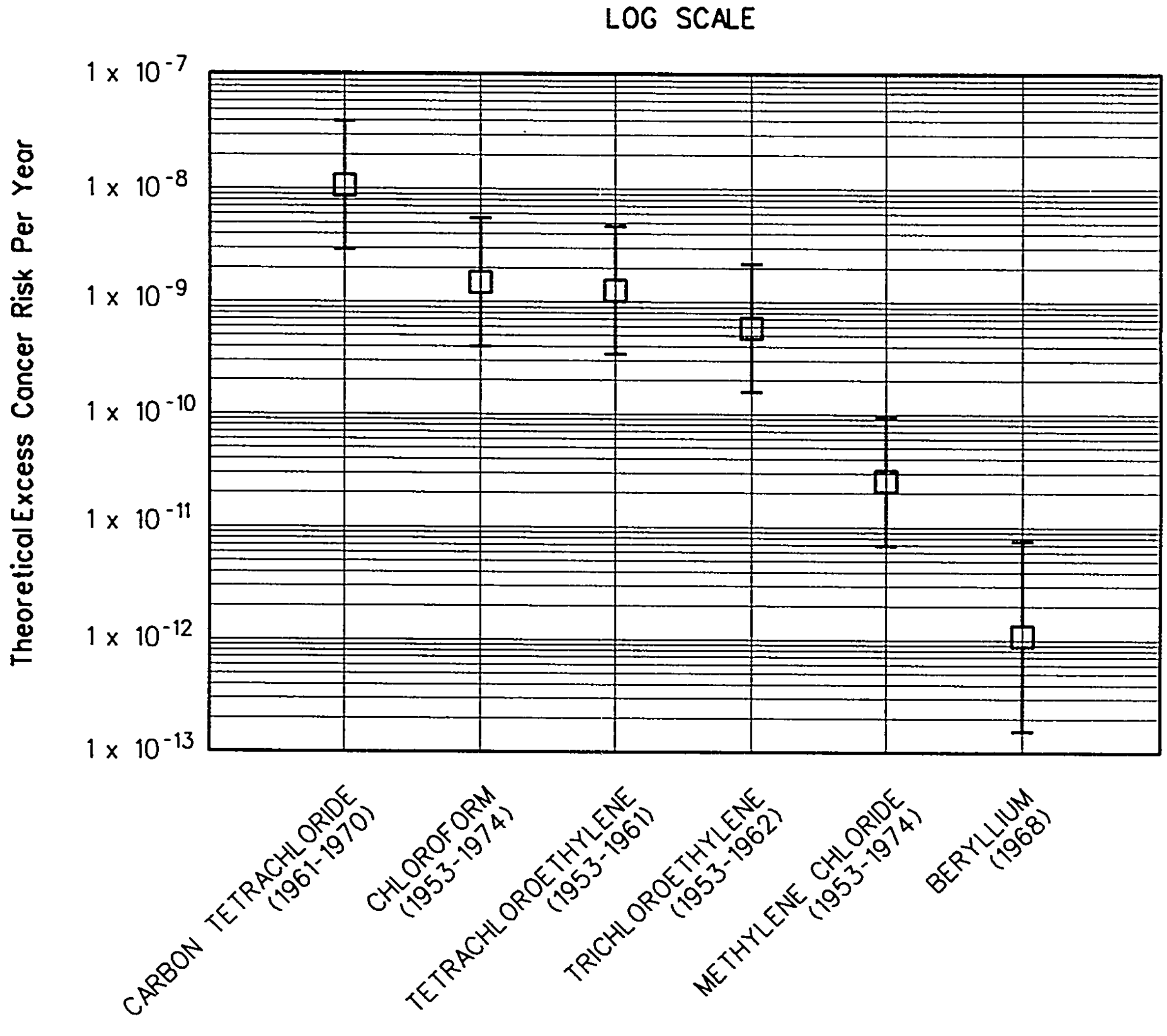
I 95% Conf

10^{-1} Scientific

Note: Cancer ri
and non

ChemRisk
A Division of McLaren/Hart

Rky794H/5-6.dgn; Rev: 09-12-94



ate

ence Interval About The Best Estimate

otation; 10^{-1} = 0.1 or 1/10; 10^{-1} = 0.01 or 1/100; etc.

for chemicals includes the risk of fatal
atal cancers.

FIGURE 5-6
PRELIMINARY EXCESS LIFETIME CANCER RISK ESTIMATES ASSOCIATED WITH ONE-YEAR EXPOSURE TO AIRBORNE RELEASE OF CHEMICALS FROM THE ROCKY FLATS PLANT-SECTOR 12 (HIGHEST SINGLE-YEAR OR PERIOD)

DENVER
(16 MILES SOUTHEAST
OF THE PLANT)

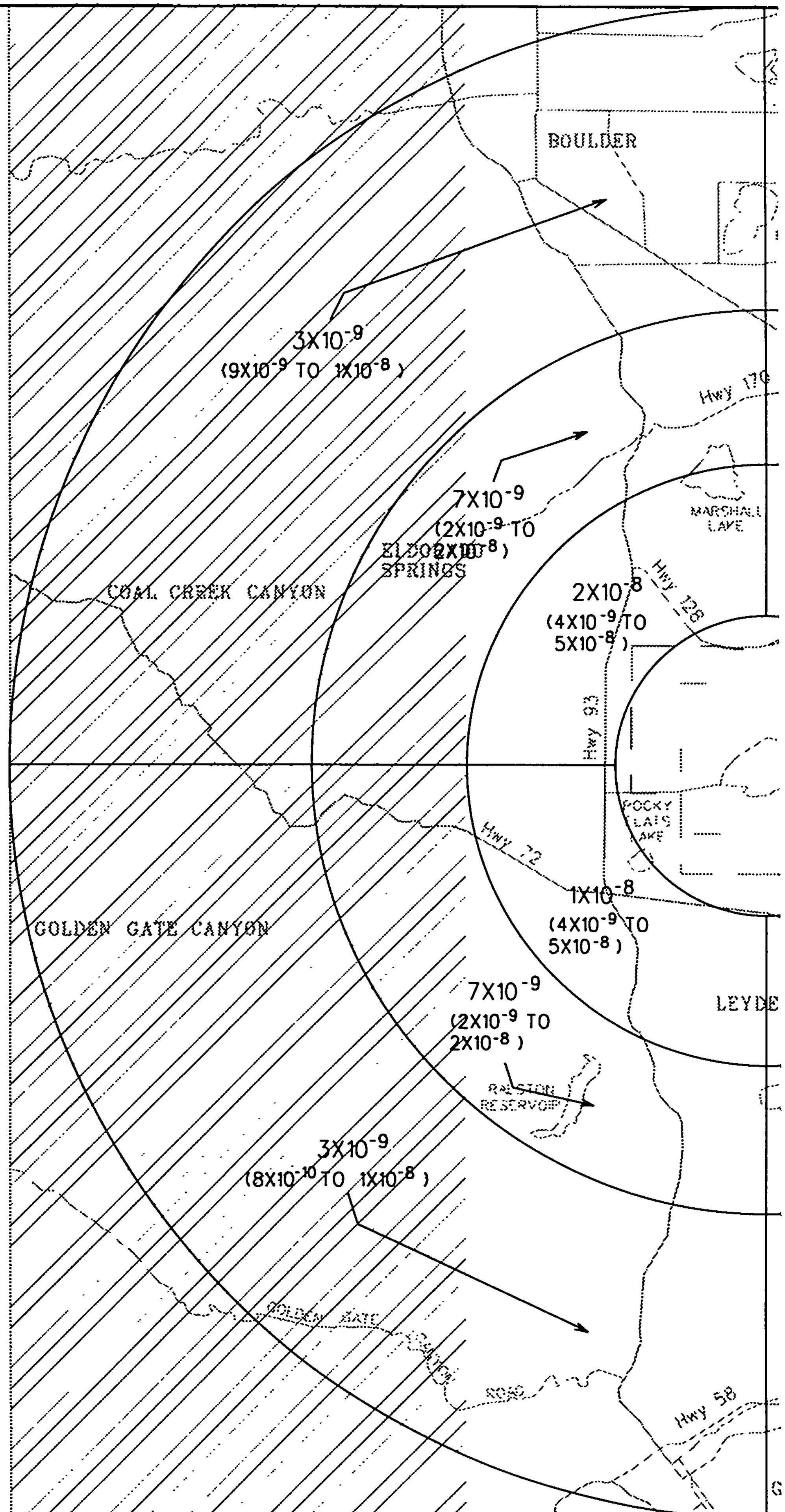
$4X10^{-9}$
($1X10^{-9}$ TO $2X10^{-8}$)

LAKEWOOD
(12 MILES SOUTH-SOUTHEAST
OF THE PLANT)

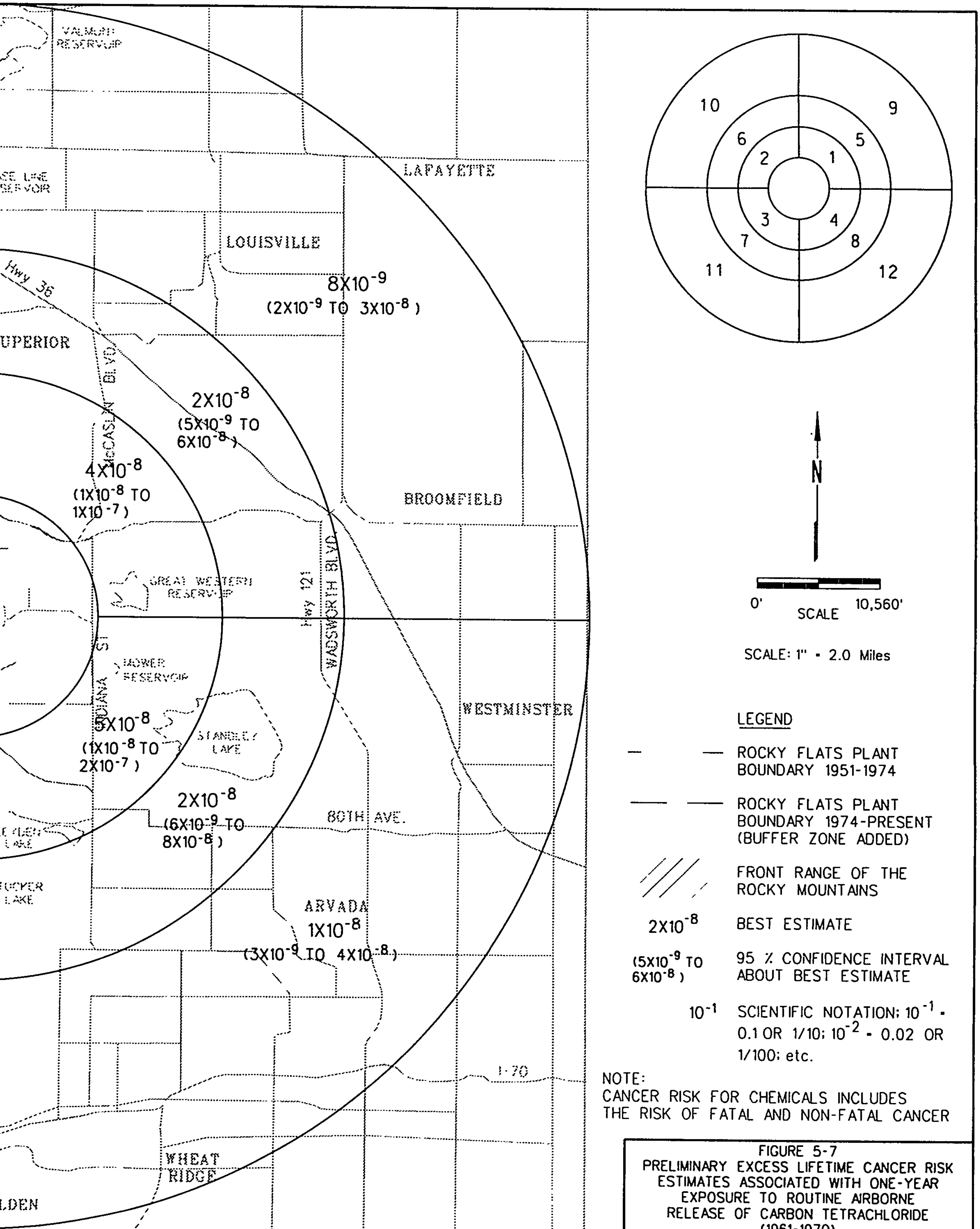
$5X10^{-9}$
($1X10^{-9}$ TO $2X10^{-8}$)

LONGMONT
(20 MILES NORTH
OF THE PLANT)

$2X10^{-9}$
($5X10^{-10}$ TO $6X10^{-9}$)



ChemRisk
A Division of McLaren/Hart



SCALE: 1" = 2.0 Miles

LEGEND

ROCKY FLATS PLANT BOUNDARY 1951-1974

ROCKY FLATS PLANT BOUNDARY 1974-PRESENT (BUFFER ZONE ADDED)

FRONT RANGE OF THE ROCKY MOUNTAINS

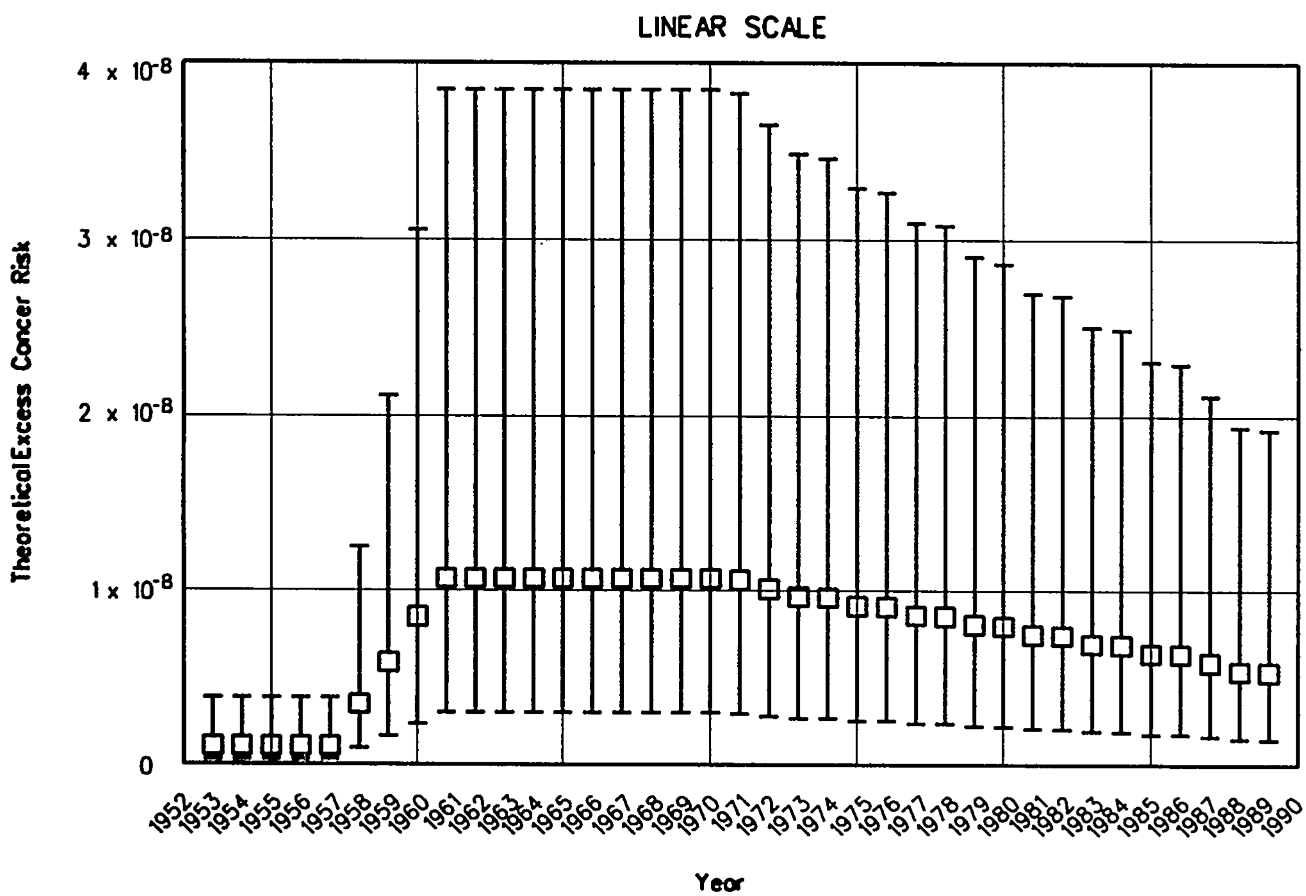
$2X10^{-8}$ BEST ESTIMATE

($5X10^{-9}$ TO $6X10^{-8}$) 95 % CONFIDENCE INTERVAL ABOUT BEST ESTIMATE

10^{-1} SCIENTIFIC NOTATION: 10^{-1} = 0.1 OR 1/10; 10^{-2} = 0.02 OR 1/100; etc.

NOTE:
CANCER RISK FOR CHEMICALS INCLUDES THE RISK OF FATAL AND NON-FATAL CANCER

FIGURE 5-7
PRELIMINARY EXCESS LIFETIME CANCER RISK ESTIMATES ASSOCIATED WITH ONE-YEAR EXPOSURE TO ROUTINE AIRBORNE RELEASE OF CARBON TETRACHLORIDE (1961-1970)



LEGEND

Best Estin

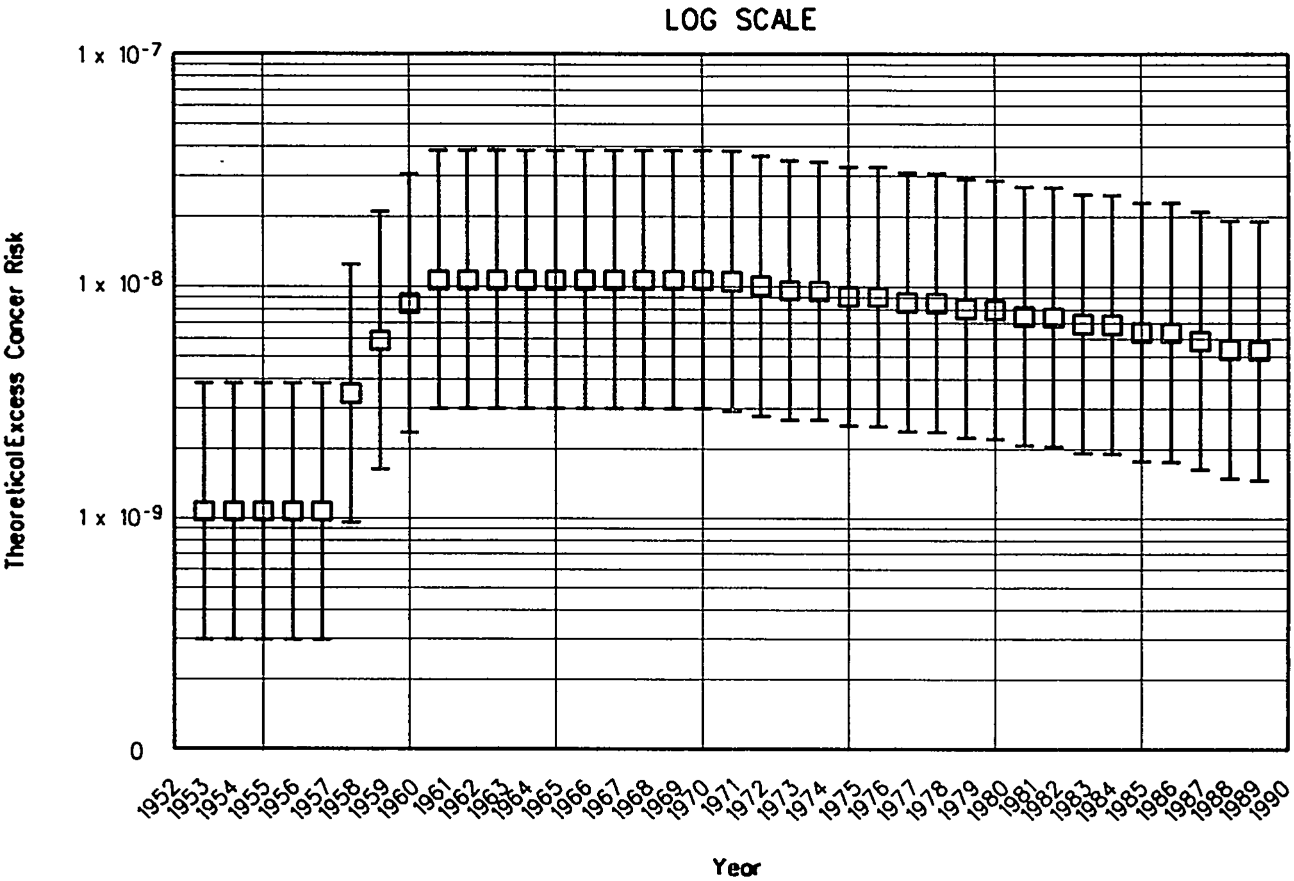
95% Confi

10^{-1} Scientific

NOTE: Ca
of

ChemRisk
A Division of McLaren/Hart

Rky794H/5-B.dgn; Rev: 09-21-94



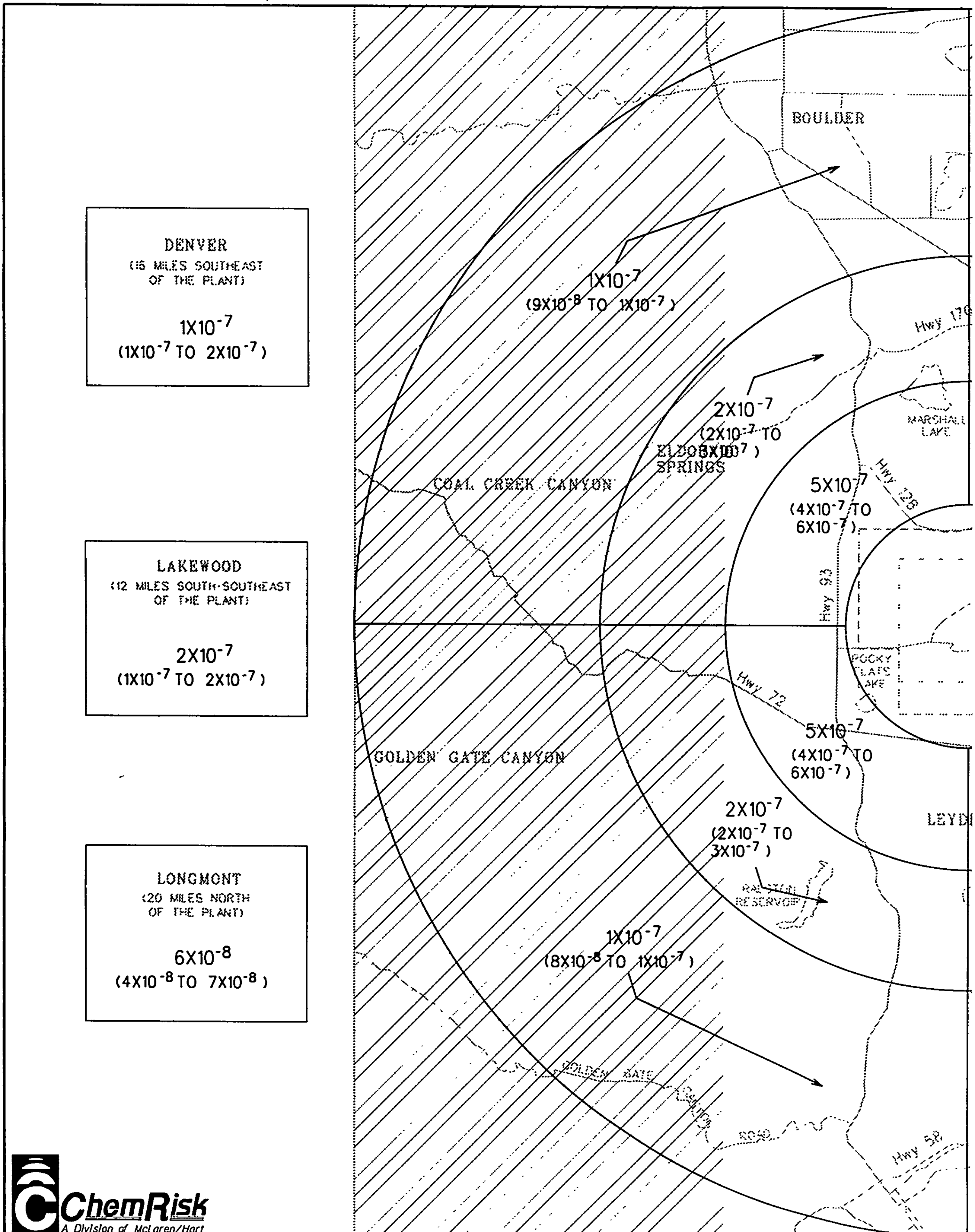
te

ence Interval About The Best Estimate

otation; 10^{-1} = 0.1 or 1/10; 10^{-2} = 0.01 or 1/100; etc.

er risk for chemicals includes the risk
tal and non-fatal cancer

FIGURE 5-8
PRELIMINARY EXCESS LIFETIME CANCER RISK
ESTIMATES ASSOCIATED WITH ONE YEAR EXPOSURE
TO ROUTINE AIRBORNE RELEASE OF
CARBON TETRACHLORIDE - SECTOR 12 (1953-1989)



RkyF794H/5-09.dgn; Rev 09-20-94

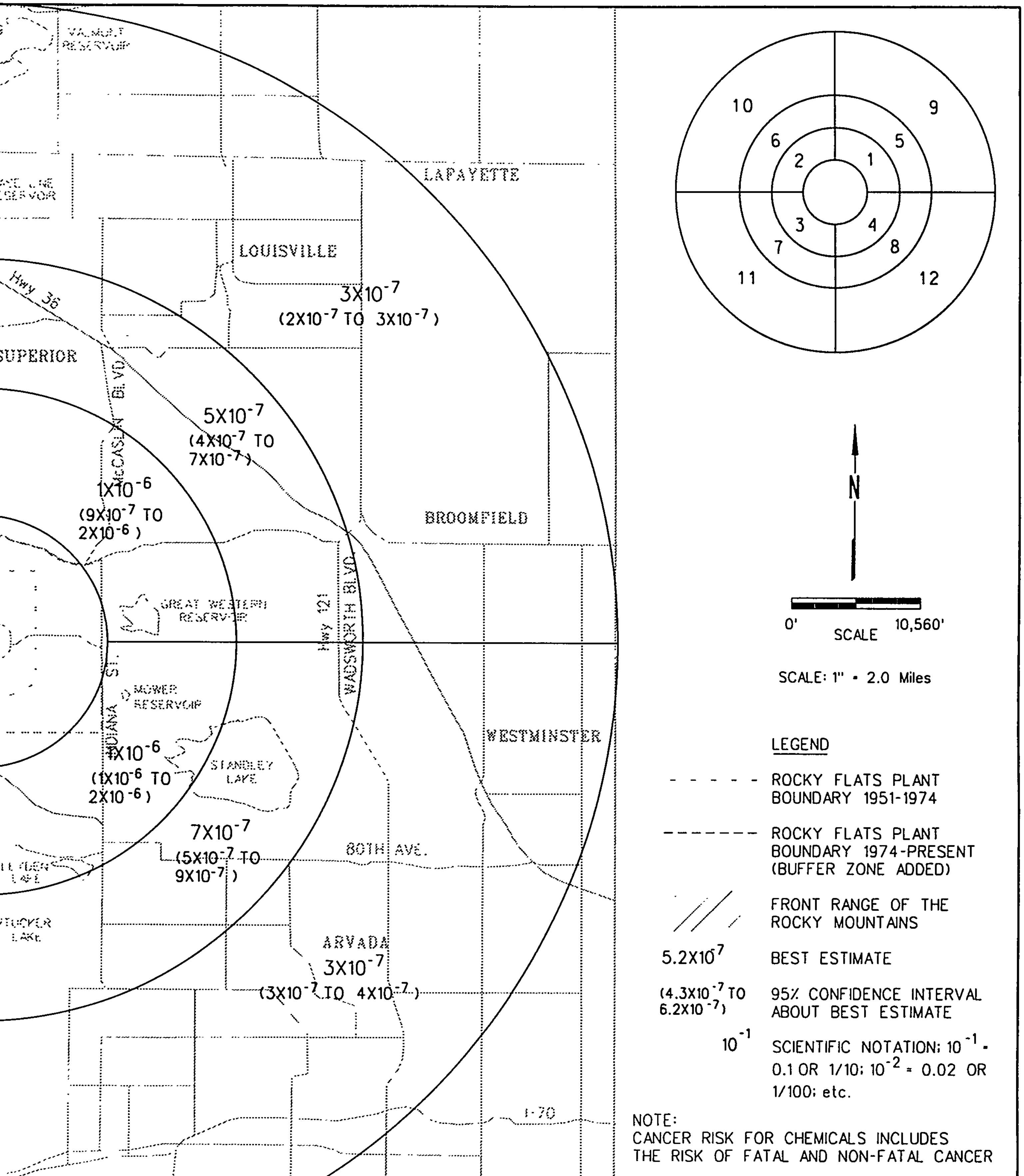
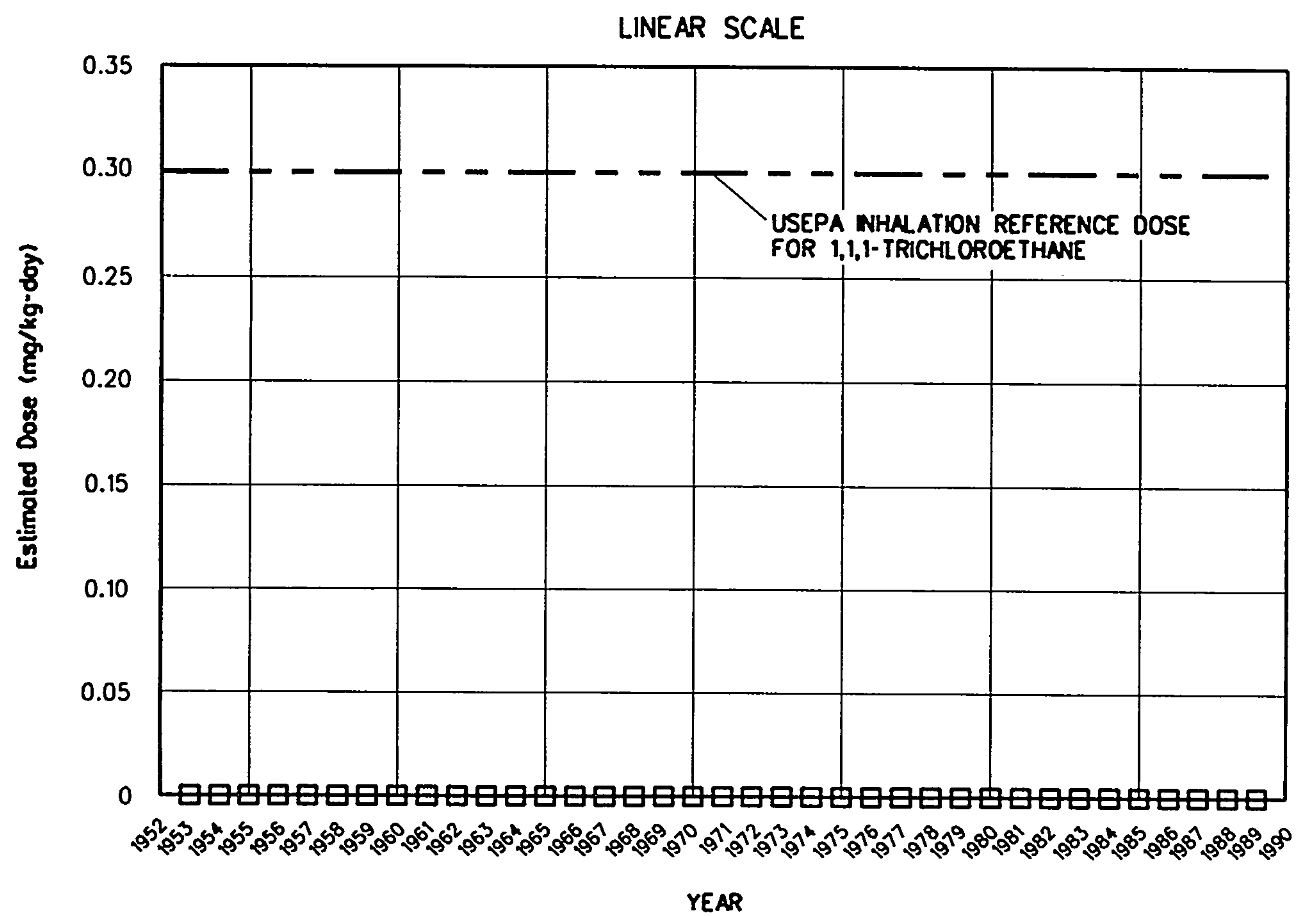


FIGURE 5-9
PRELIMINARY EXCESS LIFETIME CANCER RISK ESTIMATES ASSOCIATED WITH 37-YEAR EXPOSURE TO ROUTINE AIRBORNE RELEASE OF CARBON TETRACHLORIDE (1953-1989)

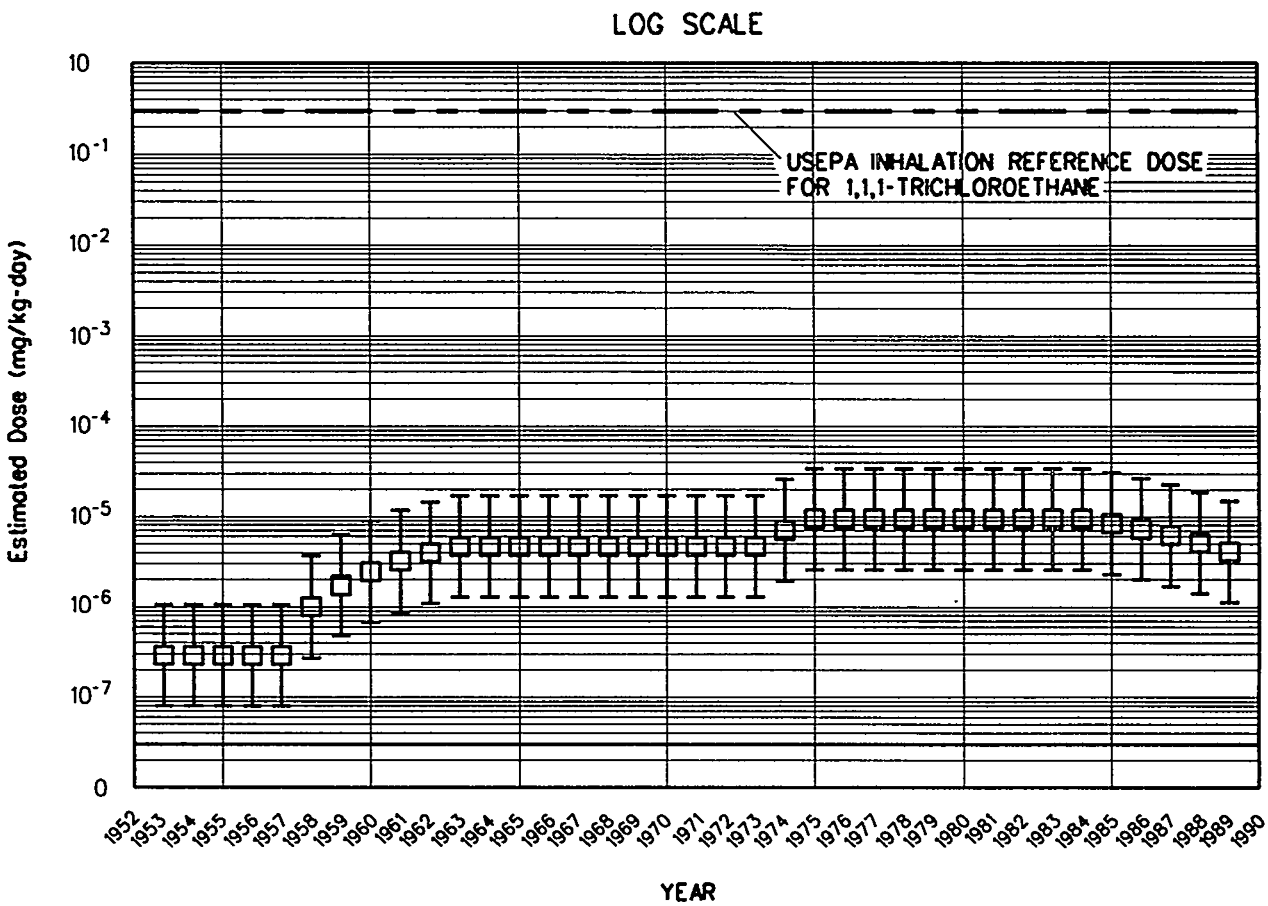


LEGEND

□	Best Est
I	95% Con
10^{-1}	Scientific

ChemRisk
A Division of McLaren/Hart

Rky794H/5-10.dgn; Rev: 09-21-94



ate

dence Interval About The Best Estimate

Notation; 10^{-1} = 0.1 or 1/10; 10^{-2} = 0.01 or 1/100; etc.

FIGURE 5-10
INHALATION DOSES ASSOCIATED WITH ONE-YEAR EXPOSURE
ROUTINE AIRBORNE RELEASE OF
1,1,1-TRICHLOROETHANE IN RELATION TO A
REFERENCE DOSE - SECTOR 12 (1953-1989)

While there are a number of reasons to argue against directly adding the risks from chemicals and radionuclides, and for carefully interpreting health risks posed by a variety of contaminants through various pathways, there is also a desire to produce some overall estimate of health risk from the operation of the Rocky Flats Plant. The preliminary risk estimates described in this section can be summed to very roughly estimate the total excess cancer risk associated with the release of all radionuclides and carcinogenic chemicals over the 37-year history of the plant. For the purposes of this illustration, we have calculated total excess cancer risks for the following two locations:

Location 1: Using risk estimates calculated for Sector 4 for routine releases, Sector 4B for 903 Pad releases, and east-trending plumes at 3 miles from the plant for the 1957 and 1969 fires.

Location 2: Using risk estimates calculated for Sector 12 for routine releases, Sector 12B for 903 Pad releases, and east-trending plumes at 8 miles from the plant for the 1957 and 1969 fires.

Location 1 was chosen because it is the nearest location in the primary downwind direction and likely represents the theoretical maximum excess cancer risk estimate, even though few, if any, people lived there for the entire 37-year period. Location 2 was chosen because it is also in the primary downwind direction and corresponds to an area where a considerable number of people could have been exposed. The total excess cancer risk estimates for these locations (arithmetic sums of the geometric means of the doses from the individual release types or events) are 1×10^{-4} and 2×10^{-5}, respectively.

5.4 Conclusions

The events associated with the largest releases of contaminants that would have led to the largest health hazards are also those for which information and data are most limited. This situation leads to relatively large uncertainties. As a result, the following activities are those that should receive high priority as part of the Phase II follow-up to Phase I work:

- The development of alternative approaches to estimating the releases of radioactive contaminants from the 903 Pad and the 1957 fire, which were the dominant release events identified by Phase I. These releases came from complex events for which limited data are available. The use of alternative scientific approaches to the evaluation of these releases could yield further insights into the potential health hazards that these events may have posed.

- The identification of additional environmental data that could be used to establish whether the predicted exposures are consistent with actual measurements taken in the environment.

In addition, releases of chemicals and radionuclides to surface water should be more fully characterized, because limited information was identified in Phase I on either the release of liquid contaminants from the plant or the degree of contamination present in the nearby reservoirs and related drinking waters.

Using the information developed in both phases of the Health Studies, the Phase II contractor will be in a position to describe the potential health risks associated with the primary sources of contaminant exposure for the public.

6.0 REFERENCES

ATSDR (1988). Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services. "Toxicological Profile for Beryllium." ATSDR/TP-88/07. December.

ATSDR (1989a). Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services. "Toxicological Profile for Carbon Tetrachloride." PB90-168196.

ATSDR (1989b). Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services. "Toxicological Profile for Chloroform." PB89-160360.

ATSDR (1989c). Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services. "Toxicological Profile for Methylene Chloride." PB90-194468.

ATSDR (1989d). Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services. "Toxicological Profile for Trichloroethylene." PB90-127523.

Calabrese, E. J., and C. Gilbert (1993). "Lack of Total Independence of Uncertainty Factors (UFs): Implications for the Size of the Total Uncertainty Factor." *Regulatory Toxicology and Pharmacology*, **17**, 44-51.

CDHS (1988). California Department of Health Services. "Proposition 65 Risk Specific Intake Levels: Carbon Tetrachloride."

ChemRisk (1991a). ChemRisk Division of McLaren/Hart Environmental Engineering, Inc. "Task 1 Report (R1), Identification of Chemicals and Radionuclides Used at Rocky Flats." Repository Document TW-362. March.

ChemRisk (1991b). ChemRisk Division of McLaren/Hart Environmental Engineering, Inc. "Task 2 Report, Selection of the Chemicals and Radionuclides of Concern." Repository Document TA-723. June.

ChemRisk (1992). ChemRisk Division of McLaren/Hart Environmental Engineering, Inc. "Project Tasks 3 & 4, Final Draft Report, Reconstruction of Historical Rocky Flats Operations & Identification of Release Points." Repository Document TA-1202. August.

ChemRisk (1994a). ChemRisk Division of McLaren/Hart Environmental Engineering, Inc. "Project Task 6 Report, Exposure Pathway Identification and Transport Modeling." Repository Document TA-1241. May.

ChemRisk (1994b). ChemRisk Division of McLaren/Hart Environmental Engineering, Inc. "Project Task 7 Report, Demographic & Land Use Reconstruction of the Area Surrounding the Rocky Flats Plant." Repository Document TW-214. April.

ChemRisk (1994c). ChemRisk Division of McLaren/Hart Environmental Engineering, Inc. "Project Task 5 Report, Estimating Historical Emissions from Rocky Flats." Repository Document TA-1240. March.

Hinds, W. (1982). Aerosol Technology - Properties, Behavior and Measurement of Airborne Particles. John Wiley & Sons, New York.

ICRP (1989). International Commission on Radiological Protection. "Age-dependent Doses to Members of the Public from Intake of Radionuclides: Part 1." ICRP Publication 56. *Annals of the ICRP*, Vol. 20, No. 2, Pergamon Press, Oxford.

ICRP (1990). International Commission on Radiological Protection. "1990 Recommendation of the International Commission on Radiological Protection." ICRP Publication 60. *Annals of the ICRP*, Vol. 21, No. 1-3, Pergamon Press, Oxford.

Kocher, D. C. (1983). "External Dosimetry" In: *Radiological Assessment - a Textbook on Environmental Dose Analysis*. J.E. Till and H. R. Meyer, Eds. NUREG/CR-3332, ORNL-5968.

NCRP (1984). National Council on Radiation Protection and Measurements. "Radiological Assessment: Predicting the Transport, Bioaccumulation, and Uptake by Man of Radionuclides Released to the Environment." NCRP Report No. 76. Bethesda, MD.

NRC (1990). National Research Council. "Health Effects of Exposure to Low Levels of Ionizing Radiation." "BEIR V", National Academy Press, Washington, D.C.

USEPA (1984). U.S. Environmental Protection Agency. "Health Assessment Document for Carbon Tetrachloride. Final Report". Environmental Criteria and Assessment Office. Cincinnati, OH. EPA-600/8-82-001F. September.

USEPA (1985). U.S. Environmental Protection Agency. "Health Assessment Document for Chloroform. Final Report." Office of Health and Environmental Assessment. Washington, D.C. EPA-600/8-84-004F. August.

USEPA (1988). U.S. Environmental Protection Agency. "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion." Federal Guidance Report No. 11. EPA-520/1-88-020.

USEPA (1989). U.S. Environmental Protection Agency. "Exposure Factors Handbook." Exposure Assessment Group, Office of Health and Environmental Assessment, Washington, D.C.

USEPA (1992). U.S. Environmental Protection Agency. "Health Effects Assessment Summary Tables, Annual FY-1992." OERR 9200.6-303-(92-1), Office of Research and Development, Office of Emergency and Remedial Response, Washington, D.C.

USEPA (1993). U.S. Environmental Protection Agency. "Integrated Risk Information System (IRIS)." Washington, D.C.

This page intentionally left blank.

7.0 GLOSSARY

absorption efficiency	The fraction of contaminant inhaled, ingested or adhered to the skin that is actually absorbed into the blood stream.
air dispersion model	A mathematical model that predicts the movement and distribution of airborne materials in the atmosphere.
air transport model	See air dispersion model.
airborne releases	Release of contaminants into the atmosphere.
alpha particles	Highly energetic helium nuclei that are emitted from some radioactive materials undergoing transformation. Alpha particles give up their energy very rapidly and do not travel far in air or water. Alpha emitting radionuclides can cause very localized damage when inhaled or ingested but do not cause any damage outside the body because alpha particles cannot penetrate the outer layer of skin.ambient air monitoringMonitoring of contaminants in air at a location away from the source.
background levels	Levels of contaminant normally found in air, soil, water or food that are not attributable to a particular known source of interest.
beta particles	Electrons that are emitted from some radioactive materials undergoing transformation. Beta particles can travel up to 10 m in air and 1 cm in water. Beta emitting radionuclides can cause damage internally when inhaled or ingested. Unlike alpha particles, some highly energetic beta particles can also penetrate the skin.
carcinogen	A substance or agent which has been shown to increase cancer incidence rates in laboratory animals or humans.
centroid	The center of mass of an area having constant density. In this report, centroids represent the geographic center of sectors.
chemical dose	The amount of a chemical taken in by an exposed individual through one or more exposure pathways.

dose conversion factor	Factors used by health professionals to relate the amount of radionuclide inhaled or ingested or concentration of radionuclide in an environmental medium to potential health effects as measured by equivalent dose or effective dose. See Appendix B for a more detailed explanation.
dose assessment	The process of identifying environmental exposures and quantifying doses associated with these exposures.
effective dose	A term used by health professionals to quantify radiation doses to specific organs of the body in terms of what the equivalent dose would be to the whole body that would result in similar health risk. See Appendix A for a more detailed explanation.
equivalent dose	A term used by health professionals to quantify radiation dose to a particular organ or tissue. See Appendix A for a more detailed explanation.
environmental transport	Movement of a material or contaminant through environmental media such as air, soil, or water by either diffusion, bioconcentration, or mass movement.
exposure duration	The period of time in which an individual is assumed to be exposed to contaminants in the environment.
exposure point	A location where people may come into contact with contaminants in environmental media such as air, soil, water, and food.
exposure routes	Pathways through which contaminants in environmental media (e.g., air, soil, or water) may affect an individual. Some commonly encountered exposure routes are: inhalation of contaminated air, ingestion of contaminated soil, water, and food stuffs, and dermal contact of contaminated soil or water.

external exposure pathways	Exposure routes arising from close proximity to radioactive material that is not taken into the body. Examples of external exposure are immersion in contaminated air or water and ground exposure. Through these three pathways, beta and gamma emitting radionuclides can impart a radiation dose to a nearby person without entering the body of the person. Also see immersion and ground exposure.
Fugitive Dust Model	An air dispersion model used in the Rocky Flats Toxicologic Review and Dose Reconstruction project for the prediction of dispersion and deposition of contaminated soil particles.
gamma radiation	Electromagnetic waves emitted from nuclei of atoms following radioactive transformation. Also known as gamma rays. Unlike alpha and beta radiations, gamma radiations are not particles. Gamma radiations have higher penetrating power than alpha and beta particles, but can be attenuated by a thick layer of lead. Health effects of gamma radiation are identical to X-rays of the same energy.
gastrointestinal tract	The digestive tract, which is composed of the stomach and intestines.
geometric mean	In statistics, one way to describe the central tendency of a group of values or population.
geometric standard deviation	In statistics, one way to measure the degree of scattering in a group of values or population.
gross alpha radioactivity	Radioactivity measured in terms of alpha particles emitted, with no determination of their energy or the identity of the specific radionuclides from which they were emitted.
ground exposure	Ground exposure occurs when an individual stands on or near a ground surface contaminated with radionuclides that emit gamma or beta radiation.
human exposure pathways	The routes through which a contaminant in the environment can impact the health of an exposed person.

hydrogeology	The study of the occurrence, nature, and distribution of groundwater in a geologic system. It includes the study of physical makeup (*e.g.*, mineral composition and grain size of the sediment or rocks), geometrical relations between various formations and structural features (*e.g.*, cleavages, fractures and folds) in the system.
immersion	Immersion occurs when an individual is surrounded by an atmosphere or a body of water contaminated with radionuclides that emit gamma or beta radiation.
input parameters	Data used in mathematical equations; input parameters and equations are two integral parts of a mathematical model.
ionizing radiation	Radiation with a relatively high level of energy that is capable of creating positive and negative ions in water.
isopleth	A line on a map connecting points at which a given variable has a specific constant value.
isotopes	Elements having the same atomic number but different atomic weights; they have similar chemical properties but somewhat different physical properties.
microsievert	One millionth of a sievert (10^{-6} Sv).
model	A simplified representation of what we know about a system. Generally, mathematical equations and parameters are used to represent the physical, chemical, or biological processes that take place inside the system.
Monte Carlo simulation	A method of randomly sampling and combining variables of a mathematical equation. See Section 3.5 and Appendix K for more detailed explanations.
organic solvents	A group of chemicals that are commonly used as solvents for removing dirt and grease from metals or fabrics. They are generally quite volatile and have relatively low boiling points. Most of the commonly used organic solvents are short-chain hydrocarbons that contain one or more chlorine atoms.

plume	An elongated, mobile column or band of smoke or airborne contaminant.
radiation dose	The quantity of radiation energy absorbed by a body. Often weighted by factors to indicate the potential for biological damage. See Appendix A for a detailed explanation.
radiation dosimetry	The theory and application of the principles and techniques involved in the estimation of exposures to ionizing radiations.
radioactivity	The property of some materials that undergo spontaneous nuclear transformations that result in the formation of new elements. These transformations are accompanied by one or more emissions, such as gamma rays, alpha particles, or beta particles.
radionuclide	An atom of a radioactive element distinguished by its atomic number, atomic weight, and energy state.
reference dose	A criterion recommended by the USEPA to evaluate chronic noncarcinogenic health effects of a chemical. It is the highest dose of a chemical that is not expected to cause adverse health effects over a lifetime of daily exposure.
sievert	Under the international system of units for radiation, the special name given to the units for equivalent dose and effective dose, joules per kilogram.
slope factor	Defined by the USEPA as the 95 percent upper confidence limit of the probability of a carcinogenic response per unit daily intake of a chemical over 70 years. SFs are generally based on long-term animal studies and the application of conservative models to predict the relationship between chemical dose and excess cancer risk.
soil resuspension	The transport of soil particles from the ground surface to the air by the action of mechanical disturbance or wind.
source terms	Information relating the quantity, timing, and chemical and physical characteristics of a contaminant release.

surface waterborne releases	Release of contaminants into visible waters such as streams, rivers, creeks, or lakes.
wet deposition	A mechanism of removing gas or suspended particles from the atmosphere through rain or snow.

METRIC FRACTIONS

Multiple	Decimal Equivalent	Prefix	Symbol
10^{6}	1,000,000	mega-	M
10^{3}	1,000	kilo-	k
10^{2}	100	hecto-	h
10	10	deka-	da
10^{-1}	0.1	deci-	d
10^{-2}	0.01	centi-	c
10^{-3}	0.001	milli-	m
10^{-6}	0.000001	micro-	μ
10^{-9}	0.000000001	nano-	n
10^{-12}	0.000000000001	pico-	p
10^{-15}	0.000000000000001	femto-	f
10^{-18}	0.000000000000000001	atto-	a

METRIC CONVERSION TABLE

Multiply	By	Equals	Multiply	By	Equals
in.	2.54	cm	cm	0.394	in.
ft	0.305	m	m	3.28	ft
ac	0.404	ha	ha	2.47	ac
mi	1.61	km	km	0.621	mi
lb	0.4536	kg	kg	2.205	lb
liq. qt.-U.S.	0.946	L	L	1.057	liq. qt.-U.S.
ft^2	0.093	m^2	m^2	10.764	ft^2
mi^2	2.59	km^2	km^2	0.386	mi^2
ft^3	0.028	m^3	m^3	35.31	ft^3
d/m	0.450	pCi	pCi	2.22	d/m
pCi L^{-1}(water)	10^{-9}	μCi ml^{-1}(water)	μCi ml^{-1}(water)	10^{9}	pCi L^{-1}(water)
pCi m^{-3}(air)	10^{-12}	μCi cm^{-3}(air)	μCi cm^{-3}(air)	10^{12}	pCi m^{-3}(air

TRADITIONAL AND INTERNATIONAL RADIOLOGICAL UNITS

(Traditional units are in parentheses.)

Quantity	Unit / Special Name	Symbol	Expression in Terms of Other Units
absorbed dose	gray	Gy	J Kg^{-1}
	(rad)	rad	10^{-2} Gy
activity	becquerel	Bq	1 d s^{-1}
	(curie)	Ci	3.7×10^{10} Bq
dose equivalent	sievert	Sv	J Kg^{-1}
	(rem)	rem	10^{-2} Sv
exposure	coulomb per kilogram (roentgen)		C Kg^{-1}
		R	2.58×10^{-4} C Kg^{-1}

0914CDJ2

APPENDIX A

EQUIVALENT AND EFFECTIVE RADIATION DOSE

APPENDIX A

EQUIVALENT AND EFFECTIVE RADIATION DOSE

This appendix defines the terms used to describe and quantify radiation dose in this report. There are four main types of ionizing radiation often considered in evaluating dose: neutrons, alpha particles, beta particles, and gamma rays. Each is produced by radionuclides undergoing transformation from a higher energy state to a lower energy state. This transformation is commonly known as radioactive decay. Each type of radiation has the potential to cause adverse biological effects by imparting energy to cellular substances such as proteins and DNA. Absorbed dose, D, defined as the energy absorbed per unit mass at a point or average energy absorbed over a tissue or organ, is the fundamental dose quantity used to describe exposure to radiation (ICRP, 1990). Under the Système International (SI) of units, the unit of absorbed dose is the joule per kilogram (J kg^{-1}), which is given the special name gray (Gy). Until recently, the most common unit of absorbed dose was the rad. One gray is equal to 100 rad. However, absorbed dose alone is considered inadequate for predicting adverse health effects.

The amount of biological damage caused by each type of radiation is dependent upon its linear energy transfer (LET). LET is defined as the average energy imparted to an absorbing medium by a charged particle of specified energy as it moves across a unit distance in that medium. In the field of radiation dosimetry, LET is usually expressed in units of kiloelectron volts of radiation energy per micron of absorbing medium or keV μm^{-1}. The LET for photons represents the energy imparted to a medium (*e.g.*, tissue) by secondary electrons (electrons removed from their atomic orbitals) as a result of interaction between the photons and the absorbing medium. Different types of radiation have different LETs. Heavily-charged particles such as alpha particles and protons generally have high LETs, and beta particles and gamma rays or photon radiation have low LET.

For a given absorbed dose, high-LET radiations are more effective in causing biological damage than low-LET radiations. To account for differences in biological effects as a function of LET per unit absorbed dose, the ICRP in 1990 defined a radiation weighting factor (w_R), formerly known as the quality factor, that is applied to absorbed dose to yield a single dosimetric quantity called equivalent dose (ICRP, 1990). The numerical value of the w_R is a function of the type and energy of the radiation incident on the body or tissues of the body. These factors are not dependent on tissue or biological endpoint. Table A-1 presents radiation weighting factors for various ionizing radiations recommended by the Commission (ICRP, 1990).

TABLE A-1

RADIATION WEIGHTING FACTORS FOR DIFFERENT RADIATION TYPES (ICRP, 1990)

Radiation Type	Radiation Weighting Factor, w_R
X rays, γ rays, electrons	1
Neutrons with different energies	5 - 20
α particles, multiple charge particles, and particles of unknown charge and energy	20

The product of absorbed dose averaged over a tissue or organ and the radiation weighting factor is known as the equivalent dose, H_T :

$$H_T = \sum_R D_{T,R} \times w_R$$

Where:

H_T = Equivalent dose, joule per kilogram (special name: sievert, Sv);
$D_{T,R}$ = Average absorbed energy over an organ or tissue T, due to radiation R, Gy; and
w_R = Weighting factor for radiation R, dimensionless.

Equivalent dose is recommended by the Commission (1990) as a measure of radiation dose absorbed by an organ; it includes the amount of energy deposited on a tissue or organ and the biological effectiveness of associated radiations. Previously, H_T was known as the dose equivalent. The probability of stochastic health effects (such as malignant disease and genetic disorders) caused by ionizing radiation at low doses is found to be dependent on equivalent dose and the organ or tissue irradiated. ICRP therefore introduced another term called the tissue weighting factor, W_T, to represent the relative contribution of the damage in an organ or tissue to the total stochastic effects. The tissue weighting factors recommended by the ICRP are listed in Table A-2.

TABLE A-2

TISSUE WEIGHTING FACTORS FOR STOCHASTIC RISKS (ICRP, 1990)

Organ or Tissue	Tissue Weighting Factor, W_T
Gonads	0.20
Bone Marrow (red)	0.12
Colon	0.12
Lung	0.12
Stomach	0.12
Bladder	0.05
Breast	0.05
Liver	0.05
Esophagus	0.05
Thyroid	0.05
Skin	0.01
Bone Surface	0.01
Remainder	0.05

The sum of the weighted equivalent doses in all tissues and organs of the body is known as the effective dose, E:

$$E = \sum_T H_T \times W_T$$

Where:

E = Effective dose, joule per kilogram (special name: sievert, Sv);
H_T = Average equivalent dose in a tissue or organ T, Sv; and
W_T = Tissue weighting factor of tissue or organ T, dimensionless.

In the previous terminology, effective dose was known as effective dose equivalent. Effective dose is used in this assessment to quantify radiation doses resulting from external exposures such as ground exposure and air immersion exposure.

Radiation doses resulting from inhalation and ingestion of radionuclides are expressed in terms of committed effective doses. This is because, unlike external exposures that stop when the individual moves away from the contaminated area, certain radionuclides have relatively long biological half-lives in the body. For example, when plutonium and uranium isotopes are absorbed into the body, they are not readily excreted and can cause continuous irradiation of body tissue long after the intake has ceased. In the determination of radiation doses due to internal exposure, it is therefore necessary to calculate the total dose received over a period of time following intake. By convention, this period of time is taken to be 50 years. This 50-year sum of doses is known as the committed effective dose, E_{50}, and can be calculated by the following equation:

$$E_{50} = \sum_{T} W_T \times H_{T,50}$$

Where:

E_{50}	=	Committed effective dose, joule per kilogram (special name: sievert, Sv);
$H_{T,50}$	=	Total committed equivalent dose deposited in tissue or organ, T, over a 50-year period following intake of the radionuclide, Sv; and
W_T	=	Tissue weighting factor of tissue or organ T, dimensionless.

Effective dose and committed effective dose are used in this report to quantify radiation doses because they are consistent with our current knowledge of biological effects caused by radiation exposure and are believed to be directly proportional to radiation hazard.

REFERENCES

ICRP (1990). International Commission on Radiological Protection, "1990 Recommendations of the International Commission on Radiological Protection." ICRP Publication 60. *Annals of the ICRP*, Vol. 21, No. 1-3. Pergamon Press, Oxford.

APPENDIX B

SELECTION OF DOSE CONVERSION FACTORS

APPENDIX B

SELECTION OF DOSE CONVERSION FACTORS

This appendix explains what radiation dose conversion factors (DCFs) are and how they were used in this study to convert intakes of radionuclides and concentrations of radionuclides in environmental media to committed effective doses and effective doses to potentially exposed populations. DCFs are determined based on our understanding of the absorption and distribution of radionuclides in the body, anatomy of the human body, and biological effects of radiation. The determination of DCFs is quite complicated, and is not within the scope of this report.

Published values of DCFs are available from a number of authoritative sources:

- USEPA (1988). "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion." Federal Guidance Report No. 11. United States Environmental Protection Agency, Office of Radiation Programs, Washington D.C.

- USEPA (1993). "External Exposure to Radionuclides in Air, Water, and Soil." Federal Guidance Report No. 12. United States Environmental Protection Agency, Office of Radiation and Indoor Air, Washington, D.C.

- ICRP (1979). International Commission on Radiological Protection. "Limits for Intake of Radionuclides by Workers." ICRP Publication No. 30. *Annuals of the ICRP*. Volume 2, No. 3/4, Pergamon Press, Oxford.

- ICRP (1990). International Commission on Radiological Protection. "Age-Dependent Doses to Members of the Public from Intake of Radionuclides: Part 1." ICRP Publication No. 56. *Annals of the ICRP.* Volume 20, No. 2. Pergamon Press, Oxford.

- USDOE (1988). U. S. Department of Energy. "External Dose-Rate Conversion Factors for Calculation of Dose to the Public." DOE/EH-0070, DE88-014691.

- USDOE (1988). U. S. Department of Energy. "Internal Dose Conversion Factors for Calculation of Dose to the Public." DOE/EH-0071, DE88-014297.

Most of the DCFs provided in the documents listed above are very similar, since they are based on "reference man" assumptions of ICRP Report 23 (ICRP, 1975) and the conceptual models recommended by ICRP Report 30 (1979). It should be noted that values of DCFs are revised from time to time to reflect our current knowledge of radiation dosimetry. For purposes of this assessment, DCFs derived by the ICRP (1990) and the USEPA (1988 and 1993) were used and are presented in Table 2-1. They are expressed in terms of Sv Bq^{-1} (internal dose per unit activity inhaled or ingested), Sv y^{-1} per Bq cm^{-3} or Sv y^{-1} per Bq cm^{-2} (external dose rate per unit radionuclide concentration in air or on the ground surface). An assessment of the uncertainty in these DCFs was beyond the scope of Phase I investigations, and has not been included in associated uncertainty analyses. The Phase II contractor will address uncertainty of dose conversion factors as part of their health studies activities.

As explained in Appendix A, committed effective dose and effective dose are used in this report to quantify radiation doses. They can be calculated by the two equations shown below:

For internal exposures such as inhalation and ingestion of radionuclides

$$E_{50} = I_i \times DCF_i$$

Where:

E_{50}	=	Committed effective dose, Sv;
I_i	=	Amount of a radionuclide inhaled or ingested, Bq; and
DCF_i	=	Committed effective dose per unit intake (dose conversion factor) for a particular radionuclide, Sv Bq^{-1}.

For external exposures such as air immersion and ground exposure

$$DR = C \times DCF_e$$

Where:

DR	=	Effective dose rate, Sv y^{-1};
C	=	Amount of radionuclide in an environmental medium, Bq cm^{-3} in air or Bq cm^{-2} on ground surfaces; and
DCF_e	=	Dose rate factor for external exposure, Sv y^{-1} per Bq cm^{-3} or Sv y^{-1} per Bq cm^{-2}.

Since DCFs are specific to radionuclide, route of exposure, physical and chemical form of the radionuclide and the age of the exposed individual, it is important to select the DCFs that are appropriate to the exposure situation under evaluation. The rationale used in the selection of DCFs in this assessment is discussed in the following sections.

Inhalation Exposure

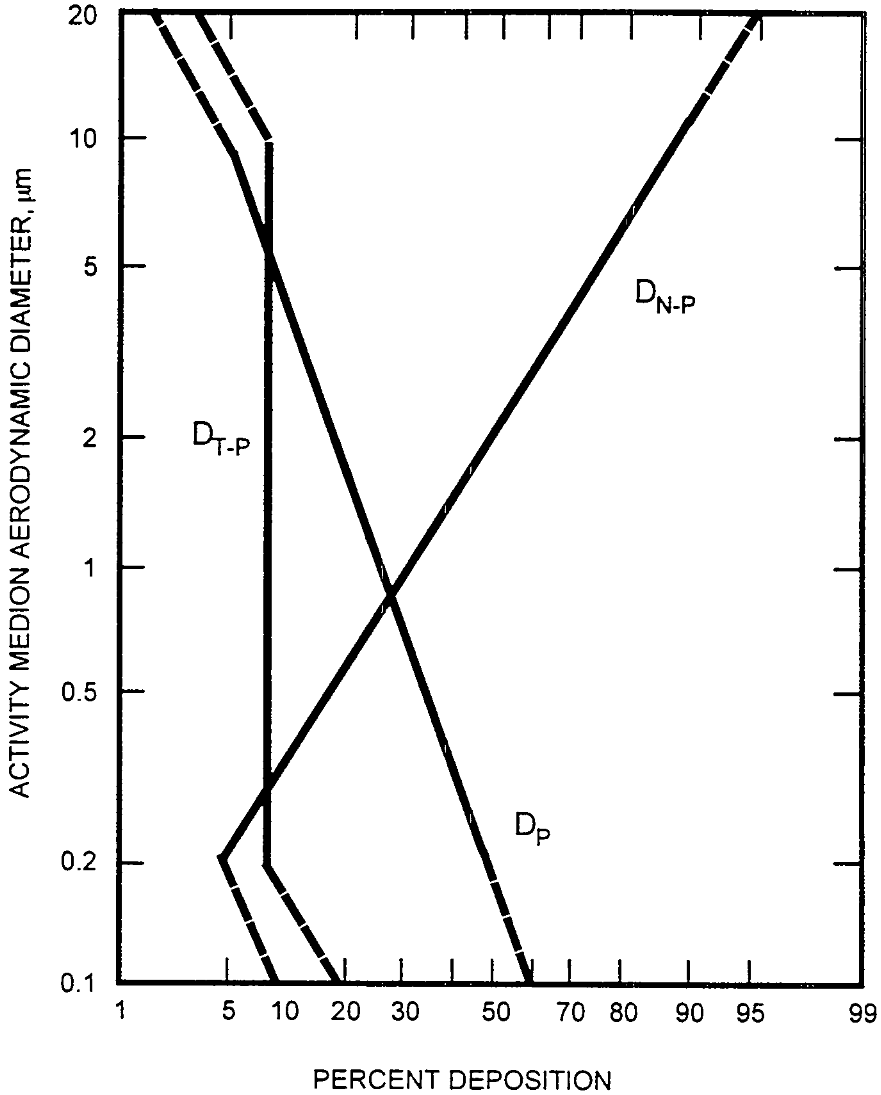
The health hazard posed by a radioactive compound is dependent on the chemical composition and physical properties (such as water solubility) of the compound. In the development of DCFs for inhalation exposure, the ICRP placed radioactive compounds into three classes (D for days, W for weeks, and Y for years) according to the magnitude of lung clearance half-times for the materials in humans. For a given radionuclide, a DCF for inhalation is determined for every relevant class of compounds. For example, most plutonium compounds are relatively insoluble and fall under class W (half-time of 10 to 100 days) or Y (half-time greater than 100 days). According to ICRP Report 56 (ICRP, 1990), inhalation DCFs of plutonium-239/240 compounds in classes W and Y are 1.2×10^{-4} and 8.4×10^{-5} Sv Bq^{-1}, respectively.

As discussed in the Task 5 report, it appears that forms of uranium and plutonium with varying chemical properties were present at Rocky Flats. Therefore, to account for the possibility that uranium and plutonium associated with Rocky Flats emissions may have experienced varying rates of clearance from the lung, the inhalation DCFs for enriched uranium, depleted uranium, and plutonium-239/240 are represented by uniform distributions between values corresponding to slightly soluble (Class W) and insoluble (Class Y) compounds of uranium-234, uranium-238, and plutonium-239.

The inhalation DCF of a radionuclide is also dependent on the particle size of the radioactive material involved. This is because the fractions of inhaled particles deposited in the nasopharyngeal (N-P), tracheobronchial (T-B) and pulmonary (P) regions of the respiratory system are related to the activity or mass median aerodynamic diameter (AMAD or MMAD) of the particles. According to the ICRP deposition model, as AMAD of inhaled particles decreases from 5 to less than one micron, the fraction of particles deposited in the pulmonary region increases from less than 10 percent to about 50 percent (Figure B-1).

Inhalation DCFs established by various scientific bodies are based on the assumption that the diameters of inhaled particles are lognormally distributed and have an AMAD of 1 micron. A method is suggested in ICRP 30 (1979) for the determination of inhalation DCFs for particles with AMADs other than 1 micron. As described in the Task 5 report, routine effluents from the plant were filtered by high efficiency particulate air (HEPA) filters before release into the atmosphere. Based on the theory of operation of HEPA filters and limited effluent particle size studies, contaminant particles released during routine operations are likely to have had aerodynamic diameters near 0.3 to 0.4 micron. Radionuclides released from fires and the resuspension of contaminated soils are believed to have particle size distributions that differ from those associated with routine releases.

No studies have been identified that adequately characterize the actual particle size distribution of radioactive contaminants at off-site exposure locations for the various types of releases. If the public were being exposed only to very small particles (particles lognormally distributed with an AMAD of 0.3 micron), then the inhalation DCFs used in this report would result in understatement of associated doses by about 60 percent. However, due to the lack of information on the actual particle size distribution of contaminant particles the public has been exposed to, inhalation DCFs used in this assessment are based on the standard assumption of particle size distribution (particles lognormally distributed with an AMAD of 1 micron). Refinements to these DCF assumptions may be pursued under the Phase II Studies.



The percentage of activity or mass of an aerosol which is deposited in the nasopharyngeal (N-P), tracheobronchial (T-B) and pulmonary (P) regions is given in relation to the Activity Median Aerodynamic Diameter (AMAD) of the aerosol distribution. The model is intended for use with aerosol distributions with AMADs between 0.2 and 10 μm and with geometric standard deviations of less than 4.5. Provisional estimates of deposition further extending the size range are given by the dashed lines. For an unusual distribution with an AMAD of greater than 20 μm, complete deposition in N-P can be assumed. The model does not apply to aerosols with AMADs of less than 0.1 μm.

ChemRisk
A Division of McLaren/Hart

FIGURE B-1
DEPOSITION OF DUST IN THE
RESPIRATORY SYSTEM
(SOURCE: ICRP 30)

Ingestion Exposure

Similar to inhalation exposure, there is usually more than one ingestion DCF for a particular radionuclide. This is because the health hazard posed by a radioactive compound through ingestion is dependent on the extent to which the compound is absorbed into the blood from the gastrointestinal system. The ICRP placed radioactive compounds into different classes according to their fractional uptake from the small intestine to blood (f_1). For a given radionuclide, a high fractional uptake is generally associated with a high ingestion DCF. For example, ingestion DCFs for uranium-234 compounds with GI uptake factors equal to 0.002 and 0.05 are 7.1×10^{-9} and 7.7×10^{-8} Sv Bq^{-1}, respectively.

To account for the possibility that uranium associated with Rocky Flats emissions may have experienced varying fractional uptakes from the gastrointestinal tract to the blood, ingestion DCFs for enriched and depleted uranium are represented by uniform distributions between values corresponding to fractional uptake values of 0.2 percent and 5 percent. Because DCFs for plutonium are given in ICRP 56 for only a single fractional uptake class (f_1 = 0.1 percent), the ingestion DCF for plutonium-239/240 is represented by a point estimate based on the DCF for plutonium-239.

Immersion and Ground Exposure

DCFs used to calculate exposures from direct exposure from contaminated ground surfaces and immersion in contaminated air were taken from USEPA's Federal Guidance Report No. 12, "External Exposures to Radionuclides in Air, Water, and Soil" (USEPA, 1993). DCFs for external exposure routes such as immersion and ground exposure differ from DCFs for inhalation and ingestion in two important ways. First, radiation dose calculated for external exposure is presented in terms of effective dose instead of committed effective dose. This is because external radiation exposure ends when the individual moves away from the contaminated area. This differs from the situation of ingested or inhaled radioactivity, where dose often continues to be delivered to the body of the exposed individual for years after intake ends. Another distinction is that radiation dose calculated for external exposure pathways is usually stated in terms of a dose rate, for example in Sv y^{-1}. However, dose rates can easily be converted to integrated or committed radiation doses in Sv if the durations of exposure are known.

The plutonium in Rocky Flats emissions that is represented as plutonium-239/240 contained both Pu-239 and Pu-240. To account for implications of this fact on exposures from contaminated ground surfaces and from immersion in contaminated air, associated DCFs are represented by uniform distributions between values corresponding to Pu-239 and Pu-240.

REFERENCES

ICRP (1975). International Commission on Radiological Protection. "Report of the Task Group on Reference Man." ICRP Publication No. 23. Pergamon Press, Oxford.

ICRP (1979). International Commission on Radiological Protection. "Limits for Intake of Radionuclides by Workers." ICRP Publication No. 30. *Annals of the ICRP.* Vol. 2, No. 3/4. Pergamon Press, Oxford.

ICRP (1989). International Commission on Radiological Protection. "Age-Dependent Doses to Members of the Public from Intake of Radionuclides: Part 1." ICRP Publication No. 56. *Annals of the ICRP.* Vol. 20, No. 2. Pergamon Press, Oxford.

Lee, S.Y., E.A. Bondietti, and T. Tamura (1982). "Dissolution Characteristics of Pu-contaminated Soils and Sediments in Lung Serum Stimulant Solution." *Health Physics,* Vol. 43, 663-666.

USEPA (1988). United States Environmental Protection Agency. "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion." Federal Guidance Report No. 11. Office of Radiation Programs, Washington, D.C.

USEPA (1993). United States Environmental Protection Agency "External Exposure to Radionuclides in Air, Water, and Soil." Federal Guidance Report No.12. Office of Radiation and Indoor Air, Washington, D.C.

APPENDIX C

EXPOSURE CHARACTERISTICS OF THE INDIVIDUAL MODELED IN THE DOSE ASSESSMENT

APPENDIX C

EXPOSURE CHARACTERISTICS OF THE INDIVIDUAL MODELED IN THE DOSE ASSESSMENT

The chemical and radiation doses determined in this dose assessment are very much dependent on how the exposed individual was defined in terms of intake rates, exposure patterns, and dietary habits. The purpose of this appendix is to provide a more detailed description of the individual modeled in this report and to put some of the intake parameters into more recognizable terms. It is important to keep in mind that the intake values presented in this appendix are based on surveys or studies of the adult population. As discussed in Section 2.3 of the main text, intake values for infants and small children are often different from those presented here. Some of the more important intake parameters of different age groups are presented in Tables 2-2 and 2-3 of the main text. It is also important to keep in mind that the input parameter distributions are used for both short- and long-term events. As a result, the parameter distributions may be somewhat broad (*i.e.*, the lower and upper bounds may be larger than necessary) for the longer term events; however, the limited amount of data that are available for most of these parameters makes it difficult to narrow these bounds. In any event, other uncertainties in this analysis, *e.g.*, uncertainties associated with air dispersion modeling, are much larger, and will dwarf any additional uncertainty associated with the broad bounds on the input distributions.

The following characteristics were used to describe the individual modeled in this assessment:

- An adult resident
- Exposed to contaminants released from the Rocky Flats Plant through one or more of the following pathways
  - Inhalation exposure to direct releases and resuspended soil particulates
  - Ingestion of locally grown vegetables, wheat, milk and beef
  - Incidental ingestion of soil
  - Ingestion of drinking water
  - Ground exposure to deposited radionuclides
  - Immersion exposure to direct releases and resuspended soil particulates
- Air, water, food, and incidental soil intake rates typical of those reported for the nation's population
- Exposure characteristics, such as exposure frequency and the fraction of food that is locally grown, typical of those reported for the nation's population.

Although all of the human intake parameters or characteristics are summarized in Appendix J, they are generally given in units that are convenient for the dose calculations, but not necessarily very understandable. Where possible, the following discussion translates these parameters into more easily understood terms.

Body Weight

The best or most likely estimate of body weight used in this assessment is 68 kilograms or about 150 pounds. The lower and upper bounds for this parameter are about 105 and 215 pounds, respectively.

Inhalation Rate

The best estimate of inhalation rate is 20 cubic meters of air per day. This parameter is not easy to put into more understandable terms. Essentially, a person's daily intake of air is going to be dependent on the type of activities he or she engages in. Many studies have been done to estimate breathing rates associated with various activities, ranging from sleeping or resting to heavy activities such as construction work or strenuous exercise. Based on these types of studies, a daily inhalation of 20 cubic meters is equivalent to approximately 8 hours of rest (*e.g.*, sleeping, watching television, reading), 12 hours of light activity (*e.g.*, office work, some household chores) and 4 hours of moderate activity (*e.g.*, some types of exercise, construction work). The lower and upper bounds for this parameter are 9 and 29 cubic meters per day, respectively. These lower and upper bound daily intakes would be associated with an individual who engages in mostly resting activities or an individual who engages in moderate or heavy activity for 8 or more hours a day.

Milk Ingestion Rate

The best estimate of milk ingestion is 0.25 liters per day, or approximately 8 ounces. This would likely correspond to someone who drinks a single glass of milk a day. The lower and upper bounds for this parameter are about 2.5 and 31 ounces per day, respectively. The lower bound likely represents an individual who ingests milk as part of other food (*e.g.*, bowl of cereal), while the upper bound represents someone who drinks nearly a quart of milk per day.

Beef Ingestion Rate

The best estimate of beef ingestion rate is 0.09 kilograms per day, or approximately one-quarter of a pound per day. Since a typical serving of beef likely exceeds a quarter of a pound, this ingestion rate likely corresponds to someone who eats beef 3 or 4 times per week. The upper and lower bounds for this parameter are about one-tenth and four-tenths of a pound, respectively. An individual representative of the lower bound likely eats beef only once a week, while an individual representative of the upper bound probably eats beef nearly every day.

Vegetable Ingestion Rate

The best estimate of vegetable ingestion is 0.15 kilograms, or about one-third of a pound per day. This quantity of vegetables corresponds to either about a medium-sized zucchini or a large tomato. The lower and upper bounds of this parameter are about one-tenth and three-quarters of a pound, respectively. The lower bound likely represents an individual who doesn't eat vegetables every day, while the upper bound likely represents an individual who eats more than one serving of vegetables every day.

APPENDIX D

VARIATION OF PREDICTED AIR CONCENTRATIONS WITHIN THE IDENTIFIED SECTORS

APPENDIX D

VARIATION OF PREDICTED AIR CONCENTRATIONS WITHIN THE IDENTIFIED SECTORS

Introduction

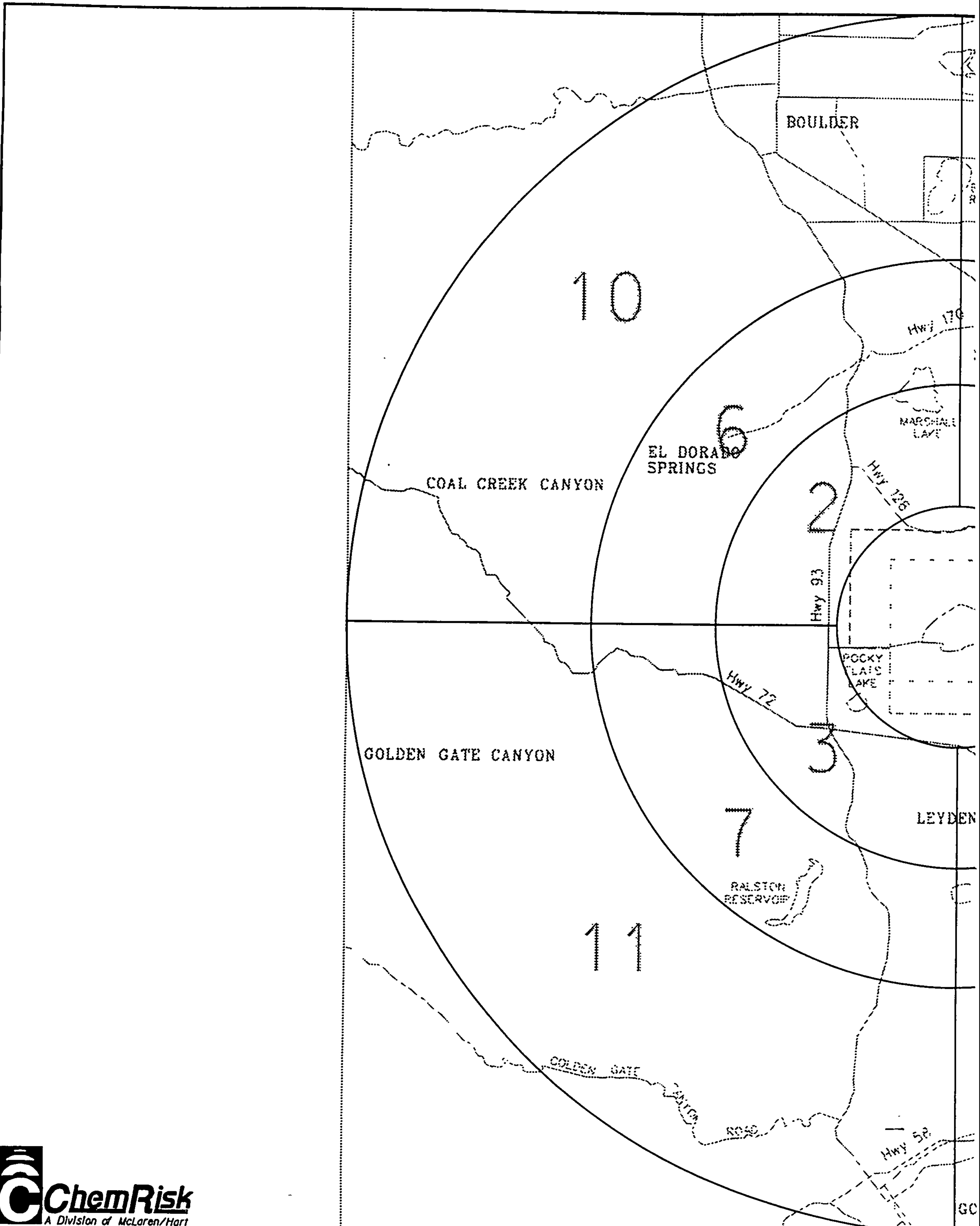
There are many locations where individuals around Rocky Flats could have been exposed during the operational history of the plant. For the purpose of this dose assessment, an area between 2 and 10 miles from the center of the Rocky Flats Plant (RFP) was considered the primary study area for which chemical and radionuclide doses would be calculated. It should be noted, however, that the study area to the west of the plant extends only as far as the dramatic increase in elevation associated with the front range of the Rocky Mountains, because the air dispersion models used for these analyses do not accurately predict contaminant concentrations in mountainous areas. As the study area encompasses over 300-square miles, it was partitioned into smaller geographical areas, or sectors, within which contaminant concentrations in various environmental media could be represented by those determined for a single point, *i.e.*, the centroid. The purpose of this appendix is to describe the variation of predicted air concentrations within the identified sectors. This is accomplished by first predicting annual average air concentrations at the corners and centroids of the sectors for the different airborne release events. Second, the variation of predicted air concentrations within a sector is assessed by comparing the air concentration at each of the four corners of a sector to the air concentration at the centroid of the sector. The results of these comparisons for routine and accidental releases are discussed separately in the following sections.

Routine Airborne Releases

The size of the sectors that can be used is dependent on the nature of the airborne contaminant release, which influences its distribution in the environment. Routine releases occurred throughout the year and were subjected to the full range of environmental conditions at the site that tend to fairly uniformly distribute contaminants in the vicinity of the plant. For the purposes of this assessment, the study area was divided into 12 sectors as shown in Figure D-1. Since it is expected that there would be greater variability near the source, the sectors close to the plant are smaller than those further away.

As discussed in the Task 6 report, three different modeling runs were conducted for the routine releases to account for differences in stack parameters and release points. The first run is applicable to routine releases of plutonium-239/240 and americium-241, the second to routine releases of depleted and enriched uranium and the third to routine releases of tritium and all of the chemicals of concern. Using a unit concentration, annual average air concentrations were predicted for the 12 centroid locations and the four corners of each sector. The variation in predicted air concentrations within each sector is shown on Figures D-2 through D-4 for the three modeling runs, respectively.

This page intentionally left blank.



ChemRisk
A Division of McLaren/Hart
RkyF893H/RFd-01.dgn; Rev: 10-01-93

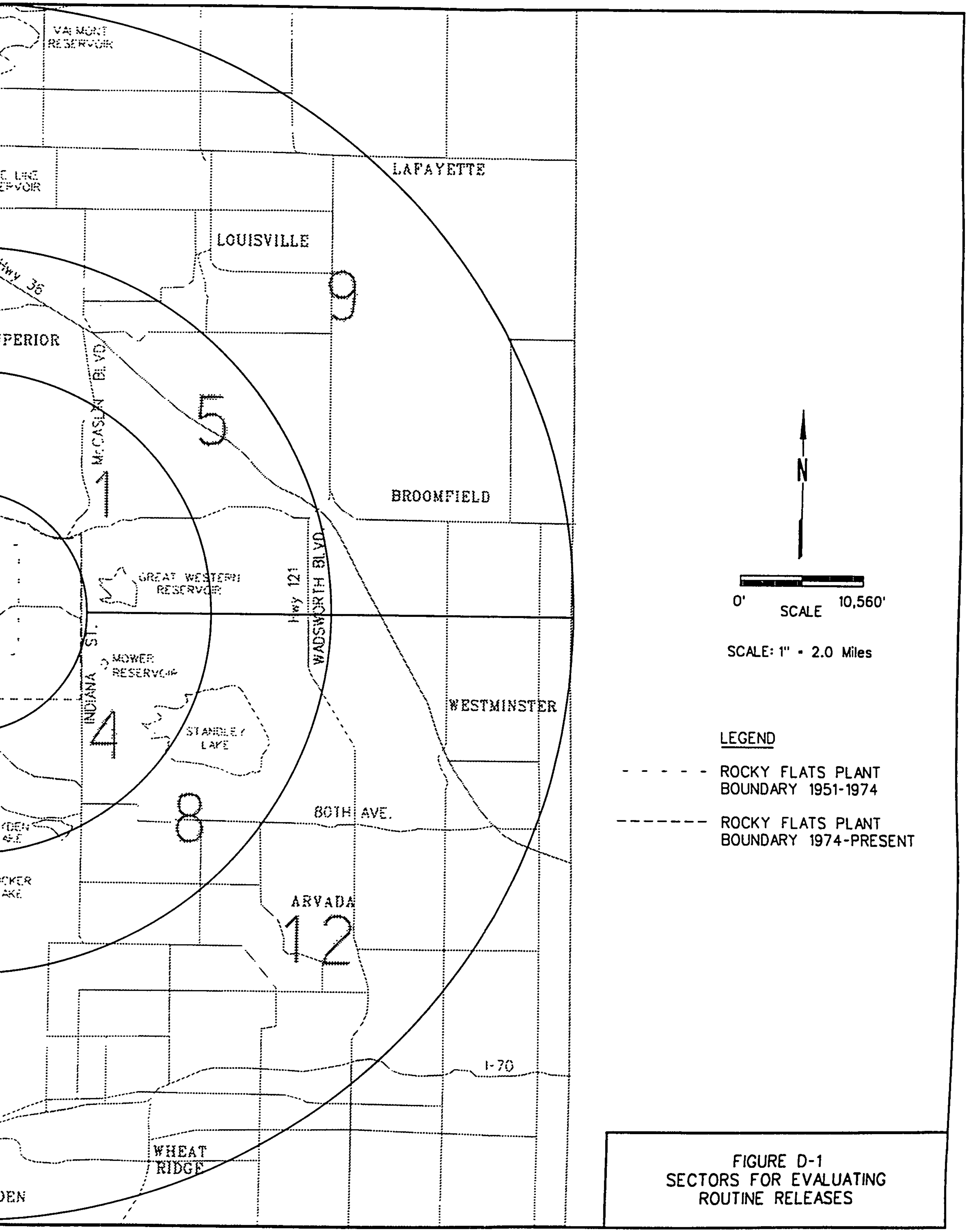
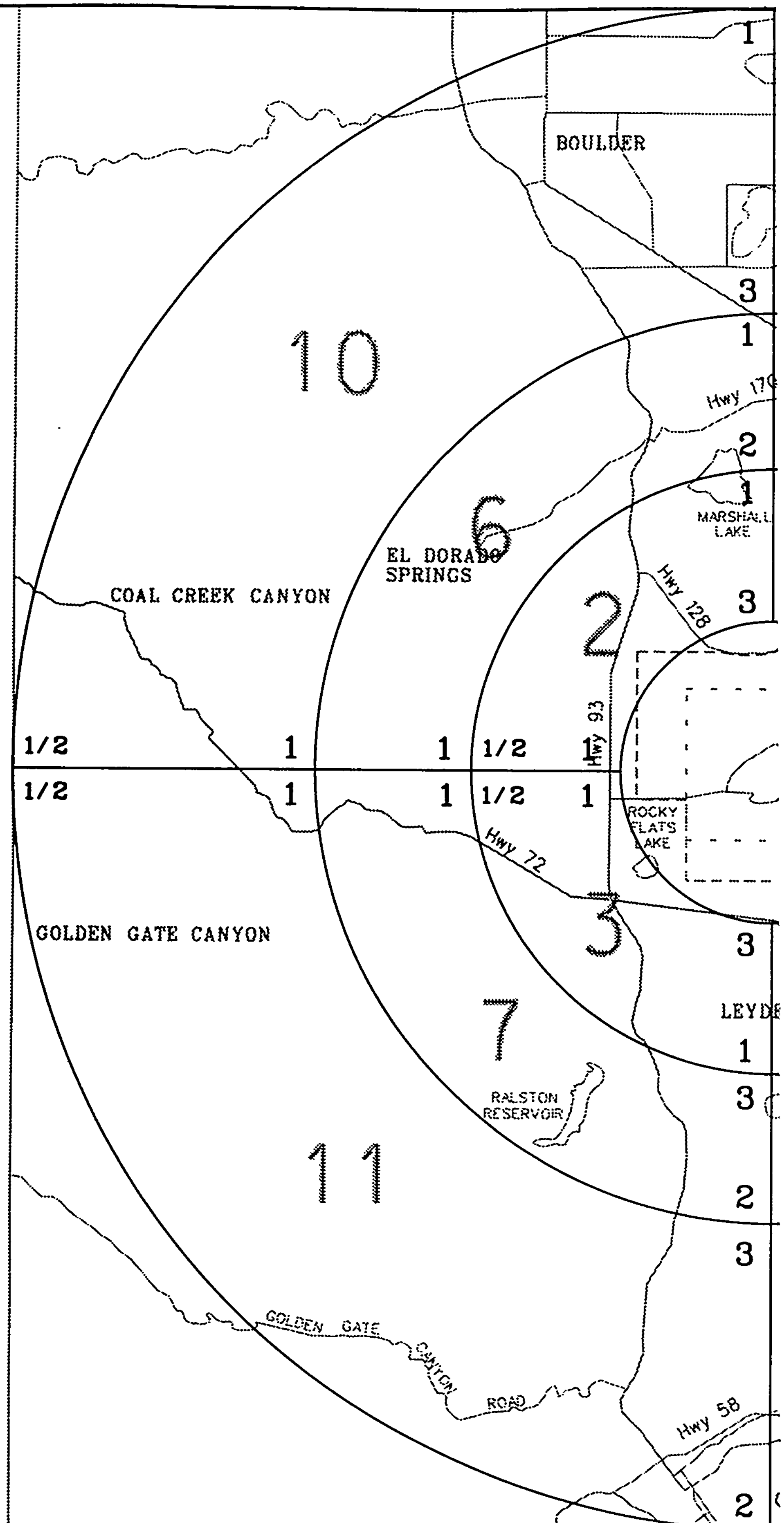
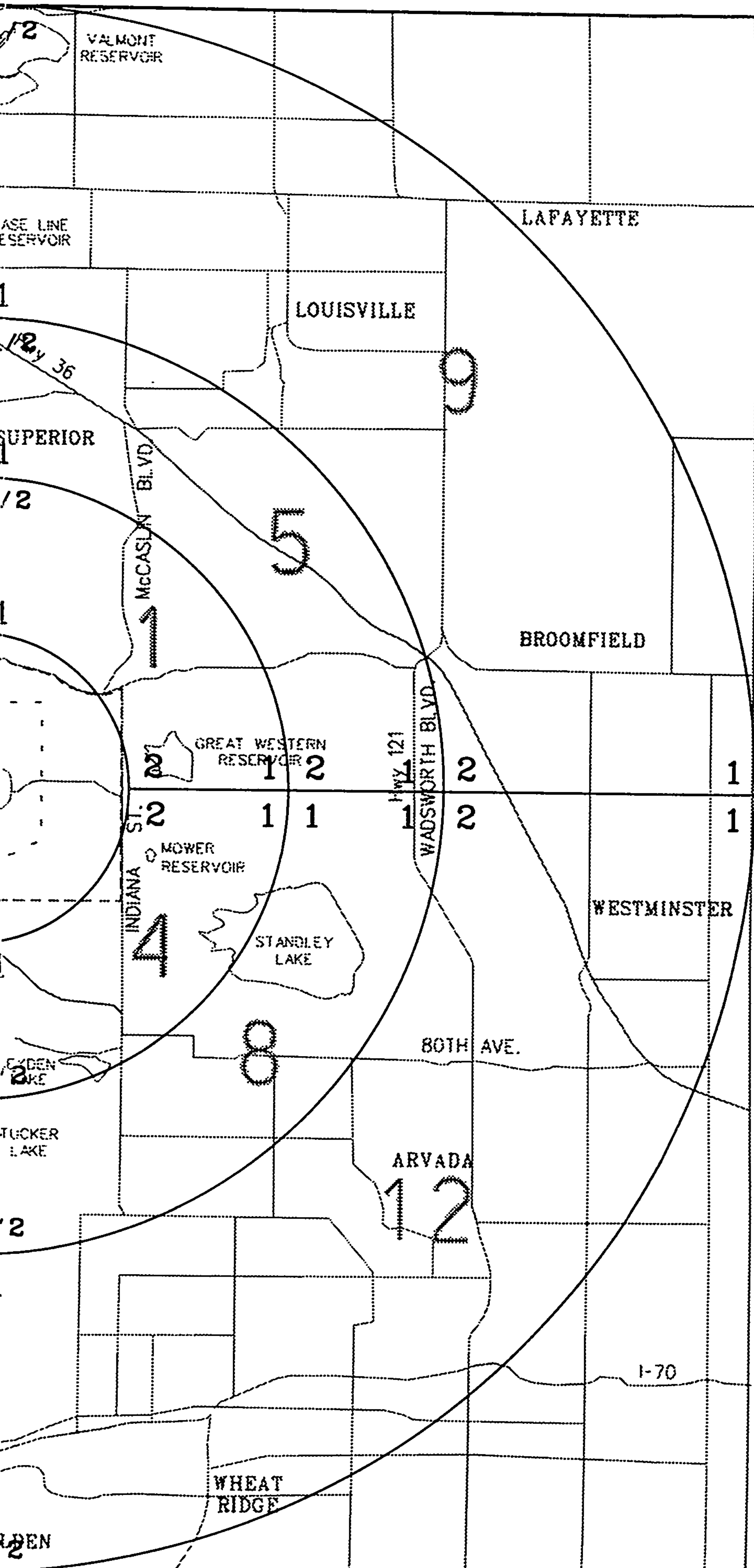


FIGURE D-1
SECTORS FOR EVALUATING ROUTINE RELEASES



ChemRisk
A Division of McLaren/Hart

RkyF893H/RFd-02.dgn; Rev: 10-01-93



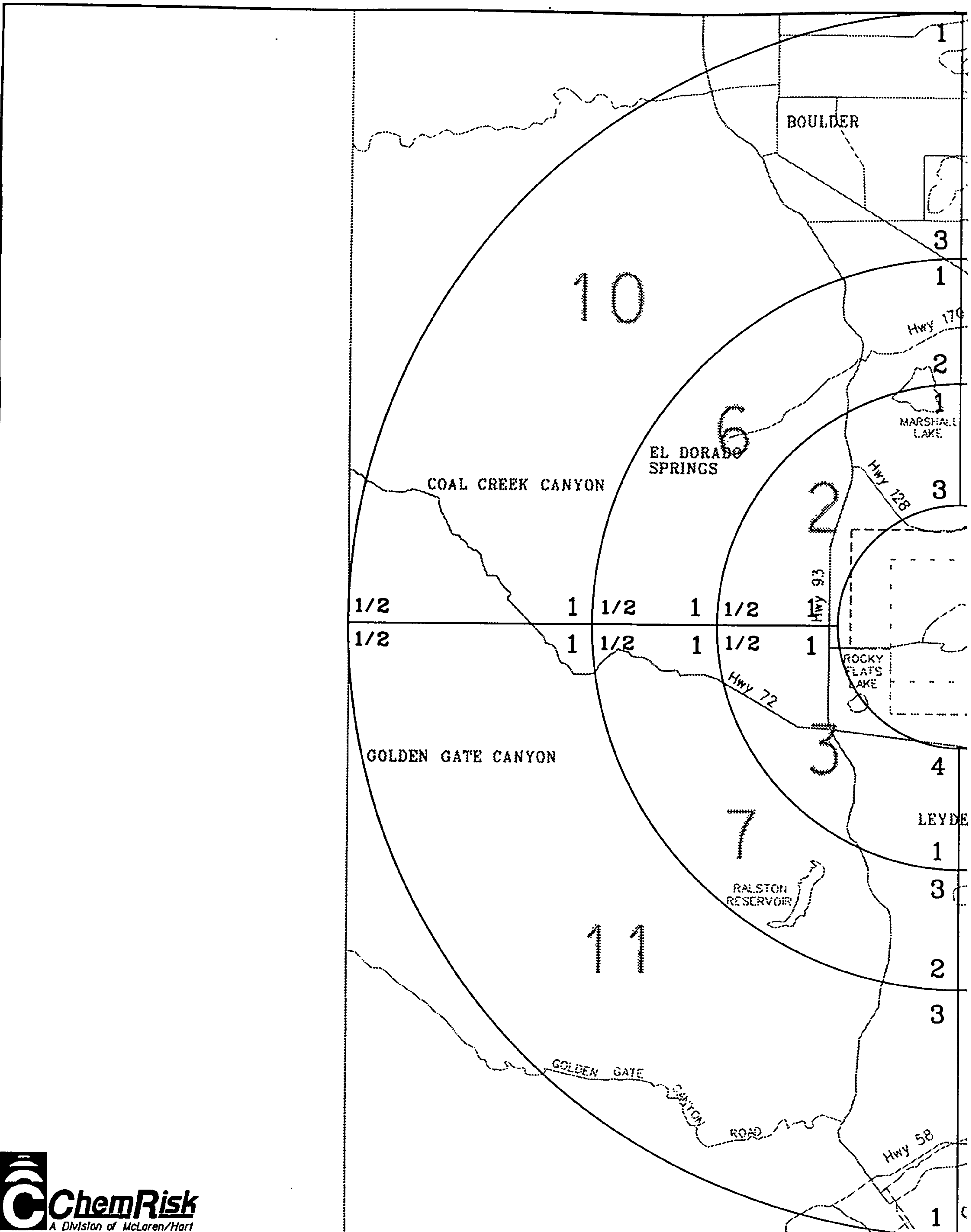
LEGEND

- - - - - ROCKY FLATS PLANT BOUNDARY 1951-1974

-·-·-·-·- ROCKY FLATS PLANT BOUNDARY 1974-PRESENT

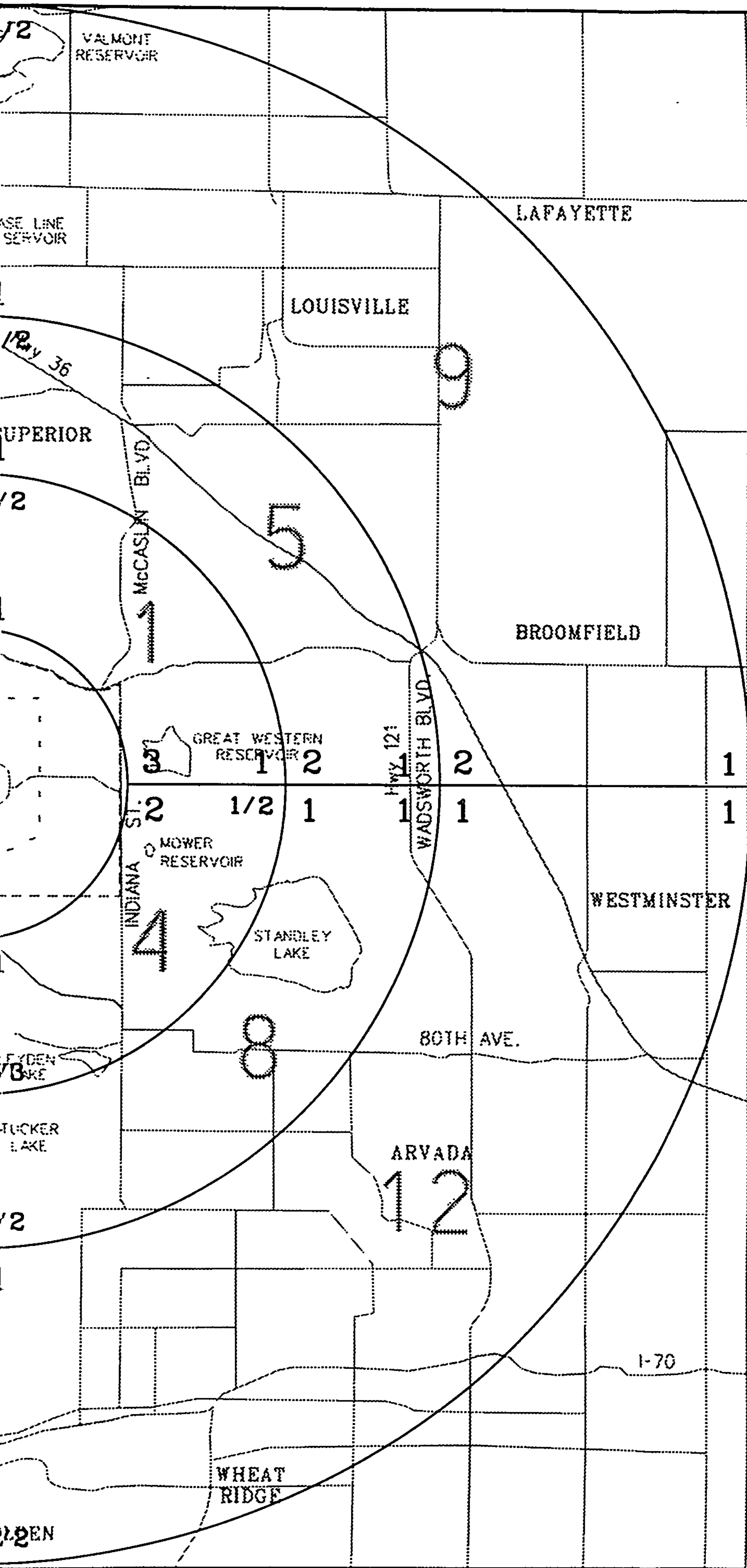
NOTE:
THE NUMBER IN THE CORNER OF EACH SECTOR REPRESENTS THE RATIO OF THE PREDICTED CONCENTRATION AT THE CORNER TO THE PREDICTED CONCENTRATION AT THE CENTROID (e.g., A VALUE OF 2 MEANS THAT THE PREDICTED CONCENTRATION AT THE CORNER IS APPROXIMATELY TWO TIMES HIGHER THAN THE CONCENTRATION PREDICTED AT THE CENTROID, AND SO ON.)

FIGURE D-2
VARIATION OF PREDICTED AIR CONCENTRATIONS WITHIN A SECTOR-ROUTINE PLUTONIUM-239/240 AND AMERICIUM-241 RELEASES



ChemRisk
A Division of McLaren/Hart

RkyF893H/RFd-03.dgn; Rev: 10-01-93



N

0' 10,560'
SCALE

SCALE: 1" = 2.0 Miles

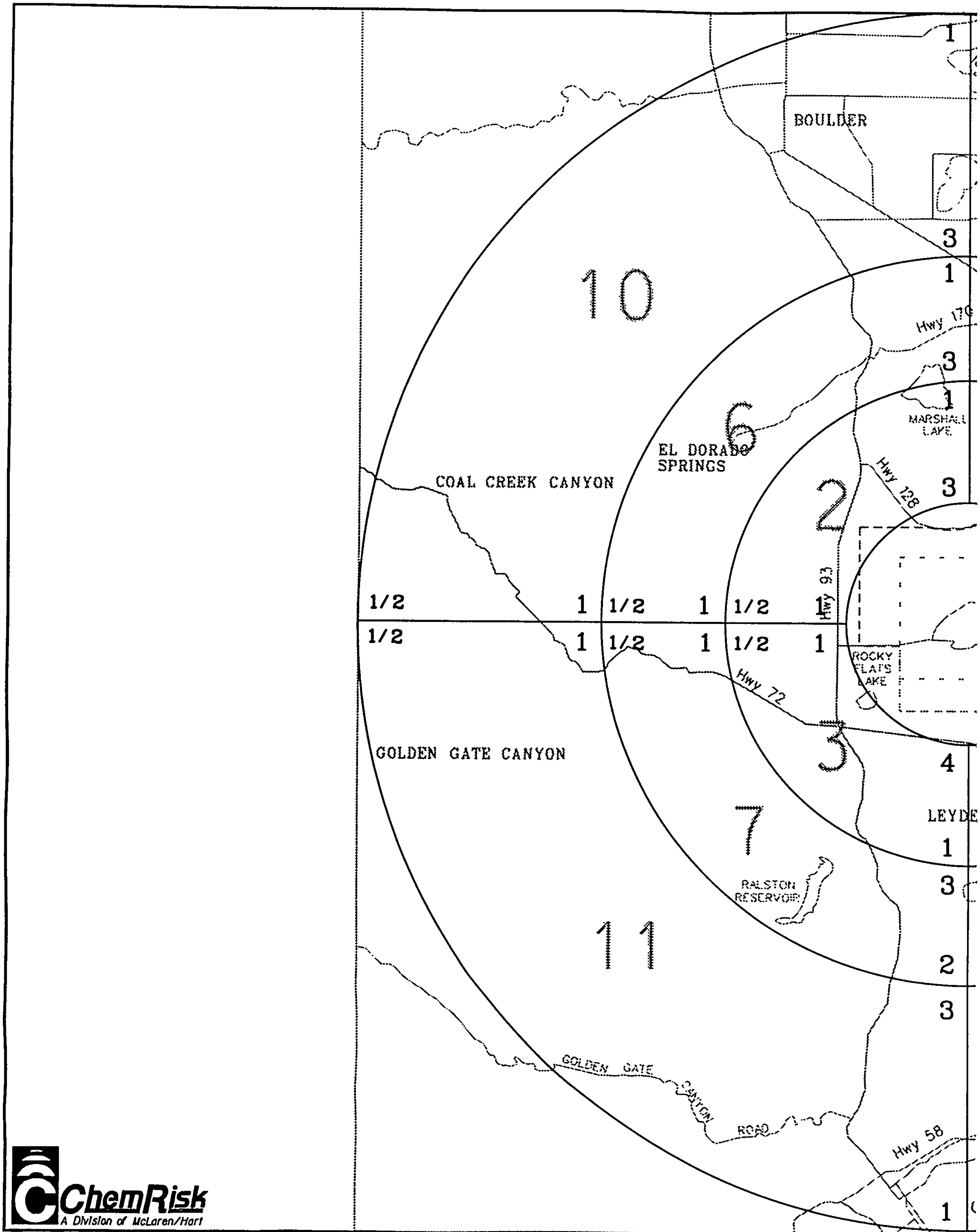
LEGEND

- - - - - ROCKY FLATS PLANT BOUNDARY 1951-1974

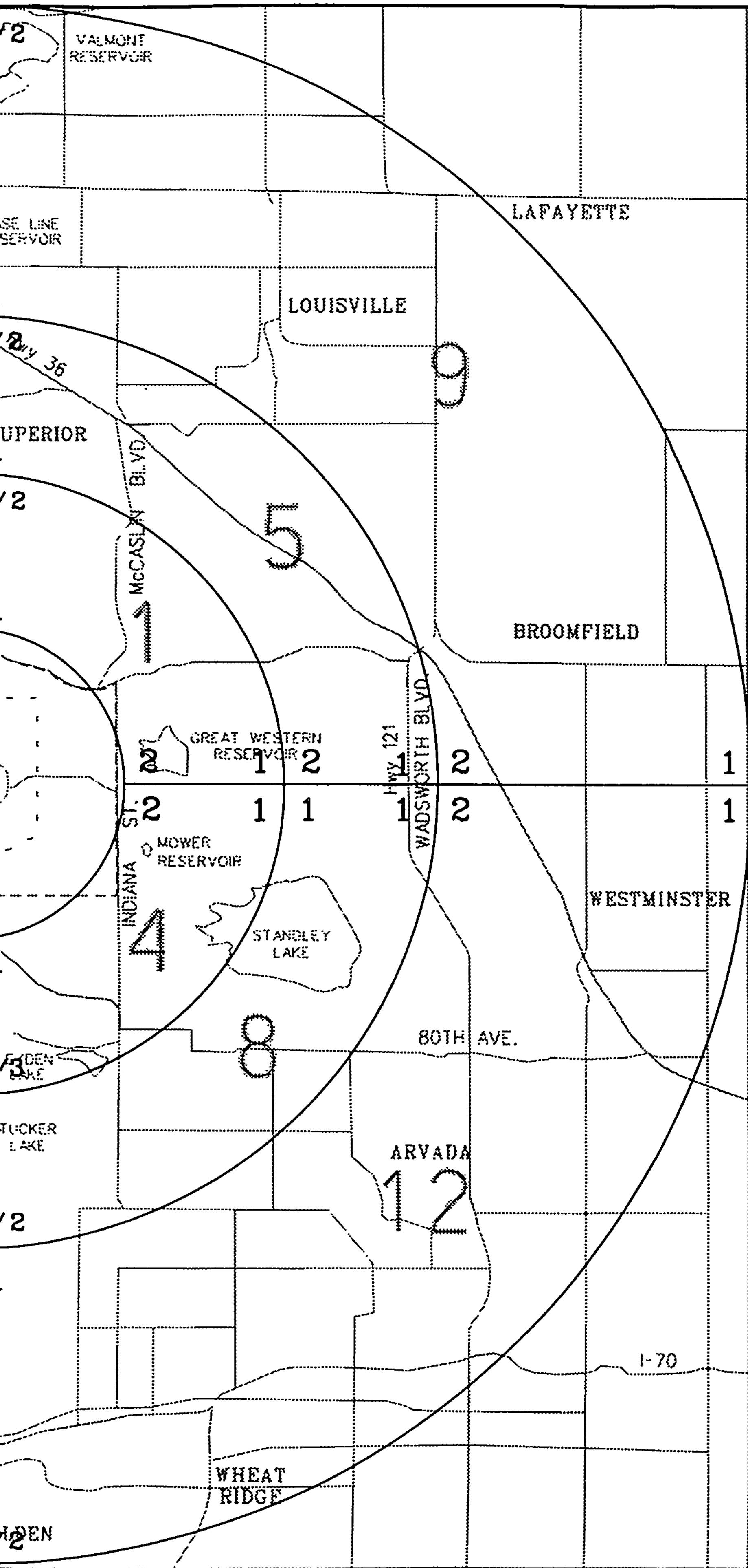
-------- ROCKY FLATS PLANT BOUNDARY 1974-PRESENT

NOTE:
THE NUMBER IN THE CORNER OF EACH SECTOR REPRESENTS THE RATIO OF THE PREDICTED CONCENTRATION AT THE CORNER TO THE PREDICTED CONCENTRATION AT THE CENTROID (e.g., A VALUE OF 2 MEANS THAT THE PREDICTED CONCENTRATION AT THE CORNER IS APPROXIMATELY TWO TIMES HIGHER THAN THE CONCENTRATION PREDICTED AT THE CENTROID, AND SO ON.)

FIGURE D-3
VARIATION OF PREDICTED AIR CONCENTRATIONS WITHIN A SECTOR-ROUTINE ENRICHED AND DEPLETED URANIUM RELEASES



ChemRisk
A Division of McLaren/Hart
RkyF893H/RFd-04.dgn; Rev: 10-01-93



N

0' SCALE 10,560'

SCALE: 1" = 2.0 Miles

LEGEND

- - - - - ROCKY FLATS PLANT BOUNDARY 1951-1974

------- ROCKY FLATS PLANT BOUNDARY 1974-PRESENT

NOTE:
THE NUMBER IN THE CORNER OF EACH SECTOR REPRESENTS THE RATIO OF THE PREDICTED CONCENTRATION AT THE CORNER TO THE PREDICTED CONCENTRATION AT THE CENTROID (e.g., A VALUE OF 2 MEANS THAT THE PREDICTED CONCENTRATION AT THE CORNER IS APPROXIMATELY TWO TIMES HIGHER THAN THE CONCENTRATION PREDICTED AT THE CENTROID, AND SO ON.)

FIGURE D-4
VARIATION OF PREDICTED AIR CONCENTRATIONS WITHIN A SECTOR-ROUTINE CHEMICAL AND TRITIUM RELEASES

The number in the corner of each sector represents the ratio of the predicted concentration at that corner to the predicted concentration at the centroid. For example, as shown in Figure D-2, the ratios for Sector 1, beginning in the lower left corner and proceeding in a counter clock-wise direction, are 2, 1, ½, and 1. A value of 2 means that the predicted concentration at the corner is approximately two times higher than the concentration predicted at the centroid. Conversely, a value of ½ means that the predicted concentration at the corner is approximately one-half as high as the concentration predicted at the centroid, and so on. It is important to keep in mind that a single concentration is predicted for a corner that is shared by more than one sector, *e.g.*, the intersection of sectors 1, 4, 5, and 8. In this case, the predicted concentration for this point is compared to each of the four centroids, resulting in four separate ratios. Based on the ratios shown in Figures D-2 through D-4, the variation within the 12 sectors is as high as a factor of 4, but is generally within a factor of 2 or 3 for routinely released contaminants.

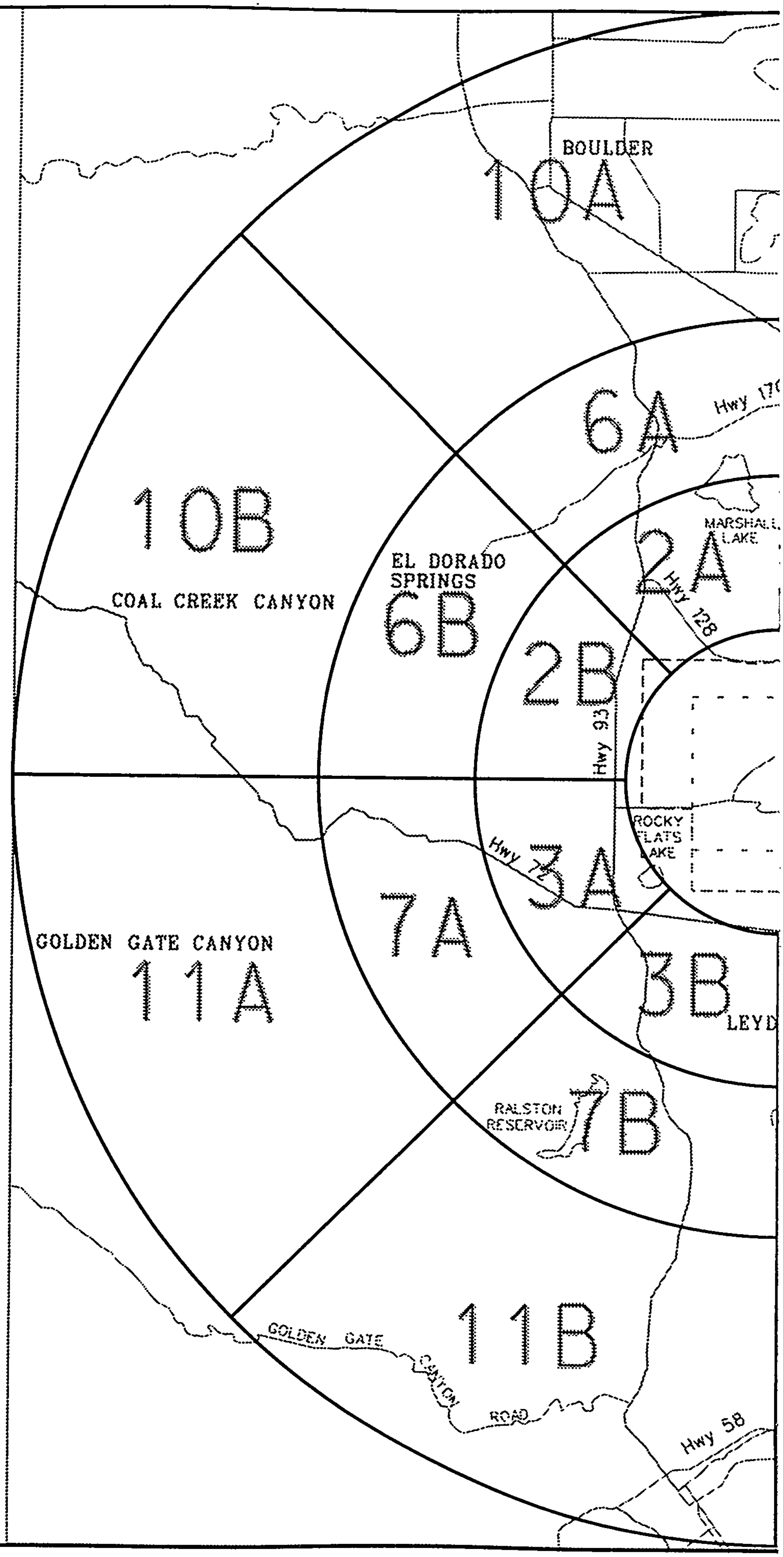
903 Pad Releases

Releases from the 903 Pad are believed to have occurred over a period of 5 years and were likely subjected to a wide range of meteorological conditions at the site. However, since the releases occurred over a much shorter time than the routine releases and were related to wind velocity, we expected that the variation within the sectors would be somewhat higher. The 12 sectors were therefore divided into 24 subsectors as shown in Figure D-5. Unlike the routine releases, the dispersion modeling for the 903 Pad was not based on a unit concentration, but on the source term estimate developed in Task 6. Average air concentrations were predicted at each of the 24 centroids and the four corners of each sector. The variation within each subsector is shown in Figure D-6. As shown in the figure, the variation within the 24 subsectors is as high a factor of 7, but is generally within a factor of 3 or 4 for releases from the 903 Pad.

1957 and 1969 Fires

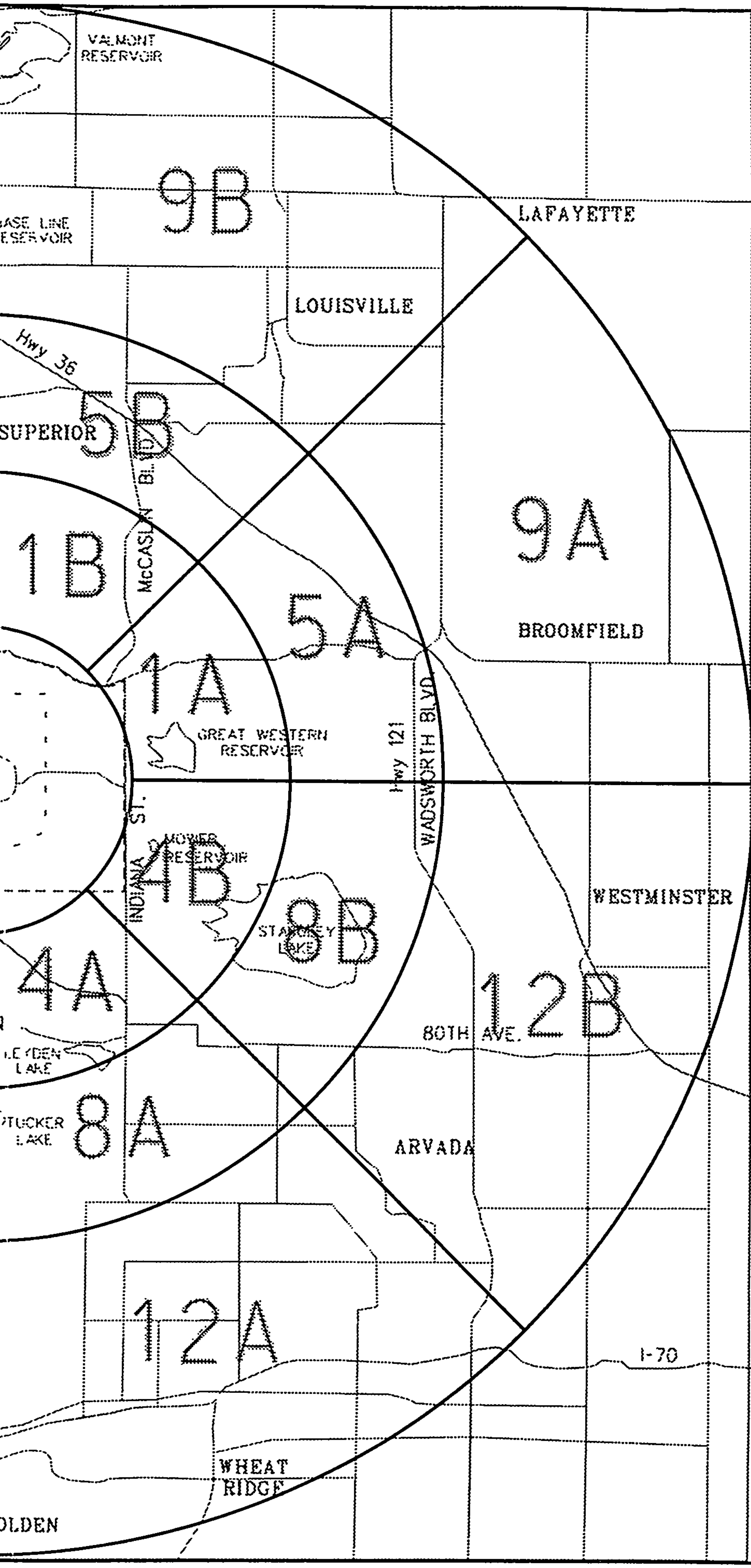
The 1957 and 1969 fires both lasted less than 20 hours and were influenced by specific, short-term meteorological conditions that would be expected to distribute the contaminants released during these events in a more irregular fashion than the routine or 903 Pad releases. Using the same 24 subsectors established for the 903 Pad releases, the variation within each subsector is shown in Figures D-7 and D-8 for the 1957 and 1969 fires, respectively. Based on the ratios shown in these figures, the variation within a sector often exceeds a factor of 50. This level of variation suggests that, even within a relatively small subsector, one individual may have been greatly affected by either fire, while another person located in the same sector just one-quarter to one-half mile away may have been largely unaffected. Instead of further dividing the subsectors to decrease the variation, we have chosen instead to calculate doses for locations that lie along the center line of the predicted contaminant plumes (see Figures 3-6 and 3-8 in the main text) and these would represent the highest exposure or doses predicted to occur at various distances from the plant.

This page intentionally left blank.



ChemRisk
A Division of McLaren/Hart

v: 09-
RF893H/RFd-05.dgn



N

0' SCALE 10,560'

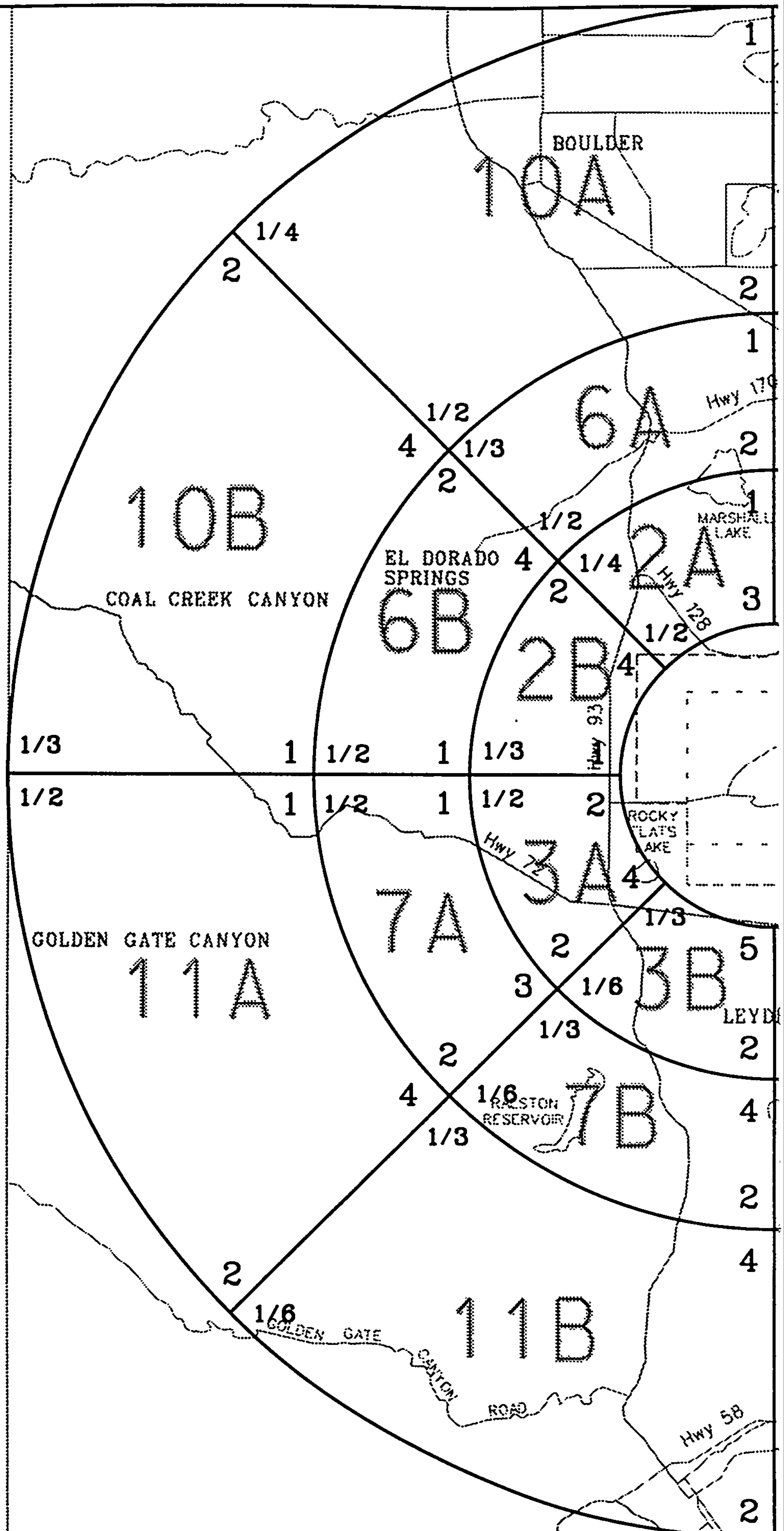
SCALE: 1" = 2.0 Miles

LEGEND

- - - - - ROCKY FLATS PLANT BOUNDARY 1951-1974

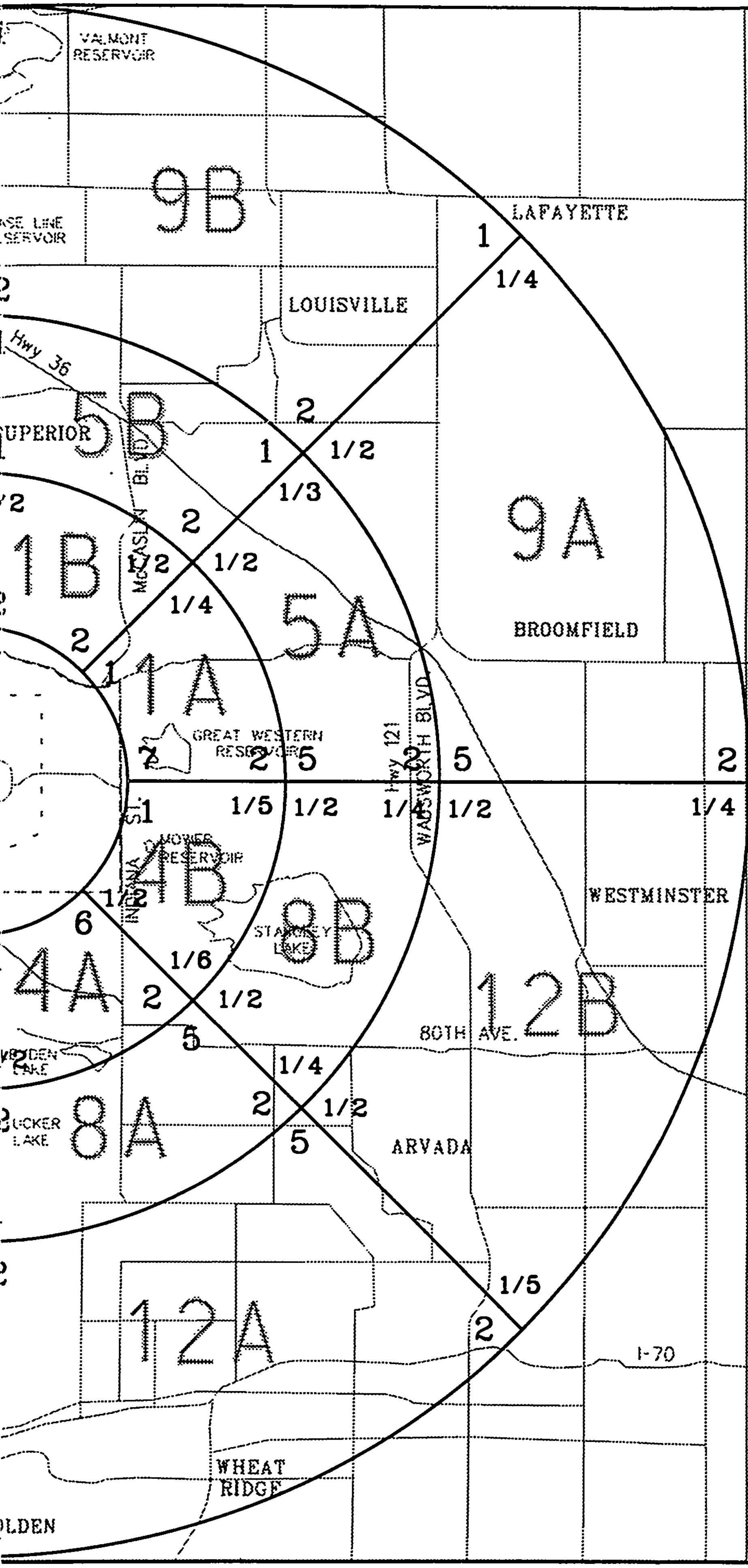
——— ROCKY FLATS PLANT BOUNDARY 1974-PRESENT

FIGURE D-5
SECTORS FOR EVALUATING
903 PAD RELEASES



ChemRisk
A Division of McLaren/Hart

RF893H/Rfd-06.dgn; Rev: 10-01-93



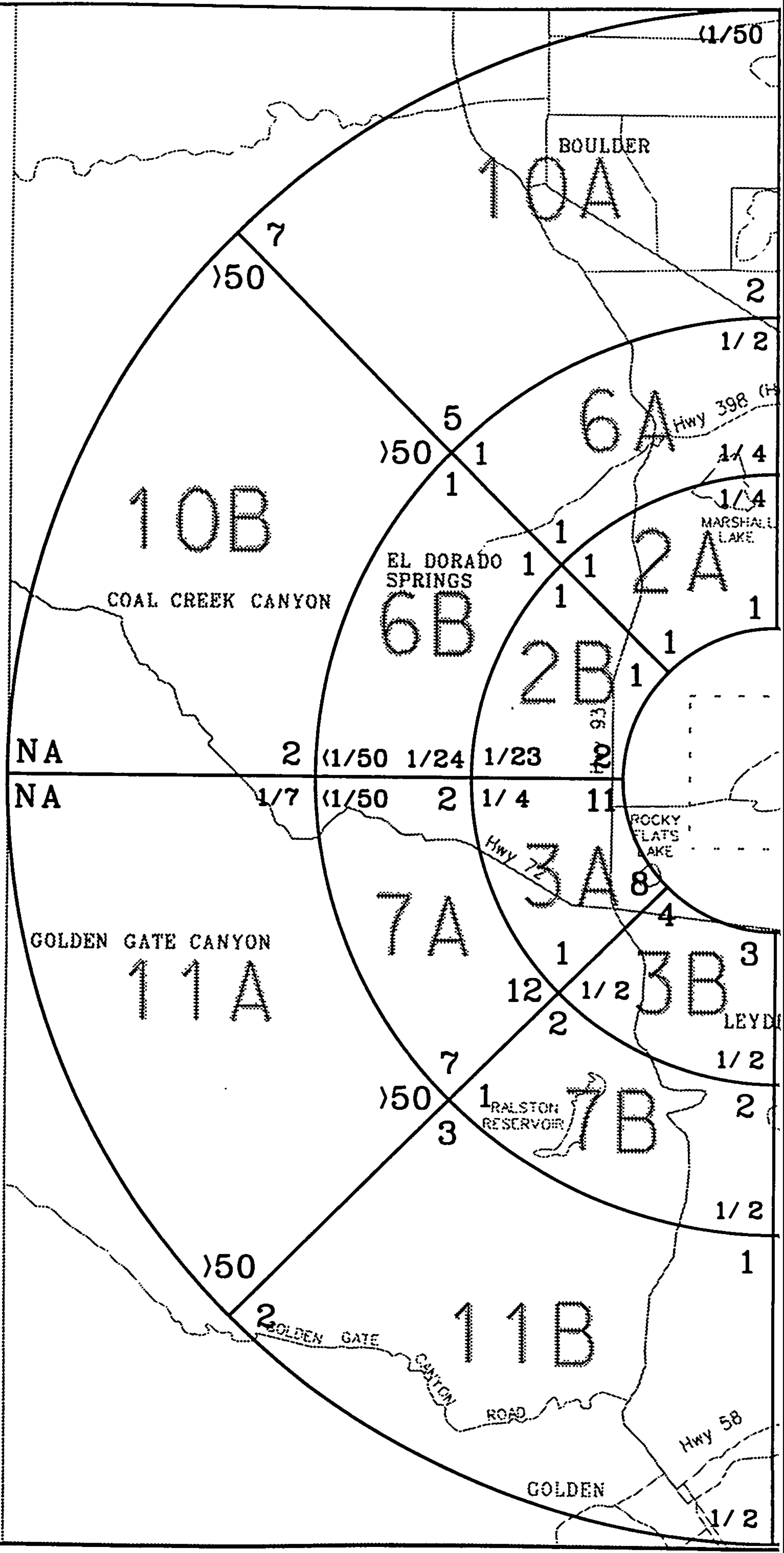
LEGEND

- - - - - ROCKY FLATS PLANT BOUNDARY 1951-1974

------- ROCKY FLATS PLANT BOUNDARY 1974-PRESENT

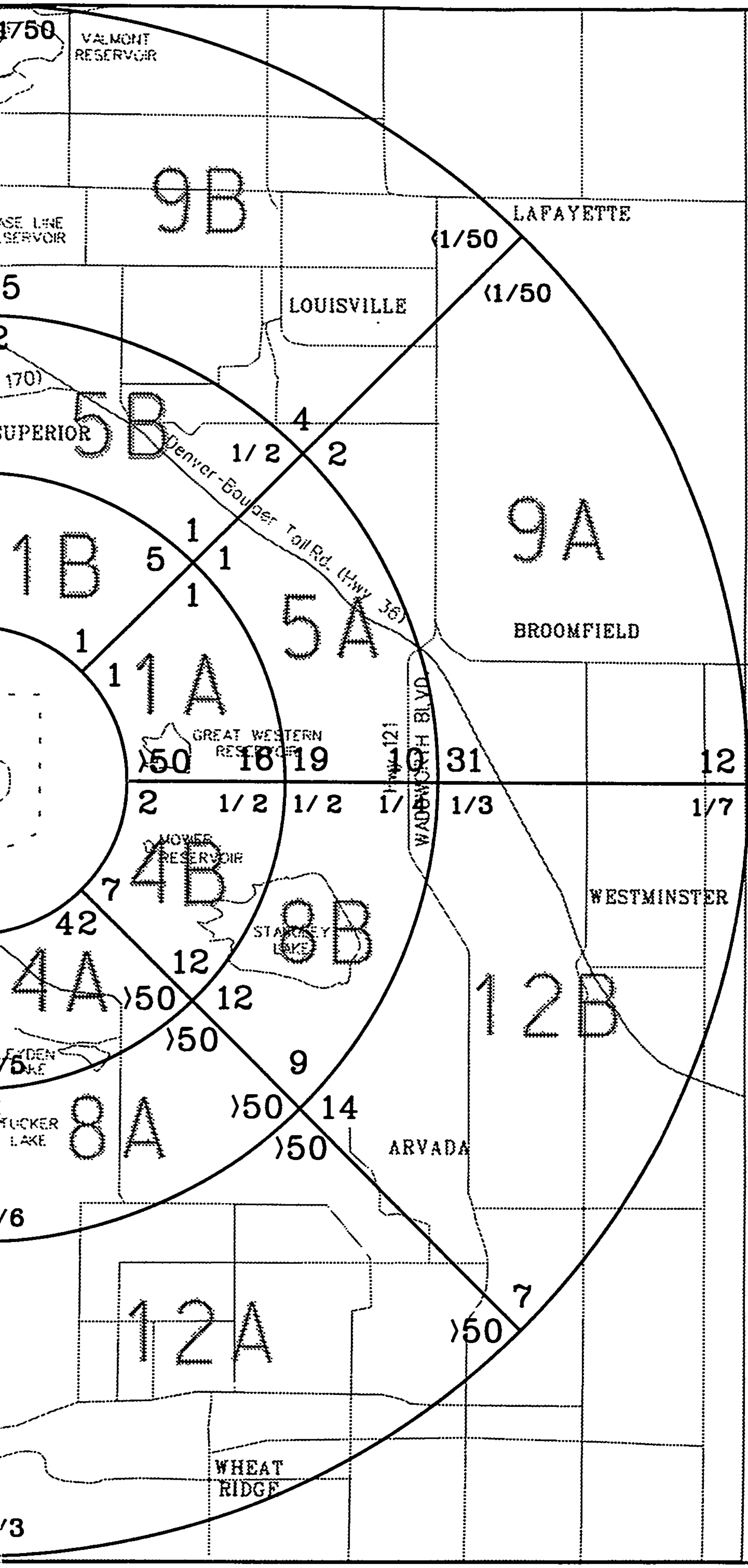
NOTE:
THE NUMBER IN THE CORNER OF EACH SECTOR REPRESENTS THE RATIO OF THE PREDICTED CONCENTRATION AT THE CORNER TO THE PREDICTED CONCENTRATION AT THE CENTROID (e.g., A VALUE OF 2 MEANS THAT THE PREDICTED CONCENTRATION AT THE CORNER IS APPROXIMATELY TWO TIMES HIGHER THAN THE CONCENTRATION PREDICTED AT THE CENTROID, AND SO ON.)

FIGURE D-6
VARIATION OF PREDICTED AIR CONCENTRATIONS WITHIN A SECTOR-903 PAD RELEASES



ChemRisk
A Division of McLaren/Hart

RF893H/Rfd-07.dgn; Rev: 10-01-93



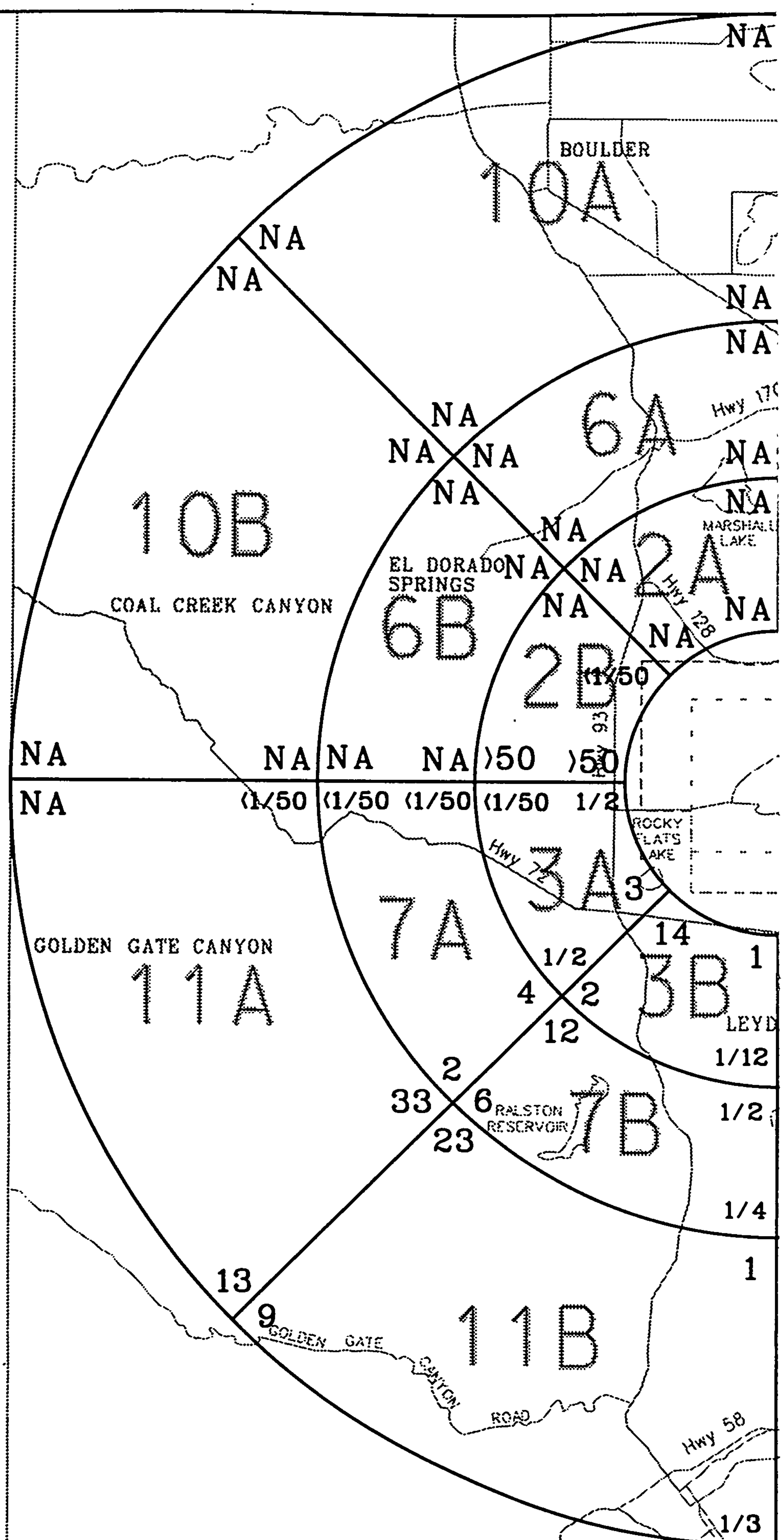
LEGEND

- - - - - ROCKY FLATS PLANT BOUNDARY 1951-1974

NA NOT APPLICABLE (MODEL PREDICTED ZERO AT CENTROID AND/OR CORNER

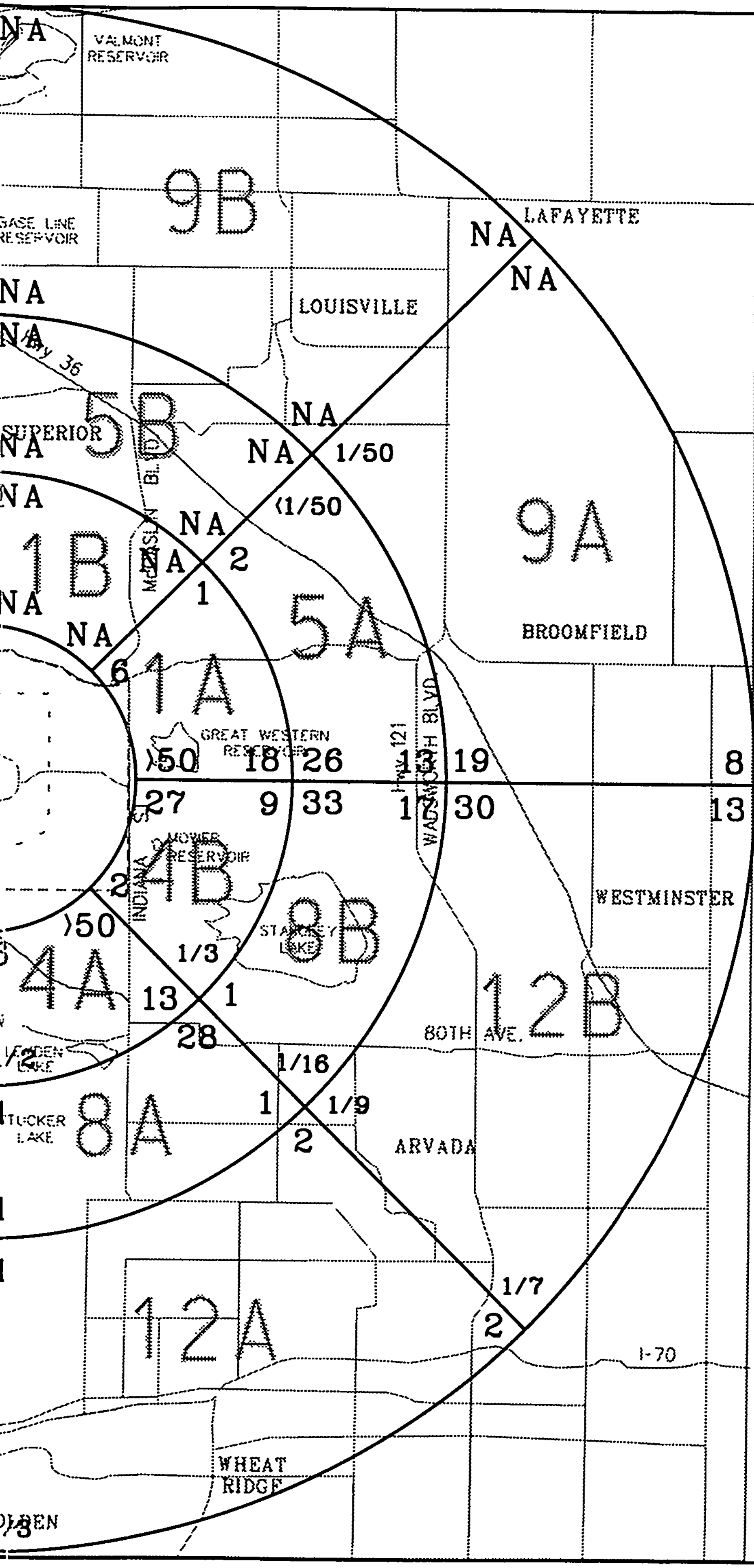
NOTE:
THE NUMBER IN THE CORNER OF EACH SECTOR REPRESENTS THE RATIO OF THE PREDICTED CONCENTRATION AT THE CORNER TO THE PREDICTED CONCENTRATION AT THE CENTROID (e.g., A VALUE OF 2 MEANS THAT THE PREDICTED CONCENTRATION AT THE CORNER IS APPROXIMATELY TWO TIMES HIGHER THAN THE CONCENTRATION PREDICTED AT THE CENTROID, AND SO ON.)

FIGURE D-7
VARIATION OF PREDICTED AIR CONCENTRATIONS WITHIN A SECTOR-1957 FIRE



ChemRisk
A Division of McLaren/Hart

RF893H/RFd-08.dgn; Rev: 10-01-93



N

0' SCALE 10,560'

SCALE: 1" - 2.0 Miles

LEGEND

- - - - - ROCKY FLATS PLANT BOUNDARY 1951-1974

-·-·-·-·- ROCKY FLATS PLANT BOUNDARY 1974-PRESENT

NA NOT APPLICABLE (MODEL PREDICTED ZERO AT CENTROID AND /OR CORNER

NOTE:
THE NUMBER IN THE CORNER OF EACH SECTOR REPRESENTS THE RATIO OF THE PREDICTED CONCENTRATION AT THE CORNER TO THE PREDICTED CONCENTRATION AT THE CENTROID (e.g., A VALUE OF 2 MEANS THAT THE PREDICTED CONCENTRATION AT THE CORNER IS APPROXIMATELY TWO TIMES HIGHER THAN THE CONCENTRATION PREDICTED AT THE CENTROID, AND SO ON.)

FIGURE D-8
VARIATION OF PREDICTED AIR CONCENTRATIONS WITHIN A SECTOR-1969 FIRE

APPENDIX E

DETERMINATION OF CONTAMINANT CONCENTRATIONS IN AIR AND SOIL ASSOCIATED WITH ROUTINE AIRBORNE RELEASES

APPENDIX E

DETERMINATION OF CONTAMINANT CONCENTRATIONS IN AIR AND SOIL ASSOCIATED WITH ROUTINE AIRBORNE RELEASES

Introduction

In this appendix, the methodology used to calculate annual average contaminant concentrations in air, surface soil and bulk soil compartments at various exposure points is described. Annual average air concentrations associated with routine airborne releases are determined by scaling the air dispersion model results derived in Task 6 by the annual release estimates developed in Task 5. Uncertainties associated with the application of the model and release estimates were also quantified in the two reports and are used in the estimation of uncertainty in the predicted air concentrations.

Contaminant concentrations in soil are determined by using the predicted annual average contaminant concentrations in air and a deposition model. Annual average soil concentrations are determined for the nonvolatile contaminants of concern: americium-241, plutonium-239/240, enriched and depleted uranium and beryllium. As explained in the main text, soil-related pathways are not considered applicable to tritium and the organic solvents listed in Table 1-1; therefore, soil concentrations, are not determined for these contaminants.

Contaminant Concentrations in Air Associated with Routine Airborne Releases

The modeling of the dispersion and transport of contaminants released into the atmosphere through routine operation was described in detail in the Task 6 report. In the report, the contaminant releases are divided into three groups: (1) americium and plutonium isotopes, (2) uranium isotopes and (3) beryllium, organic solvents and tritium. Characteristics of contaminant releases, such as building location and stack height, for a particular group are considered to be identical. Using a unit emission rate (1 mCi y^{-1} for radionuclides and 1 g y^{-1} for chemicals) and specific release characteristics, annual average air concentrations (fCi m^{-3} for radionuclides or pg m^{-3} for chemicals) at all the exposure points were determined for each group.

As described by Brenk *et al.* (1983), the air concentrations predicted in this fashion are also known as long-term dispersion factors (χ/Q). Long-term dispersion factors (χ/Q) are defined as follows:

$$C_{air} = (\chi/Q) \times ST$$

Where:

C_{air} = Annual average air concentration of a contaminant at a given location, fCi m^{-3} or pg m^{-3};

χ/Q = Long-term dispersion factor of a location for a contaminant group, fCi m^{-3} per mCi y^{-1} or pg m^{-3} per g y^{-1}; and

ST = Source term or estimated airborne release rate of a contaminant, mCi y^{-1} or g y^{-1}.

When the source term, ST, is equal to unity, *i.e.*, 1 mCi y^{-1} or 1 g y^{-1}, then the predicted air concentration is equal to the long-term dispersion factor (χ/Q). Long-term dispersion factors determined for the three release groups at various exposure points are presented in Table E-1.

TABLE E-1

LONG-TERM DISPERSION FACTORS (χ/Q) FOR THE CONTAMINANTS OF CONCERN AT VARIOUS EXPOSURE POINTS

Exposure Point	Dispersion Factor (χ/Q) of Plutonium and Americium Releases (fCi m^{-3} per mCi y^{-1})	Dispersion Factor (χ/Q) of Enriched and Depleted Uranium Releases (fCi m^{-3} per mCi y^{-1})	Dispersion Factor (χ/Q) of Chemical and Tritium Releases (pg m^{-3} per g y^{-1} or fCi m^{-3} per mCi y^{-1})
Sector 1	1.56×10^{-3}	3.38×10^{-3}	4.13×10^{-3}
Sector 2	6.65×10^{-4}	1.67×10^{-3}	1.74×10^{-3}
Sector 3	5.99×10^{-4}	1.68×10^{-3}	1.62×10^{-3}
Sector 4	1.95×10^{-3}	5.67×10^{-3}	5.27×10^{-3}
Sector 5	8.45×10^{-4}	1.67×10^{-3}	1.91×10^{-3}
Sector 6	3.46×10^{-4}	7.61×10^{-4}	7.89×10^{-4}
Sector 7	3.21×10^{-4}	7.42×10^{-4}	7.38×10^{-4}
Sector 8	1.06×10^{-3}	2.50×10^{-3}	2.43×10^{-3}
Sector 9	4.62×10^{-4}	8.62×10^{-4}	9.52×10^{-4}
Sector 10	1.85×10^{-4}	3.74×10^{-4}	3.88×10^{-4}
Sector 11	1.75×10^{-4}	3.60×10^{-4}	3.64×10^{-4}
Sector 12	5.81×10^{-4}	1.21×10^{-3}	1.21×10^{-3}
Denver	2.32×10^{-4}	4.37×10^{-4}	4.46×10^{-4}
Lakewood	2.74×10^{-4}	5.46×10^{-4}	5.48×10^{-4}
Longmont	1.03×10^{-4}	1.84×10^{-4}	1.96×10^{-4}

Annual average air concentration of a contaminant at a specific exposure point in a specific year can be calculated by scaling the long-term dispersion factor at that location by the appropriate emission rate of the contaminant. Estimated annual emission rates of the contaminants of concern are obtained from the Task 5 report.

The centroid of Sector 4 will be used to illustrate the determinations of air and soil concentrations associated with routine releases. The annual average plutonium-239/240 concentration in air at the centroid of Sector 4 in 1953 can be calculated as follows:

$$C_{air} = (\chi/Q) \times ST$$

Where:

C_{air}	=	Predicted annual average air concentration of plutonium-239/240 at the centroid of Sector 4 in 1953, fCi m^{-3};
χ/Q	=	Long-term dispersion factor of plutonium-239/240 at the centroid of Sector 4 (0.00195 fCi m^{-3} per mCi y^{-1}), and
ST	=	Source term or estimated airborne release rate of plutonium-239/240 in 1953 (0.0016 mCi y^{-1}).

It should be noted that the long-term dispersion factor, χ/Q, determined in this assessment for routine releases is dependent on the contaminant release type and location only and does not change from year to year. This is because the long-term dispersion factor has been derived from a high quality, 5-year-average meteorological data set. There are uncertainties associated with the air dispersion model prediction (χ/Q) and contaminant release estimates (ST). Uncertainty associated with the application of the air model has been estimated in Task 6 and uncertainties associated with the release estimates of various contaminants have been determined in Task 5. In this report, Monte Carlo simulation is used to propagate the uncertainties associated with (χ/Q) and ST and predict air concentrations. A description of Monte Carlo simulation is provided in Appendix K. In this assessment, all of the Monte Carlo prediction results are lognormally distributed. Therefore, the best estimate of a prediction will be represented by the geometric mean (GM) of the prediction and the uncertainty associated with the prediction will be represented by the upper and lower 95 percent confidence bounds about the best estimate. The bounds are related to the GM and geometric standard deviation (GSD) of the prediction and can be calculated by the following equations:

$$\text{Upper 95\% confidence bound} = GM \times GSD^2$$
$$\text{Lower 95\% confidence bound} = GM \div GSD^2$$

The GM and GSD of annual average plutonium-239/240 concentrations in air at the centroid of Sector 4 between 1953 and 1989 are shown in Table E-2.

TABLE E-2

PREDICTED ANNUAL AVERAGE PLUTONIUM-239/240 CONCENTRATION IN AIR AT THE SECTOR 4 CENTROID DUE TO ROUTINE RELEASES

Year	Plutonium-239/240 Concentration in Air at the Sector 4 Centroid	
	GM (fCi m^{-3})	GSD
1953	3.1×10^{-6}	1.6
1954	1.0×10^{-4}	1.6
1955	1.2×10^{-4}	1.6
1956	3.7×10^{-4}	1.6
1957	2.5×10^{-3}	1.6
1958	4.9×10^{-3}	1.6
1959	2.2×10^{-3}	1.6
1960	2.2×10^{-3}	1.6
1961	2.3×10^{-3}	1.6
1962	4.7×10^{-3}	1.6
1963	6.2×10^{-3}	1.6
1964	4.5×10^{-3}	1.6
1965	1.0×10^{-2}	1.6
1966	5.0×10^{-4}	1.6
1967	6.4×10^{-4}	1.6
1968	7.8×10^{-4}	1.6
1969	2.7×10^{-3}	1.6
1970	6.1×10^{-4}	1.6
1971	1.2×10^{-4}	1.6
1972	9.8×10^{-5}	1.6
1973	1.2×10^{-4}	1.6
1974	2.0×10^{-3}	1.6
1975	2.3×10^{-5}	1.6
1976	9.8×10^{-6}	1.6
1977	9.8×10^{-6}	1.6
1978	7.8×10^{-6}	1.6
1979	1.6×10^{-5}	1.6
1980	2.3×10^{-5}	1.6

TABLE E-2

PREDICTED ANNUAL AVERAGE PLUTONIUM-239/240 CONCENTRATION IN AIR AT THE SECTOR 4 CENTROID DUE TO ROUTINE RELEASES

Year	Plutonium-239/240 Concentration in Air at the Sector 4 Centroid	
	GM (fCi m^{-3})	GSD
1981	2.3×10^{-5}	1.6
1982	5.7×10^{-5}	1.6
1983	2.0×10^{-4}	1.6
1984	3.3×10^{-5}	1.6
1985	2.7×10^{-5}	1.6
1986	5.3×10^{-5}	1.6
1987	5.5×10^{-5}	1.6
1988	4.3×10^{-5}	1.6
1989	1.8×10^{-5}	1.6

GM = Geometric mean
GSD = Geometric standard deviation

In a similar way, annual average air concentrations and associated uncertainties are determined for other contaminants of concern and exposure points.

Contaminant Concentrations in Soil Associated with Routine Airborne Releases

As described in the Task 5 report, all metals released from the RFP from routine operations were filtered by high efficiency particle air (HEPA) filters. As a result, contaminants in the routine exhaust air were composed of extremely small, submicron-sized particulates (ChemRisk, 1992). Because of the low deposition velocities associated with particulates of this size range, they can be transported long distances by air currents before being brought to the ground surface through dry and wet deposition or interception by natural or man-made objects.

For the purpose of the dose assessment, a contaminant deposited onto the ground surface is considered to be in either a surface soil compartment or a bulk soil compartment. In the surface soil compartment, all of the deposited contaminant is assumed to be uniformly distributed in a layer of soil that extends from the ground surface to a depth of 1 cm. Contaminants in surface soil (in pCi kg^{-1} or pCi m^{-2} for radionuclides and μg kg^{-1} for chemicals) are considered to be relevant to soil ingestion, ground exposure, milk and beef ingestion and exposure pathways related to soil resuspension. Similarly, in the bulk soil compartment, all of the deposited contaminant is assumed to be uniformly distributed in a layer of soil that extends from the ground surface to a depth of 25 cm. The bulk soil compartment is considered to include the root system of a plant. Contaminants in this compartment (in pCi kg^{-1} for radionuclides and $\mu g\ kg^{-1}$ for chemicals) are considered to be relevant to wheat, vegetable, milk and beef ingestion.

In the case of routine airborne releases, we have made the simplifying assumption that, when calculating contaminant concentrations in the surface soil compartment, all the deposited contamination is present in the top 1 cm (this tends to overestimate dose from surface-soil-related pathways). This approach differs from that used in Appendices G and H to calculate the plutonium-239/240 and americium-241 concentrations in soil as a result of the 903 Pad releases; which assumes 20 percent of the total contamination is found in the surface soil compartment. As discussed in the Task 6 report, the distribution of contaminants released from the 903 Pad in the two soil compartments is based on measured concentrations of plutonium-239/240 in soil and some knowledge of the distribution of plutonium-239/240 in the soil column in the early 1970s. Overestimating the surface soil concentrations for routinely released contaminants should not have a significant impact on the dose estimates because deposition from routine releases was low and the majority of the dose is associated with direct inhalation of the airborne materials.

Equations for the determination of contaminant concentrations in surface soil and bulk soil compartments are provided in Figure E-1. Input parameters that are used in the equations are presented in Table E-3. Monte Carlo simulation is used to propagate errors and estimate uncertainty of the predicted soil concentrations.

One of the key input parameters listed in Table E-3 is wet and dry deposition velocity. This parameter is site specific and can vary over several orders of magnitude. It can be affected by many factors, such as the size of the released contaminant particles, local meteorology, topography and vegetation cover of the site. As explained in the Task 6 report, after considering the size of the released particles and local meteorology, it was concluded that 0.3 cm s^{-1} (260 m d^{-1}) can be used to represent the average deposition velocity of the contaminant particles released during the routine operations (ChemRisk, 1993). We have represented the uncertainty of this parameter by a lognormal distribution with a GM equal to 1 and a GSD of 1.7.

The equations and input parameters described above are all used to determine cumulative contaminant concentrations in soil. The approach described in the following section is applicable to all non-volatile contaminants with the exception of americium-241. As explained in the Task 5 report, both plutonium-241 and americium-241 were released into the atmosphere. Because plutonium-241 decays into americium-241 and its half-life of 14.4 y is relatively short compared to the operational history of the plant, it is important to include the contribution of plutonium-241 decay to the total americium-241 concentration in soil. The method used to determine cumulative americium-241 concentrations in soil is described later in this appendix.

FIGURE E-1. EQUATIONS AND PARAMETERS FOR THE DETERMINATION OF CONTAMINANT CONCENTRATIONS IN SURFACE SOIL AND BULK SOIL COMPARTMENTS.

Contaminant Concentrations in the Surface Soil Compartment

To calculate areal concentrations:

$$C_{soil(surf)} = C_{air}\ V_d\ T$$

where:

$C_{soil(surf)}$	=	Equilibrium concentration of contaminant in surface soil, μg m^{-2} or pCi m^{-2};
C_{air}	=	Average concentration of contaminant in air, μg m^{-3} or pCi m^{-3};
V_d	=	Wet and dry deposition velocity, m d^{-1};
T	=	Accumulation time, d.

To calculate concentrations based on mass:

$$C_{soil(surf)} = \frac{C_{air}\ V_d}{SD_{surface}\ BD}\ T$$

Where:

$C_{soil(surf)}$	=	Equilibrium concentration of contaminant in surface soil, μg kg^{-1} or pCi kg^{-1};
C_{air}	=	Average concentration of contaminant in air, μg m^{-3} or pCi m^{-3};
V_d	=	Wet and dry deposition velocity, m d^{-1};
$SD_{surface}$	=	Soil depth of mixing (surface soil), m;
BD	=	Soil dry bulk density, kg m^{-3}; and
T	=	Accumulation time, d.

Contaminant Concentration in the Bulk Soil Compartment

$$C_{soil(bulk)} = \frac{C_{air}\ V_d}{SD_{bulk}\ BD}\ T$$

Where:

$C_{soil(bulk)}$	=	Equilibrium concentration of contaminant in bulk soil, μg kg^{-1} or pCi kg^{-1};
C_{air}	=	Average concentration of contaminant in air, μg m^{-3} or pCi m^{-3};
V_d	=	Wet and dry deposition velocity, m d^{-1};
SD_{bulk}	=	Soil depth of mixing (bulk soil), m;
BD	=	Soil dry bulk density, kg m^{-3}; and
T	=	Accumulation time, d.

TABLE E-3

INPUT PARAMETERS FOR THE DETERMINATION OF CONTAMINANT CONCENTRATIONS IN SOIL AS A RESULT OF ROUTINE AIRBORNE RELEASES

Parameter	Unit	Distribution	Characteristics of Distribution
V_d	m d^{-1}	lognormal	GM = 260 GSD = 1.7
T	d	point estimate	365
$SD_{surface}$	m	point estimate	0.01
SD_{bulk}	m	point estimate	0.25
BD	kg m^{-3}	triangular	mode = 1400, range = 1100 to 1700

Determination of Contaminant Concentrations in Soil (Except Americium-241)

The method used to determine cumulative contaminant concentrations in the surface soil and bulk soil compartments is similar. The calculation of cumulative plutonium-239/240 concentrations (in terms of mass concentration) in the surface soil compartment at the centroid of Sector 4 between 1953 and 1956 is used as an example to illustrate this method. The calculation process can be divided into three steps:

(1) Predicted annual average plutonium-239/240 concentrations in air at the centroid of Sector 4 between 1953 and 1956 are obtained from Table E-2:

Year	Predicted annual average Pu-239/240 concentration in air at the centroid of Sector 4 (in pCi m^{-3})
1953	3.1×10^{-9}
1954	1.0×10^{-7}
1955	1.2×10^{-7}
1956	3.7×10^{-7}

(2) Using the estimated air concentrations and equations provided in Figure E-1 , plutonium-239/240 concentrations in the surface soil compartment due to wet and dry deposition are determined for each year independently:

Year	Predicted annual average Pu-239/240 concentration in surface soil (pCi kg^{-1}) at the centroid of Sector 4
1953	2.1×10^{-5}
1954	7.0×10^{-4}
1955	7.8×10^{-4}
1956	2.5×10^{-3}

(3) Finally, cumulative plutonium-239/240 concentration in the surface soil compartment for a particular year is calculated by summing all the annual average soil concentrations up to that year:

Year	Predicted cumulative Pu-239/240 concentration in surface soil (pCi kg^{-1}) at the centroid of Sector 4
1953	2.1×10^{-5}
1954	7.2×10^{-4}
1955	1.5×10^{-3}
1956	4.0×10^{-3}

Cumulative contaminant concentrations in the surface soil compartment (in pCi kg^{-1} and pCi m^{-2} for radionuclides and μg kg^{-1} for chemicals) and the bulk soil compartment (in pCi kg^{-1} for radionuclides and μg kg^{-1} for chemicals) are similarly determined for other contaminants and years. Again, Monte Carlo simulation is used to account for the uncertainty in each of the inputs in calculating the estimate and its associated uncertainty.

Determination of Americium-241 Concentrations in Soil

The determination of cumulative americium-241 concentration in soil is slightly different from the method described above because both the airborne releases of americium-241 and plutonium-241 contribute to americium-241 concentration in soil. The method can be divided into four steps and is best explained by an example. The concentration of americium-241 in the surface soil compartment at the centroid of Sector 4 in 1955 can be determined as follows:

(1) The cumulative americium-241 concentration in surface soil in 1955 due to americium-241 routinely released in previous years ($C_{soil(Am\text{-}241)direct}$) is determined using the method just described for plutonium-239/240. $C_{soil(Am\text{-}241)direct}$ is calculated to be 3.36×10^{-4} pCi kg^{-1}.

(2) Based on the estimated annual release rate of plutonium-241 and the deposition model, annual plutonium-241 concentrations in soil between 1953 and 1955 are determined:

$$C_{soil(Pu\text{-}241)1953} = 1.10\times10^{-4}\ pCi\ kg^{-1}$$
$$C_{soil(Pu\text{-}241)1954} = 3.57\times10^{-3}\ pCi\ kg^{-1}$$
$$C_{soil(Pu\text{-}241)1955} = 3.95\times10^{-3}\ pCi\ kg^{-1}$$

Where:

$C_{soil(Pu\text{-}241)1953}$ = Plutonium-241 concentration in the surface soil compartment due to plutonium-241 released in 1953;

$C_{soil(Pu\text{-}241)1954}$ = Plutonium-241 concentration in the surface soil compartment due to plutonium-241 released in 1954; and

$C_{soil(Pu\text{-}241)1955}$ = Plutonium-241 concentration in the surface soil compartment due to plutonium-241 released in 1955.

(3) Cumulative concentration of americium-241 in the surface soil compartment in 1955 due to the decay of plutonium-241 deposited between 1953 and 1955 is determined by the following equation:

$$C_{soil\ (Am\text{-}241)indirect} = [C_{soil(Pu\text{-}241)1953} * (1\text{-}e^{-\lambda * T1}) * R] + [C_{soil(Pu\text{-}241)1954} * (1\text{-}e^{-\lambda * T2}) * R]$$
$$+ [\ C_{soil(Pu\text{-}241)1955} * (1\text{-}e^{-\lambda * T3}) * R]$$
$$= 5.87\times10^{-6}\ pCi\ kg^{-1}$$

Where:

$C_{soil\ (Am\text{-}241)indirect}$ = Concentration of americium-241 in the surface soil compartment in 1955 due to the plutonium-241 deposited between 1953 and 1955;

λ = Radioactive decay constant of plutonium-241, equals to 0.693/half-life of plutonium-241 or 0.693/14.4 y;

R = The ratio of pCi atom^{-1} for americium-241 to pCi atom^{-1} for plutonium-241. This simplifies to the ratio of the radioactive decay constant for americium-241 to the radioactive decay constant for plutonium-241, which is equal to 0.033;

T1 = 1955 - 1953 = 2 y;
T2 = 1955 - 1954 = 1 y; and
T3 = 1955 - 1955 = 0 y.

(4) Cumulative concentration of americium-241 in the surface soil compartment in 1955 is determined by summing the americium-241 concentration in soil due to direct americium-241 releases and americium-241 concentration in soil due to the decay of deposited plutonium-241:

$$
\begin{aligned}
C_{soil\ (Am\text{-}241)1955} &= C_{soil(Am\text{-}241)direct} + C_{soil(Am\text{-}241)indirect} \\
&= 3.36 \times 10^{-4} + 5.87 \times 10^{-6}\ pCi\ kg^{-1} \\
&= 3.41 \times 10^{-4}\ pCi\ kg^{-1}
\end{aligned}
$$

This approach is used to calculate americium-241 concentrations in the surface soil and bulk soil compartments from 1953 to 1989. Monte Carlo simulation is again used to propagate the uncertainties associated with this calculation.

REFERENCES

Brenk, H.D., J.E. Fairobent and E.H. Markee, Jr. (1983). " Transport of Radionuclides in the Atmosphere" in Radiological Assessment: A Textbook on Environmental Dose Analysis. Edited by Till, J.E. and H.R. Meyer. NUREG/CR-3332, ORNL-5968, U.S. Government Printing Office, Washington, D.C.

ChemRisk. (1992). Estimating Historical Emissions from Rocky Flats. Project Task 5. Draft Report. November. Repository Document TA-1240.

ChemRisk. (1993). Exposure Pathway Identification and Transport Modeling. Project Task 6. Draft Report. May. Repository Document TA-1241.

APPENDIX F

DETERMINATION OF AIR AND SOIL CONCENTRATIONS FOR THE 1957 AND 1969 FIRES

APPENDIX F

DETERMINATION OF AIR AND SOIL CONCENTRATIONS FOR THE 1957 AND 1969 FIRES

During the 1957 and 1969 fires, particles of plutonium-239/240 were released and carried off-site by wind currents and eventually deposited onto the ground surface. A detailed description of what we know about the two accidents is provided in the Tasks 3 and 4 and Task 6 reports (ChemRisk, 1992 and 1993). Using the available environmental monitoring data collected during and immediately after the accidents and an air dispersion model, plutonium-239/240 concentrations in air at various exposure points were determined in Task 6 and are summarized in Table F-1 for the 1957 fire and Table F-2 for the 1969 fire.

TABLE F-1

PREDICTED PLUTONIUM-239/240 CONCENTRATIONS IN AIR FOR THE 1957 FIRE

Exposure Point	Predicted Pu-239/240 Concentration in Air (pCi m^{-3})
Plume A (east-southeast)	
3 miles	6.23×10^{-1}
5 miles	5.30×10^{-1}
8 miles	4.21×10^{-1}
Plume B (south-southeast)	
3 miles	3.22×10^{-1}
5 miles	1.90×10^{-1}
8 miles	9.66×10^{-2}
Denver	1.74×10^{-2}
Lakewood	8.49×10^{-5}
Longmont	0

TABLE F-2

PREDICTED PLUTONIUM-239/240
CONCENTRATIONS IN AIR FOR THE 1969 FIRE

Exposure Point	Predicted Pu-239/240 Concentration in Air (pCi m^{-3})
Plume C (east)	
3 miles	1.17×10^{-1}
5 miles	4.39×10^{-2}
8 miles	1.99×10^{-2}
Plume D (southwest)	
3 miles	5.47×10^{-3}
5 miles	2.01×10^{-3}
8 miles	8.36×10^{-4}
Denver	0
Lakewood	0
Longmont	0

In the Task 5 report, it was estimated that the average activity ratio of americium-241 to plutonium-239/240 is 23% (ChemRisk, 1992). Using this information and the predicted plutonium-239/240 concentrations in air listed in Tables F-1 and F-2, americium-241 concentrations in air associated with the two accidents can be calculated. For example, the predicted americium-241 concentration in air due to the 1969 fire in plume C (east) at 8 miles from the plant can be calculated as follows:

$$(Cair)_{Am\text{-}241} = (Cair)_{Pu\text{-}239/240} * 0.23$$

Where:

$(Cair)_{Am\text{-}241}$ = Predicted americium-241 concentration in air in plume C (east) at 8 miles from the plant, pCi m^{-3}; and

$(Cair)_{Pu\text{-}239/240}$ = Predicted plutonium-239/240 concentration in air in plume C (east) at 8 miles from the plant, pCi m^{-3}.

In this appendix, the predicted air concentrations are used in conjunction with a deposition model for the determination of plutonium-239/240 concentrations in soil as a result of the two fires. The approach and method used in this appendix are similar to those described in Appendix E. Equations shown in Figure E-1 can also be used to calculate contaminant concentrations in soil as a result of the fires; however, some of the input parameters that are used in the equations are different.

For example, wet and dry deposition is considered in the calculation of soil concentrations as a result of the routine airborne releases. As discussed in the Task 6 report, no precipitation was recorded in the Rocky Flats region during the 1957 and 1969 fires. Therefore, the V_d used to model these two release events does not include precipitation scavenging or wet deposition. In this assessment, V_d is assumed to have a value of 0.1 cm sec^{-1} or 86 m d^{-1} (ChemRisk, 1993). Due to the breaching of the HEPA filters in the 1957 fire, there is considerable uncertainty about the size of the particles released during the fire. Therefore, a relatively large uncertainty factor of 10 (GM of 1 and GSD of 3.2) is assigned to the V_d used in the evaluation of the 1957 fire (ChemRisk, 1993). By contrast, plutonium particles released during the 1969 fire are believed to have passed through HEPA filters and are likely to be submicron in size. As a result, a smaller uncertainty factor of 3 (GM of 1 and GSD of 1.7) is assigned to the V_d used in the evaluation of 1969 fire (ChemRisk, 1993).

The accumulation times, T, used to calculate plutonium-239/240 concentrations in soil associated with the fires are also different from those associated with routine releases. Since doses associated with routine airborne releases are evaluated on an annual basis, annual average soil concentrations are determined in Appendix E. This is achieved by specifying T equal to 365 d. However, the 1957 and 1969 fires are both short-term events and the accumulation time should be equal to the duration of the accidents, or 13.5 h for the 1957 fire and 17.5 h for the 1969 fire (ChemRisk, 1993).

Uncertainties associated with the predicted air concentrations of the fires have been estimated in the Task 6 report (ChemRisk, 1993). Again, because of the uncertainties associated with the input parameters, soil concentrations cannot be determined by simple arithmetic. Instead, Monte Carlo simulation is used to determine the soil concentrations and the associated uncertainties.

REFERENCES

ChemRisk. (1992). Reconstruction of Historical Rocky Flats Operations and Identification of Release Points. Project Tasks 3 & 4. Final Draft Report. August, 1992.

ChemRisk. (1993). Exposure Pathway Identification and Transport Modeling. Project Task 6. Draft Report. May. Repository Document TA-1241.

APPENDIX G

DETERMINATION OF PLUTONIUM-239/240 CONCENTRATIONS IN AIR AND SOIL FOR THE 903 PAD RELEASE

APPENDIX G

DETERMINATION OF PLUTONIUM-239/240 CONCENTRATIONS IN AIR AND SOIL FOR THE 903 PAD RELEASE

Introduction

The 903 Pad release began when plutonium-contaminated cutting oil and solvents, stored in drums to await recycling for recovery of plutonium, leaked into the soil. Because of the high value and safety hazard of plutonium, the cutting oil and solvent were filtered prior to storage to remove particles greater than about 2 to 3 microns in diameter (ChemRisk, 1993). When some of the drums corroded and began leaking, plutonium in the cutting oil was incorporated in soil particles and carried off-site by the action of wind. It is estimated that contaminated soil particles from submicron to 150 micron in diameter could have been carried by the wind. As described in the Task 6 report, the Fugitive Dust Model (FDM) was used to model the dispersion and deposition of various sizes of contaminated soil particles from the 903 Pad.

This appendix describes the approach to estimating plutonium-239/240 concentrations in air and soil as a result of the 903 Pad release for use in the exposure model. As explained in Section 3.3.2 of this report, the 903 Pad incident is treated as a discrete release event of five years duration. For a given location, a single dose estimate is determined for exposure over the period of the pad release (1965 to 1969), and the doses associated with the deposited materials are separately calculated for the period after the release ended (1970 to 1989). This approach represents a simplification of the more complex and variable release that took place over the approximate five-year period during which contaminants were being directly released from the pad, and the period following the direct releases during which surface soil concentrations may have slowly decreased. During the period of direct release from the pad, some days, weeks, or months may have been associated with higher or lower releases than others during the release period. However, determining releases and exposures on a finer time-scale is limited by the absence of detailed information regarding the timing of site disturbances and site meteorology. The air dispersion model predictions developed using this simplified approach are directly applicable to the calculation of average direct exposures by inhalation from the entire event. However, the modeling predictions require a number of mathematical manipulations to produce inputs that are compatible with the exposure model for calculating indirect pathway exposures, and this appendix details these manipulations.

FDM Predictions Associated with the 903 Pad Release

Average plutonium-239/240 concentrations in air and 5-year cumulative plutonium-239/240 concentrations in soil predicted by the FDM at different exposure points are presented in Table G-1. It is important to note that the air concentrations listed in the table represent radioactivity associated with soil particles in the respirable range, i.e., less than 8-micron in aerodynamic diameter. These air concentrations are only suitable for the evaluation of the direct inhalation exposure pathway. These predicted average respirable plutonium-239/240

Exposure equations used to evaluate contamination of vegetables and pasture due to the deposition of airborne contaminants are presented in Appendix I. For the evaluation of 903 Pad release, the term ($C_{air} \times V_d$) in the equations is replaced with AD.

Determination of Soil Concentrations in Surface and Bulk Soil Compartments

The exposure model used to estimate doses to the public requires estimates of contaminant concentrations in both the surface soil compartment (1 cm depth) and the bulk soil compartment (up to 25 cm depth). Surface soil compartment concentrations affect exposure via the following pathways:

- Ground exposure,
- Soil ingestion,
- Resuspension, and
- Beef and milk via surface soil ingestion.

The bulk soil compartment concentrations affect exposure via:

- Vegetable ingestion from root uptake of contamination,
- Wheat ingestion from root uptake of contamination, and
- Beef and milk from pasture that has taken up contaminants through roots.

The concentration of plutonium-239/240 in the surface and bulk soil compartments is estimated for a single point in time, 1969, when the pad was covered and direct release of contamination ceased. For the purposes of this analysis, we have assumed that the soil concentration estimated for 1969 is applicable for evaluating soil-related exposures throughout the direct release period (1965 through 1969), as well as the period from 1969 to 1989. This assumption will likely overestimate to some degree both the exposures that occurred during direct pad releases and after the pad was covered. During the years of direct pad release, soil concentrations would have been increasing to 1969 levels. Assuming that soil concentrations were at 1969 levels over the period of direct release is likely to overestimate soil-related radiation doses by a factor of 1.5 to 2 during this five-year period. For the years after the direct releases ceased, soil concentrations of plutonium-239/240 would be expected to decrease slowly due to infiltration loss to the deep soil and other transport mechanisms. However, the relatively low water solubility of plutonium compounds would suggest a very low loss rate from the soil. The following discussion describes the approach used to estimate surface and bulk soil concentrations associated with the 903 Pad release.

In Task 6, the total plutonium inventory in soil due to the 903 Pad was estimated by assuming that 20 percent of the deposited plutonium is in the top 1 cm of the soil and 100 percent of the plutonium is in the top 15 cm of the soil (ChemRisk, 1993). Similar assumptions are used in this analysis to calculate plutonium-239/240 concentrations in the surface and bulk soil compartments based on the predicted areal soil concentrations. The following equations are used to calculate the surface and bulk soil compartment concentrations of plutonium-239/240:

(1) Surface soil concentration based on areal concentration (in pCi m^{-2})

$$C_{soil(surface)} = C_{soil} * MU * F_{surface} * SIU$$

Where:

$C_{soil(surface)}$	=	Cumulative areal concentration of plutonium-239/240 in surface soil, pCi m^{-2};
C_{soil}	=	Cumulative areal concentration of plutonium-239/240 in soil predicted by the FDM, pCi m^{-2};
MU	=	Uncertainty factor associated with the soil concentrations predicted by FDM, dimensionless;
$F_{surface}$	=	Fraction of deposited plutonium-239/240 in the surface soil compartment, dimensionless; and
SIU	=	Uncertainty factor associated with $F_{surface}$, dimensionless.

This soil concentration is used for the determination of radiation dose associated with the soil resuspension and ground exposure pathways.

(2) Surface soil concentration based on mass (in pCi kg^{-1})

$$C_{soil(surface)} = (C_{soil} * MU * F_{surface} * SIU) / (SD * BD)$$

Where:

$C_{soil(surface)}$	=	Cumulative concentration of plutonium-239/240 in surface soil, pCi kg^{-1};
C_{soil}	=	Cumulative areal concentration of plutonium-239/240 in soil predicted by the FDM, pCi m^{-2};
MU	=	Uncertainty factor associated with the soil concentrations predicted by FDM, dimensionless;
$F_{surface}$	=	Fraction of deposited plutonium-239/240 in the surface soil compartment, dimensionless;
SIU	=	Uncertainty factor associated with $F_{surface}$, dimensionless;
$SD_{surface}$	=	Soil depth of mixing (surface soil), m; and
BD	=	Dry soil bulk density, kg m^{-3}.

This soil concentration is used for the determination of radiation dose associated with the soil, milk and beef ingestion pathways.

(3) Bulk soil concentration (in pCi kg^{-1})

$$C_{soil(bulk)} = (C_{soil} * MU * F_{bulk}) / (SD * BD)$$

Where:

$C_{soil(bulk)}$	=	Cumulative concentration of plutonium-239/240 in bulk soil, pCi kg^{-1};
C_{soil}	=	Cumulative areal concentration of plutonium-239/240 in soil predicted by the FDM, pCi m^{-2};
MU	=	Uncertainty factor associated with the soil concentrations predicted by FDM, dimensionless;
F_{bulk}	=	Fraction of deposited plutonium-239/240 in the bulk soil compartment, dimensionless;
SD_{bulk}	=	Soil depth of mixing (bulk soil), m; and
BD	=	Dry soil bulk density, kg m^{-3}.

This soil concentration is used for the determination of radiation dose associated with the vegetable, wheat, milk and beef ingestion pathways.

Table G-2 presents the values of the parameters used in the determination of soil concentrations for the 903 Pad release. Since a number of the inputs to these calculations are expressed in terms of a probability distribution, Monte Carlo techniques are used to perform these calculations and propagate the identified uncertainties.

TABLE G-2

INPUT PARAMETERS FOR THE DETERMINATION OF PLUTONIUM-239/240 CONCENTRATIONS IN SOIL AS A RESULT OF THE 903 PAD RELEASE

Parameter	Unit	Distribution	Characteristics of Distribution
MU	dimensionless	lognormal	GM=1, GSD=3.3
$F_{surface}$	dimensionless	point estimate	0.2
F_{bulk}	dimensionless	point estimate	1.0
SIU	dimensionless	lognormal	GM=1, GSD=1.2
$SD_{surface}$	m	point estimate	0.01
SD_{bulk}	m	point estimate	0.25
BD	kg m^{-3}	triangular	mode = 1400, range = 1100 to 1700

REFERENCES

ChemRisk. (1993). Exposure Pathway Identification and Transport Modeling. Project Task 6. Draft Report. May. Repository Document TA-1241.

APPENDIX H

DETERMINATION OF AMERICIUM-241 CONCENTRATIONS IN AIR AND SOIL FOR THE 903 PAD RELEASE

APPENDIX H

DETERMINATION OF AMERICIUM-241 CONCENTRATIONS IN AIR AND SOIL FOR THE 903 PAD RELEASE

Introduction

Appendix G presented the methodology used to estimate plutonium-239/240 concentrations in air and soil for the 903 Pad release. However, these were not the only contaminants released from the 903 Pad during this event. As discussed in the Task 5 report, Rocky Flats plutonium also contained plutonium-241 and its daughter americium-241. The exact composition of this material is likely to have varied over the operational history of the plant for a number of reasons, one of which is the fact that plutonium-241 has a half-life of only 14.4 years (Chemrisk, 1992a). Nevertheless, we estimated in Task 5 that, on average, the beta activity of plutonium-241 and the alpha activity of americium-241 are 5.06 and 0.23 times the alpha activity of plutonium-239/240, respectively (ChemRisk, 1992a).

This appendix describes the approach to estimating americium-241 concentrations in air and soil as a result of the 903 Pad release for use in the exposure model. Similar to the approach used to estimate plutonium-239/240 concentrations in air and soil from the 903 Pad described in Appendix G, the release of americium-241 from the 903 Pad is also treated as a discrete event of five years duration. For a given location, a single dose estimate is determined for exposure over the period of the pad release (1965 to 1969), and the doses associated with the deposited contaminants are calculated separately for the period after the release ended (1970 to 1989). A key difference in the approach to estimating americium-241 concentrations is the fact that there are actually two sources of americium-241 that must be taken into account: the americium that was already present in the oil when it was placed in the drums, and the natural decay of plutonium-241 into americium-241 that took place while the oil was still in the drums and after it leaked into the soil and was released into the environment. A number of mathematical manipulations are required to determine americium-241 concentrations in air and soil for the evaluation of the periods during and after the 903 Pad release, and this appendix details these manipulations.

Age of Plutonium-241

Information presented in the Tasks 3 and 4 report indicated that cutting oil and solvents contaminated with plutonium particles were stored in steel drums and placed on the pad between late 1958 and early 1967 (ChemRisk, 1992b). Evidence of drum leakage and contamination of the soil became apparent in early 1964 and the first drum was removed in January, 1967. The removal of drums was complete by June 1968 and the pad was covered with fill material and asphalt by November 1969. Since we do not have a careful accounting of the time when the plutonium waste was generated and when it was released into the environment, we have to make some assumptions regarding the typical age of plutonium-241. For the purpose of calculating americium-241 concentrations in air and soil due to the 903 Pad, the age of the plutonium-241 in soil stored on the pad is assumed to be the difference between the mid-point (1963) of the storage period (1958 to 1967) and the time when the pad was covered with asphalt in 1969, i.e., 6 years. Based on this assumption, the determination of americium-241 concentrations in air and soil is described in the following sections.

Determination of Americium-241 Concentrations in Air

As discussed above, the amount of americium-241 in the 903 Pad waste oil is comprised of the amount of americium-241 originally present in the waste and the amount that would have been formed as a result of radioactive decay of plutonium-241. The portion of the americium-241 concentration in air derived from that originally present in the waste oil can be back-calculated from the plutonium-239/240 concentration in air predicted by the Fugitive Dust Model (FDM) presented in Table G-1:

$$C_{air(Am\text{-}241)original} = C_{air(Pu\text{-}239/240)} \times 0.23$$

Where:

$C_{air(Am\text{-}241)original}$	=	Americium-241 concentration in air due to americium-241 originally present in the waste, pCi m^{-3};
$C_{air(Pu\text{-}239/240)}$	=	Plutonium-239/240 concentration in air predicted by the FDM, pCi m^{-3}; and
0.23	=	The ratio of americium-241 alpha activity to plutonium-239/240 alpha activity in Rocky Flats plutonium, dimensionless.

The additional amount of americium-241 formed during the storage period and its contribution to the total americium-241 concentration in air can be back-calculated from the plutonium-239/240 concentration in air predicted by the FDM (Table G-1) and the assumed decay time of 6 y:

$$C_{air(Am\text{-}241)decay} = C_{air(Pu\text{-}239/240)} \times 5.06 \times [1\text{-}\exp(-\lambda \times t)] \times R$$

Where:

$C_{air(Am\text{-}241)decay}$	=	Americium-241 concentration in air due to the decay of plutonium-241 originally present in the waste, pCi m^{-3};
$C_{air(Pu\text{-}239/240)}$	=	Plutonium-239/240 concentration in air predicted by the FDM, pCi m^{-3};
5.06	=	The ratio of plutonium-241 beta activity to plutonium-239/240 alpha activity in Rocky Flats plutonium, dimensionless;

λ = Radioactive decay constant of plutonium-241, which is equal to 0.693/14.4 y or 0.048 y^{-1};

t = Storage time of the waste on the pad before it was released, 6 y; and

R = The ratio of pCi $atom^{-1}$ for americium-241 to pCi $atom^{-1}$ for plutonium-241. This simplifies to the ratio of the radioactive decay constant for americium-241 to the radioactive decay constant for plutonium-241, which is equal to 0.033.

The total americium-241 concentration in air is simply the sum of the two components:

$$C_{air(Am\text{-}241)total} = C_{air(Am\text{-}241)original} + C_{air(Am\text{-}241)decay}$$

It should be noted that, just as with the air concentrations presented in Table G-1, the americium-241 concentrations in air determined in this section represent radioactivity associated with soil particles in the respirable range, *i.e.*, less than 8-micron in aerodynamic diameter. These air concentrations are only suitable for the evaluation of direct inhalation exposure pathway between 1965 and 1969.

When the 903 Pad was covered with asphalt in 1969, there was no further direct contaminant release from the pad; therefore, inhalation and immersion exposures are not considered applicable for the period between 1970 and 1989 and americium-241 concentrations in air are not calculated.

Determination of Americium-241 Concentrations in Soil

The method used to calculate americium-241 concentrations in the surface and bulk soil compartments is the same as that described in Appendix G for plutonium-239/240. An example of the calculation of americium-241 concentration in the surface soil compartment (by mass) is presented in this section to illustrate the method. Similar to the calculation of air concentrations, the americium-241 concentration in the surface soil compartment can be considered to be made up of two components: americium-241 originally present in the waste and americium-241 formed as a result of the decay of plutonium-241 originally present in the waste. Both of these components are calculated based on the plutonium-239/240 concentrations in the surface soil compartment (by mass) determined in Appendix G:

$$C_{soil(Am\text{-}241)original} = C_{soil(Pu\text{-}239/240)} \times 0.23$$

Where:

$C_{soil(Am\text{-}241)original}$ = Americium-241 concentration in the surface soil compartment due to the americium-241 originally present in the waste oil, pCi kg^{-1};

$C_{soil(Pu\text{-}239/240)}$ = Plutonium-239/240 concentration in the surface soil compartment, pCi kg^{-1}; and

0.23 = The ratio of americium-241 alpha activity to plutonium-239/240 alpha activity in Rocky Flats plutonium, dimensionless.

The additional amount of americium-241 formed during the storage period and its contribution to the total americium-241 concentration in the surface soil compartment can be back-calculated from the plutonium-239/240 concentration in soil and the assumed decay time of 6 years:

$$C_{soil(Am\text{-}241)decay} = C_{soil(Pu\text{-}239/240)} \times 5.06 \times [1\text{-}\exp(-\lambda \times t)] \times R$$

Where:

$C_{soil(Am\text{-}241)decay}$ = Americium-241 concentration in the surface soil compartment due to the decay of plutonium-241 originally present in the waste oil, pCi kg^{-1};

$C_{soil(Pu\text{-}239/240)}$ = Plutonium-239/240 concentration in the surface soil compartment, pCi kg^{-1};

5.06 = The ratio of plutonium-241 beta activity to plutonium-239/240 alpha activity in Rocky Flats plutonium, dimensionless;

λ = Radioactive decay constant of plutonium-241, which is equal to 0.693/14.4 y or 0.048 y^{-1};

t = Storage time of the waste on the pad before it was released, 6 y; and

R = The ratio of pCi $atom^{-1}$ for americium-241 to pCi $atom^{-1}$ for plutonium-241. This simplifies to the ratio of the radioactive decay constant of americium-241 to the radioactive decay constant for plutonium-241, which is equal to 0.033.

The total americium-241 concentration in the surface soil compartment is calculated by summing the two components:

$$C_{soil(Am\text{-}241)total} = C_{soil(Am\text{-}241)original} + C_{soil(Am\text{-}241)decay}$$

Similar to the determination of plutonium-239/240 concentrations in soil in Appendix G, the soil concentrations calculated by the method shown above are estimated for a single point in time, 1969. For the purpose of this analysis, we have assumed that the soil concentration estimates for 1969 are applicable for evaluating soil-related exposures throughout the direct release period

(1965 through 1969). This assumption will likely overestimate to some degree the americium-241 doses received by the public through soil-related exposure pathways.

The calculation of americium-241 concentrations in soil for the period after direct releases ceased (1970 to 1989) accounts for the additional ingrowth of americium-241 on an annual basis from the decay of plutonium-241. For example, americium-241 concentrations in the surface soil compartment (by mass) in a later year can be calculated by using the same equations and input parameters identified before with the exception of decay time, t. For example, to calculate the soil concentration in 1977, a decay time of 14 years (1963-1977) is used instead of 6 years. Using this approach, americium-241 concentrations in the surface and bulk soil compartments are calculated for all of the years from 1970 through 1989. Since a number of the inputs to the calculations presented in this appendix are expressed in terms of probability distributions, Monte Carlo techniques are used to perform these calculations and propagate the identified uncertainties. A description of the probability distributions for the input parameters is presented in Table G-2.

REFERENCES

ChemRisk. (1992a). Estimating Historical Emissions from Rocky Flats. Project Task 5. Draft Report. November. Repository Document TA-1240.

ChemRisk. (1992b). Reconstruction of Historical Rocky Flats Operations and Identification of Release Points. Project Tasks 3 & 4 . Final Draft Report. August, 1992.

APPENDIX I

EXPOSURE PATHWAY EQUATIONS FOR CHEMICALS AND RADIONUCLIDES

APPENDIX I

EXPOSURE PATHWAY EQUATIONS FOR CHEMICALS AND RADIONUCLIDES

This appendix presents the exposure equations used in this assessment to calculate chemical and radiation doses. Since there are differences in how chemical and radiation dose are defined, separate, although similar, equations are used. For chemicals, intake doses are calculated in terms of milligram chemical per unit body weight per day (mg kg^{-1} d^{-1}) and milligram chemical per year (mg y^{-1}). For radionuclides, the equations are divided into two parts. The first equation is used to calculated radiation intake in terms of picocuries per year (pCi y^{-1}). The second equation is used to calculate radiation dose in terms of sieverts per year (Sv y^{-1}). A radiation dose expressed in Sv y^{-1} can be converted to rem y^{-1} by multiplying by 100. It should be noted that the determination of intake is not appropriate for immersion and ground exposure, because exposure occurs without the contaminant being taken up by the body. In these cases, only an equation for radiation dose is presented.

EXPOSURE PATHWAY EQUATIONS FOR CHEMICALS

$$I_{air} = \frac{C_{air} U_{air}}{BW} f_t f_s$$

$$I'_{air} = C_{air} U_{air} f_t f_s T_e$$

where:

I_{air}	=	Daily intake of chemical per unit body weight due to inhalation, mg kg^{-1}d^{-1};
I'_{air}	=	Annual intake of chemical due to inhalation, mg y^{-1};
C_{air}	=	Average concentration of chemical in air, mg m^{-3};
U_{air}	=	Volume of air inhaled per day, m^3 d^{-1};
f_t	=	Fraction of time that a person is exposed, dimensionless;
f_s	=	Indoor/outdoor shielding factor, dimensionless;
BW	=	Average body weight of an adult, kg; and
T_e	=	Exposure duration, 365 d y^{-1}.

$$I_{soil} = \frac{C_{soil(surf)}\ U_{soil}}{BW} f_c$$

$$I'_{soil} = C_{soil(surf)}\ U_{soil}\ f_e\ T_e$$

where:

I_{soil} = Daily intake of chemical per unit body weight due to incidental soil ingestion, mg kg^{-1} d^{-1};

I'_{soil} = Annual intake of chemical due to incidental soil ingestion, mg y^{-1};

$C_{soil(surf)}$ = Equilibrium concentration of chemical in surface soil, mg kg^{-1};

U_{soil} = Average daily ingestion of soil, kg d^{-1};

BW = Average body weight of an adult, kg;

f_c = Fraction of soil ingested that is contaminated, dimensionless; and

T_e = Exposure duration, 365 d y^{-1}.

$$C_{veg} = C_{soil(bulk)} B_{veg} + C_{air} V_d \left(\frac{IF}{Y}\right) \left(\frac{1 - e^{-\lambda_w T_g}}{\lambda_w}\right) f_w$$

where:

C_{veg}	=	Equilibrium concentration of chemical on washed leafy vegetables (wet weight), mg kg^{-1};
$C_{soil(bulk)}$	=	Equilibrium concentration of chemical in bulk soil, mg kg^{-1};
B_{veg}	=	Concentration ratio for the transfer of chemical from dry soil to leafy vegetables (wet weight), dimensionless;
C_{air}	=	Average concentration of chemical in air, mg m^{-3};
λ_w	=	Weathering rate constant, d^{-1}
V_d	=	Deposition velocity, m d^{-1};
T_g	=	Growth period or exposure period, d;
IF/Y	=	Interception fraction by crop per crop biomass (wet weight) at harvest, m^2 kg^{-1}; and
f_w	=	Fraction of chemical remain after washing, dimensionless.

Associated Intake Dose Calculation:

$$I_{veg} = \frac{C_{veg}\ U_{veg}}{BW} f_c$$

$$I'_{veg} = C_{veg}\ U_{veg}\ f_c\ T_e$$

where:

I_{veg}	=	Daily intake of chemical per unit body weight due to leafy vegetable ingestion, mg kg^{-1} d^{-1};
I'_{veg}	=	Annual intake of chemical due to leafy vegetable ingestion, mg y^{-1};
C_{veg}	=	Equilibrium concentration of chemical on vegetables (wet weight), mg kg^{-1};
U_{veg}	=	Average daily consumption of vegetables (wet weight), kg d^{-1};
f_c	=	Fraction of vegetables consumed that is contaminated, dimensionless;
BW	=	Average body weight of an adult, kg; and
T_e	=	Exposure duration, 365 d y^{-1}.

$$C_{past} = C_{soil(bulk)}\ B_{past} + C_{air}\ V_d\ (\frac{IF}{Y})\ (\frac{1 - e^{-\lambda_w T_g}}{\lambda_w})$$

where:

C_{past}	=	Equilibrium concentration of chemical on pasture (dry weight), mg kg^{-1};
$C_{soil(bulk)}$	=	Equilibrium concentration of chemical in bulk soil, mg kg^{-1};
B_{past}	=	Concentration ratio for the transfer of chemical from dry soil to pasture (dry weight), dimensionless;
C_{air}	=	Average concentration of chemical in air, mg m^{-3};
V_d	=	Deposition velocity, m d^{-1};
IF/Y	=	Interception fraction by pasture per pasture biomass (dry weight) at harvest, m^2 kg^{-1};
λ_w	=	Weathering rate constant, d^{-1} and
T_g	=	Growth period or exposure period, d.

Pasture → Beef

$$C_{beef(past)} = C_{past}\ Q_{past(b)}\ F_f\ f_p$$

where:

$C_{beef(past)}$	=	Equilibrium concentration of chemical in beef, mg kg^{-1};
C_{past}	=	Equilibrium concentration of chemical on pasture (dry weight), mg kg^{-1};
$Q_{past(b)}$	=	Daily ingestion of pasture (dry weight) by beef cattle, kg d^{-1};
F_f	=	Biotransfer factor from cattle intake to meat concentration, (mg kg^{-1}) per (mg d^{-1}); and
f_p	=	Fraction of feed that is pasture, dimensionless.

Pasture → Milk

$$C_{milk(past)} = C_{past}\ Q_{past(d)}\ F_m\ f_p$$

where:

$C_{milk(past)}$	=	Equilibrium concentration of chemical in milk, mg L^{-1};
C_{past}	=	Equilibrium concentration of chemical on pasture (dry weight), mg kg^{-1};
$Q_{past(d)}$	=	Daily ingestion of pasture (dry weight) by dairy cattle, kg d^{-1};
F_m	=	Biotransfer factor from cattle intake to milk concentration, (mg L^{-1}) per (mg d^{-1}); and
f_p	=	Fraction of feed that is pasture, dimensionless.

Air → Beef

$$C_{beef(air)} = C_{air}\, Q_{air(b)}\, F_f$$

where:

$C_{beef(air)}$	=	Equilibrium concentration of chemical in beef due to inhalation, mg kg^{-1};
C_{air}	=	Average concentration of chemical in air, mg m^{-3};
$Q_{air(b)}$	=	Daily inhalation rate of beef cattle, m^3 d^{-1}; and
F_f	=	Biotransfer factor from cattle intake to meat concentration, (mg kg^{-1}) per (mg d^{-1}).

Air → Milk

$$C_{milk(air)} = C_{air}\, Q_{air(d)}\, F_m$$

where:

$C_{milk(air)}$	=	Equilibrium concentration of chemical in milk due to inhalation, mg L^{-1};
C_{air}	=	Average concentration of chemical in air, mg m^{-3};
$Q_{air(d)}$	=	Daily inhalation rate of dairy cattle, m^3 d^{-1}; and
F_m	=	Biotransfer factor from cattle intake to milk concentration, (mg L^{-1}) per (mg d^{-1}).

Soil → Beef

$$C_{beef(soil)} = C_{soil(surf)}\ Q_{soil(b)}\ F_f\ f_c$$

where:

$C_{beef(soil)}$ = Equilibrium concentration of chemical in beef due to soil ingestion, mg kg^{-1};

$C_{soil(surf)}$ = Equilibrium concentration of chemical in surface soil, mg kg^{-1};

$Q_{soil(b)}$ = Daily ingestion rate of soil by beef cattle, kg d^{-1};

F_f = Biotransfer factor from cattle intake to meat concentration, (mg kg^{-1}) per (mg d^{-1}); and

f_c = Fraction of ingested soil that is contaminated, dimensionless.

Soil → Milk

$$C_{milk(soil)} = C_{soil(surf)}\ Q_{soil(d)}\ F_m\ f_c$$

where:

$C_{milk(soil)}$ = Equilibrium concentration of chemical in milk due to soil ingestion, mg L^{-1};

$C_{soil(surf)}$ = Equilibrium concentration of chemical in surface soil, mg kg^{-1};

$Q_{soil(d)}$ = Daily ingestion rate of soil by dairy cattle, kg d^{-1};

F_m = Biotransfer factor from cattle intake to milk concentration, (mg L^{-1}) per (mg d^{-1}); and

f_c = Fraction of ingested soil that is contaminated, dimensionless.

$$I_{beef} = \frac{C_{beef(air)} + C_{beef(soil)} + C_{beef(past)}}{BW} U_{beef} f_c$$

$$I'_{beef} = [C_{beef(air)} + C_{beef(soil)} + C_{beef(past)}] U_{beef} f_c T_e$$

where:

I_{beef}	=	Daily intake of chemical per unit body weight due to beef ingestion, mg kg^{-1} d^{-1};
I'_{beef}	=	Annual intake of chemical due to beef ingestion, mg y^{-1};
$C_{beef(air)}$	=	Equilibrium concentration of chemical in beef due to inhalation, mg kg^{-1};
$C_{beef(soil)}$	=	Equilibrium concentration of chemical in beef due to ingestion of soil, mg kg^{-1};
$C_{beef(past)}$	=	Equilibrium concentration of chemical in beef due to ingestion of pasture, mg kg^{-1};
U_{beef}	=	Daily consumption of beef, kg d^{-1};
BW	=	Average body weight of an adult, kg;
f_c	=	Fraction of beef consumed that is contaminated, dimensionless; and
T_e	=	Exposure duration, 365 d y^{-1}.

$$I_{milk} = \frac{C_{milk(air)} + C_{milk(soil)} + C_{milk(past)}}{BW} U_{milk} f_c$$

$$I'_{milk} = [C_{milk(air)} + C_{milk(soil)} + C_{milk(past)}] U_{milk} f_c T_e$$

where:

I_{milk}	=	Daily intake of chemical per unit body weight due to milk ingestion, mg kg^{-1} d^{-1};
I'_{milk}	=	Annual intake of chemical due to milk ingestion, mg y^{-1};
$C_{milk(air)}$	=	Equilibrium concentration of chemical in milk due to inhalation, mg L^{-1};
$C_{milk(soil)}$	=	Equilibrium concentration of chemical in milk due to ingestion of soil, mg L^{-1};
$C_{milk(past)}$	=	Equilibrium concentration of chemical in milk due to ingestion of pasture, mg L^{-1};
U_{milk}	=	Daily consumption of milk, L d^{-1};
BW	=	Average body weight of an adult, kg;
f_c	=	Fraction of milk consumed that is contaminated, dimensionless; and
T_e	=	Exposure duration, 365 d y^{-1}.

$$C_{wheat} = C_{soil(bulk)} \, B_{veg}$$

where:

C_{wheat} = Equilibrium concentration of chemical in wheat (wet weight), mg kg^{-1}; and

$C_{soil(bulk)}$ = Equilibrium concentration of chemical in bulk soil, mg kg^{-1};

B_{veg} = Concentration ratio for the transfer of chemical from dry soil to leafy vegetables (wet weight), dimensionless.

$$I_{wheat} = \frac{C_{wheat} \, U_{wheat} \, f_c}{f_{wd} \quad BW}$$

$$I'_{wheat} = \frac{C_{wheat} \, U_{wheat} \, f_c}{f_{wd}} \, T_e$$

where:

I_{wheat} = Daily intake of chemical due to wheat ingestion, mg kg^{-1} d^{-1};

I'_{wheat} = Annual intake of chemical due to wheat ingestion, mg y^{-1}.

C_{wheat} = Equilibrium concentration of chemical in wheat, mg kg^{-1} (wet wt.);

f_{wd} = Conversion factor for wheat (wet) to flour (dry), dimensionless;

U_{wheat} = Daily consumption of flour (dry), kg d^{-1};

f_c = Fraction of wheat consumed that is contaminated, dimensionless;

BW = Average body weight of an adult, kg; and

T_e = Exposure duration, 365 d y^{-1}.

$$C_{air\text{-}resus} = A\ M\ F\ f_u$$

where:

$C_{air\text{-}resus}$ = Average concentration of chemical in air due to resuspension, mg m^{-3};

A = Equilibrium concentration of chemical on surface soil, mg kg^{-1};

M = Mass loading of particles in ambient air, mg m^{-3};

F = Enhancement factor, dimensionless; and

f_u = Conversion factor, kg mg^{-1}.

$$I_{water} = \frac{C_{water}\ U_{water}}{BW} f_c$$

$$I'_{water} = C_{water}\ U_{water}\ f_c\ T_e$$

where:

I_{water}	=	Daily intake of chemical per unit body weight due to water consumption, mg kg^{-1} d^{-1};
I'_{water}	=	Annual intake of chemical due to water consumption, mg y^{-1};
C_{water}	=	Average concentration of chemical in water, mg L^{-1};
U_{water}	=	Average daily consumption of drinking water, L d^{-1};
BW	=	Average body weight of an adult, kg;
f_c	=	Fraction of water consumed that is contaminated, dimensionless; and
T_e	=	Exposure duration, 365 d y^{-1}.

EXPOSURE PATHWAY EQUATIONS FOR RADIONUCLIDES

$$I_{air} = C_{air} U_{air} f_t f_s T_e$$

where:

I_{air}	=	Annual intake of radionuclide due to inhalation, pCi y^{-1};
C_{air}	=	Average concentration of radionuclide in air, pCi m^{-3};
U_{air}	=	Volume of air inhaled per day, m^3 d^{-1};
f_t	=	Fraction of time that a person is exposed, dimensionless;
f_s	=	Indoor/outdoor shielding factor, dimensionless; and
T_e	=	Exposure duration, 365 d y^{-1}.

$$Dose_{air} = I_{air} f_u \, DCF_{inhalation}$$

where:

$Dose_{air}$	=	Radiation dose due to inhalation exposure, Sv y^{-1};
I_{air}	=	Annual intake of radionuclide due to inhalation, pCi y^{-1};
f_u	=	Conversion factor, Bq pCi^{-1};
$DCF_{inhalation}$	=	Dose conversion factor for inhalation of radionuclide, Sv Bq^{-1}.

$$I_{soil} = C_{soil(surf)} \, U_{soil} \, f_c \, T_e$$

where:

I_{soil} = Annual intake of radionuclide due to incidental soil ingestion, pCi y^{-1};

$C_{soil(surf)}$ = Equilibrium concentration of radionuclide in surface soil, pCi kg^{-1};

U_{soil} = Average daily ingestion of soil, kg d^{-1};

f_c = Fraction of soil ingested that is contaminated, dimensionless; and

T_e = Exposure duration, 365 d y^{-1}.

$$Dose_{soil} = I_{soil} \, f_u \, DCF_{ingestion}$$

where:

$Dose_{soil}$ = Radiation dose due to incidental soil ingestion, Sv y^{-1};

I_{soil} = Annual intake of radionuclide due to incidental soil ingestion, pCi y^{-1};

f_u = Conversion factor, Bq pCi^{-1};

$DCF_{ingestion}$ = Dose conversion factor for ingestion of radionuclide, Sv Bq^{-1}.

$$Dose_{imm} = C_{air}\ DCF_{imm}\ f_t\ f_s\ f_u$$

where:

$Dose_{imm}$	=	Dose due to air immersion, Sv y^{-1};
C_{air}	=	Average concentration of radionuclide in air, pCi m^{-3};
DCF_{imm}	=	Dose conversion factor for immersion in an infinite cloud, Sv y^{-1} per Bq cm^{-3};
f_t	=	Fraction of time exposed, dimensionless;
f_s	=	Indoor/outdoor shielding factor, dimensionless; and
f_u	=	Conversion factor, Bq cm^{-3} per pCi m^{-3}.

$$C_{veg} = C_{soil(bulk)}\ B_{veg} + C_{air}\ V_d\ \left(\frac{IF}{Y}\right)\left(\frac{1 - e^{-\lambda_{eff} T_g}}{\lambda_{eff}}\right) f_w$$

where:

C_{veg}	=	Equilibrium concentration of radionuclide on washed leafy vegetables (wet weight), pCi kg^{-1};
$C_{soil(bulk)}$	=	Equilibrium concentration of radionuclide in bulk soil, pCi kg^{-1};
B_{veg}	=	Concentration ratio for the transfer of radionuclide from dry soil to leafy vegetables (wet weight), dimensionless;
C_{air}	=	Average concentration of radionuclide in air, pCi m^{-3};
λ_{eff}	=	$\lambda_w + \lambda_i$;
λ_w	=	Weathering rate constant, d^{-1};
λ_i	=	Decay constant of radionuclide, d^{-1};
V_d	=	Deposition velocity, m d^{-1};
T_g	=	Growth period or exposure period, d;
IF/Y	=	Interception fraction by crop per crop biomass (wet weight) at harvest, m^2 kg^{-1}; and
f_w	=	Fraction of radionuclide remain after washing, dimensionless.

Associated Radiation Dose Calculation:

$$I_{veg} = C_{veg}\ U_{veg}\ f_c\ T_e$$

where:

I_{veg}	=	Annual intake of radionuclide due to leafy vegetable ingestion, pCi y^{-1};
C_{veg}	=	Equilibrium concentration of radionuclide on vegetables (wet weight), pCi kg^{-1};
U_{veg}	=	Average daily consumption of vegetables (wet weight), kg d^{-1};
f_c	=	Fraction of vegetables consumed that is contaminated, dimensionless; and
T_e	=	Exposure duration, 365 d y^{-1}.

$$Dose_{veg} = I_{veg}\ f_u\ DCF_{ingestion}$$

where:

$Dose_{veg}$	=	Radiation dose due to leafy vegetable ingestion, Sv y^{-1};
I_{veg}	=	Annual intake of radionuclide due to leafy vegetable ingestion, pCi y^{-1};
f_u	=	Conversion factor, Bq pCi^{-1}; and
$DCF_{ingestion}$	=	Dose conversion factor for ingestion of radionuclide, Sv Bq^{-1}.

$$C_{past} = C_{soil(bulk)}\, B_{past} + C_{air}\, V_d \left(\frac{IF}{Y}\right) \left(\frac{1 - e^{-\lambda_{eff} T_g}}{\lambda_{eff}}\right)$$

where:

C_{past}	=	Equilibrium concentration of radionuclide on pasture (dry weight), pCi kg^{-1};
$C_{soil(bulk)}$	=	Equilibrium concentration of radionuclide in bulk soil, pCi kg^{-1};
B_{past}	=	Concentration ratio for the transfer of radionuclide from dry soil to pasture (dry weight), dimensionless;
C_{air}	=	Average concentration of radionuclide in air, pCi m^{-3};
V_d	=	Deposition velocity, m d^{-1};
IF/Y	=	Interception fraction by pasture per pasture biomass (dry weight) at harvest, m^2 kg^{-1};
λ_{eff}	=	$\lambda_w + \lambda_i$;
λ_w	=	Weathering rate constant, d^{-1};
λ_i	=	Decay constant of radionuclide, d^{-1}; and
T_g	=	Growth period or exposure period, d.

Pasture → Beef

$$C_{beef(past)} = C_{past}\ Q_{past(b)}\ F_f\ f_p$$

where:

$C_{beef(past)}$	=	Equilibrium concentration of radionuclide in beef, pCi kg^{-1};
C_{past}	=	Equilibrium concentration of radionuclide on pasture (dry weight), pCi kg^{-1};
$Q_{past(b)}$	=	Daily ingestion of pasture (dry weight) by beef cattle, kg d^{-1};
F_f	=	Biotransfer factor from cattle intake to meat concentration, (pCi kg^{-1}) per (pCi d^{-1}); and
f_p	=	Fraction of feed that is pasture, dimensionless.

Pasture → Milk

$$C_{milk(past)} = C_{past}\ Q_{past(d)}\ F_m\ f_p$$

where:

$C_{milk(past)}$	=	Equilibrium concentration of radionuclide in milk, pCi L^{-1};
C_{past}	=	Equilibrium concentration of radionuclide on pasture (dry weight), pCi kg^{-1};
$Q_{past(d)}$	=	Daily ingestion of pasture (dry weight) by dairy cattle, kg d^{-1};
F_m	=	Biotransfer factor from cattle intake to milk concentration, (pCi L^{-1}) per (pCi d^{-1}); and
f_p	=	Fraction of feed that is pasture, dimensionless.

Air → Beef

$$C_{beef(air)} = C_{air}\ Q_{air(b)}\ F_f$$

where:

$C_{beef(air)}$	=	Equilibrium concentration of radionuclide in beef due to inhalation, pCi kg^{-1};
C_{air}	=	Average concentration of radionuclide in air, pCi m^{-3};
$Q_{air(b)}$	=	Daily inhalation rate of beef cattle, m^3 d^{-1}; and
F_f	=	Biotransfer factor from cattle intake to meat concentration, (pCi kg^{-1}) per (pCi d^{-1}).

Air → Milk

$$C_{milk(air)} = C_{air}\ Q_{air(d)}\ F_m$$

where:

$C_{milk(air)}$	=	Equilibrium concentration of radionuclide in milk due to inhalation, pCi L^{-1};
C_{air}	=	Average concentration of radionuclide in air, pCi m^{-3};
$Q_{air(d)}$	=	Daily inhalation rate of dairy cattle, m^3 d^{-1}; and
F_m	=	Biotransfer factor from cattle intake to milk concentration, (pCi L^{-1}) per (pCi d^{-1}).

Soil → Beef

$$C_{beef(soil)} = C_{soil(surf)} \, Q_{soil(b)} \, F_f \, f_c$$

where:

$C_{beef(soil)}$	=	Equilibrium concentration of radionuclide in beef due to soil ingestion, pCi kg^{-1};
$C_{soil(surf)}$	=	Equilibrium concentration of radionuclide in surface soil, pCi kg^{-1};
$Q_{soil(b)}$	=	Daily ingestion rate of soil by beef cattle, kg d^{-1};
F_f	=	Biotransfer factor from cattle intake to meat concentration, (pCi kg^{-1}) per (pCi d^{-1}); and
f_c	=	Fraction of ingested soil that is contaminated, dimensionless.

Soil → Milk

$$C_{milk(soil)} = C_{soil(surf)} \, Q_{soil(d)} \, F_m \, f_c$$

where:

$C_{milk(soil)}$	=	Equilibrium concentration of radionuclide in milk due to soil ingestion, pCi L^{-1};
$C_{soil(surf)}$	=	Equilibrium concentration of radionuclide in surface soil, pCi kg^{-1};
$Q_{soil(d)}$	=	Daily ingestion rate of soil by dairy cattle, kg d^{-1};
F_m	=	Biotransfer factor from cattle intake to milk concentration, (pCi L^{-1}) per (pCi d^{-1}); and
f_c	=	Fraction of ingested soil that is contaminated, dimensionless.

$$I_{beef} = (C_{beef(air)} + C_{beef(soil)} + C_{beef(past)})\ U_{beef}\, f_c\ T_e$$

where:

I_{beef}	=	Annual intake of radionuclide due to beef ingestion, pCi y^{-1};
$C_{beef(air)}$	=	Equilibrium concentration of radionuclide in beef due to inhalation, pCi kg^{-1};
$C_{beef(soil)}$	=	Equilibrium concentration of radionuclide in beef due to ingestion of soil, pCi kg^{-1};
$C_{beef(past)}$	=	Equilibrium concentration of radionuclide in beef due to ingestion of pasture, pCi kg^{-1};
U_{beef}	=	Daily consumption of beef, kg d^{-1};
f_c	=	Fraction of beef consumed that is contaminated, dimensionless; and
T_e	=	Exposure duration, 365 d y^{-1}.

$$Dose_{beef} = I_{beef}\, f_u\ DCF_{ingestion}$$

where:

$Dose_{beef}$	=	Radiation dose due to beef ingestion, Sv y^{-1};
I_{beef}	=	Annual intake of radionuclide due to beef ingestion, pCi y^{-1};
f_u	=	Conversion fact, Bq pCi^{-1}; and
$DCF_{ingestion}$	=	Dose conversion factor for ingestion of radionuclide, Sv Bq^{-1}.

$$I_{milk} = (C_{milk(air)} + C_{milk(soil)} + C_{milk(past)})\ U_{milk}\ f_c\ T_e$$

where:

I_{milk}	=	Annual intake of radionuclide due to milk ingestion, pCi y^{-1};
$C_{milk(air)}$	=	Equilibrium concentration of radionuclide in milk due to inhalation, pCi L^{-1};
$C_{milk(soil)}$	=	Equilibrium concentration of radionuclide in milk due to ingestion of soil, pCi L^{-1};
$C_{milk(past)}$	=	Equilibrium concentration of radionuclide in milk due to ingestion of pasture, pCi L^{-1};
U_{milk}	=	Daily consumption of milk, L d^{-1};
f_c	=	Fraction of milk consumed that is contaminated, dimensionless; and
T_e	=	Exposure duration, 365 d y^{-1}.

$$Dose_{milk} = I_{milk}\ f_u\ DCF_{ingestion}$$

where:

$Dose_{milk}$	=	Radiation dose due to milk ingestion, Sv y^{-1};
I_{milk}	=	Annual intake of radionuclide due to milk ingestion, pCi y^{-1};
f_u	=	Conversion factor, Bq pCi^{-1}; and
$DCF_{ingestion}$	=	Dose conversion factor for ingestion of radionuclide, Sv Bq^{-1}.

$$I_{wheat} = \frac{C_{soil(bulk)}\ B_{veg}\ U_{wheat}\ f_c}{f_{wd}}\ T_e$$

where:

I_{wheat}	=	Annual intake of radionuclide due to wheat ingestion, pCi y^{-1};
$C_{soil(bulk)}$	=	Equilibrium concentration of radionuclide in bulk soil, pCi kg^{-1};
B_{veg}	=	Concentration ratio for the transfer of radionuclide from dry soil to leafy vegetables (wet weight), dimensionless;
f_{wd}	=	Conversion factor for wheat (wet) to flour (dry), dimensionless;
U_{wheat}	=	Daily consumption of flour (dry), kg d^{-1};
f_c	=	Fraction of wheat consumed that is contaminated, dimensionless; and
T_e	=	Exposure duration, 365 d y^{-1}.

$$Dose_{wheat} = I_{wheat}\ f_u\ DCF_{ingestion}$$

where:

$Dose_{wheat}$	=	Radiation dose due to wheat ingestion, Sv y^{-1};
I_{wheat}	=	Annual intake of radionuclide due to wheat ingestion, pCi y^{-1};
f_u	=	Conversion factor, Bq pCi^{-1}; and
$DCF_{ingestion}$	=	Dose conversion factor for ingestion of radionuclide, Sv Bq^{-1}.

$$C_{air-resus} = A\ M\ F\ f_u$$

where:

$C_{air-resus}$ = Average concentration of radionuclide in air due to resuspension, pCi m^{-3};

A = Equilibrium concentration of radionuclide on surface soil, pCi kg^{-1};

M = Mass loading of particles in ambient air, mg m^{-3};

F = Enhancement factor, dimensionless; and

f_u = Conversion factor, kg mg^{-1}.

$$Dose_{surf} = C_{soil(surf)}\ DCF_{surf}\ f_t\ f_s\ f_u$$

where:

$Dose_{surf}$	=	Dose from ground exposure, Sv y^{-1};
$C_{soil(surf)}$	=	Equilibrium concentration of radionuclide in surface soil, pCi m^{-2};
DCF_{surf}	=	Dose conversion factor for ground exposure to an infinite plane at a point 1 meter above ground, Sv y^{-1} per Bq cm^{-2};
f_t	=	Fraction of time exposed, dimensionless;
f_s	=	Indoor/outdoor shielding factor, dimensionless; and
f_u	=	Conversion factor; Bq cm^{-2} per pCi m^{-2}.

APPENDIX J

EXPOSURE PARAMETERS

APPENDIX J

EXPOSURE PARAMETERS

This appendix summarizes the exposure parameters which are a key input to the exposure pathways equations for calculating dose. There is uncertainty in each of these parameters that is reflected in the probability distributions that describe them. A discussion of how these uncertainties are addressed in estimating dose is provided in Appendix K. It should be noted that for many parameters, multiple scientific journal articles or reference documents were reviewed. In some cases, the probability distribution used in the assessment is taken directly from one of the reference materials. In other cases, the probability distribution reflects a synthesis of information from two or more sources. In any event, all of the references that were consulted are documented.

APPENDIX J

EXPOSURE PARAMETERS

Parameter	Unit	Distribution	Mean/Mode	SD	GM	GSD	Range	Comments	Reference
Adult body weight, BW	kg	Lognormal			68	1.2			14, 27
Adult inhalation rate, U(air)	$m^3\ d^{-1}$	Triangular	20				9 - 29		9, 14, 28
Fraction of day exposed	dimensionless	Uniform					0.5 - 1.0	Worker: 12 hr/24 hr	Professional Judgement
Indoor/Outdoor shielding factor (Inhalation)	dimensionless	Triangular	0.5				0.3 - 0.8		19
Indoor/Outdoor shielding factor (Immersion)	dimensionless	Triangular	0.2				0.1 - 0.5		19
Indoor/Outdoor shielding factor (Ground exposure)	dimensionless	Triangular	0.3				0.2 - 0.6		19
Adult milk ingestion rate, U(milk)	$L\ d^{-1}$	Lognormal			0.25	1.9		Only fresh fluid milk is considered	8,9,14,17,24,28
Fraction of milk that is contaminated	dimensionless	Triangular	0.4				0.1 - 1.0		28
Adult beef ingestion rate, U(beef)	$kg\ d^{-1}$	Lognormal			0.2	1.4			8,9,13,17,24,28
Fraction of beef that is contaminated	dimensionless	Triangular	0.44				0.1 - 1.0		28
Adult vegetable ingestion rate, U(veg.)	$kg(wet)\ d^{-1}$	Lognormal			0.15	1.5		Vegetables only	13,14,15,17,28
Fraction of vegetables that are homegrown	dimensionless	Triangular	0.25				0.1 - 1.0		11,28
Adult flour ingestion rate, U(wheat)	$kg\ (dry)\ d^{-1}$	Lognormal			0.07	1.8			13,14,17,25
Conversion from wheat(wet) to flour (dry)	dimensionless	Uniform					0.8 - 0.9		21
Fraction of wheat that is locally grown	dimensionless	Triangular	0.5				0.3 - 0.8	highly conservative	11

EXPOSURE PARAMETERS

Parameter	Unit	Distribution	Mean/Mode	SD	GM	GSD	Range	Comments	Reference
Adult water ingestion rate, U(water)	L d^{-1}	point estimate	2.0					conservative estimate	22,28
Fraction of water that is contaminated	dimensionless	Point Estimate	1					conservative estimate	
Adult soil ingestion rate, U(soil)	kg d^{-1}	Uniform					1×10^{-6} to 5×10^{-5}		6,9,10,28,30
Fraction of ingested soil that is contaminated	dimensionless	Uniform					0.1-1.0		Professional Judgement
Total deposition velocity, Vd - Total	m d^{-1}	Lognormal			260	1.7		Routine Releases	4,21,23,26
Dry deposition velocity, Vd - Dry	m d^{-1}	Lognormal			87	3.2		57 Fire	21,23,26
Dry deposition velocity, Vd - Dry	m d^{-1}	Lognormal			87	1.7		69 Fire	21,23,26
IF(pasture)/Y(pasture)	m^2 kg^{-1} (dry)	Lognormal			2.0	1.6		IF = 0.5, Y = 0.28 kg(dry) m^{-2}	3,15,16,17,29
Weathering rate constant for pasture, λ_w	d^{-1}	Triangular	0.05				0.02 - 0.08	9 to 34 days	9,16,29
Exposure period of pasture, T_g	d	Triangular	30				15 - 60		29
IF(vegetables)/Y(vegetables)	m^2 kg^{-1} (wet)	Triangular	0.1				0.05 - 0.3	IF = 0.2, Y = 2 kg(wet)/m^2	3,9,10,15,17,29
Weathering rate constant for vegetables, λ_w	d^{-1}	Triangular	0.05				0.02 - 0.08	9 to 34 days	9,16
Exposure period of vegetables, T_g	d^{-1}	Triangular	60				30 - 90		7,29
Fraction of contaminant remaining after washing, f_w	dimensionless	Triangular	0.3				0.1-0.5		Professional Judgement

EXPOSURE PARAMETERS

Parameter	Unit	Distribution	Mean/Mode	SD	GM	GSD	Range	Comments	Reference
Soil dry bulk density, BD (surface)	kg m^{-3}	Triangular	1,000				800-1100		Task 6
Soil dry bulk density, BD (bulk)	kg m^{-3}	Triangular	1,700				1200-2200		Task 6
Soil depth of mixing, SD (surface)	m	Point Estimate	0.01						Professional Judgement
Soil depth of mixing, SD (bulk)	m	Point Estimate	0.25						Professional Judgement
BEEF CATTLE									
Feed ingestion rate of beef cattle, $Q_{past(b)}$	kg(dry) d^{-1}	Lognormal			11	1.5			7,14,17,29
Fraction of feed which is pasture	dimensionless	Triangular	0.75				0.5 - 1.0		Professional Judgement
Inhalation rate of beef cattle, $Q_{air(b)}$	m^3 d^{-1}	Normal	122	33					7,14
Fraction of day exposed	dimensionless	Point Estimate	1.0						Professional Judgement
Soil ingestion rate of beef cattle, $Q_{soil(b)}$	kg d^{-1}	Lognormal			0.34	1.8			14
Fraction of soil that is contaminated	dimensionless	Point Estimate	1.0						Professional Judgement
DAIRY CATTLE									
Feed ingestion rate of dairy cattle, $Q_{past(d)}$	kg(dry) d^{-1}	Lognormal			16	1.4			7,12,14,17,29
Fraction of feed which is pasture	dimensionless	Triangular	0.5				0.3-0.7		Professional Judgement
Inhalation rate of dairy cattle, $Q_{air(d)}$	m^3 d^{-1}	Normal	150	33					7, 14
Fraction of day exposed	dimensionless	Point Estimate	1.0						Professional Judgement

EXPOSURE PARAMETERS

Parameter	Unit	Distribution	Mean/Mode	SD	GM	GSD	Range	Comments	Reference
Soil ingestion rate of dairy cattle, $Q_{soil(d)}$	kg d^{-1}	Lognormal			0.36	1.6			14
Fraction of soil that is contaminated	dimensionless	Point Estimate	1.0						Professional Judgement
AMERICIUM-241									
F_f	d kg^{-1}	Logtriangular	3.5×10^{-6}				3.5×10^{-7} to 3.5×10^{-5}		19,29
F_m	d^{-1} L	Logtriangular	4.0×10^{-7}				4.0×10^{-8} to 4.0×10^{-6}		19,29
B(pasture) (dry pasture / dry soil)	dimensionless	Logtriangular	5.5×10^{-3}				5.5×10^{-4} to 5.5×10^{-2}		29
B(veg.) (wet produce / dry soil)	dimensionless	Logtriangular	2.5×10^{-4}				1.0×10^{-4} to 5.0×10^{-3}		19
BERYLLIUM									
F_f	d kg^{-1}	Logtriangular	1.0×10^{-3}				1.0×10^{-4} to 1.0×10^{-2}		29
F_m	d L^{-1}	Logtriangular	9.0×10^{-7}				9.0×10^{-8} to 9.0×10^{-6}		29
B(pasture) (dry pasture / dry soil)	dimensionless	Logtriangular	1.0×10^{-2}				1.0×10^{-3} to 1.0×10^{-1}		29
B(veg.) (wet produce / dry soil)	dimensionless	Logtriangular	6.4×10^{-4}				6.4×10^{-3} to 6.4×10^{-5}		29
PLUTONIUM									
F_f	d kg^{-1}	Logtriangular	1.0×10^{-6}				1.0×10^{-7} to 6.0×10^{-6}		1,20,29
F_m	d L^{-1}	Logtriangular	1.0×10^{-7}				1.0×10^{-8} to 1.0×10^{-6}		1,20,29
B(pasture) (dry pasture / dry soil)	dimensionless	Logtriangular	4.5×10^{-4}				4.5×10^{-5} to 4.5×10^{-3}		18,20,29

EXPOSURE PARAMETERS

Parameter	Unit	Distribution	Mean/Mode	SD	GM	GSD	Range	Comments	Reference
B(veg.) (wet produce / dry soil)	dimensionless	Logtriangular	1.2×10^{-4}				6×10^{-7} to 1×10^{-2}		18,20,29
URANIUM									
F_f	d kg^{-1}	Logtriangular	2.0×10^{-4}				2.0×10^{-5} to 2.0×10^{-3}		2,20,29
F_m	d L^{-1}	Logtriangular	6.0×10^{-4}				6.0×10^{-5} to 6.0×10^{-3}		2,20,29
B(pasture) (dry pasture / dry soil)	dimensionless	Logtriangular	8.5×10^{-3}				8.5×10^{-4} to 8.5×10^{-2}		18,20,29
B(veg.) (wet produce / dry soil)	dimensionless	Logtriangular	1.7×10^{-3}				1.7×10^{-4} to 1.7×10^{-2}		18,20,29

FOOTNOTES:

NA = not available

When the distribution is NORMAL, mean/mode = MEAN. When the distribution is TRIANGULAR, mean/mode is MODE.

REFERENCES

1. ATSDR. (1990). Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services. Toxicological Profile for Plutonium. TP-90-21.

2. ATSDR. (1990). Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services. Toxicological Profile for Uranium. TP-90-29.

3. Baes et al. (1984). A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture. ORNL-5786. Oak Ridge National Laboratory, Oak Ridge, TN.

4. Beal, S. K. and J. J. Mauro. (1989). Analysis of the Uncertainties in the Risk Assessment Performed in Support of the Proposed NESHAPS for Radionuclides. S. Cohen and Associates, McLean, VA.

5. Brady, N. C. (1984). The Nature and Properties of Soils. 9th edition. Macmillan Publishing, NY. p. 49-52.

6. Calabrese, E. J., E. J. Stanek, C. E. Gilbert and R. M. Barnes. (1990). Preliminary Adult Soil Ingestion Estimates: Results of Pilot Study. Reg. Tox. Pharm. 12:88-95.

7. CAPCOA. (1991). California Air Pollution Control Officers Association. Air Toxics "Hot Spots" Program, AB 2588, Risk Assessment Guidelines. Risk Assessment Committee of CAPCOA. Sacramento, California.

8. CHESS Committee. (1992). Calabrese, E. J. and P. T. Kostecki, Editors. A Review of Default Parameters for Preliminary Pollutant Limit Values (PPLV).

9. Clement Associates, Inc. (1988). Multi-Pathway Health Risk Assessment Input Parameters Guidance Document. Prepared for the California South Coast Air Quality Management District.

10. Hattemer-Frey, H. A. and C. Travis. (1991). Health Effects of Municipal Waste Incineration, CRC Press, Boca Raton, FL. p.90, 217.

11. Higley, K. A. (1991). Master of Science Thesis (Draft). Colorado State University. Fort Collins, CO.

12. Hoffman, F. O. and C. F. Baes. (1979). A Statistical Analysis of Selected Parameters for Predicting Food Chain Transport and Internal Dose of Radionuclides. ORNL/NUREG/TM-282. Oak Ridge National Laboratory, Oak Ridge, TN. Prepared for the U.S. Nuclear Regulatory Commission. October 1979.

13. Linkenheil, D. G. (1990). An Estimation of the Risk from Plutonium in Soil at the Guideline Levels of the Colorado Department of Health and the Environmental Protection Agency (Master of Science) Thesis. Colorado State University. Fort Collins, CO.

14. McKone, T. E. (1988). Conventional Weapons Demilitarization: A Health and Environmental Effects Data Base Assessment. Methods of Estimating Multi-Pathway Exposure to Environmental Contaminants. Final Report, Phase II. AD UCRL-21064. Lawrence Livermore National Laboratory, Livermore, CA.

15. Miller, C. W. (1979). Models and Parameters for Environmental Radiological Assessments. Oak Ridge National Laboratory. DOE/TIC-11468. Office of Nuclear Energy, Washington, D.C.

16. Miller, C. W. and F. O. Hoffman. (1983). An Examination of the Environmental Half-time for Radionuclides Deposited on Vegetation. Health Physics 45(3): 731-744.

17. NCRP. (1985). National Council on Radiation Protection and Measurements. Radiological Assessment: Predicting the Transport, Bioaccumulation, and Uptake by Man of Radionuclides Released to the Environment. NCRP Report No. 76, p.200. Bethesda, MD.

18. NCRP. (1989). National Council on Radiation Protection and Measurements. Screening Techniques for Determining Compliance with Environmental Standards. Releases of Radionuclides to the Atmosphere. NCRP Commentary No. 3. Bethesda, MD.

19. NCRP. (1991). National Council on Radiation Protection and Measurements. Uncertainty in NCRP Screening Models: An Evaluation of NCRP Commentary No. 3 (Draft). NCRP Commentary No. 8. NCRP Scientific Committee 64-16, Bethesda, MD.

20. Ng, Y. C. (1982). A Review of Transfer Factors for Assessing the Dose from Radionuclides in Agricultural Products. Nuclear Safety 23(1): 57-71.

21. Peterson, H. T. Jr. (1983). "Terrestrial and Aquatic Food Chain Pathways" in Radiological Assessment: A Textbook of Environmental Dose Analysis. Till, J.E. and H.R. Meyer, editors. United States Nuclear Regulatory Commission. Washington, D.C.

22. Rosebery, A. M. and D. E. Burmaster. (1991). Lognormal Distributions for Water Intake by Children and Adults. Risk Analysis 12(1):99-104.

23. Slinn, W.G.N. (1984). Precipitation Scavenging. In: Atmospheric Science and Power Production. Edited by Darryl Randerson. Technical Information Center, Office of Scientific and Technical Information, U.S. Department of Energy. 1984.

24. USDA. (1982). U.S. Department of Agriculture. Food Commonly Eaten by Individuals: Amount per Day and per Eating Occasion. Home Economics Research Report Number 44, March 1982 (reprinted February 1990). USDA, Hyattsville, MD.

25. USDA. (1983). U.S. Department of Agriculture. Food Consumption: Households in the United States, Seasons and Year 1977-78. Nationwide Food Consumption Survey 1977-78, Report No. H-6. Issued June 1983.

26. USEPA. (1979). U.S. Environmental Protection Agency. AIRDOS-EPA: A Computerized Methodology for Estimating Environmental Concentrations and Dose to Man from Airborne Releases of Radionuclides. Oak Ridge National Laboratory, Oak Ridge, TN. p.86.

27. USEPA. (1985). U.S. Environmental Protection Agency. Development of Statistical Distributions or Ranges of Standard Factors Used in Exposure Assessments. EPA 600-8-85-010. Prepared for USEPA, Washington, D.C., by GCA Corporation, Chapel Hill, NC.

28. USEPA. (1989). U.S. Environmental Protection Agency. Exposure Factors Handbook. EPA 600-8-89-043. Washington, D.C.

29. USEPA. (1989). U.S. Environmental Protection Agency. Risk Assessment Methodology, Environmental Impact Statement, NESHAPS for Radionuclides. Background Information Document, Volume 1. EPA/520/1-89-005. Washington, D.C.

30. USEPA. (1991). U.S. Environmental Protection Agency. Human Health Evaluation Manual. Supplemental Guidance- Standard Default Exposure Factors. OSWER Directive 9285.6-03. Office of Solid Waste and Emergency Response, Washington, D.C.

APPENDIX K

DESCRIPTION OF MONTE CARLO SIMULATION

APPENDIX K

DESCRIPTION OF MONTE CARLO SIMULATION

Introduction

Many calculations have been performed in arriving at the dose estimates contained in this report. Appendix I alone specifies a large number of equations that were solved to produce estimates of exposure. These equations could all be solved using simple arithmetic if each of the inputs were discrete numbers. However, the majority of the inputs to these equations are not known exactly, or, in other words, they have some uncertainty associated with them. The evaluation of uncertainty is an important aspect of all the investigations and analyses that have been performed to support the calculation of contaminant dose to the public. Uncertainties have been identified and quantified in each step of the dose reconstruction process, including the development of release estimates, modeling the transport of contaminants, and estimating exposure and uptake. As a result, virtually all the calculations deal with estimates that are defined not in terms of a single, discrete number, but instead in terms of a defined probability distribution of values that we are confident includes the true but unknown value of a particular parameter. When using inputs or predictions that are described in terms of these probability distributions to perform calculations, there is more than one possible answer, and an equation must be solved many times using discrete input values that are sampled from the probability distributions defined for each of the inputs. The answer that this calculation process produces is itself a probability distribution. One method that is used to sample input probability distributions to select inputs used to solve the calculations repeatedly is known as Monte Carlo simulation. This method of calculation permits the propagation of the errors identified throughout the analytic process so that they are accurately reflected in our endpoint, or dose estimate. The dose estimate itself is defined in terms of a probability distribution.

This appendix describes Monte Carlo techniques using simple random sampling, as well as a related sampling protocol known as Latin Hypercube sampling that has been used extensively in the calculation of doses on this project.

Monte Carlo Techniques

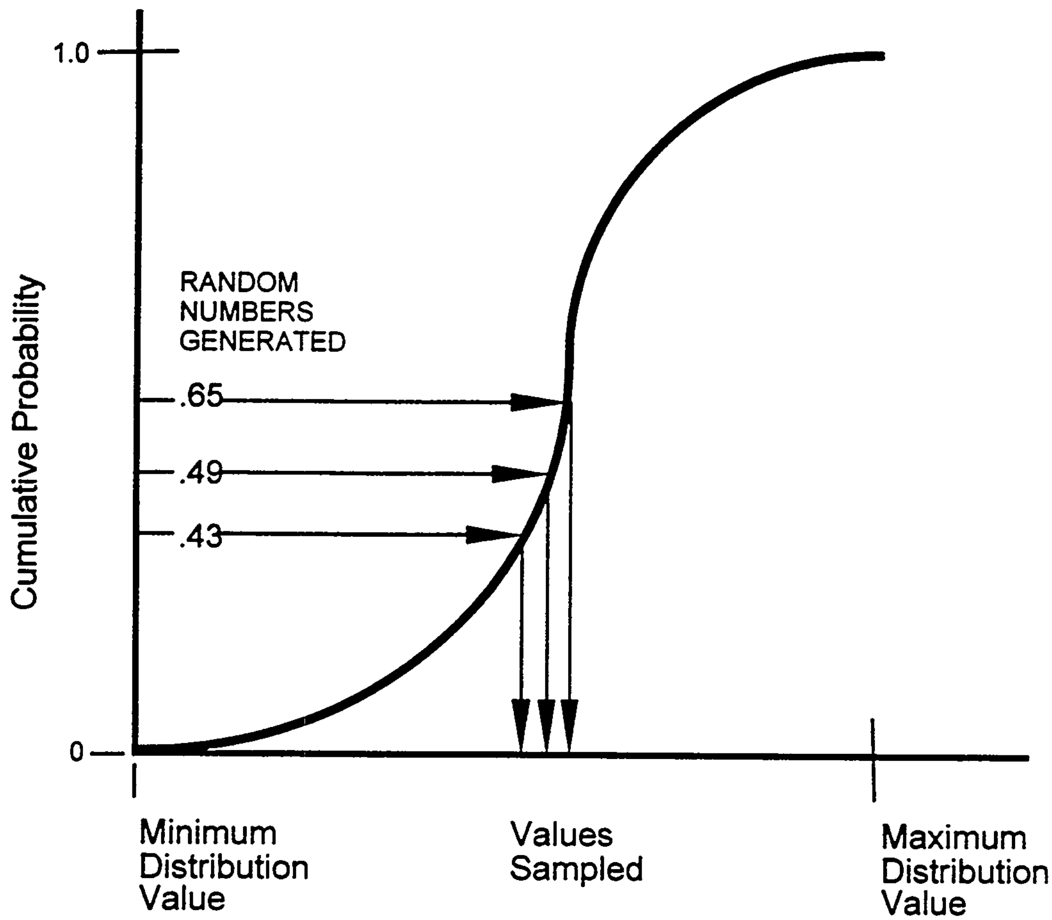
Sampling from input probability distributions functions is used to generate possible values that are then used to solve a given equation. This sampling is the basis for hundreds or thousands of "what-if" scenarios performed to repeatedly solve an equation. With enough iterations, the sampled values for a probability distribution will become distributed in a manner that approximates the defined input probability distribution. Statisticians have developed several techniques for drawing random samples. An important factor in evaluating sampling techniques is the number of iterations required to accurately recreate an input distribution through sampling. If one sampling method requires more iterations than another to approximate input distributions, it is the less "efficient" method.

In discussing different sampling methods, it is important to understand the concept of a cumulative distribution. Any probability distribution may be expressed in cumulative form. A cumulative curve is typically scaled from 0 to 1 on the Y-axis, with Y-axis values representing the cumulative probability up to the corresponding X-axis value (Figure K-1). In a cumulative curve, at the 0.5 (or 50%) cumulative value point on the curve, fifty percent of the values in the distribution fall below this median value and fifty percent are above. The 0 cumulative value is the minimum value (0% of the values will fall below this point) and the 1.0 cumulative value is the maximum value (100% of the values will fall below this point).

Monte Carlo sampling refers to the traditional technique for using random or pseudo-random numbers to sample from a probability distribution. The 0 to 1.0 scale of the cumulative curve is the range of the possible random numbers generated during sampling. In a typical Monte Carlo sampling sequence, the computer will generate a random number between 0 and 1 with any number in the range equally likely to occur. This number is then used to select a value from the cumulative curve. As the shape of the cumulative curve is based on the shape of the input probability distribution, more likely outcomes will be more likely to be sampled. The more likely outcomes are in the range where the cumulative curve is the "steepest" (Figure K-1).

The term "Monte Carlo" was introduced during World War II as a code name for simulation of problems associated with the development of the atomic bomb. Monte Carlo sampling techniques are entirely random, that is, any given sample may fall anywhere within the range of the input distribution. However, samples are more likely to be drawn in areas of the distribution which have higher probabilities of occurrence. In the adjacent illustration of a cumulative distribution, each Monte Carlo sample will use a new random number between 0 and 1. With enough iterations, Monte Carlo sampling will "recreate" the input distributions through sampling. A problem of clustering can arise when a small number of iterations are performed. In the illustration, each of the 3 samples drawn falls in the middle of the distribution. The values of the outer ranges of the distribution are not represented in the samples and thus their impact on the results is not included in the result.

Clustering becomes especially pronounced when a distribution includes low probability outcomes that could have a major impact on the results. To include these low probability outcomes, they must be sampled. However, if the probabilities are low enough for some of the outcomes, a small number of Monte Carlo iterations may not sample sufficient quantities of these outcomes to accurately represent their probability. This problem has led to the development of stratified sampling techniques such as the Latin Hypercube sampling which has been used in our calculational approach.



ChemRisk
A Division of McLaren/Hart

FIGURE K-1
RELATIONSHIP BETWEEN A CUMULATIVE CURVE AND MONTE CARLO SAMPLING TECHNIQUE

RkyF893H/3K1 Rev 10-05-93

Latin Hypercube Sampling

Latin Hypercube sampling is a recent development in sampling technology designed to accurately recreate the input distribution through sampling in fewer iterations when compared with the simple random sampling method. The approach to Latin Hypercube sampling involves the stratification of the input probability distributions. Stratification divides the cumulative curve into equal intervals on the cumulative probability scale. A sample is then randomly taken from each interval or stratification of the input distribution. Sampling is forced to represent values in each interval, and thus, is forced to recreate the input probability distribution.

We have chosen to use the Latin Hypercube sampling approach in our calculations because it leads to greater sampling efficiency, and as a result, reduces the calculational run times required for the thousands of calculations that we have performed in estimating off-site doses.

APPENDIX L

CHEMICAL AND RADIATION DOSES ASSOCIATED WITH HISTORICAL CONTAMINANT RELEASES FROM THE ROCKY FLATS PLANT

APPENDIX L

CHEMICAL AND RADIATION DOSES ASSOCIATED WITH HISTORICAL CONTAMINANT RELEASES FROM THE ROCKY FLATS PLANT

This appendix includes documentation of the chemical and radiation doses associated with historical contaminant releases from the Rocky Flats Plant as determined in this assessment. Pathway-specific and total doses are provided on a yearly basis for contaminants that were routinely released from the plant. Dose estimates associated with the 1957 fire, the 1969 fire, and the 903 Pad are provided in two parts. First, pathway-specific and total doses are provided for the event itself (i.e., the 13.5-hour fire in 1957, the 17.5-hour fire in 1969, and the 5-year period of direct release from the 903 Pad). Second, pathway-specific and total doses from contamination deposited by these events are provided on a yearly basis for the period following the event. Every dose reported in this appendix is represented by a range of estimates that can be characterized by the geometric mean (GM) and the geometric standard deviation (GSD). For the purpose of this analysis, the best estimate of dose is represented by the GM. The uncertainty in the best estimate is dependent on the GSD, and can be represented by a lower and upper bound. These bounds describe our level of confidence that the true but unknown value is within the described range. The 95% confidence interval about the best estimate (*i.e.*, we are 95% confident that the true but unknown value falls within this interval) is equal to the best estimate multiplied by the square of the GSD, i.e., $GM \times GSD^2$ (upper bound), and the best estimate divided by the square of the GSD, i.e., $GM \div GSD^2$ (lower bound).

Dose estimates calculated for each pathway and the sum of these doses (total dose) for a single exposure location (*i.e.*, sector or remote location) are presented in two-page tables for each of the routinely released radionuclides and beryllium. The title of the table identifies the contaminant and exposure location for which the doses have been calculated. Since there are 12 sectors and 3 remote locations (15 exposure points) and a two-page table per exposure point, 30 pages of tables are required to present the results for each routinely released radionuclide and beryllium. The dose estimates for the other routinely released chemicals and for the accidental releases are organized in a similar manner. The title of each table identifies the contaminant, and the corresponding exposure location is either identified in the title or in the left-hand column.

It is important to note that for some materials, *i.e.,* tritium and volatile solvents released routinely, and plutonium-239/240 remaining in the environment after an accidental release, some or all of the dose estimates are associated with a period of years rather than a single year. In these cases, the dose estimate is considered to be the same for each year in the period and represents an annual value; the value presented <u>does</u> <u>not</u> represent a total dose estimate for the period.

PATHWAY-SPECIFIC DOSES ASSOCIATED WITH ROUTINE AIRBORNE RELEASE OF AMERICIUM-241

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241
Sector 1
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	8.4E-12	2.1	8.7E-16	4.0	1.2E-13	3.3	6.5E-16	2.6	1.4E-19	2.1
1954	2.7E-10	2.4	2.9E-14	4.0	4.0E-12	3.9	2.1E-14	2.8	4.5E-18	2.5
1955	3.0E-10	2.2	6.5E-14	3.8	4.1E-12	3.2	4.6E-14	2.4	4.9E-18	2.2
1956	9.7E-10	2.4	1.7E-13	3.4	1.4E-11	3.5	1.3E-13	2.3	1.6E-17	2.3
1957	6.8E-08	2.1	6.9E-12	3.8	8.5E-10	3.2	4.9E-12	2.5	1.1E-15	2.1
1958	1.3E-08	2.2	8.9E-12	3.6	1.8E-10	3.2	5.7E-12	2.4	2.1E-16	2.2
1959	5.6E-09	2.2	9.4E-12	3.7	8.3E-11	3.1	7.5E-12	2.4	9.3E-17	2.3
1960	5.6E-09	2.3	9.8E-12	3.7	7.5E-11	3.3	8.3E-12	2.3	9.3E-17	2.2
1961	6.4E-09	2.2	1.1E-11	3.5	9.1E-11	3.6	8.2E-12	2.3	1.1E-16	2.3
1962	1.2E-08	2.3	1.3E-11	3.6	1.9E-10	3.3	1.0E-11	2.4	2.0E-16	2.2
1963	1.5E-08	2.2	1.5E-11	3.3	2.1E-10	3.3	1.2E-11	2.3	2.5E-16	2.3
1964	1.2E-08	2.2	1.5E-11	3.7	1.7E-10	3.3	1.2E-11	2.2	2.0E-16	2.2
1965	2.8E-08	2.2	2.0E-11	3.3	4.1E-10	3.2	1.6E-11	2.2	4.8E-16	2.2
1966	1.3E-09	2.3	2.5E-11	3.4	2.0E-11	3.1	1.7E-11	2.2	2.1E-17	2.3
1967	1.7E-09	2.1	2.4E-11	3.5	2.7E-11	2.9	1.7E-11	2.1	2.8E-17	2.2
1968	1.9E-09	2.3	2.2E-11	3.7	3.1E-11	3.0	1.8E-11	2.3	3.2E-17	2.3
1969	6.1E-09	2.2	2.7E-11	3.4	8.6E-11	3.2	1.8E-11	2.1	1.0E-16	2.2
1970	1.6E-09	2.3	2.6E-11	3.6	2.6E-11	3.2	1.8E-11	2.1	2.6E-17	2.3
1971	3.1E-10	2.2	2.7E-11	3.3	7.3E-12	2.8	1.8E-11	2.1	5.3E-18	2.2
1972	2.5E-10	2.2	2.7E-11	3.5	6.6E-12	2.7	2.0E-11	2.0	4.1E-18	2.3
1973	2.4E-10	2.2	3.0E-11	3.3	6.5E-12	2.7	1.9E-11	2.2	4.0E-18	2.3
1974	4.8E-09	2.2	2.8E-11	3.5	6.9E-11	3.1	2.1E-11	2.1	8.0E-17	2.2
1975	5.4E-10	2.3	3.1E-11	3.4	1.2E-11	2.9	2.1E-11	2.1	8.9E-18	2.3
1976	2.1E-11	2.3	2.7E-11	3.4	2.9E-12	3.1	2.0E-11	2.1	3.5E-19	2.4
1977	2.1E-11	2.3	2.8E-11	3.4	2.6E-12	3.2	2.1E-11	2.2	3.3E-19	2.3
1978	1.5E-11	2.2	3.0E-11	3.5	2.5E-12	3.3	2.3E-11	2.2	2.4E-19	2.3
1979	2.9E-11	2.2	3.5E-11	3.2	3.1E-12	3.0	2.1E-11	2.1	4.9E-19	2.3
1980	5.7E-11	2.3	2.9E-11	3.2	3.6E-12	2.8	2.1E-11	2.1	9.5E-19	2.3
1981	4.1E-11	2.2	3.1E-11	3.4	3.2E-12	2.9	2.3E-11	2.1	6.8E-19	2.3
1982	1.0E-10	2.2	2.9E-11	3.5	4.5E-12	2.9	2.2E-11	2.0	1.6E-18	2.3
1983	4.2E-10	2.3	3.1E-11	3.4	1.0E-11	2.9	2.3E-11	2.1	6.8E-18	2.3
1984	4.0E-10	2.3	3.1E-11	3.5	9.9E-12	2.8	2.4E-11	2.1	6.6E-18	2.3
1985	4.7E-11	2.2	3.1E-11	3.4	3.7E-12	2.9	2.3E-11	2.1	8.1E-19	2.2
1986	2.3E-10	2.3	3.2E-11	3.3	7.5E-12	2.7	2.5E-11	2.0	3.8E-18	2.3
1987	7.8E-11	2.3	3.1E-11	3.6	4.2E-12	2.8	2.4E-11	2.1	1.3E-18	2.2
1988	4.7E-11	2.2	3.4E-11	3.4	3.6E-12	2.8	2.3E-11	2.1	7.9E-19	2.2
1989	2.6E-11	2.2	3.4E-11	3.4	3.6E-12	3.0	2.3E-11	2.2	4.3E-19	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241 (continued)
Sector 1
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	4.6E-17	3.9	3.0E-17	4.5	2.2E-16	4.8	2.1E-15	2.9	3.4E-23	2.9	8.6E-12	2.1
1954	1.7E-15	4.1	1.1E-15	5.2	9.3E-15	4.4	7.4E-14	3.2	1.2E-21	3.3	2.8E-10	2.4
1955	3.5E-15	3.9	1.3E-15	4.6	9.5E-15	4.1	1.7E-13	3.1	2.7E-21	3.1	3.1E-10	2.2
1956	8.7E-15	3.8	4.2E-15	5.0	3.2E-14	4.4	4.2E-13	2.8	7.0E-21	2.9	1.0E-09	2.4
1957	3.5E-13	3.5	2.7E-13	4.8	2.0E-12	4.2	1.6E-11	3.0	2.7E-19	3.0	6.9E-08	2.1
1958	4.4E-13	3.8	7.5E-14	4.3	5.1E-13	4.3	2.1E-11	3.0	3.4E-19	3.0	1.3E-08	2.2
1959	4.9E-13	3.8	4.7E-14	4.1	3.2E-13	3.9	2.3E-11	3.0	3.8E-19	3.0	5.8E-09	2.2
1960	5.2E-13	3.5	4.4E-14	4.2	3.4E-13	4.2	2.6E-11	2.9	4.3E-19	2.9	5.8E-09	2.2
1961	6.4E-13	3.5	5.6E-14	4.1	3.8E-13	3.9	2.8E-11	2.8	4.8E-19	2.8	6.6E-09	2.2
1962	7.8E-13	3.6	8.0E-14	4.5	5.5E-13	4.0	3.2E-11	3.1	5.3E-19	3.1	1.2E-08	2.2
1963	8.5E-13	3.4	9.8E-14	4.1	6.9E-13	3.8	3.7E-11	2.7	6.1E-19	2.7	1.6E-08	2.2
1964	9.2E-13	3.9	8.2E-14	4.1	6.3E-13	3.8	4.1E-11	2.8	6.7E-19	2.8	1.2E-08	2.2
1965	1.2E-12	3.5	1.5E-13	4.3	1.3E-12	4.0	5.2E-11	2.9	8.7E-19	2.9	2.9E-08	2.2
1966	1.3E-12	3.6	4.5E-14	3.8	3.8E-13	3.9	5.9E-11	2.7	9.5E-19	2.7	1.5E-09	2.1
1967	1.2E-12	3.5	5.5E-14	4.2	4.0E-13	4.3	6.2E-11	2.8	1.0E-18	2.8	1.9E-09	1.9
1968	1.3E-12	3.7	5.8E-14	4.5	3.9E-13	3.8	6.1E-11	2.7	1.0E-18	2.8	2.2E-09	2.1
1969	1.4E-12	3.5	8.1E-14	3.9	5.5E-13	3.8	6.0E-11	2.7	1.0E-18	2.7	6.4E-09	2.2
1970	1.4E-12	3.5	5.5E-14	4.2	3.7E-13	3.7	6.4E-11	2.7	1.1E-18	2.7	1.9E-09	2.1
1971	1.3E-12	3.6	5.6E-14	4.3	3.5E-13	3.8	7.2E-11	2.6	1.2E-18	2.6	5.2E-10	1.8
1972	1.4E-12	3.3	4.7E-14	4.1	3.3E-13	3.9	6.6E-11	2.7	1.1E-18	2.7	4.4E-10	1.8
1973	1.4E-12	3.5	5.2E-14	4.1	3.7E-13	4.0	6.3E-11	2.6	1.0E-18	2.6	4.4E-10	1.8
1974	1.5E-12	3.5	7.7E-14	4.0	5.3E-13	3.7	6.7E-11	2.6	1.1E-18	2.6	5.1E-09	2.2
1975	1.4E-12	3.5	5.6E-14	4.2	3.8E-13	4.1	6.9E-11	2.7	1.1E-18	2.8	7.8E-10	1.9
1976	1.6E-12	3.4	4.7E-14	4.4	3.5E-13	4.1	6.7E-11	2.7	1.1E-18	2.8	1.8E-10	1.9
1977	1.5E-12	3.5	5.6E-14	4.5	3.4E-13	4.3	7.4E-11	2.7	1.2E-18	2.8	1.9E-10	1.9
1978	1.6E-12	3.5	4.7E-14	4.1	3.9E-13	3.9	7.6E-11	2.7	1.2E-18	2.8	1.9E-10	2.0
1979	1.6E-12	3.6	5.7E-14	4.2	3.9E-13	4.1	7.8E-11	2.7	1.3E-18	2.7	2.2E-10	1.9
1980	1.6E-12	3.4	4.9E-14	4.4	3.7E-13	4.0	7.3E-11	2.7	1.2E-18	2.7	2.4E-10	1.8
1981	1.5E-12	3.3	4.9E-14	4.3	3.5E-13	4.1	7.5E-11	2.7	1.3E-18	2.7	2.3E-10	1.8
1982	1.6E-12	3.5	5.6E-14	4.5	3.9E-13	4.0	7.3E-11	2.7	1.2E-18	2.8	3.0E-10	1.8
1983	1.4E-12	3.6	5.7E-14	4.1	4.2E-13	4.1	7.9E-11	2.7	1.3E-18	2.8	6.6E-10	2.0
1984	1.7E-12	3.2	5.8E-14	4.3	4.0E-13	4.1	7.5E-11	2.6	1.2E-18	2.7	6.4E-10	1.9
1985	1.7E-12	3.5	5.3E-14	4.3	3.8E-13	4.2	7.6E-11	2.6	1.3E-18	2.6	2.4E-10	1.8
1986	1.8E-12	3.7	5.8E-14	4.5	4.0E-13	4.0	8.4E-11	2.6	1.4E-18	2.6	4.7E-10	1.8
1987	1.7E-12	3.4	6.5E-14	4.3	4.2E-13	3.8	8.4E-11	2.7	1.4E-18	2.8	2.9E-10	1.8
1988	1.6E-12	3.7	5.6E-14	4.5	3.6E-13	4.5	8.2E-11	2.6	1.4E-18	2.7	2.5E-10	1.8
1989	1.8E-12	3.5	5.6E-14	4.2	4.1E-13	3.8	7.8E-11	2.6	1.3E-18	2.6	2.2E-10	1.8

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241
Sector 2
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	3.4E-12	2.2	3.7E-16	3.6	4.7E-14	3.4	2.6E-16	2.7	5.8E-20	2.3
1954	1.2E-10	2.1	1.3E-14	4.0	1.7E-12	3.1	9.8E-15	2.6	2.1E-18	2.2
1955	1.3E-10	2.2	2.6E-14	3.7	1.9E-12	3.2	2.1E-14	2.3	2.1E-18	2.2
1956	4.1E-10	2.3	7.0E-14	3.5	5.4E-12	3.4	5.4E-14	2.4	6.7E-18	2.3
1957	2.5E-08	2.2	2.8E-12	4.1	3.8E-10	3.2	1.9E-12	2.5	4.3E-16	2.2
1958	5.4E-09	2.3	3.8E-12	3.2	7.7E-11	3.3	2.8E-12	2.4	9.1E-17	2.3
1959	2.5E-09	2.2	4.2E-12	3.8	3.6E-11	3.2	2.9E-12	2.3	4.1E-17	2.3
1960	2.4E-09	2.4	4.7E-12	3.7	3.4E-11	3.2	3.3E-12	2.2	3.9E-17	2.3
1961	2.7E-09	2.3	5.4E-12	3.7	4.0E-11	3.4	3.7E-12	2.2	4.6E-17	2.3
1962	5.4E-09	2.2	5.9E-12	3.4	7.7E-11	3.3	4.2E-12	2.2	9.1E-17	2.2
1963	6.3E-09	2.2	6.3E-12	3.6	8.5E-11	3.3	5.0E-12	2.3	1.1E-16	2.3
1964	5.2E-09	2.1	7.9E-12	3.4	6.9E-11	3.1	5.3E-12	2.2	9.0E-17	2.1
1965	1.2E-08	2.3	9.2E-12	3.8	1.7E-10	3.3	6.9E-12	2.2	2.1E-16	2.3
1966	6.0E-10	2.2	1.0E-11	3.7	1.0E-11	3.1	7.0E-12	2.2	1.0E-17	2.3
1967	7.4E-10	2.2	9.5E-12	3.3	1.3E-11	2.9	6.7E-12	2.2	1.2E-17	2.2
1968	9.0E-10	2.3	1.1E-11	3.5	1.4E-11	3.3	7.1E-12	2.3	1.5E-17	2.3
1969	2.5E-09	2.3	1.1E-11	3.5	3.6E-11	3.1	7.7E-12	2.1	4.2E-17	2.3
1970	6.7E-10	2.2	1.1E-11	3.6	1.1E-11	3.0	8.1E-12	2.1	1.1E-17	2.2
1971	1.2E-10	2.1	1.2E-11	3.4	3.4E-12	2.7	8.1E-12	2.1	2.1E-18	2.2
1972	1.1E-10	2.3	1.3E-11	3.4	2.9E-12	2.7	8.7E-12	2.2	1.8E-18	2.3
1973	1.0E-10	2.2	1.1E-11	3.6	2.7E-12	2.9	8.2E-12	2.1	1.7E-18	2.3
1974	2.0E-09	2.4	1.3E-11	3.2	3.0E-11	3.2	9.0E-12	2.1	3.4E-17	2.4
1975	2.3E-10	2.2	1.3E-11	3.1	4.9E-12	3.0	8.8E-12	2.2	3.9E-18	2.2
1976	8.4E-12	2.3	1.3E-11	3.5	1.2E-12	2.9	9.3E-12	2.2	1.4E-19	2.3
1977	9.0E-12	2.4	1.3E-11	3.5	1.3E-12	3.0	9.5E-12	2.1	1.6E-19	2.4
1978	6.6E-12	2.2	1.4E-11	3.2	1.2E-12	3.1	9.6E-12	2.1	1.1E-19	2.3
1979	1.2E-11	2.3	1.3E-11	3.4	1.1E-12	3.0	9.1E-12	2.2	2.0E-19	2.3
1980	2.7E-11	2.3	1.2E-11	3.5	1.7E-12	3.0	9.1E-12	2.1	4.4E-19	2.4
1981	1.8E-11	2.2	1.3E-11	3.4	1.4E-12	3.1	9.9E-12	2.3	3.0E-19	2.2
1982	4.7E-11	2.2	1.4E-11	3.6	2.0E-12	2.8	9.7E-12	2.1	7.9E-19	2.2
1983	1.6E-10	2.2	1.4E-11	3.4	4.0E-12	2.9	9.9E-12	2.1	2.6E-18	2.3
1984	1.7E-10	2.3	1.4E-11	3.6	4.2E-12	2.9	9.5E-12	2.0	2.8E-18	2.3
1985	2.0E-11	2.2	1.4E-11	3.3	1.5E-12	2.8	1.0E-11	2.0	3.3E-19	2.1
1986	9.0E-11	2.1	1.4E-11	3.3	3.0E-12	2.6	9.7E-12	2.2	1.6E-18	2.2
1987	3.2E-11	2.3	1.5E-11	3.4	1.6E-12	2.9	9.7E-12	2.1	5.3E-19	2.3
1988	2.0E-11	2.2	1.5E-11	3.3	1.6E-12	3.0	1.0E-11	2.1	3.4E-19	2.3
1989	1.1E-11	2.2	1.4E-11	3.4	1.4E-12	3.1	1.0E-11	2.2	1.8E-19	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241 (continued)
Sector 2
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	GSD	Milk Ingestion GM (Sv/year)	GSD	Beef Ingestion GM (Sv/year)	GSD	Inhalation of Resuspended Particulates GM (Sv/year)	GSD	Immersion in Resuspended Particulates GM (Sv/year)	GSD	Total Dose GM (Sv/year)	GSD
1953	1.9E-17	3.7	1.5E-17	4.5	9.5E-17	4.3	8.6E-16	3.3	1.5E-23	3.2	3.5E-12	2.2
1954	7.1E-16	3.6	4.3E-16	4.6	3.4E-15	4.1	3.2E-14	3.2	5.4E-22	3.1	1.3E-10	2.1
1955	1.5E-15	3.8	5.2E-16	4.8	4.2E-15	4.3	6.6E-14	3.0	1.1E-21	3.0	1.3E-10	2.2
1956	4.3E-15	3.9	1.6E-15	4.9	1.2E-14	4.4	1.8E-13	2.8	2.9E-21	2.8	4.2E-10	2.3
1957	1.6E-13	3.9	8.9E-14	4.7	7.1E-13	4.1	6.9E-12	3.0	1.2E-19	3.0	2.6E-08	2.2
1958	2.1E-13	3.8	3.1E-14	4.4	2.2E-13	4.2	8.4E-12	3.0	1.4E-19	3.0	5.5E-09	2.3
1959	2.1E-13	3.9	2.1E-14	4.6	1.4E-13	3.8	1.0E-11	2.8	1.7E-19	2.9	2.6E-09	2.2
1960	2.5E-13	3.5	2.1E-14	4.1	1.6E-13	3.9	1.1E-11	2.9	1.8E-19	2.9	2.5E-09	2.3
1961	2.6E-13	3.6	2.4E-14	4.1	1.8E-13	3.8	1.3E-11	2.9	2.2E-19	2.8	2.9E-09	2.3
1962	3.0E-13	3.7	3.9E-14	3.8	2.9E-13	3.6	1.4E-11	2.9	2.4E-19	2.8	5.6E-09	2.1
1963	3.6E-13	3.5	4.0E-14	4.5	3.0E-13	3.9	1.6E-11	2.8	2.7E-19	2.9	6.5E-09	2.2
1964	4.1E-13	3.5	3.8E-14	4.1	2.6E-13	3.8	1.8E-11	2.8	3.1E-19	2.8	5.4E-09	2.1
1965	4.8E-13	3.7	7.0E-14	4.2	5.0E-13	4.1	2.3E-11	2.9	3.9E-19	3.0	1.2E-08	2.3
1966	4.9E-13	3.4	2.1E-14	4.1	1.5E-13	3.8	2.5E-11	2.7	4.1E-19	2.7	7.0E-10	2.1
1967	5.6E-13	3.6	2.2E-14	4.0	1.6E-13	3.8	2.4E-11	2.7	4.0E-19	2.6	8.4E-10	2.1
1968	5.6E-13	3.8	2.2E-14	4.2	1.8E-13	3.9	2.4E-11	2.8	4.0E-19	2.9	1.0E-09	2.1
1969	5.7E-13	3.5	3.1E-14	4.2	2.6E-13	3.8	2.7E-11	2.7	4.5E-19	2.7	2.7E-09	2.2
1970	5.5E-13	3.7	2.6E-14	4.4	1.6E-13	4.0	2.7E-11	2.7	4.4E-19	2.8	7.7E-10	2.0
1971	5.9E-13	3.5	2.3E-14	4.1	1.6E-13	4.0	2.8E-11	2.8	4.8E-19	2.8	2.1E-10	1.8
1972	6.1E-13	3.8	2.1E-14	4.1	1.6E-13	4.1	3.1E-11	2.8	5.2E-19	2.7	2.0E-10	1.8
1973	6.3E-13	3.4	2.3E-14	4.6	1.5E-13	4.2	2.8E-11	2.7	4.6E-19	2.8	1.9E-10	1.8
1974	6.2E-13	3.4	3.7E-14	4.5	2.7E-13	4.0	3.3E-11	2.6	5.5E-19	2.7	2.2E-09	2.3
1975	6.3E-13	3.5	2.6E-14	4.2	1.6E-13	4.0	3.2E-11	2.7	5.5E-19	2.8	3.3E-10	1.9
1976	7.0E-13	3.4	2.4E-14	4.4	1.7E-13	3.9	3.1E-11	2.7	5.2E-19	2.7	8.3E-11	1.9
1977	6.9E-13	3.6	2.2E-14	4.2	1.7E-13	4.2	3.1E-11	2.8	5.2E-19	2.9	8.5E-11	2.0
1978	6.8E-13	3.3	2.2E-14	4.7	1.5E-13	3.9	3.2E-11	2.7	5.2E-19	2.8	8.2E-11	1.9
1979	6.0E-13	3.4	2.3E-14	4.0	1.6E-13	3.8	3.2E-11	2.7	5.2E-19	2.6	8.9E-11	1.8
1980	6.6E-13	3.6	2.2E-14	4.4	1.7E-13	3.9	3.1E-11	2.7	5.1E-19	2.8	1.1E-10	1.8
1981	6.4E-13	3.5	2.5E-14	4.4	1.8E-13	4.0	3.3E-11	2.8	5.4E-19	2.8	1.0E-10	1.9
1982	6.9E-13	3.5	2.4E-14	4.6	1.8E-13	4.1	3.4E-11	2.7	5.8E-19	2.8	1.4E-10	1.8
1983	7.3E-13	3.6	2.7E-14	4.4	1.7E-13	3.8	3.5E-11	2.7	5.6E-19	2.6	2.7E-10	1.9
1984	8.1E-13	3.4	2.8E-14	4.0	1.9E-13	3.8	3.4E-11	2.7	5.7E-19	2.7	2.8E-10	1.9
1985	6.7E-13	3.3	2.8E-14	4.4	1.8E-13	3.7	3.3E-11	2.6	5.5E-19	2.7	1.0E-10	1.8
1986	7.2E-13	3.6	2.6E-14	4.4	1.7E-13	4.0	3.6E-11	2.7	6.3E-19	2.8	1.9E-10	1.8
1987	7.1E-13	3.4	2.6E-14	4.3	1.8E-13	3.8	3.4E-11	2.7	5.5E-19	2.7	1.2E-10	1.8
1988	7.6E-13	3.6	2.7E-14	4.4	1.7E-13	3.9	3.4E-11	2.8	5.8E-19	2.8	1.0E-10	1.9
1989	7.9E-13	3.5	2.4E-14	3.9	1.6E-13	4.1	3.4E-11	2.6	5.6E-19	2.6	9.4E-11	1.8

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241
Sector 3
(1953 - 1989)

Year	Inhalation		Soil Ingestion		Vegetable Ingestion		Ground Exposure		Immersion	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	3.2E-12	2.2	3.3E-16	3.7	4.7E-14	3.0	2.2E-16	2.7	5.2E-20	2.1
1954	1.1E-10	2.3	1.1E-14	3.9	1.6E-12	3.5	8.9E-15	2.7	1.8E-18	2.3
1955	1.2E-10	2.2	2.6E-14	3.9	1.6E-12	3.2	1.9E-14	2.4	2.0E-18	2.2
1956	3.5E-10	2.3	7.0E-14	3.8	4.7E-12	3.4	4.5E-14	2.4	6.1E-18	2.3
1957	2.5E-08	2.3	2.6E-12	3.5	3.3E-10	3.2	1.9E-12	2.6	4.0E-16	2.3
1958	5.0E-09	2.2	3.3E-12	3.6	6.8E-11	3.1	2.3E-12	2.4	8.3E-17	2.3
1959	2.2E-09	2.2	4.1E-12	3.8	2.9E-11	3.1	2.8E-12	2.4	3.5E-17	2.3
1960	2.1E-09	2.3	4.0E-12	3.7	3.1E-11	3.2	2.9E-12	2.3	3.4E-17	2.3
1961	2.5E-09	2.3	4.4E-12	3.6	3.3E-11	3.3	3.3E-12	2.4	4.1E-17	2.3
1962	4.5E-09	2.3	5.2E-12	3.7	6.7E-11	3.3	3.6E-12	2.2	7.7E-17	2.3
1963	5.6E-09	2.2	7.2E-12	3.5	8.0E-11	3.4	4.5E-12	2.1	9.1E-17	2.2
1964	4.6E-09	2.3	7.2E-12	3.5	6.0E-11	3.1	4.9E-12	2.2	7.8E-17	2.3
1965	1.1E-08	2.2	8.9E-12	3.3	1.5E-10	3.3	6.2E-12	2.2	1.8E-16	2.2
1966	5.1E-10	2.2	9.7E-12	3.6	8.9E-12	3.0	6.2E-12	2.1	8.8E-18	2.3
1967	6.3E-10	2.1	8.6E-12	3.4	1.1E-11	3.0	6.3E-12	2.2	1.1E-17	2.2
1968	7.5E-10	2.1	1.0E-11	3.5	1.2E-11	3.0	6.8E-12	2.2	1.3E-17	2.2
1969	2.2E-09	2.2	1.0E-11	3.3	3.3E-11	3.3	7.2E-12	2.3	3.5E-17	2.2
1970	5.8E-10	2.2	1.1E-11	3.3	9.6E-12	2.9	7.2E-12	2.3	1.0E-17	2.2
1971	1.2E-10	2.3	1.0E-11	3.2	2.8E-12	2.9	7.7E-12	2.2	1.9E-18	2.2
1972	8.9E-11	2.3	9.9E-12	3.4	2.6E-12	2.7	7.0E-12	2.2	1.6E-18	2.3
1973	1.0E-10	2.2	1.0E-11	3.7	2.8E-12	2.7	7.2E-12	2.1	1.7E-18	2.2
1974	1.8E-09	2.3	1.2E-11	3.4	2.7E-11	3.1	8.3E-12	2.1	3.1E-17	2.2
1975	1.9E-10	2.2	1.1E-11	3.4	4.1E-12	2.8	7.8E-12	2.2	3.0E-18	2.3
1976	7.6E-12	2.3	1.1E-11	3.3	1.0E-12	3.1	8.3E-12	2.2	1.2E-19	2.2
1977	7.6E-12	2.2	1.2E-11	3.4	1.1E-12	3.1	7.9E-12	2.0	1.3E-19	2.1
1978	5.9E-12	2.3	1.2E-11	3.4	9.8E-13	3.1	8.2E-12	2.1	1.0E-19	2.4
1979	1.0E-11	2.2	1.2E-11	3.5	1.2E-12	2.9	8.3E-12	2.1	1.8E-19	2.3
1980	2.3E-11	2.2	1.3E-11	3.4	1.4E-12	3.0	8.4E-12	2.1	3.8E-19	2.2
1981	1.7E-11	2.3	1.3E-11	3.3	1.3E-12	3.2	8.7E-12	2.2	2.8E-19	2.3
1982	3.8E-11	2.3	1.2E-11	3.5	1.8E-12	2.8	9.2E-12	2.1	6.2E-19	2.3
1983	1.6E-10	2.2	1.3E-11	3.5	3.7E-12	2.8	9.0E-12	2.2	2.6E-18	2.2
1984	1.5E-10	2.2	1.2E-11	3.3	3.7E-12	2.8	9.2E-12	2.1	2.5E-18	2.3
1985	1.8E-11	2.3	1.3E-11	3.4	1.3E-12	3.0	9.1E-12	2.0	3.1E-19	2.4
1986	8.2E-11	2.2	1.3E-11	3.5	2.5E-12	2.8	9.2E-12	2.1	1.3E-18	2.3
1987	2.9E-11	2.2	1.3E-11	3.2	1.7E-12	2.9	9.2E-12	2.1	4.7E-19	2.3
1988	1.8E-11	2.3	1.3E-11	3.3	1.4E-12	2.9	9.2E-12	2.2	3.0E-19	2.3
1989	9.4E-12	2.2	1.3E-11	3.3	1.2E-12	3.0	9.3E-12	2.1	1.6E-19	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241 (continued)
Sector 3
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	GSD	Milk Ingestion GM (Sv/year)	GSD	Beef Ingestion GM (Sv/year)	GSD	Inhalation of Resuspended Particulates GM (Sv/year)	GSD	Immersion in Resuspended Particulates GM (Sv/year)	GSD	Total Dose GM (Sv/year)	GSD
1953	1.6E-17	4.2	1.2E-17	4.5	9.4E-17	4.6	7.9E-16	3.2	1.3E-23	3.2	3.3E-12	2.2
1954	6.4E-16	3.9	4.0E-16	5.1	3.1E-15	4.5	2.8E-14	3.2	4.6E-22	3.2	1.1E-10	2.3
1955	1.2E-15	3.5	4.8E-16	4.4	3.7E-15	4.3	6.8E-14	3.1	1.2E-21	3.2	1.2E-10	2.2
1956	3.5E-15	3.4	1.5E-15	4.8	1.2E-14	4.1	1.6E-13	3.0	2.8E-21	3.0	3.6E-10	2.3
1957	1.4E-13	3.6	9.1E-14	4.8	7.5E-13	4.2	6.5E-12	3.1	1.0E-19	3.0	2.6E-08	2.3
1958	1.7E-13	3.7	2.7E-14	4.6	2.1E-13	4.7	8.3E-12	2.9	1.4E-19	2.9	5.1E-09	2.2
1959	2.0E-13	3.5	1.6E-14	4.1	1.2E-13	3.9	9.3E-12	2.9	1.5E-19	3.0	2.3E-09	2.2
1960	2.2E-13	3.9	1.9E-14	4.6	1.3E-13	3.7	1.1E-11	2.9	1.7E-19	2.9	2.2E-09	2.2
1961	2.4E-13	3.4	2.1E-14	4.4	1.5E-13	3.7	1.2E-11	2.8	2.0E-19	2.9	2.6E-09	2.2
1962	2.8E-13	3.8	2.9E-14	4.4	2.4E-13	4.0	1.4E-11	2.9	2.3E-19	2.9	4.7E-09	2.2
1963	3.0E-13	3.8	4.1E-14	4.3	2.8E-13	3.8	1.6E-11	2.9	2.6E-19	2.9	5.8E-09	2.2
1964	3.6E-13	3.6	3.6E-14	4.3	2.4E-13	3.9	1.7E-11	2.8	2.9E-19	2.8	4.8E-09	2.3
1965	4.3E-13	3.4	6.1E-14	4.4	4.3E-13	4.1	2.0E-11	3.0	3.3E-19	3.0	1.1E-08	2.2
1966	4.7E-13	3.6	1.8E-14	4.0	1.2E-13	3.9	2.1E-11	2.7	3.7E-19	2.7	6.0E-10	2.0
1967	4.3E-13	3.6	2.2E-14	4.2	1.4E-13	3.9	2.1E-11	2.8	3.5E-19	2.8	7.2E-10	2.0
1968	5.2E-13	3.5	2.0E-14	3.9	1.6E-13	3.7	2.4E-11	2.8	4.0E-19	2.7	8.5E-10	2.0
1969	5.4E-13	3.5	3.2E-14	4.2	2.0E-13	3.5	2.5E-11	2.8	4.1E-19	2.9	2.3E-09	2.2
1970	5.2E-13	3.6	2.2E-14	4.0	1.5E-13	4.0	2.5E-11	2.8	4.3E-19	2.9	6.8E-10	2.0
1971	5.3E-13	3.5	1.9E-14	4.2	1.5E-13	3.7	2.5E-11	2.7	4.1E-19	2.7	1.9E-10	1.9
1972	5.5E-13	3.5	2.0E-14	4.4	1.3E-13	4.1	2.3E-11	2.6	4.0E-19	2.8	1.6E-10	1.8
1973	5.6E-13	3.4	1.8E-14	4.1	1.2E-13	3.8	2.5E-11	2.8	4.1E-19	2.8	1.8E-10	1.9
1974	5.6E-13	3.5	3.3E-14	4.2	2.4E-13	3.8	3.0E-11	2.8	5.1E-19	2.8	2.0E-09	2.2
1975	5.8E-13	3.6	2.1E-14	4.3	1.5E-13	4.0	2.5E-11	2.6	4.1E-19	2.6	2.7E-10	1.9
1976	6.4E-13	3.6	1.9E-14	4.0	1.4E-13	3.7	2.8E-11	2.5	4.5E-19	2.6	7.4E-11	1.8
1977	6.1E-13	3.3	2.1E-14	4.6	1.4E-13	4.3	2.7E-11	2.6	4.6E-19	2.7	7.3E-11	1.9
1978	6.1E-13	3.6	1.9E-14	4.1	1.2E-13	4.0	2.5E-11	2.5	4.3E-19	2.6	6.8E-11	1.9
1979	5.8E-13	3.5	2.2E-14	4.4	1.4E-13	4.1	2.8E-11	2.8	4.8E-19	2.8	8.0E-11	1.9
1980	6.9E-13	3.4	1.9E-14	4.4	1.5E-13	3.8	2.9E-11	2.7	4.9E-19	2.7	9.8E-11	1.8
1981	5.9E-13	3.8	2.2E-14	4.1	1.5E-13	4.1	2.9E-11	2.7	4.8E-19	2.8	9.0E-11	1.8
1982	6.4E-13	3.5	1.9E-14	4.5	1.6E-13	4.0	2.9E-11	2.7	4.9E-19	2.7	1.2E-10	1.8
1983	6.8E-13	3.4	2.5E-14	4.3	1.6E-13	4.0	3.1E-11	2.8	5.2E-19	2.8	2.6E-10	1.9
1984	6.8E-13	3.5	2.4E-14	4.3	1.5E-13	3.8	2.9E-11	2.6	4.8E-19	2.6	2.4E-10	1.8
1985	6.1E-13	3.3	2.2E-14	4.2	1.6E-13	4.1	3.1E-11	2.6	5.2E-19	2.6	9.5E-11	1.9
1986	6.9E-13	3.4	2.4E-14	4.3	1.6E-13	4.0	3.1E-11	2.8	5.1E-19	2.8	1.7E-10	1.8
1987	6.7E-13	3.7	2.1E-14	4.2	1.5E-13	3.8	3.1E-11	2.5	5.1E-19	2.5	1.1E-10	1.7
1988	6.3E-13	3.5	2.3E-14	4.4	1.7E-13	4.2	3.2E-11	2.6	5.4E-19	2.6	9.6E-11	1.8
1989	6.1E-13	3.5	2.1E-14	4.8	1.5E-13	4.4	3.0E-11	2.7	4.9E-19	2.7	8.2E-11	1.8

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241
Sector 4
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	1.0E-11	2.3	1.2E-15	3.8	1.3E-13	3.3	7.5E-16	2.6	1.6E-19	2.3
1954	3.5E-10	2.2	3.9E-14	4.0	5.1E-12	3.2	2.8E-14	2.5	5.9E-18	2.3
1955	3.7E-10	2.3	7.8E-14	3.8	5.4E-12	3.3	5.5E-14	2.3	6.3E-18	2.3
1956	1.3E-09	2.3	2.0E-13	3.5	1.7E-11	3.4	1.5E-13	2.3	2.1E-17	2.4
1957	7.8E-08	2.3	8.3E-12	3.6	1.1E-09	3.2	5.9E-12	2.5	1.4E-15	2.3
1958	1.6E-08	2.1	1.1E-11	3.4	2.1E-10	3.2	8.3E-12	2.3	2.6E-16	2.2
1959	6.9E-09	2.2	1.2E-11	3.6	1.1E-10	3.5	8.6E-12	2.4	1.2E-16	2.2
1960	6.5E-09	2.2	1.4E-11	3.6	8.8E-11	3.1	9.9E-12	2.2	1.1E-16	2.2
1961	8.3E-09	2.2	1.5E-11	3.6	1.2E-10	3.3	1.0E-11	2.2	1.3E-16	2.2
1962	1.6E-08	2.3	1.7E-11	3.4	2.1E-10	3.2	1.3E-11	2.3	2.7E-16	2.3
1963	1.8E-08	2.2	2.1E-11	3.6	2.6E-10	3.3	1.4E-11	2.3	3.1E-16	2.2
1964	1.5E-08	2.2	2.3E-11	3.6	2.1E-10	3.1	1.6E-11	2.2	2.5E-16	2.2
1965	3.7E-08	2.3	2.7E-11	3.5	5.0E-10	3.3	1.9E-11	2.2	5.9E-16	2.3
1966	1.6E-09	2.3	2.8E-11	3.6	2.8E-11	2.9	1.9E-11	2.3	2.7E-17	2.3
1967	2.1E-09	2.2	3.2E-11	3.2	3.5E-11	3.0	2.1E-11	2.2	3.5E-17	2.2
1968	2.6E-09	2.3	3.2E-11	3.4	4.2E-11	3.0	2.1E-11	2.2	4.3E-17	2.3
1969	7.8E-09	2.3	3.0E-11	3.5	1.1E-10	3.2	2.3E-11	2.1	1.3E-16	2.3
1970	1.9E-09	2.2	3.2E-11	3.4	3.1E-11	2.9	2.3E-11	2.1	3.0E-17	2.2
1971	3.8E-10	2.2	3.2E-11	3.6	8.8E-12	2.8	2.4E-11	2.1	6.4E-18	2.3
1972	3.1E-10	2.3	3.4E-11	3.3	9.0E-12	2.9	2.4E-11	2.1	5.2E-18	2.3
1973	3.1E-10	2.2	3.7E-11	3.5	7.8E-12	2.7	2.6E-11	2.0	5.1E-18	2.2
1974	6.1E-09	2.3	3.9E-11	3.3	9.4E-11	3.2	2.6E-11	2.2	1.0E-16	2.3
1975	6.0E-10	2.1	3.6E-11	3.5	1.3E-11	2.6	2.5E-11	2.0	1.0E-17	2.2
1976	2.4E-11	2.2	3.8E-11	3.3	3.7E-12	3.2	2.6E-11	2.1	4.1E-19	2.2
1977	2.6E-11	2.2	3.9E-11	3.3	3.7E-12	3.0	2.6E-11	2.2	4.4E-19	2.2
1978	1.9E-11	2.3	4.1E-11	3.4	3.4E-12	3.1	2.7E-11	2.0	3.1E-19	2.3
1979	3.6E-11	2.2	3.6E-11	3.3	3.6E-12	2.8	2.7E-11	2.1	6.0E-19	2.2
1980	7.4E-11	2.2	3.8E-11	3.4	4.6E-12	2.8	2.7E-11	2.0	1.3E-18	2.2
1981	5.3E-11	2.2	3.9E-11	3.5	4.0E-12	2.8	2.7E-11	2.0	9.0E-19	2.2
1982	1.3E-10	2.3	4.0E-11	3.4	6.2E-12	2.9	2.8E-11	2.1	2.2E-18	2.4
1983	4.8E-10	2.3	4.0E-11	3.3	1.2E-11	2.8	2.8E-11	2.2	7.9E-18	2.4
1984	5.3E-10	2.1	3.9E-11	3.3	1.3E-11	2.7	2.8E-11	2.1	8.6E-18	2.2
1985	5.7E-11	2.2	4.0E-11	3.5	4.5E-12	3.1	2.9E-11	2.2	9.4E-19	2.2
1986	2.7E-10	2.2	4.6E-11	3.4	8.5E-12	2.7	3.0E-11	2.1	4.5E-18	2.2
1987	9.0E-11	2.3	4.4E-11	3.2	5.2E-12	2.6	2.9E-11	2.1	1.5E-18	2.3
1988	5.4E-11	2.3	4.2E-11	3.3	4.3E-12	2.8	3.0E-11	2.0	9.1E-19	2.3
1989	3.0E-11	2.3	4.6E-11	3.3	4.2E-12	3.1	2.8E-11	2.1	5.0E-19	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241 (continued)
Sector 4
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	5.4E-17	3.9	3.8E-17	4.8	3.1E-16	4.8	2.8E-15	3.2	4.5E-23	3.1	1.0E-11	2.3
1954	2.0E-15	4.0	1.4E-15	4.5	1.1E-14	4.3	8.9E-14	3.2	1.5E-21	3.3	3.6E-10	2.2
1955	4.1E-15	4.0	1.6E-15	4.9	1.3E-14	4.3	1.9E-13	3.1	3.3E-21	3.1	3.8E-10	2.2
1956	1.2E-14	3.9	5.2E-15	4.5	4.2E-14	4.6	4.9E-13	2.9	8.3E-21	2.9	1.3E-09	2.3
1957	4.4E-13	3.9	3.0E-13	4.7	2.1E-12	4.2	2.1E-11	2.9	3.6E-19	2.9	8.0E-08	2.3
1958	5.6E-13	4.0	8.5E-14	4.2	6.7E-13	3.8	2.6E-11	3.0	4.3E-19	3.1	1.6E-08	2.1
1959	6.6E-13	3.5	5.6E-14	4.1	4.3E-13	3.8	2.8E-11	2.8	4.9E-19	2.8	7.2E-09	2.2
1960	7.3E-13	3.5	6.1E-14	4.2	4.3E-13	3.8	3.1E-11	2.8	5.2E-19	2.8	6.8E-09	2.1
1961	8.3E-13	3.4	7.8E-14	4.1	4.8E-13	3.7	3.7E-11	2.8	6.0E-19	2.7	8.6E-09	2.2
1962	8.4E-13	3.4	1.1E-13	4.0	7.1E-13	3.9	4.4E-11	2.8	7.3E-19	2.8	1.7E-08	2.2
1963	1.1E-12	3.7	1.3E-13	4.3	8.1E-13	3.7	5.1E-11	2.7	8.5E-19	2.7	1.9E-08	2.2
1964	1.1E-12	3.7	1.3E-13	4.3	8.7E-13	3.9	5.9E-11	2.7	9.6E-19	2.7	1.6E-08	2.1
1965	1.3E-12	3.6	2.1E-13	4.1	1.6E-12	3.6	6.7E-11	2.8	1.1E-18	2.9	3.8E-08	2.2
1966	1.5E-12	3.8	6.7E-14	4.3	4.5E-13	4.0	7.0E-11	2.6	1.2E-18	2.7	1.9E-09	2.1
1967	1.6E-12	3.4	6.0E-14	4.0	4.8E-13	3.8	7.3E-11	2.7	1.2E-18	2.8	2.4E-09	2.1
1968	1.5E-12	3.9	6.7E-14	4.2	4.9E-13	4.0	7.5E-11	2.7	1.3E-18	2.6	2.9E-09	2.1
1969	1.6E-12	3.4	9.6E-14	4.0	7.2E-13	3.7	7.4E-11	2.7	1.2E-18	2.7	8.2E-09	2.2
1970	1.8E-12	3.5	6.1E-14	4.2	4.5E-13	3.8	7.9E-11	2.7	1.3E-18	2.8	2.2E-09	2.0
1971	1.7E-12	3.7	6.1E-14	4.1	4.5E-13	4.3	8.4E-11	2.8	1.4E-18	2.9	6.3E-10	1.9
1972	1.8E-12	3.5	6.2E-14	4.5	4.1E-13	4.0	7.9E-11	2.9	1.3E-18	2.8	5.6E-10	1.9
1973	1.7E-12	3.5	6.1E-14	4.3	4.3E-13	3.8	8.1E-11	2.7	1.3E-18	2.8	5.6E-10	1.8
1974	1.7E-12	3.1	1.0E-13	4.2	7.0E-13	4.0	9.0E-11	2.6	1.5E-18	2.6	6.6E-09	2.2
1975	2.1E-12	3.3	6.7E-14	4.2	4.8E-13	4.0	8.7E-11	2.6	1.5E-18	2.6	8.7E-10	1.8
1976	2.0E-12	3.5	6.5E-14	4.5	4.9E-13	3.7	9.1E-11	2.6	1.5E-18	2.7	2.4E-10	1.9
1977	1.9E-12	3.6	6.9E-14	4.4	4.6E-13	4.1	8.8E-11	2.6	1.5E-18	2.6	2.4E-10	1.8
1978	1.9E-12	3.5	6.9E-14	4.1	4.8E-13	3.8	9.4E-11	2.6	1.6E-18	2.7	2.4E-10	1.9
1979	2.0E-12	3.4	7.3E-14	4.6	4.7E-13	4.0	8.8E-11	2.6	1.5E-18	2.7	2.5E-10	1.8
1980	1.9E-12	3.4	6.9E-14	4.2	4.6E-13	3.9	9.1E-11	2.6	1.5E-18	2.6	3.0E-10	1.8
1981	1.8E-12	3.3	7.2E-14	4.3	4.8E-13	4.0	9.1E-11	2.6	1.6E-18	2.7	2.8E-10	1.8
1982	2.3E-12	3.5	6.5E-14	4.3	4.6E-13	4.3	9.1E-11	2.8	1.5E-18	2.9	3.9E-10	1.8
1983	2.2E-12	3.5	7.4E-14	4.1	5.1E-13	3.9	9.7E-11	2.6	1.6E-18	2.7	7.8E-10	1.9
1984	2.2E-12	3.5	8.4E-14	4.0	5.4E-13	3.7	1.1E-10	2.6	1.7E-18	2.6	8.4E-10	1.8
1985	2.1E-12	3.6	6.8E-14	4.1	4.6E-13	3.9	9.9E-11	2.5	1.6E-18	2.6	3.0E-10	1.8
1986	2.1E-12	3.7	7.5E-14	4.4	5.5E-13	4.0	1.0E-10	2.7	1.7E-18	2.7	5.7E-10	1.8
1987	2.2E-12	3.2	7.6E-14	4.3	5.1E-13	4.1	9.7E-11	2.5	1.6E-18	2.5	3.4E-10	1.8
1988	2.2E-12	3.5	7.5E-14	4.6	5.2E-13	4.1	1.1E-10	2.6	1.8E-18	2.6	3.1E-10	1.8
1989	2.4E-12	3.5	8.1E-14	4.7	5.3E-13	4.1	1.1E-10	2.7	1.8E-18	2.7	2.8E-10	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241
Sector 5
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	4.4E-12	2.1	5.0E-16	3.7	6.0E-14	3.3	3.4E-16	2.6	7.1E-20	2.3
1954	1.5E-10	2.2	1.5E-14	3.8	2.0E-12	3.3	1.2E-14	2.3	2.5E-18	2.2
1955	1.7E-10	2.3	3.7E-14	3.7	2.3E-12	3.5	2.5E-14	2.4	2.8E-18	2.3
1956	5.6E-10	2.2	9.8E-14	3.5	7.7E-12	3.4	7.2E-14	2.4	9.2E-18	2.2
1957	3.5E-08	2.3	3.6E-12	3.7	4.6E-10	3.4	2.6E-12	2.6	5.6E-16	2.3
1958	7.1E-09	2.3	4.1E-12	3.8	9.0E-11	3.6	3.4E-12	2.5	1.2E-16	2.3
1959	3.4E-09	2.3	5.0E-12	3.7	4.3E-11	3.5	3.8E-12	2.4	5.6E-17	2.3
1960	2.8E-09	2.2	6.9E-12	3.6	4.0E-11	3.1	4.3E-12	2.4	4.8E-17	2.2
1961	3.6E-09	2.2	6.9E-12	3.6	5.4E-11	3.2	4.7E-12	2.3	6.0E-17	2.3
1962	7.2E-09	2.2	7.9E-12	3.4	9.7E-11	3.2	5.4E-12	2.3	1.2E-16	2.3
1963	8.4E-09	2.1	8.6E-12	3.5	1.2E-10	3.3	6.1E-12	2.3	1.4E-16	2.1
1964	6.2E-09	2.2	9.7E-12	3.4	8.5E-11	3.1	6.8E-12	2.3	1.1E-16	2.3
1965	1.6E-08	2.2	1.3E-11	3.5	2.2E-10	3.2	8.4E-12	2.3	2.8E-16	2.3
1966	7.8E-10	2.3	1.3E-11	3.6	1.2E-11	3.2	8.8E-12	2.3	1.3E-17	2.4
1967	8.9E-10	2.3	1.4E-11	3.7	1.5E-11	3.2	8.9E-12	2.2	1.4E-17	2.4
1968	1.1E-09	2.2	1.3E-11	3.4	1.8E-11	3.3	9.6E-12	2.2	1.8E-17	2.3
1969	3.1E-09	2.3	1.4E-11	3.4	4.5E-11	3.2	9.5E-12	2.2	5.1E-17	2.4
1970	8.5E-10	2.2	1.4E-11	3.4	1.4E-11	2.9	1.0E-11	2.2	1.4E-17	2.3
1971	1.7E-10	2.3	1.5E-11	3.4	4.1E-12	3.0	9.6E-12	2.2	2.7E-18	2.3
1972	1.4E-10	2.2	1.3E-11	3.5	3.9E-12	2.7	1.0E-11	2.2	2.4E-18	2.3
1973	1.4E-10	2.2	1.5E-11	3.6	3.7E-12	3.0	1.1E-11	2.1	2.4E-18	2.2
1974	2.6E-09	2.3	1.6E-11	3.3	3.8E-11	3.4	1.1E-11	2.2	4.5E-17	2.4
1975	2.8E-10	2.2	1.7E-11	3.4	6.0E-12	2.7	1.1E-11	2.2	4.5E-18	2.2
1976	1.0E-11	2.2	1.5E-11	3.6	1.5E-12	2.9	1.2E-11	2.2	1.8E-19	2.2
1977	1.1E-11	2.3	1.6E-11	3.4	1.6E-12	3.2	1.2E-11	2.1	1.8E-19	2.2
1978	8.2E-12	2.3	1.7E-11	3.3	1.4E-12	3.1	1.2E-11	2.1	1.4E-19	2.2
1979	1.6E-11	2.3	1.7E-11	3.9	1.8E-12	3.1	1.3E-11	2.1	2.7E-19	2.2
1980	3.3E-11	2.4	1.6E-11	3.3	2.1E-12	3.0	1.1E-11	2.2	5.5E-19	2.3
1981	2.2E-11	2.3	1.7E-11	3.3	1.9E-12	2.9	1.2E-11	2.1	3.7E-19	2.3
1982	6.2E-11	2.2	1.6E-11	3.5	2.6E-12	2.7	1.2E-11	2.1	1.0E-18	2.2
1983	2.0E-10	2.2	1.7E-11	3.4	5.2E-12	2.7	1.2E-11	2.1	3.5E-18	2.2
1984	2.0E-10	2.3	1.8E-11	3.4	5.1E-12	2.8	1.3E-11	2.1	3.4E-18	2.3
1985	2.4E-11	2.3	1.7E-11	3.4	1.9E-12	2.9	1.2E-11	2.2	4.0E-19	2.3
1986	1.2E-10	2.3	1.7E-11	3.8	3.4E-12	2.9	1.2E-11	2.0	2.1E-18	2.3
1987	4.1E-11	2.4	1.9E-11	3.3	2.4E-12	3.0	1.3E-11	2.2	6.9E-19	2.4
1988	2.5E-11	2.2	1.9E-11	3.4	1.9E-12	3.0	1.2E-11	2.1	4.2E-19	2.2
1989	1.4E-11	2.3	1.7E-11	3.3	1.8E-12	3.1	1.3E-11	2.1	2.2E-19	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241 (continued)
Sector 5
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	2.7E-17	4.0	1.9E-17	4.4	1.2E-16	4.5	1.1E-15	2.9	1.8E-23	3.1	4.5E-12	2.1
1954	7.9E-16	3.7	6.1E-16	4.8	4.6E-15	4.4	3.7E-14	2.9	6.3E-22	2.9	1.5E-10	2.2
1955	2.1E-15	3.6	7.3E-16	4.7	5.3E-15	4.3	8.9E-14	2.9	1.5E-21	2.9	1.7E-10	2.3
1956	4.9E-15	3.6	2.3E-15	5.0	1.7E-14	4.4	2.3E-13	2.8	3.8E-21	2.8	5.8E-10	2.2
1957	2.0E-13	3.8	1.3E-13	5.2	9.2E-13	4.5	8.3E-12	3.1	1.3E-19	3.2	3.6E-08	2.3
1958	2.4E-13	4.0	4.5E-14	4.1	3.0E-13	4.0	1.1E-11	2.9	1.9E-19	3.0	7.3E-09	2.3
1959	3.1E-13	3.7	2.4E-14	4.3	1.6E-13	3.7	1.4E-11	3.0	2.2E-19	3.1	3.5E-09	2.2
1960	3.3E-13	3.9	2.6E-14	4.1	1.8E-13	3.5	1.5E-11	2.9	2.6E-19	2.9	3.0E-09	2.2
1961	3.5E-13	3.7	3.2E-14	4.0	2.4E-13	4.0	1.6E-11	2.8	2.7E-19	2.8	3.8E-09	2.2
1962	3.9E-13	3.8	4.6E-14	4.5	3.3E-13	3.7	1.8E-11	3.0	3.0E-19	3.0	7.5E-09	2.2
1963	4.6E-13	3.3	5.3E-14	3.9	4.5E-13	4.0	2.1E-11	2.8	3.5E-19	2.8	8.7E-09	2.1
1964	4.5E-13	3.5	4.3E-14	4.1	3.1E-13	3.7	2.2E-11	2.8	3.8E-19	2.9	6.4E-09	2.2
1965	6.2E-13	3.5	9.5E-14	4.4	7.3E-13	3.6	3.0E-11	2.8	5.2E-19	2.9	1.7E-08	2.2
1966	6.8E-13	3.5	2.8E-14	3.9	1.9E-13	3.7	3.0E-11	2.9	5.1E-19	3.0	9.2E-10	2.1
1967	7.0E-13	3.4	2.8E-14	4.2	2.1E-13	3.9	3.4E-11	2.7	5.4E-19	2.8	1.0E-09	2.2
1968	6.4E-13	3.7	3.2E-14	4.5	2.1E-13	4.0	3.2E-11	2.8	5.2E-19	2.8	1.3E-09	2.1
1969	6.4E-13	3.7	3.9E-14	3.9	2.9E-13	3.5	3.5E-11	2.7	5.8E-19	2.8	3.2E-09	2.3
1970	6.9E-13	3.5	3.3E-14	4.3	2.2E-13	3.9	3.5E-11	2.7	5.6E-19	2.8	9.8E-10	2.1
1971	7.2E-13	3.6	2.5E-14	4.1	2.0E-13	3.9	3.4E-11	2.7	5.5E-19	2.7	2.7E-10	1.9
1972	7.7E-13	3.3	2.7E-14	4.4	1.7E-13	4.3	3.4E-11	2.8	5.6E-19	2.8	2.5E-10	1.9
1973	7.9E-13	3.9	2.7E-14	4.5	1.9E-13	4.2	3.7E-11	2.8	6.2E-19	2.8	2.5E-10	1.9
1974	8.6E-13	3.6	4.2E-14	4.0	3.3E-13	3.6	3.8E-11	2.7	6.5E-19	2.8	2.8E-09	2.2
1975	7.5E-13	3.5	2.9E-14	4.2	2.2E-13	4.2	3.9E-11	2.8	6.2E-19	2.7	4.1E-10	1.9
1976	8.7E-13	3.5	3.0E-14	4.3	2.1E-13	4.1	4.1E-11	2.7	6.9E-19	2.7	1.1E-10	1.9
1977	8.9E-13	3.7	2.7E-14	4.4	2.0E-13	4.0	3.8E-11	2.6	6.4E-19	2.6	1.0E-10	1.9
1978	8.8E-13	3.5	3.1E-14	4.5	2.1E-13	4.0	4.0E-11	2.8	6.7E-19	2.8	1.0E-10	1.9
1979	9.0E-13	3.4	3.3E-14	4.3	2.0E-13	4.0	4.0E-11	2.7	6.8E-19	2.7	1.2E-10	1.9
1980	9.2E-13	3.6	2.8E-14	4.1	2.0E-13	3.7	3.9E-11	2.7	6.4E-19	2.7	1.3E-10	1.9
1981	8.8E-13	3.5	3.0E-14	4.1	2.0E-13	4.0	4.0E-11	2.7	6.5E-19	2.9	1.3E-10	1.8
1982	8.0E-13	3.6	3.1E-14	4.1	2.0E-13	3.8	4.2E-11	2.7	7.1E-19	2.7	1.7E-10	1.8
1983	8.1E-13	3.6	3.4E-14	4.1	2.3E-13	4.0	4.1E-11	2.8	6.9E-19	2.8	3.3E-10	1.8
1984	9.1E-13	3.8	3.1E-14	4.5	2.2E-13	4.2	4.2E-11	2.8	6.9E-19	2.8	3.4E-10	1.9
1985	8.6E-13	3.4	3.0E-14	4.6	2.0E-13	4.1	3.8E-11	2.6	6.3E-19	2.7	1.2E-10	1.8
1986	8.8E-13	3.4	3.3E-14	4.5	2.2E-13	4.0	4.1E-11	2.7	7.0E-19	2.7	2.5E-10	1.9
1987	9.6E-13	3.6	3.3E-14	4.4	2.1E-13	4.2	4.1E-11	2.6	6.8E-19	2.6	1.5E-10	1.8
1988	8.6E-13	3.5	3.1E-14	4.0	2.2E-13	4.1	4.5E-11	2.9	7.6E-19	2.8	1.4E-10	1.9
1989	9.0E-13	3.4	3.7E-14	4.4	2.1E-13	4.0	4.2E-11	2.8	7.0E-19	2.7	1.2E-10	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241
Sector 6
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	1.9E-12	2.1	1.8E-16	3.6	2.5E-14	3.3	1.4E-16	2.5	3.1E-20	2.2
1954	6.8E-11	2.3	7.0E-15	3.8	9.5E-13	3.5	4.9E-15	2.4	1.1E-18	2.2
1955	7.3E-11	2.4	1.6E-14	3.5	1.0E-12	3.4	1.1E-14	2.4	1.2E-18	2.4
1956	2.1E-10	2.3	3.9E-14	3.3	2.9E-12	3.4	2.7E-14	2.3	3.6E-18	2.3
1957	1.4E-08	2.2	1.5E-12	3.7	1.8E-10	3.4	1.1E-12	2.5	2.3E-16	2.3
1958	3.1E-09	2.2	1.9E-12	3.6	4.5E-11	3.3	1.5E-12	2.4	5.3E-17	2.2
1959	1.4E-09	2.3	2.3E-12	3.6	1.9E-11	3.3	1.5E-12	2.3	2.3E-17	2.3
1960	1.1E-09	2.1	2.5E-12	3.3	1.6E-11	3.1	1.7E-12	2.3	1.9E-17	2.2
1961	1.4E-09	2.2	2.7E-12	3.5	2.0E-11	3.3	1.9E-12	2.3	2.4E-17	2.2
1962	2.7E-09	2.3	2.9E-12	3.6	3.4E-11	3.4	2.3E-12	2.2	4.5E-17	2.4
1963	3.3E-09	2.2	3.5E-12	3.7	4.2E-11	3.1	2.6E-12	2.3	5.5E-17	2.3
1964	2.7E-09	2.1	4.0E-12	3.3	3.9E-11	3.0	2.9E-12	2.1	4.5E-17	2.2
1965	6.6E-09	2.2	5.0E-12	3.5	8.8E-11	3.3	3.5E-12	2.2	1.1E-16	2.2
1966	3.1E-10	2.4	5.2E-12	3.5	5.1E-12	3.1	3.5E-12	2.2	5.1E-18	2.3
1967	3.9E-10	2.3	5.2E-12	3.1	5.8E-12	3.3	3.6E-12	2.1	6.4E-18	2.3
1968	4.2E-10	2.2	5.1E-12	3.6	6.6E-12	3.2	3.8E-12	2.1	7.0E-18	2.3
1969	1.3E-09	2.2	5.4E-12	3.7	1.9E-11	3.1	3.9E-12	2.2	2.2E-17	2.3
1970	3.7E-10	2.2	6.3E-12	3.2	6.2E-12	3.1	3.9E-12	2.1	6.1E-18	2.3
1971	6.6E-11	2.2	5.7E-12	3.6	1.5E-12	2.7	4.1E-12	2.1	1.1E-18	2.2
1972	5.6E-11	2.2	6.0E-12	3.5	1.7E-12	2.9	4.3E-12	2.1	9.7E-19	2.2
1973	5.6E-11	2.3	6.4E-12	3.4	1.6E-12	2.9	4.5E-12	2.2	9.2E-19	2.3
1974	1.1E-09	2.2	7.0E-12	3.4	1.5E-11	3.1	4.6E-12	2.2	1.8E-17	2.2
1975	1.2E-10	2.2	5.9E-12	3.3	2.6E-12	2.8	4.6E-12	2.1	1.9E-18	2.2
1976	4.3E-12	2.2	7.0E-12	3.5	5.9E-13	3.2	4.6E-12	2.1	7.2E-20	2.3
1977	4.1E-12	2.2	6.4E-12	3.3	6.4E-13	3.2	4.8E-12	2.1	7.3E-20	2.2
1978	3.1E-12	2.3	6.7E-12	3.7	5.9E-13	3.1	4.8E-12	2.2	5.0E-20	2.4
1979	6.3E-12	2.2	6.9E-12	3.3	7.1E-13	3.0	4.8E-12	2.2	1.0E-19	2.3
1980	1.3E-11	2.3	7.1E-12	3.4	8.8E-13	2.8	4.9E-12	2.0	2.2E-19	2.3
1981	9.2E-12	2.3	6.7E-12	3.4	7.6E-13	3.0	5.0E-12	2.1	1.5E-19	2.2
1982	2.3E-11	2.2	6.0E-12	3.5	1.0E-12	2.7	4.9E-12	2.2	3.7E-19	2.2
1983	8.9E-11	2.2	7.1E-12	3.4	2.2E-12	2.7	5.2E-12	2.1	1.5E-18	2.3
1984	8.7E-11	2.2	7.7E-12	3.3	2.2E-12	2.7	4.9E-12	2.2	1.4E-18	2.3
1985	1.0E-11	2.1	7.2E-12	3.4	8.1E-13	3.0	5.0E-12	2.1	1.7E-19	2.2
1986	4.6E-11	2.2	7.3E-12	3.2	1.4E-12	2.7	5.3E-12	2.0	7.8E-19	2.3
1987	1.7E-11	2.3	7.3E-12	3.6	9.9E-13	3.0	5.2E-12	2.1	2.7E-19	2.3
1988	1.0E-11	2.1	7.2E-12	3.5	8.7E-13	2.8	5.0E-12	2.1	1.7E-19	2.2
1989	5.4E-12	2.3	7.3E-12	3.5	7.5E-13	3.3	5.3E-12	2.1	9.1E-20	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241 (continued)
Sector 6
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	GSD	Milk Ingestion GM (Sv/year)	GSD	Beef Ingestion GM (Sv/year)	GSD	Inhalation of Resuspended Particulates GM (Sv/year)	GSD	Immersion in Resuspended Particulates GM (Sv/year)	GSD	Total Dose GM (Sv/year)	GSD
1953	9.2E-18	3.9	7.8E-18	4.7	5.2E-17	4.3	5.0E-16	3.0	8.2E-24	3.0	1.9E-12	2.1
1954	3.4E-16	3.8	2.7E-16	4.9	2.0E-15	4.6	1.8E-14	2.9	2.8E-22	2.9	7.0E-11	2.3
1955	7.4E-16	3.8	3.2E-16	4.7	2.3E-15	4.4	3.7E-14	2.9	6.2E-22	2.9	7.5E-11	2.4
1956	2.1E-15	3.8	8.1E-16	4.7	5.9E-15	4.0	9.8E-14	2.9	1.6E-21	2.9	2.2E-10	2.3
1957	8.2E-14	4.2	5.1E-14	4.8	4.1E-13	4.4	3.3E-12	3.1	5.6E-20	3.1	1.4E-08	2.2
1958	8.7E-14	3.6	1.7E-14	4.5	1.2E-13	4.0	4.4E-12	3.0	7.5E-20	3.1	3.2E-09	2.2
1959	1.2E-13	3.7	1.0E-14	4.0	7.7E-14	3.8	5.3E-12	2.9	9.1E-20	3.0	1.4E-09	2.2
1960	1.3E-13	3.7	9.6E-15	4.0	8.0E-14	3.9	5.8E-12	2.8	1.0E-19	2.8	1.1E-09	2.1
1961	1.4E-13	3.6	1.2E-14	4.5	8.2E-14	3.8	6.5E-12	2.8	1.1E-19	2.9	1.5E-09	2.2
1962	1.7E-13	3.4	1.7E-14	4.1	1.3E-13	4.1	7.1E-12	2.8	1.2E-19	2.8	2.8E-09	2.3
1963	1.8E-13	3.7	2.1E-14	4.1	1.5E-13	3.4	8.6E-12	2.8	1.4E-19	3.0	3.4E-09	2.2
1964	2.0E-13	3.5	1.9E-14	4.1	1.4E-13	3.8	8.9E-12	2.7	1.5E-19	2.8	2.8E-09	2.1
1965	2.7E-13	3.4	3.4E-14	4.5	2.5E-13	3.8	1.2E-11	2.8	2.0E-19	2.9	6.8E-09	2.2
1966	2.6E-13	3.5	1.3E-14	4.4	8.3E-14	3.4	1.2E-11	2.7	2.0E-19	2.7	3.6E-10	2.2
1967	3.0E-13	3.5	1.2E-14	4.3	8.3E-14	3.9	1.3E-11	2.7	2.1E-19	2.7	4.4E-10	2.1
1968	2.8E-13	3.5	1.3E-14	4.1	9.3E-14	3.5	1.2E-11	2.6	2.1E-19	2.8	4.7E-10	2.1
1969	3.1E-13	3.6	2.0E-14	3.9	1.3E-13	3.6	1.4E-11	2.7	2.3E-19	2.7	1.4E-09	2.2
1970	3.2E-13	3.6	1.2E-14	4.0	9.7E-14	3.7	1.4E-11	2.6	2.4E-19	2.6	4.2E-10	2.1
1971	3.1E-13	3.2	1.1E-14	4.2	7.1E-14	3.9	1.4E-11	2.6	2.4E-19	2.7	1.1E-10	1.9
1972	3.3E-13	3.4	1.2E-14	4.6	8.5E-14	3.7	1.4E-11	2.9	2.4E-19	2.9	1.0E-10	1.8
1973	3.4E-13	3.7	1.1E-14	4.3	7.3E-14	4.2	1.4E-11	2.8	2.3E-19	2.8	1.0E-10	1.9
1974	3.3E-13	3.5	2.0E-14	4.0	1.5E-13	3.5	1.6E-11	2.5	2.7E-19	2.6	1.2E-09	2.1
1975	3.4E-13	3.7	1.2E-14	4.3	8.9E-14	3.9	1.6E-11	2.6	2.6E-19	2.7	1.7E-10	1.9
1976	3.6E-13	3.5	1.1E-14	4.3	8.3E-14	3.9	1.6E-11	2.8	2.6E-19	2.7	4.2E-11	2.0
1977	3.6E-13	3.5	1.2E-14	4.3	7.5E-14	3.9	1.5E-11	2.6	2.7E-19	2.7	4.1E-11	1.9
1978	3.5E-13	3.3	1.2E-14	4.6	7.8E-14	3.7	1.6E-11	2.7	2.6E-19	2.7	4.1E-11	2.0
1979	4.0E-13	3.5	1.2E-14	4.1	8.6E-14	4.0	1.7E-11	2.7	2.8E-19	2.7	4.7E-11	1.9
1980	3.6E-13	3.5	1.3E-14	4.7	7.9E-14	4.0	1.5E-11	2.8	2.6E-19	2.8	5.4E-11	1.8
1981	3.9E-13	3.5	1.3E-14	4.3	8.8E-14	4.0	1.7E-11	2.4	2.7E-19	2.6	5.0E-11	1.8
1982	3.9E-13	3.3	1.1E-14	4.5	7.9E-14	3.9	1.6E-11	2.7	2.6E-19	2.7	6.6E-11	1.8
1983	3.7E-13	3.6	1.3E-14	4.5	8.7E-14	4.0	1.9E-11	2.6	3.2E-19	2.6	1.5E-10	1.8
1984	3.7E-13	3.2	1.3E-14	4.6	9.7E-14	4.0	1.8E-11	2.7	3.0E-19	2.6	1.4E-10	1.9
1985	4.0E-13	3.6	1.4E-14	4.2	9.3E-14	4.1	1.7E-11	2.6	2.9E-19	2.6	5.3E-11	1.8
1986	3.5E-13	3.3	1.3E-14	4.3	8.4E-14	4.1	1.6E-11	2.7	2.6E-19	2.6	9.3E-11	1.8
1987	4.0E-13	3.4	1.3E-14	4.2	9.9E-14	4.0	1.8E-11	2.7	2.9E-19	2.7	6.3E-11	1.8
1988	3.8E-13	3.6	1.4E-14	4.7	9.2E-14	4.2	1.9E-11	2.8	3.2E-19	2.8	5.5E-11	1.9
1989	3.8E-13	3.6	1.4E-14	4.1	8.9E-14	4.4	1.7E-11	2.6	3.0E-19	2.7	4.7E-11	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241
Sector 7
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	1.7E-12	2.3	1.6E-16	4.2	2.4E-14	3.4	1.2E-16	2.4	2.8E-20	2.3
1954	5.7E-11	2.4	6.4E-15	3.6	7.6E-13	3.4	4.1E-15	2.5	9.6E-19	2.4
1955	6.4E-11	2.3	1.2E-14	3.7	8.9E-13	3.4	9.7E-15	2.4	1.1E-18	2.3
1956	2.1E-10	2.1	3.3E-14	3.6	2.7E-12	3.3	2.5E-14	2.4	3.4E-18	2.2
1957	1.3E-08	2.3	1.4E-12	3.8	1.8E-10	3.5	1.0E-12	2.6	2.1E-16	2.3
1958	2.6E-09	2.3	1.9E-12	3.7	3.6E-11	3.3	1.4E-12	2.5	4.3E-17	2.3
1959	1.2E-09	2.2	1.8E-12	3.7	1.8E-11	3.1	1.6E-12	2.4	2.1E-17	2.3
1960	1.0E-09	2.2	2.1E-12	3.7	1.5E-11	3.2	1.6E-12	2.3	1.7E-17	2.3
1961	1.3E-09	2.2	2.5E-12	3.8	1.9E-11	3.3	1.8E-12	2.3	2.1E-17	2.2
1962	2.7E-09	2.2	3.0E-12	3.5	3.8E-11	3.3	2.0E-12	2.3	4.5E-17	2.2
1963	3.2E-09	2.3	3.4E-12	3.2	4.3E-11	3.3	2.4E-12	2.2	5.2E-17	2.4
1964	2.4E-09	2.2	3.5E-12	3.6	3.3E-11	3.2	2.6E-12	2.3	4.1E-17	2.3
1965	6.1E-09	2.3	4.1E-12	3.7	8.5E-11	3.3	3.3E-12	2.3	1.1E-16	2.3
1966	2.7E-10	2.3	4.5E-12	3.6	4.6E-12	3.0	3.2E-12	2.2	4.5E-18	2.3
1967	3.5E-10	2.2	4.6E-12	3.6	5.6E-12	3.1	3.5E-12	2.2	5.8E-18	2.3
1968	4.2E-10	2.3	5.0E-12	3.4	6.9E-12	3.1	3.4E-12	2.2	6.9E-18	2.4
1969	1.2E-09	2.3	5.9E-12	3.3	1.7E-11	3.2	3.8E-12	2.2	1.9E-17	2.3
1970	3.2E-10	2.2	5.3E-12	3.5	5.0E-12	2.9	3.8E-12	2.1	5.1E-18	2.3
1971	5.8E-11	2.3	4.9E-12	3.4	1.6E-12	2.9	3.9E-12	2.2	9.8E-19	2.3
1972	5.4E-11	2.2	5.5E-12	3.5	1.5E-12	2.9	4.0E-12	2.1	8.8E-19	2.2
1973	5.0E-11	2.1	5.5E-12	3.6	1.4E-12	2.8	4.0E-12	2.3	8.1E-19	2.2
1974	1.0E-09	2.2	5.9E-12	3.5	1.6E-11	3.2	4.4E-12	2.1	1.7E-17	2.3
1975	1.1E-10	2.2	6.8E-12	3.4	2.3E-12	3.0	4.3E-12	2.2	1.7E-18	2.3
1976	3.9E-12	2.1	5.9E-12	3.4	5.8E-13	3.0	4.2E-12	2.1	6.7E-20	2.2
1977	4.3E-12	2.2	6.0E-12	3.7	5.6E-13	3.1	4.4E-12	2.1	7.1E-20	2.3
1978	2.9E-12	2.3	6.2E-12	3.3	5.4E-13	3.1	4.3E-12	2.2	4.8E-20	2.3
1979	6.1E-12	2.2	6.4E-12	3.8	6.4E-13	3.2	4.4E-12	2.1	1.0E-19	2.3
1980	1.3E-11	2.2	6.4E-12	3.3	7.7E-13	2.8	4.6E-12	2.2	2.1E-19	2.3
1981	8.8E-12	2.2	6.8E-12	3.2	7.0E-13	2.9	4.4E-12	2.2	1.5E-19	2.2
1982	2.2E-11	2.2	6.1E-12	3.6	1.0E-12	2.9	4.5E-12	2.1	3.7E-19	2.2
1983	8.2E-11	2.2	6.3E-12	3.5	1.9E-12	3.0	4.6E-12	2.1	1.3E-18	2.3
1984	8.5E-11	2.4	6.7E-12	3.4	2.0E-12	2.9	4.8E-12	2.1	1.4E-18	2.4
1985	9.4E-12	2.2	6.6E-12	3.7	6.5E-13	3.0	4.7E-12	2.1	1.6E-19	2.3
1986	4.6E-11	2.4	6.8E-12	3.2	1.5E-12	2.8	4.7E-12	2.2	7.8E-19	2.5
1987	1.6E-11	2.1	6.3E-12	3.5	9.0E-13	2.8	4.9E-12	2.1	2.6E-19	2.1
1988	9.3E-12	2.2	7.4E-12	3.2	7.3E-13	3.0	4.7E-12	2.2	1.5E-19	2.3
1989	5.3E-12	2.3	7.2E-12	3.5	7.4E-13	3.2	4.6E-12	2.1	9.2E-20	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241 (continued)
Sector 7
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	9.6E-18	4.1	6.8E-18	5.2	5.2E-17	4.7	4.3E-16	3.2	7.1E-24	3.4	1.8E-12	2.3
1954	3.4E-16	4.1	2.1E-16	5.2	1.4E-15	4.7	1.6E-14	3.0	2.7E-22	3.0	5.8E-11	2.3
1955	7.0E-16	3.6	2.9E-16	5.0	1.8E-15	4.4	3.4E-14	2.9	5.6E-22	2.9	6.5E-11	2.3
1956	1.9E-15	3.5	7.4E-16	4.8	6.3E-15	4.4	8.1E-14	3.0	1.3E-21	3.2	2.1E-10	2.1
1957	6.6E-14	3.7	5.2E-14	4.9	3.6E-13	4.4	3.2E-12	3.1	5.3E-20	3.2	1.3E-08	2.3
1958	9.2E-14	4.1	1.5E-14	4.5	9.3E-14	3.9	4.4E-12	2.9	7.4E-20	2.9	2.6E-09	2.3
1959	1.0E-13	3.7	9.8E-15	3.9	7.1E-14	3.6	4.6E-12	3.1	7.8E-20	3.1	1.3E-09	2.2
1960	1.1E-13	3.7	9.3E-15	4.7	6.4E-14	3.9	5.2E-12	3.1	8.8E-20	3.1	1.1E-09	2.2
1961	1.3E-13	3.8	1.0E-14	4.2	7.9E-14	3.8	6.1E-12	2.8	9.9E-20	2.9	1.3E-09	2.2
1962	1.4E-13	3.9	1.8E-14	4.1	1.2E-13	3.8	6.7E-12	2.8	1.1E-19	2.8	2.8E-09	2.1
1963	1.9E-13	3.7	1.8E-14	4.3	1.5E-13	3.8	8.8E-12	2.8	1.4E-19	2.9	3.3E-09	2.3
1964	2.1E-13	3.5	1.9E-14	4.1	1.2E-13	3.6	8.8E-12	2.9	1.5E-19	2.9	2.5E-09	2.2
1965	2.6E-13	3.5	3.8E-14	4.4	2.5E-13	4.0	1.1E-11	2.8	1.9E-19	2.9	6.3E-09	2.2
1966	2.3E-13	3.6	9.7E-15	4.0	6.4E-14	4.0	1.1E-11	2.9	1.7E-19	2.9	3.2E-10	2.1
1967	2.5E-13	3.4	1.1E-14	4.2	7.5E-14	3.7	1.2E-11	2.6	2.0E-19	2.7	4.0E-10	2.1
1968	2.7E-13	3.4	1.1E-14	4.0	7.6E-14	3.7	1.2E-11	2.6	1.9E-19	2.6	4.7E-10	2.2
1969	2.5E-13	3.4	1.6E-14	4.1	1.0E-13	3.9	1.3E-11	2.7	2.1E-19	2.8	1.3E-09	2.2
1970	2.8E-13	3.4	1.1E-14	4.4	7.7E-14	3.9	1.3E-11	2.9	2.1E-19	3.0	3.7E-10	2.1
1971	3.4E-13	3.8	1.0E-14	4.2	7.2E-14	4.3	1.3E-11	2.5	2.1E-19	2.6	9.9E-11	1.8
1972	2.7E-13	3.6	9.9E-15	4.2	7.7E-14	3.9	1.4E-11	2.8	2.3E-19	2.8	9.7E-11	1.8
1973	2.9E-13	3.5	1.0E-14	4.4	6.8E-14	4.2	1.4E-11	2.7	2.2E-19	2.7	9.1E-11	1.8
1974	3.0E-13	3.5	1.7E-14	4.0	1.1E-13	4.0	1.5E-11	2.8	2.5E-19	2.8	1.1E-09	2.1
1975	3.0E-13	3.5	1.2E-14	4.3	7.2E-14	4.0	1.4E-11	2.8	2.3E-19	2.8	1.6E-10	1.9
1976	3.1E-13	3.7	1.2E-14	4.4	7.2E-14	4.0	1.4E-11	2.7	2.5E-19	2.7	3.8E-11	1.9
1977	3.0E-13	3.5	1.3E-14	4.2	7.5E-14	3.9	1.5E-11	2.8	2.5E-19	2.8	4.0E-11	1.9
1978	3.2E-13	3.3	1.1E-14	4.5	7.5E-14	4.3	1.5E-11	2.7	2.5E-19	2.7	3.8E-11	1.9
1979	3.2E-13	3.8	1.2E-14	4.4	7.2E-14	4.3	1.6E-11	2.6	2.7E-19	2.6	4.5E-11	1.8
1980	3.5E-13	3.5	1.2E-14	4.5	7.9E-14	3.9	1.5E-11	2.6	2.6E-19	2.6	5.2E-11	1.8
1981	3.6E-13	3.5	1.0E-14	4.1	7.3E-14	3.8	1.5E-11	2.7	2.6E-19	2.7	4.7E-11	1.8
1982	3.9E-13	3.6	1.1E-14	4.4	7.3E-14	4.2	1.5E-11	2.6	2.5E-19	2.7	6.3E-11	1.8
1983	3.4E-13	3.6	1.4E-14	4.3	8.8E-14	4.2	1.6E-11	2.6	2.5E-19	2.7	1.3E-10	1.9
1984	3.2E-13	3.5	1.3E-14	4.5	8.4E-14	4.5	1.5E-11	2.6	2.6E-19	2.6	1.4E-10	2.0
1985	3.2E-13	3.4	1.2E-14	4.4	8.9E-14	4.0	1.7E-11	2.8	2.9E-19	2.7	5.1E-11	1.9
1986	3.6E-13	3.6	1.2E-14	4.4	8.1E-14	4.2	1.6E-11	2.8	2.7E-19	2.8	9.4E-11	1.9
1987	3.6E-13	3.7	1.1E-14	4.3	7.8E-14	3.8	1.6E-11	2.5	2.6E-19	2.6	5.6E-11	1.7
1988	3.3E-13	3.4	1.2E-14	4.3	7.9E-14	4.6	1.7E-11	2.6	2.8E-19	2.8	5.1E-11	1.8
1989	4.0E-13	3.7	1.3E-14	4.3	7.7E-14	4.4	1.6E-11	2.7	2.8E-19	2.7	4.5E-11	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241
Sector 8
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	5.8E-12	2.3	5.5E-16	4.0	7.6E-14	3.4	3.9E-16	2.7	9.3E-20	2.4
1954	1.9E-10	2.2	2.1E-14	4.0	2.5E-12	3.1	1.7E-14	2.6	3.2E-18	2.2
1955	2.0E-10	2.2	5.3E-14	3.5	2.6E-12	3.4	3.1E-14	2.5	3.3E-18	2.2
1956	6.3E-10	2.3	1.3E-13	3.8	8.8E-12	3.3	8.7E-14	2.5	1.0E-17	2.3
1957	4.2E-08	2.2	4.7E-12	4.1	5.6E-10	3.4	3.4E-12	2.6	7.1E-16	2.3
1958	9.0E-09	2.2	6.0E-12	3.4	1.2E-10	3.2	4.4E-12	2.5	1.5E-16	2.3
1959	4.0E-09	2.4	6.8E-12	3.6	5.3E-11	3.3	4.9E-12	2.4	6.4E-17	2.4
1960	3.7E-09	2.4	7.0E-12	3.6	4.7E-11	3.4	5.6E-12	2.3	6.0E-17	2.4
1961	4.3E-09	2.3	7.3E-12	3.6	5.5E-11	3.3	5.8E-12	2.4	7.0E-17	2.2
1962	8.4E-09	2.2	9.2E-12	3.4	1.1E-10	3.4	6.6E-12	2.4	1.4E-16	2.3
1963	1.1E-08	2.3	1.1E-11	3.7	1.5E-10	3.4	7.6E-12	2.3	1.8E-16	2.3
1964	7.5E-09	2.1	1.2E-11	3.7	1.1E-10	3.4	8.2E-12	2.2	1.3E-16	2.1
1965	1.9E-08	2.2	1.3E-11	3.5	2.6E-10	3.3	1.1E-11	2.2	3.3E-16	2.3
1966	9.7E-10	2.3	1.5E-11	3.8	1.5E-11	3.1	1.1E-11	2.2	1.5E-17	2.3
1967	1.1E-09	2.2	1.5E-11	3.4	1.7E-11	3.1	1.1E-11	2.2	1.9E-17	2.2
1968	1.3E-09	2.3	1.7E-11	3.4	2.4E-11	3.2	1.1E-11	2.2	2.2E-17	2.2
1969	3.9E-09	2.4	1.5E-11	3.5	6.0E-11	3.4	1.2E-11	2.2	6.4E-17	2.3
1970	1.1E-09	2.2	1.9E-11	3.3	1.7E-11	3.1	1.4E-11	2.2	1.8E-17	2.2
1971	2.2E-10	2.2	1.9E-11	3.5	5.2E-12	2.7	1.3E-11	2.3	3.5E-18	2.2
1972	1.8E-10	2.3	1.8E-11	3.5	4.9E-12	2.8	1.3E-11	2.2	2.9E-18	2.3
1973	1.7E-10	2.2	1.8E-11	3.9	4.6E-12	2.9	1.4E-11	2.2	2.9E-18	2.2
1974	3.4E-09	2.2	2.0E-11	3.4	4.9E-11	3.2	1.3E-11	2.1	5.6E-17	2.2
1975	3.6E-10	2.2	1.9E-11	3.6	7.9E-12	2.9	1.4E-11	2.2	5.9E-18	2.3
1976	1.4E-11	2.3	1.8E-11	3.5	1.9E-12	3.2	1.4E-11	2.1	2.3E-19	2.4
1977	1.4E-11	2.2	1.9E-11	3.8	1.9E-12	3.4	1.4E-11	2.2	2.3E-19	2.2
1978	1.0E-11	2.1	2.0E-11	3.4	1.9E-12	3.1	1.5E-11	2.1	1.7E-19	2.2
1979	2.0E-11	2.1	2.2E-11	3.4	2.1E-12	3.0	1.4E-11	2.1	3.3E-19	2.3
1980	4.2E-11	2.3	2.1E-11	4.0	2.6E-12	3.0	1.5E-11	2.2	6.7E-19	2.3
1981	2.9E-11	2.4	2.0E-11	3.4	2.1E-12	2.9	1.6E-11	2.2	4.8E-19	2.4
1982	6.8E-11	2.1	2.0E-11	3.7	3.2E-12	3.0	1.5E-11	2.0	1.1E-18	2.2
1983	2.8E-10	2.3	2.2E-11	3.5	6.5E-12	2.9	1.6E-11	2.1	4.7E-18	2.3
1984	2.7E-10	2.3	2.5E-11	3.6	7.0E-12	2.7	1.5E-11	2.2	4.6E-18	2.3
1985	3.0E-11	2.2	2.1E-11	3.3	2.3E-12	3.0	1.5E-11	2.0	4.9E-19	2.2
1986	1.5E-10	2.2	2.2E-11	3.4	4.9E-12	2.7	1.5E-11	2.2	2.5E-18	2.3
1987	4.9E-11	2.3	2.3E-11	3.6	2.8E-12	2.9	1.7E-11	2.2	8.2E-19	2.3
1988	3.1E-11	2.3	2.2E-11	3.3	2.6E-12	3.2	1.5E-11	2.1	5.2E-19	2.3
1989	1.7E-11	2.2	2.3E-11	3.3	2.2E-12	3.0	1.6E-11	2.3	2.7E-19	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241 (continued)
Sector 8
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	3.1E-17	4.0	2.1E-17	5.1	1.6E-16	4.4	1.4E-15	3.2	2.3E-23	3.3	5.9E-12	2.3
1954	1.0E-15	4.0	7.3E-16	4.7	5.9E-15	4.3	5.1E-14	3.2	8.3E-22	3.2	2.0E-10	2.2
1955	2.1E-15	4.1	8.1E-16	4.5	6.2E-15	4.5	1.1E-13	2.9	1.9E-21	2.9	2.0E-10	2.2
1956	5.2E-15	3.5	2.4E-15	4.6	2.0E-14	4.4	3.0E-13	2.9	5.0E-21	3.0	6.5E-10	2.3
1957	2.5E-13	3.8	1.7E-13	4.8	1.2E-12	4.2	1.2E-11	3.1	2.0E-19	3.1	4.3E-08	2.2
1958	3.2E-13	3.6	4.9E-14	4.5	3.4E-13	3.8	1.4E-11	2.9	2.4E-19	2.9	9.2E-09	2.2
1959	3.6E-13	3.9	3.1E-14	4.1	2.2E-13	3.8	1.6E-11	2.9	2.6E-19	2.9	4.1E-09	2.4
1960	3.7E-13	3.8	2.8E-14	4.1	2.2E-13	3.9	1.7E-11	2.9	2.8E-19	3.0	3.8E-09	2.4
1961	4.4E-13	3.6	3.4E-14	4.2	2.5E-13	3.8	1.9E-11	3.0	3.1E-19	3.0	4.4E-09	2.2
1962	4.5E-13	3.8	5.5E-14	4.0	4.0E-13	4.0	2.1E-11	2.7	3.6E-19	2.7	8.6E-09	2.2
1963	5.6E-13	3.4	6.9E-14	4.3	5.1E-13	4.0	2.7E-11	2.8	4.4E-19	2.7	1.1E-08	2.2
1964	6.7E-13	3.8	5.6E-14	4.3	4.0E-13	4.0	3.0E-11	2.9	5.2E-19	2.8	7.8E-09	2.1
1965	7.5E-13	3.8	1.1E-13	4.5	9.1E-13	4.2	3.6E-11	2.7	6.0E-19	2.7	2.0E-08	2.2
1966	7.4E-13	3.7	3.4E-14	4.1	2.4E-13	3.9	3.7E-11	2.8	5.9E-19	2.8	1.1E-09	2.1
1967	8.0E-13	3.6	4.1E-14	4.2	2.8E-13	3.7	4.0E-11	2.7	6.6E-19	2.7	1.3E-09	2.1
1968	8.8E-13	3.6	4.1E-14	4.3	2.6E-13	3.7	4.0E-11	2.9	6.6E-19	2.9	1.5E-09	2.1
1969	9.1E-13	3.6	5.3E-14	4.1	4.0E-13	3.7	4.0E-11	2.8	6.6E-19	2.8	4.2E-09	2.3
1970	9.2E-13	3.6	3.7E-14	4.2	2.9E-13	4.1	4.3E-11	2.7	7.1E-19	2.8	1.2E-09	2.0
1971	9.5E-13	3.6	3.3E-14	4.5	2.5E-13	4.4	4.4E-11	2.8	7.1E-19	2.8	3.6E-10	1.8
1972	1.0E-12	3.4	3.4E-14	4.3	2.3E-13	4.1	4.4E-11	2.8	7.2E-19	2.8	3.2E-10	1.9
1973	1.1E-12	3.6	3.7E-14	4.3	2.3E-13	3.9	4.3E-11	2.8	7.3E-19	2.9	3.1E-10	1.9
1974	1.1E-12	3.4	5.5E-14	4.4	4.0E-13	3.8	4.8E-11	2.7	8.0E-19	2.8	3.6E-09	2.1
1975	9.7E-13	3.5	3.5E-14	4.7	2.6E-13	3.7	4.7E-11	2.8	7.6E-19	2.8	5.2E-10	1.9
1976	1.1E-12	3.5	3.5E-14	4.2	2.3E-13	4.0	4.6E-11	2.7	7.6E-19	2.7	1.2E-10	1.9
1977	1.1E-12	3.9	3.6E-14	4.8	2.4E-13	4.1	5.0E-11	2.8	8.1E-19	2.8	1.3E-10	2.0
1978	1.1E-12	3.4	3.9E-14	4.2	2.6E-13	3.9	5.2E-11	2.7	8.7E-19	2.7	1.3E-10	1.9
1979	1.1E-12	3.4	3.6E-14	4.3	2.7E-13	4.2	4.9E-11	2.6	8.0E-19	2.7	1.4E-10	1.8
1980	1.1E-12	3.6	3.8E-14	4.7	2.5E-13	4.3	5.2E-11	2.9	8.3E-19	2.8	1.8E-10	1.9
1981	9.9E-13	3.7	4.0E-14	4.1	2.4E-13	4.2	5.1E-11	2.7	8.3E-19	2.7	1.6E-10	1.8
1982	1.2E-12	3.5	4.3E-14	4.2	2.7E-13	3.9	5.2E-11	2.7	8.6E-19	2.8	2.0E-10	1.8
1983	1.1E-12	3.5	4.3E-14	4.0	2.6E-13	3.9	5.5E-11	2.6	9.4E-19	2.7	4.5E-10	1.9
1984	1.1E-12	3.4	4.5E-14	4.2	3.1E-13	4.2	5.7E-11	2.8	9.4E-19	2.8	4.6E-10	1.9
1985	1.1E-12	3.4	4.0E-14	4.4	2.7E-13	3.8	5.7E-11	2.7	9.3E-19	2.7	1.6E-10	1.9
1986	1.2E-12	3.4	3.8E-14	4.4	2.7E-13	4.2	5.2E-11	2.6	8.8E-19	2.7	3.1E-10	1.8
1987	1.1E-12	3.5	4.0E-14	4.6	3.0E-13	4.1	5.3E-11	2.7	8.9E-19	2.6	1.9E-10	1.8
1988	1.2E-12	3.8	3.8E-14	4.6	2.7E-13	3.8	5.4E-11	2.6	9.0E-19	2.6	1.6E-10	1.8
1989	1.1E-12	3.4	4.1E-14	4.7	2.7E-13	4.1	5.7E-11	2.6	9.1E-19	2.6	1.5E-10	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241
Sector 9
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	2.4E-12	2.2	2.7E-16	3.8	3.6E-14	3.3	1.9E-16	2.5	3.9E-20	2.3
1954	8.0E-11	2.4	9.3E-15	3.8	1.1E-12	3.6	6.6E-15	2.6	1.4E-18	2.4
1955	8.3E-11	2.3	1.9E-14	3.8	1.1E-12	3.4	1.4E-14	2.3	1.3E-18	2.3
1956	2.9E-10	2.2	5.2E-14	3.8	4.3E-12	3.1	3.5E-14	2.4	4.7E-18	2.2
1957	1.9E-08	2.1	2.0E-12	3.8	2.7E-10	3.3	1.4E-12	2.5	3.1E-16	2.2
1958	4.0E-09	2.4	2.5E-12	3.9	5.1E-11	3.5	1.9E-12	2.4	6.7E-17	2.3
1959	1.8E-09	2.1	2.9E-12	3.7	2.5E-11	3.6	2.1E-12	2.3	3.0E-17	2.2
1960	1.6E-09	2.3	3.7E-12	3.6	2.4E-11	3.0	2.2E-12	2.2	2.6E-17	2.3
1961	1.8E-09	2.3	3.7E-12	3.6	2.7E-11	3.2	2.5E-12	2.3	3.0E-17	2.3
1962	3.8E-09	2.2	4.0E-12	3.5	5.3E-11	3.2	3.0E-12	2.3	6.3E-17	2.2
1963	4.2E-09	2.3	4.4E-12	3.8	5.8E-11	3.2	3.4E-12	2.1	7.2E-17	2.3
1964	3.4E-09	2.3	5.0E-12	3.8	4.9E-11	3.1	3.7E-12	2.2	5.6E-17	2.3
1965	8.5E-09	2.1	6.9E-12	3.5	1.1E-10	3.2	5.0E-12	2.3	1.4E-16	2.1
1966	4.0E-10	2.3	6.6E-12	3.5	6.6E-12	3.1	4.8E-12	2.2	6.5E-18	2.4
1967	5.1E-10	2.1	6.9E-12	3.5	8.4E-12	3.1	4.7E-12	2.2	8.1E-18	2.2
1968	5.8E-10	2.1	6.8E-12	3.3	9.7E-12	3.2	5.0E-12	2.1	9.7E-18	2.1
1969	1.8E-09	2.2	7.1E-12	3.3	2.7E-11	3.1	5.3E-12	2.1	3.0E-17	2.3
1970	5.0E-10	2.3	7.6E-12	3.4	7.7E-12	3.0	5.5E-12	2.2	8.3E-18	2.3
1971	9.0E-11	2.2	8.0E-12	3.4	2.2E-12	2.8	5.5E-12	2.1	1.5E-18	2.2
1972	7.4E-11	2.2	7.6E-12	3.5	2.0E-12	2.9	5.8E-12	2.2	1.2E-18	2.2
1973	7.5E-11	2.2	8.5E-12	3.2	2.0E-12	2.7	6.2E-12	2.0	1.2E-18	2.3
1974	1.5E-09	2.3	7.7E-12	3.4	2.3E-11	3.2	5.8E-12	2.2	2.3E-17	2.4
1975	1.5E-10	2.2	8.9E-12	3.3	3.4E-12	2.8	6.1E-12	2.1	2.6E-18	2.2
1976	6.1E-12	2.3	8.7E-12	3.4	8.4E-13	3.0	6.4E-12	2.2	1.0E-19	2.3
1977	6.0E-12	2.3	9.3E-12	3.2	7.7E-13	3.3	6.4E-12	2.2	9.9E-20	2.3
1978	4.1E-12	2.3	9.4E-12	3.2	7.3E-13	3.1	6.2E-12	2.1	6.8E-20	2.3
1979	9.2E-12	2.1	9.1E-12	3.5	1.0E-12	3.1	6.3E-12	2.2	1.5E-19	2.2
1980	1.9E-11	2.4	8.9E-12	3.1	1.1E-12	2.7	6.9E-12	2.1	3.2E-19	2.4
1981	1.2E-11	2.2	9.1E-12	3.4	9.3E-13	2.8	6.8E-12	2.0	2.1E-19	2.1
1982	3.2E-11	2.3	9.4E-12	3.3	1.5E-12	2.8	7.0E-12	2.1	5.3E-19	2.4
1983	1.2E-10	2.2	8.9E-12	3.4	3.0E-12	2.7	7.0E-12	2.2	2.1E-18	2.3
1984	1.2E-10	2.2	9.3E-12	3.4	2.8E-12	2.9	7.5E-12	2.1	2.0E-18	2.2
1985	1.4E-11	2.2	8.9E-12	3.4	1.0E-12	3.0	6.7E-12	2.1	2.3E-19	2.2
1986	6.3E-11	2.2	9.9E-12	3.4	2.0E-12	2.7	6.9E-12	2.1	1.0E-18	2.3
1987	2.2E-11	2.2	1.0E-11	3.3	1.3E-12	2.8	7.0E-12	2.0	3.7E-19	2.2
1988	1.3E-11	2.3	9.4E-12	3.5	1.0E-12	2.9	7.1E-12	2.1	2.2E-19	2.3
1989	7.6E-12	2.2	1.0E-11	3.3	8.7E-13	3.0	7.3E-12	2.2	1.2E-19	2.4

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241 (continued)
Sector 9
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	1.3E-17	3.9	9.9E-18	5.0	7.2E-17	4.6	6.3E-16	3.1	1.0E-23	3.1	2.5E-12	2.2
1954	4.6E-16	4.0	3.3E-16	4.7	2.6E-15	4.4	2.3E-14	3.2	3.9E-22	3.2	8.2E-11	2.4
1955	1.0E-15	3.6	3.4E-16	4.6	2.8E-15	4.6	4.7E-14	2.8	7.5E-22	2.8	8.5E-11	2.3
1956	3.0E-15	3.9	1.3E-15	4.8	9.3E-15	4.3	1.3E-13	2.9	2.1E-21	2.9	3.0E-10	2.2
1957	1.2E-13	4.3	7.5E-14	4.8	5.3E-13	4.3	5.0E-12	3.2	8.2E-20	3.2	1.9E-08	2.1
1958	1.3E-13	3.8	2.1E-14	4.6	1.6E-13	4.0	6.0E-12	3.0	1.0E-19	3.0	4.1E-09	2.3
1959	1.5E-13	3.6	1.4E-14	4.3	9.7E-14	3.8	7.2E-12	2.8	1.2E-19	2.8	1.8E-09	2.1
1960	1.5E-13	4.1	1.5E-14	4.2	9.7E-14	3.9	8.4E-12	2.8	1.4E-19	2.9	1.7E-09	2.2
1961	2.0E-13	3.6	1.7E-14	4.5	1.1E-13	4.0	9.1E-12	2.7	1.5E-19	2.7	1.9E-09	2.2
1962	2.3E-13	3.8	2.4E-14	4.4	1.6E-13	3.8	9.8E-12	2.6	1.7E-19	2.7	3.9E-09	2.2
1963	2.5E-13	3.5	2.5E-14	4.4	1.9E-13	3.8	1.1E-11	2.8	1.8E-19	2.8	4.4E-09	2.2
1964	2.9E-13	3.3	2.7E-14	4.2	2.0E-13	3.6	1.4E-11	2.7	2.3E-19	2.8	3.5E-09	2.3
1965	3.6E-13	3.6	4.8E-14	4.5	3.4E-13	3.9	1.6E-11	2.7	2.6E-19	2.7	8.7E-09	2.1
1966	3.4E-13	3.6	1.5E-14	4.5	1.1E-13	3.8	1.7E-11	2.7	2.8E-19	2.8	4.6E-10	2.2
1967	3.7E-13	3.6	1.6E-14	3.8	1.1E-13	3.9	1.7E-11	2.5	2.7E-19	2.5	5.7E-10	2.0
1968	4.0E-13	3.6	1.7E-14	3.9	1.2E-13	3.6	1.7E-11	2.8	2.8E-19	2.8	6.5E-10	2.0
1969	3.9E-13	3.6	1.8E-14	4.1	1.7E-13	3.5	1.7E-11	2.5	2.9E-19	2.6	1.9E-09	2.1
1970	3.7E-13	3.6	1.6E-14	4.1	1.2E-13	3.5	1.7E-11	2.6	2.8E-19	2.7	5.7E-10	2.1
1971	4.1E-13	3.4	1.4E-14	4.2	1.0E-13	3.8	2.0E-11	2.7	3.2E-19	2.7	1.5E-10	1.8
1972	4.2E-13	3.8	1.5E-14	4.2	1.0E-13	3.6	1.9E-11	2.7	3.2E-19	2.7	1.3E-10	1.9
1973	4.2E-13	3.4	1.6E-14	4.0	1.1E-13	3.6	2.1E-11	2.5	3.5E-19	2.5	1.4E-10	1.8
1974	4.1E-13	3.5	2.5E-14	4.2	1.7E-13	3.8	2.0E-11	2.8	3.2E-19	2.8	1.6E-09	2.3
1975	4.6E-13	3.4	1.5E-14	4.1	1.1E-13	3.9	2.1E-11	2.5	3.5E-19	2.5	2.2E-10	1.8
1976	4.7E-13	3.5	1.5E-14	4.6	1.0E-13	4.1	2.1E-11	2.7	3.6E-19	2.8	5.7E-11	1.9
1977	4.4E-13	3.6	1.6E-14	4.3	1.1E-13	4.0	2.2E-11	2.6	3.6E-19	2.7	5.8E-11	1.9
1978	4.2E-13	3.4	1.6E-14	4.2	1.1E-13	3.9	2.3E-11	2.7	3.8E-19	2.7	5.6E-11	2.0
1979	5.1E-13	3.5	1.6E-14	4.0	1.1E-13	4.2	2.3E-11	2.7	3.7E-19	2.7	6.5E-11	1.9
1980	4.8E-13	3.5	1.6E-14	4.2	9.9E-14	3.8	2.3E-11	2.7	3.8E-19	2.7	7.7E-11	1.8
1981	4.8E-13	3.4	1.6E-14	4.4	1.1E-13	3.9	2.0E-11	2.7	3.4E-19	2.6	6.4E-11	1.8
1982	5.1E-13	3.5	1.6E-14	4.2	1.2E-13	3.8	2.2E-11	2.7	3.6E-19	2.8	9.3E-11	1.8
1983	4.5E-13	3.5	1.7E-14	4.1	1.3E-13	3.9	2.3E-11	2.6	3.8E-19	2.7	1.9E-10	1.8
1984	4.7E-13	3.5	1.8E-14	4.2	1.2E-13	3.8	2.2E-11	2.6	3.6E-19	2.6	1.9E-10	1.9
1985	5.0E-13	3.5	1.5E-14	4.3	1.2E-13	3.9	2.3E-11	2.7	3.8E-19	2.7	7.0E-11	1.8
1986	5.2E-13	3.5	1.9E-14	4.4	1.3E-13	3.9	2.5E-11	2.6	4.0E-19	2.6	1.3E-10	1.8
1987	5.1E-13	3.4	1.7E-14	4.6	1.2E-13	4.2	2.4E-11	2.7	4.1E-19	2.8	8.4E-11	1.8
1988	4.7E-13	3.5	1.7E-14	4.4	1.2E-13	4.1	2.3E-11	2.7	3.9E-19	2.7	7.2E-11	1.8
1989	4.6E-13	3.4	1.8E-14	4.4	1.3E-13	4.0	2.5E-11	2.7	4.1E-19	2.7	6.7E-11	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241
Sector 10
(1953 - 1989)

Year	Inhalation GM (Sv/year)	GSD	Soil Ingestion GM (Sv/year)	GSD	Vegetable Ingestion GM (Sv/year)	GSD	Ground Exposure GM (Sv/year)	GSD	Immersion GM (Sv/year)	GSD
1953	1.0E-12	2.2	9.0E-17	4.0	1.2E-14	3.3	7.0E-17	2.5	1.7E-20	2.3
1954	3.3E-11	2.1	3.7E-15	3.6	4.3E-13	3.2	2.6E-15	2.5	5.5E-19	2.2
1955	3.6E-11	2.2	8.0E-15	4.0	4.8E-13	3.1	5.9E-15	2.4	5.8E-19	2.2
1956	1.1E-10	2.3	1.9E-14	3.6	1.6E-12	3.5	1.5E-14	2.4	1.9E-18	2.3
1957	7.7E-09	2.3	7.7E-13	4.1	1.1E-10	3.5	5.6E-13	2.4	1.3E-16	2.3
1958	1.5E-09	2.2	1.1E-12	3.5	2.0E-11	3.2	7.5E-13	2.5	2.5E-17	2.2
1959	7.1E-10	2.2	1.1E-12	3.8	1.0E-11	3.0	8.9E-13	2.3	1.2E-17	2.2
1960	6.1E-10	2.2	1.3E-12	3.4	9.1E-12	3.2	8.6E-13	2.4	9.8E-18	2.2
1961	7.5E-10	2.3	1.3E-12	3.4	1.0E-11	3.2	1.1E-12	2.3	1.2E-17	2.3
1962	1.5E-09	2.2	1.6E-12	3.7	2.2E-11	3.1	1.2E-12	2.3	2.5E-17	2.3
1963	1.9E-09	2.2	1.7E-12	3.7	2.5E-11	3.3	1.3E-12	2.2	3.1E-17	2.2
1964	1.4E-09	2.1	2.0E-12	3.5	1.9E-11	3.2	1.5E-12	2.3	2.3E-17	2.2
1965	3.5E-09	2.3	2.9E-12	3.4	4.7E-11	3.4	1.8E-12	2.3	5.7E-17	2.3
1966	1.5E-10	2.3	2.6E-12	3.4	2.5E-12	3.2	2.0E-12	2.3	2.4E-18	2.3
1967	2.1E-10	2.2	2.6E-12	3.7	3.3E-12	3.2	2.1E-12	2.3	3.4E-18	2.2
1968	2.4E-10	2.2	2.9E-12	3.5	3.8E-12	3.1	2.0E-12	2.2	4.0E-18	2.2
1969	7.0E-10	2.4	2.8E-12	3.6	1.0E-11	3.1	2.1E-12	2.1	1.2E-17	2.3
1970	1.9E-10	2.2	3.0E-12	3.4	3.3E-12	3.0	2.1E-12	2.2	3.0E-18	2.3
1971	3.6E-11	2.3	3.1E-12	3.3	9.1E-13	2.8	2.3E-12	2.3	5.9E-19	2.3
1972	3.0E-11	2.2	3.1E-12	3.5	7.7E-13	2.9	2.3E-12	2.2	5.0E-19	2.3
1973	3.0E-11	2.3	3.2E-12	3.3	7.9E-13	2.6	2.2E-12	2.2	5.0E-19	2.3
1974	5.8E-10	2.2	3.4E-12	3.3	8.4E-12	3.0	2.5E-12	2.1	9.9E-18	2.2
1975	6.4E-11	2.4	3.5E-12	3.4	1.4E-12	2.9	2.5E-12	2.1	1.0E-18	2.5
1976	2.4E-12	2.3	3.6E-12	3.5	3.2E-13	3.0	2.6E-12	2.2	4.0E-20	2.3
1977	2.4E-12	2.1	3.6E-12	3.3	3.2E-13	3.2	2.6E-12	2.3	4.1E-20	2.2
1978	1.8E-12	2.3	3.6E-12	3.4	3.1E-13	3.1	2.5E-12	2.2	3.0E-20	2.3
1979	3.3E-12	2.3	3.9E-12	3.5	3.3E-13	3.0	2.6E-12	2.2	5.5E-20	2.3
1980	7.2E-12	2.1	3.4E-12	3.5	4.4E-13	2.9	2.6E-12	2.1	1.2E-19	2.2
1981	5.1E-12	2.3	3.8E-12	3.5	4.2E-13	2.9	2.6E-12	2.2	8.6E-20	2.4
1982	1.1E-11	2.2	3.9E-12	3.1	5.3E-13	2.8	2.7E-12	2.1	1.9E-19	2.3
1983	4.6E-11	2.2	3.8E-12	3.3	1.1E-12	2.8	2.7E-12	2.2	7.8E-19	2.2
1984	4.7E-11	2.3	3.9E-12	3.2	1.1E-12	2.9	2.9E-12	2.1	8.0E-19	2.3
1985	5.6E-12	2.2	3.9E-12	3.4	4.0E-13	2.9	2.8E-12	2.1	9.3E-20	2.2
1986	2.5E-11	2.3	3.7E-12	3.5	8.2E-13	2.7	2.8E-12	2.1	4.1E-19	2.2
1987	8.8E-12	2.2	4.1E-12	3.2	5.3E-13	2.9	2.7E-12	2.2	1.5E-19	2.3
1988	5.6E-12	2.2	4.0E-12	3.4	4.2E-13	2.9	2.9E-12	2.1	9.2E-20	2.3
1989	3.0E-12	2.2	4.0E-12	3.7	3.9E-13	3.2	2.8E-12	2.2	4.9E-20	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241 (continued)
Sector 10
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	GSD	Milk Ingestion GM (Sv/year)	GSD	Beef Ingestion GM (Sv/year)	GSD	Inhalation of Resuspended Particulates GM (Sv/year)	GSD	Immersion in Resuspended Particulates GM (Sv/year)	GSD	Total Dose GM (Sv/year)	GSD
1953	5.2E-18	4.2	3.5E-18	4.9	2.5E-17	4.4	2.4E-16	2.9	4.0E-24	3.0	1.0E-12	2.2
1954	2.0E-16	3.7	1.2E-16	4.6	9.6E-16	4.6	9.1E-15	3.0	1.5E-22	3.1	3.4E-11	2.1
1955	4.2E-16	3.8	1.6E-16	5.1	1.0E-15	3.8	2.0E-14	3.0	3.2E-22	3.0	3.7E-11	2.2
1956	1.1E-15	3.9	4.8E-16	4.8	3.3E-15	4.7	4.9E-14	2.9	8.2E-22	2.9	1.2E-10	2.3
1957	4.4E-14	3.8	3.1E-14	4.9	2.5E-13	4.4	1.8E-12	3.0	3.1E-20	3.1	7.9E-09	2.3
1958	5.2E-14	3.9	8.5E-15	4.3	6.3E-14	4.3	2.6E-12	2.9	4.2E-20	2.9	1.6E-09	2.2
1959	6.3E-14	3.6	5.1E-15	4.2	3.7E-14	3.9	2.9E-12	2.7	4.9E-20	2.8	7.4E-10	2.1
1960	6.9E-14	3.5	5.8E-15	3.9	3.6E-14	3.6	3.1E-12	2.9	5.0E-20	2.9	6.4E-10	2.2
1961	7.9E-14	3.9	6.2E-15	4.1	4.5E-14	3.8	3.4E-12	2.9	5.4E-20	2.9	7.8E-10	2.3
1962	9.0E-14	3.6	9.4E-15	4.2	7.8E-14	4.2	3.9E-12	3.1	6.5E-20	3.0	1.6E-09	2.2
1963	1.1E-13	3.7	1.2E-14	4.1	9.6E-14	3.9	4.9E-12	2.8	8.1E-20	2.8	1.9E-09	2.1
1964	1.1E-13	3.7	1.1E-14	4.1	8.1E-14	3.7	4.9E-12	2.7	8.1E-20	2.8	1.4E-09	2.1
1965	1.4E-13	3.5	1.9E-14	4.6	1.4E-13	3.9	6.6E-12	2.8	1.1E-19	2.8	3.6E-09	2.2
1966	1.3E-13	3.7	5.0E-15	3.9	3.9E-14	3.8	6.5E-12	2.7	1.1E-19	2.8	1.8E-10	2.1
1967	1.3E-13	3.5	6.6E-15	4.5	4.3E-14	4.0	7.0E-12	2.7	1.1E-19	2.7	2.4E-10	2.1
1968	1.6E-13	3.5	6.4E-15	4.1	4.6E-14	3.6	7.0E-12	2.7	1.2E-19	2.8	2.7E-10	2.1
1969	1.5E-13	3.6	8.5E-15	4.4	6.8E-14	3.7	6.7E-12	2.8	1.1E-19	2.8	7.4E-10	2.3
1970	1.5E-13	3.6	7.5E-15	4.1	5.1E-14	3.9	7.6E-12	2.7	1.2E-19	2.7	2.2E-10	2.1
1971	1.5E-13	3.4	5.7E-15	4.2	3.9E-14	4.0	7.2E-12	2.6	1.2E-19	2.5	5.9E-11	1.9
1972	1.7E-13	3.7	5.8E-15	4.3	3.9E-14	3.9	7.8E-12	2.7	1.3E-19	2.8	5.4E-11	1.8
1973	1.7E-13	3.4	6.2E-15	4.5	4.0E-14	4.1	8.0E-12	2.7	1.3E-19	2.7	5.4E-11	1.9
1974	1.8E-13	3.7	8.8E-15	4.3	7.0E-14	4.0	8.5E-12	2.7	1.5E-19	2.8	6.2E-10	2.1
1975	1.9E-13	3.6	6.4E-15	4.4	4.6E-14	4.2	8.7E-12	2.7	1.4E-19	2.7	9.5E-11	2.0
1976	1.8E-13	3.5	6.1E-15	4.3	4.2E-14	4.1	8.7E-12	2.8	1.4E-19	2.7	2.4E-11	1.9
1977	1.7E-13	3.7	6.2E-15	4.3	4.4E-14	4.1	8.3E-12	2.7	1.4E-19	2.7	2.3E-11	1.9
1978	1.8E-13	3.6	6.2E-15	4.6	4.4E-14	4.2	8.7E-12	2.6	1.5E-19	2.7	2.2E-11	1.9
1979	1.9E-13	3.7	7.1E-15	4.4	4.7E-14	4.2	9.7E-12	2.9	1.6E-19	2.9	2.6E-11	2.0
1980	1.8E-13	3.3	6.9E-15	4.6	4.3E-14	4.2	8.5E-12	2.8	1.4E-19	2.8	2.9E-11	1.8
1981	2.1E-13	3.3	7.2E-15	4.8	4.8E-14	4.0	9.3E-12	2.7	1.6E-19	2.8	2.8E-11	1.9
1982	1.9E-13	3.4	6.4E-15	4.6	5.0E-14	4.0	9.2E-12	2.7	1.6E-19	2.8	3.6E-11	1.8
1983	1.8E-13	3.5	7.0E-15	4.2	5.4E-14	4.3	9.3E-12	2.7	1.6E-19	2.7	7.5E-11	1.8
1984	1.8E-13	3.5	7.4E-15	4.0	4.5E-14	4.1	9.2E-12	2.6	1.6E-19	2.7	7.6E-11	1.9
1985	2.0E-13	3.5	6.4E-15	4.4	4.5E-14	4.3	9.4E-12	2.7	1.6E-19	2.7	2.9E-11	1.8
1986	2.0E-13	3.5	8.1E-15	4.8	5.1E-14	4.0	9.1E-12	2.6	1.5E-19	2.6	5.1E-11	1.8
1987	2.1E-13	3.7	6.8E-15	4.4	4.4E-14	4.3	9.4E-12	2.7	1.5E-19	2.8	3.3E-11	1.8
1988	1.9E-13	3.6	7.2E-15	4.1	4.7E-14	4.0	9.4E-12	2.6	1.5E-19	2.7	3.0E-11	1.8
1989	2.2E-13	3.6	7.3E-15	4.1	4.7E-14	4.1	9.7E-12	2.7	1.6E-19	2.7	2.7E-11	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241
Sector 11
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	9.9E-13	2.2	8.6E-17	3.9	1.3E-14	3.3	7.4E-17	2.4	1.6E-20	2.2
1954	3.1E-11	2.2	3.5E-15	3.8	4.0E-13	3.3	2.5E-15	2.6	5.4E-19	2.3
1955	3.2E-11	2.3	8.5E-15	3.3	4.3E-13	3.2	5.4E-15	2.3	5.5E-19	2.3
1956	1.0E-10	2.2	2.1E-14	3.4	1.5E-12	3.2	1.4E-14	2.4	1.8E-18	2.2
1957	7.3E-09	2.3	8.2E-13	4.3	9.3E-11	3.4	5.7E-13	2.5	1.2E-16	2.4
1958	1.4E-09	2.3	9.6E-13	3.8	2.0E-11	3.3	7.1E-13	2.4	2.4E-17	2.2
1959	6.7E-10	2.2	1.0E-12	3.5	9.1E-12	3.1	7.5E-13	2.3	1.1E-17	2.3
1960	5.9E-10	2.2	1.2E-12	3.8	8.7E-12	3.1	9.4E-13	2.4	9.8E-18	2.2
1961	7.4E-10	2.3	1.4E-12	3.6	1.0E-11	3.3	9.3E-13	2.3	1.2E-17	2.3
1962	1.4E-09	2.2	1.7E-12	3.5	2.0E-11	3.4	1.1E-12	2.2	2.4E-17	2.2
1963	1.8E-09	2.3	2.0E-12	3.5	2.5E-11	3.1	1.3E-12	2.2	2.9E-17	2.3
1964	1.3E-09	2.3	2.1E-12	3.4	1.9E-11	3.3	1.4E-12	2.1	2.2E-17	2.3
1965	3.1E-09	2.3	2.4E-12	3.5	4.2E-11	3.6	1.8E-12	2.3	5.2E-17	2.3
1966	1.6E-10	2.3	2.5E-12	3.5	2.6E-12	3.0	1.8E-12	2.2	2.6E-18	2.3
1967	2.0E-10	2.1	2.7E-12	3.5	3.2E-12	2.9	1.9E-12	2.3	3.3E-18	2.2
1968	2.4E-10	2.1	2.9E-12	3.5	3.6E-12	3.0	1.8E-12	2.1	4.0E-18	2.2
1969	6.7E-10	2.3	2.7E-12	3.4	9.5E-12	3.0	2.0E-12	2.1	1.1E-17	2.3
1970	1.9E-10	2.3	2.8E-12	3.7	3.1E-12	2.9	2.2E-12	2.1	3.1E-18	2.3
1971	3.4E-11	2.2	2.9E-12	3.5	8.2E-13	2.8	2.1E-12	2.2	5.6E-19	2.2
1972	2.8E-11	2.3	2.8E-12	3.6	7.8E-13	2.8	2.1E-12	2.2	4.7E-19	2.4
1973	2.7E-11	2.2	2.9E-12	3.6	7.3E-13	2.8	2.2E-12	2.1	4.6E-19	2.2
1974	5.1E-10	2.3	3.3E-12	3.4	7.9E-12	3.1	2.3E-12	2.1	8.6E-18	2.3
1975	5.7E-11	2.3	3.2E-12	3.2	1.3E-12	2.8	2.5E-12	2.2	9.4E-19	2.3
1976	2.3E-12	2.3	3.3E-12	4.0	3.3E-13	3.2	2.4E-12	2.2	3.8E-20	2.4
1977	2.3E-12	2.2	3.0E-12	3.4	3.2E-13	2.9	2.5E-12	2.2	3.9E-20	2.2
1978	1.7E-12	2.2	3.4E-12	3.7	3.0E-13	3.3	2.4E-12	2.1	2.8E-20	2.3
1979	3.1E-12	2.3	3.4E-12	3.6	3.6E-13	3.0	2.4E-12	2.2	5.2E-20	2.3
1980	6.8E-12	2.2	3.7E-12	3.3	4.1E-13	2.9	2.4E-12	2.2	1.1E-19	2.3
1981	4.8E-12	2.3	3.8E-12	3.3	3.9E-13	2.8	2.6E-12	2.2	8.0E-20	2.3
1982	1.1E-11	2.2	3.6E-12	3.4	5.0E-13	2.8	2.6E-12	2.1	1.9E-19	2.2
1983	4.7E-11	2.4	3.8E-12	3.3	1.1E-12	3.0	2.4E-12	2.0	7.5E-19	2.4
1984	4.4E-11	2.3	3.7E-12	3.4	1.1E-12	2.8	2.6E-12	2.2	7.3E-19	2.2
1985	5.4E-12	2.2	4.0E-12	3.4	3.9E-13	2.7	2.8E-12	2.1	8.8E-20	2.3
1986	2.5E-11	2.3	3.9E-12	3.3	7.3E-13	2.8	2.5E-12	2.1	4.1E-19	2.3
1987	9.2E-12	2.2	3.8E-12	3.4	4.7E-13	2.9	2.8E-12	2.2	1.5E-19	2.2
1988	5.3E-12	2.2	3.8E-12	3.5	4.2E-13	2.8	2.6E-12	2.0	8.7E-20	2.2
1989	2.9E-12	2.2	3.8E-12	3.7	3.7E-13	2.9	2.8E-12	2.2	4.7E-20	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241 (continued)
Sector 11
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	5.0E-18	4.2	3.9E-18	4.9	2.7E-17	4.5	2.4E-16	3.0	4.0E-24	3.0	1.0E-12	2.2
1954	1.9E-16	3.7	1.2E-16	4.4	9.0E-16	4.4	7.8E-15	3.0	1.3E-22	3.1	3.2E-11	2.2
1955	3.9E-16	3.9	1.4E-16	4.6	1.0E-15	4.5	1.9E-14	2.8	3.3E-22	2.8	3.3E-11	2.3
1956	1.1E-15	3.6	4.5E-16	4.4	3.3E-15	4.0	4.9E-14	2.6	8.3E-22	2.6	1.1E-10	2.2
1957	3.8E-14	3.7	2.9E-14	4.6	2.0E-13	4.5	1.9E-12	3.4	3.1E-20	3.5	7.4E-09	2.3
1958	4.5E-14	3.6	8.4E-15	4.6	6.1E-14	3.8	2.3E-12	2.9	3.8E-20	2.9	1.5E-09	2.3
1959	6.6E-14	3.6	5.6E-15	4.1	4.1E-14	4.2	2.7E-12	3.1	4.4E-20	3.1	7.0E-10	2.2
1960	6.5E-14	3.9	5.7E-15	4.2	4.0E-14	3.5	3.0E-12	2.8	5.0E-20	2.8	6.1E-10	2.2
1961	6.8E-14	3.6	6.0E-15	4.1	4.5E-14	3.7	3.3E-12	3.0	5.4E-20	2.9	7.7E-10	2.3
1962	8.0E-14	3.5	9.4E-15	4.5	6.9E-14	3.8	4.0E-12	2.9	6.7E-20	2.9	1.5E-09	2.2
1963	9.6E-14	3.7	1.2E-14	4.2	8.9E-14	4.0	5.0E-12	2.7	8.1E-20	2.8	1.9E-09	2.3
1964	1.1E-13	3.6	9.0E-15	4.4	6.9E-14	3.5	5.0E-12	2.7	8.1E-20	2.7	1.4E-09	2.3
1965	1.3E-13	3.5	2.0E-14	4.2	1.3E-13	4.1	6.1E-12	2.7	1.0E-19	2.8	3.2E-09	2.3
1966	1.3E-13	3.5	5.7E-15	4.3	4.0E-14	3.6	6.2E-12	2.8	9.9E-20	2.9	1.9E-10	2.1
1967	1.6E-13	3.7	5.9E-15	4.3	4.4E-14	3.9	6.4E-12	2.8	1.1E-19	2.7	2.2E-10	2.0
1968	1.3E-13	3.7	5.9E-15	4.1	4.8E-14	3.7	6.8E-12	2.7	1.2E-19	2.7	2.6E-10	2.0
1969	1.5E-13	3.5	9.6E-15	4.1	6.1E-14	3.7	7.4E-12	2.7	1.2E-19	2.7	7.1E-10	2.2
1970	1.6E-13	3.5	7.2E-15	4.1	4.7E-14	3.5	7.6E-12	2.7	1.3E-19	2.7	2.2E-10	2.1
1971	1.5E-13	3.5	5.2E-15	4.4	3.8E-14	4.2	7.3E-12	2.8	1.2E-19	2.8	5.7E-11	1.9
1972	1.7E-13	3.7	5.3E-15	4.3	4.0E-14	4.1	7.0E-12	2.8	1.2E-19	2.8	5.1E-11	1.9
1973	1.6E-13	3.5	5.6E-15	4.4	3.9E-14	4.0	7.2E-12	2.6	1.2E-19	2.6	4.9E-11	1.8
1974	1.5E-13	3.4	9.4E-15	3.9	6.6E-14	3.8	7.6E-12	2.7	1.3E-19	2.7	5.6E-10	2.2
1975	1.7E-13	3.5	6.2E-15	4.0	4.4E-14	4.0	7.8E-12	2.6	1.3E-19	2.6	8.2E-11	1.9
1976	1.7E-13	3.7	6.2E-15	4.6	4.0E-14	4.2	8.1E-12	2.7	1.4E-19	2.8	2.2E-11	2.0
1977	1.8E-13	3.3	5.3E-15	4.6	3.6E-14	4.2	7.8E-12	2.7	1.3E-19	2.7	2.1E-11	1.9
1978	1.7E-13	3.8	6.1E-15	4.2	4.0E-14	4.2	8.4E-12	2.6	1.3E-19	2.7	2.1E-11	1.9
1979	1.8E-13	3.4	6.3E-15	4.6	4.2E-14	4.4	8.3E-12	2.8	1.4E-19	2.7	2.4E-11	1.9
1980	1.8E-13	3.4	6.8E-15	4.5	3.9E-14	4.1	8.3E-12	2.6	1.4E-19	2.6	2.8E-11	1.8
1981	1.8E-13	3.5	6.3E-15	4.0	4.4E-14	3.8	8.7E-12	2.8	1.5E-19	2.8	2.7E-11	1.8
1982	1.8E-13	3.7	6.9E-15	4.6	4.8E-14	4.1	8.5E-12	2.8	1.4E-19	2.8	3.4E-11	1.8
1983	2.2E-13	3.5	6.2E-15	4.1	4.3E-14	4.0	8.6E-12	2.8	1.4E-19	2.7	7.5E-11	2.0
1984	1.9E-13	3.4	8.7E-15	4.5	4.5E-14	3.6	9.5E-12	2.7	1.6E-19	2.7	7.2E-11	1.9
1985	1.9E-13	3.4	6.8E-15	4.6	5.0E-14	4.2	9.3E-12	2.6	1.5E-19	2.7	2.9E-11	1.8
1986	1.8E-13	3.4	6.7E-15	4.7	4.5E-14	4.2	9.2E-12	2.6	1.5E-19	2.6	5.1E-11	1.8
1987	1.9E-13	3.4	6.3E-15	4.2	4.6E-14	3.9	9.1E-12	2.6	1.5E-19	2.7	3.3E-11	1.8
1988	2.0E-13	3.5	6.2E-15	4.5	4.9E-14	4.4	9.7E-12	2.8	1.6E-19	2.8	2.9E-11	1.9
1989	2.1E-13	3.3	5.4E-15	4.2	4.4E-14	4.3	9.6E-12	2.7	1.5E-19	2.7	2.6E-11	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241
Sector 12
(1953 - 1989)

Year	Inhalation		Soil Ingestion		Vegetable Ingestion		Ground Exposure		Immersion	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	3.2E-12	2.2	3.4E-16	3.7	4.1E-14	3.4	2.3E-16	2.6	5.2E-20	2.3
1954	1.0E-10	2.3	1.1E-14	3.9	1.2E-12	3.3	7.8E-15	2.5	1.7E-18	2.3
1955	1.1E-10	2.3	2.6E-14	3.6	1.6E-12	3.5	1.8E-14	2.4	1.9E-18	2.3
1956	3.4E-10	2.3	5.9E-14	3.6	4.9E-12	3.5	4.6E-14	2.4	5.5E-18	2.3
1957	2.4E-08	2.2	2.6E-12	3.9	3.5E-10	3.2	1.7E-12	2.5	4.0E-16	2.3
1958	4.8E-09	2.2	3.4E-12	3.7	6.7E-11	3.3	2.4E-12	2.3	8.0E-17	2.2
1959	2.2E-09	2.2	3.7E-12	3.4	3.1E-11	3.1	2.7E-12	2.4	3.6E-17	2.3
1960	1.8E-09	2.2	4.2E-12	3.3	2.4E-11	3.3	2.9E-12	2.3	2.9E-17	2.2
1961	2.3E-09	2.4	5.0E-12	3.4	3.6E-11	3.2	3.3E-12	2.3	4.0E-17	2.3
1962	4.7E-09	2.2	5.6E-12	3.6	6.9E-11	3.1	3.8E-12	2.3	7.5E-17	2.3
1963	5.5E-09	2.2	5.8E-12	3.2	7.1E-11	3.2	4.5E-12	2.3	9.0E-17	2.2
1964	4.3E-09	2.3	7.0E-12	3.6	6.1E-11	3.1	4.9E-12	2.3	7.5E-17	2.2
1965	1.0E-08	2.3	8.5E-12	3.6	1.4E-10	3.4	6.1E-12	2.2	1.7E-16	2.3
1966	5.0E-10	2.1	8.5E-12	3.4	7.6E-12	3.0	6.1E-12	2.1	8.5E-18	2.2
1967	6.3E-10	2.2	8.5E-12	3.3	1.0E-11	3.0	6.7E-12	2.2	1.0E-17	2.3
1968	7.7E-10	2.2	8.9E-12	3.4	1.1E-11	3.0	6.3E-12	2.2	1.2E-17	2.2
1969	2.1E-09	2.3	9.8E-12	3.4	3.1E-11	3.1	6.8E-12	2.2	3.5E-17	2.3
1970	6.0E-10	2.2	8.9E-12	3.7	9.8E-12	2.8	7.1E-12	2.2	9.4E-18	2.2
1971	1.1E-10	2.2	1.0E-11	3.5	3.1E-12	2.8	6.9E-12	2.2	1.9E-18	2.3
1972	9.9E-11	2.3	1.1E-11	3.5	2.6E-12	2.9	7.5E-12	2.2	1.6E-18	2.4
1973	9.0E-11	2.4	1.1E-11	3.4	2.6E-12	2.9	7.3E-12	2.2	1.5E-18	2.4
1974	1.9E-09	2.2	1.2E-11	3.4	2.8E-11	3.3	7.9E-12	2.1	3.2E-17	2.2
1975	2.0E-10	2.3	1.1E-11	3.4	4.1E-12	3.0	7.0E-12	2.1	3.3E-18	2.3
1976	7.7E-12	2.2	1.1E-11	3.6	9.7E-13	3.4	7.4E-12	2.1	1.3E-19	2.2
1977	7.4E-12	2.3	1.2E-11	3.3	1.1E-12	3.0	7.9E-12	2.3	1.2E-19	2.4
1978	5.7E-12	2.2	1.2E-11	3.2	1.1E-12	3.2	8.0E-12	2.1	9.3E-20	2.2
1979	1.1E-11	2.2	1.2E-11	3.6	1.2E-12	3.0	8.4E-12	2.1	1.9E-19	2.2
1980	2.2E-11	2.3	1.1E-11	3.7	1.3E-12	2.8	8.6E-12	2.0	3.5E-19	2.3
1981	1.6E-11	2.3	1.2E-11	3.7	1.3E-12	2.9	7.7E-12	2.2	2.6E-19	2.3
1982	3.9E-11	2.2	1.2E-11	3.4	1.7E-12	2.9	8.2E-12	2.2	6.5E-19	2.2
1983	1.5E-10	2.2	1.2E-11	3.2	3.8E-12	2.5	8.8E-12	2.2	2.6E-18	2.1
1984	1.5E-10	2.2	1.3E-11	3.6	3.3E-12	2.7	8.8E-12	2.1	2.4E-18	2.2
1985	1.8E-11	2.3	1.3E-11	3.3	1.4E-12	2.8	8.9E-12	2.2	2.9E-19	2.3
1986	8.7E-11	2.3	1.2E-11	3.4	2.6E-12	2.8	9.0E-12	2.1	1.5E-18	2.3
1987	2.9E-11	2.2	1.2E-11	3.3	1.6E-12	2.8	8.6E-12	2.2	4.8E-19	2.2
1988	1.8E-11	2.3	1.3E-11	3.3	1.3E-12	3.1	8.5E-12	2.1	3.0E-19	2.3
1989	9.7E-12	2.3	1.3E-11	3.4	1.1E-12	2.9	8.8E-12	2.1	1.6E-19	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241 (continued)
Sector 12
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	GSD	Milk Ingestion GM (Sv/year)	GSD	Beef Ingestion GM (Sv/year)	GSD	Inhalation of Resuspended Particulates GM (Sv/year)	GSD	Immersion in Resuspended Particulates GM (Sv/year)	GSD	Total Dose GM (Sv/year)	GSD
1953	1.5E-17	3.9	1.2E-17	5.1	9.2E-17	4.6	7.6E-16	3.1	1.3E-23	3.1	3.2E-12	2.2
1954	6.2E-16	3.7	3.8E-16	4.5	2.8E-15	4.7	2.7E-14	3.0	4.4E-22	3.1	1.1E-10	2.3
1955	1.3E-15	3.9	4.9E-16	4.6	3.7E-15	4.2	6.3E-14	2.9	1.0E-21	2.9	1.2E-10	2.3
1956	3.6E-15	3.9	1.5E-15	5.1	1.1E-14	4.5	1.4E-13	2.8	2.4E-21	2.7	3.4E-10	2.3
1957	1.3E-13	4.0	9.9E-14	4.7	7.2E-13	4.4	6.3E-12	3.1	1.1E-19	3.2	2.5E-08	2.2
1958	1.6E-13	3.7	2.6E-14	4.5	1.9E-13	4.1	8.1E-12	2.8	1.3E-19	2.9	5.0E-09	2.1
1959	1.8E-13	3.8	1.7E-14	4.2	1.3E-13	3.8	9.4E-12	2.8	1.5E-19	2.8	2.3E-09	2.2
1960	2.0E-13	3.7	1.8E-14	4.0	1.1E-13	3.8	9.6E-12	2.8	1.6E-19	2.8	1.9E-09	2.2
1961	2.5E-13	3.6	2.0E-14	4.0	1.4E-13	4.0	1.0E-11	2.9	1.8E-19	2.9	2.4E-09	2.3
1962	2.5E-13	3.4	3.0E-14	4.1	2.3E-13	3.8	1.3E-11	2.7	2.1E-19	2.8	4.8E-09	2.2
1963	3.1E-13	3.6	3.3E-14	4.0	2.7E-13	3.7	1.5E-11	2.8	2.4E-19	2.8	5.7E-09	2.1
1964	3.9E-13	4.0	3.4E-14	4.2	2.5E-13	3.6	1.6E-11	2.9	2.8E-19	2.9	4.4E-09	2.2
1965	4.5E-13	3.6	5.8E-14	4.3	4.7E-13	4.1	2.0E-11	2.6	3.5E-19	2.7	1.0E-08	2.3
1966	4.9E-13	3.5	1.9E-14	4.2	1.3E-13	4.0	2.0E-11	2.8	3.4E-19	2.8	5.8E-10	2.0
1967	4.7E-13	3.6	2.0E-14	4.1	1.3E-13	3.8	2.1E-11	2.6	3.4E-19	2.7	7.2E-10	2.1
1968	4.6E-13	3.8	2.0E-14	4.1	1.5E-13	3.6	2.2E-11	2.7	3.5E-19	2.8	8.6E-10	2.0
1969	4.6E-13	3.7	2.7E-14	4.0	2.0E-13	3.7	2.5E-11	2.7	4.2E-19	2.8	2.3E-09	2.2
1970	5.4E-13	3.4	2.3E-14	4.4	1.6E-13	3.9	2.4E-11	2.7	3.7E-19	2.8	6.9E-10	2.1
1971	5.6E-13	3.6	2.1E-14	4.5	1.2E-13	4.0	2.6E-11	2.8	4.4E-19	2.8	1.9E-10	1.8
1972	5.4E-13	3.4	2.1E-14	3.9	1.3E-13	3.9	2.6E-11	2.7	4.2E-19	2.8	1.8E-10	1.9
1973	5.1E-13	3.8	1.9E-14	4.1	1.3E-13	3.9	2.4E-11	2.7	4.0E-19	2.7	1.7E-10	1.9
1974	6.1E-13	3.6	3.0E-14	4.0	2.2E-13	3.9	2.7E-11	2.8	4.4E-19	2.8	2.1E-09	2.1
1975	5.6E-13	3.5	2.2E-14	4.2	1.4E-13	3.5	2.6E-11	2.7	4.3E-19	2.7	2.8E-10	1.9
1976	5.5E-13	3.6	1.9E-14	4.1	1.2E-13	4.2	2.7E-11	2.7	4.4E-19	2.8	7.1E-11	1.9
1977	6.8E-13	3.5	1.9E-14	4.4	1.3E-13	4.0	2.7E-11	2.7	4.4E-19	2.7	7.3E-11	1.9
1978	6.0E-13	3.4	2.1E-14	4.6	1.4E-13	4.0	2.7E-11	2.5	4.5E-19	2.6	7.1E-11	1.8
1979	5.6E-13	3.6	1.9E-14	4.1	1.4E-13	4.2	2.9E-11	2.7	4.9E-19	2.8	8.2E-11	1.9
1980	5.8E-13	3.5	2.2E-14	4.6	1.5E-13	4.4	2.9E-11	2.8	4.7E-19	2.8	9.6E-11	1.9
1981	6.0E-13	3.6	2.1E-14	4.2	1.5E-13	4.2	3.1E-11	2.8	5.0E-19	2.8	9.1E-11	1.9
1982	6.1E-13	3.4	2.2E-14	4.2	1.4E-13	3.6	2.9E-11	2.7	4.9E-19	2.8	1.2E-10	1.8
1983	6.9E-13	3.4	2.0E-14	4.4	1.6E-13	3.7	2.9E-11	2.7	4.9E-19	2.7	2.5E-10	1.8
1984	6.3E-13	3.3	2.3E-14	4.1	1.6E-13	4.3	3.2E-11	2.8	5.2E-19	2.8	2.4E-10	1.9
1985	6.7E-13	3.4	2.2E-14	4.1	1.6E-13	4.0	3.0E-11	2.7	5.0E-19	2.7	9.3E-11	1.8
1986	6.4E-13	3.5	2.2E-14	4.0	1.6E-13	4.1	3.2E-11	2.6	5.3E-19	2.7	1.8E-10	1.9
1987	6.7E-13	3.4	1.9E-14	4.6	1.4E-13	4.1	2.8E-11	2.7	4.7E-19	2.7	1.0E-10	1.8
1988	6.2E-13	3.6	2.2E-14	4.2	1.7E-13	4.1	3.1E-11	2.5	5.2E-19	2.6	9.3E-11	1.8
1989	6.2E-13	3.2	2.1E-14	4.1	1.3E-13	4.2	3.1E-11	2.6	5.0E-19	2.7	8.1E-11	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241
Denver
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	1.2E-12	2.3	1.2E-16	4.0	1.7E-14	3.5	9.2E-17	2.6	2.1E-20	2.3
1954	4.5E-11	2.3	4.5E-15	3.7	6.6E-13	3.3	3.2E-15	2.5	7.3E-19	2.2
1955	4.4E-11	2.1	9.9E-15	3.8	5.9E-13	3.2	6.5E-15	2.4	7.3E-19	2.1
1956	1.4E-10	2.2	2.5E-14	3.7	2.0E-12	3.3	1.8E-14	2.4	2.4E-18	2.2
1957	9.8E-09	2.3	9.3E-13	3.7	1.4E-10	3.2	7.1E-13	2.4	1.6E-16	2.3
1958	1.9E-09	2.2	1.2E-12	3.9	2.7E-11	3.4	1.0E-12	2.5	3.1E-17	2.3
1959	8.5E-10	2.2	1.5E-12	3.7	1.3E-11	3.3	1.1E-12	2.5	1.4E-17	2.2
1960	7.6E-10	2.1	1.6E-12	3.8	1.1E-11	3.3	1.2E-12	2.4	1.3E-17	2.1
1961	9.6E-10	2.3	1.8E-12	3.5	1.3E-11	3.2	1.3E-12	2.3	1.6E-17	2.3
1962	1.9E-09	2.3	2.1E-12	3.7	2.6E-11	3.3	1.4E-12	2.3	3.0E-17	2.4
1963	2.2E-09	2.3	2.6E-12	3.6	3.0E-11	3.6	1.8E-12	2.3	3.4E-17	2.2
1964	1.7E-09	2.1	2.7E-12	3.2	2.4E-11	3.2	1.8E-12	2.3	2.9E-17	2.1
1965	4.1E-09	2.2	3.3E-12	3.4	5.7E-11	3.2	2.4E-12	2.3	7.0E-17	2.2
1966	2.1E-10	2.2	3.3E-12	3.5	3.1E-12	2.9	2.5E-12	2.3	3.4E-18	2.2
1967	2.5E-10	2.3	3.1E-12	3.4	3.9E-12	3.0	2.4E-12	2.2	4.3E-18	2.3
1968	3.0E-10	2.3	3.4E-12	3.8	5.0E-12	3.2	2.7E-12	2.2	4.9E-18	2.3
1969	8.5E-10	2.3	3.8E-12	3.6	1.3E-11	3.2	2.8E-12	2.1	1.4E-17	2.3
1970	2.4E-10	2.3	3.7E-12	3.6	4.1E-12	3.1	2.8E-12	2.2	4.1E-18	2.4
1971	4.4E-11	2.3	4.0E-12	3.7	1.2E-12	2.8	2.8E-12	2.2	7.6E-19	2.3
1972	3.7E-11	2.3	4.3E-12	3.4	9.9E-13	2.8	2.9E-12	2.3	6.1E-19	2.3
1973	3.8E-11	2.2	4.2E-12	3.6	9.9E-13	2.8	2.9E-12	2.2	6.4E-19	2.3
1974	7.6E-10	2.4	4.1E-12	3.7	1.1E-11	3.2	3.0E-12	2.2	1.3E-17	2.5
1975	8.1E-11	2.3	4.3E-12	3.5	1.8E-12	2.9	2.8E-12	2.1	1.4E-18	2.3
1976	3.0E-12	2.2	4.5E-12	3.5	4.1E-13	3.1	3.0E-12	2.2	5.0E-20	2.2
1977	2.9E-12	2.2	4.6E-12	3.5	3.9E-13	3.3	3.1E-12	2.2	4.9E-20	2.2
1978	2.1E-12	2.3	4.4E-12	3.5	4.0E-13	3.0	3.2E-12	2.2	3.3E-20	2.3
1979	4.1E-12	2.2	4.6E-12	3.6	4.4E-13	3.2	3.5E-12	2.2	6.7E-20	2.3
1980	8.9E-12	2.2	4.8E-12	3.3	5.4E-13	2.9	3.3E-12	2.2	1.5E-19	2.2
1981	6.2E-12	2.2	4.6E-12	3.2	4.6E-13	3.0	3.4E-12	2.1	1.0E-19	2.3
1982	1.5E-11	2.2	4.9E-12	3.4	6.6E-13	2.8	3.5E-12	2.2	2.5E-19	2.2
1983	6.1E-11	2.3	4.7E-12	3.3	1.5E-12	2.9	3.3E-12	2.2	9.9E-19	2.3
1984	5.9E-11	2.3	5.0E-12	3.3	1.5E-12	2.9	3.3E-12	2.2	9.8E-19	2.2
1985	7.3E-12	2.2	5.0E-12	3.2	5.3E-13	3.0	3.6E-12	2.2	1.2E-19	2.2
1986	3.1E-11	2.3	5.2E-12	3.4	1.0E-12	2.9	3.5E-12	2.2	5.4E-19	2.3
1987	1.1E-11	2.2	4.9E-12	3.2	6.3E-13	2.8	3.5E-12	2.2	1.8E-19	2.2
1988	7.4E-12	2.4	4.8E-12	3.4	5.4E-13	3.0	3.8E-12	2.1	1.2E-19	2.3
1989	3.7E-12	2.3	4.8E-12	3.5	4.5E-13	3.0	3.6E-12	2.2	6.0E-20	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241 (continued)
Denver
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	7.6E-18	4.2	5.3E-18	4.5	3.6E-17	4.4	3.0E-16	3.2	5.0E-24	3.2	1.3E-12	2.3
1954	2.7E-16	4.1	1.8E-16	4.8	1.3E-15	4.2	1.1E-14	3.2	1.8E-22	3.2	4.6E-11	2.2
1955	5.1E-16	3.7	1.9E-16	4.5	1.3E-15	4.2	2.5E-14	3.1	4.2E-22	3.0	4.5E-11	2.1
1956	1.4E-15	3.6	6.2E-16	4.5	3.9E-15	4.0	6.4E-14	2.9	1.1E-21	3.0	1.5E-10	2.2
1957	5.2E-14	3.9	4.3E-14	4.6	2.8E-13	3.9	2.4E-12	3.1	3.9E-20	3.1	1.0E-08	2.3
1958	6.6E-14	3.9	1.1E-14	4.5	8.5E-14	4.1	3.1E-12	3.3	5.0E-20	3.3	1.9E-09	2.2
1959	7.6E-14	3.7	6.2E-15	3.9	4.9E-14	3.9	3.7E-12	3.0	6.2E-20	3.1	8.9E-10	2.2
1960	8.1E-14	3.7	6.8E-15	4.1	5.1E-14	3.6	4.0E-12	2.9	6.9E-20	2.9	7.9E-10	2.0
1961	1.0E-13	3.7	7.7E-15	4.3	5.6E-14	3.8	4.4E-12	2.9	7.1E-20	2.9	1.0E-09	2.2
1962	1.1E-13	3.8	1.3E-14	4.0	9.9E-14	4.1	5.6E-12	2.8	9.0E-20	2.9	1.9E-09	2.3
1963	1.2E-13	4.0	1.4E-14	4.4	9.8E-14	3.9	5.9E-12	3.0	9.4E-20	3.1	2.2E-09	2.3
1964	1.5E-13	3.5	1.3E-14	3.9	9.0E-14	4.0	6.6E-12	2.7	1.1E-19	2.7	1.8E-09	2.1
1965	1.7E-13	3.7	2.2E-14	4.5	1.8E-13	3.8	7.9E-12	2.7	1.4E-19	2.7	4.2E-09	2.2
1966	1.8E-13	3.7	6.5E-15	4.0	5.2E-14	4.0	8.1E-12	2.9	1.4E-19	2.9	2.4E-10	2.0
1967	1.8E-13	3.5	6.9E-15	4.2	4.8E-14	3.9	8.2E-12	2.9	1.4E-19	2.9	2.9E-10	2.1
1968	1.8E-13	3.4	8.5E-15	4.4	5.9E-14	3.8	8.3E-12	2.8	1.4E-19	2.8	3.4E-10	2.1
1969	2.0E-13	3.5	1.1E-14	4.0	8.5E-14	3.5	8.8E-12	2.9	1.5E-19	2.9	9.1E-10	2.2
1970	1.8E-13	3.6	7.9E-15	4.1	6.0E-14	3.7	9.3E-12	2.7	1.6E-19	2.7	2.8E-10	2.1
1971	2.1E-13	3.4	8.5E-15	4.5	5.1E-14	3.7	8.7E-12	2.7	1.5E-19	2.7	7.3E-11	1.9
1972	2.0E-13	3.6	7.7E-15	4.5	5.3E-14	4.1	1.0E-11	2.9	1.7E-19	2.9	6.8E-11	1.9
1973	2.0E-13	3.6	8.0E-15	4.4	5.5E-14	4.1	9.7E-12	2.7	1.6E-19	2.7	6.8E-11	1.8
1974	2.3E-13	3.5	1.2E-14	4.2	9.1E-14	3.6	1.1E-11	2.7	1.7E-19	2.7	8.2E-10	2.3
1975	2.5E-13	3.6	8.2E-15	4.4	5.5E-14	4.0	1.0E-11	2.7	1.7E-19	2.8	1.1E-10	1.9
1976	2.2E-13	3.4	7.1E-15	4.5	4.6E-14	4.5	1.1E-11	2.8	1.8E-19	2.9	2.9E-11	1.9
1977	2.2E-13	3.6	7.6E-15	4.3	5.4E-14	4.3	1.0E-11	2.6	1.7E-19	2.8	2.8E-11	1.9
1978	2.3E-13	3.4	7.2E-15	4.3	5.0E-14	4.4	1.1E-11	2.7	1.8E-19	2.8	2.8E-11	2.0
1979	2.4E-13	3.6	9.1E-15	4.7	5.7E-14	4.1	1.2E-11	2.7	1.9E-19	2.8	3.2E-11	1.9
1980	2.3E-13	3.5	8.8E-15	4.3	5.4E-14	4.4	1.1E-11	2.8	1.9E-19	2.8	3.8E-11	1.8
1981	2.4E-13	3.6	7.9E-15	4.4	5.4E-14	3.8	1.1E-11	2.6	1.8E-19	2.7	3.3E-11	1.8
1982	2.4E-13	3.5	8.5E-15	4.2	5.7E-14	3.8	1.2E-11	2.7	1.9E-19	2.7	4.7E-11	1.8
1983	2.3E-13	3.6	8.2E-15	4.4	6.1E-14	3.7	1.1E-11	2.8	1.7E-19	2.9	9.7E-11	1.9
1984	2.6E-13	3.4	9.6E-15	4.0	6.1E-14	4.1	1.3E-11	2.7	2.1E-19	2.6	9.6E-11	1.9
1985	2.5E-13	3.5	8.6E-15	4.7	5.9E-14	4.0	1.2E-11	2.7	2.0E-19	2.7	3.7E-11	1.9
1986	2.5E-13	3.5	8.5E-15	4.2	6.1E-14	4.1	1.2E-11	2.6	2.0E-19	2.6	6.6E-11	1.8
1987	2.6E-13	3.5	7.8E-15	4.2	6.0E-14	3.9	1.1E-11	2.7	1.8E-19	2.8	4.0E-11	1.8
1988	2.6E-13	3.5	8.8E-15	4.7	6.2E-14	3.7	1.2E-11	2.8	1.9E-19	2.8	3.8E-11	1.8
1989	2.6E-13	3.5	9.5E-15	4.8	5.9E-14	4.0	1.2E-11	2.7	1.9E-19	2.7	3.3E-11	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241
Lakewood
(1953 - 1989)

Year	Inhalation		Soil Ingestion		Vegetable Ingestion		Ground Exposure		Immersion	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	1.6E-12	2.3	1.6E-16	3.7	2.2E-14	3.1	1.1E-16	2.4	2.5E-20	2.3
1954	5.1E-11	2.2	5.4E-15	3.3	6.4E-13	3.4	3.8E-15	2.6	8.5E-19	2.2
1955	5.5E-11	2.2	1.2E-14	3.7	7.4E-13	3.2	8.2E-15	2.3	9.2E-19	2.2
1956	1.6E-10	2.2	2.8E-14	3.8	2.1E-12	3.3	2.3E-14	2.4	2.7E-18	2.2
1957	1.1E-08	2.2	1.2E-12	3.8	1.5E-10	3.1	8.9E-13	2.5	1.8E-16	2.3
1958	2.3E-09	2.3	1.6E-12	3.8	3.3E-11	3.5	1.1E-12	2.4	3.8E-17	2.3
1959	1.0E-09	2.2	1.9E-12	3.6	1.4E-11	3.0	1.3E-12	2.5	1.7E-17	2.1
1960	9.3E-10	2.3	1.9E-12	3.7	1.4E-11	3.4	1.4E-12	2.3	1.6E-17	2.4
1961	1.1E-09	2.3	2.1E-12	3.7	1.5E-11	3.4	1.5E-12	2.3	1.8E-17	2.3
1962	2.1E-09	2.3	2.5E-12	3.4	3.2E-11	3.2	1.6E-12	2.3	3.5E-17	2.3
1963	2.6E-09	2.3	2.8E-12	3.7	3.4E-11	3.3	2.1E-12	2.2	4.3E-17	2.3
1964	2.1E-09	2.3	3.0E-12	3.5	2.9E-11	3.4	2.4E-12	2.3	3.4E-17	2.3
1965	5.1E-09	2.3	3.8E-12	3.4	6.7E-11	3.3	2.8E-12	2.2	8.2E-17	2.4
1966	2.6E-10	2.3	4.0E-12	3.3	4.0E-12	3.3	2.9E-12	2.1	4.2E-18	2.3
1967	2.9E-10	2.3	4.0E-12	3.7	4.7E-12	3.0	2.9E-12	2.3	4.7E-18	2.2
1968	3.3E-10	2.2	4.9E-12	3.6	5.8E-12	3.2	3.0E-12	2.1	5.5E-18	2.2
1969	9.8E-10	2.2	4.4E-12	3.8	1.4E-11	3.2	3.0E-12	2.2	1.7E-17	2.3
1970	2.6E-10	2.2	4.5E-12	3.5	4.2E-12	3.0	3.4E-12	2.1	4.4E-18	2.2
1971	5.0E-11	2.4	4.3E-12	3.4	1.2E-12	3.0	3.5E-12	2.1	8.3E-19	2.4
1972	4.2E-11	2.2	4.4E-12	3.6	1.2E-12	2.7	3.7E-12	2.1	7.0E-19	2.2
1973	4.5E-11	2.4	5.0E-12	3.3	1.3E-12	2.8	3.5E-12	2.2	7.5E-19	2.4
1974	8.1E-10	2.2	5.2E-12	3.5	1.3E-11	3.0	3.4E-12	2.2	1.3E-17	2.2
1975	8.9E-11	2.2	5.0E-12	3.6	1.9E-12	2.8	3.7E-12	2.2	1.5E-18	2.2
1976	3.3E-12	2.3	4.9E-12	3.3	4.5E-13	3.3	3.6E-12	2.1	5.4E-20	2.3
1977	3.8E-12	2.3	5.0E-12	3.4	5.1E-13	3.2	3.6E-12	2.1	6.4E-20	2.3
1978	2.5E-12	2.4	5.2E-12	3.3	4.5E-13	3.1	3.9E-12	2.1	4.2E-20	2.4
1979	4.8E-12	2.2	5.3E-12	3.6	5.4E-13	3.3	4.0E-12	2.2	8.0E-20	2.2
1980	1.0E-11	2.3	5.5E-12	3.3	6.2E-13	2.9	4.0E-12	2.1	1.7E-19	2.2
1981	7.9E-12	2.1	5.5E-12	3.3	6.3E-13	3.0	3.9E-12	2.2	1.3E-19	2.2
1982	1.8E-11	2.3	5.5E-12	3.6	8.5E-13	2.9	4.1E-12	2.2	3.0E-19	2.3
1983	6.9E-11	2.4	5.5E-12	3.6	1.7E-12	2.9	3.9E-12	2.1	1.1E-18	2.4
1984	6.9E-11	2.3	6.1E-12	3.4	1.7E-12	3.0	4.0E-12	2.1	1.1E-18	2.2
1985	8.9E-12	2.2	6.6E-12	3.4	6.2E-13	3.0	4.0E-12	2.2	1.4E-19	2.2
1986	3.9E-11	2.3	6.1E-12	3.6	1.2E-12	2.8	4.0E-12	2.1	6.5E-19	2.3
1987	1.4E-11	2.2	5.7E-12	3.7	7.8E-13	3.0	4.2E-12	2.2	2.2E-19	2.3
1988	8.1E-12	2.3	5.9E-12	3.7	6.3E-13	2.9	4.4E-12	2.1	1.3E-19	2.4
1989	4.6E-12	2.2	5.7E-12	3.3	5.7E-13	3.0	4.1E-12	2.1	7.7E-20	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241 (continued)
Lakewood
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	GSD	Milk Ingestion GM (Sv/year)	GSD	Beef Ingestion GM (Sv/year)	GSD	Inhalation of Resuspended Particulates GM (Sv/year)	GSD	Immersion in Resuspended Particulates GM (Sv/year)	GSD	Total Dose GM (Sv/year)	GSD
1953	8.2E-18	3.6	6.6E-18	4.8	4.4E-17	4.5	4.0E-16	3.1	6.4E-24	3.0	1.6E-12	2.2
1954	2.5E-16	4.2	1.8E-16	4.9	1.4E-15	4.3	1.3E-14	2.8	2.1E-22	2.9	5.3E-11	2.2
1955	6.4E-16	3.9	2.1E-16	4.4	1.8E-15	4.5	2.9E-14	2.9	4.8E-22	3.0	5.6E-11	2.2
1956	1.5E-15	3.7	6.9E-16	4.3	4.8E-15	4.0	7.6E-14	2.7	1.2E-21	2.8	1.7E-10	2.2
1957	5.2E-14	3.7	4.1E-14	4.8	3.3E-13	4.5	2.7E-12	3.0	4.4E-20	3.0	1.2E-08	2.2
1958	8.1E-14	3.6	1.4E-14	4.3	9.4E-14	4.0	3.7E-12	2.9	6.2E-20	2.9	2.4E-09	2.3
1959	9.0E-14	3.7	7.8E-15	4.3	5.8E-14	3.5	3.9E-12	3.0	6.6E-20	3.0	1.0E-09	2.2
1960	9.8E-14	3.7	8.0E-15	4.2	5.6E-14	4.0	5.0E-12	2.8	8.5E-20	2.8	9.7E-10	2.3
1961	1.0E-13	3.6	9.6E-15	4.2	6.2E-14	3.8	5.5E-12	3.0	9.2E-20	3.0	1.1E-09	2.3
1962	1.3E-13	3.6	1.5E-14	4.1	1.1E-13	3.9	6.0E-12	2.8	1.0E-19	2.8	2.2E-09	2.3
1963	1.4E-13	3.6	1.7E-14	4.4	1.3E-13	4.2	6.7E-12	2.7	1.1E-19	2.6	2.7E-09	2.2
1964	1.6E-13	3.5	1.5E-14	4.3	1.1E-13	4.1	7.3E-12	2.7	1.2E-19	2.7	2.1E-09	2.3
1965	2.1E-13	3.6	2.7E-14	4.6	2.2E-13	4.1	9.8E-12	2.8	1.6E-19	2.8	5.2E-09	2.3
1966	2.0E-13	3.5	9.8E-15	4.4	5.8E-14	3.7	9.9E-12	2.7	1.6E-19	2.8	2.9E-10	2.1
1967	2.2E-13	3.6	9.3E-15	4.1	6.1E-14	3.9	1.0E-11	2.6	1.7E-19	2.7	3.3E-10	2.1
1968	2.1E-13	3.5	1.1E-14	4.2	6.6E-14	3.9	1.2E-11	2.7	1.9E-19	2.8	3.8E-10	2.1
1969	2.1E-13	3.6	1.5E-14	4.0	9.7E-14	3.8	1.2E-11	2.8	2.1E-19	2.9	1.0E-09	2.1
1970	2.5E-13	3.2	1.1E-14	4.2	7.4E-14	3.7	1.0E-11	2.8	1.8E-19	2.8	3.0E-10	2.0
1971	2.4E-13	3.5	7.5E-15	4.5	5.9E-14	4.0	1.1E-11	2.6	1.7E-19	2.6	8.3E-11	1.9
1972	2.6E-13	3.5	7.7E-15	4.4	6.1E-14	4.0	1.1E-11	2.7	1.8E-19	2.7	7.5E-11	1.8
1973	2.4E-13	3.5	8.9E-15	4.4	6.0E-14	4.0	1.2E-11	2.8	2.1E-19	2.7	8.3E-11	1.9
1974	2.5E-13	3.7	1.4E-14	4.3	1.0E-13	3.8	1.3E-11	2.8	2.1E-19	2.9	8.8E-10	2.1
1975	2.6E-13	3.5	1.0E-14	4.1	7.2E-14	3.6	1.2E-11	2.6	2.0E-19	2.6	1.3E-10	1.9
1976	2.6E-13	3.9	8.6E-15	4.1	6.2E-14	4.0	1.2E-11	2.8	1.9E-19	2.8	3.2E-11	1.9
1977	2.8E-13	3.7	8.9E-15	4.2	6.4E-14	4.1	1.2E-11	2.7	2.0E-19	2.7	3.3E-11	1.9
1978	2.7E-13	3.6	9.1E-15	4.4	6.6E-14	3.8	1.3E-11	2.7	2.2E-19	2.7	3.3E-11	1.9
1979	3.0E-13	3.6	9.8E-15	4.1	6.4E-14	3.9	1.3E-11	2.7	2.1E-19	2.6	3.6E-11	1.9
1980	2.6E-13	3.5	9.8E-15	4.4	6.2E-14	4.0	1.3E-11	2.7	2.1E-19	2.6	4.3E-11	1.9
1981	3.0E-13	3.5	9.3E-15	4.3	7.0E-14	4.2	1.5E-11	2.7	2.4E-19	2.7	4.2E-11	1.8
1982	2.8E-13	3.6	1.1E-14	4.6	7.0E-14	4.0	1.4E-11	2.7	2.4E-19	2.8	5.5E-11	1.8
1983	3.2E-13	3.4	1.1E-14	4.1	7.4E-14	3.9	1.4E-11	2.6	2.3E-19	2.7	1.1E-10	2.0
1984	2.9E-13	3.5	9.9E-15	4.2	8.4E-14	3.8	1.5E-11	2.7	2.4E-19	2.8	1.1E-10	1.9
1985	2.8E-13	3.4	1.2E-14	4.3	7.4E-14	4.1	1.5E-11	2.7	2.4E-19	2.8	4.6E-11	1.8
1986	3.1E-13	3.6	1.1E-14	4.7	7.7E-14	3.9	1.5E-11	2.9	2.4E-19	2.8	8.1E-11	1.9
1987	3.1E-13	3.7	1.1E-14	4.1	7.5E-14	4.4	1.4E-11	2.8	2.2E-19	2.9	5.1E-11	1.8
1988	2.9E-13	3.6	9.5E-15	4.5	7.2E-14	3.9	1.5E-11	2.7	2.4E-19	2.7	4.5E-11	1.9
1989	3.2E-13	3.5	1.0E-14	4.3	6.7E-14	4.2	1.4E-11	2.8	2.4E-19	2.9	3.8E-11	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241
Longmont
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	5.4E-13	2.2	5.0E-17	4.0	7.7E-15	3.3	4.0E-17	2.6	9.2E-21	2.3
1954	1.9E-11	2.3	1.9E-15	3.8	2.9E-13	3.2	1.4E-15	2.4	3.2E-19	2.4
1955	1.9E-11	2.2	4.6E-15	3.5	2.7E-13	3.3	3.3E-15	2.5	3.2E-19	2.2
1956	6.6E-11	2.3	1.2E-14	3.7	9.4E-13	3.5	8.3E-15	2.5	1.1E-18	2.4
1957	4.3E-09	2.2	4.3E-13	3.8	5.7E-11	3.2	3.1E-13	2.6	7.2E-17	2.2
1958	8.9E-10	2.2	6.1E-13	3.6	1.2E-11	3.2	3.9E-13	2.5	1.4E-17	2.3
1959	4.1E-10	2.2	6.6E-13	3.5	5.3E-12	3.3	4.8E-13	2.4	6.8E-18	2.2
1960	3.7E-10	2.2	6.6E-13	3.9	5.1E-12	3.3	4.8E-13	2.3	6.1E-18	2.3
1961	4.2E-10	2.3	7.5E-13	3.9	6.3E-12	3.3	5.5E-13	2.3	7.2E-18	2.3
1962	8.8E-10	2.3	9.1E-13	3.7	1.2E-11	3.3	7.0E-13	2.3	1.4E-17	2.4
1963	1.1E-09	2.2	9.7E-13	3.9	1.5E-11	3.1	7.4E-13	2.2	1.8E-17	2.2
1964	8.4E-10	2.1	1.2E-12	3.7	1.1E-11	3.2	9.2E-13	2.2	1.4E-17	2.2
1965	1.9E-09	2.2	1.3E-12	3.4	2.6E-11	3.2	1.0E-12	2.3	3.3E-17	2.2
1966	9.2E-11	2.3	1.4E-12	3.4	1.6E-12	3.2	1.1E-12	2.3	1.5E-18	2.2
1967	1.1E-10	2.3	1.4E-12	3.6	1.7E-12	3.1	1.1E-12	2.1	1.8E-18	2.3
1968	1.3E-10	2.2	1.8E-12	3.5	2.1E-12	3.3	1.1E-12	2.2	2.2E-18	2.2
1969	4.0E-10	2.2	1.7E-12	3.4	5.8E-12	3.2	1.1E-12	2.3	6.6E-18	2.2
1970	1.1E-10	2.2	1.8E-12	3.4	1.7E-12	3.2	1.2E-12	2.3	1.8E-18	2.3
1971	1.9E-11	2.3	1.7E-12	3.4	4.8E-13	2.7	1.3E-12	2.2	3.2E-19	2.3
1972	1.6E-11	2.1	2.0E-12	3.4	4.4E-13	2.8	1.2E-12	2.2	2.6E-19	2.3
1973	1.7E-11	2.1	1.8E-12	4.0	4.7E-13	2.7	1.3E-12	2.2	2.8E-19	2.2
1974	3.0E-10	2.1	1.9E-12	3.5	4.4E-12	3.1	1.3E-12	2.2	5.1E-18	2.1
1975	3.5E-11	2.2	1.8E-12	3.5	7.5E-13	2.8	1.4E-12	2.2	5.7E-19	2.3
1976	1.3E-12	2.3	2.0E-12	3.4	1.7E-13	3.3	1.4E-12	2.2	2.1E-20	2.3
1977	1.3E-12	2.2	2.0E-12	3.5	2.0E-13	3.4	1.4E-12	2.2	2.1E-20	2.2
1978	9.1E-13	2.3	1.8E-12	3.6	1.7E-13	3.4	1.5E-12	2.2	1.5E-20	2.2
1979	1.9E-12	2.2	2.2E-12	3.3	2.1E-13	3.2	1.5E-12	2.2	3.2E-20	2.2
1980	3.9E-12	2.2	2.1E-12	3.4	2.4E-13	2.9	1.4E-12	2.2	6.1E-20	2.2
1981	2.8E-12	2.2	2.3E-12	3.3	2.4E-13	2.9	1.6E-12	2.3	4.6E-20	2.2
1982	7.0E-12	2.3	2.0E-12	3.5	3.2E-13	2.9	1.4E-12	2.1	1.1E-19	2.3
1983	2.6E-11	2.3	2.2E-12	3.6	6.2E-13	3.0	1.6E-12	2.2	4.4E-19	2.3
1984	2.6E-11	2.2	2.2E-12	3.4	6.7E-13	2.7	1.6E-12	2.0	4.3E-19	2.3
1985	2.9E-12	2.3	2.1E-12	3.3	2.5E-13	2.9	1.5E-12	2.2	4.9E-20	2.2
1986	1.4E-11	2.2	2.2E-12	3.3	4.3E-13	2.9	1.5E-12	2.2	2.3E-19	2.2
1987	5.0E-12	2.3	2.1E-12	3.5	2.8E-13	3.0	1.5E-12	2.3	8.0E-20	2.4
1988	2.9E-12	2.3	2.3E-12	3.3	2.5E-13	3.0	1.5E-12	2.2	5.0E-20	2.3
1989	1.7E-12	2.2	2.2E-12	3.4	1.9E-13	3.0	1.6E-12	2.2	2.8E-20	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Americium-241 (continued)
Longmont
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	2.8E-18	3.8	2.1E-18	4.6	1.5E-17	4.2	1.4E-16	3.0	2.4E-24	3.0	5.6E-13	2.2
1954	9.4E-17	3.9	7.2E-17	5.3	5.6E-16	4.2	5.0E-15	3.0	8.4E-23	3.2	1.9E-11	2.3
1955	2.4E-16	3.9	9.3E-17	4.6	6.5E-16	4.1	1.1E-14	2.9	1.8E-22	3.0	2.0E-11	2.2
1956	5.6E-16	3.5	3.4E-16	5.0	2.2E-15	4.4	2.8E-14	3.0	4.4E-22	3.0	6.8E-11	2.3
1957	2.5E-14	3.8	1.5E-14	5.0	1.3E-13	4.1	9.7E-13	3.2	1.6E-20	3.3	4.4E-09	2.1
1958	2.8E-14	4.1	4.8E-15	4.3	4.0E-14	4.1	1.4E-12	3.1	2.3E-20	3.2	9.1E-10	2.2
1959	3.5E-14	3.8	3.2E-15	4.2	2.4E-14	3.8	1.5E-12	2.9	2.5E-20	2.9	4.2E-10	2.2
1960	3.7E-14	3.7	3.0E-15	4.2	2.3E-14	3.7	1.8E-12	2.8	3.0E-20	2.9	3.9E-10	2.2
1961	3.8E-14	3.7	3.6E-15	4.1	2.5E-14	3.8	1.9E-12	3.0	3.2E-20	3.0	4.4E-10	2.3
1962	5.2E-14	3.9	5.7E-15	4.6	3.7E-14	3.6	2.3E-12	2.9	3.8E-20	2.9	9.1E-10	2.2
1963	5.6E-14	3.7	6.2E-15	4.5	5.3E-14	4.0	2.5E-12	2.8	4.1E-20	2.8	1.1E-09	2.2
1964	6.0E-14	3.7	5.7E-15	4.1	4.4E-14	3.9	3.0E-12	2.9	4.9E-20	2.9	8.7E-10	2.1
1965	8.2E-14	3.9	1.1E-14	4.1	7.4E-14	3.8	3.3E-12	2.7	5.7E-20	2.7	2.0E-09	2.2
1966	8.1E-14	3.7	3.6E-15	4.1	2.2E-14	4.3	3.7E-12	2.8	6.1E-20	2.8	1.1E-10	2.1
1967	7.9E-14	3.5	3.3E-15	4.2	2.5E-14	3.7	3.7E-12	2.7	6.1E-20	2.8	1.3E-10	2.2
1968	8.5E-14	3.5	4.3E-15	4.2	2.9E-14	3.8	4.3E-12	2.6	7.1E-20	2.7	1.5E-10	2.1
1969	8.6E-14	3.5	5.2E-15	4.0	3.6E-14	3.8	4.0E-12	2.9	6.6E-20	2.8	4.2E-10	2.1
1970	8.9E-14	3.5	3.8E-15	4.2	2.6E-14	3.9	4.4E-12	2.8	7.3E-20	3.0	1.3E-10	2.1
1971	8.6E-14	3.5	3.6E-15	4.3	2.2E-14	4.0	4.4E-12	2.7	7.3E-20	2.7	3.2E-11	1.9
1972	1.0E-13	4.0	3.8E-15	4.6	2.4E-14	4.3	4.8E-12	2.6	8.0E-20	2.7	3.0E-11	1.8
1973	9.7E-14	3.6	3.1E-15	4.5	2.3E-14	4.1	4.5E-12	2.9	7.5E-20	3.0	3.1E-11	1.8
1974	9.9E-14	3.7	5.6E-15	4.2	3.7E-14	3.5	4.7E-12	2.8	7.9E-20	2.8	3.3E-10	2.1
1975	9.4E-14	3.6	3.9E-15	4.2	2.4E-14	4.1	4.9E-12	2.7	8.0E-20	2.8	5.1E-11	1.9
1976	9.4E-14	3.8	3.6E-15	4.4	2.2E-14	4.3	4.6E-12	2.8	7.6E-20	2.7	1.3E-11	1.9
1977	1.1E-13	3.9	3.4E-15	4.3	2.3E-14	4.5	4.7E-12	2.9	7.7E-20	2.9	1.3E-11	1.9
1978	9.6E-14	3.5	3.7E-15	4.5	2.4E-14	4.3	4.7E-12	2.7	7.8E-20	2.7	1.2E-11	1.9
1979	1.1E-13	3.5	3.5E-15	4.1	2.1E-14	4.1	4.6E-12	2.9	7.9E-20	2.8	1.4E-11	1.9
1980	1.1E-13	3.6	4.2E-15	4.5	2.5E-14	3.9	5.5E-12	2.7	8.7E-20	2.7	1.7E-11	1.8
1981	1.1E-13	3.8	3.7E-15	4.1	2.4E-14	4.0	5.0E-12	2.5	8.3E-20	2.6	1.6E-11	1.8
1982	1.1E-13	4.0	3.8E-15	4.7	2.5E-14	3.9	5.0E-12	2.7	8.2E-20	2.7	2.1E-11	1.8
1983	1.0E-13	3.6	4.8E-15	4.2	2.7E-14	4.1	5.4E-12	2.8	8.9E-20	2.9	4.3E-11	1.9
1984	1.1E-13	3.5	4.2E-15	4.4	3.0E-14	4.3	5.5E-12	2.9	9.2E-20	2.9	4.3E-11	1.9
1985	1.2E-13	3.7	3.1E-15	4.4	2.4E-14	4.2	5.1E-12	2.6	8.7E-20	2.6	1.6E-11	1.8
1986	1.2E-13	3.6	3.7E-15	4.3	2.9E-14	4.2	5.3E-12	2.7	9.0E-20	2.7	2.9E-11	1.8
1987	1.1E-13	3.5	3.6E-15	4.7	2.5E-14	4.3	5.7E-12	2.8	9.3E-20	2.8	1.9E-11	1.9
1988	1.3E-13	3.4	4.3E-15	4.2	2.9E-14	3.9	5.6E-12	2.6	9.5E-20	2.6	1.6E-11	1.9
1989	1.0E-13	3.6	4.2E-15	4.3	2.5E-14	3.5	5.6E-12	2.6	9.2E-20	2.6	1.5E-11	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

PATHWAY-SPECIFIC DOSES ASSOCIATED WITH ROUTINE AIRBORNE RELEASE OF DEPLETED URANIUM

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium
Sector 1
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	7.5E-09	2.8	2.2E-13	4.7	2.9E-11	3.8	8.5E-14	2.6	4.1E-18	2.3
1954	7.5E-09	2.8	4.9E-13	3.8	2.9E-11	3.9	1.9E-13	2.3	4.1E-18	2.2
1955	1.3E-08	2.9	9.5E-13	4.0	5.0E-11	3.7	3.6E-13	2.1	6.9E-18	2.3
1956	6.1E-09	2.8	1.2E-12	3.7	2.4E-11	3.6	4.5E-13	2.1	3.3E-18	2.2
1957	4.4E-09	2.8	1.3E-12	3.9	1.8E-11	3.4	5.2E-13	2.0	2.4E-18	2.3
1958	9.8E-09	2.9	1.7E-12	3.8	3.9E-11	4.0	6.6E-13	2.0	5.4E-18	2.2
1959	1.6E-09	2.9	1.8E-12	3.8	7.4E-12	3.5	6.9E-13	2.0	9.0E-19	2.3
1960	2.1E-09	2.9	1.9E-12	3.7	9.5E-12	3.4	7.2E-13	2.1	1.2E-18	2.2
1961	3.2E-09	2.9	2.0E-12	4.0	1.4E-11	4.0	7.7E-13	1.9	1.7E-18	2.2
1962	2.2E-09	2.9	2.1E-12	3.9	9.9E-12	3.3	8.0E-13	2.0	1.2E-18	2.2
1963	3.0E-09	3.0	2.2E-12	3.8	1.3E-11	3.5	8.4E-13	1.9	1.6E-18	2.2
1964	1.4E-09	2.9	2.2E-12	3.8	6.8E-12	3.3	8.7E-13	2.0	7.9E-19	2.2
1965	1.7E-09	3.0	2.3E-12	3.6	7.9E-12	3.4	8.9E-13	1.9	9.2E-19	2.2
1966	8.4E-10	2.9	2.3E-12	3.6	4.6E-12	3.6	9.0E-13	1.9	4.6E-19	2.2
1967	8.4E-10	2.9	2.4E-12	3.8	4.5E-12	3.4	9.1E-13	1.9	4.6E-19	2.3
1968	8.4E-10	2.8	2.4E-12	3.8	4.4E-12	3.7	9.3E-13	1.9	4.6E-19	2.2
1969	9.8E-10	2.7	2.4E-12	3.7	5.1E-12	3.4	9.4E-13	1.9	5.4E-19	2.2
1970	1.2E-09	2.9	2.5E-12	3.9	5.9E-12	3.4	9.6E-13	1.9	6.4E-19	2.2
1971	3.5E-10	2.9	2.5E-12	3.7	2.4E-12	3.4	9.7E-13	1.9	1.9E-19	2.3
1972	2.6E-10	3.0	2.5E-12	3.7	2.0E-12	3.3	9.7E-13	1.9	1.4E-19	2.2
1973	3.3E-10	3.0	2.5E-12	3.6	2.3E-12	3.3	9.7E-13	1.9	1.8E-19	2.2
1974	5.6E-11	2.8	2.5E-12	3.7	1.0E-12	3.3	9.8E-13	1.9	3.1E-20	2.2
1975	1.7E-10	2.8	2.5E-12	3.8	1.6E-12	3.6	9.8E-13	1.9	9.2E-20	2.2
1976	7.5E-11	2.7	2.5E-12	3.8	1.2E-12	3.3	9.8E-13	2.0	4.1E-20	2.2
1977	1.2E-10	2.8	2.5E-12	3.8	1.4E-12	3.4	9.8E-13	1.9	6.4E-20	2.2
1978	2.0E-10	2.9	2.6E-12	3.8	1.8E-12	3.1	9.8E-13	1.9	1.1E-19	2.2
1979	1.6E-10	2.9	2.6E-12	4.0	1.6E-12	3.2	9.9E-13	1.9	8.7E-20	2.2
1980	9.3E-11	2.8	2.6E-12	3.5	1.3E-12	3.2	9.9E-13	1.9	5.1E-20	2.3
1981	1.1E-10	3.0	2.6E-12	3.8	1.3E-12	3.4	9.9E-13	1.9	5.9E-20	2.3
1982	1.2E-10	2.8	2.6E-12	3.8	1.4E-12	3.1	9.9E-13	1.9	6.4E-20	2.2
1983	1.9E-10	2.8	2.6E-12	3.9	1.7E-12	3.1	1.0E-12	1.9	1.0E-19	2.3
1984	3.4E-11	2.9	2.6E-12	4.0	9.1E-13	3.3	9.9E-13	2.0	1.8E-20	2.2
1985	2.4E-10	2.9	2.6E-12	3.8	2.0E-12	3.4	1.0E-12	1.9	1.3E-19	2.2
1986	1.8E-11	2.9	2.6E-12	3.6	8.1E-13	3.8	1.0E-12	1.9	9.7E-21	2.3
1987	7.5E-11	2.8	2.6E-12	3.9	1.2E-12	3.5	1.0E-12	1.9	4.1E-20	2.2
1988	5.6E-11	2.7	2.6E-12	3.7	1.1E-12	3.3	1.0E-12	1.9	3.1E-20	2.2
1989	1.5E-11	2.7	2.6E-12	3.7	7.8E-13	3.8	1.0E-12	1.9	8.5E-21	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium (continued)
Sector 1
(1953 - 1989)

Year	Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	3.9E-14	4.9	1.2E-11	5.5	3.5E-12	5.2	1.9E-12	4.2	1.0E-21	3.5	7.6E-09	2.8
1954	8.7E-14	4.4	1.4E-11	5.0	3.8E-12	5.0	4.2E-12	3.5	2.3E-21	2.8	7.6E-09	2.8
1955	1.7E-13	4.4	2.4E-11	5.0	6.6E-12	5.0	8.1E-12	3.4	4.5E-21	2.8	1.3E-08	2.9
1956	2.1E-13	4.3	1.4E-11	5.0	3.9E-12	4.5	1.0E-11	3.3	5.5E-21	2.7	6.2E-09	2.8
1957	2.4E-13	4.1	1.2E-11	4.9	3.3E-12	4.4	1.2E-11	3.3	6.4E-21	2.6	4.6E-09	2.8
1958	3.0E-13	4.2	2.2E-11	4.8	6.1E-12	4.7	1.5E-11	3.3	8.1E-21	2.7	1.0E-08	2.8
1959	3.2E-13	4.1	8.6E-12	4.2	2.3E-12	4.1	1.5E-11	3.1	8.4E-21	2.5	1.7E-09	2.7
1960	3.3E-13	4.1	9.7E-12	4.5	2.6E-12	4.4	1.6E-11	3.2	8.8E-21	2.5	2.3E-09	2.8
1961	3.5E-13	4.3	1.2E-11	4.4	3.3E-12	4.5	1.7E-11	3.3	9.4E-21	2.6	3.3E-09	2.8
1962	3.7E-13	4.1	1.0E-11	4.3	2.9E-12	4.1	1.8E-11	3.1	9.8E-21	2.6	2.4E-09	2.7
1963	3.9E-13	4.2	1.2E-11	4.5	3.4E-12	4.4	1.9E-11	3.1	1.0E-20	2.6	3.1E-09	2.9
1964	4.0E-13	4.0	9.5E-12	4.5	2.6E-12	4.1	1.9E-11	3.1	1.1E-20	2.5	1.6E-09	2.7
1965	4.1E-13	4.1	1.0E-11	4.8	2.7E-12	4.1	2.0E-11	3.2	1.1E-20	2.5	1.8E-09	2.8
1966	4.1E-13	4.3	8.4E-12	4.4	2.3E-12	4.2	2.0E-11	3.1	1.1E-20	2.5	9.4E-10	2.7
1967	4.2E-13	4.4	8.5E-12	4.6	2.3E-12	4.2	2.1E-11	3.3	1.1E-20	2.5	9.4E-10	2.7
1968	4.3E-13	4.1	8.7E-12	4.6	2.3E-12	4.3	2.1E-11	3.0	1.1E-20	2.6	9.4E-10	2.6
1969	4.3E-13	4.2	9.0E-12	4.4	2.4E-12	4.2	2.1E-11	3.3	1.2E-20	2.5	1.1E-09	2.5
1970	4.4E-13	4.2	9.5E-12	4.4	2.6E-12	3.9	2.1E-11	3.1	1.2E-20	2.5	1.3E-09	2.7
1971	4.4E-13	4.4	7.7E-12	4.6	2.0E-12	4.3	2.2E-11	2.9	1.2E-20	2.5	4.3E-10	2.6
1972	4.5E-13	4.0	7.5E-12	4.6	2.0E-12	4.4	2.2E-11	3.3	1.2E-20	2.6	3.4E-10	2.6
1973	4.5E-13	4.4	7.8E-12	4.6	2.0E-12	4.3	2.2E-11	3.1	1.2E-20	2.5	4.2E-10	2.6
1974	4.5E-13	4.2	6.9E-12	4.6	1.8E-12	4.5	2.2E-11	3.2	1.2E-20	2.6	1.2E-10	2.2
1975	4.5E-13	4.1	7.3E-12	4.8	1.9E-12	4.0	2.2E-11	3.0	1.2E-20	2.5	2.5E-10	2.4
1976	4.5E-13	4.4	7.0E-12	4.5	1.8E-12	4.1	2.2E-11	3.0	1.2E-20	2.5	1.4E-10	2.2
1977	4.5E-13	4.2	7.2E-12	4.4	1.9E-12	4.4	2.2E-11	2.9	1.2E-20	2.5	1.9E-10	2.2
1978	4.5E-13	4.1	7.5E-12	4.3	2.0E-12	4.1	2.2E-11	3.3	1.2E-20	2.5	2.9E-10	2.4
1979	4.5E-13	3.9	7.3E-12	4.4	1.9E-12	4.3	2.2E-11	3.1	1.2E-20	2.4	2.4E-10	2.4
1980	4.5E-13	3.9	7.2E-12	4.5	1.9E-12	4.5	2.2E-11	3.2	1.2E-20	2.5	1.7E-10	2.2
1981	4.5E-13	4.1	7.2E-12	4.3	1.9E-12	4.2	2.2E-11	3.2	1.2E-20	2.5	1.8E-10	2.4
1982	4.5E-13	3.8	7.2E-12	4.9	1.9E-12	4.5	2.2E-11	3.2	1.2E-20	2.6	2.0E-10	2.3
1983	4.6E-13	4.1	7.5E-12	4.7	2.0E-12	4.3	2.2E-11	3.1	1.2E-20	2.6	2.7E-10	2.3
1984	4.6E-13	4.3	7.0E-12	4.3	1.8E-12	4.5	2.2E-11	3.0	1.2E-20	2.5	9.8E-11	2.2
1985	4.6E-13	4.1	7.6E-12	4.7	2.0E-12	4.2	2.2E-11	3.1	1.2E-20	2.5	3.2E-10	2.5
1986	4.6E-13	4.3	7.0E-12	4.7	1.8E-12	4.2	2.2E-11	2.8	1.2E-20	2.5	7.9E-11	2.1
1987	4.6E-13	4.3	7.1E-12	4.4	1.9E-12	4.3	2.2E-11	3.0	1.2E-20	2.5	1.4E-10	2.2
1988	4.6E-13	4.0	7.1E-12	4.9	1.9E-12	4.5	2.2E-11	3.1	1.2E-20	2.5	1.3E-10	2.1
1989	4.6E-13	3.9	7.0E-12	4.4	1.8E-12	4.7	2.2E-11	3.0	1.2E-20	2.5	7.4E-11	2.1

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium
Sector 2
(1953 - 1989)

Year	Inhalation		Soil Ingestion		Vegetable Ingestion		Ground Exposure		Immersion	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	3.7E-09	2.9	1.1E-13	4.4	1.4E-11	3.9	4.2E-14	2.5	2.0E-18	2.2
1954	3.7E-09	2.9	2.4E-13	3.9	1.4E-11	3.8	9.4E-14	2.2	2.0E-18	2.2
1955	6.2E-09	2.9	4.7E-13	3.9	2.4E-11	3.6	1.8E 13	2.1	3.4E-18	2.3
1956	3.0E-09	2.8	5.8E-13	3.7	1.2E-11	3.5	2.2E-13	2.1	1.6E-18	2.2
1957	2.2E-09	2.9	6.7E-13	3.9	8.9E-12	3.6	2.6E-13	2.1	1.2E-18	2.3
1958	4.8E-09	3.0	8.5E-13	3.7	1.9E-11	3.8	3.3E-13	2.0	2.7E-18	2.3
1959	8.1E-10	2.8	8.8E-13	3.8	3.7E-12	3.4	3.4E-13	2.0	4.4E-19	2.2
1960	1.1E-09	2.9	9.2E-13	3.7	4.7E-12	3.8	3.6E-13	2.0	5.8E-19	2.2
1961	1.6E-09	2.7	9.9E-13	3.9	6.7E-12	3.4	3.8E-13	2.0	8.6E-19	2.2
1962	1.1E-09	2.7	1.0E-12	3.8	4.9E-12	3.7	4.0E-13	2.0	6.1E-19	2.2
1963	1.5E-09	2.9	1.1E-12	3.7	6.3E-12	3.5	4.2E-13	2.0	8.1E-19	2.3
1964	7.1E-10	2.9	1.1E-12	3.7	3.4E-12	3.2	4.3E-13	2.0	3.9E-19	2.2
1965	8.3E-10	3.0	1.1E-12	3.7	3.9E-12	3.6	4.4E-13	2.0	4.6E-19	2.3
1966	4.2E-10	2.9	1.2E-12	3.8	2.2E-12	3.5	4.5E-13	2.0	2.3E-19	2.2
1967	4.1E-10	2.8	1.2E-12	3.8	2.2E-12	3.4	4.5E-13	2.0	2.3E-19	2.2
1968	4.1E-10	2.7	1.2E-12	3.6	2.2E-12	3.4	4.6E-13	1.9	2.3E-19	2.2
1969	4.8E-10	2.9	1.2E-12	3.7	2.6E-12	3.5	4.7E-13	1.9	2.7E-19	2.2
1970	5.8E-10	2.8	1.2E-12	3.6	2.9E-12	3.6	4.7E-13	1.9	3.2E-19	2.2
1971	1.7E-10	2.8	1.2E-12	3.5	1.2E-12	3.3	4.8E-13	1.9	9.5E-20	2.2
1972	1.3E-10	2.9	1.2E-12	3.8	1.0E-12	3.2	4.8E-13	1.9	7.0E-20	2.2
1973	1.6E-10	2.8	1.3E-12	3.8	1.2E-12	3.3	4.8E-13	2.0	8.9E-20	2.3
1974	2.8E-11	2.9	1.3E-12	3.8	5.1E-13	3.3	4.8E-13	1.9	1.5E-20	2.2
1975	8.3E-11	2.9	1.3E-12	3.7	8.0E-13	3.2	4.8E-13	1.9	4.6E-20	2.3
1976	3.7E-11	2.7	1.3E-12	3.6	5.6E-13	3.3	4.8E-13	1.9	2.0E-20	2.3
1977	5.8E-11	2.8	1.3E-12	3.6	6.8E-13	3.5	4.9E-13	2.0	3.2E-20	2.3
1978	9.9E-11	2.9	1.3E-12	3.6	8.9E-13	3.3	4.9E-13	2.0	5.4E-20	2.2
1979	7.8E-11	2.9	1.3E-12	3.7	7.8E-13	3.3	4.9E-13	2.0	4.3E-20	2.2
1980	4.6E-11	2.9	1.3E-12	3.8	6.2E-13	3.5	4.9E-13	1.9	2.5E-20	2.2
1981	5.3E-11	2.8	1.3E-12	3.7	6.5E-13	3.4	4.9E-13	1.9	2.9E-20	2.3
1982	5.8E-11	2.8	1.3E-12	3.7	6.9E-13	3.5	4.9E-13	1.9	3.2E-20	2.2
1983	9.2E-11	2.8	1.3E-12	3.6	8.5E-13	3.4	4.9E-13	1.9	5.1E-20	2.3
1984	1.7E-11	2.8	1.3E-12	3.7	4.5E-13	3.3	4.9E-13	1.9	9.1E-21	2.2
1985	1.2E-10	2.8	1.3E-12	3.8	9.9E-13	3.1	4.9E-13	1.9	6.5E-20	2.2
1986	8.8E-12	2.9	1.3E-12	3.9	3.9E-13	3.4	4.9E-13	2.0	4.8E-21	2.3
1987	3.7E-11	2.9	1.3E-12	3.9	5.7E-13	3.4	4.9E-13	1.9	2.0E-20	2.2
1988	2.8E-11	3.0	1.3E-12	3.8	5.3E-13	3.3	5.0E-13	1.9	1.5E-20	2.2
1989	7.6E-12	2.9	1.3E-12	3.8	3.9E-13	4.0	4.9E-13	1.9	4.2E-21	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium (continued)
Sector 2
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	1.9E-14	4.8	6.1E-12	6.0	1.7E-12	5.1	9.4E-13	3.6	5.1E-22	3.0	3.8E-09	2.8
1954	4.3E-14	4.6	6.7E-12	5.3	1.9E-12	4.8	2.1E-12	3.4	1.2E-21	2.8	3.8E-09	2.8
1955	8.3E-14	4.3	1.1E-11	5.3	3.3E-12	4.7	4.0E-12	3.2	2.2E-21	2.7	6.3E-09	2.8
1956	1.0E-13	4.2	7.0E-12	4.7	2.0E-12	4.5	5.0E-12	3.4	2.7E-21	2.7	3.1E-09	2.8
1957	1.2E-13	4.4	6.1E-12	5.1	1.7E-12	4.3	5.8E-12	3.3	3.2E-21	2.6	2.3E-09	2.8
1958	1.5E-13	4.3	1.1E-11	4.6	3.0E-12	4.3	7.3E-12	3.3	4.0E-21	2.5	5.0E-09	2.9
1959	1.6E-13	4.4	4.2E-12	4.5	1.1E-12	4.0	7.6E-12	3.2	4.1E-21	2.5	8.5E-10	2.7
1960	1.6E-13	4.4	4.8E-12	4.8	1.3E-12	3.9	7.9E-12	3.4	4.4E-21	2.6	1.1E-09	2.8
1961	1.7E-13	4.3	6.0E-12	4.5	1.6E-12	4.2	8.5E-12	3.1	4.6E-21	2.7	1.6E-09	2.6
1962	1.8E-13	4.1	5.1E-12	4.6	1.4E-12	4.2	8.8E-12	3.2	4.9E-21	2.5	1.2E-09	2.6
1963	1.9E-13	4.0	6.0E-12	4.6	1.7E-12	4.4	9.3E-12	3.2	5.1E-21	2.6	1.5E-09	2.8
1964	2.0E-13	3.9	4.7E-12	4.5	1.3E-12	4.2	9.5E-12	3.1	5.2E-21	2.5	7.7E-10	2.7
1965	2.0E-13	4.4	5.0E-12	4.3	1.4E-12	4.1	9.8E-12	3.2	5.4E-21	2.5	8.9E-10	2.8
1966	2.1E-13	3.8	4.1E-12	4.5	1.1E-12	4.3	1.0E-11	3.2	5.5E-21	2.7	4.6E-10	2.7
1967	2.1E-13	3.7	4.2E-12	4.3	1.1E-12	4.1	1.0E-11	3.1	5.6E-21	2.6	4.6E-10	2.6
1968	2.1E-13	4.0	4.3E-12	4.6	1.1E-12	4.4	1.0E-11	3.1	5.6E-21	2.5	4.7E-10	2.5
1969	2.1E-13	4.3	4.5E-12	4.4	1.2E-12	4.1	1.0E-11	3.2	5.7E-21	2.6	5.4E-10	2.7
1970	2.2E-13	4.2	4.8E-12	4.2	1.3E-12	4.2	1.1E-11	3.1	5.8E-21	2.5	6.3E-10	2.6
1971	2.2E-13	3.9	3.8E-12	4.4	1.0E-12	4.3	1.1E-11	3.2	5.9E-21	2.6	2.2E-10	2.5
1972	2.2E-13	3.9	3.7E-12	4.3	9.8E-13	4.4	1.1E-11	3.1	5.9E-21	2.6	1.7E-10	2.4
1973	2.2E-13	4.1	3.8E-12	4.6	1.0E-12	4.3	1.1E-11	3.1	5.9E-21	2.5	2.1E-10	2.5
1974	2.2E-13	3.8	3.4E-12	4.5	9.0E-13	4.4	1.1E-11	3.1	5.9E-21	2.5	6.1E-11	2.2
1975	2.2E-13	4.3	3.6E-12	4.4	9.5E-13	4.3	1.1E-11	3.1	5.9E-21	2.5	1.2E-10	2.3
1976	2.2E-13	3.8	3.5E-12	4.7	9.0E-13	4.4	1.1E-11	3.2	5.9E-21	2.5	7.2E-11	2.2
1977	2.2E-13	4.1	3.6E-12	4.8	9.3E-13	4.2	1.1E-11	3.1	5.9E-21	2.5	9.6E-11	2.3
1978	2.2E-13	4.2	3.7E-12	4.5	9.7E-13	4.4	1.1E-11	3.1	6.0E-21	2.5	1.4E-10	2.4
1979	2.2E-13	3.9	3.6E-12	4.5	9.6E-13	4.5	1.1E-11	3.2	6.0E-21	2.6	1.2E-10	2.4
1980	2.2E-13	4.5	3.5E-12	5.0	9.2E-13	4.2	1.1E-11	3.1	6.0E-21	2.4	8.4E-11	2.2
1981	2.3E-13	4.0	3.6E-12	4.9	9.3E-13	4.5	1.1E-11	3.0	6.0E-21	2.5	9.1E-11	2.3
1982	2.3E-13	4.1	3.6E-12	4.9	9.4E-13	4.5	1.1E-11	3.1	6.0E-21	2.5	9.5E-11	2.4
1983	2.3E-13	4.3	3.7E-12	4.5	9.7E-13	4.1	1.1E-11	3.0	6.0E-21	2.5	1.3E-10	2.3
1984	2.3E-13	4.0	3.5E-12	4.7	9.0E-13	4.7	1.1E-11	3.2	6.0E-21	2.5	4.9E-11	2.2
1985	2.3E-13	4.0	3.8E-12	4.8	1.0E-12	4.2	1.1E-11	3.1	6.0E-21	2.6	1.6E-10	2.4
1986	2.3E-13	3.8	3.5E-12	4.6	9.0E-13	4.6	1.1E-11	3.1	6.1E-21	2.5	3.9E-11	2.2
1987	2.3E-13	4.0	3.5E-12	4.6	9.3E-13	4.5	1.1E-11	3.4	6.0E-21	2.6	7.3E-11	2.3
1988	2.3E-13	4.0	3.5E-12	4.8	9.3E-13	4.6	1.1E-11	3.1	6.1E-21	2.5	6.2E-11	2.2
1989	2.3E-13	4.4	3.5E-12	4.8	9.0E-13	4.4	1.1E-11	3.1	6.1E-21	2.5	3.7E-11	2.2

NOTES:
1) E-01 is the same as the value divided by 10^{1}; E-02 is the same as the value divided by 10^{2}; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium
Sector 3
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	3.7E-09	2.8	1.1E-13	4.5	1.4E-11	4.0	4.2E-14	2.6	2.0E-18	2.2
1954	3.7E-09	2.8	2.5E-13	4.0	1.5E-11	3.8	9.5E-14	2.2	2.0E-18	2.2
1955	6.3E-09	3.0	4.7E-13	4.0	2.5E-11	3.6	1.8E-13	2.2	3.4E-18	2.2
1956	3.0E-09	2.8	5.9E-13	3.5	1.2E-11	3.4	2.3E-13	2.1	1.7E-18	2.2
1957	2.2E-09	2.8	6.7E-13	4.1	9.1E-12	3.5	2.6E-13	2.0	1.2E-18	2.3
1958	4.9E-09	2.9	8.6E-13	3.7	1.9E-11	3.9	3.3E-13	2.0	2.7E-18	2.2
1959	8.1E-10	2.9	8.9E-13	3.9	3.7E-12	3.4	3.4E-13	2.0	4.5E-19	2.2
1960	1.1E-09	2.9	9.3E-13	3.6	4.7E-12	3.6	3.6E-13	2.0	5.9E-19	2.2
1961	1.6E-09	2.9	9.9E-13	3.6	6.8E-12	3.7	3.8E-13	2.0	8.6E-19	2.3
1962	1.1E-09	2.7	1.0E-12	3.6	4.9E-12	3.6	4.0E-13	1.9	6.1E-19	2.2
1963	1.5E-09	2.9	1.1E-12	3.7	6.4E-12	3.5	4.2E-13	1.9	8.1E-19	2.2
1964	7.2E-10	2.8	1.1E-12	3.9	3.4E-12	3.4	4.3E-13	1.9	3.9E-19	2.2
1965	8.3E-10	2.9	1.2E-12	3.6	3.9E-12	3.5	4.4E-13	1.9	4.6E-19	2.3
1966	4.2E-10	2.7	1.2E-12	3.7	2.2E-12	3.3	4.5E-13	1.9	2.3E-19	2.2
1967	4.2E-10	2.8	1.2E-12	3.6	2.2E-12	3.4	4.6E-13	1.9	2.3E-19	2.3
1968	4.2E-10	2.9	1.2E-12	3.8	2.3E-12	3.3	4.6E-13	1.9	2.3E-19	2.2
1969	4.9E-10	2.9	1.2E-12	3.8	2.5E-12	3.2	4.7E-13	1.9	2.7E-19	2.2
1970	5.8E-10	2.7	1.2E-12	3.9	2.9E-12	3.5	4.8E-13	1.9	3.2E-19	2.3
1971	1.7E-10	2.9	1.3E-12	3.6	1.2E-12	3.4	4.8E-13	2.0	9.5E-20	2.3
1972	1.3E-10	2.8	1.3E-12	3.9	1.0E-12	3.2	4.8E-13	1.9	7.0E-20	2.2
1973	1.6E-10	2.8	1.3E-12	3.9	1.2E-12	3.2	4.9E-13	1.9	8.9E-20	2.2
1974	2.8E-11	2.9	1.3E-12	3.7	5.1E-13	3.3	4.9E-13	1.9	1.5E-20	2.3
1975	8.3E-11	2.9	1.3E-12	3.7	8.0E-13	3.1	4.9E-13	1.9	4.6E-20	2.3
1976	3.7E-11	2.8	1.3E-12	3.6	5.8E-13	3.4	4.9E-13	1.9	2.0E-20	2.2
1977	5.8E-11	2.8	1.3E-12	3.8	6.8E-13	3.4	4.9E-13	1.9	3.2E-20	2.2
1978	1.0E-10	2.9	1.3E-12	3.9	9.0E-13	3.2	4.9E-13	1.9	5.5E-20	2.2
1979	7.9E-11	2.8	1.3E-12	3.6	7.8E-13	3.3	4.9E-13	1.9	4.3E-20	2.2
1980	4.6E-11	2.8	1.3E-12	3.8	6.3E-13	3.2	4.9E-13	1.9	2.5E-20	2.2
1981	5.3E-11	2.9	1.3E-12	3.8	6.7E-13	3.5	4.9E-13	1.9	2.9E-20	2.3
1982	5.8E-11	2.9	1.3E-12	3.8	6.7E-13	3.3	4.9E-13	1.9	3.2E-20	2.2
1983	9.3E-11	2.8	1.3E-12	3.5	8.6E-13	3.3	5.0E-13	1.9	5.1E-20	2.1
1984	1.7E-11	2.8	1.3E-12	3.6	4.5E-13	3.5	5.0E-13	1.9	9.2E-21	2.3
1985	1.2E-10	2.8	1.3E-12	3.6	1.0E-12	3.0	5.0E-13	1.9	6.5E-20	2.2
1986	8.8E-12	2.8	1.3E-12	3.5	4.0E-13	3.7	5.0E-13	1.9	4.8E-21	2.2
1987	3.7E-11	3.0	1.3E-12	3.7	5.8E-13	3.3	5.0E-13	1.9	2.0E-20	2.2
1988	2.8E-11	2.8	1.3E-12	3.6	5.2E-13	3.4	5.0E-13	1.9	1.5E-20	2.2
1989	7.7E-12	2.9	1.3E-12	3.7	3.9E-13	3.6	5.0E-13	2.0	4.2E-21	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium (continued)
Sector 3
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	GSD	Milk Ingestion GM (Sv/year)	GSD	Beef Ingestion GM (Sv/year)	GSD	Inhalation of Resuspended Particulates GM (Sv/year)	GSD	Immersion in Resuspended Particulates GM (Sv/year)	GSD	Total Dose GM (Sv/year)	GSD
1953	1.9E-14	4.9	6.2E-12	5.4	1.7E-12	5.1	9.4E-13	3.8	5.2E-22	3.1	3.8E-09	2.8
1954	4.4E-14	4.5	6.8E-12	5.4	1.9E-12	4.2	2.1E-12	3.3	1.2E-21	2.8	3.8E-09	2.8
1955	8.4E-14	4.5	1.2E-11	4.8	3.3E-12	4.4	4.0E-12	3.6	2.2E-21	2.8	6.4E-09	2.9
1956	1.0E-13	4.1	7.0E-12	5.3	1.9E-12	4.2	5.1E-12	3.3	2.8E-21	2.6	3.1E-09	2.8
1957	1.2E-13	4.3	6.0E-12	4.7	1.7E-12	4.3	5.8E-12	3.3	3.2E-21	2.7	2.3E-09	2.8
1958	1.5E-13	4.2	1.1E-11	4.9	3.1E-12	4.6	7.4E-12	3.3	4.0E-21	2.7	5.0E-09	2.9
1959	1.6E-13	4.5	4.3E-12	4.5	1.2E-12	4.4	7.6E-12	3.1	4.2E-21	2.5	8.6E-10	2.8
1960	1.6E-13	4.1	4.8E-12	4.6	1.3E-12	4.1	8.0E-12	3.2	4.4E-21	2.6	1.1E-09	2.8
1961	1.8E-13	4.2	6.0E-12	4.8	1.7E-12	4.2	8.5E-12	3.1	4.7E-21	2.6	1.6E-09	2.9
1962	1.8E-13	4.0	5.2E-12	4.4	1.4E-12	4.2	8.9E-12	3.1	4.9E-21	2.6	1.2E-09	2.6
1963	1.9E-13	4.4	6.1E-12	4.4	1.7E-12	4.1	9.4E-12	3.2	5.2E-21	2.6	1.5E-09	2.8
1964	2.0E-13	4.2	4.7E-12	4.7	1.3E-12	3.9	9.6E-12	3.2	5.3E-21	2.5	7.8E-10	2.6
1965	2.0E-13	4.3	5.1E-12	4.5	1.3E-12	4.1	9.9E-12	3.1	5.4E-21	2.5	8.9E-10	2.8
1966	2.1E-13	4.2	4.2E-12	4.3	1.1E-12	4.2	1.0E-11	3.1	5.5E-21	2.4	4.7E-10	2.5
1967	2.1E-13	3.9	4.2E-12	4.6	1.1E-12	4.3	1.0E-11	3.1	5.6E-21	2.5	4.7E-10	2.6
1968	2.1E-13	4.1	4.3E-12	4.4	1.2E-12	4.1	1.0E-11	3.1	5.7E-21	2.4	4.6E-10	2.7
1969	2.2E-13	4.0	4.6E-12	4.2	1.2E-12	4.1	1.0E-11	2.9	5.7E-21	2.6	5.4E-10	2.7
1970	2.2E-13	4.3	4.8E-12	4.5	1.3E-12	4.1	1.1E-11	3.0	5.9E-21	2.6	6.4E-10	2.6
1971	2.2E-13	4.3	3.8E-12	4.6	1.0E-12	4.2	1.1E-11	3.1	5.9E-21	2.4	2.2E-10	2.5
1972	2.2E-13	4.1	3.7E-12	4.6	9.9E-13	4.4	1.1E-11	3.1	5.9E-21	2.6	1.7E-10	2.4
1973	2.2E-13	4.4	3.8E-12	4.6	1.0E-12	4.1	1.1E-11	3.1	5.9E-21	2.7	2.1E-10	2.4
1974	2.2E-13	3.9	3.5E-12	4.5	9.0E-13	4.5	1.1E-11	3.3	6.0E-21	2.6	6.2E-11	2.3
1975	2.2E-13	4.0	3.6E-12	4.5	9.6E-13	4.5	1.1E-11	3.0	6.0E-21	2.5	1.2E-10	2.3
1976	2.2E-13	4.1	3.5E-12	4.4	9.1E-13	4.5	1.1E-11	3.2	6.0E-21	2.6	7.2E-11	2.3
1977	2.3E-13	4.1	3.6E-12	4.8	9.4E-13	4.5	1.1E-11	3.0	6.0E-21	2.5	9.6E-11	2.3
1978	2.3E-13	4.2	3.7E-12	4.4	9.8E-13	4.4	1.1E-11	3.2	6.0E-21	2.6	1.4E-10	2.4
1979	2.3E-13	4.2	3.6E-12	4.7	9.5E-13	4.5	1.1E-11	3.0	6.0E-21	2.5	1.2E-10	2.3
1980	2.3E-13	3.9	3.6E-12	4.4	9.3E-13	4.3	1.1E-11	2.9	6.0E-21	2.4	8.2E-11	2.2
1981	2.3E-13	4.3	3.6E-12	4.5	9.4E-13	4.3	1.1E-11	3.1	6.0E-21	2.5	9.1E-11	2.3
1982	2.3E-13	4.0	3.6E-12	4.5	9.5E-13	4.4	1.1E-11	3.0	6.1E-21	2.5	9.6E-11	2.2
1983	2.3E-13	3.9	3.7E-12	4.5	9.8E-13	4.1	1.1E-11	3.0	6.1E-21	2.4	1.3E-10	2.3
1984	2.3E-13	4.0	3.5E-12	4.7	9.1E-13	4.4	1.1E-11	3.1	6.1E-21	2.6	4.8E-11	2.2
1985	2.3E-13	3.9	3.8E-12	4.4	1.0E-12	4.4	1.1E-11	3.2	6.1E-21	2.5	1.6E-10	2.4
1986	2.3E-13	4.1	3.5E-12	4.6	9.0E-13	4.2	1.1E-11	3.2	6.1E-21	2.4	3.9E-11	2.2
1987	2.3E-13	4.0	3.6E-12	4.6	9.3E-13	4.3	1.1E-11	3.1	6.1E-21	2.5	7.4E-11	2.3
1988	2.3E-13	4.1	3.6E-12	4.8	9.3E-13	4.3	1.1E-11	3.0	6.1E-21	2.5	6.2E-11	2.2
1989	2.3E-13	4.2	3.5E-12	4.5	9.1E-13	4.2	1.1E-11	3.2	6.1E-21	2.6	3.8E-11	2.1

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium
Sector 4
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	1.3E-08	3.0	3.7E-13	4.5	4.9E-11	3.7	1.4E-13	2.5	6.9E-18	2.3
1954	1.3E-08	2.8	8.3E-13	3.7	4.9E-11	3.8	3.2E-13	2.1	6.9E-18	2.2
1955	2.1E-08	2.9	1.6E-12	4.0	8.3E-11	3.9	6.1E 13	2.1	1.2E-17	2.2
1956	1.0E-08	2.9	2.0E-12	4.0	4.1E-11	3.7	7.6E-13	2.1	5.6E-18	2.2
1957	7.4E-09	2.9	2.3E-12	3.8	3.0E-11	3.6	8.7E-13	2.0	4.1E-18	2.2
1958	1.6E-08	2.9	2.9E-12	4.2	6.5E-11	3.6	1.1E-12	1.9	9.0E-18	2.3
1959	2.7E-09	2.8	3.0E-12	3.9	1.3E-11	3.6	1.2E-12	1.9	1.5E-18	2.3
1960	3.6E-09	3.0	3.1E-12	3.5	1.6E-11	3.8	1.2E-12	1.9	2.0E-18	2.3
1961	5.3E-09	2.8	3.4E-12	3.7	2.3E-11	3.6	1.3E-12	2.0	2.9E-18	2.2
1962	3.8E-09	2.8	3.5E-12	3.6	1.7E-11	3.8	1.3E-12	1.9	2.1E-18	2.3
1963	5.0E-09	2.8	3.7E-12	3.8	2.2E-11	3.4	1.4E-12	1.9	2.8E-18	2.2
1964	2.4E-09	2.8	3.8E-12	3.8	1.1E-11	3.3	1.5E-12	1.9	1.3E-18	2.2
1965	2.8E-09	2.9	3.9E-12	3.6	1.3E-11	3.4	1.5E-12	1.9	1.5E-18	2.2
1966	1.4E-09	2.9	4.0E-12	3.8	7.5E-12	3.2	1.5E-12	1.9	7.7E-19	2.2
1967	1.4E-09	2.8	4.0E-12	3.7	7.5E-12	3.4	1.5E-12	1.9	7.7E-19	2.3
1968	1.4E-09	2.9	4.1E-12	3.7	7.5E-12	3.3	1.6E-12	1.9	7.7E-19	2.2
1969	1.6E-09	2.8	4.1E-12	3.6	8.5E-12	3.2	1.6E-12	1.9	9.0E-19	2.1
1970	2.0E-09	2.9	4.2E-12	4.1	9.7E-12	3.4	1.6E-12	1.9	1.1E-18	2.3
1971	5.9E-10	2.9	4.2E-12	4.0	4.0E-12	3.4	1.6E-12	1.9	3.2E-19	2.3
1972	4.3E-10	2.8	4.2E-12	3.7	3.4E-12	3.1	1.6E-12	1.9	2.4E-19	2.2
1973	5.5E-10	2.8	4.3E-12	3.8	4.0E-12	3.4	1.6E-12	1.9	3.0E-19	2.3
1974	9.4E-11	2.9	4.3E-12	3.6	1.7E-12	3.4	1.6E-12	1.9	5.2E-20	2.2
1975	2.8E-10	2.9	4.3E-12	3.8	2.7E-12	3.3	1.6E-12	1.9	1.6E-19	2.2
1976	1.3E-10	2.9	4.3E-12	3.8	2.0E-12	3.3	1.6E-12	1.9	6.9E-20	2.3
1977	2.0E-10	2.9	4.3E-12	3.5	2.3E-12	3.2	1.7E-12	1.9	1.1E-19	2.2
1978	3.4E-10	2.8	4.3E-12	3.7	3.0E-12	3.2	1.7E-12	1.9	1.8E-19	2.2
1979	2.7E-10	2.8	4.3E-12	3.9	2.6E-12	3.2	1.7E-12	1.9	1.5E-19	2.3
1980	1.6E-10	2.7	4.3E-12	3.6	2.2E-12	3.3	1.7E-12	1.9	8.6E-20	2.2
1981	1.8E-10	2.9	4.3E-12	3.9	2.2E-12	3.2	1.7E-12	1.9	9.9E-20	2.3
1982	2.0E-10	2.9	4.3E-12	3.8	2.3E-12	3.3	1.7E-12	1.9	1.1E-19	2.3
1983	3.1E-10	2.9	4.3E-12	3.9	2.9E-12	3.4	1.7E-12	1.9	1.7E-19	2.3
1984	5.6E-11	2.8	4.3E-12	3.8	1.5E-12	3.5	1.7E-12	1.9	3.1E-20	2.3
1985	4.0E-10	2.8	4.4E-12	3.9	3.3E-12	3.2	1.7E-12	1.9	2.2E-19	2.2
1986	3.0E-11	2.8	4.4E-12	4.0	1.4E-12	3.5	1.7E-12	1.9	1.6E-20	2.3
1987	1.3E-10	2.7	4.4E-12	3.8	1.9E-12	3.2	1.7E-12	1.9	6.9E-20	2.2
1988	9.4E-11	2.8	4.4E-12	3.5	1.8E-12	3.6	1.7E-12	1.9	5.2E-20	2.3
1989	2.6E-11	2.8	4.4E-12	3.8	1.3E-12	3.5	1.7E-12	1.9	1.4E-20	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium (continued)
Sector 4
(1953 - 1989)

Year	Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	6.5E-14	4.6	2.0E-11	5.3	5.9E-12	4.9	3.2E-12	3.9	1.7E-21	3.1	1.3E-08	2.9
1954	1.5E-13	4.5	2.3E-11	5.5	6.4E-12	4.6	7.1E-12	3.4	3.9E-21	2.8	1.3E-08	2.8
1955	2.8E-13	4.5	3.9E-11	5.0	1.1E-11	4.7	1.4E-11	3.0	7.5E-21	2.6	2.2E-08	2.8
1956	3.5E-13	4.0	2.3E-11	4.8	6.5E-12	4.5	1.7E-11	3.1	9.3E-21	2.6	1.0E-08	2.8
1957	4.0E-13	4.3	2.0E-11	4.6	5.7E-12	4.4	1.9E-11	3.3	1.1E-20	2.5	7.6E-09	2.9
1958	5.1E-13	4.2	3.7E-11	5.4	1.0E-11	4.3	2.5E-11	3.1	1.4E-20	2.6	1.7E-08	2.8
1959	5.3E-13	4.4	1.4E-11	4.9	3.9E-12	4.1	2.6E-11	3.3	1.4E-20	2.6	2.9E-09	2.7
1960	5.5E-13	4.0	1.6E-11	4.2	4.5E-12	4.2	2.7E-11	3.2	1.5E-20	2.5	3.8E-09	2.9
1961	5.9E-13	3.8	2.0E-11	4.8	5.5E-12	4.1	2.9E-11	3.1	1.6E-20	2.6	5.6E-09	2.7
1962	6.2E-13	4.4	1.8E-11	4.9	5.0E-12	4.3	3.0E-11	3.2	1.6E-20	2.5	4.0E-09	2.7
1963	6.6E-13	4.0	2.1E-11	4.5	5.7E-12	4.4	3.2E-11	3.0	1.7E-20	2.6	5.3E-09	2.7
1964	6.7E-13	4.1	1.6E-11	4.2	4.3E-12	4.2	3.2E-11	3.1	1.8E-20	2.4	2.6E-09	2.7
1965	6.9E-13	4.2	1.7E-11	4.2	4.7E-12	3.9	3.3E-11	3.0	1.8E-20	2.4	3.0E-09	2.7
1966	7.0E-13	4.0	1.4E-11	4.8	3.8E-12	3.8	3.4E-11	3.2	1.9E-20	2.5	1.6E-09	2.7
1967	7.1E-13	3.9	1.4E-11	4.6	3.8E-12	4.3	3.4E-11	3.2	1.9E-20	2.5	1.6E-09	2.7
1968	7.2E-13	4.1	1.4E-11	4.3	3.8E-12	3.9	3.5E-11	3.1	1.9E-20	2.5	1.6E-09	2.7
1969	7.3E-13	4.0	1.5E-11	4.6	4.1E-12	3.9	3.5E-11	3.0	1.9E-20	2.5	1.8E-09	2.6
1970	7.4E-13	4.2	1.6E-11	4.6	4.4E-12	4.1	3.6E-11	3.0	2.0E-20	2.5	2.1E-09	2.7
1971	7.5E-13	3.9	1.3E-11	4.4	3.4E-12	4.0	3.6E-11	3.1	2.0E-20	2.5	7.3E-10	2.6
1972	7.5E-13	4.1	1.3E-11	4.3	3.3E-12	4.4	3.6E-11	3.2	2.0E-20	2.5	5.7E-10	2.4
1973	7.5E-13	4.2	1.3E-11	4.4	3.4E-12	4.2	3.7E-11	3.2	2.0E-20	2.6	7.0E-10	2.4
1974	7.5E-13	4.1	1.2E-11	4.4	3.0E-12	4.5	3.7E-11	3.1	2.0E-20	2.6	2.1E-10	2.2
1975	7.6E-13	3.9	1.2E-11	4.7	3.2E-12	4.1	3.7E-11	3.3	2.0E-20	2.6	4.2E-10	2.4
1976	7.6E-13	4.2	1.2E-11	4.4	3.1E-12	4.2	3.7E-11	3.2	2.0E-20	2.5	2.4E-10	2.3
1977	7.6E-13	4.1	1.2E-11	4.7	3.2E-12	4.5	3.7E-11	3.1	2.0E-20	2.5	3.3E-10	2.3
1978	7.6E-13	4.0	1.2E-11	4.5	3.3E-12	4.3	3.7E-11	3.2	2.0E-20	2.5	4.7E-10	2.4
1979	7.6E-13	4.2	1.2E-11	4.7	3.2E-12	4.2	3.7E-11	3.1	2.0E-20	2.6	4.0E-10	2.3
1980	7.6E-13	4.1	1.2E-11	4.4	3.1E-12	4.3	3.7E-11	3.2	2.0E-20	2.5	2.8E-10	2.2
1981	7.7E-13	3.8	1.2E-11	4.7	3.2E-12	4.4	3.7E-11	3.2	2.0E-20	2.5	3.1E-10	2.3
1982	7.6E-13	4.2	1.2E-11	5.0	3.2E-12	4.5	3.7E-11	3.1	2.0E-20	2.5	3.3E-10	2.3
1983	7.7E-13	4.2	1.3E-11	4.5	3.3E-12	4.3	3.7E-11	3.1	2.0E-20	2.5	4.5E-10	2.4
1984	7.7E-13	4.1	1.2E-11	4.3	3.1E-12	4.2	3.7E-11	3.0	2.0E-20	2.5	1.6E-10	2.1
1985	7.7E-13	3.7	1.3E-11	4.6	3.4E-12	4.2	3.7E-11	3.0	2.1E-20	2.5	5.4E-10	2.4
1986	7.7E-13	4.1	1.2E-11	4.7	3.1E-12	4.6	3.7E-11	2.9	2.1E-20	2.4	1.3E-10	2.2
1987	7.7E-13	4.1	1.2E-11	4.5	3.2E-12	4.7	3.7E-11	3.2	2.1E-20	2.5	2.4E-10	2.2
1988	7.8E-13	4.0	1.2E-11	4.7	3.1E-12	4.6	3.8E-11	3.2	2.1E-20	2.5	2.1E-10	2.2
1989	7.7E-13	4.1	1.2E-11	4.6	3.1E-12	4.2	3.8E-11	3.2	2.1E-20	2.5	1.2E-10	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium
Sector 5
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	3.7E-09	2.9	1.1E-13	4.9	1.4E-11	4.0	4.2E-14	2.6	2.0E-18	2.2
1954	3.7E-09	3.0	2.5E-13	4.2	1.4E-11	3.8	9.5E-14	2.3	2.0E-18	2.3
1955	6.2E-09	2.7	4.7E-13	4.1	2.5E-11	3.9	1.8E-13	2.2	3.4E-18	2.2
1956	3.0E-09	2.9	5.8E-13	4.0	1.2E-11	4.0	2.2E-13	2.1	1.6E-18	2.3
1957	2.2E-09	2.8	6.7E-13	3.9	8.9E-12	3.7	2.6E-13	2.1	1.2E-18	2.2
1958	4.8E-09	2.9	8.5E-13	3.9	1.9E-11	3.9	3.3E-13	2.0	2.7E-18	2.2
1959	8.1E-10	3.0	8.8E-13	3.8	3.7E-12	3.4	3.4E-13	2.0	4.4E-19	2.3
1960	1.1E-09	2.8	9.2E-13	3.9	4.7E-12	3.3	3.5E-13	2.0	5.8E-19	2.2
1961	1.6E-09	2.8	9.8E-13	3.7	6.7E-12	3.5	3.8E-13	2.0	8.6E-19	2.2
1962	1.1E-09	2.9	1.0E-12	3.8	4.9E-12	3.5	3.9E-13	1.9	6.1E-19	2.3
1963	1.5E-09	2.8	1.1E-12	3.7	6.4E-12	3.6	4.2E-13	2.0	8.1E-19	2.3
1964	7.2E-10	2.7	1.1E-12	3.6	3.4E-12	3.4	4.3E-13	1.9	3.9E-19	2.2
1965	8.3E-10	2.8	1.1E-12	3.9	3.9E-12	3.7	4.4E-13	2.0	4.6E-19	2.2
1966	4.1E-10	2.9	1.2E-12	3.9	2.2E-12	3.4	4.5E-13	1.9	2.3E-19	2.2
1967	4.2E-10	2.9	1.2E-12	3.6	2.3E-12	3.3	4.5E-13	2.0	2.3E-19	2.2
1968	4.2E-10	2.8	1.2E-12	3.7	2.2E-12	3.6	4.6E-13	2.0	2.3E-19	2.2
1969	4.8E-10	3.0	1.2E-12	3.8	2.5E-12	3.2	4.7E-13	2.0	2.7E-19	2.2
1970	5.8E-10	2.9	1.2E-12	3.6	2.9E-12	3.5	4.8E-13	2.0	3.2E-19	2.3
1971	1.7E-10	3.1	1.2E-12	3.9	1.2E-12	3.3	4.8E-13	2.0	9.5E-20	2.3
1972	1.3E-10	2.9	1.2E-12	3.9	1.0E-12	3.1	4.8E-13	2.0	7.0E-20	2.2
1973	1.6E-10	2.8	1.2E-12	3.8	1.2E-12	3.0	4.8E-13	2.0	8.9E-20	2.2
1974	2.8E-11	2.9	1.3E-12	3.8	5.1E-13	3.6	4.8E-13	1.9	1.5E-20	2.3
1975	8.3E-11	2.9	1.3E-12	3.8	8.0E-13	3.1	4.8E-13	2.0	4.6E-20	2.3
1976	3.7E-11	2.9	1.3E-12	3.6	5.7E-13	3.3	4.8E-13	1.9	2.0E-20	2.2
1977	5.8E-11	2.9	1.3E-12	3.8	6.8E-13	3.4	4.9E-13	1.9	3.2E-20	2.3
1978	9.9E-11	2.8	1.3E-12	3.7	8.8E-13	3.3	4.9E-13	2.0	5.5E-20	2.2
1979	7.8E-11	2.8	1.3E-12	3.6	7.9E-13	3.4	4.9E-13	2.0	4.3E-20	2.2
1980	4.6E-11	2.8	1.3E-12	3.5	6.2E-13	3.5	4.9E-13	1.9	2.5E-20	2.2
1981	5.3E-11	2.8	1.3E-12	3.4	6.6E-13	3.4	4.9E-13	2.0	2.9E-20	2.2
1982	5.8E-11	3.0	1.3E-12	3.8	6.8E-13	3.4	4.9E-13	2.0	3.2E-20	2.3
1983	9.2E-11	2.8	1.3E-12	3.6	8.6E-13	3.3	4.9E-13	2.0	5.1E-20	2.2
1984	1.7E-11	3.0	1.3E-12	3.9	4.5E-13	3.3	4.9E-13	1.9	9.1E-21	2.3
1985	1.2E-10	2.8	1.3E-12	3.6	9.8E-13	3.3	4.9E-13	1.9	6.5E-20	2.2
1986	8.8E-12	2.8	1.3E-12	3.8	4.0E-13	3.7	4.9E-13	2.0	4.8E-21	2.3
1987	3.7E-11	2.8	1.3E-12	3.6	5.7E-13	3.3	5.0E-13	2.0	2.0E-20	2.2
1988	2.8E-11	2.9	1.3E-12	3.7	5.3E-13	3.3	4.9E-13	2.0	1.5E-20	2.3
1989	7.6E-12	2.8	1.3E-12	3.7	3.9E-13	4.0	4.9E-13	1.9	4.2E-21	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium (continued)
Sector 5
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	1.9E-14	4.8	6.0E-12	5.1	1.7E-12	5.2	9.4E-13	3.7	5.1E-22	3.1	3.8E-09	2.8
1954	4.3E-14	4.2	6.7E-12	5.3	1.9E-12	4.7	2.1E-12	3.6	1.2E-21	2.9	3.8E-09	2.9
1955	8.3E-14	4.3	1.2E-11	5.4	3.3E-12	5.2	4.0E-12	3.5	2.2E-21	2.8	6.4E-09	2.6
1956	1.0E-13	4.3	7.0E-12	4.9	2.0E-12	4.5	5.0E-12	3.2	2.7E-21	2.7	3.1E-09	2.8
1957	1.2E-13	4.2	6.0E-12	4.5	1.7E-12	4.5	5.7E-12	3.3	3.2E-21	2.6	2.3E-09	2.7
1958	1.5E-13	4.2	1.1E-11	4.7	3.1E-12	4.6	7.3E-12	3.3	4.0E-21	2.6	5.0E-09	2.9
1959	1.6E-13	4.3	4.2E-12	4.4	1.1E-12	4.5	7.6E-12	3.2	4.2E-21	2.6	8.5E-10	2.9
1960	1.6E-13	4.0	4.9E-12	4.4	1.3E-12	4.4	7.9E-12	3.3	4.4E-21	2.6	1.1E-09	2.7
1961	1.7E-13	4.1	5.9E-12	4.6	1.6E-12	4.5	8.4E-12	3.2	4.6E-21	2.6	1.6E-09	2.7
1962	1.8E-13	4.3	5.2E-12	4.8	1.4E-12	4.2	8.8E-12	3.2	4.8E-21	2.6	1.2E-09	2.8
1963	1.9E-13	3.8	5.9E-12	4.5	1.7E-12	4.1	9.3E-12	3.1	5.1E-21	2.6	1.5E-09	2.7
1964	2.0E-13	4.1	4.7E-12	4.4	1.3E-12	4.0	9.6E-12	3.1	5.2E-21	2.5	7.7E-10	2.6
1965	2.0E-13	4.6	5.1E-12	5.1	1.4E-12	4.1	9.8E-12	3.2	5.4E-21	2.5	9.0E-10	2.7
1966	2.1E-13	4.2	4.2E-12	4.6	1.1E-12	4.1	9.9E-12	3.1	5.5E-21	2.5	4.6E-10	2.7
1967	2.1E-13	4.4	4.2E-12	4.4	1.1E-12	4.2	1.0E-11	3.2	5.5E-21	2.6	4.6E-10	2.7
1968	2.1E-13	4.2	4.3E-12	4.3	1.2E-12	4.4	1.0E-11	3.2	5.6E-21	2.6	4.6E-10	2.7
1969	2.1E-13	3.9	4.5E-12	4.3	1.2E-12	4.2	1.0E-11	3.2	5.7E-21	2.5	5.4E-10	2.7
1970	2.2E-13	4.0	4.7E-12	4.5	1.3E-12	4.0	1.1E-11	3.2	5.8E-21	2.4	6.3E-10	2.7
1971	2.2E-13	4.0	3.8E-12	4.7	1.0E-12	4.1	1.1E-11	3.3	5.9E-21	2.6	2.2E-10	2.7
1972	2.2E-13	4.1	3.7E-12	4.6	9.7E-13	4.3	1.1E-11	3.3	5.9E-21	2.6	1.7E-10	2.5
1973	2.2E-13	4.1	3.8E-12	4.5	1.0E-12	4.3	1.1E-11	3.1	5.9E-21	2.5	2.0E-10	2.5
1974	2.2E-13	4.4	3.4E-12	4.9	8.9E-13	4.4	1.1E-11	3.3	5.9E-21	2.5	6.1E-11	2.3
1975	2.2E-13	4.0	3.6E-12	5 1	9.5E-13	4.5	1.1E-11	3.2	5.9E-21	2.5	1.2E-10	2.4
1976	2.2E-13	4.3	3.5E-12	4.5	9.1E-13	4.4	1.1E-11	3.1	5.9E-21	2.5	7.2E-11	2.3
1977	2.2E-13	4.1	3.5E-12	4.3	9.3E-13	3.9	1.1E-11	3.2	5.9E-21	2.6	9.5E-11	2.3
1978	2.2E-13	4.2	3.7E-12	4.5	9.6E-13	4.2	1.1E-11	3.2	6.0E-21	2.7	1.4E-10	2.4
1979	2.2E-13	4.2	3.6E-12	4.5	9.5E-13	4.3	1.1E-11	3.2	6.0E-21	2.5	1.2E-10	2.3
1980	2.3E-13	4.1	3.5E-12	4.6	9.3E-13	3.9	1.1E-11	2.9	6.0E-21	2.5	8.2E-11	2.2
1981	2.3E-13	4.1	3.6E-12	4.4	9.3E-13	4.1	1.1E-11	3.2	6.0E-21	2.6	9.1E-11	2.2
1982	2.2E-13	4.3	3.6E-12	4.8	9.5E-13	4.3	1.1E-11	3.1	6.0E-21	2.7	9.6E-11	2.4
1983	2.3E-13	4.0	3.7E-12	4.7	9.7E 13	4.3	1.1E-11	3.1	6.0E-21	2.5	1.3E-10	2.4
1984	2.3E-13	4.1	3.4E-12	4.7	9 0E-13	4.3	1.1E-11	2.9	6.0E-21	2.5	4.9E-11	2.1
1985	2.3E-13	3.7	3.8E-12	4.6	1.0E-12	4.3	1.1E-11	3.1	6.0E-21	2.6	1.6E-10	2.4
1986	2.3E-13	4.1	3.4E-12	4.9	8.9E-13	4.5	1.1E-11	3.2	6.0E-21	2.5	3 9E-11	2.3
1987	2.3E-13	4.0	3.5E-12	4.5	9.3E-13	4.0	1.1E-11	3.3	6.0E-21	2.6	7 3E-11	2.2
1988	2.3E-13	4.0	3.5E-12	4.6	9.1E-13	4.2	1.1E-11	3.4	6.0E-21	2.5	6 2E-11	2.3
1989	2.3E-13	4.3	3.4E-12	4.5	9.0E-13	4.4	1.1E-11	3.2	6 0E-21	2 5	3.7E-11	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium
Sector 6
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	1.7E-09	2.7	5 0E-14	4.4	6.6E-12	4 0	1.9E-14	2.6	9.3E-19	2.3
1954	1.7E-09	2.7	1 1E-13	4.2	6.6E-12	3.8	4.3E-14	2.2	9.2E-19	2.2
1955	2.8E-09	2.9	2.1E-13	3.6	1.1E-11	3.9	8.2E-14	2.1	1.6E-18	2.3
1956	1.4E-09	2.8	2.7E-13	3.9	5.5E-12	3.5	1.0E-13	2.1	7.5E-19	2.2
1957	1.0E-09	2.9	3.1E-13	3.8	4.1E-12	3.7	1.2E-13	2.0	5.5E-19	2.2
1958	2.2E-09	2.8	3.9E-13	3.8	8.8E-12	3.6	1.5E-13	2.0	1.2E-18	2.2
1959	3.7E-10	2.8	4.0E-13	3.8	1.7E-12	3.6	1.5E-13	2.0	2.0E-19	2.2
1960	4.8E-10	2.9	4.2E-13	3.6	2.1E-12	3.7	1.6E-13	2.0	2.7E-19	2.2
1961	7.1E-10	2.9	4.5E-13	3.7	3.0E-12	3.6	1.7E-13	2.0	3.9E-19	2.3
1962	5.0E-10	2.8	4.7E-13	3.8	2.2E-12	3.7	1.8E-13	1.9	2.8E-19	2.3
1963	6.7E-10	3.0	4.9E-13	3.8	2.9E-12	3.9	1.9E-13	2.0	3.7E-19	2.3
1964	3.2E-10	2.8	5.0E-13	3.6	1.5E-12	3.4	2.0E-13	1.9	1.8E-19	2.2
1965	3.8E-10	2.9	5.2E-13	4.0	1.8E-12	3.5	2.0E-13	2.0	2.1E-19	2.2
1966	1.9E-10	2.8	5.3E-13	3.7	1.0E-12	3.2	2.0E-13	2.0	1.0E-19	2.2
1967	1.9E-10	2.8	5.4E-13	3.8	1.0E-12	3.4	2.1E-13	2.0	1.0E-19	2.2
1968	1.9E-10	2.8	5.4E-13	3.6	1.0E-12	3.5	2.1E-13	1.9	1.0E-19	2.3
1969	2.2E-10	2.8	5.5E-13	3.6	1.1E-12	3.4	2.1E-13	2.0	1.2E-19	2.2
1970	2.6E-10	2.9	5.7E-13	3.6	1.3E-12	3.6	2.2E-13	1.9	1.4E-19	2.3
1971	7.9E-11	2.9	5.7E-13	4.0	5.6E-13	3.3	2.2E-13	1.9	4.3E-20	2.3
1972	5.8E-11	2.8	5.7E-13	3.8	4.5E-13	3.2	2.2E-13	1.9	3.2E-20	2.3
1973	7.4E-11	3.0	5.7E-13	3.8	5.4E-13	3.3	2.2E-13	1.9	4.0E-20	2.2
1974	1.3E-11	2.8	5.7E-13	3.9	2.3E-13	3.4	2.2E-13	1.9	6.9E-21	2.1
1975	3.8E-11	2.9	5.7E-13	3.9	3.7E-13	3.3	2.2E-13	1.9	2.1E-20	2.2
1976	1.7E-11	2.8	5.7E-13	3.7	2.6E-13	3.3	2 2E-13	2.0	9.3E-21	2.2
1977	2.6E-11	2.7	5.7E-13	3.8	3 1E-13	3.2	2.2E-13	1.9	1.4E-20	2.2
1978	4.5E-11	2.8	5.8E-13	3.8	4.1E-13	3.3	2.2E-13	1.9	2.5E-20	2.2
1979	3.6E-11	2.8	5.8E-13	3.6	3.6E-13	3.3	2.2E-13	2.0	2.0E-20	2.2
1980	2.1E-11	2.9	5.8E-13	4.0	2.8E-13	3.3	2.2E-13	1.9	1.2E-20	2.3
1981	2.4E-11	2.8	5.8E-13	3.9	3.0E-13	3.2	2.2E-13	1.9	1.3E-20	2.3
1982	2.6E-11	2.9	5.8E-13	3.9	3.1E-13	3.4	2.2E-13	1.9	1.4E-20	2.3
1983	4.2E-11	2.8	5.8E-13	3.9	4.0E-13	3.2	2.2E-13	1.9	2.3E-20	2.3
1984	7.6E-12	2.9	5 8E-13	3.7	2.1E-13	3.6	2.2E-13	1.9	4.2E-21	2.3
1985	5.4E-11	3.0	5 9E-13	3.7	4.5E-13	3 4	2.2E-13	1.9	2.9E-20	2 2
1986	4.0E-12	2.9	5.8E-13	3.6	1 8E-13	3.5	2.3E-13	1.9	2.2E-21	2.3
1987	1.7E-11	2.9	5.8E-13	3.5	2.6E-13	3.3	2.3E-13	1.9	9.3E-21	2.3
1988	1.3E-11	2.8	5.9E-13	3.8	2.4E-13	3.5	2.3E-13	1.9	6.9E-21	2 2
1989	3.5E-12	2.8	5.9E-13	3.6	1.8E-13	3.6	2 3E-13	1.9	1.9E-21	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium (continued)
Sector 6
(1953 - 1989)

Year	Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	8.8E-15	4.8	2.8E-12	5.1	7.8E-13	4.9	4.3E-13	3.9	2.3E-22	3.4	1.7E-09	2.7
1954	2.0E-14	4.2	3.0E-12	5.0	8.7E-13	4.8	9.6E-13	3.4	5.3E-22	2.9	1.7E-09	2.7
1955	3.8E-14	4.0	5.3E-12	5.6	1.5E-12	5.2	1.8E-12	3.5	1.0E-21	2.7	2.9E-09	2.8
1956	4.7E-14	4.2	3.2E-12	4.6	9.0E-13	4.5	2.3E-12	3.3	1.3E-21	2.6	1.4E-09	2.8
1957	5.4E-14	3.9	2.7E-12	5.0	7.6E-13	4.1	2.6E-12	3.2	1.4E-21	2.6	1.0E-09	2.8
1958	6.9E-14	4.2	5.0E-12	5.0	1.4E-12	4.2	3.3E-12	3.2	1.8E-21	2.6	2.3E-09	2.8
1959	7.1E-14	4.1	1.9E-12	4.8	5.2E-13	4.1	3.4E-12	3.1	1.9E-21	2.7	3.9E-10	2.7
1960	7.4E-14	4.2	2.2E-12	4.6	6.0E-13	4.1	3.6E-12	3.3	2.0E-21	2.5	5.1E-10	2.8
1961	7.9E-14	4.1	2.7E-12	4.3	7.5E-13	4.1	3.9E-12	3.1	2.1E-21	2.6	7.4E-10	2.8
1962	8.3E-14	4.1	2.3E-12	4.6	6.4E-13	4.1	4.0E-12	3.2	2.2E-21	2.7	5.3E-10	2.7
1963	8.8E-14	4.4	2.8E-12	4.6	7.6E-13	4.0	4.2E-12	3.2	2.3E-21	2.6	7.1E-10	2.9
1964	9.0E-14	4.2	2.1E-12	4.5	5.8E-13	4.1	4.3E-12	3.0	2.4E-21	2.5	3.5E-10	2.7
1965	9.2E-14	4.2	2.3E-12	4.3	6.2E-13	4.0	4.5E-12	3.2	2.5E-21	2.6	4.0E-10	2.8
1966	9.3E-14	4.1	2.0E-12	4.6	5.2E-13	4.4	4.5E-12	3.2	2.5E-21	2.6	2.1E-10	2.6
1967	9.5E-14	4.1	1.9E-12	4.6	5.2E-13	4.1	4.6E-12	2.9	2.5E-21	2.5	2.1E-10	2.6
1968	9.6E-14	3.9	2.0E-12	4.5	5.2E-13	4.4	4.7E-12	3.1	2.6E-21	2.6	2.1E-10	2.6
1969	9.8E-14	4.1	2.0E-12	4.6	5.4E-13	4.0	4.7E-12	3.3	2.6E-21	2.7	2.4E-10	2.6
1970	9.9E-14	3.8	2.1E-12	4.2	5.8E-13	4.0	4.8E-12	3.2	2.7E-21	2.5	2.9E-10	2.7
1971	1.0E-13	4.3	1.7E-12	4.9	4.6E-13	4.4	4.8E-12	3.2	2.7E-21	2.5	1.0E-10	2.5
1972	1.0E-13	4.0	1.7E-12	4.6	4.4E-13	4.1	4.9E-12	3.1	2.7E-21	2.6	7.7E-11	2.4
1973	1.0E-13	3.8	1.7E-12	4.5	4.6E-13	4.4	4.9E-12	3.1	2.7E-21	2.5	9.3E-11	2.6
1974	1.0E-13	4.3	1.6E-12	4.6	4.1E-13	4.7	4.9E-12	3.2	2.7E-21	2.5	2.8E-11	2.3
1975	1.0E-13	4.1	1.6E-12	5.0	4.3E-13	4.1	4.9E-12	3.2	2.7E-21	2.6	5.6E-11	2.4
1976	1.0E-13	4.3	1.6E-12	4.6	4.2E-13	4.2	4.9E-12	3.1	2.7E-21	2.6	3.2E-11	2.2
1977	1.0E-13	3.8	1.6E-12	4.6	4.2E-13	4.0	4.9E-12	3.1	2.7E-21	2.5	4.3E-11	2.3
1978	1.0E-13	4.2	1.7E-12	4.8	4.4E-13	4.4	4.9E-12	3.1	2.7E-21	2.6	6.4E-11	2.4
1979	1.0E-13	4.2	1.6E-12	4.9	4.3E-13	4.2	5.0E-12	3.1	2.7E-21	2.5	5.4E-11	2.3
1980	1.0E-13	3.9	1.6E-12	4.5	4.2E-13	4.4	5.0E-12	2.9	2.7E-21	2.6	3.8E-11	2.2
1981	1.0E-13	4.1	1.6E-12	4.6	4.3E-13	4.6	5.0E-12	3.2	2.7E-21	2.5	4.1E-11	2.3
1982	1.0E-13	4.0	1.6E-12	4.8	4.3E-13	4.1	5.0E-12	3.0	2.7E-21	2.5	4.3E-11	2.3
1983	1.0E-13	4.0	1.7E-12	4.9	4.5E-13	4.2	5.0E-12	3.1	2.7E-21	2.5	6.1E-11	2.4
1984	1.0E-13	4.0	1.6E-12	4.8	4.1E-13	4.5	5.0E-12	3.2	2.7E-21	2.5	2.3E-11	2.2
1985	1.0E-13	4.3	1.7E-12	4.9	4.5E-13	4.3	5.0E-12	3.1	2.8E-21	2.6	7.3E-11	2.5
1986	1.0E-13	3.9	1.6E-12	4.4	4.1E-13	4.5	5.0E-12	3.1	2.8E-21	2.4	1.8E-11	2.1
1987	1.0E-13	3.9	1.6E-12	4.8	4.2E-13	4.3	5.0E-12	3.0	2.8E-21	2.5	3.3E-11	2.2
1988	1.0E-13	4.2	1.6E-12	4.6	4.2E-13	4.5	5.0E-12	3.1	2.8E-21	2.6	2.8E-11	2.2
1989	1.0E-13	4.2	1.6E-12	4.9	4.1E-13	4.6	5.0E-12	3.2	2.8E-21	2.6	1.7E-11	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium
Sector 7
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	1.6E-09	2.8	4.8E-14	4 6	6.4E-12	3.8	1.9E-14	2.6	9.0E-19	2.2
1954	1.6E-09	2.8	1.1E-13	4.3	6 4E-12	3.7	4.1E-14	2.3	9.0E-19	2.2
1955	2.8E-09	2.8	2.1E-13	4.0	1.1E-11	3.4	8 0E 14	2.1	1.5E-18	2.3
1956	1.3E-09	2.8	2.6E-13	4.1	5.3E-12	3.8	9.9E-14	2.1	7.3E-19	2.3
1957	9.7E-10	2.9	3.0E-13	3.9	4.0E-12	3.5	1 1E-13	2.0	5.3E-19	2.4
1958	2.1E-09	2.9	3.8E-13	3.9	8.6E-12	3.7	1.5E-13	2.0	1.2E-18	2.2
1959	3.6E-10	2.8	3.9E-13	3.7	1.6E-12	3.5	1.5E-13	2.0	2.0E-19	2.2
1960	4.7E-10	2.9	4.1E-13	4.1	2.1E-12	3.5	1.6E-13	2.0	2.6E-19	2.3
1961	7.0E-10	2.9	4.4E-13	3.8	3.0E-12	3.4	1.7E-13	1.9	3.8E-19	2.3
1962	4.9E-10	2.8	4.6E-13	4 0	2.2E-12	3.6	1.8E-13	1.9	2.7E-19	2.2
1963	6.6E-10	2.9	4.8E-13	3.8	2.8E-12	3.6	1.9E-13	2.0	3.6E-19	2.3
1964	3.2E-10	3.0	4.9E-13	3.7	1.5E-12	3.6	1.9E-13	1.9	1.7E-19	2.2
1965	3.7E-10	2.7	5.1E-13	3.7	1.7E-12	3.7	2.0E-13	1.9	2.0E-19	2.3
1966	1.8E-10	2.9	5.1E-13	3.7	9.6E-13	3.4	2 0E-13	2.0	1.0E-19	2.3
1967	1.8E-10	2.9	5.2E-13	3.4	9.9E-13	3.4	2.0E-13	2.0	1.0E-19	2.2
1968	1.8E-10	2.8	5.3E-13	3.7	1.0E-12	3.5	2.0E-13	1.9	1.0E-19	2.2
1969	2.2E-10	2.9	5.4E-13	3.9	1.1E-12	3.5	2.1E-13	1.9	1.2E-19	2.3
1970	2.6E-10	2.9	5.5E-13	3.7	1.3E-12	3.5	2.1E-13	1.9	1.4E-19	2.2
1971	7.7E-11	2.8	5.5E-13	3.8	5.5E-13	3.3	2.1E-13	2.0	4.2E-20	2.3
1972	5.6E-11	2.9	5.5E-13	3.8	4.4E-13	3.3	2.1E-13	1.9	3.1E-20	2.2
1973	7.2E-11	2.9	5.6E-13	3.7	5.2E-13	3.3	2.1E-13	1.9	3.9E-20	2.3
1974	1.2E-11	2.9	5.6E-13	3.8	2.3E-13	3.3	2.1E-13	2.0	6.8E-21	2.2
1975	3.7E-11	2.8	5.6E-13	3.7	3.5E-13	3.4	2.1E-13	2.0	2.0E-20	2.2
1976	1.6E-11	2.9	5.6E-13	3.7	2.5E-13	3.4	2.1E-13	1.9	9.0E-21	2.3
1977	2.6E-11	2.9	5.6E-13	3.8	3.0E-13	3.2	2.1E-13	2.0	1.4E-20	2.2
1978	4.4E-11	2.9	5.6E-13	3.9	3.9E-13	3.3	2.2E-13	1.9	2.4E-20	2.3
1979	3.5E-11	2.8	5.6E-13	3.5	3.5E-13	3.1	2.2E-13	1.9	1.9E-20	2.2
1980	2.0E-11	3.0	5.6E-13	3.6	2.8E-13	3.2	2.2E-13	2.0	1.1E-20	2.2
1981	2.4E-11	2.8	5.6E-13	3.7	2.9E-13	3.3	2.2E-13	1.9	1.3E-20	2.3
1982	2.6E-11	3.0	5.6E-13	3.5	3.1E-13	3.5	2.2E-13	2.0	1.4E-20	2.3
1983	4.1E-11	2.9	5.7E-13	3.6	3.8E-13	3.4	2.2E-13	1.9	2.2E-20	2.2
1984	7.4E-12	2.9	5.7E-13	3.5	2.0E-13	3 6	2.2E-13	2.0	4.0E-21	2.3
1985	5.2E-11	2.8	5.7E-13	3.8	4.3E-13	3.3	2.2E-13	1.9	2.9E-20	2.2
1986	3.9E-12	2.8	5.7E-13	3.6	1 8E-13	3.6	2.2E-13	1.9	2.1E-21	2.3
1987	1.6E-11	3.1	5.7E-13	3.6	2 5E-13	3.3	2 2E-13	2.0	9.0E-21	2.3
1988	1.2E-11	2.8	5.7E-13	3.8	2.3E-13	3.4	2 2E-13	1.9	6.8E-21	2.2
1989	3.4E-12	2.8	5.7E-13	3.8	1.7E-13	4.0	2.2E-13	1.9	1.9E-21	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium (continued)
Sector 7
(1953 - 1989)

Year	Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	8.6E-15	4.7	2.7E-12	5.4	7.7E-13	5.5	4.1E-13	4.0	2.3E-22	3.2	1.7E-09	2.8
1954	1.9E-14	4.4	3.0E-12	5.6	8.4E-13	4.6	9.2E-13	3.6	5.0E-22	2.8	1.7E-09	2.7
1955	3.7E-14	4.4	5.1E-12	5.3	1.5E-12	4.7	1.8E-12	3.4	9.7E-22	2.7	2.8E-09	2.8
1956	4.6E-14	4.4	3.1E-12	5.0	8.7E-13	4.6	2.2E-12	3.3	1.2E-21	2.6	1.4E-09	2.8
1957	5.2E-14	4.2	2.6E-12	4.7	7.3E-13	4.4	2.5E-12	3.3	1.4E-21	2.7	1.0E-09	2.8
1958	6.7E-14	4.1	4.9E-12	5.2	1.4E-12	4.4	3.2E-12	3.2	1.8E-21	2.6	2.2E-09	2.8
1959	6.9E-14	4.2	1.9E-12	4.9	5.1E-13	4.1	3.4E-12	3.3	1.8E-21	2.5	3.8E-10	2.7
1960	7.3E-14	4.1	2.2E-12	4.7	5.8E-13	4.2	3.5E-12	3.3	1.9E-21	2.6	5.0E-10	2.8
1961	7.7E-14	4.3	2.6E-12	4.5	7.1E-13	4.3	3.8E-12	3.1	2.1E-21	2.6	7.3E-10	2.8
1962	8.1E-14	4.1	2.3E-12	4.8	6.3E-13	4.0	3.9E-12	3.3	2.2E-21	2.6	5.2E-10	2.7
1963	8.5E-14	4.2	2.7E-12	4.6	7.3E-13	4.4	4.1E-12	3.3	2.3E-21	2.5	6.9E-10	2.8
1964	8.7E-14	4.1	2.1E-12	4.1	5.7E-13	4.0	4.2E-12	3.3	2.3E-21	2.6	3.4E-10	2.8
1965	9.0E-14	4.2	2.2E-12	4.7	6.1E-13	4.3	4.4E-12	3.1	2.4E-21	2.5	3.9E-10	2.6
1966	9.1E-14	4.0	1.8E-12	4.4	5.0E-13	4.0	4.4E-12	3.2	2.4E-21	2.6	2.1E-10	2.7
1967	9.3E-14	4.3	1.9E-12	4.6	5.0E-13	3.7	4.5E-12	3.2	2.5E-21	2.5	2.1E-10	2.6
1968	9.4E-14	4.4	1.9E-12	4.5	5.0E-13	4.2	4.6E-12	3.1	2.5E-21	2.6	2.1E-10	2.6
1969	9.5E-14	4.1	2.0E-12	4.5	5.4E-13	4.1	4.6E-12	3.0	2.5E-21	2.5	2.4E-10	2.7
1970	9.7E-14	4.2	2.1E-12	4.5	5.7E-13	4.5	4.7E-12	3.2	2.6E-21	2.6	2.8E-10	2.7
1971	9.8E-14	4.2	1.7E-12	4.7	4.6E-13	4.7	4.7E-12	3.2	2.6E-21	2.5	9.7E-11	2.5
1972	9.8E-14	4.1	1.7E-12	4.4	4.4E-13	3.9	4.8E-12	3.3	2.6E-21	2.5	7.5E-11	2.5
1973	9.8E-14	3.9	1.7E-12	4.4	4 4E-13	4.4	4.8E-12	3.1	2.6E-21	2.5	9.1E-11	2.5
1974	9.8E-14	4.0	1.5E-12	4.7	4.0E-13	4.4	4.8E-12	3.0	2.6E-21	2.5	2.7E-11	2.2
1975	9.9E-14	4.2	1.6E-12	4.8	4.2E-13	4.1	4.8E-12	3.0	2.6E-21	2.5	5.4E-11	2.3
1976	9.9E-14	4.0	1.5E-12	4.7	4.1E-13	4.3	4.8E-12	3.1	2.6E-21	2.5	3.2E-11	2.3
1977	9.9E-14	4.2	1.6E-12	4.9	4.1E-13	4.3	4.8E-12	3.3	2.6E-21	2.6	4.3E-11	2.4
1978	9.9E-14	3.8	1.6E-12	4.4	4.3E-13	4.2	4.8E-12	3.2	2.6E-21	2.5	6.2E-11	2.4
1979	9.9E-14	4.1	1.6E-12	4.4	4.2E-13	4.1	4.8E-12	3.1	2.6E-21	2.5	5.2E-11	2.3
1980	1.0E-13	4.0	1.6E-12	4.7	4.1E-13	4.3	4.8E-12	3.1	2.7E-21	2.5	3.7E-11	2.3
1981	1.0E-13	4.0	1.6E-12	4.7	4.1E-13	4.3	4.8E-12	3.1	2.7E-21	2.5	4.0E-11	2.2
1982	1.0E-13	4.2	1.6E-12	4.2	4.2E-13	4.2	4.8E-12	3.1	2.7E-21	2.4	4.2E-11	2.3
1983	1.0E-13	4.2	1.6E-12	4.5	4.3E-13	4.5	4.9E-12	3.1	2.7E-21	2.6	5.9E-11	2.4
1984	1.0E-13	4.2	1.5E-12	4.7	4.0E-13	4.6	4.9E-12	3.1	2.7E-21	2.5	2.2E-11	2.1
1985	1.0E-13	4.4	1.7E-12	4.8	4.4E-13	4.2	4 9E-12	3.2	2.7E-21	2.5	7.1E-11	2.4
1986	1.0E-13	4.3	1.5E-12	4.7	4.0E-13	4 4	4.9E-12	3.0	2.7E-21	2.5	1.7E-11	2.2
1987	1.0E-13	4.2	1.6E-12	4.8	4.1E-13	4.6	4.9E-12	3 2	2.7E-21	2.6	3.3E-11	2.3
1988	1.0E-13	4.1	1.6E-12	4.5	4.1E-13	4 0	4.9E-12	3.1	2.7E-21	2.6	2.7E-11	2.2
1989	1.0E-13	4.0	1.5E-12	4.6	4.0E-13	4.4	4.9E-12	2.9	2.7E-21	2.4	1.6E-11	2 1

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium
Sector 8
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	5.5E-09	2 9	1.6E 13	4 4	2.1E-11	4 1	6 3E-14	2 5	3.0E-18	2.3
1954	5.5E-09	2 7	3.7E-13	4 0	2.2E-11	3 7	1 4E-13	2 2	3.0E-18	2.2
1955	9.3E-09	2 9	7.0E-13	3 9	3.7E 11	3 8	2 7E-13	2.1	5.1E-18	2.3
1956	4.5E-09	2.9	8 7E-13	4.1	1.8E-11	3.9	3.4E 13	2.1	2.5E-18	2.3
1957	3.3E-09	2.9	1.0E-12	3.8	1.3E-11	3.6	3.9E-13	2.0	1.8E-18	2.3
1958	7.2E-09	2.9	1.3E-12	3.6	2.9E-11	4.0	4.9E-13	2.0	4.0E-18	2.3
1959	1.2E-09	2.8	1.3E-12	3.8	5.4E-12	3.4	5.1E-13	2.1	6.6E-19	2.2
1960	1.6E-09	2.9	1.4E-12	3.9	7.0E-12	3.4	5.3E-13	2.0	8.7E-19	2.2
1961	2.4E-09	2.9	1.5E-12	3.8	1.0E-11	3 5	5.7E-13	2.0	1.3E-18	2.2
1962	1.7E-09	2.9	1.5E-12	3 6	7.4E-12	3.6	5.9E-13	2.0	9.1E-19	2.3
1963	2.2E-09	2.9	1.6E-12	3.8	9.5E-12	3.7	6.2E-13	1.9	1.2E-18	2.3
1964	1.1E-09	2.9	1.7E-12	3.8	5 1E-12	3.4	6.4E-13	2.0	5.9E-19	2.3
1965	1.2E-09	3.0	1.7E-12	3.8	5.8E-12	3.7	6.6E-13	2.0	6.8E-19	2.3
1966	6.2E-10	2.8	1.7E-12	3 6	3.3E-12	3.4	6.7E-13	2.0	3.4E-19	2.2
1967	6.2E-10	2.9	1.8E-12	3.9	3.4E-12	3.5	6.8E-13	2.0	3.4E-19	2.3
1968	6.2E-10	2.8	1.8E-12	3.6	3.3E-12	3.3	6.9E-13	2.0	3.4E-19	2.2
1969	7.2E-10	3.0	1.8E-12	4.1	3.7E-12	3.4	7.0E-13	2.0	4.0E-19	2.3
1970	8.6E-10	2.8	1.8E-12	3.9	4.4E-12	3.4	7.1E-13	1.9	4.7E-19	2.2
1971	2.6E-10	2.8	1.9E-12	3.6	1.9E-12	3.2	7.1E-13	2.0	1.4E-19	2.2
1972	1.9E-10	2.8	1.9E-12	3.5	1.5E-12	3.2	7.2E-13	2.0	1.0E-19	2.3
1973	2.4E-10	2.8	1.9E-12	3.6	1.8E-12	3.4	7.2E-13	2.0	1.3E-19	2.2
1974	4.1E-11	3.0	1.9E-12	3.9	7.8E-13	3.3	7.2E-13	2.0	2.3E-20	2.3
1975	1.2E-10	2.9	1.9E-12	3 7	1.2E-12	3.2	7.2E-13	1.9	6.8E-20	2.3
1976	5.5E-11	2 9	1.9E-12	3.7	8.4E-13	3.4	7.2E-13	2.0	3.0E-20	2.3
1977	8.6E-11	2.8	1.9E-12	3.7	1.0E-12	3.4	7.2E-13	1.9	4.7E-20	2.2
1978	1.5E-10	3.0	1.9E-12	3.6	1.4E-12	3.1	7.3E-13	2.0	8.1E-20	2.3
1979	1.2E-10	2.9	1.9E-12	3.8	1.2E-12	3.3	7.3E-13	1.9	6.4E-20	2.3
1980	6.9E-11	2.8	1.9E-12	3.8	9.2E-13	3.2	7.3E-13	1.9	3.8E-20	2.2
1981	7.9E-11	3.0	1 9E-12	3.8	9.8E-13	3.5	7.3E-13	2.0	4.4E-20	2.2
1982	8.6E-11	2.9	1 9E-12	3.8	1.0E-12	3.1	7.3E-13	2.0	4.7E-20	2.2
1983	1.4E-10	2.8	1.9E-12	3.6	1.3E-12	3.2	7.3E-13	1.9	7.6E-20	2.2
1984	2.5E-11	2.9	1.9E-12	3.9	6.7E-13	3.5	7.4E-13	2.0	1.4E-20	2.3
1985	1.8E-10	2.9	1.9E-12	3.8	1.5E-12	3 3	7.4E-13	1.9	9.7E-20	2.2
1986	1.3E-11	2.8	1.9E-12	3.6	5 9E-13	3.7	7.4E-13	2.0	7.2E-21	2.2
1987	5.5E-11	2.8	1.9E-12	3.6	8.6E-13	3.3	7.4E-13	1.9	3.0E-20	2.2
1988	4.2E-11	2.9	1.9E-12	3.6	7 8E-13	3.2	7.4E-13	1 9	2.3E-20	2.2
1989	1.1E-11	2.8	1.9E-12	3.7	5.8E-13	3.7	7.4E-13	2.0	6.2E-21	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium (continued)
Sector 8
(1953 - 1989)

Year	Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	2.9E-14	4.9	9.1E-12	5.3	2.6E-12	4.5	1.4E-12	3.8	7.7E-22	3.0	5.6E-09	2.9
1954	6.5E-14	4.5	1.0E-11	5.3	2.8E-12	4.7	3.2E-12	3.3	1.7E-21	2.8	5.6E-09	2.7
1955	1.2E-13	4.4	1.7E-11	5.0	4.9E-12	4.9	6.0E-12	3.4	3.3E-21	2.7	9.5E-09	2.8
1956	1.5E-13	4.3	1.0E-11	5.0	3.0E-12	4.7	7.5E-12	3.3	4.1E-21	2.8	4.6E-09	2.8
1957	1.8E-13	4.1	8.9E-12	4.5	2.5E-12	4.4	8.6E-12	3.1	4.7E-21	2.6	3.4E-09	2.8
1958	2.3E-13	4.2	1.6E 11	5.7	4.6E-12	4.3	1.1E-11	3.3	6.0E-21	2.6	7.4E-09	2.8
1959	2.3E-13	4.2	6.3E-12	4.6	1.7E-12	4.1	1.1E-11	3 5	6.2E-21	2.7	1.3E-09	2.7
1960	2.4E-13	4.2	7.2E-12	4.8	2.0E-12	4.2	1.2E-11	3.2	6.5E-21	2.6	1.7E-09	2.8
1961	2.6E-13	4.3	9.1E-12	4.8	2.5E-12	4.2	1.3E-11	3.2	6.9E-21	2.6	2.5E-09	2.8
1962	2.7E-13	4.2	7.8E-12	4.4	2.1E-12	4.3	1.3E-11	3.2	7.2E-21	2.6	1.7E-09	2.8
1963	2.9E-13	4.3	9.1E-12	4.9	2.5E-12	4.4	1.4E-11	3.2	7.6E-21	2.7	2.3E-09	2.8
1964	3.0E-13	4.1	6.9E-12	4.5	1.9E-12	4.0	1.4E-11	3.0	7.8E-21	2.6	1.2E-09	2.8
1965	3.0E-13	4.1	7.5E-12	4.5	2.0E-12	3.9	1.5E-11	3.3	8.1E-21	2.6	1.3E-09	2.9
1966	3.1E-13	4.1	6.3E-12	4.7	1.7E-12	4.4	1.5E-11	3.2	8.2E-21	2.5	7.0E-10	2.6
1967	3.1E-13	4.3	6.3E-12	4.5	1.7E-12	4.1	1.5E-11	3.2	8.3E-21	2.7	6.9E-10	2.7
1968	3.1E-13	4.1	6.4E-12	4.5	1.7E-12	4.2	1.5E-11	3.2	8.4E-21	2.5	6.9E-10	2.6
1969	3.2E-13	3.9	6.7E-12	4.9	1.8E-12	3.9	1.6E-11	3.2	8.6E-21	2.5	8.0E-10	2.8
1970	3.2E-13	4.1	7.2E-12	4.5	1.9E-12	4.0	1.6E-11	3.1	8.7E-21	2.6	9.4E-10	2.6
1971	3.3E-13	4.4	5.8E-12	4.4	1.5E-12	4.5	1.6E-11	3.1	8.7E-21	2.5	3.3E-10	2.4
1972	3.3E-13	4.0	5.6E-12	4.7	1.5E-12	4 2	1.6E-11	3.0	8.8E-21	2.6	2.5E-10	2.4
1973	3.3E-13	4.1	5.7E-12	4.3	1.5E-12	4.2	1.6E-11	3.1	8.8E-21	2.5	3.1E-10	2.4
1974	3.3E-13	3.9	5.1E-12	4.7	1.3E-12	4.2	1.6E-11	3.2	8.8E-21	2.6	9.1E-11	2.3
1975	3.3E-13	4.1	5.4E-12	4.7	1.4E-12	4.6	1.6E-11	3.3	8.8E-21	2.7	1.8E-10	2.4
1976	3.3E-13	4.2	5.2E-12	4.9	1.4E-12	4.5	1.6E-11	3.1	8.9E-21	2.6	1.1E-10	2.2
1977	3.3E-13	4.4	5.3E-12	4.5	1.4E-12	4.2	1.6E-11	3.3	8.9E-21	2.5	1.4E-10	2.3
1978	3.3E-13	3.9	5.5E-12	4.7	1.4E-12	4.1	1.6E-11	3.1	8.9E-21	2.6	2.1E-10	2.5
1979	3.4E-13	4.2	5.4E-12	4.4	1.4E-12	4.1	1.6E-11	3.1	8.9E-21	2.4	1.7E-10	2.4
1980	3.4E-13	3.9	5.3E-12	4.1	1.4E-12	4.2	1.6E-11	3.1	8.9E-21	2.6	1.2E-10	2.2
1981	3.4E-13	4.2	5.3E-12	4.6	1.4E-12	4.5	1.6E-11	3.1	8.9E-21	2.5	1.4E-10	2.4
1982	3.4E-13	4.0	5.3E-12	4 2	1.4E-12	4.4	1.6E-11	3.1	8.9E-21	2.6	1.4E-10	2.3
1983	3.4E-13	4.0	5.5E-12	4.3	1.4E-12	4.2	1.6E-11	3.2	9.0E-21	2.6	2.0E-10	2.3
1984	3.4E-13	4.3	5.2E-12	4.6	1.4E-12	4.4	1.6E-11	3.0	9.0E-21	2.5	7.3E-11	2.2
1985	3.4E-13	4.4	5.7E-12	4.6	1.5E-12	4.3	1.6E-11	3.1	9.0E-21	2.6	2.4E-10	2.4
1986	3.4E-13	4.0	5.1E-12	4.6	1.3E-12	4.2	1.6E-11	3.1	9.0E-21	2.6	5.7E-11	2.2
1987	3.4E-13	4.1	5.3E-12	4.6	1.4E-12	4.5	1.6E-11	3.0	9.0E-21	2.5	1.1E-10	2 2
1988	3.4E-13	4.0	5.2E-12	5.0	1.4E-12	4.3	1.6E-11	3.1	9 0E-21	2.4	9.4E-11	2 2
1989	3.4E-13	4.1	5.2E-12	4.4	1.3E-12	4.4	1.6E-11	3 1	9.0E-21	2.4	5.5E-11	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium
Sector 9
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	1.9E-09	2.8	5 6E-14	4.4	7 4E-12	3.8	2.2E-14	2.7	1.0E-18	2.2
1954	1.9E-09	2.8	1.3E-13	4.1	7.5E-12	3.5	4.8E-14	2.3	1.0E-18	2.2
1955	3.2E-09	3.0	2.4E-13	4 1	1.3E-11	3.7	9.2E-14	2.1	1.8E-18	2.2
1956	1.5E-09	2.9	3.0E-13	4.0	6.2E-12	3.7	1.2E-13	2.1	8.5E-19	2.3
1957	1.1E-09	3.0	3.4E-13	3.5	4.6E-12	3.8	1.3E-13	2.1	6.2E-19	2.3
1958	2.5E-09	2.9	4.4E-13	3.7	1.0E-11	3.8	1.7E-13	2.0	1.4E-18	2.2
1959	4.2E-10	3.0	4.5E-13	3.7	1.9E-12	3.3	1.7E-13	2.0	2.3E-19	2.2
1960	5.5E-10	2.9	4.7E-13	3.7	2.4E-12	3.8	1.8E-13	2.0	3.0E-19	2.2
1961	8.1E-10	2.9	5.1E-13	3.6	3.5E-12	3.5	2.0E-13	2.0	4.4E-19	2.2
1962	5.7E-10	2.8	5.3E-13	3.7	2.6E-12	3.4	2.0E-13	2.0	3.1E-19	2.3
1963	7.6E-10	2.9	5.6E-13	3.8	3.3E-12	3.4	2.2E-13	1.9	4.2E-19	2.3
1964	3.7E-10	2.8	5.7E-13	3.7	1.8E-12	3.4	2.2E-13	2.0	2.0E-19	2.2
1965	4.3E-10	2.9	5.9E-13	4.0	2.0E-12	3.3	2.3E-13	1.9	2.4E-19	2.2
1966	2.1E-10	2.8	6.0E-13	3.7	1.1E-12	3.3	2.3E-13	2.0	1.2E-19	2.2
1967	2.1E-10	2.9	6.1E-13	3 8	1.2E-12	3.5	2.3E-13	1.9	1.2E-19	2.2
1968	2.1E-10	2.9	6.2E-13	3.8	1.1E-12	3.6	2.4E-13	1.9	1.2E-19	2.3
1969	2.5E-10	2.8	6.2E-13	3.8	1.3E-12	3 5	2.4E-13	1.9	1.4E-19	2.2
1970	3.0E-10	2.9	6.4E-13	3.7	1.5E-12	3.2	2.4E-13	1.9	1.6E-19	2.2
1971	8.9E-11	2.8	6.4E-13	3 6	6.2E-13	3.4	2.5E-13	1.9	4.9E-20	2.3
1972	6.5E-11	2.8	6.4E-13	3 7	5.2E-13	3.2	2.5E-13	1.9	3.6E-20	2.2
1973	8.3E-11	2.8	6.4E-13	3.7	6.0E-13	3.4	2.5E-13	2.0	4.6E-20	2.3
1974	1.4E-11	2.8	6.4E-13	3.9	2.6E-13	3.5	2.5E-13	2.0	7.8E-21	2.2
1975	4.3E-11	2.8	6.5E-13	3.8	4.1E-13	3.2	2.5E-13	2.0	2.4E-20	2.3
1976	1.9E-11	2.8	6.5E-13	4.0	3.0E-13	3.3	2.5E-13	2.0	1.0E-20	2.2
1977	3.0E-11	2.9	6.5E-13	4.0	3.5E-13	3.3	2.5E-13	2.0	1.6E-20	2.2
1978	5.1E-11	2.9	6.5E-13	3.7	4.5E-13	3.3	2.5E-13	1.9	2.8E-20	2.3
1979	4.1E-11	2.9	6.5E-13	3.9	4.1E-13	3.4	2.5E-13	1.9	2.2E-20	2.3
1980	2.4E-11	2.7	6.5E-13	3.9	3.2E-13	3.4	2.5E-13	2.0	1.3E-20	2.3
1981	2.7E-11	2.9	6.5E-13	3.8	3.4E-13	3.3	2.5E-13	1.9	1.5E-20	2.2
1982	3.0E-11	2.9	6.5E-13	3.7	3.6E-13	3.4	2.5E-13	1.9	1.6E-20	2.2
1983	4.8E-11	2.8	6.6E-13	4.1	4.4E-13	3.0	2.5E-13	2.0	2.6E-20	2.2
1984	8.6E-12	2.9	6.6E-13	3.7	2.3E-13	3.3	2.5E-13	1.9	4.7E-21	2.3
1985	6.1E-11	2.8	6.6E-13	3.5	5.1E-13	3.6	2.5E-13	2.0	3.3E-20	2.2
1986	4.5E-12	2.9	6.6E-13	3.8	2.0E-13	3.7	2 5E-13	2.0	2.5E-21	2.2
1987	1.9E-11	2.9	6.6E-13	3.8	3.0E-13	3.4	2.6E-13	2.0	1.0E-20	2.2
1988	1.4E-11	2.8	6.6E-13	3.7	2.7E-13	3.5	2.5E-13	1.9	7.8E-21	2.2
1989	3.9E-12	2.9	6.6E-13	3.8	2.0E-13	3.8	2.6E-13	1.9	2.2E-21	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium (continued)
Sector 9
(1953 - 1989)

Year	Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	9.9E-15	4.5	3.2E-12	5.6	9.0E 13	5.2	4.8E-13	3.8	2.6E-22	3.2	1.9E-09	2.8
1954	2.2E-14	4.6	3.5E-12	5.1	9.8E-13	4.7	1.1E-12	3.5	5.9E-22	2.8	1.9E-09	2.7
1955	4.2E-14	4.6	5.9E-12	4.8	1.7E-12	4.7	2.1E-12	3.2	1.1E-21	2.7	3.3E-09	2.9
1956	5.3E-14	4.4	3.6E-12	4.6	1.0E-12	4.4	2.6E-12	3.2	1.4E-21	2.6	1.6E-09	2.8
1957	6.1E-14	4.4	3.2E-12	4.8	8.7E-13	4.2	3.0E-12	3.4	1.6E-21	2.7	1.2E-09	2.9
1958	7.8E-14	4.7	5.6E-12	4.8	1.6E-12	4.4	3.7E-12	3.2	2.1E-21	2.5	2.6E-09	2.8
1959	8.0E-14	4.5	2.1E-12	4.7	5.9E-13	4.2	3.9E-12	3.3	2.1E-21	2.7	4.4E-10	2.8
1960	8.4E-14	4.3	2.5E-12	4.6	6.9E-13	4.3	4.1E-12	3.0	2.2E-21	2.5	5.8E-10	2.8
1961	9.0E-14	4.1	3.1E-12	4.5	8.4E-13	4.3	4.4E-12	3.3	2.4E-21	2.6	8.4E-10	2.8
1962	9.4E-14	4.2	2.7E-12	4.6	7.4E-13	4.2	4.5E-12	3.1	2.5E-21	2.6	6.0E-10	2.7
1963	9.9E-14	4.3	3.2E-12	4.3	8.8E-13	4.3	4.8E-12	3.2	2.6E-21	2.5	8.0E-10	2.8
1964	1.0E-13	4.0	2.4E-12	4.6	6.5E-13	4.2	4.9E-12	3.2	2.7E-21	2.5	4.0E-10	2.7
1965	1.0E-13	4.0	2.6E-12	4.5	7.0E-13	4.2	5.1E-12	3.2	2.8E-21	2.5	4.6E-10	2.7
1966	1.1E-13	4.0	2.2E-12	4.6	5.8E-13	4.3	5.1E-12	3.1	2.8E-21	2.5	2.4E-10	2.6
1967	1.1E-13	4.1	2.2E-12	4.6	5.9E-13	4.2	5.2E-12	3.2	2.9E-21	2.7	2.4E-10	2.7
1968	1.1E-13	4.3	2.2E-12	4.9	6.0E-13	4.3	5.3E-12	3.2	2.9E-21	2.6	2.4E-10	2.6
1969	1.1E-13	4.5	2.3E-12	4.8	6.2E-13	4.2	5.4E-12	3.1	2.9E-21	2.5	2.8E-10	2.6
1970	1.1E-13	4.0	2.4E-12	4.7	6.6E-13	4.2	5.5E-12	3.0	3.0E-21	2.6	3.3E-10	2.8
1971	1.1E-13	3.9	2.0E-12	4.6	5.3E-13	4.0	5.5E-12	3.2	3.0E-21	2.5	1.1E-10	2.5
1972	1.1E-13	4.0	1.9E-12	4.8	5.1E-13	4.5	5.5E-12	3.0	3.0E-21	2.5	8.7E-11	2.5
1973	1.1E-13	4.0	2.0E-12	4.6	5.2E-13	4.1	5.5E-12	3.2	3.0E-21	2.6	1.1E-10	2.5
1974	1.1E-13	4.2	1.8E-12	4.5	4.6E-13	4.7	5.5E-12	3.0	3.0E-21	2.5	3.1E-11	2.2
1975	1.1E-13	4.0	1.9E-12	4.4	4.9E-13	4.5	5.6E-12	3.2	3.0E-21	2.6	6.3E-11	2.4
1976	1.2E-13	4.1	1.8E-12	4.5	4.7E-13	4.5	5.6E-12	3.0	3.0E-21	2.6	3.7E-11	2.2
1977	1.2E-13	4.1	1.8E-12	5.0	4.8E-13	4.3	5.6E-12	3.3	3.1E-21	2.6	4.9E-11	2.4
1978	1.2E-13	4.1	1.9E-12	4.6	5.0E-13	4.4	5.6E-12	3.1	3.1E-21	2.6	7.2E-11	2.4
1979	1.2E-13	4.1	1.9E-12	4.5	4.9E-13	4.4	5.6E-12	3.3	3.1E-21	2.6	6.1E-11	2.4
1980	1.2E-13	4.0	1.8E-12	5.0	4.8E-13	4.3	5.6E-12	3.0	3.1E-21	2.5	4.3E-11	2.2
1981	1.2E-13	4.2	1.8E-12	4.5	4.8E-13	4.1	5.6E-12	3.0	3.1E-21	2.6	4.6E-11	2.3
1982	1.2E-13	4.1	1.9E-12	4.7	4.8E-13	4.2	5.6E-12	3 1	3.1E-21	2.6	4.9E-11	2.3
1983	1.2E-13	4.0	1.9E-12	4.6	5.0E-13	4.0	5.6E-12	3.1	3.1E-21	2.4	6.8E-11	2.4
1984	1.2E-13	4.0	1.8E-12	4.6	4.6E-13	4.6	5.6E-12	3.1	3.1E-21	2.6	2.5E-11	2.2
1985	1.2E-13	4.1	1.9E-12	4.7	5.1E-13	4.2	5.7E-12	3 2	3.1E-21	2.6	8.3E-11	2.4
1986	1.2E-13	4.1	1.8E-12	4.5	4.6E-13	4.4	5.7E-12	3.2	3.1E-21	2.6	2.0E-11	2.2
1987	1.2E-13	4.1	1.8E-12	4.4	4.8E-13	4.4	5.7E-12	3.1	3.1E-21	2.4	3.7E-11	2.3
1988	1.2E-13	4.0	1.8E-12	4.8	4.7E-13	4.7	5.7E-12	3.0	3.1E-21	2.4	3.2E-11	2 1
1989	1.2E-13	4.2	1.8E-12	4.8	4.6E-13	4.6	5.7E-12	3 2	3.1E-21	2 5	2.0E-11	2 2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium
Sector 10
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	8.3E-10	2.8	2.4E-14	4.3	3.2E-12	3.9	9.4E-15	2.5	4.5E-19	2.3
1954	8.3E-10	2.9	5.5E-14	4.1	3.2E-12	4.0	2.1E-14	2.1	4.5E-19	2.2
1955	1.4E-09	2.8	1.0E-13	4.0	5.5E-12	3.9	4.0E-14	2.0	7.7E-19	2.3
1956	6.7E-10	2.8	1.3E-13	3.7	2.7E-12	3.9	5.0E-14	2.0	3.7E-19	2.3
1957	4.9E-10	3.0	1.5E-13	3.7	2.0E-12	3.7	5.7E-14	2.0	2.7E-19	2.2
1958	1.1E-09	2.9	1.9E-13	3.7	4.3E-12	3.8	7.3E-14	2.0	6.0E-19	2.2
1959	1.8E-10	2.8	2.0E-13	3.9	8.2E-13	3.6	7.6E-14	2.0	9.9E-20	2.3
1960	2.4E-10	2.8	2.1E-13	3.8	1.1E-12	3.7	7.9E-14	2.0	1.3E-19	2.2
1961	3.5E-10	2.8	2.2E-13	3.9	1.5E-12	3.6	8.5E-14	1.9	1.9E-19	2.2
1962	2.5E-10	2.9	2.3E-13	3.6	1.1E-12	3.5	8.8E-14	1.9	1.4E-19	2.2
1963	3.3E-10	2.9	2.4E-13	3.6	1.4E-12	3.6	9.3E-14	1.9	1.8E-19	2.2
1964	1.6E-10	2.9	2.5E-13	3.8	7.5E-13	3.4	9.6E-14	2.0	8.8E-20	2.3
1965	1.9E-10	2.8	2.6E-13	3.6	8.6E-13	3.5	9.9E-14	2.0	1.0E-19	2.2
1966	9.3E-11	2.8	2.6E-13	3.9	5.0E-13	3.4	1.0E-13	2.0	5.1E-20	2.2
1967	9.3E-11	2.9	2.6E-13	3.7	5.0E-13	3.2	1.0E-13	1.9	5.1E-20	2.3
1968	9.3E-11	2.9	2.7E-13	3.6	5.0E-13	3.5	1.0E-13	1.9	5.1E-20	2.3
1969	1.1E-10	3.0	2.7E-13	3.7	5.6E-13	3.5	1.0E-13	2.0	6.0E-20	2.3
1970	1.3E-10	2.9	2.8E-13	3.6	6.5E-13	3.5	1.1E-13	1.9	7.1E-20	2.3
1971	3.9E-11	2.8	2.8E-13	3.9	2.7E-13	3.2	1.1E-13	2.0	2.1E-20	2.2
1972	2.8E-11	2.9	2.8E-13	3.8	2.3E-13	3.2	1.1E-13	2.0	1.6E-20	2.2
1973	3.6E-11	2.7	2.8E-13	3.7	2.6E-13	3.3	1.1E-13	1.9	2.0E-20	2.3
1974	6.2E-12	2.8	2.8E-13	3.8	1.1E-13	3.1	1.1E-13	2.0	3.4E-21	2.3
1975	1.9E-11	2.9	2.8E-13	3.9	1.8E-13	3.3	1.1E-13	2.0	1.0E-20	2.3
1976	8.3E-12	2.9	2.8E-13	3.8	1.3E-13	3.4	1.1E-13	1.9	4.5E-21	2.2
1977	1.3E-11	2.9	2.8E-13	3.7	1.5E-13	3.3	1.1E-13	1.9	7.1E-21	2.3
1978	2.2E-11	2.9	2.8E-13	3.7	1.9E-13	3.3	1.1E-13	1.9	1.2E-20	2.3
1979	1.8E-11	2.8	2.8E-13	3.9	1.7E-13	3.2	1.1E-13	2.0	9.6E-21	2.3
1980	1.0E-11	2.8	2.8E-13	3.9	1.4E-13	3.4	1.1E-13	1.9	5.7E-21	2.2
1981	1.2E-11	2.7	2.8E-13	3.7	1.5E-13	3.3	1.1E-13	1.9	6.5E-21	2.2
1982	1.3E-11	2.7	2.8E-13	3.8	1.5E-13	3.3	1.1E-13	1.9	7.1E-21	2.3
1983	2.1E-11	2.8	2.8E-13	3.6	1.9E-13	3.3	1.1E-13	1.9	1.1E-20	2.3
1984	3.7E-12	2.8	2.9E-13	4.1	1.0E-13	3.5	1.1E-13	1.9	2.0E-21	2.3
1985	2.6E-11	2.9	2.9E-13	3.8	2.2E-13	3.2	1.1E-13	1.9	1.4E-20	2.2
1986	2.0E-12	3.0	2.9E-13	3.6	8.8E-14	3.7	1.1E-13	2.0	1.1E-21	2.2
1987	8.3E-12	2.9	2.9E-13	3.6	1.3E-13	3.4	1.1E-13	1.9	4.6E-21	2.3
1988	6.2E-12	2.9	2.9E-13	3.5	1.2E-13	3.5	1.1E-13	1.9	3.4E-21	2.3
1989	1.7E-12	2.8	2.9E-13	3.7	8.6E-14	3.6	1.1E-13	1.9	9.4E-22	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium (continued)
Sector 10
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	4.3E-15	4.6	1.4E-12	5.6	3.9E-13	5.1	2.1E-13	3.7	1.2E-22	3.0	8.4E-10	2.8
1954	9.7E-15	4.2	1.5E-12	5.2	4 3E-13	4.9	4.7E-13	3.5	2.6E-22	2.7	8.4E-10	2.8
1955	1.9E-14	4.1	2.6E-12	5.1	7.3E-13	4.9	9.0E-13	3.1	4.9E-22	2.7	1.4E-09	2.8
1956	2.3E-14	4.1	1.6E-12	4.7	4.4E-13	4.5	1.1E-12	3.4	6.2E-22	2.6	6.9E-10	2.8
1957	2.7E-14	4.0	1.3E-12	4.7	3.7E-13	4.7	1.3E-12	3.2	7.0E-22	2.5	5.1E-10	2.9
1958	3.4E-14	4.3	2.4E-12	5.0	6.9E-13	4.7	1.6E-12	3.2	8.9E-22	2.5	1.1E-09	2.9
1959	3.5E-14	4.2	9.4E-13	4.4	2.6E-13	3.8	1.7E-12	3.5	9.3E-22	2.6	1.9E-10	2.7
1960	3.7E-14	4.1	1.1E-12	4.7	3.0E-13	4.6	1.8E-12	3.4	9.7E-22	2.7	2.5E-10	2.8
1961	3.9E-14	4.0	1.3E-12	4.5	3.7E-13	4.0	1.9E-12	3.1	1.0E-21	2.6	3.7E-10	2.7
1962	4.1E-14	3.9	1.2E-12	4.1	3.2E-13	4.1	2.0E-12	3.2	1.1E-21	2.6	2.6E-10	2.8
1963	4.3E-14	4.2	1.4E-12	4.8	3.8E-13	4.1	2.1E-12	3.1	1.1E-21	2.5	3.5E-10	2.8
1964	4.4E-14	4.2	1.0E-12	4.4	2.8E-13	4.4	2.1E-12	3.1	1.2E-21	2.5	1.7E-10	2.8
1965	4.5E-14	4.1	1.1E-12	4.6	3.1E-13	4.2	2.2E-12	3.0	1.2E-21	2.6	2.0E-10	2.6
1966	4.6E-14	4.4	9.4E-13	4.8	2.5E-13	4.2	2.2E-12	3.1	1.2E-21	2.5	1.0E-10	2.6
1967	4.7E-14	4.1	9.3E-13	4.5	2.5E-13	4.2	2.3E-12	3.4	1.2E-21	2.5	1.0E-10	2.7
1968	4.7E-14	4.3	9.5E-13	4.7	2.5E-13	4.0	2.3E-12	3.2	1.3E-21	2.5	1.0E-10	2.7
1969	4.8E-14	4.3	1.0E-12	4.6	2.8E-13	4.0	2.3E-12	3.3	1.3E-21	2.5	1.2E-10	2.8
1970	4.9E-14	3.9	1.0E-12	4.3	2.8E-13	3.8	2.4E-12	3.2	1.3E-21	2.5	1.4E-10	2.7
1971	4.9E-14	3.9	8.6E-13	4.5	2.3E-13	3.9	2.4E-12	3.1	1.3E-21	2.5	4.8E-11	2.5
1972	4.9E-14	4.0	8.2E-13	4.6	2.2E-13	4.5	2.4E-12	3.0	1.3E-21	2.5	3.8E-11	2.4
1973	5.0E-14	4.0	8.5E-13	4.5	2.3E-13	4.5	2.4E-12	3.2	1.3E-21	2.5	4.6E-11	2.4
1974	5.0E-14	4.0	7.7E-13	4.9	2.0E-13	4.5	2.4E-12	3.0	1.3E-21	2.6	1.4E-11	2.2
1975	5.0E-14	3.9	8.0E-13	4.5	2.1E-13	4.1	2.4E-12	3.0	1.3E-21	2.6	2.7E-11	2.4
1976	5.0E-14	4.1	7.8E-13	4.6	2.0E-13	4.3	2.4E-12	3.0	1.3E-21	2.5	1.6E-11	2.2
1977	5.0E-14	4.1	7.9E-13	4.5	2.1E-13	4.2	2.4E-12	3.1	1.3E-21	2.5	2.1E-11	2.3
1978	5.0E-14	3.9	8.2E-13	4.4	2.2E-13	4.4	2.4E-12	3.2	1.3E-21	2.4	3.1E-11	2.5
1979	5.0E-14	3.8	8.1E-13	4.8	2.1E-13	4.3	2.4E-12	3.1	1.3E-21	2.6	2.7E-11	2.4
1980	5.0E-14	4.1	7.9E-13	4.8	2.1E-13	4.3	2.4E-12	3.2	1.3E-21	2.6	1.9E-11	2.3
1981	5.0E-14	4.0	8.0E-13	4.6	2.1E-13	4.4	2.4E-12	3.1	1.3E-21	2.5	2.0E-11	2.2
1982	5.1E-14	4.3	8.0E-13	4.6	2.1E-13	4.3	2.4E-12	2.9	1.3E-21	2.5	2.1E-11	2.2
1983	5.1E-14	4.1	8.2E-13	4.6	2.2E-13	4.3	2.4E-12	3.2	1.3E-21	2.6	3.0E-11	2.4
1984	5.0E-14	4.0	7.8E-13	4.6	2.0E-13	4.1	2.4E-12	3.3	1.3E-21	2.6	1.1E-11	2.2
1985	5.1E-14	4.0	8.4E-13	4.4	2.2E-13	4.3	2 5E-12	3.3	1.3E-21	2.6	3.6E-11	2.4
1986	5.1E-14	4.1	7.7E-13	4.3	2.0E-13	4.3	2.5E-12	3 2	1.3E-21	2.5	8.8E-12	2.1
1987	5.1E-14	4.1	7.9E-13	4.4	2.1E-13	4.1	2.5E-12	3 0	1.4E-21	2.5	1.6E-11	2 2
1988	5.1E-14	4.3	7.9E-13	4.6	2.0E-13	4.6	2.5E-12	3.0	1.4E-21	2.5	1.4E-11	2.2
1989	5.1E-14	3.9	7.7E-13	4.6	2.0E-13	4.4	2.5E-12	3.2	1.3E-21	2.5	8.2E-12	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium
Sector 11
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	7.9E-10	3.0	2.3E-14	4.3	3.1E-12	3 9	9 1E-15	2.5	4.4E-19	2.3
1954	7.9E-10	2.8	5.2E-14	4 0	3 1E-12	3 4	2.0E-14	2.2	4.4E-19	2.3
1955	1.3E-09	2.8	1.0E-13	3.8	5.3E-12	3 6	3 8E-14	2.1	7.4E-19	2.2
1956	6.5E-10	3.0	1.2E-13	3 7	2.6E-12	3 7	4 8E-14	2.0	3.5E-19	2.3
1957	4.7E-10	2.9	1 4E-13	3.8	1.9E-12	3.8	5 5E-14	1.9	2.6E-19	2.2
1958	1.0E-09	2.8	1.8E-13	4.1	4 2E-12	3 8	7.1E-14	2 0	5.7E-19	2.2
1959	1.7E-10	2.8	1.9E-13	3.5	7.9E-13	3.7	7.3E-14	2.0	9.6E-20	2.2
1960	2.3E-10	3 0	2.0E-13	3.9	1.0E-12	3.9	7.7E-14	2.0	1.3E-19	2.2
1961	3.4E-10	2.9	2.1E-13	3.8	1.5E-12	3.6	8.2E-14	2.0	1.9E-19	2.2
1962	2.4E-10	2.9	2.2E-13	3.7	1.1E-12	3.3	8.5E-14	2.0	1.3E-19	2.2
1963	3.2E-10	2.9	2.3E-13	3.8	1.4E-12	3.8	9.0E-14	1.9	1.7E-19	2.3
1964	1.5E-10	2.9	2.4E-13	3 8	7.3E-13	3.5	9.3E-14	1.9	8.5E-20	2.2
1965	1.8E-10	2.9	2.5E-13	3.8	8.4E-13	3.3	9.5E-14	2.0	9.8E-20	2.3
1966	9.0E-11	2.9	2.5E-13	3.7	4.8E-13	3.5	9.7E-14	1.9	4.9E-20	2.3
1967	8.9E-11	2.8	2.5E-13	3.8	4.8E-13	3.3	9.8E-14	1.9	4.9E-20	2.3
1968	8.9E-11	2.7	2.6E-13	3.6	4.8E-13	3.5	9.9E-14	1.9	4.9E-20	2.2
1969	1.0E-10	2.9	2.6E-13	3.4	5.4E-13	3.3	1.0E-13	1.9	5.7E-20	2.2
1970	1.2E-10	2.7	2.7E-13	3.6	6.2E-13	3.3	1.0E-13	1.9	6.8E-20	2.2
1971	3.7E-11	2.9	2.7E-13	3.7	2.6E-13	3.4	1.0E-13	1.9	2.0E-20	2.2
1972	2.7E-11	2.8	2.7E-13	3.6	2.2E-13	3.1	1.0E-13	1.9	1.5E-20	2.2
1973	3.5E-11	2.8	2.7E-13	3.9	2.5E-13	3.4	1 0E-13	1.9	1.9E-20	2.2
1974	6.0E-12	3.0	2.7E-13	3.7	1.1E-13	3.5	1.0E-13	1.9	3.3E-21	2.2
1975	1.8E-11	2.8	2.7E-13	3.6	1.7E-13	3.1	1.0E-13	1.9	9.8E-21	2.3
1976	8.0E-12	2.8	2.7E-13	3.7	1.2E-13	3.3	1.0E-13	1.9	4.4E-21	2.2
1977	1.2E-11	3.0	2.7E-13	3.6	1.5E-13	3.4	1.0E-13	1.9	6.8E-21	2.3
1978	2.1E-11	2.8	2.7E-13	3.9	2.0E-13	3.3	1.0E-13	1.9	1.2E-20	2.3
1979	1.7E-11	2.9	2.7E-13	3.6	1.7E-13	3.4	1.1E-13	1.9	9.3E-21	2.3
1980	1.0E-11	2.9	2.7E-13	3.9	1.3E-13	3.3	1.1E-13	2.0	5.5E-21	2.2
1981	1.1E-11	2.8	2.7E-13	3.9	1.4E-13	3.3	1.1E-13	2.0	6.3E-21	2.2
1982	1.2E-11	3.0	2.8E-13	3.9	1.5E-13	3.2	1.1E-13	1.9	6.8E-21	2.2
1983	2.0E-11	2.8	2.7E-13	3 6	1.8E-13	3.4	1 1E-13	1.9	1.1E-20	2.2
1984	3.6E-12	3.0	2.8E-13	3.8	9.8E-14	3.5	1.1E-13	1.9	2.0E-21	2.3
1985	2.5E-11	2.7	2.8E-13	3 8	2 1E-13	3 1	1.1E-13	1.9	1.4E-20	2.2
1986	1.9E-12	3.0	2.8E-13	3.9	8.6E-14	3.9	1 1E-13	1.9	1.0E-21	2.3
1987	8.0E-12	2.9	2 8E-13	3.7	1.3E-13	3.4	1 1E-13	1.9	4.4E-21	2.3
1988	6.0E-12	2.8	2.8E-13	3.8	1.1E-13	3.4	1.1E-13	1.9	3.3E-21	2.3
1989	1.6E-12	2.9	2.8E-13	3.6	8.3E-14	3.7	1 1E-13	1.9	9.0E-22	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium (continued)
Sector 11
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	4.2E-15	4.9	1.3E-12	5.5	3.7E-13	5 2	2.0E-13	3.4	1.1E-22	3.0	8.1E-10	2.9
1954	9.3E-15	4.1	1.5E-12	5.2	4.1E-13	4.9	4.5E-13	3.2	2.5E-22	2.7	8.1E-10	2.7
1955	1.8E-14	4.1	2.5E-12	4.9	7.0E-13	4.6	8.6E-13	3.1	4.7E-22	2.6	1.4E-09	2.8
1956	2.2E-14	3.9	1.5E-12	4.8	4.1E-13	4.4	1.1E-12	3.2	5.9E-22	2.7	6.6E-10	2.9
1957	2.5E-14	4.1	1.3E-12	4.8	3.6E-13	4.7	1.2E-12	3.1	6.8E-22	2.6	4.9E-10	2.9
1958	3.2E-14	4.1	2.3E-12	4.9	6.6E-13	4.4	1.6E-12	3.2	8.6E-22	2.6	1.1E-09	2.8
1959	3.4E-14	4.4	9.1E-13	4.6	2.5E-13	4.7	1.6E-12	3.1	9.0E-22	2.5	1.8E-10	2.7
1960	3.5E-14	4.2	1.0E-12	4.9	2.9E-13	4.5	1.7E-12	3.1	9.4E-22	2.6	2.4E-10	2.8
1961	3.8E-14	4.2	1.3E-12	4.4	3.5E-13	4.2	1.8E-12	3.2	1.0E-21	2.5	3.5E-10	2.8
1962	3.9E-14	4.3	1.1E-12	4.5	3.0E-13	3.9	1.9E-12	3.2	1.0E-21	2.5	2.5E-10	2.8
1963	4.2E-14	4.0	1.3E-12	4.4	3.6E-13	4.1	2.0E-12	3.1	1.1E-21	2.5	3.3E-10	2.8
1964	4.2E-14	4.0	1.0E-12	4.3	2.7E-13	4.1	2.1E-12	2.9	1.1E-21	2.4	1.7E-10	2.7
1965	4.4E-14	3.9	1.1E-12	4.8	3.0E-13	4.1	2.1E-12	3.2	1.2E-21	2.5	1.9E-10	2.8
1966	4.4E-14	4.1	9.1E-13	4.9	2.5E-13	4.3	2.2E-12	3.2	1.2E-21	2.5	1.0E-10	2.7
1967	4.5E-14	3.9	9.1E-13	4.5	2.5E-13	4.4	2.2E-12	3.1	1.2E-21	2.6	1.0E-10	2.6
1968	4.6E-14	4.2	9.1E-13	4.7	2.5E-13	4.4	2.2E-12	3.1	1.2E-21	2.6	1.0E-10	2.6
1969	4.6E-14	4.2	9.7E-13	4.5	2.6E-13	3.9	2.2E-12	3.1	1.2E-21	2.6	1.2E-10	2.7
1970	4.7E-14	4.1	1.0E-12	4.5	2.8E-13	3.9	2.3E-12	3.2	1.3E-21	2.5	1.4E-10	2.5
1971	4.7E-14	4.2	8.2E-13	4.3	2.2E-13	4.5	2.3E-12	3.1	1.3E-21	2.5	4.6E-11	2.5
1972	4.8E-14	4.3	8.0E-13	4.4	2.1E-13	4.3	2.3E-12	3.0	1.3E-21	2.5	3.6E-11	2.5
1973	4.8E-14	4.2	8.2E-13	4.7	2.2E-13	4.2	2.3E-12	3.3	1.3E-21	2.6	4.4E-11	2.5
1974	4.8E-14	4.0	7.4E-13	4.8	1.9E-13	4.2	2.3E-12	3.2	1.3E-21	2.5	1.3E-11	2.3
1975	4.8E-14	4.0	7.8E-13	4.5	2.1E-13	4.3	2.3E-12	3.2	1.3E-21	2.5	2.6E-11	2.3
1976	4.8E-14	4.3	7.5E-13	4.9	2.0E-13	4.2	2.3E-12	3 1	1.3E-21	2.5	1.5E-11	2.2
1977	4.8E-14	4.1	7.6E-13	4.5	2.0E-13	4.3	2.3E-12	2.9	1.3E-21	2.5	2.0E-11	2.3
1978	4.9E-14	4.2	7.9E-13	4 5	2.1E-13	4.1	2.3E-12	3.3	1.3E-21	2.6	3.0E-11	2.4
1979	4.9E-14	4.2	7.8E-13	4.7	2.1E-13	4.4	2.3E-12	3.1	1.3E-21	2.5	2.5E-11	2.4
1980	4.8E-14	4.1	7.6E-13	4.3	2.0E-13	4.6	2.3E-12	3.2	1.3E-21	2.5	1.8E-11	2.3
1981	4.9E-14	3.9	7.7E-13	4.6	2.0E-13	4.4	2.4E-12	3.0	1.3E-21	2.5	1.9E-11	2.2
1982	4.9E-14	4.2	7.7E-13	4.8	2.0E-13	4.5	2.4E-12	3.3	1.3E-21	2.5	2.1E-11	2.4
1983	4.9E-14	4.3	8.0E-13	4.5	2.1E-13	4.4	2.4E-12	3.1	1.3E-21	2.5	2.8E-11	2.4
1984	4.9E-14	4.1	7.5E-13	4.6	2.0E-13	4.2	2.4E-12	3.3	1.3E-21	2.5	1.0E-11	2.3
1985	4.9E-14	3.9	8.2E-13	4.7	2.1E-13	4.4	2.4E-12	3 2	1.3E-21	2.5	3.5E-11	2 3
1986	4.9E-14	4.3	7.5E-13	4.4	1.9E-13	4 1	2.4E-12	3 4	1.3E-21	2.6	8 4E-12	2.3
1987	4.9E-14	4.0	7.7E-13	5.0	2.0E-13	4 5	2.4E-12	3 1	1.3E-21	2.5	1 6E-11	2 3
1988	4.9E-14	3.9	7.6E-13	4.7	2 0E-13	4.3	2.4E-12	3 3	1.3E-21	2 5	1 3E-11	2.3
1989	4.9E-14	3.9	7.5E-13	4.6	1.9E-13	4.5	2.4E-12	3 1	1.3E-21	2.5	8.1E-12	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium
Sector 12
(1953 - 1989)

Year	Inhalation		Soil Ingestion		Vegetable Ingestion		Ground Exposure		Immersion	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	2.7E-09	2.8	7.9E-14	4.5	1.0E-11	3.7	3.0E-14	2.6	1.5E-18	2.2
1954	2.7E-09	2.8	1.8E-13	3.9	1.1E-11	4.0	6.8E-14	2.2	1.5E-18	2.3
1955	4.5E-09	2.9	3.4E-13	4.0	1.8E-11	3.9	1.3E-13	2.1	2.5E-18	2.2
1956	2.2E-09	2.8	4.2E-13	3.8	8.7E-12	3.6	1.6E-13	2.0	1.2E-18	2.2
1957	1.6E-09	2.8	4.8E-13	3.9	6.5E-12	3.5	1.9E-13	2.0	8.7E-19	2.2
1958	3.5E-09	2.8	6.1E-13	3.8	1.4E-11	3.8	2.4E-13	2.0	1.9E-18	2.3
1959	5.9E-10	2.9	6.4E-13	3.6	2.7E-12	3.2	2.5E-13	2.0	3.2E-19	2.3
1960	7.7E-10	3.0	6.7E-13	3.8	3.4E-12	3.8	2.6E-13	2.0	4.2E-19	2.3
1961	1.1E-09	2.9	7.1E-13	4.0	4.9E-12	3.5	2.7E-13	1.9	6.2E-19	2.3
1962	8.0E-10	2.8	7.4E-13	3.9	3.6E-12	3.7	2.9E-13	2.0	4.4E-19	2.2
1963	1.1E-09	2.9	7.9E-13	3.6	4.6E-12	3 7	3.0E-13	1.9	5.9E-19	2.3
1964	5.2E-10	2.9	8.1E-13	3.7	2.5E-12	3.3	3.1E-13	1.9	2.8E-19	2.3
1965	6.0E-10	2.8	8.3E-13	3.9	2.8E-12	3.6	3.2E-13	1.9	3.3E-19	2.2
1966	3.0E-10	2.9	8.4E-13	3.6	1.6E-12	3.3	3.2E-13	1.9	1.7E-19	2.2
1967	3.0E-10	2.9	8.5E-13	3.6	1.6E-12	3.5	3.3E-13	2.0	1.6E-19	2.3
1968	3.0E-10	2.8	8.6E-13	3.8	1.6E-12	3.3	3.3E-13	1.9	1.6E-19	2.2
1969	3.5E-10	2.9	8.8E-13	3.6	1.8E-12	3.4	3.4E-13	1.9	1.9E-19	2.3
1970	4.2E-10	2.9	9.0E-13	3.6	2.1E-12	3.4	3.4E-13	1.9	2.3E-19	2.3
1971	1.3E-10	2.7	9.0E-13	3 7	8.7E-13	3.4	3.5E-13	1.9	6.9E-20	2.2
1972	9.2E-11	2.8	9.0E-13	3.8	7.2E-13	3.3	3.5E-13	1.9	5.0E-20	2.2
1973	1.2E-10	2.9	9.1E-13	3.7	8.4E-13	3.3	3.5E-13	1.9	6.4E-20	2.2
1974	2.0E-11	2.9	9.1E-13	3.6	3.7E-13	3.4	3.5E-13	1.9	1.1E-20	2.2
1975	6.0E-11	2.8	9.1E-13	3.7	5.7E-13	3.3	3.5E-13	2.0	3.3E-20	2.3
1976	2.7E-11	2.8	9.1E-13	3.6	4.1E-13	3.3	3.5E-13	1.9	1.5E-20	2.2
1977	4.2E-11	3.0	9.1E-13	3.6	4.9E-13	3.3	3.5E-13	1.9	2.3E-20	2.2
1978	7.2E-11	2.9	9.1E-13	3.6	6.5E-13	3.2	3.5E-13	1.9	3.9E-20	2.2
1979	5.7E-11	2.9	9.2E-13	3.7	5.6E-13	3 5	3.5E-13	1.9	3.1E-20	2.2
1980	3.3E-11	2.9	9.2E-13	3.8	4.5E-13	3.2	3.5E-13	2.0	1.8E-20	2.2
1981	3.8E-11	2.8	9.2E-13	3.9	4.7E-13	3.3	3.5E-13	1.9	2.1E-20	2.3
1982	4.2E-11	2.8	9.2E-13	3.8	5.0E-13	3 3	3.6E-13	1.9	2.3E-20	2.3
1983	6.7E-11	2.9	9.3E-13	3.8	6.3E-13	3.3	3.6E-13	1.9	3.7E-20	2.2
1984	1.2E-11	2.7	9.3E-13	3.7	3.3E-13	3.4	3.6E-13	1.9	6.6E-21	2.2
1985	8.5E-11	2.8	9.3E-13	3.7	7.2E-13	3.3	3.6E-13	1.9	4.7E-20	2.3
1986	6.3E-12	2.8	9.3E-13	3.8	2.9E-13	3.6	3.6E-13	1.9	3.5E-21	2.2
1987	2.7E-11	2.9	9.3E-13	3.8	4.2E-13	3.2	3.6E-13	1.9	1.5E-20	2 2
1988	2.0E-11	2.8	9.3E-13	3.6	3.7E-13	3.4	3.6E-13	1.9	1.1E-20	2.2
1989	5.5E-12	2.8	9.3E-13	3.9	2.8E-13	3.7	3.6E-13	1.9	3.0E-21	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium (continued)
Sector 12
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	1.4E-14	5.0	4.4E-12	5.3	1.3E-12	4.8	6.8E-13	4.0	3.7E-22	3.1	2.7E-09	2.8
1954	3.1E-14	4.6	4.9E-12	5.7	1.4E-12	5.0	1.5E-12	3.4	8.3E-22	2.8	2.7E-09	2.7
1955	6.0E-14	4.2	8.3E-12	5.2	2.4E-12	4.6	2.9E-12	3.2	1.6E-21	2.6	4.6E-09	2.8
1956	7.4E-14	4.6	5.0E-12	4.8	1.4E-12	4.5	3.6E-12	3.2	2.0E-21	2.6	2.2E-09	2.8
1957	8.5E-14	4.2	4.4E-12	4.4	1.2E-12	4.3	4.1E-12	3.3	2.3E-21	2.6	1.6E-09	2.8
1958	1.1E-13	4.3	7.9E-12	5.0	2.2E-12	4.4	5.3E-12	3.2	2.9E-21	2.5	3.6E-09	2.7
1959	1.1E-13	4.2	3.0E-12	4.5	8.2E-13	4.1	5.5E-12	3.2	3.0E-21	2.5	6.2E-10	2.8
1960	1.2E-13	4.2	3.5E-12	4.5	9.5E-13	4.5	5.8E-12	3.1	3.2E-21	2.6	8.1E-10	2.9
1961	1.3E-13	4.0	4.3E-12	4.6	1.2E-12	4.1	6.1E-12	3.1	3.3E-21	2.5	1.2E-09	2.8
1962	1.3E-13	4.1	3.8E-12	4.7	1.1E-12	4.3	6.4E-12	3.0	3.5E-21	2.6	8.5E-10	2.7
1963	1.4E-13	4.1	4.3E-12	4.2	1.2E-12	4.1	6.8E-12	3.2	3.7E-21	2.6	1.1E-09	2.8
1964	1.4E-13	4.1	3.4E-12	4.4	9.2E-13	4.0	6.9E-12	2.9	3.8E-21	2.5	5.6E-10	2.8
1965	1.5E-13	4.5	3.6E-12	4.4	9.8E-13	4.3	7.1E-12	3.1	3.9E-21	2.5	6.4E-10	2.7
1966	1.5E-13	4.3	3.0E-12	4.4	8.2E-13	4.0	7.2E-12	3.1	4.0E-21	2.6	3.4E-10	2.7
1967	1.5E-13	4.3	3.1E-12	4.3	8.3E-13	3.9	7.3E-12	3.1	4.0E-21	2.6	3.3E-10	2.7
1968	1.5E-13	4.4	3.1E-12	4.4	8.3E-13	3.9	7.4E-12	3.1	4.1E-21	2.5	3.4E-10	2.6
1969	1.6E-13	4.3	3.2E-12	4.7	8.6E-13	4.6	7.5E-12	3.2	4.1E-21	2.6	3.9E-10	2.7
1970	1.6E-13	4.1	3.5E-12	4.4	9.3E-13	4.2	7.7E-12	3.1	4.2E-21	2.5	4.6E-10	2.8
1971	1.6E-13	4.1	2.8E-12	4.7	7.4E-13	4.2	7.7E-12	3.1	4.2E-21	2.5	1.6E-10	2.4
1972	1.6E-13	4.2	2.7E-12	4.4	7.1E-13	4.2	7.8E-12	3.0	4.3E-21	2.5	1.2E-10	2.4
1973	1.6E-13	4.1	2.8E-12	4.6	7.3E-13	4.4	7.8E-12	3.0	4.3E-21	2.5	1.5E-10	2.6
1974	1.6E-13	4.1	2.5E-12	4.5	6.5E-13	4.2	7.8E-12	3.1	4.3E-21	2.6	4.4E-11	2.2
1975	1.6E-13	4.1	2.6E-12	4.5	6.9E-13	4.3	7.8E-12	3.1	4.3E-21	2.5	8.7E-11	2.3
1976	1.6E-13	4.2	2.5E-12	5.0	6.6E-13	4.1	7.8E-12	3.1	4.3E-21	2.5	5.2E-11	2.3
1977	1.6E-13	3.9	2.6E-12	4.6	6.7E-13	4.3	7.8E-12	3.1	4.3E-21	2.5	6.9E-11	2.4
1978	1.6E-13	4.2	2.7E-12	4.6	7.0E-13	3.9	7.9E-12	3.2	4.3E-21	2.5	1.0E-10	2.5
1979	1.6E-13	4.0	2.6E-12	4.7	6.9E-13	4.5	7.9E-12	3.3	4.3E-21	2.6	8.5E-11	2.4
1980	1.6E-13	3.9	2.6E-12	4.6	6.7E-13	4.2	7.9E-12	3.0	4.3E-21	2.5	5.9E-11	2.3
1981	1.6E-13	4.1	2.6E-12	4.6	6.7E-13	4.4	7.9E-12	3.0	4.3E-21	2.6	6.6E-11	2.2
1982	1.6E-13	4.2	2.6E-12	4.5	6.8E-13	4.3	7.9E-12	3.1	4.3E-21	2.4	6.9E-11	2.3
1983	1.6E-13	4.3	2.7E-12	4.4	7.1E-13	4.1	8.0E-12	3.3	4.4E-21	2.6	9.7E-11	2.5
1984	1.6E-13	4.0	2.5E-12	4.4	6.5E-13	4.5	7.9E-12	3.0	4.4E-21	2.5	3.5E-11	2.1
1985	1.6E-13	4.1	2.8E-12	4.5	7.4E-13	4.6	8.0E-12	3.0	4.4E-21	2.5	1.2E-10	2.4
1986	1.6E-13	4.1	2.5E-12	4.9	6.5E-13	4.7	8.0E-12	3.1	4.4E-21	2.5	2.8E-11	2.2
1987	1.6E-13	4.1	2.6E-12	4.5	6.7E-13	4.4	8.0E-12	3.2	4.4E-21	2.5	5.3E-11	2.3
1988	1.6E-13	4.2	2.5E-12	4.7	6.7E-13	4.2	8.0E-12	3.2	4.4E-21	2.5	4.5E-11	2.3
1989	1.6E-13	4.1	2.5E-12	4.6	6.5E-13	4.4	8.0E-12	3.0	4.4E-21	2.5	2.6E-11	2.1

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium
Denver
(1953 - 1989)

Year	Inhalation		Soil Ingestion		Vegetable Ingestion		Ground Exposure		Immersion	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	9.7E-10	2.8	2.8E-14	4.3	3.8E-12	3.9	1.1E-14	2.7	5.3E-19	2.2
1954	9.7E-10	2.8	6.3E-14	3.9	3.8E-12	3.8	2.4E-14	2.3	5.3E-19	2.2
1955	1.6E-09	2.7	1.2E-13	4.1	6.4E-12	3.9	4.7E-14	2.1	9.0E-19	2.2
1956	7.8E-10	2.8	1.5E-13	4.1	3.1E-12	3.5	5.8E-14	2.1	4.3E-19	2.2
1957	5.7E-10	2.9	1.7E-13	3.8	2.3E-12	3.7	6.7E-14	2.0	3.1E-19	2.3
1958	1.3E-09	3.0	2.2E-13	3.6	5.1E-12	3.9	8.5E-14	2.0	7.0E-19	2.2
1959	2.1E-10	2.8	2.3E-13	3.5	9.6E-13	3.6	8.8E-14	2.0	1.2E-19	2.2
1960	2.8E-10	2.8	2.4E-13	3.7	1.2E-12	3.5	9.2E-14	2.0	1.5E-19	2.2
1961	4.1E-10	2.7	2.5E-13	3.8	1.8E-12	3.5	9.8E-14	2.0	2.3E-19	2.3
1962	2.9E-10	2.9	2.7E-13	3.8	1.3E-12	3.6	1.0E-13	2.0	1.6E-19	2.3
1963	3.9E-10	2.7	2.8E-13	3.6	1.7E-12	3.6	1.1E-13	2.0	2.1E-19	2.2
1964	1.9E-10	2.9	2.9E-13	3.7	8.9E-13	3.6	1.1E-13	2.0	1.0E-19	2.2
1965	2.2E-10	2.7	3.0E-13	3.9	1.0E-12	3.6	1.1E-13	2.0	1.2E-19	2.2
1966	1.1E-10	2.9	3.0E-13	3.8	5.8E-13	3.5	1.2E-13	2.0	6.0E-20	2.3
1967	1.1E-10	2.9	3.1E-13	4.0	5.8E-13	3.3	1.2E-13	2.0	6.0E-20	2.2
1968	1.1E-10	2.7	3.1E-13	3.7	5.8E-13	3.4	1.2E-13	2.0	6.0E-20	2.2
1969	1.3E-10	2.9	3.2E-13	3.8	6.5E-13	3.5	1.2E-13	2.0	7.0E-20	2.3
1970	1.5E-10	3.0	3.2E-13	3.9	7.8E-13	3.4	1.2E-13	1.9	8.3E-20	2.2
1971	4.5E-11	2.9	3.2E-13	3.7	3.2E-13	3.3	1.2E-13	1.9	2.5E-20	2.2
1972	3.3E-11	2.8	3.2E-13	3.8	2.6E-13	3.3	1.2E-13	2.0	1.8E-20	2.2
1973	4.2E-11	2.8	3.3E-13	3.8	3.0E-13	3.4	1.3E-13	1.9	2.3E-20	2.2
1974	7.2E-12	2.8	3.3E-13	3.8	1.3E-13	3.5	1.3E-13	1.9	4.0E-21	2.2
1975	2.2E-11	2.9	3.3E-13	3.9	2.1E-13	3.2	1.3E-13	2.0	1.2E-20	2.3
1976	9.6E-12	2.9	3.3E-13	3.6	1.5E-13	3.3	1.3E-13	2.0	5.3E-21	2.3
1977	1.5E-11	2.8	3.3E-13	3.8	1.8E-13	3.2	1.3E-13	1.9	8.3E-21	2.2
1978	2.6E-11	2.9	3.3E-13	3.7	2.3E-13	3.4	1.3E-13	2.0	1.4E-20	2.2
1979	2.1E-11	2.8	3.3E-13	3.6	2.1E-13	3.2	1.3E-13	2.0	1.1E-20	2.3
1980	1.2E-11	2.8	3.3E-13	4.0	1.6E-13	3.4	1.3E-13	1.9	6.6E-21	2.3
1981	1.4E-11	2.7	3.3E-13	3.8	1.7E-13	3.3	1.3E-13	1.9	7.6E-21	2.2
1982	1.5E-11	3.0	3.3E-13	3.8	1.8E-13	3.4	1.3E-13	1.9	8.3E-21	2.3
1983	2.4E-11	2.8	3.3E-13	4.0	2.2E-13	3.1	1.3E-13	1.9	1.3E-20	2.2
1984	4.3E-12	2.9	3.3E-13	3.7	1.2E-13	3.4	1.3E-13	2.0	2.4E-21	2.3
1985	3.1E-11	2.9	3.3E-13	3.6	2.6E-13	3.2	1.3E-13	1.9	1.7E-20	2.2
1986	2.3E-12	3.0	3.3E-13	4.0	1.0E-13	3.6	1.3E-13	2.0	1.3E-21	2.3
1987	9.7E-12	2.9	3.3E-13	3.9	1.5E-13	3.3	1.3E-13	1.9	5.3E-21	2.2
1988	7.2E-12	2.9	3.3E-13	3.8	1.4E-13	3.4	1.3E-13	1.9	4.0E-21	2.2
1989	2.0E-12	2.8	3.3E-13	3.5	1.0E-13	3.8	1.3E-13	1.9	1.1E-21	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium (continued)
Denver
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	5.0E-15	4.8	1.6E-12	5.4	4.5E-13	5.2	2.4E-13	3.7	1.3E-22	3.3	9.9E-10	2.8
1954	1.1E-14	4.5	1.7E-12	5.2	4.9E-13	4.8	5.4E-13	3.3	3.0E-22	2.8	9.9E-10	2.8
1955	2.1E-14	4.4	3.0E-12	5.2	8.6E-13	4.8	1.0E-12	3.2	5.7E-22	2.7	1.7E-09	2.7
1956	2.7E-14	4.1	1.8E-12	4.9	5.1E-13	4.0	1.3E-12	3.4	7.1E-22	2.7	8.0E-10	2.8
1957	3.1E-14	4.3	1.6E-12	4.8	4.3E-13	4.3	1.5E-12	3.3	8.1E-22	2.6	5.9E-10	2.8
1958	3.9E-14	4.1	2.9E-12	5.2	8.1E-13	5.3	1 9E-12	3.2	1.0E-21	2.5	1.3E-09	2.9
1959	4.0E-14	4.0	1.1E-12	4.9	3.0E-13	4.1	2.0E-12	3.2	1.1E-21	2.6	2.2E-10	2.7
1960	4.3E-14	4.4	1.2E-12	4.5	3.5E-13	4.3	2.1E-12	3.2	1.1E-21	2.6	2.9E-10	2.7
1961	4.5E-14	4.3	1.5E-12	4.8	4.2E-13	4.4	2.2E-12	3.3	1.2E-21	2.6	4.3E-10	2.6
1962	4.7E-14	4.0	1.4E-12	4.5	3.8E-13	4.0	2.3E-12	3.2	1.3E-21	2.7	3.1E-10	2.8
1963	5.0E-14	4.1	1.6E-12	4.6	4.3E-13	4.3	2.4E-12	3.2	1.3E-21	2.6	4.0E-10	2.6
1964	5.1E-14	4.2	1.2E-12	4.6	3.3E-13	4.3	2.5E-12	3.1	1.4E-21	2.5	2.0E-10	2.8
1965	5.3E-14	4.1	1.3E-12	4.5	3.6E-13	4.2	2.6E-12	3.1	1.4E-21	2.5	2.3E-10	2.6
1966	5.3E-14	4.3	1.1E-12	4.5	2.9E-13	4.1	2.6E-12	3.2	1.4E-21	2.5	1.2E-10	2.7
1967	5.4E-14	4.0	1.1E-12	4.5	2.9E-13	4.1	2.6E-12	3.3	1.4E-21	2.6	1.2E-10	2.6
1968	5.5E-14	4.0	1.1E-12	4.6	3.0E-13	4.3	2.7E-12	3.0	1.5E-21	2.5	1.2E-10	2.6
1969	5.6E-14	4.0	1.2E-12	4.4	3.1E-13	4.1	2.7E-12	3.1	1.5E-21	2.7	1.4E-10	2.7
1970	5.7E-14	4.1	1.2E-12	4.4	3.3E-13	4.0	2.8E-12	3.2	1.5E-21	2.5	1.7E-10	2.8
1971	5.7E-14	4.4	9.9E-13	4.7	2.6E-13	4.5	2.8E-12	3.2	1.5E-21	2.6	5.7E-11	2.5
1972	5.7E-14	4.2	9.6E-13	4.6	2.5E-13	4.2	2.8E-12	3.2	1.5E-21	2.5	4.4E-11	2.5
1973	5.8E-14	4.2	1.0E-12	4.5	2.6E-13	3.9	2.8E-12	3.2	1.5E-21	2.6	5.4E-11	2.5
1974	5.8E-14	4.2	8.9E-13	4.7	2.3E-13	4.6	2.8E-12	3.2	1.5E-21	2.6	1.6E-11	2.3
1975	5.8E-14	3.8	9.4E-13	4.4	2.5E-13	4.4	2.8E-12	3.3	1.5E-21	2.5	3.2E-11	2.4
1976	5.8E-14	4.3	9.0E-13	4.6	2.4E-13	4.5	2.8E-12	3.1	1.5E-21	2.6	1.9E-11	2.2
1977	5.8E-14	4.2	9.2E-13	4.8	2.4E-13	4.2	2.8E-12	3.2	1.5E-21	2.6	2.5E-11	2.3
1978	5.8E-14	3.9	9.6E-13	4.6	2.5E-13	4.2	2.8E-12	3.2	1.5E-21	2.6	3.7E-11	2.4
1979	5.8E-14	4.1	9.4E-13	4.6	2.5E-13	4.3	2.8E-12	3.2	1.6E-21	2.5	3.1E-11	2.4
1980	5.8E-14	4.1	9.2E-13	4.5	2.4E-13	4.4	2.8E-12	3.2	1.6E-21	2.6	2.2E-11	2.3
1981	5.9E-14	4.1	9.3E-13	4.6	2.4E-13	4.5	2.8E-12	3.1	1.6E-21	2.6	2.3E-11	2.2
1982	5.9E-14	4.2	9.3E-13	4.5	2.4E-13	4.0	2.8E-12	3.2	1.6E-21	2.6	2.5E-11	2.4
1983	5.9E-14	4.2	9.5E-13	5.0	2.5E-13	4.3	2.9E-12	3.1	1.6E-21	2.5	3.5E-11	2.3
1984	5.9E-14	3.9	9.0E-13	4.6	2.4E-13	4.6	2.9E-12	3.2	1.6E-21	2.4	1.3E-11	2.2
1985	5.9E-14	3.8	9 8E-13	4.7	2.6E-13	4.5	2.9E-12	3.0	1.6E-21	2.5	4.2E-11	2.4
1986	5.9E-14	4.0	9.0E-13	4.5	2.3E-13	4.5	2.9E-12	3.3	1.6E-21	2.6	1.0E-11	2.3
1987	5.9E-14	4.1	9 2E-13	4.6	2.4E-13	4.4	2.9E-12	3.1	1.6E-21	2.5	1.9E-11	2 3
1988	5.9E-14	4.2	9.1E-13	4.7	2.4E-13	4.4	2.9E-12	3.2	1.6E-21	2.6	1.6E-11	2 3
1989	5.9E-14	4.1	9.0E-13	4.6	2.3E-13	4.4	2.9E-12	3.2	1.6E-21	2.6	9.8E-12	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium
Lakewood
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	1.2E-09	2.8	3.6E-14	4.5	4.7E-12	4 0	1 4E-14	2.4	6.6E-19	2.3
1954	1.2E-09	2.8	7.9E-14	3 9	4 7E-12	3.6	3.0E-14	2.2	6.6E-19	2.2
1955	2.0E-09	2.7	1.5E-13	4.0	8.0E-12	3 9	5.9E-14	2.1	1.1E-18	2.2
1956	9.8E-10	2.8	1.9E-13	3.9	3.9E-12	3.7	7.4E-14	2.1	5.4E-19	2.2
1957	7.2E-10	2.8	2.2E-13	3.7	2.9E-12	3.6	8.4E-14	2.0	3.9E-19	2.3
1958	1.6E-09	2.9	2.8E-13	3.7	6.3E-12	3.9	1.1E-13	2.0	8.7E-19	2.2
1959	2.6E-10	2.7	2.9E-13	3.7	1.2E-12	3.5	1.1E-13	1.9	1.4E-19	2.3
1960	3.5E-10	2.8	3.0E-13	3 9	1.5E-12	3.4	1.2E-13	2.0	1.9E-19	2.2
1961	5.1E-10	2.9	3.2E-13	3.6	2.2E-12	3.6	1.2E-13	2.0	2.8E-19	2.2
1962	3.6E-10	2.9	3.4E-13	3.9	1.6E-12	3.7	1.3E-13	1.9	2.0E-19	2.2
1963	4.8E-10	2.9	3.6E-13	3.9	2.1E-12	3.7	1.4E-13	2.0	2.6E-19	2.2
1964	2.3E-10	2.9	3.6E-13	3.8	1.1E-12	3.5	1.4E-13	1.9	1.3E-19	2.2
1965	2.7E-10	2.8	3.8E-13	3.8	1.3E-12	3.3	1.4E-13	1.9	1.5E-19	2.2
1966	1.4E-10	2.8	3.8E-13	3.5	7.3E-13	3.3	1.5E-13	1.9	7.5E-20	2.2
1967	1.4E-10	2.9	3.9E-13	3.8	7.3E-13	3.2	1.5E-13	2.0	7.5E-20	2.3
1968	1.4E-10	2.9	3.9E-13	3.9	7.2E-13	3.6	1.5E-13	1.9	7.5E-20	2.2
1969	1.6E-10	2.9	4.0E-13	3.8	8.1E-13	3.5	1.5E-13	1.9	8.7E-20	2.3
1970	1.9E-10	2.9	4.1E-13	3.7	9.3E-13	3.5	1.6E-13	1.9	1.0E-19	2.3
1971	5.6E-11	2.8	4.1E-13	3.7	3.9E-13	3.2	1.6E-13	1.9	3.1E-20	2.2
1972	4.1E-11	2.8	4.1E-13	3.6	3.3E-13	3.1	1.6E-13	1.9	2.3E-20	2.2
1973	5.3E-11	3.0	4.1E-13	3.7	3.8E-13	3.1	1.6E-13	1.9	2.9E-20	2.2
1974	9.0E-12	2.9	4.1E-13	3 9	1.7E-13	3.3	1.6E-13	1.9	5.0E-21	2.2
1975	2.7E-11	2.8	4.1E-13	3.6	2.6E-13	3.1	1.6E-13	1.9	1.5E-20	2.3
1976	1.2E-11	2.7	4.1E-13	3.8	1.9E-13	3.4	1.6E-13	1.9	6.6E-21	2.2
1977	1.9E-11	2.7	4.1E-13	3.8	2.2E-13	3.5	1.6E-13	1.9	1.0E-20	2.3
1978	3.2E-11	2.9	4.2E-13	3.7	2.9E-13	3.0	1.6E-13	1.9	1.8E-20	2.2
1979	2.6E-11	2.9	4.2E-13	3.7	2.6E-13	3.2	1.6E-13	1.9	1.4E-20	2.3
1980	1.5E-11	2.9	4.2E-13	3.5	2.0E-13	3.2	1.6E-13	2.0	8.3E-21	2.3
1981	1.7E-11	2.8	4.2E-13	3.8	2.2E-13	3.2	1.6E-13	1.9	9.5E-21	2.2
1982	1.9E-11	2.9	4.2E-13	3.8	2.2E-13	3.1	1.6E-13	1.9	1.0E-20	2.3
1983	3.0E-11	2.8	4.2E-13	3.8	2.8E-13	3.3	1.6E-13	1.9	1.7E-20	2.2
1984	5.4E-12	2 9	4.2E-13	3.8	1.5E-13	3.6	1.6E-13	1.9	3.0E-21	2.3
1985	3.8E-11	2.9	4.2E-13	3.7	3.1E-13	3.2	1 6E-13	1.9	2.1E-20	2 2
1986	2.9E-12	2.8	4.2E-13	3.6	1.3E-13	3 6	1.6E-13	1.9	1.6E-21	2 2
1987	1.2E-11	3.0	4.2E-13	3.8	1 9E-13	3.3	1.6E-13	1.9	6.6E-21	2.2
1988	9.0E-12	2.9	4.2E-13	3.6	1.7E-13	3.3	1.6E-13	1.9	5.0E-21	2.2
1989	2.5E-12	2.8	4.2E-13	3.8	1.3E-13	3.7	1.6E-13	2.0	1.4E-21	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium (continued)
Lakewood
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	6.3E-15	4.6	2.0E-12	5.0	5.6E-13	5.5	3.1E-13	3.8	1.7E-22	3.1	1.2E-09	2.8
1954	1.4E-14	4.7	2.2E-12	4.9	6.1E-13	4.6	6.8E-13	3.5	3.7E-22	2.8	1.2E-09	2.8
1955	2.7E-14	4.2	3.8E-12	4.8	1.1E-12	5.1	1.3E-12	3.3	7.2E-22	2.6	2.1E-09	2.7
1956	3.4E-14	3.9	2.3E-12	5.3	6.4E-13	4.2	1.6E-12	3.1	9.0E-22	2.6	1.0E-09	2.8
1957	3.9E-14	4.2	2.0E-12	5.0	5.5E-13	4.5	1.9E-12	3.2	1.0E-21	2.6	7.4E-10	2.8
1958	4.9E-14	4.2	3.6E-12	5.0	1.0E-12	4.4	2.4E-12	3.3	1.3E-21	2.7	1.6E-09	2.8
1959	5.1E-14	4.2	1.4E-12	4.5	3.8E-13	4.1	2.5E-12	3.1	1.4E-21	2.6	2.8E-10	2.6
1960	5.4E-14	3.9	1.6E-12	4.7	4.4E-13	4.0	2.6E-12	3.2	1.4E-21	2.5	3.6E-10	2.7
1961	5.7E-14	4.3	2.0E-12	4.7	5.4E-13	4.3	2.8E-12	2.9	1.5E-21	2.5	5.3E-10	2.8
1962	6.0E-14	4.4	1.7E-12	4.7	4.6E-13	4.4	2.9E-12	3.1	1.6E-21	2.5	3.8E-10	2.8
1963	6.3E-14	4.0	2.0E-12	4.3	5.5E-13	4.2	3.1E-12	3.2	1.7E-21	2.5	5.0E-10	2.8
1964	6.5E-14	4.3	1.5E-12	4.5	4.3E-13	4.0	3.1E-12	3.3	1.7E-21	2.6	2.5E-10	2.7
1965	6.7E-14	4.0	1.6E-12	4.3	4.4E-13	4.3	3.2E-12	3.1	1.8E-21	2.4	2.9E-10	2.7
1966	6.8E-14	4.1	1.4E-12	4.1	3.6E-13	4.3	3.3E-12	3.1	1.8E-21	2.4	1.5E-10	2.6
1967	6.8E-14	4.1	1.4E-12	4.5	3.7E-13	4.1	3.3E-12	3.2	1.8E-21	2.5	1.5E-10	2.7
1968	6.9E-14	4.1	1.4E-12	4.8	3.8E-13	4.3	3.4E-12	3.0	1.8E-21	2.5	1.5E-10	2.7
1969	7.0E-14	4.2	1.5E-12	4.4	3.9E-13	3.8	3.4E-12	3.2	1.9E-21	2.5	1.7E-10	2.7
1970	7.2E-14	4.4	1.6E-12	4.8	4.1E-13	4.1	3.5E-12	3.2	1.9E-21	2.5	2.1E-10	2.7
1971	7.2E-14	4.1	1.3E-12	4.6	3.3E-13	4.1	3.5E-12	3.1	1.9E-21	2.4	7.1E-11	2.5
1972	7.2E-14	3.9	1.2E-12	4.5	3.2E-13	4.3	3.5E-12	3.0	1.9E-21	2.4	5.5E-11	2.4
1973	7.3E-14	4.3	1.3E-12	4.7	3.3E-13	4.3	3.5E-12	3.1	1.9E-21	2.5	6.6E-11	2.6
1974	7.3E-14	3.7	1.1E-12	4.4	3.0E-13	4.2	3.5E-12	3.0	1.9E-21	2.5	2.0E-11	2.2
1975	7.3E-14	4.2	1.2E-12	4.4	3.1E-13	4.4	3.5E-12	3.1	1.9E-21	2.5	4.0E-11	2.4
1976	7.3E-14	4.1	1.1E-12	5.0	3.0E-13	4.2	3.5E-12	3.1	1.9E-21	2.6	2.4E-11	2.2
1977	7.3E-14	4.4	1.2E-12	4.4	3.0E-13	4.1	3.5E-12	3.1	1.9E-21	2.6	3.1E-11	2.2
1978	7.3E-14	4.1	1.2E-12	4.9	3.2E-13	4.2	3.6E-12	3.2	2.0E-21	2.5	4.6E-11	2.4
1979	7.4E-14	4.0	1.2E-12	4.5	3.1E-13	4.1	3.6E-12	3.0	2.0E-21	2.5	3.9E-11	2.3
1980	7.4E-14	4.1	1.2E-12	4.6	3.0E-13	4.4	3.6E-12	3.1	2.0E-21	2.6	2.7E-11	2.3
1981	7.4E-14	4.1	1.2E-12	4.8	3.1E-13	4.4	3.6E-12	3.2	2.0E-21	2.6	2.9E-11	2.3
1982	7.4E-14	3.9	1.2E-12	4.6	3.1E-13	4.2	3.6E-12	3.2	2.0E-21	2.7	3.1E-11	2.4
1983	7.4E-14	3.8	1.2E-12	4.6	3.2E-13	4.3	3.6E-12	3.2	2.0E-21	2.5	4.4E-11	2.4
1984	7.5E-14	4.3	1.1E-12	4.7	3.0E-13	5.0	3.6E-12	3.0	2.0E-21	2.5	1.6E-11	2.2
1985	7.5E-14	4.1	1.2E-12	4.4	3.3E-13	4.2	3.6E-12	3.1	2.0E-21	2.5	5.2E-11	2.4
1986	7.5E-14	4.0	1.1E-12	4.8	2.9E-13	4.1	3.6E-12	3.3	2.0E-21	2.5	1.3E-11	2.1
1987	7.5E-14	4.0	1.2E-12	4.2	3.1E-13	4.4	3.6E-12	3 2	2.0E-21	2.6	2.4E-11	2.3
1988	7.4E-14	4.0	1.2E-12	4.9	3.0E-13	4.6	3.6E-12	3.0	2.0E-21	2.5	2.1E-11	2 1
1989	7.5E-14	3.9	1.1E-12	4.5	2.9E-13	4.3	3.6E-12	3.0	2.0E-21	2.6	1.2E-11	2.1

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium
Longmont
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	4.1E-10	2.8	1.2E-14	4 1	1.6E-12	3.8	4.6E-15	2.6	2.2E-19	2.3
1954	4.1E-10	2.8	2.7E-14	4.2	1.6E-12	3.6	1.0E-14	2.3	2.2E-19	2.2
1955	6.9E-10	2.8	5 1E-14	4.1	2.7E-12	3 6	2.0E-14	2.1	3.8E-19	2.2
1956	3.3E-10	2.8	6.4E-14	3.9	1.3E-12	3.8	2.4E-14	2.0	1.8E-19	2.3
1957	2.4E-10	2.9	7.3E-14	3 9	9.8E-13	3.7	2 8E-14	2.1	1.3E-19	2.3
1958	5.3E-10	3.0	9.3E-14	3.7	2.1E-12	3.7	3.6E-14	2.0	2.9E-19	2.2
1959	8.9E-11	2.7	9.7E-14	3.9	4.1E-13	3.5	3.7E-14	2.0	4.9E-20	2.3
1960	1.2E-10	2.9	1.0E-13	3.7	5.2E-13	3.5	3.9E-14	2.0	6.4E-20	2.3
1961	1.7E-10	2.9	1.1E-13	3.8	7.3E-13	3.5	4.2E-14	2.0	9.5E-20	2.3
1962	1.2E-10	2.8	1.1E-13	3.8	5.4E-13	3 4	4.3E-14	2.0	6.7E-20	2.2
1963	1.6E-10	3.0	1.2E-13	4.2	7.0E-13	3.7	4.6E-14	2.0	8.9E-20	2.2
1964	7.9E-11	2.9	1.2E-13	3.7	3.7E-13	3.5	4.7E-14	1.9	4.3E-20	2.3
1965	9.1E-11	2.9	1.3E-13	3.8	4.3E-13	3.4	4.8E-14	2.0	5.0E-20	2.2
1966	4.6E-11	2.9	1.3E-13	3.7	2.4E-13	3.5	4.9E-14	2.0	2.5E-20	2.2
1967	4.6E-11	2.9	1.3E-13	4.0	2.4E-13	3.5	5.0E-14	2.0	2.5E-20	2.2
1968	4.6E-11	2.8	1.3E-13	3.8	2.4E-13	3.2	5.1E-14	2.0	2.5E-20	2.3
1969	5.3E-11	2.9	1.3E-13	3.7	2.8E-13	3.5	5.1E-14	1.9	2.9E-20	2.3
1970	6.4E-11	2.9	1.4E-13	3.7	3.2E-13	3.3	5.2E-14	1.9	3.5E-20	2.3
1971	1.9E-11	2.7	1.4E-13	3.8	1.3E-13	3.4	5.2E-14	2.0	1.0E-20	2.2
1972	1.4E-11	2.9	1.4E-13	3.7	1.1E-13	3.5	5.3E-14	1.9	7.7E-21	2.3
1973	1.8E-11	2.7	1.4E-13	3.5	1 3E-13	3.3	5.3E-14	2.0	9.8E-21	2.3
1974	3.0E-12	3.0	1.4E-13	3.9	5.7E-14	3.6	5.3E-14	2.0	1.7E-21	2.3
1975	9.1E-12	3.0	1.4E-13	3.8	8.7E-14	3.3	5.3E-14	1.9	5.0E-21	2.3
1976	4.1E-12	3.0	1.4E-13	3.8	6.3E-14	3.5	5.3E-14	1.9	2.2E-21	2.3
1977	6.4E-12	2.8	1.4E-13	3.8	7.3E-14	3.4	5.3E-14	1.9	3.5E-21	2.2
1978	1.1E-11	2.8	1.4E-13	3.7	9.8E-14	3.3	5.3E-14	1.9	6.0E-21	2.2
1979	8.6E-12	2.8	1.4E-13	3 7	8.6E-14	3.3	5.4E-14	1.9	4.7E-21	2.2
1980	5.1E-12	2.8	1.4E-13	3 9	7.0E-14	3.4	5.4E-14	1.9	2.8E-21	2.2
1981	5.9E-12	2.8	1.4E-13	3.6	7.2E-14	3.3	5.4E-14	1.9	3.2E-21	2.2
1982	6.4E-12	2.9	1.4E-13	3.8	7.5E-14	3.3	5.4E-14	2.0	3.5E-21	2.2
1983	1.0E-11	2.9	1.4E-13	3.9	9.4E-14	3.4	5.4E-14	1.9	5.6E-21	2.2
1984	1.8E-12	2.9	1.4E-13	3.6	5.0E-14	3.5	5.4E-14	1.9	1.0E-21	2.3
1985	1.3E-11	2.9	1.4E-13	3.7	1.1E-13	3.3	5.4E-14	1.9	7.1E-21	2.3
1986	9.6E-13	2.8	1.4E-13	3.6	4.4E-14	3.8	5 4E-14	2.0	5.3E-22	2.2
1987	4.1E-12	3.0	1.4E-13	3.8	6.3E-14	3.4	5 4E-14	1.9	2.2E-21	2.2
1988	3.1E-12	2.7	1 4E-13	3.8	5.9E-14	3.3	5.4E-14	2.0	1.7E-21	2.2
1989	8.4E-13	3.0	1.4E-13	3.8	4.3E-14	3.8	5.4E-14	2.0	4.6E-22	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Depleted Uranium (continued)
Longmont
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	2.1E-15	4.9	6.8E-13	5.6	1.9E-13	5.1	1.0E-13	3.6	5.6E-23	3.1	4.1E-10	2.8
1954	4.7E-15	4.3	7.5E-13	5.3	2.1E-13	4.7	2.3E-13	3.5	1.3E-22	2.8	4.1E-10	2.7
1955	9.1E-15	4.3	1.3E-12	5.5	3.6E-13	4.7	4.4E-13	3.2	2.4E-22	2.7	7.0E-10	2.7
1956	1.1E-14	4.4	7.6E-13	5.0	2.1E-13	4.3	5.5E-13	3.2	3.0E-22	2.7	3.4E-10	2.8
1957	1.3E-14	4.3	6.7E-13	4.5	1.8E-13	4.3	6.3E-13	3.2	3.4E-22	2.6	2.5E-10	2.8
1958	1.7E-14	4.0	1.2E-12	4.9	3.4E-13	4.4	8.0E-13	3.3	4.4E-22	2.7	5.5E-10	2.9
1959	1.7E-14	4.1	4.6E-13	4.5	1.3E-13	4.4	8.3E-13	3.0	4.5E-22	2.6	9.4E-11	2.6
1960	1.8E-14	4.2	5.4E-13	5.0	1.4E-13	4.2	8.7E-13	3.2	4.8E-22	2.6	1.2E-10	2.8
1961	1.9E-14	4.1	6.5E-13	4.9	1.8E-13	4.1	9.3E-13	3.0	5.1E-22	2.6	1.8E-10	2.8
1962	2.0E-14	4.2	5.7E-13	5.0	1.6E-13	4.1	9.7E-13	3.2	5.3E-22	2.7	1.3E-10	2.7
1963	2.1E-14	4.3	6.6E-13	4.4	1.8E-13	4.3	1.0E-12	3.2	5.6E-22	2.6	1.7E-10	2.9
1964	2.2E-14	4.3	5.2E-13	4.4	1.4E-13	4.4	1.1E-12	3.1	5.8E-22	2.6	8.5E-11	2.7
1965	2.2E-14	4.1	5.4E-13	4.4	1.5E-13	4.1	1.1E-12	3.2	5.9E-22	2.6	9.7E-11	2.8
1966	2.3E-14	4.2	4.6E-13	4.8	1.2E-13	4.6	1.1E-12	3.3	6.0E-22	2.5	5.1E-11	2.7
1967	2.3E-14	4.2	4.6E-13	4.3	1.2E-13	4.1	1.1E-12	3.2	6.1E-22	2.5	5.1E-11	2.7
1968	2.3E-14	3.8	4.7E-13	5.1	1.3E-13	4.6	1.1E-12	3.2	6.2E-22	2.6	5.1E-11	2.6
1969	2.4E-14	4.1	4.9E-13	4.4	1.3E-13	4.4	1.1E-12	3.1	6.3E-22	2.5	5.9E-11	2.7
1970	2.4E-14	4.1	5.2E-13	4.7	1.4E-13	4.3	1.2E-12	3.3	6.4E-22	2.6	7.0E-11	2.7
1971	2.4E-14	4.0	4.2E-13	4.7	1.1E-13	4.5	1.2E-12	3.2	6.4E-22	2.7	2.4E-11	2.5
1972	2.4E-14	4.4	4.1E-13	4.7	1.1E-13	4.1	1.2E-12	3.2	6.5E-22	2.6	1.9E-11	2.4
1973	2.4E-14	3.8	4.2E-13	4.6	1.1E-13	4.2	1.2E-12	3.0	6.5E-22	2.5	2.3E-11	2.4
1974	2.4E-14	4.3	3.8E-13	4.7	9.9E-14	4.8	1.2E-12	3.1	6.5E-22	2.6	6.8E-12	2.3
1975	2.4E-14	4.5	4.0E-13	4.8	1.0E-13	3.9	1.2E-12	3.3	6.5E-22	2.6	1.4E-11	2.5
1976	2.4E-14	4.2	3.8E-13	4.4	1.0E-13	4.0	1.2E-12	3.2	6.5E-22	2.5	8.0E-12	2.3
1977	2.5E-14	3.8	3.9E-13	4.6	1.0E-13	4.1	1.2E-12	3.2	6.6E-22	2.5	1.1E-11	2.3
1978	2.5E-14	4.2	4.0E-13	4.8	1.1E-13	4.4	1.2E-12	3.0	6.5E-22	2.5	1.5E-11	2.4
1979	2.5E-14	4.3	4.0E-13	4.4	1.1E-13	4.4	1.2E-12	3.3	6.6E-22	2.5	1.3E-11	2.4
1980	2.5E-14	4.4	3.9E-13	4.9	1.0E-13	4.4	1.2E-12	3.0	6.6E-22	2.6	9.0E-12	2.2
1981	2.5E-14	4.1	3.9E-13	4.3	1.0E-13	4.3	1.2E-12	3.2	6.6E-22	2.7	9.9E-12	2.3
1982	2.5E-14	4.2	4.0E-13	4.7	1.0E-13	4.3	1.2E-12	3.1	6.6E-22	2.6	1.0E-11	2.3
1983	2.5E-14	4.1	4.1E-13	4.7	1.1E-13	4.4	1.2E-12	3.3	6.6E-22	2.6	1.5E-11	2.4
1984	2.5E-14	4.2	3.8E-13	4.3	1.0E-13	4.3	1.2E-12	3.2	6.6E-22	2.5	5.3E-12	2.2
1985	2.5E-14	4.2	4.2E-13	4.6	1.1E-13	4.2	1.2E-12	3.1	6.6E-22	2.6	1.8E-11	2.5
1986	2.5E-14	4.1	3.8E-13	4.8	9.9E-14	4.3	1.2E-12	3.2	6.6E-22	2.6	4.2E-12	2.2
1987	2.5E-14	4.3	3.9E-13	5.1	1.0E-13	4.1	1.2E-12	3.2	6.7E-22	2.5	8.1E-12	2.3
1988	2.5E-14	4.0	3.9E-13	5.1	1.0E-13	4.5	1.2E-12	3.2	6.7E-22	2.6	6.9E-12	2.2
1989	2.5E-14	4.3	3.8E-13	4.7	9.9E-14	4.8	1.2E-12	3.3	6.7E-22	2.5	4.1E-12	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

PATHWAY-SPECIFIC DOSES ASSOCIATED WITH ROUTINE AIRBORNE RELEASE OF ENRICHED URANIUM

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium (continued)
Sector 1
(1953 - 1989)

Year	Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	3.3E-16	4.8	1.0E-13	5.5	3.0E-14	4.9	1.6E-14	3.6	1.7E-23	3.2	6.4E-11	2.7
1954	7.3E-16	4.6	1.1E-13	4.7	3.2E-14	4.8	3.6E-14	3.4	3.8E-23	2.8	6.4E-11	2.8
1955	3.6E-15	4.2	8.4E-13	5.3	2.4E-13	5.0	1.7E-13	3.5	1.9E-22	2.9	5.1E-10	2.8
1956	4.3E-14	4.8	1.2E 11	5.6	3.4E-12	5.0	2.1E-12	3.4	2.3E-21	3.0	7.5E-09	2.8
1957	6.1E-14	4.4	5.4E-12	5.2	1.5E-12	4.6	3.0E-12	3.2	3.2E-21	2.7	2.6E-09	2.8
1958	7.6E-14	4.4	5.0E-12	4.5	1.4E-12	4.3	3.7E-12	3.3	3.9E-21	2.7	2.2E-09	2.9
1959	1.0E-13	4.4	7.9E-12	5.2	2.2E-12	4.3	4.9E-12	3.2	5.2E-21	2.5	3.8E-09	2.7
1960	1.4E-13	4.2	1.2E-11	5.3	3.4E-12	4.6	6.7E-12	3.1	7.1E-21	2.6	5.9E-09	2.9
1961	1.6E-13	4.2	8.6E-12	4.9	2.4E-12	4.6	7.7E-12	3.1	8.2E-21	2.6	3.3E-09	2.8
1962	1.7E-13	3.9	6.2E-12	4.5	1.7E-12	3.8	8.3E-12	3.1	8.9E-21	2.5	1.7E-09	2.8
1963	1.9E-13	4.2	7.3E-12	4.5	2.1E-12	4 3	9.1E-12	3.2	9.7E-21	2.5	2.3E-09	2.9
1964	1.9E-13	4.2	5.7E-12	4.4	1.6E-12	4.4	9.5E-12	3.1	1.0E-20	2.6	1.4E-09	2.7
1965	2.0E-13	4.2	5.9E-12	4.7	1.6E-12	4.0	9.9E-12	3.1	1.1E-20	2.5	1.4E-09	2.7
1966	2.1E-13	4.5	6.7E-12	4.4	1.8E-12	4.1	1.0E-11	3.1	1.1E-20	2.6	1.6E-09	2.8
1967	2.2E-13	4.1	5.1E-12	4.3	1.4E-12	4.1	1.1E-11	3.1	1.1E-20	2.5	7.9E-10	2.6
1968	2.3E-13	4.2	6.0E-12	4.6	1.6E-12	4.1	1.1E-11	3.3	1.2E-20	2.6	1.2E-09	2.7
1969	2.3E-13	4.2	4.4E-12	4.4	1.2E-12	4.2	1.1E-11	3.1	1.2E-20	2.5	3.9E-10	2.6
1970	2.3E-13	4.0	4.7E-12	4.7	1.2E-12	3.9	1.1E-11	3.2	1.2E-20	2.6	4.9E-10	2.6
1971	2.3E-13	4.6	4.3E-12	4.7	1.2E-12	4.1	1.1E-11	3.2	1.2E-20	2.6	3.3E-10	2.6
1972	2.3E-13	4.1	3.6E-12	5.0	9.5E-13	4.5	1.1E-11	3.2	1.2E-20	2.5	6.4E-11	2.2
1973	2.3E-13	4.0	3.8E-12	4.6	1.0E-12	4.2	1.1E-11	3.2	1.2E-20	2.6	1.3E-10	2.3
1974	2.4E-13	4.1	4.1E-12	4.5	1.1E-12	4.4	1.2E-11	3.1	1.2E-20	2.5	2.3E-10	2.5
1975	2.4E-13	4.1	4.1E-12	4.3	1.1E-12	4.5	1.2E-11	3.2	1.2E-20	2.5	2.4E-10	2.6
1976	2.4E-13	4.1	3.9E-12	4.3	1.0E-12	4.0	1.2E-11	3.2	1.2E-20	2.4	1.5E-10	2.5
1977	2.4E-13	4.0	4.0E-12	4.7	1.1E-12	4.1	1.2E-11	3.1	1.2E-20	2.6	1.9E-10	2.4
1978	2.4E-13	3.9	4.0E-12	5.1	1.1E-12	4.3	1.2E-11	3.2	1.3E-20	2.5	1.9E-10	2.5
1979	2.4E-13	4.1	3.8E-12	4.3	1.0E-12	4.3	1.2E-11	3.1	1.3E-20	2.5	1.0E-10	2.4
1980	2.4E-13	4.0	4.0E-12	4.5	1.0E-12	4.2	1.2E-11	3.1	1.3E-20	2.5	1.5E-10	2.4
1981	2.4E-13	3.9	3.9E-12	4.7	1.0E-12	4.2	1.2E-11	3.3	1.3E-20	2.6	1.3E-10	2.4
1982	2.4E-13	4.1	3.9E-12	4.5	1.0E-12	4.2	1.2E-11	3.1	1.3E-20	2.5	1.3E-10	2.3
1983	2.4E-13	4.1	4.0E-12	4.4	1.1E-12	4.3	1.2E-11	3.1	1.3E-20	2.5	1.8E-10	2.4
1984	2.4E-13	3.9	4.1E-12	4.7	1.1E-12	4.2	1.2E-11	3.2	1.3E-20	2.5	1.8E-10	2.5
1985	2.5E-13	4.1	3.9E-12	4.5	1.0E-12	4.7	1.2E-11	3.1	1.3E-20	2.5	9.4E-11	2.3
1986	2.5E-13	4.2	3.9E-12	4.6	1.0E-12	4.2	1.2E-11	3.2	1.3E-20	2.6	1.2E-10	2.3
1987	2.5E-13	4.3	3.8E-12	4.8	9.9E-13	4.6	1.2E-11	3.1	1.3E-20	2.4	6.9E-11	2.2
1988	2.5E-13	4.1	3.7E-12	4.6	9.8E-13	4.3	1.2E-11	3.2	1.3E-20	2.6	5.3E-11	2.2
1989	2.5E-13	4.1	3.8E-12	4.9	1.0E-12	4.2	1.2E-11	3.2	1.3E-20	2.5	7.5E-11	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium
Sector 1
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	6.3E-11	2.8	1.8E-15	4.3	2.4E-13	3.7	8.9E-16	2.5	6.7E-20	2.3
1954	6.3E-11	2.9	4.1E-15	4.1	2.5E-13	3.8	2.0E-15	2.2	6.7E-20	2.3
1955	5.0E-10	2.9	2.0E-14	4.0	1.9E-12	4.0	9.8E-15	2.2	5.4E-19	2.2
1956	7.3E-09	2.8	2.4E-13	4.2	2.8E-11	3.7	1.2E-13	2.4	7.8E-18	2.2
1957	2.6E-09	2.8	3.4E-13	4.0	1.0E-11	3.9	1.7E-13	2.2	2.7E-18	2.2
1958	2.1E-09	2.9	4.3E-13	4.0	8.3E-12	3.7	2.1E-13	2.2	2.2E-18	2.3
1959	3.7E-09	2.7	5.7E-13	3.8	1.5E-11	3.7	2.8E-13	2.1	3.9E-18	2.2
1960	5.8E-09	2.9	7.7E-13	4.0	2.3E-11	3.9	3.8E-13	2.0	6.1E-18	2.3
1961	3.2E-09	2.9	8.9E-13	3.6	1.3E-11	3.9	4.4E-13	2.0	3.5E-18	2.3
1962	1.7E-09	2.9	9.6E-13	3.7	7.0E-12	3.8	4.7E-13	2.0	1.8E-18	2.3
1963	2.3E-09	2.9	1.0E-12	3.6	9.4E-12	3.7	5.1E-13	2.0	2.4E-18	2.2
1964	1.3E-09	2.7	1.1E-12	3.6	5.7E-12	3.3	5.3E-13	1.9	1.4E-18	2.2
1965	1.3E-09	2.8	1.1E-12	3.6	5.8E-12	3.7	5.6E-13	1.9	1.4E-18	2.2
1966	1.6E-09	2.9	1.2E-12	3.7	6.8E-12	3.7	5.9E-13	1.9	1.7E-18	2.2
1967	7.3E-10	2.8	1.2E-12	3.8	3.5E-12	3.5	6.0E-13	1.9	7.8E-19	2.2
1968	1.1E-09	2.8	1.3E-12	3.8	5.0E-12	3.4	6.2E-13	1.9	1.2E-18	2.3
1969	3.4E-10	2.8	1.3E-12	3.9	2.0E-12	3.4	6.3E-13	2.0	3.6E-19	2.3
1970	4.4E-10	2.8	1.3E-12	3.9	2.4E-12	3.3	6.4E-13	1.9	4.7E-19	2.2
1971	2.8E-10	2.8	1.3E-12	3.9	1.7E-12	3.3	6.5E-13	1.9	3.0E-19	2.2
1972	2.7E-11	2.8	1.3E-12	3.9	5.3E-13	3.3	6.5E-13	1.9	2.9E-20	2.2
1973	8.4E-11	2.8	1.3E-12	3.8	8.4E-13	3.2	6.5E-13	1.9	8.9E-20	2.2
1974	1.8E-10	2.9	1.3E-12	3.7	1.3E-12	3.3	6.5E-13	1.9	2.0E-19	2.2
1975	1.9E-10	2.9	1.3E-12	3.7	1.3E-12	3.3	6.6E-13	1.9	2.0E-19	2.2
1976	1.1E-10	3.0	1.3E-12	3.7	9.8E-13	3.4	6.6E-13	1.9	1.2E-19	2.3
1977	1.4E-10	2.8	1.3E-12	3.9	1.1E-12	3.3	6.6E-13	1.9	1.5E-19	2.2
1978	1.4E-10	2.9	1.4E-12	3.9	1.1E-12	3.1	6.6E-13	2.0	1.5E-19	2.2
1979	6.3E-11	2.9	1.4E-12	3.8	7.3E-13	3.6	6.6E-13	1.9	6.7E-20	2.2
1980	1.0E-10	2.9	1.4E-12	3.7	9.4E-13	3.3	6.6E-13	1.9	1.1E-19	2.2
1981	8.4E-11	2.9	1.4E-12	3.6	8.5E-13	3.3	6.7E-13	1.9	8.9E-20	2.2
1982	8.4E-11	2.9	1.4E-12	3.8	8.2E-13	3.3	6.7E-13	1.9	8.9E-20	2.3
1983	1.4E-10	2.8	1.4E-12	3.8	1.1E-12	3.4	6.7E-13	1.9	1.5E-19	2.2
1984	1.4E-10	2.9	1.4E-12	3.5	1.1E-12	3.1	6.7E-13	1.9	1.5E-19	2.3
1985	5.2E-11	2.9	1.4E-12	4.1	6.7E-13	3.3	6.7E-13	1.9	5.6E-20	2.3
1986	7.3E-11	2.9	1.4E-12	3.7	8.0E-13	3.4	6.8E-13	1.9	7.8E-20	2.3
1987	3.1E-11	2.9	1.4E-12	3.6	5.7E-13	3.5	6.7E-13	1.9	3.4E-20	2.2
1988	1.8E-11	2.9	1.4E-12	3.7	4.9E-13	3.5	6.8E-13	1.9	1.9E-20	2.3
1989	3.6E-11	2.8	1.4E-12	3.8	6.0E-13	3.3	6.8E-13	1.9	3.8E-20	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium
Sector 2
(1953 - 1989)

Year	Inhalation GM (Sv/year)	GSD	Soil Ingestion GM (Sv/year)	GSD	Vegetable Ingestion GM (Sv/year)	GSD	Ground Exposure GM (Sv/year)	GSD	Immersion GM (Sv/year)	GSD
1953	3.1E-11	2.9	9.1E-16	4.5	1.2E-13	4.0	4.4E-16	2.6	3.3E-20	2.3
1954	3.1E-11	2.9	2.0E-15	4.0	1.2E-13	3.7	9.9E-16	2.3	3.3E-20	2.3
1955	2.5E-10	2.8	9.9E-15	3.9	9.6E-13	3.8	4.8E-15	2.3	2.7E-19	2.3
1956	3.6E-09	2.8	1.2E-13	4.3	1.4E-11	3.6	5.9E-14	2.4	3.9E-18	2.3
1957	1.3E-09	2.9	1.7E-13	4.0	5.0E-12	3.9	8.3E-14	2.3	1.4E-18	2.2
1958	1.0E-09	2.8	2.1E-13	4.0	4.2E-12	3.9	1.0E-13	2.2	1.1E-18	2.3
1959	1.8E-09	2.7	2.8E-13	3.8	7.1E-12	3.8	1.4E-13	2.1	1.9E-18	2.2
1960	2.8E-09	2.9	3.8E-13	4.0	1.1E-11	3.8	1.9E-13	2.1	3.0E-18	2.3
1961	1.6E-09	2.9	4.5E-13	4.0	6.5E-12	3.4	2.2E-13	2.0	1.7E-18	2.3
1962	8.3E-10	2.8	4.8E-13	3.9	3.5E-12	3.6	2.3E-13	2.0	8.8E-19	2.2
1963	1.1E-09	2.9	5.2E-13	3.7	4.6E-12	3.5	2.5E-13	2.0	1.2E-18	2.2
1964	6.5E-10	2.9	5.4E-13	3.9	2.8E-12	3.6	2.7E-13	2.0	6.9E-19	2.2
1965	6.5E-10	2.8	5.7E-13	3.8	2.8E-12	3.6	2.8E-13	2.0	6.9E-19	2.2
1966	7.8E-10	2.9	6.0E-13	3.7	3.4E-12	3.7	2.9E-13	2.0	8.3E-19	2.2
1967	3.6E-10	3.0	6.1E-13	3.7	1.7E-12	3.3	3.0E-13	2.0	3.9E-19	2.2
1968	5.4E-10	2.9	6.3E-13	3.7	2.5E-12	3.6	3.1E-13	2.0	5.8E-19	2.2
1969	1.7E-10	2.9	6.4E-13	3.8	9.6E-13	3.2	3.1E-13	2.0	1.8E-19	2.2
1970	2.2E-10	2.8	6.5E-13	3.9	1.2E-12	3.7	3.2E-13	2.0	2.3E-19	2.3
1971	1.4E-10	2.9	6.5E-13	3.8	8.4E-13	3.2	3.2E-13	2.0	1.5E-19	2.3
1972	1.3E-11	2.9	6.5E-13	3.7	2.6E-13	3.5	3.2E-13	2.0	1.4E-20	2.3
1973	4.1E-11	2.7	6.6E-13	3.6	4.0E-13	3.4	3.2E-13	2.0	4.4E-20	2.2
1974	9.1E-11	2.8	6.6E-13	3.9	6.4E-13	3.4	3.2E-13	2.0	9.7E-20	2.2
1975	9.3E-11	2.7	6.7E-13	4.0	6.4E-13	3.2	3.2E-13	2.0	1.0E-19	2.3
1976	5.4E-11	2.9	6.6E-13	3.7	4.8E-13	3.2	3.3E-13	2.0	5.8E-20	2.2
1977	7.0E-11	2.7	6.7E-13	3.8	5.6E-13	3.1	3.3E-13	2.0	7.5E-20	2.2
1978	7.0E-11	2.9	6.7E-13	3.8	5.4E-13	3.2	3.3E-13	2.0	7.4E-20	2.2
1979	3.1E-11	2.9	6.7E-13	3.6	3.6E-13	3.2	3.3E-13	1.9	3.3E-20	2.3
1980	5.2E-11	2.9	6.7E-13	3.8	4.7E-13	3.4	3.3E-13	2.0	5.5E-20	2.2
1981	4.1E-11	2.9	6.8E-13	3.8	4.2E-13	3.4	3.3E-13	2.0	4.4E-20	2.3
1982	4.2E-11	2.7	6.8E-13	3.6	4.2E-13	3.3	3.3E-13	2.0	4.4E-20	2.3
1983	6.7E-11	2.9	6.8E-13	3.9	5.4E-13	3.2	3.3E-13	2.0	7.2E-20	2.3
1984	6.7E-11	3.1	6.8E-13	3.6	5.5E-13	3.2	3.3E-13	2.0	7.2E-20	2.2
1985	2.6E-11	2.9	6.8E-13	4.0	3.4E-13	3.6	3.3E-13	1.9	2.8E-20	2.3
1986	3.6E-11	2.8	6.8E-13	3.7	4.0E-13	3.1	3.3E-13	2.0	3 9E-20	2 2
1987	1.6E-11	2.8	6.8E-13	3.7	2.8E-13	3.4	3 3E-13	1.9	1.7E-20	2.3
1988	8.8E-12	3.0	6.8E-13	3.8	2.4E-13	3.4	3.3E-13	2.0	9.4E-21	2.2
1989	1.8E-11	2.8	6.8E-13	3.7	2.9E-13	3.6	3.3E-13	1.9	1.9E-20	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium (continued)
Sector 2
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	GSD	Milk Ingestion GM (Sv/year)	GSD	Beef Ingestion GM (Sv/year)	GSD	Inhalation of Resuspended Particulates GM (Sv/year)	GSD	Immersion in Resuspended Particulates GM (Sv/year)	GSD	Total Dose GM (Sv/year)	GSD
1953	1.6E-16	5.2	5.1E-14	5.3	1.5E-14	5.2	7.9E-15	3.7	8.4E-24	3.2	3.2E-11	2.9
1954	3.6E-16	4.7	5.6E-14	4 9	1.6E-14	4.7	1.7E-14	3.5	1.9E-23	3.0	3.2E-11	2.9
1955	1.8E-15	4.4	4.2E-13	5.1	1.2E-13	4.7	8.6E-14	3.6	9.2E-23	3.0	2.5E-10	2.8
1956	2.1E-14	4.9	6.0E-12	5.3	1.7E-12	4.9	1.0E-12	3.5	1.1E-21	3.0	3.7E-09	2.8
1957	3.0E-14	4.2	2.6E-12	5.4	7.5E-13	4.6	1.5E-12	3.6	1.6E-21	2.9	1.3E-09	2.8
1958	3.7E-14	4.5	2.5E-12	4.7	6.8E-13	4.5	1.8E-12	3.4	1.9E-21	2.8	1.1E-09	2.8
1959	4.9E-14	4.3	3.9E-12	5.3	1.1E-12	4.3	2.4E-12	3.3	2.6E-21	2.8	1.9E-09	2.7
1960	6.8E-14	4.1	5.9E-12	5.1	1.7E-12	4.5	3.3E-12	3.0	3.5E-21	2.6	2.9E-09	2.8
1961	7.9E-14	4.0	4.2E-12	4.9	1.2E-12	4.3	3.8E-12	3.2	4.1E-21	2.5	1.7E-09	2.8
1962	8.4E-14	4.4	3.0E-12	4.5	8.3E-13	4.5	4.1E-12	3.4	4.4E-21	2.7	8.6E-10	2.7
1963	9.2E-14	4.3	3.6E-12	4.6	1.0E-12	4.2	4.5E-12	3.5	4.8E-21	2.7	1.2E-09	2.8
1964	9.6E-14	4.0	2.9E-12	4.7	8.0E-13	4.1	4.7E-12	3.4	5.0E-21	2.6	6.8E-10	2.8
1965	1.0E-13	4.3	3.0E-12	5.0	8.0E-13	4.2	4.9E-12	3.4	5.3E-21	2.6	6.8E-10	2.7
1966	1.1E-13	4.5	3.2E-12	4.8	8.9E-13	4.3	5.2E-12	3.3	5.5E-21	2.5	8.1E-10	2.8
1967	1.1E-13	4.0	2.5E-12	4.4	6.9E-13	4.3	5.3E-12	3.3	5.7E-21	2.6	3.9E-10	2.8
1968	1.1E-13	4.3	3.0E-12	4.6	8.1E-13	4.4	5.5E-12	3.0	5.8E-21	2.5	5.8E-10	2.7
1969	1.1E-13	4.1	2.2E-12	4.3	5.9E-13	4.0	5.5E-12	3.0	5.9E-21	2.4	1.9E-10	2.6
1970	1.1E-13	4.4	2.3E-12	4.6	6.2E-13	4.3	5.6E-12	3.2	6.0E-21	2.6	2.4E-10	2.6
1971	1.2E-13	4.1	2.1E-12	4.7	5.7E-13	4.5	5.6E-12	3.3	6.0E-21	2.6	1.6E-10	2.6
1972	1.2E-13	4.3	1.8E-12	4.3	4.7E-13	4.4	5.6E-12	3.2	6.0E-21	2.5	3.0E-11	2.3
1973	1.2E-13	4.2	1.9E-12	4.2	4.9E-13	4.3	5.7E-12	3.2	6.0E-21	2.5	6.1E-11	2.3
1974	1.2E-13	4.1	2.0E-12	4.3	5.3E-13	4.4	5.7E-12	3.4	6.1E-21	2.6	1.1E-10	2.4
1975	1.2E-13	4.1	2.0E-12	4.9	5.4E-13	4.5	5.7E-12	3.2	6.1E-21	2.7	1.2E-10	2.4
1976	1.2E-13	3.8	1.9E-12	4.3	5.1E-13	4.4	5.7E-12	3.1	6.1E-21	2.5	7.6E-11	2.4
1977	1.2E-13	4.2	2.0E-12	4.7	5.3E-13	4.4	5.8E-12	3.1	6.1E-21	2.5	9.3E-11	2.4
1978	1.2E-13	4.0	2.0E-12	4.4	5.3E-13	4.1	5.8E-12	3.2	6.2E-21	2.6	9.3E-11	2.5
1979	1.2E-13	4.1	1.9E-12	4.9	5.0E-13	4.7	5.8E-12	3.2	6.2E-21	2.5	5.1E-11	2.4
1980	1.2E-13	4.2	1.9E-12	4.5	5.1E-13	4.3	5.8E-12	3.4	6.2E-21	2.6	7.4E-11	2.4
1981	1.2E-13	3.9	1.9E-12	5.0	5.1E-13	4.3	5.9E-12	3.2	6.2E-21	2.4	6.3E-11	2.4
1982	1.2E-13	4.2	1.9E-12	4.8	5.1E-13	4.5	5.9E-12	3.2	6.2E-21	2.7	6.3E-11	2.3
1983	1.2E-13	3.9	2.0E-12	4.7	5.3E-13	4.6	5.9E-12	3.2	6.3E-21	2.5	9.0E-11	2.5
1984	1.2E-13	4.2	2.0E-12	4.7	5.3E-13	4.5	5.9E-12	3.3	6.3E-21	2.6	9.2E-11	2.6
1985	1.2E-13	4.3	1.9E-12	4.8	5.0E-13	4.3	5.9E-12	3.2	6.3E-21	2.6	4.6E-11	2.3
1986	1.2E-13	4.3	1.9E-12	4.8	5.1E-13	4.5	5.9E-12	3.1	6.3E-21	2.5	5 7E-11	2.3
1987	1.2E-13	4.0	1.9E-12	4.6	4.9E-13	4.5	5.9E-12	3.3	6.3E-21	2 6	3.4E-11	2.3
1988	1.2E-13	4.0	1.9E-12	4.8	4.8E-13	4.5	5.9E-12	3 1	6.3E-21	2.5	2.6E-11	2.2
1989	1.2E-13	4.3	1.9E-12	4.2	4.9E-13	4.6	5.9E-12	3.1	6.3E-21	2.4	3.6E-11	2 2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium
Sector 3
(1953 - 1989)

Year	Inhalation GM (Sv/year)	GSD	Soil Ingestion GM (Sv/year)	GSD	Vegetable Ingestion GM (Sv/year)	GSD	Ground Exposure GM (Sv/year)	GSD	Immersion GM (Sv/year)	GSD
1953	3.1E-11	2.7	9.2E-16	4 3	1.2E-13	3.8	4.5E-16	2.6	3.3E-20	2.3
1954	3.1E-11	2.8	2.0E-15	4.0	1.2E-13	3.9	1.0E-15	2.3	3.3E-20	2.2
1955	2.5E-10	2.8	1.0E-14	4.3	9.7E-13	3 8	4.9E-15	2.3	2.7E-19	2.2
1956	3.6E-09	2.8	1.2E-13	3.9	1.4E-11	3.8	5.9E-14	2.4	3.9E-18	2.2
1957	1.3E-09	2.9	1.7E-13	4.3	5.0E-12	3.8	8.3E-14	2.1	1.4E-18	2.3
1958	1.0E-09	2.9	2.1E-13	3.9	4.2E-12	3.7	1.0E-13	2.1	1.1E-18	2.3
1959	1.8E-09	2.9	2.8E-13	3.8	7.2E-12	3.6	1.4E-13	2.0	1.9E-18	2.3
1960	2.9E-09	2.8	3.8E-13	4.0	1.1E-11	4.0	1.9E-13	2.0	3.1E-18	2.2
1961	1.6E-09	2.9	4.5E-13	3.8	6.5E-12	4.0	2.2E-13	1.9	1.7E-18	2.3
1962	8.3E-10	2.9	4.8E-13	4.0	3.5E-12	3.7	2.3E-13	2.0	8.9E-19	2.2
1963	1.1E-09	2.9	5.2E-13	3.6	4.7E-12	3.5	2.6E-13	1.9	1.2E-18	2.2
1964	6.5E-10	2.9	5.5E-13	3.4	2.8E-12	3.5	2.7E-13	1.9	6.9E-19	2.2
1965	6.5E-10	2.8	5.7E-13	3.8	2.9E-12	3.3	2.8E-13	1.9	6.9E-19	2.2
1966	7.8E-10	2.9	6.0E-13	3.8	3.4E-12	3.6	2.9E-13	1.9	8.3E-19	2.2
1967	3.6E-10	2.9	6.2E-13	3.7	1.7E-12	3.5	3.0E-13	1.9	3.9E-19	2.3
1968	5.5E-10	2.9	6.4E-13	3.7	2.5E-12	3.7	3.1E-13	2.0	5.8E-19	2.3
1969	1.7E-10	2.9	6.4E-13	3.7	9.7E-13	3.4	3.1E-13	1.9	1.8E-19	2.2
1970	2.2E-10	2.8	6.5E-13	3.5	1.2E-12	3.5	3.2E-13	1.9	2.3E-19	2.2
1971	1.4E-10	2.9	6.6E-13	3.9	8.3E-13	3.1	3.2E-13	1.9	1.5E-19	2.2
1972	1.4E-11	2.7	6.6E-13	3.7	2.6E-13	3.2	3.2E-13	1.9	1.4E-20	2.2
1973	4.2E-11	2.8	6.6E-13	3.8	4.1E-13	3.3	3.2E-13	1.9	4.4E-20	2.3
1974	9.1E-11	2.9	6.7E-13	3.7	6.4E-13	3.2	3.2E-13	1.9	9.7E-20	2.2
1975	9.4E-11	2.8	6.7E-13	3.6	6.5E-13	3.2	3.3E-13	1.9	1.0E-19	2.3
1976	5.5E-11	2.9	6.7E-13	3.7	4.8E-13	3.3	3.3E-13	1.9	5.9E-20	2.3
1977	7.0E-11	2.9	6.7E-13	3.6	5.5E-13	3.1	3.3E-13	1.9	7.5E-20	2.3
1978	7.0E-11	2.9	6.8E-13	3.8	5.5E-13	3.3	3.3E-13	1.9	7.5E-20	2.2
1979	3.1E-11	2.9	6 8E-13	3.7	3.7E-13	3.1	3.3E-13	1.9	3.3E-20	2.2
1980	5.2E-11	2.9	6.8E-13	3.8	4.7E-13	3.1	3.3E-13	1.9	5.6E-20	2.2
1981	4.2E-11	2.8	6.8E-13	3.7	4.2E-13	3.1	3.3E-13	1.9	4.4E-20	2.2
1982	4.2E-11	2.8	6.8E-13	4.0	4.2E-13	3.4	3.3E-13	1.9	4.5E-20	2.2
1983	6.8E-11	2.8	6.9E-13	3.7	5.5E-13	3.1	3.3E-13	1.8	7.2E-20	2.3
1984	6.8E-11	2.8	6.9E-13	3.8	5.5E-13	3.2	3.4E-13	1.9	7.2E-20	2.2
1985	2.6E-11	2.7	6.9E-13	3.5	3.3E-13	3.2	3.4E-13	1.9	2.8E-20	2.2
1986	3.7E-11	2.8	6.9E-13	3.7	4.0E-13	3.3	3.4E-13	1.9	3.9E-20	2.2
1987	1.6E-11	2.9	6.9E-13	3.8	2.8E-13	3.4	3.4E-13	1.9	1.7E-20	2.2
1988	8.8E-12	2.8	6.9E-13	3.7	2.4E-13	3.4	3.4E-13	1.9	9.4E-21	2.2
1989	1.8E-11	2.8	6.9E-13	3.8	2.9E-13	3.4	3.4E-13	1.9	1.9E-20	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium (continued)
Sector 3
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	1.6E-16	5.0	5.1E-14	5.6	1.4E 14	5.1	7 9E-15	3.8	8.5E-24	3.2	3.2E-11	2.7
1954	3.6E-16	4.4	5.6E-14	5 3	1.6E-14	4.8	1.8E-14	3.3	1.9E-23	2.9	3.2E-11	2.8
1955	1.8E-15	4.5	4.2E-13	5.4	1.2E-13	4.8	8.7E-14	3.5	9.2E-23	2.9	2.5E-10	2.8
1956	2.1E-14	4.3	6.1E-12	5.1	1.7E-12	5.3	1.0E-12	3.8	1.1E-21	3.0	3.7E-09	2.8
1957	3.0E-14	4.4	2.7E-12	4.8	7.6E-13	4.7	1.5E-12	3.4	1.6E-21	2.8	1.3E-09	2.8
1958	3.8E-14	4.4	2.4E-12	5.2	6.8E-13	4.5	1.8E-12	3.2	2.0E-21	2.7	1.1E-09	2.9
1959	5.0E-14	4.3	3.9E-12	4.4	1.1E-12	4.3	2.4E-12	3.2	2.6E-21	2.7	1.9E-09	2.8
1960	6.8E-14	4.1	5.9E-12	4.9	1.7E-12	4.8	3.3E-12	3.2	3.5E-21	2.5	2.9E-09	2.8
1961	7.9E-14	3.9	4.2E-12	4.6	1.2E-12	4.3	3.9E-12	3.3	4.1E-21	2.5	1.7E-09	2.8
1962	8.5E-14	4.0	2.9E-12	4.9	8.1E-13	4.6	4.2E-12	3.2	4.4E-21	2.6	8.7E-10	2.8
1963	9.3E-14	4.4	3.7E-12	4.5	1.0E-12	4.2	4.5E-12	3.1	4.8E-21	2.5	1.2E-09	2.8
1964	9.8E-14	4.1	2.9E-12	4.6	7.9E-13	4.3	4.7E-12	3.2	5.0E-21	2.6	6.8E-10	2.8
1965	1.0E-13	4.3	2.9E-12	4.4	8.0E-13	4.0	5.0E-12	3.1	5.3E-21	2.5	6.9E-10	2.7
1966	1.1E-13	4.0	3.2E-12	4.5	8.9E-13	4.0	5.2E-12	3.2	5.6E-21	2.4	8.2E-10	2.8
1967	1.1E-13	4.0	2.5E-12	4.7	6.8E-13	3.9	5.4E-12	3.0	5.7E-21	2.5	4.0E-10	2.7
1968	1.1E-13	4.4	3.0E-12	4.4	8.2E-13	4.0	5.5E-12	3.1	5.9E-21	2.5	5.8E-10	2.8
1969	1.1E-13	4.0	2.2E-12	4.7	5.8E-13	4.1	5.6E-12	3.1	6.0E-21	2.5	2.0E-10	2.6
1970	1.2E-13	4.2	2.3E-12	4.5	6.2E-13	4.0	5.7E-12	3.0	6.0E-21	2.4	2.4E-10	2.5
1971	1.2E-13	4.2	2.1E-12	4.8	5.6E-13	4.1	5.7E-12	3.2	6.1E-21	2.6	1.6E-10	2.6
1972	1.2E-13	3.9	1.8E-12	4.6	4.7E-13	4.2	5.7E-12	3.0	6.1E-21	2.6	3.1E-11	2.1
1973	1.2E-13	4.3	1.9E-12	4.7	5.0E-13	4.0	5.7E-12	3.1	6.1E-21	2.5	6.2E-11	2.4
1974	1.2E-13	4.0	2.0E-12	4.6	5.4E-13	4.1	5.8E-12	3.1	6.1E-21	2.6	1.1E-10	2.6
1975	1.2E-13	4.2	2.0E-12	4.4	5.4E-13	4.2	5.8E-12	3.1	6.2E-21	2.5	1.2E-10	2.5
1976	1.2E-13	4.0	2.0E-12	4.5	5.2E-13	4.4	5.8E-12	3.1	6.2E-21	2.4	7.8E-11	2.4
1977	1.2E-13	4.1	2.0E-12	4.2	5.3E-13	4.1	5.8E-12	3.1	6.2E-21	2.6	9.4E-11	2.4
1978	1.2E-13	4.0	2.0E-12	4.4	5.3E-13	4.3	5.8E-12	3.1	6.2E-21	2.5	9.4E-11	2.5
1979	1.2E-13	4.0	1.9E-12	4.5	5.0E-13	4.6	5.9E-12	3.1	6.3E-21	2.5	5.2E-11	2.3
1980	1.2E-13	4.0	2.0E-12	5.0	5.2E-13	4.3	5.9E-12	3.1	6.3E-21	2.5	7.5E-11	2.4
1981	1.2E-13	4.0	1.9E-12	4 8	5.1E-13	3.9	5.9E-12	3.0	6.3E-21	2.5	6.3E-11	2.3
1982	1.2E-13	4.2	2.0E-12	4.6	5.1E-13	4.2	5.9E-12	2.9	6.3E-21	2.5	6.4E-11	2.3
1983	1.2E-13	3.9	2.0E-12	4.8	5.4E-13	4.3	5.9E-12	3.1	6.3E-21	2.5	8.9E-11	2.5
1984	1.2E-13	4.0	2.1E-12	4.4	5.4E-13	4.0	6.0E-12	3.0	6.4E-21	2.5	9.0E-11	2.4
1985	1.2E-13	3.8	1.9E-12	4.7	5.0E-13	4.2	5.9E-12	3.2	6.3E-21	2.4	4.5E-11	2.3
1986	1.2E-13	3.9	2.0E-12	4.6	5.1E-13	3.9	6.0E-12	3 0	6.4E-21	2.5	5.8E-11	2.3
1987	1.2E-13	3.9	1.9E-12	4.7	4.9E-13	4.3	6.0E-12	3.3	6.4E-21	2.5	3.4E-11	2.2
1988	1.2E-13	4.1	1.9E-12	4.9	4.9E-13	4.7	6.0E-12	3 2	6.4E-21	2.6	2.7E-11	2.2
1989	1.2E-13	4.0	1.9E-12	4.8	5 0E-13	4.3	6.0E-12	3.3	6.4E-21	2.6	3.7E-11	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium
Sector 4
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	1.1E-10	2.7	3.1E-15	4.5	4.1E-13	3.9	1.5E-15	2.5	1.1E-19	2.3
1954	1.1E-10	2.9	6.9E-15	4.1	4.1E-13	4.0	3.4E-15	2.2	1.1E-19	2.2
1955	8.4E-10	2.8	3.4E-14	4.0	3.3E-12	3.6	1.6E-14	2.3	9.0E-19	2.2
1956	1.2E-08	3.0	4.1E-13	4.3	4.8E-11	3.8	2.0E-13	2.4	1.3E-17	2.3
1957	4.3E-09	2.9	5.8E-13	3.8	1.7E-11	3.9	2.8E-13	2.2	4.6E-18	2.3
1958	3.5E-09	2.9	7.2E-13	3.7	1.4E-11	3.5	3.5E-13	2.2	3.7E-18	2.3
1959	6.1E-09	2.9	9.5E-13	3.7	2.4E-11	3.8	4.6E-13	2.1	6.6E-18	2.3
1960	9.7E-09	2.8	1.3E-12	4.0	3.8E-11	3.8	6.4E-13	2.1	1.0E-17	2.2
1961	5.4E-09	2.7	1.5E-12	3.8	2.2E-11	3.6	7.3E-13	2.0	5.8E-18	2.2
1962	2.8E-09	2.7	1.6E-12	4.0	1.2E-11	3.5	7.9E-13	2.0	3.0E-18	2.3
1963	3.8E-09	2.8	1.8E-12	4.1	1.6E-11	3.6	8.6E-13	2.0	4.0E-18	2.3
1964	2.2E-09	2.8	1.8E-12	3.7	9.6E-12	3.5	9.0E-13	2.0	2.3E-18	2.3
1965	2.2E-09	2.9	1.9E-12	3.8	9.6E-12	3.5	9.4E-13	1.9	2.3E-18	2.3
1966	2.6E-09	2.9	2.0E-12	3.7	1.1E-11	3.5	9.9E-13	2.0	2.8E-18	2.3
1967	1.2E-09	2.9	2.1E-12	3.7	5.9E-12	3.5	1.0E-12	1.9	1.3E-18	2.3
1968	1.9E-09	2.8	2.1E-12	3.6	8.3E-12	3.4	1.0E-12	2.0	2.0E-18	2.3
1969	5.7E-10	2.9	2.2E-12	3.8	3.2E-12	3.4	1.1E-12	2.0	6.1E-19	2.3
1970	7.3E-10	2.9	2.2E-12	3.7	4.0E-12	3.5	1.1E-12	2.0	7.8E-19	2.3
1971	4.7E-10	2.8	2.2E-12	3.6	2.8E-12	3.2	1.1E-12	1.9	5.0E-19	2.2
1972	4.6E-11	2.9	2.2E-12	3.8	8.8E-13	3.4	1.1E-12	1.9	4.9E-20	2.2
1973	1.4E-10	2.7	2.2E-12	3.7	1.4E-12	3.2	1.1E-12	2.0	1.5E-19	2.2
1974	3.1E-10	2.9	2.2E-12	3.7	2.1E-12	3.2	1.1E-12	1.9	3.3E-19	2.3
1975	3.2E-10	2.8	2.3E-12	3.7	2.2E-12	3.4	1.1E-12	1.9	3.4E-19	2.2
1976	1.8E-10	3.0	2.3E-12	3.8	1.6E-12	3.4	1.1E-12	2.0	2.0E-19	2.2
1977	2.4E-10	3.0	2.3E-12	4.0	1.8E-12	3.3	1.1E-12	1.9	2.5E-19	2.3
1978	2.4E-10	2.8	2.3E-12	3.9	1.9E-12	3.2	1.1E-12	2.0	2.5E-19	2.2
1979	1.1E-10	2.8	2.3E-12	3.6	1.2E-12	3.4	1.1E-12	1.9	1.1E-19	2.2
1980	1.8E-10	2.8	2.3E-12	3.7	1.6E-12	3.3	1.1E-12	1.9	1.9E-19	2.2
1981	1.4E-10	2.8	2.3E-12	3.6	1.4E-12	3.2	1.1E-12	2.0	1.5E-19	2.2
1982	1.4E-10	2.7	2.3E-12	3.8	1.4E-12	3.2	1.1E-12	2.0	1.5E-19	2.3
1983	2.3E-10	2.7	2.3E-12	3.8	1.9E-12	3.3	1.1E-12	1.9	2.4E-19	2.2
1984	2.3E-10	2.8	2.3E-12	3.6	1.8E-12	3.1	1.1E-12	2.0	2.4E-19	2.2
1985	8.8E-11	2.7	2.3E-12	3.6	1.2E-12	3.2	1.1E-12	1.9	9.4E-20	2.3
1986	1.2E-10	2.9	2.3E-12	3.7	1.3E-12	3.2	1.1E-12	1.9	1.3E-19	2.3
1987	5.3E-11	2.9	2.3E-12	3.7	9.5E-13	3.4	1.1E-12	1.9	5.6E-20	2.3
1988	3.0E-11	3.0	2.3E-12	3.4	8.1E-13	3.4	1.1E-12	1.9	3.2E-20	2.3
1989	6.0E-11	2.8	2.3E-12	3.7	1.0E-12	3.2	1.1E-12	1.9	6.4E-20	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium (continued)
Sector 4
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	GSD	Milk Ingestion GM (Sv/year)	GSD	Beef Ingestion GM (Sv/year)	GSD	Inhalation of Resuspended Particulates GM (Sv/year)	GSD	Immersion in Resuspended Particulates GM (Sv/year)	GSD	Total Dose GM (Sv/year)	GSD
1953	5.5E-16	4.6	1.7E-13	5 3	4.9E-14	5 0	2.7E-14	3 9	2.8E-23	3.2	1.1E-10	2.6
1954	1.2E-15	4.7	1.9E-13	5 2	5.5E-14	4.7	6.0E-14	3.4	6.4E-23	3.0	1.1E-10	2.8
1955	6.0E-15	4.7	1.4E-12	5.1	4.0E-13	5 0	2.9E-13	3.5	3.1E-22	2.8	8.6E-10	2.8
1956	7.2E-14	4.5	2.0E-11	5.3	5.7E-12	4.9	3.5E-12	3.6	3.8E-21	2.9	1.3E-08	2.9
1957	1.0E-13	4.6	9.1E-12	4.7	2.5E-12	4.6	5.0E-12	3 5	5.3E-21	2.9	4.4E-09	2.9
1958	1.3E-13	4.4	8.4E-12	5.2	2.4E-12	4.3	6.2E-12	3.3	6.6E-21	2.7	3.6E-09	2.8
1959	1.7E-13	4.1	1.4E-11	5.3	3.7E-12	4.6	8.2E-12	3.3	8.7E-21	2.7	6.3E-09	2.8
1960	2.3E-13	4.0	2.0E-11	4.9	5.7E-12	4.5	1.1E-11	3.2	1.2E-20	2.7	9.9E-09	2.8
1961	2.7E-13	4.5	1.4E-11	4.4	4.0E-12	4.1	1.3E-11	3.4	1.4E-20	2.6	5.6E-09	2 7
1962	2.9E-13	4.0	1.0E-11	4.4	2.8E-12	4.1	1.4E-11	3.2	1.5E-20	2.5	2.9E-09	2.7
1963	3.1E-13	4.3	1.2E-11	4.7	3.3E-12	4.3	1.5E-11	3 2	1.6E-20	2.5	3.9E-09	2.7
1964	3.3E-13	4.1	9.8E-12	4.4	2.7E-12	4.0	1.6E-11	3.2	1.7E-20	2.6	2.3E-09	2.7
1965	3.4E-13	4.2	1.0E-11	4.2	2.8E-12	4.0	1.7E-11	3.1	1.8E-20	2.6	2.3E-09	2.8
1966	3.6E-13	4.6	1 1E-11	4.5	3.1E-12	4.2	1.8E-11	3.1	1.9E-20	2.5	2.8E-09	2.8
1967	3.7E-13	4.1	8.6E-12	4.6	2.3E-12	4.0	1.8E-11	3.4	1.9E-20	2.7	1.3E-09	2.8
1968	3.8E-13	4.1	1.0E-11	4.5	2.7E-12	4.2	1.9E-11	3.1	2.0E-20	2.5	2 0E-09	2.7
1969	3.8E-13	4.0	7.5E-12	4.5	2.0E-12	3.9	1.9E-11	3.2	2.0E-20	2.7	6.6E-10	2.6
1970	3.9E-13	4.1	7.8E-12	4.8	2.1E-12	4.1	1.9E-11	3.3	2.0E-20	2.6	8.3E-10	2.6
1971	3.9E-13	4.2	7.2E-12	4.4	1.9E-12	4.0	1.9E-11	3.0	2.0E-20	2.5	5.5E-10	2.6
1972	3.9E-13	4.1	6.1E-12	4.5	1.6E-12	4.8	1.9E-11	3.3	2.0E-20	2.7	1.1E-10	2.2
1973	3.9E-13	3.9	6.4E-12	4.7	1.7E-12	4.0	1.9E-11	3.2	2.0E-20	2.5	2.1E-10	2.3
1974	4.0E-13	4.2	6.8E-12	4.7	1.8E-12	4.4	1.9E-11	3.3	2.1E-20	2.7	3.8E-10	2.6
1975	4.0E-13	4.3	6.9E-12	4.5	1.8E-12	4.5	1.9E-11	3.1	2.1E-20	2.6	4.0E-10	2.4
1976	4.0E-13	4.1	6 6E-12	4.4	1.7E-12	4.4	2.0E-11	3 2	2.1E-20	2.4	2.6E-10	2.5
1977	4.0E-13	4.1	6.8E-12	4.6	1.8E-12	4.3	2.0E-11	3.1	2.1E-20	2.5	3.2E-10	2.5
1978	4.0E-13	4.1	6.7E-12	4.7	1.8E-12	4.1	2.0E-11	3.3	2.1E-20	2.6	3.2E-10	2.4
1979	4.0E-13	4.1	6.4E-12	4.4	1.7E-12	4.3	2.0E-11	3.0	2.1E-20	2.4	1.7E-10	2.3
1980	4.0E-13	4.2	6.6E-12	4.5	1.7E-12	4.4	2.0E-11	3.1	2.1E-20	2.5	2.5E-10	2.4
1981	4.1E-13	4.2	6.6E-12	4.8	1.7E-12	4.5	2.0E-11	3.2	2.1E-20	2.5	2.1E-10	2.3
1982	4.0E-13	4.1	6.6E-12	4.5	1.7E-12	4.2	2.0E-11	3.0	2.1E-20	2.5	2.1E-10	2.3
1983	4.1E-13	4.3	6.8E-12	5.0	1.8E-12	4 3	2.0E-11	3.2	2.1E-20	2.5	3.1E-10	2.4
1984	4.1E-13	4.0	6.9E-12	4.5	1 8E-12	4.4	2.0E-11	3.2	2.1E-20	2.6	3.1E-10	2.4
1985	4.1E-13	4.2	6.4E-12	4.7	1.7E-12	4.5	2 0E-11	3 0	2.1E-20	2.6	1.5E-10	2 2
1986	4.1E-13	4.0	6.6E-12	4.6	1.7E-12	3 9	2.0E-11	3.0	2.1E-20	2.4	1.9E-10	2.4
1987	4.1E-13	4.0	6.4E-12	4 5	1.7E-12	4.2	2.0E-11	3.3	2.1E-20	2.6	1.2E-10	2.3
1988	4.1E-13	3.8	6.3E-12	4.5	1.6E-12	4.4	2.0E 11	3.2	2.1E-20	2.5	8.8E-11	2 2
1989	4.1E-13	4.1	6.4E-12	4 5	1.7E-12	4.7	2.0E-11	3 1	2.1E-20	2.5	1.2E-10	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium
Sector 5
(1953 - 1989)

Year	Inhalation		Soil Ingestion		Vegetable Ingestion		Ground Exposure		Immersion	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	3.1E-11	2.9	9.1E-16	4.6	1.2E-13	4.0	4.4E-16	2.6	3.3E-20	2.4
1954	3.1E-11	3.0	2.0E-15	4.1	1.2E-13	3.7	9.9E-16	2.3	3.3E-20	2.2
1955	2.5E-10	2.9	9.9E-15	4.3	9.6E-13	3.6	4.8E-15	2.3	2.6E-19	2.2
1956	3.6E-09	2.8	1.2E-13	4.2	1.4E-11	3.8	5.9E-14	2.5	3.9E-18	2.3
1957	1.3E-09	2.9	1.7E-13	4.2	5.0E-12	3.4	8.3E-14	2.2	1.4E-18	2.3
1958	1.0E-09	2.9	2.1E-13	3.9	4.1E-12	3.6	1.0E-13	2.1	1.1E-18	2.3
1959	1.8E-09	2.9	2.8E-13	3.9	7.1E-12	3.5	1.4E-13	2.1	1.9E-18	2.3
1960	2.9E-09	2.7	3.8E-13	3.7	1.1E-11	3.9	1.9E-13	2.0	3.0E-18	2.2
1961	1.6E-09	2.9	4.4E-13	3.7	6.5E-12	3.8	2.2E-13	2.0	1.7E-18	2.2
1962	8.3E-10	2.7	4.8E-13	3.5	3.5E-12	3.8	2.3E-13	1.9	8.8E-19	2.2
1963	1.1E-09	2.9	5.2E-13	4.0	4.6E-12	3.6	2.5E-13	2.0	1.2E-18	2.3
1964	6.5E-10	2.7	5.4E-13	4.2	2.8E-12	3.4	2.7E-13	2.0	6.9E-19	2.2
1965	6.5E-10	2.8	5.7E-13	3.6	2.8E-12	3.4	2.8E-13	1.9	6.9E-19	2.2
1966	7.8E-10	2.8	6.0E-13	3.8	3.4E-12	3.6	2.9E-13	1.9	8.3E-19	2.3
1967	3.6E-10	2.7	6.1E-13	3.6	1.7E-12	3.7	3.0E-13	1.9	3.9E-19	2.2
1968	5.4E-10	2.8	6.3E-13	3.8	2.5E-12	3.5	3.1E-13	1.9	5.8E-19	2.2
1969	1.7E-10	2.9	6.4E-13	3.9	9.7E-13	3.2	3.1E-13	1.9	1.8E-19	2.3
1970	2.2E-10	2.9	6.5E-13	3.9	1.2E-12	3.4	3.2E-13	1.9	2.3E-19	2.2
1971	1.4E-10	3.0	6.5E-13	3.9	8.5E-13	3.1	3.2E-13	1.9	1.5E-19	2.3
1972	1.3E-11	2.8	6.5E-13	3.7	2.7E-13	3.2	3.2E-13	1.9	1.4E-20	2.2
1973	4.2E-11	2.8	6.6E-13	3.8	4.1E-13	3.4	3.2E-13	1.9	4.4E-20	2.3
1974	9.0E-11	2.9	6.6E-13	3.8	6.5E-13	3.4	3.2E-13	1.9	9.6E-20	2.3
1975	9.3E-11	2.8	6.6E-13	4.0	6.5E-13	3.3	3.2E-13	1.9	1.0E-19	2.2
1976	5.4E-11	2.9	6.7E-13	3.9	4.8E-13	3.2	3.2E-13	1.9	5.8E-20	2.3
1977	7.0E-11	2.9	6.7E-13	3.8	5.4E-13	3.2	3.3E-13	1.9	7.5E-20	2.3
1978	7.0E-11	2.8	6.7E-13	4.0	5.5E-13	3.2	3.3E-13	1.9	7.5E-20	2.2
1979	3.1E-11	2.9	6.7E-13	3.7	3.6E-13	3 4	3.3E-13	1.9	3.3E-20	2.2
1980	5.2E-11	2.8	6.8E-13	3.9	4.7E-13	3.3	3.3E-13	1.9	5.5E-20	2.3
1981	4.2E-11	2.8	6.8E-13	3.7	4.2E-13	3.3	3.3E-13	1.9	4.4E-20	2.2
1982	4.1E-11	3.0	6.8E-13	3.8	4.2E-13	3.2	3.3E-13	1.9	4.4E-20	2.2
1983	6.7E-11	2.8	6.8E-13	3.8	5.4E-13	3.2	3.3E-13	1.9	7.2E-20	2.2
1984	6.8E-11	2.9	6.8E-13	3.7	5.4E-13	3.1	3.3E-13	1.9	7.2E-20	2.2
1985	2.6E-11	2.8	6.8E-13	3.6	3.3E-13	3.3	3.3E-13	1.9	2.8E-20	2.2
1986	3.6E-11	2.8	6.9E-13	3.8	3.9E-13	3.3	3.3E-13	1.9	3.9E-20	2.2
1987	1.6E-11	2.9	6.9E-13	3.9	2.8E-13	3.5	3.3E-13	1.9	1.7E-20	2.2
1988	8.8E-12	2.9	6.9E-13	3.9	2 4E-13	3.5	3.4E-13	1.9	9.4E-21	2.2
1989	1.8E-11	2.8	6.9E-13	3.5	2.9E-13	3.5	3 4E-13	1.9	1.9E-20	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium (continued)
Sector 5
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	1.6E-16	4.7	5.1E-14	5.4	1.4E-14	5.1	7.9E-15	3 7	8.4E-24	3.2	3.2E-11	2.9
1954	3.6E-16	4.4	5.6E-14	5.5	1.6E-14	4.3	1.8E-14	3.3	1.9E-23	2.7	3.2E-11	3.0
1955	1.8E-15	4.4	4.2E-13	5.0	1.2E-13	5.0	8.6E-14	3 6	9.1E-23	2.9	2.5E-10	2.9
1956	2.1E-14	4.3	6.0E-12	4.9	1.7E-12	4.9	1.0E-12	3.6	1.1E-21	3.0	3.7E-09	2.8
1957	3.0E-14	4.5	2.7E-12	4.9	7.5E-13	4.7	1.5E-12	3.2	1.6E-21	2.8	1.3E-09	2.8
1958	3.7E-14	4.2	2.4E-12	4.8	6.9E-13	4.7	1.8E-12	3.3	1.9E-21	2.7	1.1E-09	2.8
1959	4.9E-14	4.3	3.9E-12	4.6	1.1E-12	4.3	2.4E-12	3.4	2.6E-21	2.7	1.8E-09	2.8
1960	6.8E-14	4.4	5.9E-12	5.3	1.7E-12	4.6	3.3E-12	3.4	3.5E-21	2.8	2.9E-09	2.7
1961	7.9E-14	3.9	4.2E-12	4.6	1.2E-12	4.4	3.8E-12	3.2	4.1E-21	2.6	1.6E-09	2.9
1962	8.4E-14	4.1	3.0E-12	5.0	8.3E-13	4.5	4.1E-12	3.0	4.4E-21	2.5	8.6E-10	2.7
1963	9.2E-14	4.0	3.6E-12	4.6	1.0E-12	4.0	4.5E-12	3.0	4.8E-21	2.5	1.2E-09	2.8
1964	9.6E-14	4.2	2.9E-12	4.5	7.8E-13	4.2	4.7E-12	3.2	5.0E-21	2.5	6.8E-10	2.6
1965	1.0E-13	4.0	2.9E-12	4.2	8.0E-13	4.3	4.9E-12	3.2	5.3E-21	2.6	6.8E-10	2.7
1966	1.1E-13	4.2	3.3E-12	4.6	9.0E-13	4.1	5.2E-12	3.2	5.5E-21	2.7	8.1E-10	2.8
1967	1.1E-13	4.2	2.5E-12	4.2	6.8E-13	4.2	5.3E-12	3.0	5.6E-21	2.6	3.9E-10	2.6
1968	1.1E-13	4.1	3.0E-12	4.2	8.1E-13	4.1	5.5E-12	3.3	5.9E-21	2.6	5.7E-10	2.7
1969	1.1E-13	4.0	2.2E-12	4.4	5.8E-13	4.2	5.5E-12	3.2	5.9E-21	2.6	1.9E-10	2.7
1970	1.1E-13	4.2	2.3E-12	4.6	6.1E-13	4.2	5.6E-12	3.1	6.0E-21	2.5	2.4E-10	2.7
1971	1.2E-13	4.1	2.1E-12	4.6	5.6E-13	4.3	5.7E-12	3.0	6.0E-21	2.5	1.6E-10	2.7
1972	1.2E-13	3.9	1.8E-12	4.9	4.7E-13	4.3	5.7E-12	3.4	6.0E-21	2.7	3.1E-11	2.2
1973	1.2E-13	4.2	1.9E-12	4.8	4.9E-13	4.4	5.7E-12	3.0	6.1E-21	2.4	6.2E-11	2.3
1974	1.2E-13	4.3	2.0E-12	4.5	5.3E-13	4.1	5.7E-12	3.2	6.1E-21	2.4	1.1E-10	2.6
1975	1.2E-13	4.1	2.0E-12	4.8	5.4E-13	4.2	5.7E-12	3.0	6.1E-21	2.5	1.2E-10	2.5
1976	1.2E-13	4.1	1.9E-12	4.5	5.1E-13	4.2	5.8E-12	3.1	6.2E-21	2.5	7.7E-11	2.4
1977	1.2E-13	4.0	2.0E-12	4.3	5.2E-13	4.2	5.8E-12	3.2	6.2E-21	2.6	9.3E-11	2.4
1978	1.2E-13	3.9	2.0E-12	4.6	5.3E-13	4 3	5.8E-12	3.3	6.2E-21	2.5	9.3E-11	2.4
1979	1.2E-13	4.3	1.9E-12	5.1	5.0E-13	3.9	5.8E-12	3.0	6.2E-21	2.5	5.1E-11	2.4
1980	1.2E-13	4.3	2.0E-12	4.6	5.1E-13	4.3	5.8E-12	3.1	6.2E-21	2.5	7.4E-11	2.3
1981	1.2E-13	4.1	1.9E-12	4 9	5.1E-13	4.3	5.9E-12	3.3	6.3E-21	2.5	6.3E-11	2.3
1982	1.2E-13	4.4	1.9E-12	4.4	5.1E-13	4.3	5.9E-12	3.2	6.3E-21	2.5	6.3E-11	2.4
1983	1.2E-13	4.2	2.0E-12	4.5	5.4E-13	4.1	5.9E-12	3.2	6.3E-21	2.5	9.0E-11	2.5
1984	1.2E-13	3.9	2.0E-12	4.5	5.3E-13	4.4	5.9E-12	3.1	6.3E-21	2.4	9.1E-11	2.4
1985	1.2E-13	4.1	1.9E-12	4.7	5.0E-13	4.0	5 9E-12	3.1	6.3E-21	2.5	4.6E-11	2.2
1986	1.2E-13	3.9	2.0E-12	4.4	5.1E-13	4.3	6.0E-12	3.1	6.4E-21	2.6	5.7E-11	2.3
1987	1.2E-13	4.3	1.9E-12	4.9	4.9E-13	4.7	5.9E-12	3.1	6.3E-21	2.5	3.4E-11	2.3
1988	1.2E-13	4.1	1.9E-12	4.8	4.8E-13	4.4	5.9E-12	3.0	6.3E-21	2.5	2.6E-11	2 2
1989	1.2E-13	4.1	1.9E-12	4.6	4.9E-13	4.4	5.9E-12	3.1	6.3E-21	2.5	3 7E-11	2.2

NOTES:
1) E-01 is the same as the value divided by 10[1]; E-02 is the same as the value divided by 10[2]; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium
Sector 6
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	1.4E-11	2.9	4.1E-16	4.3	5.5E-14	3.8	2.0E-16	2.4	1.5E-20	2.3
1954	1.4E-11	2.9	9.3E-16	4.0	5.5E-14	3.8	4.5E-16	2.2	1.5E-20	2.3
1955	1.1E-10	2.7	4.5E-15	4.1	4.4E-13	3.7	2.2E-15	2.3	1.2E-19	2.2
1956	1.7E-09	2.9	5.5E-14	4.1	6.4E-12	3.7	2.7E-14	2.4	1.8E-18	2.2
1957	5.8E-10	2.7	7.7E-14	4.1	2.3E-12	4.0	3.8E-14	2.2	6.2E-19	2.2
1958	4.7E-10	2.8	9.6E-14	3.8	1.9E-12	3.5	4.7E-14	2.2	5.0E-19	2.3
1959	8.2E-10	2.9	1.3E-13	3.8	3.3E-12	3.8	6.2E-14	2.1	8.8E-19	2.3
1960	1.3E-09	2.9	1.7E-13	4.1	5.1E-12	4.0	8.5E-14	2.0	1.4E-18	2.2
1961	7.3E-10	2.8	2.0E-13	3.8	2.9E-12	3.6	9.9E-14	2.0	7.8E-19	2.2
1962	3.8E-10	3.0	2.2E-13	3.8	1.6E-12	3.5	1.1E-13	2.0	4.0E-19	2.2
1963	5.1E-10	2.9	2.4E-13	3.9	2.1E-12	3.7	1.2E-13	2.0	5.4E-19	2.2
1964	3.0E-10	2.9	2.5E-13	3.9	1.3E-12	3.5	1.2E-13	1.9	3.1E-19	2.2
1965	3.0E-10	2.8	2.6E-13	3.9	1.3E-12	3.6	1.3E-13	2.0	3.2E-19	2.3
1966	3.5E-10	2.9	2.7E-13	3.6	1.5E-12	3.4	1.3E-13	2.0	3.8E-19	2.3
1967	1.7E-10	2.9	2.8E-13	3.8	8.0E-13	3.4	1.4E-13	2.0	1.8E-19	2.2
1968	2.5E-10	2.8	2.9E-13	3.8	1.1E-12	3.3	1.4E-13	2.0	2.6E-19	2.3
1969	7.7E-11	2.8	2.9E-13	4.0	4.3E-13	3.3	1.4E-13	1.9	8.2E-20	2.2
1970	9.8E-11	2.9	3.0E-13	3.6	5.3E-13	3.2	1.4E-13	2.0	1.0E-19	2.2
1971	6.2E-11	2.8	3.0E-13	3.6	3.8E-13	3.3	1.4E-13	1.9	6.7E-20	2.1
1972	6.1E-12	2.8	3.0E-13	3.8	1.2E-13	3.7	1.5E-13	2.0	6.5E-21	2.2
1973	1.9E-11	3.0	3.0E-13	3.6	1.9E-13	3.2	1.5E-13	2.0	2.0E-20	2.2
1974	4.1E-11	2.8	3.0E-13	3.9	2.9E-13	3.3	1.5E-13	2.0	4.4E-20	2.2
1975	4.3E-11	2.8	3.0E-13	3.7	2.9E-13	3.4	1.5E-13	1.9	4.5E-20	2.2
1976	2.5E-11	3.0	3.0E-13	3.8	2.2E-13	3.1	1.5E-13	2.0	2.6E-20	2.2
1977	3.2E-11	2.8	3.0E-13	3.6	2.5E-13	3.2	1.5E-13	1.9	3.4E-20	2.2
1978	3.2E-11	2.8	3.0E-13	3.7	2.5E-13	3.3	1.5E-13	1.9	3.4E-20	2.2
1979	1.4E-11	2.8	3.1E-13	3.9	1.7E-13	3.3	1.5E-13	1.9	1.5E-20	2.2
1980	2.4E-11	2.9	3.1E-13	3.6	2.1E-13	3.3	1.5E-13	2.0	2.5E-20	2.2
1981	1.9E-11	2.8	3.1E-13	3.8	1.9E-13	3.3	1.5E-13	1.9	2.0E-20	2.2
1982	1.9E-11	2.9	3.1E-13	3.9	1.9E-13	3.2	1.5E-13	1.9	2.0E-20	2.3
1983	3.1E-11	2.9	3.1E-13	3.8	2.5E-13	3.2	1.5E-13	2.0	3.3E-20	2.2
1984	3.1E-11	2.7	3.1E-13	3.6	2.4E-13	3.3	1.5E-13	1.9	3.3E-20	2.3
1985	1.2E-11	2.8	3.1E-13	3.8	1.5E-13	3.2	1.5E-13	1.9	1.3E-20	2.2
1986	1.7E-11	2.9	3.1E-13	3.7	1.8E-13	3.3	1.5E-13	1.9	1.8E-20	2.3
1987	7.1E-12	2.9	3.1E-13	3.8	1.3E-13	3.7	1.5E-13	2.0	7.5E-21	2.3
1988	4.0E-12	2.8	3.1E-13	3 6	1.1E-13	3.5	1.5E-13	1.9	4.3E-21	2.2
1989	8.0E-12	2.9	3.1E-13	3.5	1.3E-13	3.5	1.5E-13	2.0	8.6E-21	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium (continued)
Sector 6
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	7.3E-17	4.8	2.3E-14	5.2	6.5E-15	5.2	3.6E-15	3.7	3.8E-24	3.2	1.4E-11	2.9
1954	1.6E-16	4.3	2.6E-14	5.3	7.3E-15	4.9	8.0E-15	3.5	8.6E-24	2.8	1.4E-11	2.9
1955	8.0E-16	4.6	1.9E-13	5.4	5.4E-14	4.9	3.9E-14	3.5	4.2E-23	2.9	1.2E-10	2.7
1956	9.7E-15	4.8	2.7E-12	4.9	7.7E-13	5.0	4.7E-13	3.6	5.1E-22	3.0	1.7E-09	2.9
1957	1.4E-14	4.2	1.2E-12	5.4	3.4E-13	4.5	6.7E-13	3.3	7.1E-22	2.7	5.9E-10	2.6
1958	1.7E-14	4.4	1.1E-12	4.8	3.1E-13	4.5	8.3E-13	3.2	8.9E-22	2.6	4.8E-10	2.8
1959	2.2E-14	4.3	1.8E-12	4.6	5.1E-13	4.5	1.1E-12	3.1	1.2E-21	2.5	8.5E-10	2.9
1960	3.1E-14	4.2	2.7E-12	5.2	7.6E-13	4.6	1.5E-12	3.3	1.6E-21	2.6	1.3E-09	2.9
1961	3.6E-14	4.0	1.9E-12	4.8	5.4E-13	4.3	1.7E-12	3.3	1.9E-21	2.7	7.5E-10	2.7
1962	3.8E-14	4.0	1.4E-12	4.6	3.7E-13	4.3	1.9E-12	3.2	2.0E-21	2.5	3.9E-10	2.9
1963	4.2E-14	4.5	1.6E-12	4.4	4.6E-13	4.3	2.0E-12	3.0	2.2E-21	2.5	5.2E-10	2.8
1964	4.4E-14	4.2	1.3E-12	4.4	3.6E-13	4.2	2.1E-12	3.2	2.3E-21	2.5	3.1E-10	2.8
1965	4.6E-14	4.3	1.4E-12	4.5	3.7E-13	4.0	2.2E-12	3.0	2.4E-21	2.4	3.1E-10	2.7
1966	4.8E-14	4.2	1.5E-12	4.7	4.1E-13	3.8	2.4E-12	3.3	2.5E-21	2.6	3.7E-10	2.8
1967	4.9E-14	4.1	1.1E-12	4.8	3.1E-13	4.2	2.4E-12	3.3	2.6E-21	2.6	1.8E-10	2.7
1968	5.1E-14	4.2	1.3E-12	4.2	3.6E-13	4.3	2.5E-12	3.3	2.7E-21	2.5	2.6E-10	2.6
1969	5.2E-14	3.8	9.7E-13	4.6	2.6E-13	4.2	2.5E-12	3.2	2.7E-21	2.5	8.8E-11	2.6
1970	5.2E-14	3.9	1.0E-12	4.6	2.8E-13	4.0	2.6E-12	3.2	2.7E-21	2.7	1.1E-10	2.6
1971	5.3E-14	3.9	9.6E-13	4.5	2.6E-13	4.3	2.6E-12	3.0	2.7E-21	2.4	7.4E-11	2.6
1972	5.3E-14	4.1	8.2E-13	4.9	2.1E-13	4.2	2.6E-12	3.1	2.7E-21	2.5	1.4E-11	2.2
1973	5.3E-14	3.9	8.5E-13	5.1	2.2E-13	4.2	2.6E-12	3.0	2.8E-21	2.6	2.8E-11	2.4
1974	5.3E-14	3.8	9.3E-13	4.7	2.5E-13	4.1	2.6E-12	3.0	2.8E-21	2.5	5.3E-11	2.4
1975	5.3E-14	4.1	9.3E-13	4.8	2.4E-13	4.5	2.6E-12	3.2	2.8E-21	2.6	5.3E-11	2.5
1976	5.3E-14	4.1	8.8E-13	4.7	2.3E-13	4.4	2.6E-12	3.4	2.8E-21	2.7	3.5E-11	2.5
1977	5.4E-14	4.1	9.0E-13	4.7	2.4E-13	4.3	2.6E-12	3.2	2.8E-21	2.6	4.2E-11	2.5
1978	5.4E-14	4.1	9.1E-13	4.5	2.4E-13	4.2	2.6E-12	3.2	2.8E-21	2.5	4.2E-11	2.4
1979	5.4E-14	4.2	8.6E-13	4.8	2.3E-13	4.5	2.6E-12	3.0	2.8E-21	2.5	2.4E-11	2.2
1980	5.4E-14	3.9	8.9E-13	4.9	2.4E-13	4.3	2.7E-12	3.2	2.8E-21	2.5	3.4E-11	2.4
1981	5.4E-14	3.8	8.8E-13	4.4	2.3E-13	4.4	2.7E-12	3.1	2.8E-21	2.5	2.8E-11	2.4
1982	5.5E-14	4.2	8.8E-13	5.1	2.3E-13	4.3	2.7E-12	3.1	2.8E-21	2.6	2.9E-11	2.4
1983	5.5E-14	4.3	9.2E-13	4.4	2.4E-13	4.4	2.7E-12	3.2	2.8E-21	2.5	4.1E-11	2.4
1984	5.5E-14	4.0	9.2E-13	4.5	2.4E-13	4.4	2.7E-12	2.9	2.9E-21	2.5	4.1E-11	2.3
1985	5.5E-14	4.1	8.7E-13	4.2	2.3E-13	4.5	2.7E-12	3.2	2.9E-21	2.5	2.1E-11	2.2
1986	5.5E-14	4.1	8.8E-13	4.4	2.3E-13	4.3	2.7E-12	3.2	2.9E-21	2.4	2.6E-11	2.4
1987	5.5E-14	4.3	8.6E-13	4.7	2.2E-13	4.5	2.7E-12	3.3	2.9E-21	2.6	1.6E-11	2.3
1988	5.5E-14	4.1	8.5E-13	4.9	2.2E-13	4.6	2.7E-12	3.1	2.9E-21	2.7	1.2E-11	2.1
1989	5.5E-14	4.2	8.6E-13	4.4	2.2E-13	4.3	2.7E-12	3.1	2.9E-21	2.5	1.7E-11	2.1

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium
Sector 7
(1953 - 1989)

Year	Inhalation		Soil Ingestion		Vegetable Ingestion		Ground Exposure		Immersion	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	1.4E-11	2.9	4.1E-16	4.4	5.3E-14	3.9	2.0E-16	2.6	1.5E-20	2.2
1954	1.4E-11	2.9	9.1E-16	4.0	5.4E-14	3.7	4.5E-16	2.3	1.5E-20	2.2
1955	1.1E-10	2.8	4.4E-15	4.2	4.3E-13	4.0	2.2E-15	2.3	1.2E-19	2.3
1956	1.6E-09	3.0	5.3E-14	4.1	6.2E-12	3.9	2.6E-14	2.5	1.7E-18	2.3
1957	5.6E-10	2.8	7.5E-14	3.8	2.2E-12	3.8	3.7E-14	2.2	6.0E-19	2.2
1958	4.6E-10	2.9	9.4E-14	3.8	1.8E-12	3.8	4.6E-14	2.1	4.9E-19	2.2
1959	8.1E-10	3.0	1.2E-13	4.0	3.2E-12	3.9	6.0E-14	2.0	8.6E-19	2.2
1960	1.3E-09	3.0	1.7E-13	3.8	5.0E-12	3.6	8.3E-14	2.0	1.3E-18	2.3
1961	7.1E-10	2.8	2.0E-13	3.7	2.9E-12	3.8	9.6E-14	2.0	7.6E-19	2.2
1962	3.7E-10	2.7	2.1E-13	3.8	1.6E-12	3.4	1.0E-13	2.0	3.9E-19	2.2
1963	4.9E-10	2.7	2.3E-13	3.7	2.1E-12	3.6	1.1E-13	2.0	5.3E-19	2.3
1964	2.9E-10	2.8	2.4E-13	3.6	1.3E-12	3.6	1.2E-13	2.0	3.1E-19	2.2
1965	2.9E-10	2.8	2.5E-13	3.9	1.3E-12	3.6	1.2E-13	2.0	3.1E-19	2.2
1966	3.4E-10	3.0	2.7E-13	3.7	1.5E-12	3.6	1.3E-13	1.9	3.7E-19	2.2
1967	1.6E-10	2.8	2.7E-13	3.8	7.7E-13	3.6	1.3E-13	1.9	1.7E-19	2.3
1968	2.4E-10	2.9	2.8E-13	3.8	1.1E-12	3.6	1.4E-13	1.9	2.6E-19	2.3
1969	7.5E-11	2.9	2.8E-13	3.8	4.2E-13	3.3	1.4E-13	1.9	8.0E-20	2.2
1970	9.6E-11	2.9	2.9E-13	3.6	5.2E-13	3.6	1.4E-13	1.9	1.0E-19	2.2
1971	6.1E-11	2.9	2.9E-13	3.6	3.7E-13	3.2	1.4E-13	2.0	6.5E-20	2.1
1972	6.0E-12	2.8	2.9E-13	3.9	1.2E-13	3.3	1.4E-13	1.9	6.4E-21	2.2
1973	1.8E-11	3.0	2.9E-13	3.7	1.8E-13	3.3	1.4E-13	1.9	2.0E-20	2.3
1974	4.0E-11	2.7	2.9E-13	3.6	2.8E-13	3.3	1.4E-13	1.9	4.3E-20	2.2
1975	4.1E-11	2.9	2.9E-13	3.6	2.9E-13	3.3	1.4E-13	1.9	4.4E-20	2.3
1976	2.4E-11	2.8	2.9E-13	4.0	2.1E-13	3.4	1.4E-13	2.0	2.6E-20	2.2
1977	3.1E-11	2.9	3.0E-13	3.7	2.4E-13	3.1	1.4E-13	1.9	3.3E-20	2.3
1978	3.1E-11	2.9	3.0E-13	3.6	2.4E-13	3.3	1.5E-13	1.9	3.3E-20	2.2
1979	1.4E-11	2.9	3.0E-13	3.8	1.6E-13	3.2	1.5E-13	1.9	1.5E-20	2.2
1980	2.3E-11	2.9	3.0E-13	3.5	2.0E-13	3.3	1.5E-13	1.9	2.4E-20	2.2
1981	1.8E-11	2.9	3.0E-13	3.7	1.9E-13	3.3	1.5E-13	1.9	2.0E-20	2.3
1982	1.8E-11	2.8	3.0E-13	3.8	1.9E-13	3.3	1.5E-13	1.9	2.0E-20	2.2
1983	3.0E-11	2.9	3.0E-13	3.8	2.5E-13	3.2	1.5E-13	1.9	3.2E-20	2.2
1984	3.0E-11	2.9	3.0E-13	3.9	2.4E-13	3.2	1.5E-13	1.9	3.2E-20	2.2
1985	1.1E-11	2.9	3.0E-13	3.6	1.5E-13	3.3	1.5E-13	1.9	1.2E-20	2.3
1986	1.6E-11	2.9	3.0E-13	3.9	1.8E-13	3.3	1.5E-13	2.0	1.7E-20	2.2
1987	6.9E-12	2.9	3.0E-13	3.6	1.3E-13	3.4	1.5E-13	1.9	7.4E-21	2.2
1988	3.9E-12	2.9	3.0E-13	4.0	1.1E-13	3.7	1.5E-13	1.9	4.2E-21	2.2
1989	7.8E-12	2.8	3.0E-13	3.7	1.3E-13	3.6	1.5E-13	1.9	8.4E-21	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium (continued)
Sector 7
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	GSD	Milk Ingestion GM (Sv/year)	GSD	Beef Ingestion GM (Sv/year)	GSD	Inhalation of Resuspended Particulates GM (Sv/year)	GSD	Immersion in Resuspended Particulates GM (Sv/year)	GSD	Total Dose GM (Sv/year)	GSD
1953	7.1E-17	5.0	2.3E-14	5 5	6 5E-15	5.2	3 5E-15	3 8	3.7E-24	3.2	1.4E-11	2.9
1954	1.6E-16	4.6	2.5E-14	5.3	7.0E 15	4.7	7.9E-15	3.6	8.4E-24	2.9	1.4E-11	2.9
1955	7.8E-16	4.8	1.9E-13	5 0	5.3E 14	4 7	3.8E-14	3.4	4.1E-23	2.9	1.1E-10	2.8
1956	9.4E-15	4.7	2.6E-12	5.7	7.5E-13	4.7	4.6E-13	3 5	4.9E-22	2.9	1.6E-09	2.9
1957	1.3E-14	4.8	1.2E-12	4.8	3.3E-13	4 5	6.5E-13	3.3	7.0E-22	2.9	5.8E-10	2.8
1958	1.7E-14	4.0	1.1E-12	4.9	3.0E-13	4.5	8.1E-13	3.3	8.7E-22	2.7	4.7E-10	2.8
1959	2.2E-14	4.3	1.7E-12	4.8	4.9E-13	4.3	1.1E-12	3.2	1.1E-21	2.6	8.3E-10	2.9
1960	3.0E-14	4.1	2.6E-12	5.0	7.3E-13	4.6	1.5E-12	3.3	1.6E-21	2.7	1.3E-09	3.0
1961	3.5E-14	4.1	1.9E-12	5.0	5.2E-13	4.3	1.7E-12	3.0	1.8E-21	2.5	7.3E-10	2.8
1962	3.7E-14	4.1	1.3E-12	4.4	3.6E-13	4.2	1.8E-12	3.1	1.9E-21	2.6	3.8E-10	2.6
1963	4.0E-14	3.9	1.6E-12	4.6	4.4E-13	3.8	2.0E-12	3.3	2.1E-21	2.6	5.1E-10	2.7
1964	4.3E-14	4.1	1.3E-12	4.4	3.5E-13	4.2	2.1E-12	3.2	2.2E-21	2 5	3.0E-10	2.8
1965	4.5E-14	4.1	1.3E-12	4.3	3.7E-13	4.4	2.2E-12	3.3	2.3E-21	2.5	3.0E-10	2.7
1966	4.7E-14	4.3	1.4E-12	4.4	4.0E-13	3.9	2.3E-12	3.2	2.4E-21	2.5	3.6E-10	2.9
1967	4.8E-14	4.2	1.1E-12	4.3	3.0E-13	4.1	2.3E-12	3.1	2.5E-21	2.6	1.7E-10	2.6
1968	5.0E-14	4.0	1.3E-12	4.6	3.5E-13	4.0	2.4E-12	3.1	2.6E-21	2.5	2.6E-10	2.8
1969	5.0E-14	4.1	9.6E-13	4.3	2.6E-13	4.2	2.5E-12	3 1	2.6E-21	2.5	8.6E-11	2.7
1970	5.1E-14	4.0	1.0E-12	4.7	2.8E-13	4.2	2.5E-12	3.2	2.7E-21	2.5	1.1E-10	2.7
1971	5.2E-14	3.9	9.4E-13	4.2	2.5E-13	4.2	2.5E-12	3.2	2.7E-21	2.5	7.2E-11	2.6
1972	5.2E-14	3.9	7.9E-13	4.6	2.1E-13	4.4	2.5E-12	3.2	2.7E-21	2.6	1.4E-11	2.2
1973	5.1E-14	4.0	8.3E-13	4.9	2.2E-13	4.3	2.5E-12	3 3	2.7E-21	2.6	2.8E-11	2.5
1974	5.2E-14	4.1	8.9E-13	4.1	2.4E-13	4.3	2.5E-12	3.1	2.7E-21	2.4	5.0E-11	2.4
1975	5.2E-14	4.3	9.0E-13	4.7	2.4E-13	4.1	2.5E-12	3.3	2.7E-21	2.5	5.2E-11	2.5
1976	5.2E-14	3.9	8.7E-13	4.6	2.3E-13	4.4	2.5E-12	3.1	2.7E-21	2.5	3.4E-11	2.4
1977	5.2E-14	4.1	8.9E-13	4.8	2.4E-13	4.1	2.6E-12	3.1	2.7E-21	2.5	4.1E-11	2.5
1978	5.3E-14	4.3	8.8E-13	4.4	2.3E-13	4.4	2.6E-12	3.0	2.7E-21	2.5	4.1E-11	2.5
1979	5.3E-14	4.0	8.4E-13	4.7	2.2E-13	4.3	2.6E-12	3.2	2.8E-21	2.6	2.3E-11	2.4
1980	5.3E-14	4.0	8.7E-13	4.6	2.3E-13	4.6	2.6E-12	3.1	2.8E-21	2.5	3.3E-11	2.4
1981	5.3E-14	4.1	8.5E-13	4.8	2.2E-13	4.4	2.6E-12	3 0	2.8E-21	2.5	2.8E-11	2.4
1982	5.3E-14	4.2	8.6E-13	4.7	2.3E-13	4.2	2.6E-12	3.2	2.8E-21	2.5	2.8E-11	2.4
1983	5.3E-14	4.0	9.0E-13	4.5	2.4E-13	4.3	2.6E-12	3 1	2.8E-21	2.6	4.1E-11	2.4
1984	5.4E-14	4.0	9.0E-13	4.4	2.4E-13	4.3	2.6E-12	3.0	2.8E-21	2.6	4.0E-11	2.4
1985	5.4E-14	3.9	8.4E-13	4 7	2.2E-13	4.2	2.6E-12	3.1	2.8E-21	2.6	2.1E-11	2.2
1986	5.4E-14	4.3	8.6E-13	4.7	2.3E-13	4.3	2.6E-12	3.1	2.8E-21	2.5	2.5E-11	2.4
1987	5.4E-14	4.1	8.3E-13	4.5	2.2E-13	4.5	2 6E-12	3.1	2.8E-21	2.5	1.5E-11	2.2
1988	5.4E-14	4.3	8.3E-13	4.6	2.2E-13	4 6	2.6E-12	3 1	2.8E-21	2.5	1.2E-11	2.2
1989	5.4E-14	4.4	8.4E-13	4.7	2.2E-13	4.5	2.6E-12	3 0	2.8E-21	2.5	1.6E-11	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium
Sector 8
(1953 - 1989)

Year	Inhalation		Soil Ingestion		Vegetable Ingestion		Ground Exposure		Immersion	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	4.7E-11	2.8	1.4E-15	3.9	1.8E-13	3.8	6.6E-16	2.5	5.0E-20	2.3
1954	4.7E-11	2.9	3.0E-15	3.8	1.8E-13	4.1	1.5E-15	2.2	5.0E-20	2.2
1955	3.7E-10	2.8	1.5E-14	4.1	1.4E-12	3.7	7.2E-15	2.2	4.0E-19	2.3
1956	5.4E-09	2.9	1.8E-13	4.4	2.1E-11	3.9	8.8E-14	2.4	5.8E-18	2.2
1957	1.9E-09	3.0	2.5E-13	4.1	7.5E-12	3.7	1.2E-13	2.3	2.0E-18	2.2
1958	1.5E-09	2.8	3.1E-13	3.8	6.2E-12	3.7	1.5E-13	2.1	1.7E-18	2.3
1959	2.7E-09	3.0	4.2E-13	4.0	1.1E-11	3.8	2.0E-13	2.1	2.9E-18	2.3
1960	4.3E-09	2.9	5.7E-13	3.8	1.7E-11	3.7	2.8E-13	2.1	4.5E-18	2.3
1961	2.4E-09	2.9	6.6E-13	3.8	9.7E-12	3.8	3.2E-13	2.0	2.6E-18	2.2
1962	1.2E-09	3.1	7.1E-13	3.8	5.2E-12	3.5	3.5E-13	2.0	1.3E-18	2.3
1963	1.7E-09	2.8	7.7E-13	3.8	7.0E-12	3.8	3.8E-13	2.0	1.8E-18	2.2
1964	9.7E-10	2.9	8.1E-13	3.8	4.2E-12	3.8	4.0E-13	1.9	1.0E-18	2.3
1965	9.7E-10	2.8	8.5E-13	3.8	4.3E-12	3.5	4.1E-13	2.0	1.0E-18	2.3
1966	1.2E-09	2.8	8.9E-13	3.8	5.0E-12	3.5	4.4E-13	2.0	1.2E-18	2.2
1967	5.4E-10	2.9	9.2E-13	3.7	2.6E-12	3.6	4.5E-13	1.9	5.8E-19	2.3
1968	8.1E-10	2.7	9.5E-13	3.9	3.7E-12	3.3	4.6E-13	1.9	8.7E-19	2.3
1969	2.5E-10	2.8	9.6E-13	3.7	1.4E-12	3.1	4.7E-13	2.0	2.7E-19	2.2
1970	3.2E-10	2.9	9.7E-13	3.9	1.7E-12	3.5	4.7E-13	1.9	3.4E-19	2.2
1971	2.1E-10	2.8	9.8E-13	3.8	1.2E-12	3.2	4.8E-13	1.9	2.2E-19	2.2
1972	2.0E-11	2.9	9.8E-13	3.9	3.9E-13	3.5	4.8E-13	1.9	2.1E-20	2.2
1973	6.2E-11	2.7	9.8E-13	3.8	6.1E-13	3.2	4.8E-13	1.9	6.6E-20	2.3
1974	1.4E-10	2.9	9.8E-13	3.6	9.3E-13	3.5	4.8E-13	1.9	1.4E-19	2.3
1975	1.4E-10	3.0	9.9E-13	3.8	9.7E-13	3.3	4.8E-13	1.9	1.5E-19	2.2
1976	8.1E-11	2.9	9.9E-13	3.9	7.0E-13	3.4	4.8E-13	1.9	8.7E-20	2.2
1977	1.0E-10	3.0	1.0E-12	3.6	8.2E-13	3.4	4.9E-13	1.9	1.1E-19	2.3
1978	1.0E-10	2.9	1.0E-12	3.9	8.1E-13	3.2	4.9E-13	1.9	1.1E-19	2.3
1979	4.6E-11	2.8	1.0E-12	3.8	5.4E-13	3.3	4.9E-13	2.0	5.0E-20	2.2
1980	7.8E-11	2.7	1.0E-12	3.9	7.2E-13	3.3	4.9E-13	1.9	8.3E-20	2.2
1981	6.2E-11	2.7	1.0E-12	3.7	6.2E-13	3.3	4.9E-13	1.9	6.6E-20	2.3
1982	6.2E-11	2.9	1.0E-12	3.8	6.1E-13	3.1	4.9E-13	2.0	6.6E-20	2.3
1983	1.0E-10	2.9	1.0E-12	3.9	8.3E-13	3.4	4.9E-13	1.9	1.1E-19	2.2
1984	1.0E-10	2.9	1.0E-12	3.8	8.1E-13	3.1	5.0E-13	1.9	1.1E-19	2.2
1985	3.9E-11	2.9	1.0E-12	3.9	5 0E-13	3.5	5.0E-13	1.9	4.1E-20	2 2
1986	5.4E-11	2.9	1.0E-12	3.7	5.8E-13	3.5	5.0E-13	1.9	5.8E-20	2.3
1987	2.3E-11	2.8	1.0E-12	3 7	4.3E-13	3.3	5.0E-13	1.9	2.5E-20	2.2
1988	1.3E-11	2.8	1.0E-12	3.9	3.6E-13	3.4	5.0E-13	1.9	1.4E-20	2.2
1989	2.6E-11	3.0	1.0E-12	3.7	4.3E-13	3.3	5.0E-13	1.9	2.8E-20	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium (continued)
Sector 8
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	2.4E-16	4.7	7.6E-14	5.0	2.2E-14	4.7	1.2E-14	3.6	1.3E-23	3.0	4.7E-11	2.8
1954	5.3E-16	4.3	8.3E-14	4.8	2.4E-14	4.9	2.6E-14	3.4	2.8E-23	2.8	4.8E-11	2.9
1955	2.6E-15	4.3	6.3E-13	5.4	1.8E-13	4.9	1.3E-13	3.3	1.4E-22	2.7	3.8E-10	2.7
1956	3.2E-14	4.5	8.9E-12	5.3	2.5E-12	4.9	1.6E-12	3.6	1.7E-21	3.0	5.5E-09	2.9
1957	4.5E-14	4.5	3.9E-12	5.4	1.1E-12	4.5	2.2E-12	3.4	2.3E-21	2.9	1.9E-09	2.9
1958	5.6E-14	4.3	3.7E-12	4.9	1.0E-12	4.3	2.7E-12	3.4	2.9E-21	2.7	1.6E-09	2.7
1959	7.4E-14	4.1	5.9E-12	4.9	1.6E 12	4.9	3.6E-12	3 3	3.8E-21	2.8	2.8E-09	3.0
1960	1.0E-13	4.3	8.9E-12	5 5	2.5E-12	5.1	5.0E-12	3.3	5.3E-21	2.7	4.4E-09	2.9
1961	1.2E-13	4.5	6.3E-12	4.8	1.7E-12	4.6	5.7E-12	3.3	6.1E-21	2.8	2.5E-09	2.8
1962	1.3E-13	4.2	4.5E-12	4.7	1.2E-12	4.0	6.1E-12	3.4	6.5E-21	2.8	1.3E-09	3.0
1963	1.4E-13	4.2	5.4E-12	4 8	1.5E-12	4.3	6.7E-12	3.1	7.2E-21	2.6	1.7E-09	2.7
1964	1.4E-13	4.1	4.3E-12	4.4	1.2E-12	4.1	7.0E-12	3.4	7.5E-21	2.6	1.0E-09	2.8
1965	1.5E-13	4.4	4.3E-12	4.7	1.2E-12	4.1	7.4E-12	3.3	7.9E-21	2.6	1.0E-09	2.7
1966	1.6E-13	4.0	4.9E-12	4.6	1.3E-12	3.9	7.7E-12	3.2	8.3E-21	2.6	1.2E-09	2.8
1967	1.6E-13	3.9	3.7E-12	4.2	1.0E-12	4.4	7.9E-12	3.1	8.4E-21	2.6	5.9E-10	2.8
1968	1.7E-13	4.1	4.4E-12	4.2	1.2E-12	4.2	8.2E-12	3.3	8.7E-21	2.5	8.6E-10	2.6
1969	1.7E-13	4.2	3.2E-12	4.7	8.7E-13	4.2	8.3E-12	3.0	8.8E-21	2.4	2.9E-10	2.6
1970	1.7E-13	3.9	3.4E-12	4.4	9.2E-13	3.8	8.4E-12	3.2	8.9E-21	2.6	3.6E-10	2.7
1971	1.7E-13	4.3	3.2E-12	4.4	8.5E-13	4.2	8.5E-12	3.1	9.0E-21	2.5	2.4E-10	2.5
1972	1.7E-13	4.4	2.7E-12	5.2	7.0E-13	4.5	8.5E-12	3.2	9.0E-21	2.5	4.8E-11	2.2
1973	1.7E-13	4.0	2.8E-12	4.3	7.4E-13	4.2	8.5E-12	3.2	9.0E-21	2.5	9.2E-11	2.2
1974	1.7E-13	3.8	3.0E-12	4.6	7.9E-13	4.1	8.5E-12	3.3	9.1E-21	2.7	1.7E-10	2.5
1975	1.8E-13	4.1	3.0E-12	4.4	8.1E-13	4.2	8.6E-12	3.2	9.1E-21	2.5	1.7E-10	2.7
1976	1.8E-13	4.0	2.9E-12	4.6	7.6E-13	4.2	8.6E-12	3.2	9.2E-21	2.5	1.1E-10	2.4
1977	1.8E-13	4.0	3.0E-12	4.7	7.9E-13	4.2	8.6E-12	3.1	9.2E-21	2.5	1.4E-10	2.5
1978	1.8E-13	3.9	3.0E-12	4.3	8.0E-13	4.0	8.7E-12	3.2	9.3E-21	2.5	1.4E-10	2.5
1979	1.8E-13	4.2	2.8E-12	4.7	7.4E-13	4.5	8.7E-12	3.0	9.3E-21	2.6	7.6E-11	2.2
1980	1.8E-13	4.2	2.9E-12	4.9	7.7E-13	4.4	8.7E-12	3.1	9.3E-21	2.5	1.1E-10	2.3
1981	1.8E-13	3.9	2.9E-12	5.0	7.6E-13	4.2	8.7E-12	3.2	9.3E-21	2.5	9.3E-11	2.3
1982	1.8E-13	3.9	2.9E-12	4.2	7.6E-13	4.1	8.7E-12	3.2	9.3E-21	2.5	9.3E-11	2 4
1983	1.8E-13	4.2	3.0E-12	4.4	7.9E-13	4.1	8.8E-12	3.1	9.4E-21	2.6	1.3E-10	2.5
1984	1.8E-13	4.4	3.0E-12	4.6	8.1E-13	4.3	8.8E-12	3.2	9.4E-21	2.6	1.4E-10	2.5
1985	1.8E-13	4.2	2.8E-12	4.4	7.4E-13	4.0	8.8E-12	3 1	9.4E-21	2.5	6.8E-11	2 3
1986	1.8E-13	4.0	2.9E-12	4.2	7.6E-13	4.2	8.8E-12	3.1	9.4E-21	2.5	8.5E-11	2.4
1987	1.8E-13	4.0	2.8E-12	4.6	7.3E-13	4.3	8.9E-12	3.0	9.5E-21	2.5	5.0E-11	2.2
1988	1.8E-13	4.0	2.8E-12	4.6	7.2E-13	4.3	8.9E-12	3.0	9.5E-21	2.5	3.9E-11	2.1
1989	1.8E-13	4.3	2.8E-12	4.7	7.4E-13	4.2	8.9E-12	3 1	9.5E-21	2.5	5.5E-11	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium
Sector 9
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	1.6E-11	2.9	4.7E-16	4.4	6.2E-14	3.5	2.3E-16	2.6	1.7E-20	2.2
1954	1.6E-11	2.8	1.1E-15	4.2	6.3E-14	3.5	5.1E-16	2.3	1.7E-20	2.2
1955	1.3E-10	3.0	5.1E-15	4.3	5.0E-13	3.8	2.5E-15	2.3	1.4E-19	2.2
1956	1.9E-09	2.9	6.2E-14	4.3	7.2E-12	3.6	3.0E-14	2.5	2.0E-18	2.2
1957	6.5E-10	2.8	8.8E-14	3.9	2.6E-12	3.7	4.3E-14	2.2	7.0E-19	2.2
1958	5.3E-10	2.8	1.1E-13	3.9	2.1E-12	3.8	5.3E-14	2.1	5.7E-19	2.2
1959	9.4E-10	2.8	1.4E-13	3.7	3.7E-12	4.1	7.0E-14	2.1	1.0E-18	2.2
1960	1.5E-09	2.8	2.0E-13	4.0	5.8E-12	3.7	9.7E-14	2.0	1.6E-18	2.2
1961	8.3E-10	2.8	2.3E-13	3.8	3.4E-12	3.6	1.1E-13	2.0	8.8E-19	2.2
1962	4.3E-10	2.9	2.5E-13	3.8	1.8E-12	3.6	1.2E-13	2.0	4.6E-19	2.3
1963	5.8E-10	2.9	2.7E-13	3.6	2.4E-12	4.0	1.3E-13	1.9	6.2E-19	2.2
1964	3.3E-10	2.9	2.8E-13	3.8	1.4E-12	3.6	1.4E-13	2.0	3.6E-19	2.3
1965	3.3E-10	2.8	2.9E-13	4.0	1.5E-12	3.7	1.4E-13	2.0	3.6E-19	2.2
1966	4.0E-10	2.7	3.1E-13	3.6	1.7E-12	3.4	1.5E-13	1.9	4.3E-19	2.3
1967	1.9E-10	2.8	3.2E-13	3.6	8.9E-13	3.5	1.5E-13	2.0	2.0E-19	2.3
1968	2.8E-10	3.0	3.3E-13	3.6	1.3E-12	3.5	1.6E-13	2.0	3.0E-19	2.3
1969	8.7E-11	2.8	3.3E-13	3.6	5.0E-13	3.4	1.6E-13	1.9	9.3E-20	2.2
1970	1.1E-10	2.9	3.4E-13	3.8	6.1E-13	3.4	1.6E-13	2.0	1.2E-19	2.2
1971	7.1E-11	2.9	3.4E-13	3.8	4.3E-13	3.2	1.7E-13	2.0	7.6E-20	2.2
1972	6.9E-12	2.8	3.4E-13	3.5	1.3E-13	3.4	1.7E-13	1.9	7.4E-21	2.3
1973	2.1E-11	2.8	3.4E-13	3.7	2.1E-13	3.2	1.7E-13	2.0	2.3E-20	2.3
1974	4.7E-11	2.8	3.4E-13	3.5	3.3E-13	3.3	1.7E-13	1.9	5.0E-20	2.2
1975	4.8E-11	2.9	3.4E-13	3.8	3.4E-13	3.4	1.7E-13	1.9	5.1E-20	2.2
1976	2.8E-11	2.9	3.4E-13	4.1	2.5E-13	3.7	1.7E-13	1.9	3.0E-20	2.3
1977	3.6E-11	2.8	3.5E-13	3.8	2.8E-13	3.3	1.7E-13	1.9	3.9E-20	2.2
1978	3.6E-11	2.8	3.5E-13	3.7	2.9E-13	3.3	1.7E-13	1.9	3.8E-20	2.2
1979	1.6E-11	2.8	3.5E-13	3.8	1.9E-13	3.3	1.7E-13	1.9	1.7E-20	2.2
1980	2.7E-11	2.8	3.5E-13	3.7	2.4E-13	3.2	1.7E-13	2.0	2.8E-20	2.3
1981	2.1E-11	3.0	3.5E-13	3.8	2.1E-13	3.3	1.7E-13	2.0	2.3E-20	2.2
1982	2.1E-11	2.8	3.5E-13	3.9	2.1E-13	3.4	1.7E-13	2.0	2.3E-20	2.2
1983	3.5E-11	2.7	3.5E-13	3.7	2.8E-13	3.3	1.7E-13	2.0	3.7E-20	2.3
1984	3.5E-11	2.8	3.5E-13	3.9	2.8E-13	3.4	1.7E-13	1.9	3.7E-20	2.2
1985	1.3E-11	2.9	3.5E-13	3.9	1.8E-13	3.2	1.7E-13	1.9	1.4E-20	2.3
1986	1.9E-11	2.9	3.6E-13	3.5	2.0E-13	3.6	1.7E-13	1.9	2.0E-20	2.2
1987	8.0E-12	2.9	3.5E-13	3.7	1.5E-13	3.6	1.7E-13	1.9	8.5E-21	2.3
1988	4.6E-12	2.9	3.6E-13	3.8	1.2E-13	3.4	1.7E-13	1.9	4.9E-21	2.3
1989	9.1E-12	2.9	3.6E-13	3.8	1.5E-13	3.3	1.7E-13	1.9	9.7E-21	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium (continued)
Sector 9
(1953 - 1989)

Year	Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	8.3E-17	4.5	2.6E-14	5.3	7.4E-15	4.8	4.1E-15	3.7	4.3E-24	3.3	1.6E-11	2.9
1954	1.9E-16	4.2	2.9E-14	4.9	8.3E-15	4.9	9.1E-15	3.4	9.7E-24	2.8	1.6E-11	2.8
1955	9.1E-16	4.7	2.2E-13	5.0	6.1E-14	4.7	4.5E-14	3.4	4.7E-23	2.8	1.3E-10	3.0
1956	1.1E-14	4.5	3.1E-12	5.1	8.8E-13	4.9	5.4E-13	3.7	5.7E-22	3.2	1.9E-09	2.8
1957	1.6E-14	4.5	1.4E-12	4.9	3.8E-13	4.2	7.6E-13	3.4	8.1E-22	2.8	6.7E-10	2.8
1958	1.9E-14	4.3	1.3E-12	5.0	3.5E-13	4.7	9.4E-13	3.5	1.0E-21	2.8	5.5E-10	2.8
1959	2.6E-14	4.1	2.0E-12	5.0	5.7E-13	4.8	1.3E-12	3.4	1.3E-21	2.7	9.6E-10	2.7
1960	3.5E-14	4.1	3.0E-12	5.4	8.6E-13	4.7	1.7E-12	3.3	1.8E-21	2.6	1.5E-09	2.8
1961	4.1E-14	4.1	2.1E-12	4.8	5.9E-13	4.4	2.0E-12	3.4	2.1E-21	2.6	8.5E-10	2.8
1962	4.4E-14	4.3	1.5E-12	4 6	4.3E-13	4.4	2.1E-12	3.3	2.3E-21	2.5	4.4E-10	2.8
1963	4.8E-14	4.5	1.9E-12	4.6	5.2E-13	4.1	2.3E-12	3.2	2.5E-21	2.5	6.0E-10	2.8
1964	5.0E-14	4.0	1.5E-12	4.1	4.1E-13	3.9	2.4E-12	3.4	2.6E-21	2.7	3.5E-10	2.8
1965	5.2E-14	3.8	1.5E-12	4.6	4.3E-13	4.6	2.6E-12	3.3	2.7E-21	2.6	3.5E-10	2.7
1966	5.5E-14	4.1	1.7E-12	4 7	4.7E-13	4.0	2.7E-12	3.3	2.9E-21	2.6	4.2E-10	2.6
1967	5.6E-14	4.1	1.3E-12	4.6	3.5E-13	4.2	2.7E-12	3.3	2.9E-21	2.6	2.0E-10	2.6
1968	5.8E-14	4.2	1.5E-12	4.0	4.1E-13	4.0	2.8E-12	3.1	3.0E-21	2.5	3.0E-10	2.9
1969	5.8E-14	4.2	1.1E-12	5.0	3.0E-13	4.1	2.9E-12	3.1	3.1E-21	2.6	1.0E-10	2.5
1970	5.9E-14	4.0	1.2E-12	4.4	3.2E-13	4.2	2.9E-12	3.1	3.1E-21	2.4	1.2E-10	2.7
1971	6.0E-14	3.9	1.1E-12	4.6	2.9E-13	4.2	2.9E-12	3.1	3.1E-21	2.5	8.4E-11	2.6
1972	6.0E-14	4.1	9.3E-13	4.3	2.4E-13	4.4	2.9E-12	2.9	3.1E-21	2.4	1.6E-11	2.1
1973	6.0E-14	4.0	9.7E-13	4.7	2.5E-13	4.4	2.9E-12	3.2	3.1E-21	2.6	3.2E-11	2.3
1974	6.0E-14	4.3	1.0E-12	4.7	2.8E-13	4.1	3.0E-12	3.1	3.1E-21	2.5	5.9E-11	2.5
1975	6.1E-14	4.1	1.1E-12	4.4	2.8E-13	4.2	3.0E-12	3.2	3.2E-21	2.6	6.0E-11	2.5
1976	6.1E-14	4.1	1.0E-12	4.8	2.7E-13	4.2	3.0E-12	3.1	3.2E-21	2.5	4.0E-11	2.4
1977	6.1E-14	3.8	1.0E-12	4.5	2.7E-13	4.3	3.0E-12	3.1	3.2E-21	2.5	4.8E-11	2.4
1978	6.1E-14	4.2	1.0E-12	4.5	2.7E-13	4.4	3.0E-12	3.2	3.2E-21	2.6	4.8E-11	2.4
1979	6.1E-14	4.0	9.8E-13	4.7	2.6E-13	4.6	3.0E-12	3.2	3.2E-21	2.5	2.7E-11	2.3
1980	6.2E-14	4.3	1.0E-12	4.8	2.7E-13	4.3	3.0E-12	3.3	3.2E-21	2.6	3.8E-11	2.4
1981	6.2E-14	4.0	1.0E-12	4.5	2.6E-13	4.3	3.0E-12	3.2	3.2E-21	2.5	3.2E-11	2.5
1982	6.2E-14	4.1	1.0E-12	4.7	2.6E-13	4.2	3.0E-12	3.2	3.2E-21	2.6	3.2E-11	2.4
1983	6.2E-14	4.1	1.0E-12	4.5	2.8E-13	4.2	3.0E-12	3.0	3.2E-21	2.7	4.7E-11	2.3
1984	6.2E-14	4.1	1.0E-12	4.8	2.8E-13	4.3	3.0E-12	2.9	3.3E-21	2.4	4.6E-11	2.4
1985	6.2E-14	4.1	9.9E-13	4.9	2.6E-13	4 2	3.0E-12	3.0	3.2E-21	2.5	2.4E-11	2.3
1986	6.3E-14	4.1	1.0E-12	4 2	2 6E-13	4.4	3.1E-12	3 2	3.3E-21	2.5	2.9E-11	2.4
1987	6.3E-14	4.5	9.7E-13	4.8	2.5E-13	4.6	3.1E-12	3 2	3.3E-21	2.6	1.8E-11	2.2
1988	6.3E-14	4 3	9.6E-13	4.7	2.5E-13	4.4	3.1E-12	3.1	3.3E-21	2.4	1.3E-11	2 2
1989	6.3E-14	4.2	9.8E-13	4.5	2.6E-13	4.1	3.1E-12	3.2	3.3E-21	2.5	1.9E-11	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium
Sector 10
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	7.0E-12	2.9	2.0E-16	4 6	2.7E-14	3.7	9.9E-17	2.6	7.4E-21	2.3
1954	7.0E-12	2.9	4.6E-16	4.2	2.7E-14	3.4	2.2E-16	2.2	7.4E-21	2.3
1955	5.6E-11	2.8	2.2E-15	4.1	2.2E-13	3.7	1.1E-15	2.2	5.9E-20	2.2
1956	8.1E-10	2.7	2.7E-14	4.2	3.1E-12	4.0	1.3E-14	2.4	8.6E-19	2.2
1957	2.8E-10	2.9	3.8E-14	3.9	1.1E-12	3.6	1.9E-14	2.2	3.0E-19	2.2
1958	2.3E-10	2.7	4.8E-14	4.0	9.2E-13	3.7	2.3E-14	2.1	2.5E-19	2.2
1959	4.1E-10	2.8	6.2E-14	4.0	1.6E-12	3.7	3.1E-14	2.0	4.3E-19	2.2
1960	6.4E-10	2.9	8.6E-14	3.7	2.5E-12	3.8	4.2E-14	2.0	6.8E-19	2.2
1961	3.6E-10	2.8	9.9E-14	3.7	1.5E-12	3.7	4.9E-14	2.0	3.8E-19	2.2
1962	1.9E-10	2.9	1.1E-13	3.8	7.8E-13	3.7	5.2E-14	2.0	2.0E-19	2.3
1963	2.5E-10	2.8	1.2E-13	3.6	1.0E-12	3.8	5.7E-14	2.0	2.7E-19	2.2
1964	1.4E-10	2.8	1.2E-13	3.8	6.3E-13	3.5	5.9E-14	1.9	1.5E-19	2.3
1965	1.4E-10	2.8	1.3E-13	3.8	6.3E-13	3.6	6.2E-14	1.9	1.5E-19	2.2
1966	1.7E-10	2.9	1.3E-13	3.8	7.5E-13	3.8	6.5E-14	1.9	1.9E-19	2.2
1967	8.1E-11	2.9	1.4E-13	3.7	3.9E-13	3.7	6.7E-14	1.9	8.7E-20	2.2
1968	1.2E-10	2.8	1.4E-13	4.0	5.5E-13	3.2	6.9E-14	1.9	1.3E-19	2.3
1969	3.8E-11	2.8	1.4E-13	3.7	2.2E-13	3.5	7.0E-14	1.9	4.0E-20	2.2
1970	4.8E-11	2.8	1.5E-13	3.9	2.6E-13	3.2	7.1E-14	1.9	5.1E-20	2.2
1971	3.1E-11	2.7	1.5E-13	3.9	1.9E-13	3.2	7.1E-14	1.9	3.3E-20	2.2
1972	3.0E-12	2.9	1.5E-13	3.7	5.9E-14	3.3	7.1E-14	1.9	3.2E-21	2.3
1973	9.3E-12	2.9	1.5E-13	3.6	9.2E-14	3.2	7.2E-14	1.9	9.9E-21	2.3
1974	2.0E-11	2.8	1.5E-13	3.8	1.4E-13	3.3	7.2E-14	1.9	2.2E-20	2.2
1975	2.1E-11	2.8	1.5E-13	3.9	1.5E-13	3.4	7.2E-14	1.9	2.2E-20	2.3
1976	1.2E-11	2.9	1.5E-13	3.6	1.1E-13	3.1	7.3E-14	1.9	1.3E-20	2.2
1977	1.6E-11	2.9	1.5E-13	3.6	1.2E-13	3.3	7.3E-14	1.9	1.7E-20	2.2
1978	1.6E-11	2.8	1.5E-13	3.7	1.2E-13	3.2	7.3E-14	1.9	1.7E-20	2.2
1979	7.0E-12	2.8	1.5E-13	3.9	8.1E-14	3.4	7.3E-14	1.9	7.4E-21	2.2
1980	1.2E-11	2.9	1.5E-13	3.8	1.0E-13	3.1	7.4E-14	1.9	1.2E-20	2.2
1981	9.3E-12	3.0	1.5E-13	3.8	9.2E-14	3.3	7.4E-14	1.9	9.9E-21	2.3
1982	9.3E-12	2.8	1.5E-13	3.9	9.2E-14	3.3	7.4E-14	1.9	9.9E-21	2.3
1983	1.5E-11	2.9	1.5E-13	3.9	1.2E-13	3.1	7.4E-14	1.9	1.6E-20	2.3
1984	1.5E-11	2.9	1.5E-13	3.9	1.2E-13	3.3	7.5E-14	1.9	1.6E-20	2.3
1985	5.8E-12	2.7	1.5E-13	3.6	7.6E-14	3.5	7.5E-14	1.9	6.2E-21	2.2
1986	8.1E-12	2.8	1.5E-13	3.7	9.0E-14	3.2	7.5E-14	1.9	8.6E-21	2.2
1987	3.5E-12	2.8	1.5E-13	3.9	6.3E-14	3.3	7.5E-14	1.9	3.7E-21	2.2
1988	2.0E-12	2.8	1.5E-13	3.6	5.4E-14	3.5	7.5E-14	1.9	2.1E-21	2.2
1989	3.9E-12	2.8	1.5E-13	3.8	6.6E-14	3.1	7.5E-14	1.8	4.2E-21	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium (continued)
Sector 10
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	GSD	Milk Ingestion GM (Sv/year)	GSD	Beef Ingestion GM (Sv/year)	GSD	Inhalation of Resuspended Particulates GM (Sv/year)	GSD	Immersion in Resuspended Particulates GM (Sv/year)	GSD	Total Dose GM (Sv/year)	GSD
1953	3.6E-17	4.8	1.1E-14	5.5	3.2E-15	4.5	1.8E-15	3.9	1.9E-24	3.3	7.1E-12	2.8
1954	8.1E-17	4.3	1.3E-14	4.7	3.5E-15	4.5	4.0E-15	3.4	4.2E-24	2.8	7.1E-12	2.8
1955	4.0E-16	4.5	9.3E-14	5.6	2.6E-14	4.8	1.9E-14	3.4	2.1E-23	3.0	5.7E-11	2.8
1956	4.8E-15	4.3	1.3E-12	5.5	3.8E-13	4.9	2.3E-13	3.5	2.5E-22	3.0	8.3E-10	2.7
1957	6.8E-15	4.6	5.9E-13	4.9	1.7E-13	4.5	3.3E-13	3.3	3.5E-22	2.8	2.9E-10	2.9
1958	8.4E-15	4.6	5.5E-13	5.0	1.5E-13	4.5	4.1E-13	3.3	4.4E-22	2.7	2.4E-10	2.7
1959	1.1E-14	4.2	8.8E-13	4.9	2.5E-13	4.3	5.4E-13	3.3	5.8E-22	2.7	4.2E-10	2.8
1960	1.5E-14	4.3	1.3E-12	4.4	3.7E-13	4.4	7.4E-13	3.2	7.9E-22	2.5	6.5E-10	2.9
1961	1.8E-14	4.0	9.5E-13	4.7	2.7E-13	4.4	8.6E-13	3.3	9.2E-22	2.6	3.7E-10	2.8
1962	1.9E-14	4.0	6.6E-13	4.7	1.8E-13	4.3	9.2E-13	3.1	9.8E-22	2.6	1.9E-10	2.9
1963	2.1E-14	4.1	8.1E-13	4.7	2.2E-13	4.1	1.0E-12	3.2	1.1E-21	2.5	2.6E-10	2.7
1964	2.2E-14	4.4	6.4E-13	4.5	1.8E-13	4.1	1.1E-12	3.0	1.1E-21	2.4	1.5E-10	2.7
1965	2.3E-14	4.0	6.5E-13	4.8	1.8E-13	4.2	1.1E-12	3.1	1.2E-21	2.6	1.5E-10	2.7
1966	2.4E-14	4.2	7.3E-13	5.0	2.0E-13	4.3	1.2E-12	3.1	1.2E-21	2.6	1.8E-10	2.9
1967	2.4E-14	4.4	5.5E-13	4.3	1.5E-13	4.3	1.2E-12	3.1	1.3E-21	2.6	8.7E-11	2.8
1968	2.5E-14	3.8	6.6E-13	4.7	1.8E-13	3.8	1.2E-12	3.1	1.3E-21	2.5	1.3E-10	2.7
1969	2.5E-14	4.0	4.8E-13	4.7	1.3E-13	4.5	1.2E-12	3.2	1.3E-21	2.6	4.3E-11	2.6
1970	2.6E-14	4.2	5.1E-13	4.5	1.4E-13	4.4	1.3E-12	3.2	1.3E-21	2.5	5.4E-11	2.7
1971	2.6E-14	4.2	4.8E-13	4.2	1.3E-13	4.3	1.3E-12	3.0	1.3E-21	2.5	3.6E-11	2.5
1972	2.6E-14	4.0	4.0E-13	4.7	1.0E-13	4.3	1.3E-12	3.1	1.4E-21	2.5	7.0E-12	2.2
1973	2.6E-14	3.8	4.2E-13	4.5	1.1E-13	4.2	1.3E-12	3.1	1.4E-21	2.5	1.4E-11	2.4
1974	2.6E-14	4.1	4.5E-13	4.6	1.2E-13	4.1	1.3E-12	3.1	1.4E-21	2.6	2.6E-11	2.5
1975	2.6E-14	4.1	4.6E-13	4.8	1.2E-13	4.2	1.3E-12	3.0	1.4E-21	2.5	2.6E-11	2.4
1976	2.6E-14	4.3	4.4E-13	4.7	1.1E-13	4.1	1.3E-12	3.1	1.4E-21	2.6	1.7E-11	2.4
1977	2.6E-14	4.3	4.5E-13	4.5	1.2E-13	4.3	1.3E-12	3.4	1.4E-21	2.6	2.1E-11	2.5
1978	2.7E-14	3.6	4.5E-13	4.3	1.2E-13	4.1	1.3E-12	3.0	1.4E-21	2.4	2.1E-11	2.4
1979	2.7E-14	4.2	4.2E-13	4.1	1.1E-13	4.3	1.3E-12	3.0	1.4E-21	2.5	1.1E-11	2.3
1980	2.7E-14	3.8	4.4E-13	4.4	1.2E-13	4.0	1.3E-12	3.0	1.4E-21	2.5	1.6E-11	2.4
1981	2.7E-14	4.2	4.3E-13	4.6	1.1E-13	4.5	1.3E-12	3.1	1.4E-21	2.4	1.4E-11	2.5
1982	2.7E-14	4.2	4.3E-13	4.7	1.1E-13	4.2	1.3E-12	3.1	1.4E-21	2.5	1.4E-11	2.4
1983	2.7E-14	3.8	4.5E-13	4.4	1.2E-13	4.1	1.3E-12	3.2	1.4E-21	2.5	2.0E-11	2.5
1984	2.7E-14	4.1	4.5E-13	4.3	1.2E-13	4.2	1.3E-12	3.2	1.4E-21	2.5	2.0E-11	2.5
1985	2.7E-14	4.3	4.3E-13	4.3	1.1E-13	4.3	1.3E-12	3.0	1.4E-21	2.4	1.0E-11	2.2
1986	2.7E-14	4.3	4.3E-13	4.6	1.1E-13	4.3	1.3E-12	3.1	1.4E-21	2.5	1.3E-11	2.3
1987	2.7E-14	4.2	4.2E-13	4.6	1.1E-13	4.7	1.3E-12	3.0	1.4E-21	2.5	7.5E-12	2.2
1988	2.7E-14	4.0	4.2E-13	4.4	1.1E-13	4.3	1.3E-12	3.1	1.4E-21	2.5	5.7E-12	2.2
1989	2.7E-14	3.9	4.2E-13	4.8	1.1E-13	4.5	1.3E-12	3.1	1.4E-21	2.5	8.2E-12	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium
Sector 11
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	6.7E-12	2.9	2.0E-16	4.5	2.6E-14	3.9	9.6E-17	2.5	7.1E-21	2.3
1954	6.7E-12	2.8	4.4E-16	3.9	2.6E-14	3.8	2.1E-16	2.2	7.1E-21	2.2
1955	5.4E-11	2.9	2.1E-15	4.1	2.1E-13	3.5	1.0E-15	2.4	5.7E-20	2.3
1956	7.8E-10	2.8	2.6E-14	4.3	3.0E-12	3.9	1.3E-14	2.5	8.4E-19	2.2
1957	2.7E-10	2.8	3.7E-14	4.1	1.1E-12	3.8	1.8E-14	2.3	2.9E-19	2.3
1958	2.2E-10	2.9	4.6E-14	3.8	8.9E-13	3.7	2.2E-14	2.2	2.4E-19	2.3
1959	3.9E-10	2.8	6.0E-14	4.2	1.5E-12	3.8	2.9E-14	2.2	4.2E-19	2.3
1960	6.1E-10	2.9	8.3E-14	3.7	2.4E-12	3.6	4.0E-14	2.1	6.6E-19	2.3
1961	3.5E-10	2.9	9.6E-14	3.9	1.4E-12	3.9	4.7E-14	2.1	3.7E-19	2.2
1962	1.8E-10	2.8	1.0E-13	3.9	7.5E-13	3.5	5.0E-14	2.1	1.9E-19	2.2
1963	2.4E-10	2.9	1.1E-13	3.8	9.8E-13	3.7	5.5E-14	2.0	2.6E-19	2.3
1964	1.4E-10	2.8	1.2E-13	3.5	6.1E-13	3.7	5.7E-14	2.0	1.5E-19	2.2
1965	1.4E-10	2.8	1.2E-13	3.7	6.1E-13	3.5	6.0E-14	2.0	1.5E-19	2.3
1966	1.7E-10	2.9	1.3E-13	4.0	7.2E-13	3.5	6.3E-14	2.0	1.8E-19	2.2
1967	7.8E-11	2.8	1.3E-13	3.8	3.8E-13	3.3	6.5E-14	2.0	8.3E-20	2.2
1968	1.2E-10	3.0	1.4E-13	3.8	5.4E-13	3.4	6.7E-14	2.0	1.2E-19	2.3
1969	3.6E-11	2.9	1.4E-13	3.8	2.1E-13	3.5	6.7E-14	1.9	3.9E-20	2.2
1970	4.6E-11	2.9	1.4E-13	3.7	2.5E-13	3.3	6.8E-14	2.0	4.9E-20	2.3
1971	3.0E-11	2.8	1.4E-13	3.9	1.8E-13	3.3	6.9E-14	2.0	3.2E-20	2.3
1972	2.9E-12	2.9	1.4E-13	3.7	5.6E-14	3.4	6.9E-14	2.0	3.1E-21	2.2
1973	8.9E-12	2.8	1.4E-13	3.9	8.7E-14	3.4	6.9E-14	1.9	9.5E-21	2.3
1974	2.0E-11	3.0	1.4E-13	3.9	1.4E-13	3.1	7.0E-14	2.0	2.1E-20	2.2
1975	2.0E-11	2.8	1.4E-13	3.9	1.4E-13	3.0	7.0E-14	2.0	2.1E-20	2.2
1976	1.2E-11	2.9	1.4E-13	3.6	1.0E-13	3.4	7.0E-14	2.0	1.3E-20	2.2
1977	1.5E-11	2.8	1.4E-13	3.9	1.2E-13	3.3	7.1E-14	2.0	1.6E-20	2.2
1978	1.5E-11	2.8	1.5E-13	3.6	1.2E-13	3.5	7.1E-14	2.0	1.6E-20	2.2
1979	6.7E-12	2.8	1.5E-13	3.9	7.9E-14	3.2	7.1E-14	2.0	7.2E-21	2.2
1980	1.1E-11	2.7	1.5E-13	3.9	9.9E-14	3.2	7.1E-14	1.9	1.2E-20	2.2
1981	8.9E-12	2.9	1.5E-13	3.8	8.9E-14	3.2	7.1E-14	2.0	9.5E-21	2.2
1982	8.9E-12	2.9	1.5E-13	3.6	8.7E-14	3.4	7.1E-14	2.0	9.5E-21	2.2
1983	1.5E-11	2.9	1.5E-13	3.8	1.2E-13	3.2	7.2E-14	2.0	1.5E-20	2.2
1984	1.5E-11	2.9	1.5E-13	4.0	1.2E-13	3.2	7.2E-14	2.0	1.5E-20	2.2
1985	5.6E-12	2.7	1.5E-13	3.7	7.4E-14	3.4	7.2E-14	1.9	5.9E-21	2.2
1986	7.8E-12	2.7	1.5E-13	3.7	8.5E-14	3.1	7.2E-14	2.0	8.3E-21	2.2
1987	3.4E-12	2.8	1.5E-13	3 8	6.1E-14	3.3	7.2E-14	2.0	3.6E-21	2.2
1988	1.9E-12	2.8	1.5E-13	3.6	5.2E-14	3.6	7.3E-14	2.0	2.0E-21	2.3
1989	3.8E-12	2.9	1.5E-13	3.8	6.4E-14	3.3	7.3E-14	2.0	4.1E-21	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium (continued)
Sector 11
(1953 - 1989)

Year	Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	3.5E-17	4.5	1.1E-14	5.7	3.1E-15	5.1	1.7E-15	3.7	1.8E-24	3.0	6.8E-12	2.8
1954	7.8E-17	4.4	1.2E-14	5.2	3.4E-15	4.4	3.8E-15	3.5	4.1E-24	2.8	6.8E-12	2.8
1955	3.8E-16	4.4	8.9E-14	5.4	2.5E-14	4.6	1.9E-14	3.4	2.0E-23	2.9	5.5E-11	2.8
1956	4.6E-15	4.9	1.3E-12	5.1	3.7E-13	5.0	2.2E-13	3.5	2.4E-22	3.0	8.0E-10	2.8
1957	6.5E-15	4.3	5.9E-13	5.0	1.6E-13	4.6	3.2E-13	3.5	3.4E-22	3.0	2.8E-10	2.7
1958	8.1E-15	4.8	5.3E-13	4.8	1.5E-13	4.5	3.9E-13	3.3	4.2E-22	2.7	2.3E-10	2.8
1959	1.1E-14	4.3	8.5E-13	5.1	2.4E-13	4.6	5.2E-13	3 2	5.6E-22	2.8	4.0E-10	2.8
1960	1.5E-14	4.3	1.3E-12	4.8	3.6E-13	4.3	7.1E-13	3.4	7.6E-22	2.8	6.3E-10	2.9
1961	1.7E-14	4.1	9.1E-13	4.7	2.5E-13	4 4	8.3E-13	3.1	8.9E-22	2.6	3.6E-10	2.8
1962	1.8E-14	4.3	6.4E-13	4.3	1.8E-13	4.1	8.9E-13	3.2	9.5E-22	2.6	1.9E-10	2.8
1963	2.0E-14	4.3	7.8E-13	4.7	2.2E-13	4.3	9.7E-13	3.3	1.0E-21	2.6	2.5E-10	2.8
1964	2.1E-14	3.9	6.2E-13	5.1	1.7E-13	4.3	1.0E-12	3.1	1.1E-21	2.6	1.5E-10	2.7
1965	2.2E-14	4.1	6.5E-13	4.8	1.8E-13	4.0	1.1E-12	3.1	1.1E-21	2.6	1.5E-10	2.7
1966	2.3E-14	4.5	7.0E-13	4.5	1.9E-13	3.8	1.1E-12	3.1	1.2E-21	2.6	1.8E-10	2.8
1967	2.3E-14	4.1	5.4E-13	4.5	1.5E-13	4.0	1.1E-12	3.1	1.2E-21	2.5	8.4E-11	2.7
1968	2.4E-14	4.2	6.4E-13	4.3	1.7E-13	4.0	1.2E-12	3.2	1.3E-21	2.7	1.2E-10	2.8
1969	2.5E-14	4.3	4.7E-13	4.2	1.3E-13	4.7	1.2E-12	3.4	1.3E-21	2.7	4.2E-11	2.6
1970	2.5E-14	4.1	5.0E-13	4.6	1.4E-13	4.0	1.2E-12	3.2	1.3E-21	2.6	5.2E-11	2.7
1971	2.5E-14	4.2	4.6E-13	4.6	1.2E-13	4.5	1.2E-12	3.1	1.3E-21	2.6	3.5E-11	2.5
1972	2.5E-14	4.4	3.9E-13	4.4	1.0E-13	4.6	1.2E-12	3.3	1.3E-21	2.6	6.7E-12	2.2
1973	2.5E-14	4.3	4.1E-13	4.7	1.1E-13	4.1	1.2E-12	3.2	1.3E-21	2.5	1.3E-11	2.4
1974	2.5E-14	4.1	4.4E-13	4.3	1.2E-13	4.5	1.2E-12	3.3	1.3E-21	2.5	2.5E-11	2.6
1975	2.5E-14	4.1	4.4E-13	4.9	1.2E-13	4.4	1.2E-12	3.3	1.3E-21	2.6	2.5E-11	2.5
1976	2.6E-14	4.3	4.2E-13	4.6	1.1E-13	4.3	1.2E-12	3.2	1.3E-21	2.5	1.6E-11	2.5
1977	2.6E-14	4.0	4.3E-13	4.7	1.1E-13	4.3	1.3E-12	3.1	1.3E-21	2.6	2.0E-11	2.4
1978	2.6E-14	4.4	4.3E-13	4.5	1.1E-13	4.3	1.3E-12	3.2	1.3E-21	2.7	2.0E-11	2.4
1979	2.6E-14	3.8	4.1E-13	4.9	1.1E-13	4.5	1.3E-12	3.2	1.3E-21	2.6	1.1E-11	2.3
1980	2.6E-14	4.1	4.2E-13	4.4	1.1E-13	4.4	1.3E-12	3.2	1.3E-21	2.5	1.6E-11	2.3
1981	2.6E-14	3.9	4.2E-13	4.9	1.1E-13	4.5	1.3E-12	3.2	1.3E-21	2.6	1.4E-11	2.4
1982	2.6E-14	3.9	4.2E-13	4.4	1.1E-13	4.3	1.3E-12	3.4	1.3E-21	2.6	1.3E-11	2.4
1983	2.6E-14	4.2	4.4E-13	4.6	1.1E-13	4.3	1.3E-12	3.2	1.4E-21	2.6	2.0E-11	2.5
1984	2.6E-14	4.1	4.4E-13	4.8	1.1E-13	4.3	1.3E-12	3.3	1.4E-21	2.6	1.9E-11	2.5
1985	2.6E-14	4.2	4.1E-13	4.7	1.1E-13	4.5	1.3E-12	3.1	1.4E-21	2.6	9.9E-12	2.2
1986	2.6E-14	4.3	4.2E-13	4.5	1.1E-13	4.4	1.3E-12	3.2	1.4E-21	2.6	1.2E-11	2.3
1987	2.6E-14	4.1	4.0E-13	4.6	1.1E-13	4.1	1.3E-12	3.3	1.4E-21	2.5	7.4E-12	2.2
1988	2.6E-14	4.2	4.0E-13	5.1	1.0E-13	4.3	1.3E-12	3.4	1.4E-21	2.7	5.7E-12	2.3
1989	2.6E-14	4.2	4.1E-13	4.5	1.1E-13	4.3	1.3E-12	3.1	1.4E-21	2.5	8.0E-12	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium
Sector 12
(1953 - 1989)

Year	Inhalation		Soil Ingestion		Vegetable Ingestion		Ground Exposure		Immersion	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	2.3E-11	2.9	6.6E-16	4.5	8.7E-14	3.8	3.2E-16	2.6	2.4E-20	2.2
1954	2.3E-11	3.0	1.5E-15	4.2	8.8E-14	4.0	7.2E-16	2.2	2.4E-20	2.2
1955	1.8E-10	2.8	7.2E-15	4.1	6.9E-13	3.7	3.5E-15	2.2	1.9E-19	2.2
1956	2.6E-09	3.0	8.7E-14	4.1	1.0E-11	3.9	4.2E-14	2.4	2.8E-18	2.3
1957	9.2E-10	3.0	1.2E-13	3.8	3.6E-12	3.7	6.1E-14	2.1	9.8E-19	2.2
1958	7.5E-10	2.8	1.5E-13	3.8	3.0E-12	3.6	7.5E-14	2.1	8.0E-19	2.3
1959	1.3E-09	2.8	2.0E-13	3.9	5.2E-12	3.6	9.9E-14	2.0	1.4E-18	2.2
1960	2.1E-09	2.8	2.8E-13	4.0	8.1E-12	3.9	1.4E-13	2.0	2.2E-18	2.2
1961	1.2E-09	2.7	3.2E-13	3.8	4.7E-12	3.9	1.6E-13	2.0	1.2E-18	2.2
1962	6.0E-10	2.9	3.5E-13	3.9	2.5E-12	3.6	1.7E-13	2.0	6.4E-19	2.3
1963	8.1E-10	2.8	3.8E-13	4.1	3.3E-12	3.7	1.8E-13	2.0	8.6E-19	2.2
1964	4.7E-10	2.8	3.9E-13	3.7	2.0E-12	3.4	1.9E-13	1.9	5.0E-19	2.2
1965	4.7E-10	2.8	4.1E-13	3.9	2.1E-12	3.5	2.0E-13	1.9	5.0E-19	2.3
1966	5.6E-10	3.0	4.3E-13	3.9	2.4E-12	3.7	2.1E-13	2.0	6.0E-19	2.3
1967	2.6E-10	2.8	4.4E-13	3.7	1.2E-12	3.3	2.2E-13	1.9	2.8E-19	2.3
1968	3.9E-10	2.8	4.6E-13	3.8	1.8E-12	3.4	2.2E-13	1.9	4.2E-19	2.3
1969	1.2E-10	2.8	4.6E-13	3.7	7.0E-13	3.1	2.3E-13	1.9	1.3E-19	2.2
1970	1.6E-10	2.9	4.7E-13	3.8	8.4E-13	3.5	2.3E-13	1.9	1.7E-19	2.2
1971	9.9E-11	2.8	4.8E-13	3.8	6.0E-13	3.3	2.3E-13	1.9	1.1E-19	2.3
1972	9.7E-12	3.0	4.8E-13	3.7	1.9E-13	3.5	2.3E-13	1.9	1.0E-20	2.3
1973	3.0E-11	2.8	4.8E-13	3.5	3.0E-13	3.3	2.3E-13	1.9	3.2E-20	2.3
1974	6.6E-11	3.0	4.8E-13	3.7	4.5E-13	3.2	2.3E-13	1.9	7.0E-20	2.2
1975	6.7E-11	2.9	4.8E-13	3.6	4.6E-13	3.2	2.4E-13	1.9	7.2E-20	2.2
1976	3.9E-11	2.9	4.8E-13	3.8	3.4E-13	3.1	2.4E-13	1.9	4.2E-20	2.2
1977	5.1E-11	2.9	4.8E-13	3.9	3.9E-13	3.1	2.4E-13	1.9	5.4E-20	2.2
1978	5.1E-11	2.9	4.9E-13	3.7	3.9E-13	3.2	2.4E-13	1.9	5.4E-20	2.2
1979	2.2E-11	2.8	4.9E-13	3.8	2.6E-13	3.2	2.4E-13	1.9	2.4E-20	2.3
1980	3.7E-11	2.8	4.9E-13	3.6	3.4E-13	3.3	2.4E-13	1.9	4.0E-20	2.3
1981	3.0E-11	2.8	4.9E-13	3.7	3.0E-13	3.6	2.4E-13	1.9	3.2E-20	2.2
1982	3.0E-11	2.9	4.9E-13	3.7	3.0E-13	3.2	2.4E-13	1.9	3.2E-20	2.2
1983	4.9E-11	3.0	4.9E-13	3.9	3.9E-13	3.3	2.4E-13	1.9	5.2E-20	2.3
1984	4.9E-11	2.7	4.9E-13	3.7	4.0E-13	3.2	2.4E-13	1.9	5.2E-20	2.3
1985	1.9E-11	2.8	5.0E-13	3.7	2.4E-13	3 5	2.4E-13	1.9	2.0E-20	2.3
1986	2.6E-11	3.0	5.0E-13	3.6	2.8E-13	3.2	2.4E-13	1.9	2.8E-20	2.2
1987	1.1E-11	2.8	5.0E-13	3.6	2.0E-13	3.3	2.4E-13	1.9	1.2E-20	2.3
1988	6.4E-12	2.9	5.0E-13	3.8	1.8E-13	3.5	2.4E-13	1.9	6.8E-21	2.3
1989	1.3E-11	2.8	5.0E-13	3.8	2.1E-13	3.4	2.4E-13	2.0	1.4E-20	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium (continued)
Sector 12
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	GSD	Milk Ingestion GM (Sv/year)	GSD	Beef Ingestion GM (Sv/year)	GSD	Inhalation of Resuspended Particulates GM (Sv/year)	GSD	Immersion in Resuspended Particulates GM (Sv/year)	GSD	Total Dose GM (Sv/year)	GSD
1953	1.2E-16	4.9	3.7E-14	4.9	1.0E-14	4.4	5.7E-15	3.6	6.1E-24	3.1	2.3E-11	2.9
1954	2.6E-16	4.4	4.0E-14	5.5	1.1E-14	5.2	1.3E-14	3.5	1.4E-23	2.8	2.3E-11	2.9
1955	1.3E-15	4.5	3.0E-13	5.5	8.5E-14	4.6	6.2E-14	3.5	6.6E-23	2.8	1.8E-10	2.8
1956	1.5E-14	4.5	4.3E-12	5.3	1.2E-12	5.1	7.5E-13	3.5	8.0E-22	2.9	2.7E-09	2.9
1957	2.2E-14	4.0	1.9E-12	4.7	5.4E-13	4.5	1.1E-12	3.5	1.1E-21	2.7	9.4E-10	3.0
1958	2.7E-14	4.3	1.8E-12	4.5	4.9E-13	4.6	1.3E-12	3.2	1.4E-21	2.6	7.7E-10	2.7
1959	3.6E-14	4.1	2.8E-12	4.9	8.0E-13	4.5	1.7E-12	3.3	1.9E-21	2.7	1.3E-09	2.7
1960	4.9E-14	4.1	4.3E-12	5.1	1.2E-12	4.9	2.4E-12	3.2	2.6E-21	2.5	2.1E-09	2.8
1961	5.7E-14	4.1	3.0E-12	4.7	8.5E-13	4.2	2.8E-12	3.2	3.0E-21	2.6	1.2E-09	2.6
1962	6.1E-14	4.2	2.1E-12	4.7	6.0E-13	4.3	3.0E-12	3.3	3.2E-21	2.6	6.3E-10	2.8
1963	6.7E-14	4.0	2.6E-12	4.6	7.2E-13	4.3	3.3E-12	3.2	3.5E-21	2.5	8.3E-10	2.7
1964	7.0E-14	4.2	2.1E-12	4.3	5.6E-13	4.1	3.4E-12	3.5	3.6E-21	2.6	4.9E-10	2.7
1965	7.3E-14	4.2	2.2E-12	4.8	5.9E-13	4.3	3.6E-12	3.1	3.8E-21	2.5	5.0E-10	2.7
1966	7.7E-14	4.0	2.3E-12	4.5	6.6E-13	4.0	3.7E-12	3.2	4.0E-21	2.8	5.9E-10	2.9
1967	7.9E-14	3.8	1.8E-12	4.8	4.9E-13	4.2	3.8E-12	3.0	4.1E-21	2.5	2.8E-10	2.7
1968	8.1E-14	4.3	2.1E-12	4.5	5.8E-13	4.1	4.0E-12	3.2	4.2E-21	2.5	4.2E-10	2.7
1969	8.3E-14	4.0	1.6E-12	4.4	4.2E-13	4.1	4.0E-12	3.0	4.3E-21	2.4	1.4E-10	2.6
1970	8.3E-14	4.3	1.7E-12	4.4	4.5E-13	4.1	4.1E-12	3.3	4.3E-21	2.5	1.8E-10	2.7
1971	8.4E-14	4.1	1.5E-12	4.4	4.1E-13	4.3	4.1E-12	3.2	4.4E-21	2.6	1.2E-10	2.5
1972	8.4E-14	4.0	1.3E-12	4.6	3.4E-13	4.4	4.1E-12	3.1	4.4E-21	2.4	2.2E-11	2.2
1973	8.4E-14	4.2	1.4E-12	4.4	3.6E-13	4.1	4.1E-12	3.1	4.4E-21	2.4	4.4E-11	2.4
1974	8.5E-14	4.0	1.5E-12	4.2	3.9E-13	4.1	4.1E-12	3.3	4.4E-21	2.5	8.4E-11	2.5
1975	8.5E-14	4.2	1.5E-12	4.4	3.9E-13	4.2	4.2E-12	3.2	4.4E-21	2.5	8.4E-11	2.5
1976	8.6E-14	4.0	1.4E-12	4.9	3.7E-13	4.4	4.2E-12	3.1	4.4E-21	2.6	5.6E-11	2.4
1977	8.6E-14	4.1	1.4E-12	4.4	3.8E-13	4.3	4.2E-12	3.1	4.5E-21	2.5	6.7E-11	2.4
1978	8.6E-14	4.3	1.4E-12	4.3	3.8E-13	4.1	4.2E-12	2.8	4.5E-21	2.4	6.6E-11	2.4
1979	8.6E-14	4.1	1.4E-12	4.7	3.6E-13	4.4	4.2E-12	3.2	4.5E-21	2.6	3.7E-11	2.3
1980	8.7E-14	3.9	1.4E-12	4.2	3.7E-13	4.3	4.2E-12	3.1	4.5E-21	2.4	5.3E-11	2.4
1981	8.7E-14	4.0	1.4E-12	4.3	3.6E-13	4.2	4.2E-12	3.2	4.5E-21	2.6	4.5E-11	2.3
1982	8.7E-14	4.0	1.4E-12	4.6	3.7E-13	4.3	4.2E-12	3.0	4.5E-21	2.5	4.5E-11	2.4
1983	8.7E-14	4.1	1.5E-12	4.6	3.9E-13	4.1	4.3E-12	3.1	4.6E-21	2.3	6.5E-11	2.5
1984	8.8E-14	4.2	1.5E-12	4.3	3.9E-13	4.2	4.3E-12	3.0	4.6E-21	2.4	6.5E-11	2.4
1985	8.8E-14	4.1	1.4E-12	4.8	3.6E-13	4.3	4.3E-12	3.1	4.6E-21	2.5	3.3E-11	2.3
1986	8.8E-14	4.1	1.4E-12	4.5	3.7E-13	4.1	4.3E-12	3.1	4.6E-21	2.3	4.1E-11	2.4
1987	8.8E-14	4.0	1.4E-12	4.6	3.6E-13	4.2	4.3E-12	3.1	4.6E-21	2.6	2.5E-11	2.2
1988	8.8E-14	4.3	1.3E-12	4.6	3.5E-13	4.3	4.3E-12	3.1	4.6E-21	2.5	1.9E-11	2.2
1989	8.8E-14	4.2	1.4E-12	4.7	3.6E-13	4.7	4.3E-12	2.9	4.6E-21	2.4	2.6E-11	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium
Denver
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	8.1E-12	2.8	2.4E-16	4.2	3.1E-14	4.1	1.2E-16	2.6	8.7E-21	2.2
1954	8.1E-12	2.8	5.3E-16	4.1	3.2E-14	3.8	2.6E-16	2.2	8.7E-21	2.3
1955	6.5E-11	3.0	2.6E-15	3.7	2.5E-13	3.9	1.3E-15	2.3	6.9E-20	2.2
1956	9.5E-10	2.9	3.1E-14	4.1	3.7E-12	3.7	1.5E-14	2.4	1.0E-18	2.3
1957	3.3E-10	2.9	4.5E-14	3.9	1.3E-12	3.7	2.2E-14	2.2	3.5E-19	2.3
1958	2.7E-10	2.8	5.5E-14	3.8	1.1E-12	3.3	2.7E-14	2.2	2.9E-19	2.3
1959	4.8E-10	2.8	7.3E-14	3 7	1.9E-12	3.7	3.6E-14	2.0	5.1E-19	2.2
1960	7.5E-10	2.9	1.0E-13	3.5	2.9E-12	3.8	4.9E-14	2.0	8.0E-19	2.3
1961	4.2E-10	2.8	1.2E-13	3.5	1.7E-12	3.5	5.7E-14	2.0	4.5E-19	2.3
1962	2.2E-10	2.8	1.2E-13	3.7	9.1E-13	3.7	6.1E-14	1.9	2.3E-19	2.3
1963	2.9E-10	2.7	1.4E-13	4.0	1.2E-12	3.7	6.6E-14	1.9	3.1E-19	2.2
1964	1.7E-10	2.8	1.4E-13	3.7	7.4E-13	3.6	7.0E-14	1.9	1.8E-19	2.2
1965	1.7E-10	2.8	1.5E-13	3.7	7.5E-13	3.4	7.3E-14	2.0	1.8E-19	2.2
1966	2.0E-10	2.8	1.6E-13	3.9	8.8E-13	3.3	7.6E-14	2.0	2.2E-19	2.2
1967	9.5E-11	2.8	1.6E-13	3.7	4.5E-13	3.6	7.8E-14	1.9	1.0E-19	2.2
1968	1.4E-10	2.7	1.7E-13	4.1	6.5E-13	3.8	8.1E-14	1.9	1.5E-19	2.3
1969	4.4E-11	2.9	1.7E-13	3.6	2.5E-13	3.4	8.2E-14	1.9	4.7E-20	2.2
1970	5.6E-11	2.8	1.7E-13	3.9	3.0E-13	3.3	8.3E-14	1.9	6.0E-20	2.2
1971	3.6E-11	2.9	1.7E-13	3.8	2.2E-13	3.1	8.3E-14	1.9	3.8E-20	2.2
1972	3.5E-12	2.8	1.7E-13	3.7	6.9E-14	3.4	8.3E-14	1.9	3.8E-21	2.2
1973	1.1E-11	2.7	1.7E-13	3.7	1.1E-13	3.3	8.4E-14	1.9	1.2E-20	2.3
1974	2.4E-11	2.8	1.7E-13	4.0	1.7E-13	3.1	8.4E-14	1.9	2.5E-20	2.2
1975	2.4E-11	2.9	1.7E-13	3.8	1.7E-13	3.3	8.4E-14	1.9	2.6E-20	2.2
1976	1.4E-11	2.9	1.7E-13	3.8	1.2E-13	3.2	8.5E-14	1.9	1.5E-20	2.2
1977	1.8E-11	2.9	1.7E-13	3.6	1.4E-13	3.2	8.5E-14	1.9	2.0E-20	2.3
1978	1.8E-11	2.9	1.7E-13	3.7	1.5E-13	3.1	8.5E-14	1.9	1.9E-20	2.3
1979	8.1E-12	2.9	1.8E-13	3.8	9.5E-14	3.3	8.6E-14	1.9	8.7E-21	2.2
1980	1.4E-11	2.9	1.8E-13	3.6	1.2E-13	3.3	8.6E-14	1.9	1.4E-20	2.2
1981	1.1E-11	2.8	1.8E-13	3.7	1.1E-13	3.2	8.6E-14	1.9	1.2E-20	2.3
1982	1.1E-11	2.8	1.8E-13	3.7	1.1E-13	3.3	8.6E-14	1.9	1.2E-20	2.3
1983	1.8E-11	2.9	1.8E-13	3.8	1.4E-13	3.4	8.7E-14	1.9	1.9E-20	2.2
1984	1.8E-11	2.9	1.8E-13	3.8	1.4E-13	3.2	8.7E-14	1.9	1.9E-20	2.2
1985	6.8E-12	3.0	1.8E-13	3 6	8.8E-14	3.1	8.7E-14	1.9	7.2E-21	2.3
1986	9.5E-12	2.7	1 8E-13	3.6	1.0E-13	3.1	8.7E-14	1 9	1.0E-20	2.2
1987	4.1E-12	2.9	1.8E-13	3.6	7.4E-14	3.4	8.7E-14	1.9	4.3E-21	2.3
1988	2.3E-12	2.9	1.8E-13	3.8	6.2E-14	3.6	8 7E-14	1.8	2.5E-21	2.3
1989	4.6E-12	2.8	1.8E-13	3.8	7.6E-14	3.3	8.7E-14	1.9	4.9E-21	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium (continued)
Denver
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	4.2E-17	4.8	1.3E-14	5.4	3.8E-15	4.8	2.1E-15	3 8	2.2E-24	2.9	8.3E-12	2.8
1954	9.4E-17	4.3	1.5E-14	5 4	4.1E-15	4.8	4.6E-15	3 8	4.9E-24	3.0	8.3E-12	2.8
1955	4.6E-16	4.4	1.1E-13	5 2	3.1E-14	4.9	2.2E-14	3 5	2.4E-23	2.9	6.6E-11	3.0
1956	5.6E-15	4.6	1.6E-12	5.3	4.5E-13	4.8	2.7E-13	3 8	2.9E-22	3.0	9.6E-10	2.9
1957	7.9E-15	4.5	7.0E-13	5.5	2.0E-13	4.4	3 8E-13	3.8	4.1E-22	3.0	3.4E-10	2.8
1958	9.8E-15	4.3	6.3E-13	4.8	1.8E-13	4.1	4 7E-13	3.3	5.1E-22	2.7	2.8E-10	2.7
1959	1.3E-14	4.3	1.0E-12	4.7	2.9E-13	4.4	6.3E-13	3.3	6.8E-22	2.6	4.9E-10	2.8
1960	1.8E-14	4.3	1.5E-12	4.7	4.3E-13	4 8	8.7E-13	3.1	9.3E-22	2.6	7.6E-10	2.8
1961	2.1E-14	4.2	1.1E-12	4.8	3.0E-13	4.4	1.0E-12	3 2	1.1E-21	2.6	4.3E-10	2.8
1962	2.2E-14	4.1	7.8E-13	4.9	2.1E-13	4.3	1.1E-12	3.2	1.2E-21	2.6	2.2E-10	2 8
1963	2.4E-14	4.0	9.4E-13	4.8	2.6E-13	3 9	1.2E-12	3.2	1.3E-21	2.5	3.0E-10	2.7
1964	2.5E-14	4.2	7.5E-13	4.4	2.0E-13	4 1	1.2E-12	3.2	1.3E-21	2.6	1.8E-10	2.7
1965	2.6E-14	4.3	7.6E-13	4.5	2.1E-13	4.3	1.3E-12	3.1	1.4E-21	2.5	1.8E-10	2.7
1966	2.8E-14	4.2	8.6E-13	4.6	2.3E-13	3.8	1.4E-12	3.1	1.5E-21	2.5	2.1E-10	2.7
1967	2.8E-14	4.2	6.6E-13	4.5	1.8E-13	4.3	1.4E-12	3.2	1.5E-21	2.6	1.0E-10	2.7
1968	2.9E-14	4.4	7.7E-13	4.7	2.1E-13	4.1	1.4E-12	3.0	1.5E-21	2.4	1.5E-10	2.6
1969	3.0E-14	3.9	5.6E-13	4.6	1.5E-13	4.5	1.4E-12	3.2	1.5E-21	2.6	5.1E-11	2.6
1970	3.0E-14	4.0	6.0E-13	4.3	1.6E-13	4.2	1.5E-12	3.2	1.6E-21	2.6	6.3E-11	2.7
1971	3.0E-14	4.0	5.5E-13	4.2	1.5E-13	4.3	1.5E-12	3.1	1.6E-21	2.5	4.2E-11	2.6
1972	3.0E-14	4.3	4.7E-13	4.7	1.2E-13	4.5	1.5E-12	3.1	1.6E-21	2.6	8.2E-12	2.2
1973	3.0E-14	4.2	4.9E-13	4.4	1.3E-13	4.4	1.5E-12	3.0	1.6E-21	2.6	1.6E-11	2.3
1974	3.1E-14	4.0	5.3E-13	4.7	1.4E-13	4.1	1.5E-12	3.1	1.6E-21	2.6	3.0E-11	2.4
1975	3.1E-14	4.1	5.3E-13	4.4	1 4E-13	4.0	1.5E-12	3.1	1.6E-21	2.5	3.1E-11	2.6
1976	3.1E-14	3.7	5.1E-13	4.7	1.3E-13	4.4	1.5E-12	3.3	1.6E-21	2.5	2.0E-11	2.4
1977	3.1E-14	4.2	5.2E-13	4.6	1.4E-13	4 3	1.5E-12	2.9	1.6E-21	2.4	2.4E-11	2.5
1978	3.1E-14	4.1	5.2E-13	5.1	1.4E-13	4.3	1.5E-12	3.1	1.6E-21	2.5	2.4E-11	2.5
1979	3.1E-14	4.1	4.9E-13	4.5	1.3E-13	4.0	1.5E-12	3.0	1.6E-21	2.4	1.3E-11	2.3
1980	3.1E-14	4.2	5.1E-13	4.7	1.3E-13	4.2	1.5E-12	3.2	1.6E-21	2.5	1.9E-11	2.4
1981	3.1E-14	4.1	5.0E-13	4.4	1.3E-13	4.3	1.5E-12	3.2	1.6E-21	2.5	1.6E-11	2.4
1982	3.1E-14	4.2	5.1E-13	4.3	1.3E-13	4.3	1.5E-12	3.1	1.6E-21	2.5	1.6E-11	2.4
1983	3.1E-14	4.2	5.3E-13	4 6	1.4E-13	4.2	1.5E-12	3.1	1.6E-21	2.5	2.4E-11	2.5
1984	3.2E-14	4.0	5.3E-13	4.8	1.4E-13	4.5	1.5E-12	3.1	1.6E-21	2.5	2.4E-11	2.5
1985	3.2E-14	4.0	5.0E-13	4.5	1.3E-13	4.3	1 5E-12	3.2	1.6E-21	2.5	1.2E-11	2.3
1986	3.2E-14	4.2	5.1E-13	4 6	1.3E-13	4.4	1.5E-12	3.0	1.7E-21	2.4	1.5E-11	2 3
1987	3.2E-14	4.0	4.9E-13	4.3	1.3E-13	4.5	1 5E-12	3.0	1.7E-21	2.5	8.9E-12	2 2
1988	3.2E-14	4 3	4 9E-13	5.1	1.3E-13	4.4	1.6E-12	3 3	1.7E-21	2.5	6.9E-12	2.3
1989	3.2E-14	4.1	4.9E-13	4.7	1.3E-13	4 5	1.6E-12	3.0	1.7E-21	2.5	9.5E-12	2 2

NOTES:
1) E-01 is the same as the value divided by 10^{1}; E-02 is the same as the value divided by 10^{2}; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium
Lakewood
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	1.0E-11	2.8	3.0E-16	4.3	3.9E-14	3.9	1.4E-16	2.6	1.1E-20	2.2
1954	1.0E-11	2.9	6.7E-16	4.0	3.9E-14	3.8	3.3E-16	2.2	1.1E-20	2.2
1955	8.1E-11	2.8	3.3E-15	4.1	3.1E-13	3.9	1.6E-15	2.3	8.7E-20	2.2
1956	1.2E-09	2.8	3.9E-14	4.3	4.6E-12	3.9	1.9E-14	2.4	1.3E-18	2.2
1957	4.1E-10	2.9	5.6E-14	4.1	1.6E-12	3.7	2.7E-14	2.2	4.4E-19	2.2
1958	3.4E-10	2.9	6.9E-14	3.8	1.4E-12	3.8	3.3E-14	2.1	3.6E-19	2.2
1959	5.9E-10	2.9	9.1E-14	3.8	2.3E-12	4.1	4.4E-14	2.0	6.3E-19	2.3
1960	9.3E-10	2.8	1.3E-13	4.0	3.7E-12	3.7	6.1E-14	1.9	9.9E-19	2.3
1961	5.2E-10	3.0	1.5E-13	3.7	2.1E-12	3.4	7.1E-14	1.9	5.6E-19	2.3
1962	2.7E-10	2.9	1.6E-13	3.7	1.1E-12	3.8	7.6E-14	1.9	2.9E-19	2.2
1963	3.6E-10	2.8	1.7E-13	3.6	1.5E-12	3.7	8.3E-14	1.9	3.9E-19	2.2
1964	2.1E-10	2.9	1.8E-13	3.7	9.2E-13	3.5	8.7E-14	1.9	2.3E-19	2.2
1965	2.1E-10	2.8	1.9E-13	3.8	9.2E-13	3.8	9.1E-14	1.9	2.3E-19	2.3
1966	2.5E-10	2.7	2.0E-13	3.8	1.1E-12	3.9	9.5E-14	1.9	2.7E-19	2.2
1967	1.2E-10	2.9	2.0E-13	3.6	5.7E-13	3.4	9.8E-14	1.9	1.3E-19	2.2
1968	1.8E-10	2.8	2.1E-13	3.7	8.1E-13	3.6	1.0E-13	1.9	1.9E-19	2.2
1969	5.5E-11	2.7	2.1E-13	3.6	3.1E-13	3.2	1.0E-13	1.9	5.9E-20	2.3
1970	7.0E-11	2.7	2.1E-13	3.7	3.8E-13	3.3	1.0E-13	1.9	7.5E-20	2.3
1971	4.5E-11	2.8	2.1E-13	3.6	2.7E-13	3.4	1.0E-13	1.9	4.8E-20	2.2
1972	4.4E-12	2.7	2.1E-13	3.6	8.4E-14	3.5	1.0E-13	1.9	4.7E-21	2.3
1973	1.4E-11	3.0	2.1E-13	3 8	1.3E-13	3.3	1.0E-13	1.9	1.4E-20	2.3
1974	3.0E-11	2.9	2.2E-13	3.5	2.1E-13	3.2	1.1E-13	1.9	3.2E-20	2.3
1975	3.0E-11	2.8	2.2E-13	3.7	2.1E-13	3.3	1.1E-13	1.9	3.2E-20	2.2
1976	1.8E-11	2.9	2.2E-13	3.8	1.5E-13	3.2	1.1E-13	1.9	1.9E-20	2.2
1977	2.3E-11	3.0	2.2E-13	3.8	1.8E-13	3.3	1.1E-13	1.9	2.4E-20	2.2
1978	2.3E-11	2.7	2.2E-13	3.8	1.8E-13	3.3	1.1E-13	1.9	2.4E-20	2.2
1979	1.0E-11	2.9	2.2E-13	3.9	1.2E-13	3.3	1.1E-13	1.9	1.1E-20	2.3
1980	1.7E-11	2.8	2.2E-13	3.8	1.5E-13	3.1	1.1E-13	1.9	1.8E-20	2.3
1981	1.4E-11	2.9	2.2E-13	4.0	1.4E-13	3.3	1.1E-13	1.9	1.4E-20	2.2
1982	1.4E-11	2.8	2.2E-13	3.9	1.4E-13	3.3	1.1E-13	1.9	1.4E-20	2.2
1983	2.2E-11	3.0	2.2E-13	3.7	1.8E-13	3.3	1.1E-13	1.9	2.3E-20	2.3
1984	2.2E-11	2.9	2.2E-13	3.9	1.8E-13	3.4	1.1E-13	1.9	2.4E-20	2.2
1985	8.5E-12	2.9	2.2E-13	3.8	1.1E-13	3.4	1.1E-13	1.9	9.0E-21	2.2
1986	1.2E-11	2.9	2.2E-13	3.7	1.3E-13	3.3	1.1E-13	1.9	1.3E-20	2.2
1987	5.1E-12	2.9	2.2E-13	3.8	9.3E-14	3.7	1.1E-13	1.9	5.4E-21	2.2
1988	2.9E-12	3.0	2.2E-13	3.8	7.8E-14	3.1	1.1E-13	1.9	3 1E-21	2.2
1989	5.8E-12	2.9	2.2E-13	3.8	9.8E-14	3.5	1.1E-13	1.9	6.1E-21	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium (continued)
Lakewood
(1953 - 1989)

Year	Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	5.3E-17	4.8	1.7E-14	5.8	4.7E-15	4.9	2.6E-15	3.7	2.7E-24	3.0	1.0E-11	2.7
1954	1.2E-16	4.1	1.8E-14	5.0	5.1E-15	4.8	5.8E-15	3.5	6.2E-24	2.9	1.0E-11	2.8
1955	5.8E-16	4.3	1.4E-13	5.5	3.9E-14	4.4	2.8E-14	3.5	3.0E-23	3.0	8.3E-11	2.7
1956	7.0E-15	4.4	2.0E-12	5.1	5.6E-13	5.1	3.4E-13	3.7	3.6E-22	2.9	1.2E-09	2.7
1957	9.9E-15	4.3	8.7E-13	4.8	2.4E-13	4.4	4.8E-13	3.5	5.2E-22	2.8	4.2E-10	2.9
1958	1.2E-14	4.2	8.1E-13	4.6	2.3E-13	4.5	6.0E-13	3.4	6.4E-22	2.7	3.5E-10	2.8
1959	1.6E-14	4.3	1.3E-12	4.8	3.6E-13	4.5	7.9E-13	3.3	8.4E-22	2.6	6.1E-10	2.9
1960	2.2E-14	4.0	2.0E-12	4.8	5.5E-13	4.2	1.1E-12	3.0	1.2E-21	2.5	9.5E-10	2.7
1961	2.6E-14	4.4	1.4E-12	4.7	3.9E-13	4.2	1.3E-12	3.2	1.3E-21	2.5	5.4E-10	2.9
1962	2.8E-14	4.2	9.7E-13	4.9	2.7E-13	4.2	1.3E-12	3.2	1.4E-21	2.6	2.8E-10	2.8
1963	3.0E-14	4.1	1.2E-12	4.4	3.3E-13	4.5	1.5E-12	3.3	1.6E-21	2.5	3.8E-10	2.7
1964	3.2E-14	4.1	9.4E-13	4.1	2.6E-13	4.4	1.5E-12	3.1	1.6E-21	2.5	2.2E-10	2.8
1965	3.3E-14	4.0	9.6E-13	4.5	2.6E-13	3.9	1.6E-12	3.2	1.7E-21	2.5	2.2E-10	2.7
1966	3.5E-14	4.0	1 1E-12	4.3	3.0E-13	4.1	1.7E-12	3.1	1.8E-21	2.5	2.6E-10	2.7
1967	3.6E-14	4.2	8.1E-13	4.2	2.2E-13	4.0	1.7E-12	3.1	1.8E-21	2.4	1.3E-10	2.7
1968	3.6E-14	4.1	9.6E-13	4.7	2.6E-13	4.3	1.8E-12	3.0	1.9E-21	2.5	1.9E-10	2.7
1969	3.7E-14	4.0	7.0E-13	4.6	1.9E-13	3.9	1.8E-12	3.1	1.9E-21	2.5	6.3E-11	2.5
1970	3.7E-14	4.2	7.6E-13	4.3	2.0E-13	4.3	1.8E-12	3.2	2.0E-21	2.6	7.9E-11	2.5
1971	3.8E-14	3.9	6.9E-13	4 3	1.8E-13	4.3	1.9E-12	3.0	2.0E-21	2.5	5.3E-11	2.6
1972	3.8E-14	4.0	5.8E-13	4.9	1.5E-13	4.4	1.8E-12	3.0	2.0E-21	2.5	1.0E-11	2.1
1973	3.8E-14	4.2	6.2E-13	4.4	1.6E-13	4.4	1.8E-12	3.2	2.0E-21	2.5	2.0E-11	2.4
1974	3.8E-14	4.1	6.5E-13	4.5	1 7E-13	4 3	1.9E-12	3.1	2.0E-21	2.5	3.7E-11	2.5
1975	3.8E-14	3.9	6.7E-13	4.7	1.8E-13	4.2	1.9E-12	3.1	2.0E-21	2.4	3.8E-11	2 5
1976	3.8E-14	4.0	6.4E-13	4.5	1.7E-13	4.2	1.9E-12	3.2	2.0E-21	2.5	2.5E-11	2.4
1977	3.9E-14	4.4	6.5E-13	4.2	1.7E-13	4.4	1.9E-12	3.1	2.0E-21	2.5	3.0E-11	2.5
1978	3.9E-14	4.2	6.5E-13	4.7	1.7E-13	4.2	1.9E-12	3.1	2.0E-21	2.4	3.0E-11	2.4
1979	3.9E-14	4.3	6.2E-13	4.6	1.6E-13	4.1	1.9E-12	3.0	2.0E-21	2.4	1.7E-11	2.3
1980	3.9E-14	4.5	6.4E-13	4.7	1.7E-13	4.3	1.9E-12	3.1	2.0E-21	2.5	2.4E-11	2.4
1981	3.9E-14	4.2	6.3E-13	4.3	1.7E-13	4.0	1.9E-12	3.1	2.0E-21	2.4	2.0E-11	2.3
1982	3.9E-14	4.1	6.3E-13	4.4	1.7E-13	4.2	1.9E-12	3.2	2.0E-21	2.6	2.0E-11	2.3
1983	3.9E-14	4.0	6.6E-13	4.6	1.7E-13	4.2	1.9E-12	3.1	2.0E-21	2.4	2.9E-11	2.5
1984	3.9E-14	4.0	6.6E-13	4.4	1.7E-13	4.6	1.9E-12	3 3	2.1E-21	2.5	3.0E-11	2.5
1985	3.9E-14	3.9	6.2E-13	4.4	1.6E-13	4.4	1.9E-12	3.2	2.1E-21	2.5	1.5E-11	2.3
1986	4.0E-14	4.2	6.4E-13	4.6	1.7E-13	4.5	1.9E-12	3.3	2.1E-21	2.5	1.9E-11	2.3
1987	4.0E-14	4.2	6.1E-13	4.8	1.6E-13	4.3	1.9E-12	3.1	2.1E-21	2.5	1.1E-11	2.2
1988	4.0E-14	3.7	6.1E-13	4 8	1.6E-13	4.3	1.9E-12	3.2	2.1E-21	2.5	8.5E-12	2.3
1989	4.0E-14	4.3	6.2E-13	4.5	1.6E-13	4.0	1.9E-12	2.9	2.1E-21	2.5	1.2E-11	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium
Longmont
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	3.4E-12	2.8	1.0E-16	4.3	1.3E-14	3.7	4.9E-17	2.5	3.6E-21	2.2
1954	3.4E-12	2.8	2.2E-16	4.1	1.3E-14	3.8	1.1E-16	2.1	3.7E-21	2.2
1955	2.7E-11	2.7	1.1E-15	4.1	1.1E-13	3.9	5.3E-16	2.3	2.9E-20	2.2
1956	4.0E-10	2.8	1.3E-14	4.2	1.5E-12	3.7	6.5E-15	2.4	4.3E-19	2.2
1957	1.4E-10	2.9	1.9E-14	4.1	5.5E-13	3.8	9.2E-15	2.3	1.5E-19	2.3
1958	1.1E-10	2.9	2.3E-14	4.0	4.6E-13	3.7	1.1E-14	2.1	1.2E-19	2.2
1959	2.0E-10	2.7	3.1E-14	4.0	7.9E-13	3.6	1.5E-14	2.0	2.1E-19	2.3
1960	3.1E-10	3.0	4.2E-14	4.1	1.2E-12	3.6	2.1E-14	2.0	3.3E-19	2.2
1961	1.8E-10	2.8	4.9E-14	3.8	7.1E-13	3.6	2.4E-14	2.0	1.9E-19	2.3
1962	9.1E-11	2.9	5.3E-14	4.0	3.8E-13	3.4	2.6E-14	2.0	9.7E-20	2.2
1963	1.2E-10	2.8	5.8E-14	3.7	5.1E-13	3.6	2.8E-14	2.0	1.3E-19	2.2
1964	7.1E-11	2.8	6.0E-14	4.0	3.1E-13	3.5	2.9E-14	2.0	7.6E-20	2.2
1965	7.1E-11	2.8	6.3E-14	3.8	3.1E-13	3.7	3.1E-14	1.9	7.6E-20	2.2
1966	8.6E-11	2.9	6.6E-14	3.5	3.7E-13	3.7	3.2E-14	1.9	9.1E-20	2.2
1967	4.0E-11	2.9	6.8E-14	4.0	1.9E-13	3.3	3.3E-14	1.9	4.3E-20	2.2
1968	6.0E-11	3.0	7.0E-14	3.8	2.7E-13	3.6	3.4E-14	1.9	6.4E-20	2.3
1969	1.9E-11	2.9	7.1E-14	3.7	1.0E-13	3.3	3.4E-14	1.9	2.0E-20	2.3
1970	2.4E-11	2.7	7.2E-14	3.7	1.3E-13	3.3	3.5E-14	1.9	2.5E-20	2.2
1971	1.5E-11	2.9	7.2E-14	3.5	9.3E-14	3.4	3.5E-14	2.0	1.6E-20	2.2
1972	1.5E-12	2.8	7.2E-14	3.7	2.8E-14	3.5	3.5E-14	1.9	1.6E-21	2.2
1973	4.6E-12	2.9	7.2E-14	3.8	4.5E-14	3.1	3.5E-14	1.9	4.9E-21	2.2
1974	1.0E-11	2.8	7.3E-14	3.8	7.1E-14	3.1	3.5E-14	1.9	1.1E-20	2.2
1975	1.0E-11	2.9	7.3E-14	3.6	7.1E-14	3.4	3.6E-14	1.9	1.1E-20	2.3
1976	6.0E-12	2.8	7.4E-14	3.6	5.4E-14	3.1	3.6E-14	1.9	6.4E-21	2.2
1977	7.7E-12	2.8	7.4E-14	3.6	6.0E-14	3.2	3.6E-14	1.9	8.2E-21	2.2
1978	7.7E-12	2.9	7.4E-14	3.9	6.0E-14	3.1	3.6E-14	1.9	8.2E-21	2.3
1979	3.4E-12	2.8	7.4E-14	3.5	4.0E-14	3.4	3.6E-14	1.9	3.7E-21	2.2
1980	5.7E-12	2.9	7.4E-14	4.0	5.2E-14	3.1	3.6E-14	1.9	6.1E-21	2.3
1981	4.6E-12	2.8	7.5E-14	3.6	4.6E-14	3.6	3.6E-14	1.9	4.9E-21	2.2
1982	4.6E-12	2.8	7.5E-14	4.0	4.5E-14	3.3	3.6E-14	1.9	4.9E-21	2.3
1983	7.4E-12	2.8	7.5E-14	4.0	6.0E-14	3.3	3.7E-14	1.9	7.9E-21	2.3
1984	7.4E-12	2.9	7.5E-14	3.6	5.9E-14	3.2	3.7E-14	1.9	7.9E-21	2.3
1985	2.9E-12	2.9	7.6E-14	3.6	3.7E-14	3.5	3.7E-14	1.9	3.0E-21	2.2
1986	4.0E-12	2.8	7.6E-14	3.8	4.4E-14	3.2	3.7E-14	1.9	4.3E-21	2.2
1987	1.7E-12	2.8	7.6E-14	3.9	3.1E-14	3.4	3.7E-14	1.9	1.8E-21	2.3
1988	9.7E-13	3.0	7.5E-14	3.8	2.7E-14	3.5	3 7E-14	1.9	1.0E-21	2.2
1989	1.9E-12	2.8	7.6E-14	3.7	3.2E-14	3.3	3 7E-14	1.9	2.1E-21	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Enriched Uranium (continued)
Longmont
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	1.8E-17	4.6	5.6E-15	5.4	1.6E-15	5.3	8.7E-16	3.9	9.3E-25	3.2	3.5E-12	2.8
1954	4.0E-17	4.3	6.2E-15	4.6	1.7E-15	4.7	1.9E-15	3.3	2.1E-24	2.8	3.5E-12	2.8
1955	1.9E-16	4.6	4.6E-14	5.3	1.3E-14	4.7	9.5E-15	3.5	1.0E-23	2.8	2.8E-11	2.7
1956	2.4E-15	4.8	6.6E-13	4.7	1.9E-13	4.8	1.2E-13	3.5	1.2E-22	2.9	4.1E-10	2.8
1957	3.3E-15	4.2	2.9E-13	4.9	8.3E-14	4.8	1.6E-13	3.5	1.7E-22	2.9	1.4E-10	2.9
1958	4.1E-15	4.3	2.7E-13	5.1	7.6E-14	4.6	2.0E-13	3.3	2.2E-22	2.7	1.2E-10	2.8
1959	5.5E-15	3.8	4.3E-13	4.6	1.2E-13	4.5	2.7E-13	3.3	2.8E-22	2.6	2.0E-10	2.7
1960	7.5E-15	4.0	6.5E-13	5.0	1.8E-13	4.5	3.7E-13	3.3	3.9E-22	2.5	3.2E-10	2.9
1961	8.7E-15	4.3	4.6E-13	4.9	1.3E-13	4.0	4.3E-13	2.9	4.6E-22	2.5	1.8E-10	2.8
1962	9.3E-15	4.1	3.3E-13	4.5	9.1E-14	4.1	4.6E-13	3.1	4.9E-22	2.6	9.5E-11	2.8
1963	1.0E-14	4.0	4.0E-13	4.8	1.1E-13	4.3	5.0E-13	3.3	5.3E-22	2.6	1.3E-10	2.8
1964	1.1E-14	4.0	3.1E-13	4.4	8.6E-14	3.9	5.2E-13	3.1	5.6E-22	2.5	7.5E-11	2.7
1965	1.1E-14	4.2	3.2E-13	4.5	9.0E-14	4.4	5.4E-13	3.0	5.8E-22	2.4	7.5E-11	2.7
1966	1.2E-14	4.3	3.6E-13	4.4	9.9E-14	4.2	5.7E-13	3.2	6.1E-22	2.5	9.0E-11	2.8
1967	1.2E-14	4.2	2.7E-13	4.3	7.5E-14	4.2	5.8E-13	3.3	6.2E-22	2.7	4.3E-11	2.7
1968	1.2E-14	4.2	3.3E-13	4.5	8.8E-14	4.3	6.0E-13	3.0	6.4E-22	2.5	6.4E-11	2.9
1969	1.3E-14	4.1	2.4E-13	4.5	6.3E-14	3.9	6.1E-13	3.2	6.5E-22	2.7	2.1E-11	2.6
1970	1.3E-14	4.1	2.5E-13	4.3	6.8E-14	4.2	6.2E-13	3.0	6.6E-22	2.4	2.7E-11	2.5
1971	1.3E-14	4.1	2.4E-13	4.6	6.3E-14	4.4	6.2E-13	3.2	6.7E-22	2.6	1.8E-11	2.6
1972	1.3E-14	4.2	2.0E-13	4.7	5.2E-14	4.4	6.2E-13	3.1	6.7E-22	2.5	3.4E-12	2.2
1973	1.3E-14	4.1	2.1E-13	4.6	5.4E-14	4.1	6.2E-13	3.2	6.7E-22	2.5	6.8E-12	2.4
1974	1.3E-14	4.0	2.2E-13	4.6	5.9E-14	4.2	6.3E-13	3.3	6.7E-22	2.7	1.3E-11	2.4
1975	1.3E-14	4.3	2.2E-13	4.4	6.0E-14	3.9	6.3E-13	3.3	6.8E-22	2.5	1.3E-11	2.5
1976	1.3E-14	4.1	2.2E-13	4.7	5.7E-14	4.4	6.3E-13	3.2	6.8E-22	2.6	8.4E-12	2.4
1977	1.3E-14	4.0	2.2E-13	4.6	5.8E-14	4.0	6.4E-13	3.0	6.8E-22	2.5	1.0E-11	2.4
1978	1.3E-14	4.1	2.2E-13	4.4	5.8E-14	4.4	6.4E-13	3.3	6.8E-22	2.5	1.0E-11	2.5
1979	1.3E-14	4.0	2.1E-13	4.5	5.5E-14	4.5	6.4E-13	3.2	6.8E-22	2.6	5.7E-12	2.2
1980	1.3E-14	4.1	2.1E-13	4.5	5.7E-14	4.4	6.4E-13	3.1	6.9E-22	2.6	8.1E-12	2.4
1981	1.3E-14	4.2	2.1E-13	4.5	5.6E-14	3.8	6.5E-13	3.1	6.9E-22	2.6	6.9E-12	2.4
1982	1.3E-14	4.2	2.1E-13	4.5	5.6E-14	4.3	6.5E-13	3.2	6.9E-22	2.6	6.8E-12	2.4
1983	1.3E-14	4.2	2.2E-13	4.9	5.9E-14	4.2	6.5E-13	3.2	6.9E-22	2.5	9.9E-12	2.4
1984	1.3E-14	4.4	2.2E-13	4.5	5.9E-14	4.8	6.5E-13	3.2	6.9E-22	2.5	1.0E-11	2.4
1985	1.3E-14	4.0	2.1E-13	4.7	5.5E-14	4.5	6.5E-13	3.1	7.0E-22	2.5	5.1E-12	2.3
1986	1.3E-14	3.8	2.1E-13	4.3	5.6E-14	4.4	6.5E-13	3.2	7.0E-22	2.5	6.2E-12	2.4
1987	1.3E-14	4.2	2.1E-13	4.5	5.4E-14	4.5	6.5E-13	3.0	7.0E-22	2.5	3.8E-12	2.1
1988	1.3E-14	4.0	2.0E-13	4.7	5.3E-14	4.1	6.5E-13	3.3	7.0E-22	2.5	2.9E-12	2.3
1989	1.3E-14	4.0	2.1E-13	4.5	5.5E-14	4.4	6.6E-13	3.0	7.0E-22	2.5	4.0E-12	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

PATHWAY-SPECIFIC DOSES ASSOCIATED WITH ROUTINE AIRBORNE RELEASE OF PLUTONIUM-239/240

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240
Sector 1
(1953 - 1989)

Year	Inhalation		Soil Ingestion		Vegetable Ingestion		Ground Exposure		Immersion	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	3.3E-11	2.2	4.0E-15	3.9	5.2E-13	3.3	5.5E-17	2.6	3.2E-21	2.2
1954	1.1E-09	2.2	1.4E-13	3.8	1.7E-11	3.3	1.9E-15	2.6	1.0E-19	2.3
1955	1.2E-09	2.3	3.2E-13	3.6	1.9E-11	3.4	4.3E-15	2.3	1.2E-19	2.2
1956	3.9E-09	2.1	8.6E-13	3.6	6.3E-11	3.2	1.2E-14	2.2	3.8E-19	2.2
1957	2.5E-07	2.2	3.2E-11	4.0	4.0E-09	3.4	4.3E-13	2.7	2.4E-17	2.2
1958	5.1E-08	2.2	4.1E-11	3.6	8.3E-10	3.4	5.6E-13	2.5	5.0E-18	2.2
1959	2.2E-08	2.2	4.5E-11	3.6	3.5E-10	3.3	6.1E-13	2.5	2.1E-18	2.3
1960	2.2E-08	2.3	4.8E-11	3.4	3.6E-10	3.2	6.6E-13	2.4	2.1E-18	2.2
1961	2.5E-08	2.2	5.3E-11	3.4	4.1E-10	3.4	7.2E-13	2.3	2.4E-18	2.3
1962	5.1E-08	2.2	6.1E-11	3.4	8.3E-10	3.2	8.4E-13	2.2	5.0E-18	2.3
1963	6.1E-08	2.2	7.1E-11	3.3	9.8E-10	3.1	9.7E-13	2.1	5.9E-18	2.3
1964	4.7E-08	2.3	7.9E-11	3.4	7.6E-10	3.3	1.1E-12	2.1	4.5E-18	2.3
1965	1.1E-07	2.2	9.6E-11	3.2	1.7E-09	3.3	1.3E-12	2.1	1.0E-17	2.2
1966	5.3E-09	2.2	9.6E-11	3.3	9.4E-11	3.0	1.3E-12	2.1	5.1E-19	2.3
1967	6.7E-09	2.2	9.7E-11	3.4	1.2E-10	3.1	1.3E-12	2.1	6.5E-19	2.3
1968	8.1E-09	2.3	9.9E-11	3.2	1.4E-10	3.2	1.4E-12	2.1	7.8E-19	2.2
1969	2.2E-08	2.2	1.0E-10	3.2	3.6E-10	3.4	1.4E-12	2.1	2.1E-18	2.2
1970	6.2E-09	2.2	1.0E-10	3.1	1.1E-10	3.2	1.4E-12	2.0	6.0E-19	2.3
1971	1.2E-09	2.3	1.0E-10	3.2	2.6E-11	3.3	1.4E-12	2.1	1.2E-19	2.3
1972	1.0E-09	2.3	1.0E-10	3.3	2.3E-11	3.1	1.4E-12	2.1	9.8E-20	2.3
1973	1.0E-09	2.3	1.0E-10	3.4	2.3E-11	3.0	1.4E-12	2.0	9.9E-20	2.3
1974	1.9E-08	2.3	1.1E-10	3.3	3.1E-10	3.2	1.5E-12	2.1	1.8E-18	2.3
1975	2.0E-10	2.2	1.1E-10	3.4	7.1E-12	3.8	1.5E-12	2.0	2.0E-20	2.2
1976	8.1E-11	2.2	1.1E-10	3.3	4.4E-12	4.4	1.5E-12	2.1	7.8E-21	2.3
1977	8.1E-11	2.2	1.1E-10	3.3	4.3E-12	4.0	1.5E-12	2.1	7.8E-21	2.3
1978	5.6E-11	2.2	1.1E-10	3.3	3.8E-12	4.4	1.5E-12	2.1	5.4E-21	2.2
1979	1.1E-10	2.2	1.1E-10	3.3	5.1E-12	3.8	1.5E-12	2.1	1.1E-20	2.3
1980	2.5E-10	2.2	1.1E-10	3.4	8.4E-12	3.4	1.5E-12	2.1	2.4E-20	2.3
1981	1.7E-10	2.2	1.1E-10	3.3	6.4E-12	3.7	1.5E-12	2.1	1.7E-20	2.2
1982	4.0E-10	2.2	1.1E-10	3.2	1.1E-11	3.4	1.5E-12	2.0	3.9E-20	2.2
1983	1.6E-09	2.2	1.1E-10	3.3	3.2E-11	3.3	1.5E-12	2.1	1.5E-19	2.3
1984	1.6E-09	2.2	1.1E-10	3.3	3.2E-11	3.0	1.5E-12	2.1	1.5E-19	2.3
1985	1.9E-10	2.3	1.1E-10	3.5	7.0E-12	3.4	1.5E-12	2.0	1.8E-20	2.3
1986	5.9E-10	2.2	1.1E-10	3.2	1.5E-11	3.4	1.5E-12	2.1	5.7E-20	2.2
1987	3.1E-10	2.2	1.1E-10	3.2	9.5E-12	3.4	1.5E-12	2.1	3.0E-20	2.3
1988	3.1E-10	2.2	1.1E-10	3.4	9.3E-12	3.5	1.5E-12	2.0	3.0E-20	2.3
1989	9.2E-11	2.3	1.1E-10	3.3	4.7E-12	4.1	1.5E-12	2.1	8.9E-21	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240 (continued)
Sector 1
(1953 - 1989)

Year	Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	3.7E-17	9.6	3.7E-17	5.1	2.7E-16	3.9	8.3E-15	3.1	8.0E-25	3.1	3.4E-11	2.2
1954	1.3E-15	8.7	1.2E-15	5.0	8.8E-15	4.0	2.9E-13	3.0	2.8E-23	3.2	1.1E-09	2.2
1955	3.0E-15	8.5	1.5E-15	4.5	1.1E-14	4.2	6.5E-13	2.9	6.3E-23	2.8	1.2E-09	2.3
1956	8.0E-15	9.3	4.7E-15	4.5	3.4E-14	4.0	1.8E-12	2.8	1.7E-22	2.8	4.0E-09	2.1
1957	3.0E-13	10.3	2.8E-13	4.6	2.1E-12	4.1	6.6E-11	3.0	6.4E-21	3.0	2.5E-07	2.2
1958	3.8E-13	9.2	8.2E-14	4.6	5.9E-13	3.7	8.4E-11	3.1	8.1E-21	3.0	5.3E-08	2.2
1959	4.2E-13	8.8	5.2E-14	4.0	3.6E-13	3.4	9.2E-11	2.9	8.9E-21	2.9	2.3E-08	2.2
1960	4.5E-13	9.0	5.3E-14	4.3	3.7E-13	3.5	1.0E-10	2.9	9.7E-21	2.9	2.3E-08	2.2
1961	4.9E-13	9.2	5.9E-14	3.8	4.1E-13	3.5	1.1E-10	2.7	1.1E-20	2.8	2.6E-08	2.2
1962	5.7E-13	8.9	9.3E-14	4.3	6.6E-13	3.4	1.3E-10	2.7	1.2E-20	2.8	5.3E-08	2.2
1963	6.6E-13	8.6	1.1E-13	4.3	7.7E-13	3.6	1.5E-10	2.7	1.4E-20	2.7	6.3E-08	2.2
1964	7.3E-13	8.4	9.8E-14	4.4	7.0E-13	3.4	1.6E-10	2.6	1.6E-20	2.6	4.8E-08	2.2
1965	8.9E-13	8.6	1.8E-13	4.5	1.3E-12	3.6	2.0E-10	2.7	1.9E-20	2.7	1.1E-07	2.2
1966	9.0E-13	8.7	5.3E-14	4.2	3.6E-13	3.6	2.0E-10	2.6	1.9E-20	2.6	6.0E-09	2.1
1967	9.1E-13	8.3	5.6E-14	4.4	3.7E-13	3.4	2.0E-10	2.5	1.9E-20	2.6	7.5E-09	2.1
1968	9.2E-13	8.7	5.8E-14	3.9	3.9E-13	3.6	2.0E-10	2.6	2.0E-20	2.6	8.9E-09	2.2
1969	9.6E-13	8.5	8.0E-14	4.0	5.6E-13	3.5	2.1E-10	2.5	2.0E-20	2.5	2.3E-08	2.2
1970	9.6E-13	8.8	5.7E-14	4.3	3.9E-13	3.4	2.1E-10	2.5	2.1E-20	2.5	7.0E-09	2.1
1971	9.6E-13	9.0	4.8E-14	4.0	3.2E-13	3.7	2.1E-10	2.6	2.1E-20	2.6	1.8E-09	2.0
1972	9.7E-13	9.0	4.8E-14	4.3	3.2E-13	3.6	2.1E-10	2.6	2.1E-20	2.4	1.6E-09	2.0
1973	9.7E-13	8.9	4.8E-14	4.2	3.2E-13	3.7	2.1E-10	2.6	2.1E-20	2.6	1.6E-09	1.9
1974	1.0E-12	8.9	7.8E-14	3.8	5.4E-13	3.6	2.2E-10	2.5	2.1E-20	2.5	2.0E-08	2.2
1975	1.0E-12	8.6	4.8E-14	4.3	3.1E-13	3.6	2.2E-10	2.5	2.1E-20	2.5	6.8E-10	1.9
1976	1.0E-12	8.5	4.7E-14	4.3	3.1E-13	3.7	2.2E-10	2.6	2.1E-20	2.6	5.3E-10	1.9
1977	1.0E-12	8.5	4.7E-14	4.5	3.1E-13	3.5	2.2E-10	2.7	2.1E-20	2.8	5.3E-10	2.0
1978	1.0E-12	8.7	4.7E-14	4.3	3.1E-13	3.8	2.2E-10	2.7	2.1E-20	2.7	4.9E-10	2.1
1979	1.0E-12	8.7	4.7E-14	4.4	3.1E-13	3.9	2.2E-10	2.4	2.1E-20	2.4	5.7E-10	1.9
1980	1.0E-12	8.9	4.8E-14	4.4	3.1E-13	3.7	2.2E-10	2.5	2.1E-20	2.5	7.5E-10	1.8
1981	1.0E-12	8.5	4.8E-14	4.2	3.1E-13	3.5	2.2E-10	2.6	2.1E-20	2.6	6.4E-10	1.9
1982	1.0E-12	9.5	4.8E-14	4.0	3.2E-13	3.6	2.2E-10	2.6	2.1E-20	2.6	9.3E-10	1.9
1983	1.0E-12	8.9	5.1E-14	4.2	3.4E-13	3.6	2.2E-10	2.6	2.1E-20	2.7	2.2E-09	1.9
1984	1.0E-12	8.4	5.1E-14	4.2	3.4E-13	3.5	2.2E-10	2.6	2.1E-20	2.5	2.2E-09	2.0
1985	1.0E-12	8.6	4.8E-14	4.3	3.1E-13	3.6	2.2E-10	2.6	2.2E-20	2.7	6.7E-10	1.9
1986	1.0E-12	9.1	4.9E-14	3.9	3.2E-13	3.7	2.2E-10	2.5	2.2E-20	2.5	1.1E-09	1.9
1987	1.0E-12	9.3	4.8E-14	4.3	3.2E-13	3.7	2.2E-10	2.5	2.2E-20	2.6	8.1E-10	1.9
1988	1.0E-12	8.8	4.8E-14	4.2	3.2E-13	3.7	2.2E-10	2.6	2.2E-20	2.6	8.2E-10	1.9
1989	1.0E-12	8.6	4.8E-14	4.3	3.1E-13	3.7	2.2E-10	2.6	2.2E-20	2.6	5.5E-10	2.0

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240
Sector 2
(1953 - 1989)

Year	Inhalation GM (Sv/year)	GSD	Soil Ingestion GM (Sv/year)	GSD	Vegetable Ingestion GM (Sv/year)	GSD	Ground Exposure GM (Sv/year)	GSD	Immersion GM (Sv/year)	GSD
1953	1.4E-11	2.2	1.7E-15	3.8	2.2E 13	3.6	2.3E-17	2.6	1.3E-21	2.3
1954	4.6E-10	2.2	5.8E-14	3 8	7.3E-12	3.4	8.0E-16	2.5	4.4E-20	2.2
1955	5.1E-10	2.3	1.3E-13	3 3	8.2E-12	3.3	1.8E-15	2.3	4.9E-20	2.2
1956	1.7E-09	2.3	3.7E-13	3 4	2.7E-11	3.3	5.0E-15	2.2	1.6E-19	2.2
1957	1.1E-07	2.3	1.3E-11	3.5	1.7E-09	3.3	1.8E-13	2.5	1.0E-17	2.2
1958	2.2E-08	2.2	1.7E-11	3.4	3.5E-10	3.3	2.4E-13	2.3	2.1E-18	2.2
1959	9.3E-09	2.2	1.9E-11	3.6	1.5E-10	3.2	2.6E-13	2.2	9.0E-19	2.3
1960	9.3E-09	2.2	2.1E-11	3.4	1.5E-10	3.3	2.8E-13	2.2	9.0E-19	2.2
1961	1.1E-08	2.2	2.2E-11	3.2	1.7E-10	3.2	3.1E-13	2.2	1.0E-18	2.3
1962	2.2E-08	2.3	2.6E-11	3.3	3.5E-10	3.3	3.5E-13	2.1	2.1E-18	2.2
1963	2.6E-08	2.2	3.0E-11	3.3	4.2E-10	3.4	4.1E-13	2.0	2.5E-18	2.2
1964	2.0E-08	2.2	3.3E-11	3.4	3.2E-10	3.4	4.6E-13	2.0	1.9E-18	2.2
1965	4.6E-08	2.2	4.1E-11	3.2	7.4E-10	3.3	5.5E-13	2.1	4.4E-18	2.2
1966	2.2E-09	2.2	4.1E-11	3.3	4.0E-11	3.1	5.6E-13	2.1	2.2E-19	2.2
1967	2.8E-09	2.2	4.1E-11	3.2	5.0E-11	3.2	5.6E-13	2.1	2.8E-19	2.2
1968	3.5E-09	2.2	4.2E-11	3.2	6.0E-11	3.2	5.7E-13	2.0	3.3E-19	2.3
1969	9.3E-09	2.2	4.3E-11	3.1	1.5E-10	3.2	5.9E-13	2.0	9.0E-19	2.3
1970	2.6E-09	2.2	4.4E-11	3.3	4.7E-11	3.2	6.0E-13	2.0	2.6E-19	2.2
1971	5.2E-10	2.2	4.4E-11	3.2	1.1E-11	3.1	6.0E-13	2.0	5.1E-20	2.2
1972	4.3E-10	2.2	4.4E-11	3.4	9.6E-12	3.3	6.0E-13	2.0	4.2E-20	2.2
1973	4.4E-10	2.2	4.4E-11	3.2	9.7E-12	3.2	6.0E-13	2.0	4.2E-20	2.2
1974	8.0E-09	2.2	4.5E-11	3.1	1.3E-10	3.3	6.2E-13	2.0	7.7E-19	2.3
1975	8.6E-11	2.2	4.5E-11	3.2	3.0E-12	3.3	6.2E-13	2.0	8.3E-21	2.2
1976	3.4E-11	2.2	4.5E-11	3.2	1.9E-12	3.8	6.2E-13	2.1	3.3E-21	2.3
1977	3.4E-11	2.2	4.5E-11	3.4	1.9E-12	3.9	6.2E-13	2.0	3.3E-21	2.2
1978	2.4E-11	2.2	4.5E-11	3.1	1.6E-12	4.1	6.2E-13	2.0	2.3E-21	2.3
1979	4.8E-11	2.2	4.5E-11	3.2	2.2E-12	3.9	6.2E-13	2.0	4.6E-21	2.2
1980	1.1E-10	2.2	4.5E-11	3.2	3.5E-12	3.4	6.2E-13	2.0	1.0E-20	2.2
1981	7.3E-11	2.2	4.5E-11	3.3	2.7E-12	3.6	6.2E-13	2.0	7.1E-21	2.3
1982	1.7E-10	2.2	4.5E-11	3.1	4.8E-12	3.4	6.2E-13	2.0	1.7E-20	2.3
1983	6.6E-10	2.2	4.6E-11	3.3	1.4E-11	3.3	6.2E-13	2.0	6.4E-20	2.2
1984	6.6E-10	2.2	4.6E-11	3.4	1.4E-11	3.1	6.2E-13	2.0	6.4E-20	2.2
1985	7.9E-11	2.2	4.6E-11	3.4	3.0E-12	3.6	6.3E-13	2.0	7.7E-21	2.3
1986	2.5E-10	2.2	4.6E-11	3 2	6.5E-12	3.2	6.3E-13	2.0	2.4E-20	2.2
1987	1.3E-10	2.2	4.6E-11	3.2	4.1E-12	3.5	6 3E-13	2.0	1.3E-20	2.2
1988	1.3E-10	2.2	4.6E-11	3.2	4.2E-12	3.3	6.3E-13	2.1	1.3E-20	2.2
1989	3.9E-11	2.2	4.6E-11	3.2	2.0E-12	3.9	6.3E-13	1.9	3.8E-21	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240 (continued)
Sector 2
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	1.6E-17	9.3	1.6E-17	5.2	1.1E-16	4.1	3.5E-15	3.0	3.4E-25	3.1	1.4E-11	2.2
1954	5.5E-16	8.9	5.3E-16	4.8	3.8E-15	4.0	1.2E-13	2.9	1.2E-23	3.0	4.7E-10	2.2
1955	1.3E-15	9.6	6.4E-16	4.5	4.6E-15	3.7	2.8E-13	2.7	2.7E-23	2.8	5.2E-10	2.2
1956	3.4E-15	8.5	2.0E-15	4.8	1.4E-14	4.2	7.6E-13	2.7	7.4E-23	2.7	1.7E-09	2.2
1957	1.3E-13	9.5	1.2E-13	4.8	8.7E-13	4.0	2.8E-11	3.0	2.7E-21	3.0	1.1E-07	2.3
1958	1.6E-13	10.1	3.5E-14	4.4	2.5E-13	3.7	3.6E-11	2.6	3.5E-21	2.7	2.3E-08	2.2
1959	1.8E-13	9.4	2.2E-14	4.1	1.5E-13	3.7	3.9E-11	2.7	3.8E-21	2.7	9.6E-09	2.2
1960	1.9E-13	9.0	2.2E-14	4.3	1.6E-13	3.4	4.2E-11	2.8	4.1E-21	2.7	9.7E-09	2.2
1961	2.1E-13	8.7	2.5E-14	4.3	1.8E-13	3.5	4.6E-11	2.7	4.5E-21	2.7	1.1E-08	2.2
1962	2.4E-13	8.6	4.0E-14	4.2	2.8E-13	3.5	5.3E-11	2.7	5.2E-21	2.7	2.3E-08	2.2
1963	2.8E-13	8.4	4.7E-14	4.0	3.3E-13	3.6	6.2E-11	2.7	6.0E-21	2.6	2.7E-08	2.2
1964	3.1E-13	8.5	4.2E-14	4.3	3.0E-13	3.4	6.9E-11	2.6	6.7E-21	2.6	2.1E-08	2.2
1965	3.8E-13	9.1	7.5E-14	4.7	5.3E-13	3.5	8.4E-11	2.5	8.1E-21	2.4	4.7E-08	2.2
1966	3.8E-13	8.8	2.2E-14	4.0	1.5E-13	3.3	8.4E-11	2.6	8.2E-21	2.6	2.5E-09	2.1
1967	3.8E-13	8.3	2.4E-14	4.2	1.6E-13	3.4	8.5E-11	2.6	8.3E-21	2.6	3.2E-09	2.1
1968	3.9E-13	8.9	2.5E-14	4.1	1.7E-13	3.4	8.7E-11	2.6	8.4E-21	2.5	3.8E-09	2.1
1969	4.1E-13	8.5	3.4E-14	4.0	2.4E-13	3.3	9.0E-11	2.5	8.7E-21	2.5	9.8E-09	2.2
1970	4.1E-13	9.2	2.4E-14	4.0	1.6E-13	3.4	9.0E-11	2.5	8.7E-21	2.5	3.0E-09	2.1
1971	4.1E-13	9.0	2.0E-14	4.1	1.4E-13	3.6	9.1E-11	2.6	8.8E-21	2.7	7.7E-10	1.9
1972	4.1E-13	8.9	2.0E-14	4.2	1.4E-13	3.6	9.1E-11	2.6	8.8E-21	2.5	6.7E-10	1.9
1973	4.1E-13	8.5	2.0E-14	4.1	1.4E-13	3.6	9.1E-11	2.6	8.8E-21	2.5	6.8E-10	1.9
1974	4.2E-13	8.3	3.3E-14	3.8	2.2E-13	3.5	9.4E-11	2.5	9.1E-21	2.6	8.4E-09	2.1
1975	4.2E-13	9.3	2.0E-14	4.1	1.3E-13	3.5	9.4E-11	2.6	9.1E-21	2.6	2.9E-10	1.9
1976	4.2E-13	9.1	2.0E-14	4.0	1.3E-13	4.0	9.4E-11	2.6	9.1E-21	2.5	2.2E-10	2.0
1977	4.2E-13	8.7	2.0E-14	4.2	1.3E-13	3.6	9.4E-11	2.4	9.1E-21	2.4	2.2E-10	1.9
1978	4.2E-13	8.8	2.0E-14	4.1	1.3E-13	3.6	9.4E-11	2.4	9.1E-21	2.5	2.1E-10	2.0
1979	4.2E-13	8.4	2.0E-14	4.1	1.3E-13	3.7	9.4E-11	2.4	9.1E-21	2.4	2.4E-10	1.9
1980	4.2E-13	8.6	2.0E-14	4.2	1.3E-13	3.8	9.4E-11	2.6	9.1E-21	2.5	3.1E-10	1.9
1981	4.2E-13	8.3	2.0E-14	4.4	1.3E-13	3.6	9.4E-11	2.5	9.1E-21	2.6	2.7E-10	1.9
1982	4.2E-13	8.9	2.0E-14	4.1	1.3E-13	3.6	9.4E-11	2.5	9.1E-21	2.5	4.0E-10	1.8
1983	4.2E-13	8.3	2.2E-14	4.1	1.4E-13	3.6	9.4E-11	2.5	9.1E-21	2.5	9.3E-10	1.9
1984	4.3E-13	8.6	2.2E-14	4.0	1.4E-13	3.4	9.4E-11	2.6	9.2E-21	2.6	9.3E-10	2.0
1985	4.3E-13	8.9	2.0E-14	4.1	1.3E-13	3 6	9.4E-11	2.5	9.1E-21	2.5	2.8E-10	1 9
1986	4.3E-13	9.1	2.1E-14	3.9	1.4E-13	3.4	9.4E-11	2.5	9.1E-21	2.5	4.8E-10	1.8
1987	4.3E-13	9.1	2.0E-14	4.0	1.3E-13	3.5	9.4E-11	2.6	9.1E-21	2.5	3.5E-10	1.9
1988	4.3E-13	9.4	2.0E-14	4.1	1.3E-13	3.5	9.5E-11	2.4	9.2E-21	2.5	3.5E-10	1.8
1989	4.3E-13	8.4	2.0E-14	4.1	1.3E-13	3.7	9.4E-11	2.6	9.1E-21	2.7	2.3E-10	2.0

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240
Sector 3
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	1.2E-11	2.3	1 5E-15	3.8	2.0E-13	3 2	2.1E-17	2.6	1.2E-21	2.2
1954	4.1E-10	2.2	5.3E-14	3.6	6 6E-12	3 3	7.3E-16	2.4	4.0E-20	2.3
1955	4.6E-10	2.3	1.2E-13	3.5	7.4E-12	3.3	1.7E-15	2.3	4.4E-20	2.2
1956	1.5E-09	2.2	3.3E-13	3.4	2.4E-11	3.3	4.5E-15	2.3	1.4E-19	2.2
1957	9.5E-08	2.2	1.2E-11	4.0	1 5E-09	3.3	1.7E-13	2.5	9.2E-18	2.3
1958	2.0E-08	2 2	1.5E-11	3.7	3.2E-10	3.3	2.1E-13	2.4	1.9E-18	2.2
1959	8.4E-09	2.2	1.7E-11	3.6	1.4E-10	3 3	2.3E-13	2.3	8.1E-19	2.2
1960	8.4E-09	2.2	1.8E-11	3.4	1.4E-10	3.3	2.5E-13	2.3	8.1E-19	2.3
1961	9.5E-09	2.3	2.0E-11	3.5	1.6E-10	3.4	2.7E-13	2.3	9.2E-19	2.2
1962	2.0E-08	2.3	2.3E-11	3.5	3.2E-10	3.4	3.2E-13	2.2	1.9E-18	2.2
1963	2.3E-08	2.2	2.7E-11	3.4	3.8E-10	3.3	3.7E-13	2.1	2.3E-18	2.2
1964	1.8E-08	2.2	3.0E-11	3.2	2.9E-10	3.2	4.1E-13	2.1	1.7E-18	2.2
1965	4.1E-08	2.2	3.7E-11	3.3	6.7E-10	3.4	5.0E-13	2.0	4.0E-18	2.2
1966	2.0E-09	2.3	3.7E-11	3.2	3.6E-11	3.3	5.0E-13	2.1	2.0E-19	2.3
1967	2.6E-09	2.2	3.7E-11	3.3	4.4E-11	3.0	5.1E-13	2.1	2.5E-19	2.2
1968	3.1E-09	2.2	3.8E-11	3.2	5.4E-11	3 1	5.2E-13	2.1	3.0E-19	2.2
1969	8.3E-09	2.3	3.9E-11	3.2	1.4E-10	3.2	5.3E-13	2.1	8.1E-19	2.3
1970	2.4E-09	2.2	4.0E-11	3.3	4.2E-11	3.0	5.4E-13	2.0	2.3E-19	2.1
1971	4.7E-10	2.2	3.9E-11	3.2	1.0E-11	3.3	5.4E-13	2.1	4.6E-20	2.2
1972	3.9E-10	2.2	4.0E-11	3.3	8.5E-12	3.1	5.4E-13	2.1	3.7E-20	2.3
1973	3.9E-10	2.2	4.0E-11	3.3	8.8E-12	3.0	5.4E-13	2.0	3.8E-20	2.2
1974	7.2E-09	2.2	4.1E-11	3.1	1.2E-10	3.2	5.6E-13	2.0	6.9E-19	2.3
1975	7.7E-11	2.2	4.1E-11	3.4	2.8E-12	3.7	5.6E-13	2.0	7.5E-21	2.2
1976	3.1E-11	2.2	4.1E-11	3.3	1.7E-12	4.1	5.6E-13	2.0	3.0E-21	2.2
1977	3.1E-11	2.2	4.1E-11	3.3	1.7E-12	4.0	5.6E-13	2.0	3.0E-21	2.2
1978	2.1E-11	2.2	4.1E-11	3.3	1.4E-12	4.4	5.6E-13	2.0	2.1E-21	2.2
1979	4.3E-11	2.3	4.1E-11	3.2	2.0E-12	3.8	5.6E-13	2.1	4.2E-21	2.2
1980	9.5E-11	2.2	4.1E-11	3.2	3.1E-12	3.3	5.6E-13	2.1	9.2E-21	2.3
1981	6.6E-11	2.2	4.1E-11	3.4	2.6E-12	3.7	5.6E-13	2.0	6.3E-21	2.2
1982	1.5E-10	2.2	4.1E-11	3.5	4.4E-12	3.2	5.6E-13	2.1	1.5E-20	2.3
1983	6.0E-10	2.2	4.1E-11	3.6	1.2E-11	3.2	5.6E-13	2.0	5.8E-20	2.3
1984	6.0E-10	2.3	4.1E-11	3.2	1.2E-11	3.0	5.6E-13	2.1	5.8E-20	2.2
1985	7.2E-11	2.3	4.1E-11	3.3	2 7E-12	3.7	5.6E-13	2.0	6.9E-21	2.2
1986	2.3E-10	2.2	4.1E-11	3.4	5 7E-12	3.2	5.6E-13	2.0	2.2E-20	2.3
1987	1.2E-10	2.3	4 1E-11	3.4	3.8E-12	3.4	5.6E-13	2.0	1.2E-20	2.2
1988	1.2E-10	2.2	4.1E-11	3.1	3.6E-12	3.4	5.6E-13	2.0	1.2E-20	2.2
1989	3.5E-11	2.2	4.1E-11	3.2	1.8E-12	3.9	5.7E-13	2.0	3.4E-21	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240 (continued)
Sector 3
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	1.4E-17	8.7	1.4E-17	4.6	1.0E-16	4.1	3.2E-15	3.2	3.1E-25	3.3	1.3E-11	2.3
1954	5.0E-16	9.8	4.7E-16	4.9	3.4E-15	4.1	1.1E-13	2.9	1.1E-23	3.0	4.2E-10	2.2
1955	1.2E-15	9.1	5.8E-16	4.3	4.2E-15	3.9	2.5E-13	2.7	2.5E-23	2.8	4.7E-10	2.2
1956	3.1E-15	9.5	1.8E-15	4.9	1.3E-14	4.1	6.8E-13	2.8	6.6E-23	2.8	1.5E-09	2.2
1957	1.1E-13	9.7	1.1E-13	5.0	7.9E-13	4.1	2.5E-11	3.4	2.4E-21	3.3	9.8E-08	2.2
1958	1.4E-13	9.6	3.2E-14	4.0	2.3E-13	3.5	3.2E-11	2.9	3.1E-21	2.9	2.0E-08	2.2
1959	1.6E-13	9.5	1.9E-14	4.5	1.4E-13	3.6	3.5E-11	2.7	3.4E-21	2.8	8.7E-09	2.2
1960	1.7E-13	9.2	2.0E-14	4.5	1.4E-13	3.7	3.8E-11	2.8	3.7E-21	2.8	8.7E-09	2.2
1961	1.9E-13	8.8	2.3E-14	4.2	1.6E-13	3.5	4.1E-11	2.6	4.0E-21	2.6	9.9E-09	2.2
1962	2.2E-13	9.0	3.6E-14	4.1	2.5E-13	3.6	4.8E-11	2.6	4.6E-21	2.7	2.0E-08	2.2
1963	2.5E-13	8.4	4.2E-14	4.2	3.0E-13	3.7	5.6E-11	2.8	5.4E-21	2.8	2.4E-08	2.2
1964	2.8E-13	9.2	3.8E-14	4.1	2.7E-13	3.5	6.2E-11	2.6	6.0E-21	2.5	1.9E-08	2.2
1965	3.4E-13	8.7	6.8E-14	4.4	4.8E-13	3.6	7.5E-11	2.6	7.3E-21	2.6	4.3E-08	2.2
1966	3.4E-13	8.9	2.0E-14	4.0	1.4E-13	3.6	7.6E-11	2.5	7.4E-21	2.6	2.3E-09	2.1
1967	3.5E-13	8.2	2.1E-14	4.1	1.4E-13	3.5	7.7E-11	2.5	7.5E-21	2.5	2.9E-09	2.1
1968	3.5E-13	8.5	2.2E-14	4.0	1.5E-13	3.3	7.8E-11	2.7	7.6E-21	2.7	3.4E-09	2.1
1969	3.6E-13	8.8	3.1E-14	4.3	2.1E-13	3.3	8.1E-11	2.6	7.8E-21	2.6	8.8E-09	2.2
1970	3.7E-13	8.9	2.2E-14	4.0	1.5E-13	3.5	8.2E-11	2.5	7.9E-21	2.6	2.7E-09	2.1
1971	3.7E-13	8.2	1.9E-14	4.2	1.2E-13	3.6	8.2E-11	2.4	7.9E-21	2.4	6.9E-10	1.9
1972	3.7E-13	8.6	1.8E-14	4.2	1.2E-13	3.5	8.2E-11	2.6	7.9E-21	2.6	6.1E-10	1.9
1973	3.7E-13	8.8	1.8E-14	3.9	1.2E-13	3.6	8.2E-11	2.6	7.9E-21	2.7	6.2E-10	1.9
1974	3.8E-13	8.8	3.0E-14	4.1	2.1E-13	3.6	8.4E-11	2.5	8.2E-21	2.5	7.6E-09	2.1
1975	3.8E-13	9.1	1.8E-14	4.0	1.2E-13	3.5	8.5E-11	2.6	8.2E-21	2.6	2.7E-10	1.9
1976	3.8E-13	9.1	1.8E-14	4.2	1.2E-13	3.8	8.4E-11	2.6	8.2E-21	2.5	2.0E-10	2.0
1977	3.8E-13	8.7	1.8E-14	4.4	1.2E-13	3.7	8.4E-11	2.6	8.2E-21	2.6	2.0E-10	2.0
1978	3.8E-13	8.6	1.8E-14	4.1	1.2E-13	3.6	8.4E-11	2.7	8.2E-21	2.6	1.9E-10	2.0
1979	3.8E-13	8.6	1.8E-14	4.3	1.2E-13	3.7	8.4E-11	2.6	8.2E-21	2.6	2.2E-10	1.9
1980	3.8E-13	8.5	1.8E-14	4.0	1.2E-13	3.7	8.4E-11	2.6	8.2E-21	2.6	2.8E-10	1.9
1981	3.8E-13	9.2	1.8E-14	4.1	1.2E-13	3.6	8.5E-11	2.6	8.2E-21	2.7	2.5E-10	1.9
1982	3.8E-13	9.2	1.8E-14	4.0	1.2E-13	3.8	8.5E-11	2.6	8.2E-21	2.5	3.6E-10	1.9
1983	3.8E-13	9.2	1.9E-14	4.2	1.3E-13	3.5	8.5E-11	2.6	8.2E-21	2.6	8.4E-10	2.0
1984	3.9E-13	8.7	1.9E-14	4.5	1.3E-13	3.5	8.5E-11	2.6	8.2E-21	2.6	8.4E-10	2.0
1985	3.8E-13	8.8	1.8E-14	4.1	1.2E-13	3.5	8.5E-11	2.6	8.2E-21	2.6	2.6E-10	1.9
1986	3.9E-13	8.9	1.9E-14	4.0	1.2E-13	3.6	8.5E-11	2.6	8.2E-21	2.6	4.4E-10	1.9
1987	3.8E-13	9.1	1.8E-14	4.1	1.2E-13	3.8	8.5E-11	2.6	8.3E-21	2.6	3.2E-10	1.9
1988	3.8E-13	8.7	1.8E-14	4.1	1.2E-13	3.4	8.5E-11	2.5	8.3E-21	2.5	3.1E-10	1.8
1989	3.9E-13	8.3	1.8E-14	4.1	1.2E-13	3.5	8.5E-11	2.5	8.2E-21	2.5	2.1E-10	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240
Sector 4
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	4.1E-11	2.2	5.0E-15	3.6	6.6E 13	3.3	6.8E-17	2.7	3.9E-21	2.2
1954	1.3E-09	2.2	1.7E-13	3.5	2 2E-11	3.3	2.3E-15	2.4	1.3E-19	2.3
1955	1.5E-09	2.2	4.0E-13	3.4	2 4E-11	3.5	5.4E-15	2.2	1.5E-19	2.2
1956	4.9E-09	2.3	1.1E-12	3.5	7.8E-11	3.4	1.5E-14	2.2	4.7E-19	2.2
1957	3.1E-07	2.2	4.0E-11	3.9	5.0E-09	3.2	5.4E-13	2.6	3.0E-17	2.2
1958	6.4E-08	2.2	5.1E-11	3.5	1.0E-09	3.3	7.0E-13	2.4	6.2E-18	2.2
1959	2.7E-08	2.3	5.6E-11	3.6	4.5E-10	3.4	7.6E-13	2.3	2.6E-18	2.2
1960	2.7E-08	2.2	6.0E-11	3.3	4.5E-10	3.3	8.3E-13	2.3	2.6E-18	2.3
1961	3.1E-08	2.2	6.6E-11	3.6	5.1E-10	3.3	9.0E-13	2.2	3.0E-18	2.3
1962	6.4E-08	2.2	7.6E-11	3.5	1.0E-09	3.3	1.0E-12	2.1	6.2E-18	2.2
1963	7.6E-08	2.3	8.9E-11	3.6	1.2E-09	3.2	1.2E-12	2.1	7.3E-18	2.3
1964	5.8E-08	2.2	9.8E-11	3.4	9.5E-10	3.3	1.3E-12	2.1	5.6E-18	2.2
1965	1.3E-07	2.3	1.2E-10	3.3	2.2E-09	3.4	1.6E-12	2.1	1.3E-17	2.3
1966	6.6E-09	2.2	1.2E-10	3.3	1.2E-10	3.3	1.6E-12	2.1	6.4E-19	2.2
1967	8.3E-09	2.2	1.2E-10	3.3	1.5E-10	3.3	1.7E-12	2.0	8.1E-19	2.2
1968	1.0E-08	2.1	1.2E-10	3.3	1.8E-10	3.3	1.7E-12	2.1	9.8E-19	2.2
1969	2.7E-08	2.2	1.3E-10	3.3	4.5E-10	3.3	1.7E-12	2.1	2.6E-18	2.3
1970	7.7E-09	2.2	1.3E-10	3.3	1.4E-10	3.1	1.8E-12	2.1	7.5E-19	2.2
1971	1.5E-09	2.2	1.3E-10	3.2	3.3E-11	3.2	1.8E-12	2.0	1.5E-19	2.2
1972	1.3E-09	2.2	1.3E-10	3.2	2.8E-11	3.2	1.8E-12	2.0	1.2E-19	2.2
1973	1.3E-09	2.2	1.3E-10	3.3	2.9E-11	3.2	1.8E-12	2.1	1.2E-19	2.2
1974	2.3E-08	2.2	1.3E-10	3.3	3.9E-10	3.2	1.8E-12	2.1	2.3E-18	2.2
1975	2.5E-10	2.3	1.3E-10	3.4	9.1E-12	3.4	1.8E-12	2.1	2.4E-20	2.3
1976	1.0E-10	2.2	1.3E-10	3.3	5.5E-12	4.1	1.8E-12	2.1	9.8E-21	2.2
1977	1.0E-10	2.3	1.3E-10	3.2	5.4E-12	3.9	1.8E-12	2.0	9.8E-21	2.2
1978	7.0E-11	2.2	1.3E-10	3.2	4.6E-12	4.4	1.8E-12	2.1	6.8E-21	2.1
1979	1.4E-10	2.2	1.3E-10	3.3	6.3E-12	3.9	1.8E-12	2.0	1.4E-20	2.2
1980	3.1E-10	2.3	1.3E-10	3.2	1.1E-11	3.5	1.8E-12	2.0	3.0E-20	2.3
1981	2.1E-10	2.2	1.3E-10	3.1	8.3E-12	3.9	1.8E-12	2.1	2.1E-20	2.3
1982	5.0E-10	2.2	1.3E-10	3.4	1.4E-11	3.4	1.8E-12	2.1	4.9E-20	2.3
1983	1.9E-09	2.2	1.3E-10	3.3	4.0E-11	3.1	1.8E-12	2.0	1.9E-19	2.2
1984	1.9E-09	2.3	1.3E-10	3.2	4.0E-11	3.1	1.8E-12	2.0	1.9E-19	2.3
1985	2.3E-10	2.2	1.3E-10	3.3	8.6E-12	3.4	1.8E-12	2.1	2.3E-20	2.2
1986	7.4E-10	2.3	1.3E-10	3.3	1.9E-11	3 2	1.8E-12	2.0	7.1E-20	2.3
1987	3.9E-10	2.2	1.3E-10	3.2	1.2E-11	3.3	1.8E-12	2.1	3.8E-20	2.3
1988	3.9E-10	2.2	1.3E-10	3.3	1.2E-11	3.4	1.8E-12	2.0	3.7E-20	2.3
1989	1.1E-10	2.2	1.3E-10	3.3	5.8E-12	4.3	1.8E-12	2.0	1.1E-20	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240 (continued)
Sector 4
(1953 - 1989)

Year	Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	4.7E-17	9.6	4.6E-17	4.5	3.4E-16	4.2	1.0E-14	3.2	1.0E-24	3.2	4.2E-11	2.2
1954	1.6E-15	8.9	1.5E-15	5.2	1.1E-14	4.0	3.5E-13	2.9	3.4E-23	2.9	1.4E-09	2.2
1955	3.7E-15	8.9	1.9E-15	4.7	1.3E-14	4.1	8.2E-13	2.8	7.9E-23	2.8	1.5E-09	2.2
1956	1.0E-14	9.0	5.9E-15	5.3	4.2E-14	4.0	2.2E-12	2.8	2.2E-22	2.9	5.0E-09	2.3
1957	3.7E-13	10.2	3.5E-13	5.1	2.6E-12	4.2	8.2E-11	3.1	7.9E-21	3.1	3.2E-07	2.2
1958	4.7E-13	9.1	1.1E-13	4.4	7.5E-13	3.8	1.0E-10	2.8	1.0E-20	2.9	6.6E-08	2.2
1959	5.2E-13	9.0	6.4E-14	4.4	4.5E-13	3.5	1.2E-10	2.8	1.1E-20	2.9	2.8E-08	2.2
1960	5.6E-13	9.4	6.6E-14	4.0	4.6E-13	3.5	1.2E-10	2.8	1.2E-20	2.7	2.8E-08	2.2
1961	6.1E-13	9.4	7.4E-14	4.1	5.1E-13	3.6	1.4E-10	2.7	1.3E-20	2.7	3.2E-08	2.1
1962	7.1E-13	8.9	1.2E-13	4.1	8.1E-13	3.6	1.6E-10	2.7	1.5E-20	2.7	6.6E-08	2.2
1963	8.3E-13	8.9	1.4E-13	4.4	1.0E-12	3.4	1.8E-10	2.7	1.8E-20	2.7	7.8E-08	2.2
1964	9.2E-13	9.1	1.2E-13	4.2	8.6E-13	3.4	2.0E-10	2.6	2.0E-20	2.6	6.0E-08	2.2
1965	1.1E-12	8.7	2.2E-13	4.4	1.6E-12	3.7	2.5E-10	2.5	2.4E-20	2.5	1.4E-07	2.3
1966	1.1E-12	8.9	6.5E-14	3.9	4.4E-13	3.7	2.5E-10	2.6	2.4E-20	2.6	7.5E-09	2.1
1967	1.1E-12	8.9	7.0E-14	3.9	4.7E-13	3.4	2.5E-10	2.6	2.4E-20	2.6	9.3E-09	2.1
1968	1.1E-12	8.8	7.4E-14	3.6	5.0E-13	3.5	2.5E-10	2.5	2.5E-20	2.6	1.1E-08	2.0
1969	1.2E-12	8.6	1.0E-13	4.0	6.9E-13	3.4	2.6E-10	2.6	2.5E-20	2.6	2.9E-08	2.2
1970	1.2E-12	9.0	7.2E-14	3.9	4.8E-13	3.5	2.7E-10	2.5	2.6E-20	2.5	8.7E-09	2.1
1971	1.2E-12	8.5	6.0E-14	4.5	4.0E-13	3.5	2.7E-10	2.6	2.6E-20	2.6	2.3E-09	1.9
1972	1.2E-12	8.3	6.0E-14	4.0	4.0E-13	3.7	2.7E-10	2.6	2.6E-20	2.6	2.0E-09	1.9
1973	1.2E-12	8.8	6.0E-14	4.3	4.0E-13	3.6	2.7E-10	2.5	2.6E-20	2.5	2.0E-09	1.9
1974	1.2E-12	8.7	9.8E-14	3.9	6.7E-13	3.4	2.8E-10	2.5	2.7E-20	2.5	2.5E-08	2.2
1975	1.2E-12	9.1	5.9E-14	4.4	3.9E-13	3.7	2.8E-10	2.6	2.7E-20	2.7	8.6E-10	1.9
1976	1.2E-12	9.1	5.9E-14	4.3	3.9E-13	3.6	2.8E-10	2.6	2.7E-20	2.5	6.5E-10	2.0
1977	1.2E-12	8.3	5.9E-14	4.2	3.9E-13	3.7	2.8E-10	2.5	2.7E-20	2.5	6.5E-10	1.9
1978	1.2E-12	8.8	5.9E-14	4.2	3.9E-13	3.6	2.8E-10	2.5	2.7E-20	2.6	6.1E-10	2.0
1979	1.2E-12	8.4	5.9E-14	4.2	3.9E-13	3.7	2.8E-10	2.6	2.7E-20	2.7	7.1E-10	2.0
1980	1.3E-12	9.4	5.9E-14	4.1	3.9E-13	3.8	2.8E-10	2.6	2.7E-20	2.6	9.2E-10	1.9
1981	1.2E-12	9.5	5.9E-14	4.2	3.9E-13	3.7	2.8E-10	2.6	2.7E-20	2.6	8.1E-10	1.9
1982	1.3E-12	9.0	6.0E-14	4.3	4.0E-13	3.4	2.8E-10	2.6	2.7E-20	2.7	1.2E-09	1.9
1983	1.3E-12	8.1	6.3E-14	4.0	4.2E-13	3.6	2.8E-10	2.7	2.7E-20	2.7	2.7E-09	2.0
1984	1.3E-12	8.8	6.4E-14	3.9	4.2E-13	3.4	2.8E-10	2.5	2.7E-20	2.4	2.8E-09	2.0
1985	1.3E-12	8.2	5.9E-14	3.9	3.9E-13	3.8	2.8E-10	2.5	2.7E-20	2.6	8.3E-10	1.9
1986	1.3E-12	9.0	6.1E-14	4.5	4.0E-13	3.7	2.8E-10	2.6	2.7E-20	2.5	1.4E-09	1.9
1987	1.3E-12	8.3	6.0E-14	4.0	4.0E-13	3.8	2.8E-10	2.6	2.7E-20	2.5	1.0E-09	1.8
1988	1.3E-12	9.1	6.0E-14	4.1	4.0E-13	3.7	2.8E-10	2.5	2.7E-20	2.6	1.0E-09	1.8
1989	1.3E-12	8.7	5.9E-14	4.4	3.9E-13	3.6	2.8E-10	2.5	2.7E-20	2.5	6.7E-10	2.0

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240
Sector 5
(1953 - 1989)

Year	Inhalation GM (Sv/year)	GSD	Soil Ingestion GM (Sv/year)	GSD	Vegetable Ingestion GM (Sv/year)	GSD	Ground Exposure GM (Sv/year)	GSD	Immersion GM (Sv/year)	GSD
1953	1.8E-11	2.2	2.2E-15	4.1	2.8E-13	3.1	3.0E-17	2.7	1.7E-21	2.2
1954	5.8E-10	2.2	7.5E-14	3.8	9.3E-12	3.4	1.0E-15	2.5	5.6E-20	2.3
1955	6.5E-10	2.2	1.7E-13	3.5	1.0E-11	3.3	2.3E-15	2.4	6.3E-20	2.3
1956	2.1E-09	2.3	4.7E-13	3.4	3.4E-11	3.3	6.4E-15	2.2	2.0E-19	2.2
1957	1.3E-07	2.2	1.7E-11	3.9	2.2E-09	3.2	2.4E-13	2.5	1.3E-17	2.3
1958	2.8E-08	2.2	2.2E-11	3.6	4.5E-10	3.3	3.0E-13	2.4	2.7E-18	2.2
1959	1.2E-08	2.3	2.4E-11	3.3	1.9E-10	3.3	3.3E-13	2.2	1.1E-18	2.3
1960	1.2E-08	2.3	2.6E-11	3.5	1.9E-10	3.2	3.6E-13	2.2	1.1E-18	2.3
1961	1.3E-08	2.2	2.9E-11	3.3	2.2E-10	3.1	3.9E-13	2.2	1.3E-18	2.3
1962	2.8E-08	2.2	3 3E-11	3.5	4.5E-10	3.3	4.5E-13	2.2	2.7E-18	2.2
1963	3.3E-08	2.1	3.8E-11	3.1	5.3E-10	3.5	5.3E-13	2.1	3.2E-18	2.2
1964	2.5E-08	2.3	4.3E-11	3.2	4.1E-10	3.3	5.8E-13	2.1	2.5E-18	2.3
1965	5.8E-08	2.2	5.2E-11	3.3	9.4E-10	3.2	7.1E-13	2.0	5.6E-18	2.2
1966	2.9E-09	2.2	5.2E-11	3.3	5.1E-11	3.3	7.1E-13	2.0	2.8E-19	2.2
1967	3.6E-09	2.2	5.3E-11	3.3	6.3E-11	3.1	7.2E-13	2.0	3.5E-19	2.2
1968	4.4E-09	2.3	5.3E-11	3.4	7.5E-11	3.3	7.3E-13	2.1	4.2E-19	2.2
1969	1.2E-08	2.2	5.5E-11	3.0	1.9E-10	3.1	7.6E-13	2.0	1.1E-18	2.2
1970	3.4E-09	2.2	5.6E-11	3.4	5.9E-11	3.3	7.7E-13	2.0	3.3E-19	2.2
1971	6.7E-10	2.2	5.6E-11	3.3	1.4E-11	3.1	7.7E-13	2.0	6.4E-20	2.2
1972	5.5E-10	2.2	5.6E-11	3.1	1.2E-11	3.1	7.7E-13	2.1	5.3E-20	2.3
1973	5.5E-10	2.2	5.6E-11	3.3	1.2E-11	3.1	7.7E-13	2.1	5.4E-20	2.2
1974	1.0E-08	2.3	5.8E-11	3.3	1.7E-10	3.2	7.9E-13	2.0	9.8E-19	2.3
1975	1.1E-10	2.2	5.8E-11	3.3	4.0E-12	3.6	7.9E-13	2.0	1.1E-20	2.2
1976	4.4E-11	2.2	5.8E-11	3.4	2.4E-12	4.0	7.9E-13	2.1	4.2E-21	2.1
1977	4.4E-11	2.3	5.8E-11	3.1	2.4E-12	4.2	7.9E-13	2.0	4.2E-21	2.1
1978	3.0E-11	2.2	5.8E-11	3.2	2.0E-12	4.3	7.9E-13	2.0	2.9E-21	2.2
1979	6.1E-11	2.3	5.8E-11	3.4	2.8E-12	3.9	7.9E-13	2.0	5.9E-21	2.3
1980	1.3E-10	2.2	5.8E-11	3.0	4.6E-12	3.4	7.9E-13	2.0	1.3E-20	2.2
1981	9.3E-11	2.3	5.8E-11	3.0	3.7E-12	3.8	7 9E-13	2.0	9.0E-21	2.3
1982	2.2E-10	2.2	5.8E-11	3.3	6.4E-12	3.3	7.9E-13	2.0	2.1E-20	2.2
1983	8.4E-10	2.2	5.8E-11	3.2	1.7E-11	3.1	8.0E-13	2.0	8.1E-20	2.3
1984	8.4E-10	2 2	5.8E-11	3.3	1.7E-11	3.2	8.0E-13	2.0	8.1E-20	2.2
1985	1.0E-10	2.2	5.8E-11	3.3	3.7E-12	3.5	8.0E-13	2.0	9 8E-21	2.2
1986	3.2E-10	2 3	5.8E-11	3.3	8.1E-12	3 3	8.0E-13	2.0	3.1E-20	2.2
1987	1.7E-10	2.2	5.8E-11	3.3	5.1E-12	3.4	8.0E-13	2.0	1.6E-20	2.3
1988	1.7E-10	2.3	5.8E-11	3.2	5.0E-12	3.4	8.0E-13	2.0	1.6E-20	2.2
1989	5.0E-11	2.2	5.8E-11	3.4	2.5E-12	4.1	8.0E-13	2.0	4.8E-21	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240 (continued)
Sector 5
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	2.0E-17	10.3	2.0E-17	4.5	1.4E-16	4.0	4.5E-15	3.2	4.3E-25	3.1	1.8E-11	2.2
1954	7.0E-16	9.8	6.6E-16	4.5	4.7E-15	4.0	1.5E-13	3.1	1.5E-23	3.0	5.9E-10	2.2
1955	1.6E-15	9.0	8.0E-16	4.7	5.8E-15	3.8	3.5E-13	2.9	3.4E-23	2.8	6.7E-10	2.2
1956	4.3E-15	9.0	2.5E-15	4.6	1.8E-14	4.0	9.6E-13	2.8	9.3E-23	2.8	2.2E-09	2.2
1957	1.6E-13	8.5	1.5E-13	4.7	1.1E-12	4.1	3.6E-11	3.0	3.4E-21	3.1	1.4E-07	2.2
1958	2.1E-13	9.4	4.4E-14	4.2	3.2E-13	3.6	4.5E-11	2.8	4.4E-21	2.8	2.9E-08	2.2
1959	2.2E-13	9.4	2.8E-14	4.4	2.0E-13	3.5	5.0E-11	2.8	4.8E-21	2.8	1.2E-08	2.3
1960	2.4E-13	8.7	2.8E-14	4.0	2.0E-13	3.6	5.4E-11	2.9	5.2E-21	2.7	1.2E-08	2.2
1961	2.7E-13	9.0	3.2E-14	4.4	2.2E-13	3.7	5.9E-11	2.7	5.7E-21	2.7	1.4E-08	2.2
1962	3.1E-13	9.2	5.2E-14	4.4	3.7E-13	3.6	6.8E-11	2.7	6.6E-21	2.6	2.9E-08	2.2
1963	3.6E-13	9.4	6.2E-14	4.1	4.3E-13	3.6	7.9E-11	2.6	7.7E-21	2.6	3.4E-08	2.1
1964	4.0E-13	8.7	5.3E-14	4.1	3.7E-13	3.4	8.8E-11	2.6	8.5E-21	2.6	2.6E-08	2.3
1965	4.8E-13	9.7	9.6E-14	4.4	6.8E-13	3.6	1.1E-10	2.6	1.0E-20	2.6	6.0E-08	2.2
1966	4.9E-13	8.6	2.9E-14	4.2	1.9E-13	3.6	1.1E-10	2.6	1.0E-20	2.6	3.3E-09	2.1
1967	4.9E-13	8.5	3.0E-14	4.1	2.0E-13	3.3	1.1E-10	2.5	1.1E-20	2.6	4.0E-09	2.1
1968	5.0E-13	9.0	3.1E-14	3.9	2.1E-13	3.5	1.1E-10	2.5	1.1E-20	2.6	4.8E-09	2.2
1969	5.2E-13	8.5	4.3E-14	4.2	3.0E-13	3.3	1.1E-10	2.5	1.1E-20	2.5	1.2E-08	2.2
1970	5.2E-13	9.3	3.1E-14	4.0	2.1E-13	3.5	1.2E-10	2.5	1.1E-20	2.5	3.8E-09	2.1
1971	5.2E-13	8.2	2.6E-14	4.2	1.7E-13	3.5	1.2E-10	2.6	1.1E-20	2.6	9.9E-10	1.9
1972	5.2E-13	8.8	2.6E-14	4.1	1.7E-13	3.5	1.2E-10	2.5	1.1E-20	2.5	8.5E-10	1.9
1973	5.2E-13	8.1	2.6E-14	4.4	1.7E-13	3.5	1.2E-10	2.5	1.1E-20	2.6	8.6E-10	1.9
1974	5.4E-13	9.0	4.2E-14	4.1	2.9E-13	3.5	1.2E-10	2.6	1.2E-20	2.6	1.1E-08	2.2
1975	5.4E-13	8.9	2.6E-14	3.6	1.7E-13	3.6	1.2E-10	2.5	1.2E-20	2.5	3.7E-10	1.9
1976	5.4E-13	9.2	2.5E-14	4.2	1.7E-13	3.7	1.2E-10	2.7	1.2E-20	2.6	2.9E-10	2.0
1977	5.4E-13	8.9	2.6E-14	4.4	1.7E-13	3.7	1.2E-10	2.5	1.2E-20	2.6	2.8E-10	1.9
1978	5.4E-13	8.9	2.6E-14	4.3	1.7E-13	3.6	1.2E-10	2.6	1.2E-20	2.5	2.7E-10	2.0
1979	5.4E-13	9.0	2.6E-14	4.2	1.7E-13	3.9	1.2E-10	2.5	1.2E-20	2.6	3.1E-10	2.0
1980	5.5E-13	8.9	2.6E-14	4.1	1.7E-13	3.7	1.2E-10	2.7	1.2E-20	2.6	4.0E-10	1.9
1981	5.4E-13	9.0	2.6E-14	4.3	1.7E-13	3.6	1.2E-10	2.6	1.2E-20	2.6	3.5E-10	1.9
1982	5.4E-13	8.7	2.6E-14	4.1	1.7E-13	3.5	1.2E-10	2.4	1.2E-20	2.4	5.0E-10	1.8
1983	5.4E-13	9.2	2.7E-14	4.2	1.8E-13	3.8	1.2E-10	2.5	1.2E-20	2.5	1.2E-09	1.9
1984	5.5E-13	8.6	2.7E-14	3.8	1.8E-13	3.6	1.2E-10	2.5	1.2E-20	2.5	1.2E-09	1.9
1985	5.4E-13	8.2	2.6E-14	4.0	1.7E-13	3.6	1.2E-10	2.5	1.2E-20	2.5	3.6E-10	1.9
1986	5.4E-13	8.6	2.6E-14	4.0	1.7E-13	3.5	1.2E-10	2.7	1.2E-20	2.7	6.2E-10	1.9
1987	5.5E-13	8.2	2.6E-14	4.0	1.7E-13	3.4	1.2E-10	2.7	1.2E-20	2.7	4.5E-10	1.9
1988	5.5E-13	8.2	2.6E-14	4.2	1.7E-13	3.4	1.2E-10	2.5	1.2E-20	2.5	4.4E-10	1.9
1989	5.5E-13	8.7	2.6E-14	4.1	1.7E-13	3.7	1.2E-10	2.6	1.2E-20	2.6	2.9E-10	2.0

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240
Sector 6
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	7.2E-12	2.3	8.9E-16	3.7	1.2E-13	3.6	1.2E-17	2.6	7.0E-22	2.3
1954	2.4E-10	2.2	3.1E-14	3.7	3.8E-12	3.5	4.2E-16	2.5	2.3E-20	2.2
1955	2.7E-10	2.2	7.0E-14	3.5	4.3E-12	3.2	9.6E-16	2.4	2.6E-20	2.2
1956	8.6E-10	2.2	1.9E-13	3.3	1.4E-11	3.4	2.6E-15	2.3	8.3E-20	2.2
1957	5.5E-08	2.2	7.1E-12	3.9	8.9E-10	3.2	9.7E-14	2.5	5.3E-18	2.2
1958	1.1E-08	2.2	9.0E-12	3.4	1.8E-10	3.4	1.2E-13	2.4	1.1E-18	2.2
1959	4.8E-09	2.2	9.8E-12	3.4	7.9E-11	3.4	1.3E-13	2.3	4.7E-19	2.2
1960	4.8E-09	2.2	1.1E-11	3.5	7.9E-11	3.4	1.5E-13	2.3	4.7E-19	2.2
1961	5.5E-09	2.3	1.2E-11	3.6	8.9E-11	3.3	1.6E-13	2.2	5.3E-19	2.3
1962	1.1E-08	2.2	1.3E-11	3.3	1.9E-10	3.5	1.9E-13	2.2	1.1E-18	2.3
1963	1.3E-08	2.2	1.6E-11	3.4	2.2E-10	3.3	2.2E-13	2.1	1.3E-18	2.3
1964	1.0E-08	2.3	1.7E-11	3.3	1.7E-10	3.5	2.4E-13	2.1	1.0E-18	2.2
1965	2.4E-08	2.2	2.1E-11	3.3	3.8E-10	3.2	2.9E-13	2.1	2.3E-18	2.2
1966	1.2E-09	2.2	2.1E-11	3.2	2.1E-11	3.1	2.9E-13	2.0	1.1E-19	2.2
1967	1.5E-09	2.2	2.2E-11	3.2	2.6E-11	3.1	2.9E-13	2.0	1.4E-19	2.2
1968	1.8E-09	2.2	2.2E-11	3.3	3.1E-11	3.1	3.0E-13	2.1	1.7E-19	2.2
1969	4.8E-09	2.2	2.3E-11	3.3	8.0E-11	3.3	3.1E-13	2.0	4.7E-19	2.2
1970	1.4E-09	2.2	2.3E-11	3.1	2.4E-11	3.4	3.1E-13	2.1	1.3E-19	2.2
1971	2.7E-10	2.3	2.3E-11	3.2	5.8E-12	3.0	3.1E-13	2.1	2.6E-20	2.2
1972	2.2E-10	2.2	2.3E-11	3.2	5.0E-12	3.1	3.1E-13	2.0	2.2E-20	2.2
1973	2.3E-10	2.2	2.3E-11	3.3	5.0E-12	3.2	3.1E-13	2.1	2.2E-20	2.2
1974	4.1E-09	2.2	2.4E-11	3.5	6.9E-11	3.2	3.2E-13	2.1	4.0E-19	2.2
1975	4.5E-11	2.2	2.4E-11	3.4	1.6E-12	3.5	3.2E-13	2.0	4.3E-21	2.2
1976	1.8E-11	2.2	2.4E-11	3.3	9.5E-13	4.0	3.2E-13	2.1	1.7E-21	2.3
1977	1.8E-11	2.2	2.4E-11	3.1	9.8E-13	3.7	3.2E-13	2.1	1.7E-21	2.2
1978	1.2E-11	2.2	2.4E-11	3.3	8.0E-13	4.4	3.2E-13	2.1	1.2E-21	2.2
1979	2.5E-11	2.2	2.4E-11	3.4	1.1E-12	4.1	3.2E-13	2.1	2.4E-21	2.2
1980	5.5E-11	2.2	2.4E-11	3.4	1.8E-12	3.6	3.2E-13	2.0	5.3E-21	2.2
1981	3.8E-11	2.2	2.4E-11	3.3	1.5E-12	3.9	3.2E-13	2.1	3.7E-21	2.2
1982	8.9E-11	2.2	2.4E-11	3.2	2.5E-12	3.3	3.2E-13	2.1	8.6E-21	2.3
1983	3.5E-10	2.2	2.4E-11	3.2	7.2E-12	3.4	3.2E-13	2.1	3.3E-20	2.3
1984	3.4E-10	2.3	2.4E-11	3.2	7.1E-12	3.1	3.3E-13	2.0	3.3E-20	2.2
1985	4.1E-11	2.2	2.4E-11	3.4	1.5E-12	3.5	3.3E-13	2.0	4.0E-21	2.2
1986	1.3E-10	2.2	2.4E-11	3.2	3.4E-12	3.2	3.3E-13	2.1	1.3E-20	2.3
1987	6.9E-11	2.2	2.4E-11	3.4	2.1E-12	3.5	3.3E-13	2.1	6.7E-21	2.2
1988	6.9E-11	2.2	2.4E-11	3.3	2.1E-12	3.5	3.3E-13	2.0	6.7E-21	2.2
1989	2.0E-11	2.3	2.4E-11	3.2	1.1E-12	4.0	3.3E-13	2.1	2.0E-21	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240 (continued)
Sector 6
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	8.3E-18	9.4	8.2E-18	4.5	5.9E-17	4.2	1.8E-15	3.1	1.8E-25	3.1	7.5E-12	2.3
1954	2.9E-16	9.8	2.7E-16	4.5	1.9E-15	4.1	6.3E-14	3.1	6.1E-24	3.1	2.4E-10	2.2
1955	6.5E-16	9.5	3.3E-16	4.6	2.4E-15	4.0	1.5E-13	2.9	1.4E-23	2.9	2.7E-10	2.2
1956	1.8E-15	9.1	1.0E-15	4.7	7.5E-15	3.6	4.0E-13	2.7	3.9E-23	2.8	8.9E-10	2.2
1957	6.6E-14	8.7	6.3E-14	5.0	4.5E-13	4.3	1.5E-11	3.0	1.4E-21	3.0	5.7E-08	2.2
1958	8.4E-14	8.8	1.8E-14	4.6	1.3E-13	3.8	1.9E-11	3.0	1.8E-21	3.0	1.2E-08	2.2
1959	9.2E-14	9.7	1.1E-14	4.2	7.9E-14	3.4	2.0E-11	3.0	2.0E-21	3.0	5.0E-09	2.2
1960	1.0E-13	9.0	1.2E-14	4.0	8.2E-14	3.4	2.2E-11	2.7	2.1E-21	2.7	5.0E-09	2.2
1961	1.1E-13	8.4	1.3E-14	4.2	9.1E-14	3.5	2.4E-11	2.7	2.3E-21	2.7	5.7E-09	2.2
1962	1.3E-13	9.2	2.1E-14	3.9	1.5E-13	3.8	2.8E-11	2.6	2.7E-21	2.7	1.2E-08	2.2
1963	1.5E-13	8.8	2.4E-14	4.2	1.7E-13	3.5	3.2E-11	2.6	3.1E-21	2.6	1.4E-08	2.2
1964	1.6E-13	8.8	2.2E-14	4.2	1.5E-13	3.6	3.6E-11	2.8	3.5E-21	2.8	1.1E-08	2.2
1965	2.0E-13	8.3	3.9E-14	4.2	2.8E-13	3.7	4.4E-11	2.6	4.2E-21	2.6	2.5E-08	2.2
1966	2.0E-13	9.2	1.2E-14	4.2	7.8E-14	3.4	4.4E-11	2.6	4.3E-21	2.5	1.3E-09	2.1
1967	2.0E-13	9.7	1.2E-14	3.9	8.3E-14	3.4	4.4E-11	2.6	4.3E-21	2.6	1.7E-09	2.1
1968	2.0E-13	8.6	1.3E-14	4.1	8.8E-14	3.4	4.5E-11	2.5	4.4E-21	2.5	2.0E-09	2.1
1969	2.1E-13	8.9	1.8E-14	3.6	1.2E-13	3.2	4.7E-11	2.6	4.5E-21	2.6	5.1E-09	2.2
1970	2.1E-13	8.8	1.3E-14	4.1	8.6E-14	3.5	4.7E-11	2.4	4.6E-21	2.4	1.6E-09	2.1
1971	2.1E-13	8.8	1.1E-14	4.1	7.0E-14	3.5	4.7E-11	2.4	4.6E-21	2.4	4.0E-10	1.9
1972	2.1E-13	8.7	1.1E-14	4.1	7.1E-14	3.7	4.8E-11	2.7	4.6E-21	2.7	3.5E-10	1.9
1973	2.1E-13	8.6	1.1E-14	4.4	7.1E-14	3.8	4.7E-11	2.5	4.6E-21	2.5	3.5E-10	1.9
1974	2.2E-13	9.0	1.7E-14	3.9	1.2E-13	3.3	4.9E-11	2.6	4.7E-21	2.7	4.4E-09	2.1
1975	2.2E-13	8.7	1.1E-14	3.9	6.9E-14	3.6	4.9E-11	2.6	4.7E-21	2.6	1.5E-10	1.9
1976	2.2E-13	8.5	1.0E-14	4.4	6.9E-14	3.7	4.9E-11	2.4	4.7E-21	2.5	1.2E-10	1.9
1977	2.2E-13	8.8	1.0E-14	4.2	6.9E-14	3.8	4.9E-11	2.5	4.7E-21	2.6	1.2E-10	1.9
1978	2.2E-13	9.4	1.0E-14	4.1	6.9E-14	3.8	4.9E-11	2.5	4.7E-21	2.5	1.1E-10	2.0
1979	2.2E-13	8.7	1.0E-14	4.4	6.9E-14	3.5	4.9E-11	2.7	4.7E-21	2.7	1.3E-10	2.1
1980	2.2E-13	9.4	1.1E-14	4.4	6.9E-14	3.6	4.9E-11	2.6	4.7E-21	2.5	1.7E-10	1.9
1981	2.2E-13	9.2	1.0E-14	4.1	6.9E-14	3.8	4.9E-11	2.5	4.7E-21	2.5	1.4E-10	1.9
1982	2.2E-13	8.6	1.1E-14	4.1	7.0E-14	3.8	4.9E-11	2.5	4.7E-21	2.5	2.0E-10	1.8
1983	2.2E-13	8.9	1.1E-14	3.8	7.4E-14	3.5	4.9E-11	2.6	4.7E-21	2.5	4.9E-10	1.9
1984	2.2E-13	9.2	1.1E-14	3.8	7.5E-14	3.7	4.9E-11	2.5	4.8E-21	2.6	4.9E-10	1.9
1985	2.2E-13	8.2	1.1E-14	4.2	7.0E-14	3.7	4.9E-11	2.5	4.8E-21	2.5	1.5E-10	1.8
1986	2.2E-13	9.0	1.1E-14	3.9	7.1E-14	3.6	4.9E-11	2.5	4.8E-21	2.5	2.5E-10	1.9
1987	2.2E-13	8.0	1.1E-14	4.4	7.0E-14	3.8	4.9E-11	2.5	4.8E-21	2.5	1.8E-10	1.9
1988	2.2E-13	9.0	1.1E-14	4.4	7.0E-14	3.6	4.9E-11	2.5	4.8E-21	2.5	1.8E-10	1.8
1989	2.2E-13	8.8	1.1E-14	4.1	7.0E-14	3.6	4.9E-11	2.6	4.8E-21	2.6	1.2E-10	2.0

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240
Sector 7
(1953 - 1989)

Year	Inhalation		Soil Ingestion		Vegetable Ingestion		Ground Exposure		Immersion	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	6.7E-12	2.3	8.2E-16	3.9	1.1E-13	3.2	1.1E-17	2.7	6.5E-22	2.3
1954	2.2E-10	2.2	2.8E-14	3.8	3.6E-12	3.3	3.9E-16	2.6	2.1E-20	2.2
1955	2.5E-10	2.2	6.5E-14	3.6	4.0E-12	3.3	8.8E-16	2.3	2.4E-20	2.3
1956	8.0E-10	2.2	1.8E-13	3.6	1.3E-11	3.5	2.5E-15	2.2	7.7E-20	2.2
1957	5.1E-08	2.3	6.5E-12	3.8	8.2E-10	3.3	8.9E-14	2.5	4.9E-18	2.3
1958	1.1E-08	2.2	8.4E-12	3.5	1.7E-10	3.3	1.1E-13	2.4	1.0E-18	2.2
1959	4.5E-09	2.2	9.2E-12	3.6	7.3E-11	3.4	1.3E-13	2.2	4.3E-19	2.2
1960	4.5E-09	2.2	1.0E-11	3.6	7.3E-11	3.2	1.4E-13	2.2	4.3E-19	2.2
1961	5.1E-09	2.2	1.1E-11	3.3	8.3E-11	3.2	1.5E-13	2.2	5.0E-19	2.2
1962	1.1E-08	2.2	1.3E-11	3.2	1.7E-10	3.2	1.7E-13	2.2	1.0E-18	2.3
1963	1.3E-08	2.3	1.5E-11	3.3	2.0E-10	3.3	2.0E-13	2.1	1.2E-18	2.2
1964	9.6E-09	2.2	1.6E-11	3.4	1.6E-10	3.3	2.2E-13	2.1	9.3E-19	2.2
1965	2.2E-08	2.2	2.0E-11	3.2	3.6E-10	3.2	2.7E-13	2.0	2.1E-18	2.3
1966	1.1E-09	2.3	2.0E-11	3.4	1.9E-11	3.3	2.7E-13	2.1	1.0E-19	2.3
1967	1.4E-09	2.2	2.0E-11	3.2	2.4E-11	3.1	2.7E-13	2.1	1.3E-19	2.3
1968	1.7E-09	2.3	2.0E-11	3.5	2.9E-11	3.3	2.8E-13	2.0	1.6E-19	2.3
1969	4.5E-09	2.3	2.1E-11	3.3	7.4E-11	3.2	2.9E-13	2.0	4.3E-19	2.3
1970	1.3E-09	2.2	2.1E-11	3.4	2.3E-11	3.2	2.9E-13	2.0	1.2E-19	2.2
1971	2.5E-10	2.2	2.1E-11	3.3	5.4E-12	3.2	2.9E-13	2.0	2.4E-20	2.2
1972	2.1E-10	2.2	2.1E-11	3.2	4.6E-12	3.2	2.9E-13	2.0	2.0E-20	2.2
1973	2.1E-10	2.2	2.1E-11	3.1	4.7E-12	3.2	2.9E-13	2.0	2.0E-20	2.2
1974	3.8E-09	2.2	2.2E-11	3.2	6.4E-11	3.2	3.0E-13	2.1	3.7E-19	2.2
1975	4.2E-11	2.3	2.2E-11	3.3	1.5E-12	3.6	3.0E-13	2.0	4.0E-21	2.2
1976	1.7E-11	2.2	2.2E-11	3.3	9.1E-13	4.1	3.0E-13	2.1	1.6E-21	2.3
1977	1.7E-11	2.2	2.2E-11	3.3	9.1E-13	4.0	3.0E-13	2.0	1.6E-21	2.2
1978	1.2E-11	2.2	2.2E-11	3.2	7.7E-13	4.4	3.0E-13	2.1	1.1E-21	2.2
1979	2.3E-11	2.2	2.2E-11	3.1	1.1E-12	3.8	3.0E-13	2.0	2.2E-21	2.3
1980	5.1E-11	2.2	2.2E-11	3.4	1.7E-12	3.5	3.0E-13	2.0	5.0E-21	2.2
1981	3.5E-11	2.3	2.2E-11	3.3	1.3E-12	3.6	3.0E-13	2.1	3.4E-21	2.2
1982	8.3E-11	2.2	2.2E-11	3.3	2.4E-12	3.4	3.0E-13	2.0	8.1E-21	2.2
1983	3.2E-10	2.2	2.2E-11	3.1	6.5E-12	3.1	3.0E-13	2.0	3.1E-20	2.2
1984	3.2E-10	2.2	2.2E-11	3.2	6.6E-12	3.2	3.0E-13	2.0	3.1E-20	2.3
1985	3.8E-11	2.2	2.2E-11	3.1	1.4E-12	3.5	3.0E-13	2.1	3.7E-21	2.3
1986	1.2E-10	2.2	2.2E-11	3.2	3.1E-12	3.2	3.0E-13	2.0	1.2E-20	2.2
1987	6.4E-11	2.2	2.2E-11	3.2	2.0E-12	3.3	3.0E-13	2.0	6.2E-21	2.2
1988	6.4E-11	2.3	2.2E-11	3.4	1.9E-12	3.4	3.0E-13	1.9	6.2E-21	2.2
1989	1.9E-11	2.2	2.2E-11	3.2	9.6E-13	4.0	3.0E-13	2.0	1.8E-21	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240 (continued)
Sector 7
(1953 - 1989)

Year	Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	7.6E-18	9.9	7.7E-18	4.8	5.5E-17	4.2	1.7E-15	3.1	1.6E-25	3.1	6.9E-12	2.3
1954	2.6E-16	9.3	2.5E-16	5.2	1.8E-15	4.3	5.9E-14	3.1	5.7E-24	3.1	2.3E-10	2.2
1955	6.0E-16	9.7	3.1E-16	4.7	2.2E-15	4.1	1.3E-13	2.8	1.3E-23	2.8	2.5E-10	2.2
1956	1.7E-15	8.2	9.7E-16	4.8	6.9E-15	4.2	3.7E-13	2.9	3.6E-23	2.9	8.2E-10	2.2
1957	6.1E-14	9.4	5.8E-14	4.9	4.2E-13	4.3	1.4E-11	3.1	1.3E-21	3.1	5.2E-08	2.2
1958	7.8E-14	9.6	1.7E-14	4.3	1.2E-13	3.6	1.7E-11	2.8	1.7E-21	2.8	1.1E-08	2.2
1959	8.6E-14	8.6	1.1E-14	4.1	7.3E-14	3.6	1.9E-11	2.6	1.8E-21	2.7	4.7E-09	2.2
1960	9.3E-14	8.8	1.1E-14	4.1	7.7E-14	3.4	2.1E-11	2.7	2.0E-21	2.8	4.7E-09	2.2
1961	1.0E-13	8.7	1.2E-14	4.2	8.4E-14	3.6	2.2E-11	2.8	2.2E-21	2.7	5.3E-09	2.2
1962	1.2E-13	8.8	2.0E-14	4.2	1.4E-13	3.7	2.6E-11	2.7	2.5E-21	2.7	1.1E-08	2.2
1963	1.4E-13	9.1	2.3E-14	4.2	1.6E-13	3.6	3.0E-11	2.7	2.9E-21	2.7	1.3E-08	2.2
1964	1.5E-13	9.0	2.0E-14	4.0	1.4E-13	3.6	3.3E-11	2.6	3.2E-21	2.6	1.0E-08	2.2
1965	1.8E-13	8.4	3.7E-14	4.3	2.6E-13	3.7	4.1E-11	2.6	3.9E-21	2.6	2.3E-08	2.2
1966	1.8E-13	8.3	1.1E-14	4.0	7.3E-14	3.5	4.1E-11	2.6	4.0E-21	2.6	1.2E-09	2.1
1967	1.9E-13	8.8	1.1E-14	4.0	7.9E-14	3.4	4.1E-11	2.4	4.0E-21	2.4	1.5E-09	2.1
1968	1.9E-13	8.7	1.2E-14	4.1	8.2E-14	3.5	4.2E-11	2.6	4.1E-21	2.6	1.8E-09	2.2
1969	2.0E-13	9.0	1.6E-14	4.2	1.1E-13	3.5	4.4E-11	2.6	4.2E-21	2.6	4.7E-09	2.3
1970	2.0E-13	8.8	1.2E-14	3.9	8.0E-14	3.4	4.4E-11	2.4	4.2E-21	2.5	1.4E-09	2.1
1971	2.0E-13	9.0	1.0E-14	4.0	6.6E-14	3.6	4.4E-11	2.5	4.3E-21	2.4	3.7E-10	1.9
1972	2.0E-13	8.8	9.9E-15	4.1	6.5E-14	3.6	4.4E-11	2.4	4.3E-21	2.5	3.2E-10	1.8
1973	2.0E-13	8.4	9.8E-15	4.1	6.5E-14	3.6	4.4E-11	2.5	4.3E-21	2.6	3.3E-10	1.9
1974	2.1E-13	8.6	1.6E-14	4.1	1.1E-13	3.3	4.5E-11	2.5	4.4E-21	2.5	4.1E-09	2.1
1975	2.1E-13	8.7	9.8E-15	4.2	6.4E-14	3.5	4.6E-11	2.6	4.4E-21	2.6	1.4E-10	1.9
1976	2.1E-13	8.4	9.7E-15	4.0	6.3E-14	3.6	4.5E-11	2.4	4.4E-21	2.5	1.1E-10	1.9
1977	2.1E-13	8.8	9.7E-15	4.1	6.4E-14	3.7	4.5E-11	2.5	4.4E-21	2.5	1.1E-10	1.9
1978	2.1E-13	8.7	9.7E-15	3.9	6.4E-14	3.7	4.5E-11	2.6	4.4E-21	2.6	1.0E-10	2.0
1979	2.1E-13	9.4	9.7E-15	4.2	6.4E-14	3.6	4.5E-11	2.6	4.4E-21	2.6	1.2E-10	1.9
1980	2.0E-13	9.3	9.8E-15	3.9	6.5E-14	3.6	4.6E-11	2.5	4.4E-21	2.5	1.5E-10	1.9
1981	2.1E-13	8.7	9.8E-15	4.0	6.4E-14	3.5	4.6E-11	2.5	4.4E-21	2.6	1.3E-10	1.9
1982	2.1E-13	9.3	9.9E-15	4.3	6.5E-14	3.5	4.5E-11	2.6	4.4E-21	2.6	1.9E-10	1.9
1983	2.1E-13	8.9	1.0E-14	4.1	6.9E-14	3.5	4.6E-11	2.6	4.4E-21	2.7	4.5E-10	1.9
1984	2.1E-13	9.0	1.0E-14	4.0	7.0E-14	3.4	4.6E-11	2.6	4.4E-21	2.6	4.5E-10	2.0
1985	2.1E-13	8.5	9.9E-15	4.3	6.5E-14	3.7	4.6E-11	2.5	4.4E-21	2.6	1.4E-10	1.9
1986	2.1E-13	8.6	1.0E-14	4.1	6.6E-14	3.4	4.6E-11	2.4	4.4E-21	2.4	2.3E-10	1.8
1987	2.1E-13	9.0	1.0E-14	4.1	6.5E-14	3.6	4.6E-11	2.6	4.4E-21	2.6	1.7E-10	1.9
1988	2.1E-13	8.7	9.9E-15	4.1	6.5E-14	3.6	4.6E-11	2.5	4.4E-21	2.5	1.7E-10	1.8
1989	2.1E-13	8.6	9.8E-15	4.0	6.5E-14	3.7	4.6E-11	2.5	4.4E-21	2.5	1.1E-10	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240
Sector 8
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	2.2E-11	2.2	2.7E-15	3.7	3.6E-13	3.3	3.7E-17	2.6	2.1E-21	2.2
1954	7.3E-10	2.2	9.3E-14	3.7	1.2E-11	3.2	1.3E-15	2.6	7.1E-20	2.3
1955	8.1E-10	2.2	2.1E-13	3.7	1.3E-11	3.4	2.9E-15	2.4	7.9E-20	2.2
1956	2.6E-09	2.2	5.9E-13	3.6	4.2E-11	3.2	8.1E-15	2.2	2.6E-19	2.2
1957	1.7E-07	2.3	2.2E-11	3.7	2.7E-09	3.5	2.9E-13	2.5	1.6E-17	2.3
1958	3.5E-08	2.2	2.8E-11	3.3	5.6E-10	3.4	3.8E-13	2.2	3.4E-18	2.2
1959	1.5E-08	2.3	3.0E-11	3.5	2.4E-10	3.2	4.1E-13	2.2	1.4E-18	2.3
1960	1.5E-08	2.3	3.3E-11	3.3	2.4E-10	3.2	4.5E-13	2.1	1.4E-18	2.3
1961	1.7E-08	2.3	3.6E-11	3.2	2.8E-10	3.5	4.9E-13	2.1	1.6E-18	2.2
1962	3.5E-08	2.2	4.1E-11	3.4	5.6E-10	3.3	5.7E-13	2.0	3.4E-18	2.2
1963	4.1E-08	2.2	4.8E-11	3.3	6.7E-10	3.2	6.6E-13	2.1	4.0E-18	2.3
1964	3.2E-08	2.3	5.3E-11	3.1	5.1E-10	3.2	7.3E-13	2.1	3.1E-18	2.3
1965	7.3E-08	2.3	6.5E-11	3.1	1.2E-09	3.3	8.9E-13	2.0	7.0E-18	2.2
1966	3.6E-09	2.2	6.5E-11	3.1	6.4E-11	3.1	8.9E-13	2.0	3.5E-19	2.2
1967	4.6E-09	2.3	6.6E-11	3.2	7.9E-11	3.1	9.0E-13	2.0	4.4E-19	2.2
1968	5.5E-09	2.2	6.7E-11	3.1	9.4E-11	3.3	9.2E-13	2.0	5.3E-19	2.2
1969	1.5E-08	2.2	6.9E-11	3.2	2.5E-10	3.4	9.5E-13	2.0	1.4E-18	2.2
1970	4.2E-09	2.3	7.0E-11	3.2	7.4E-11	3.3	9.6E-13	2.0	4.1E-19	2.3
1971	8.3E-10	2.3	7.0E-11	3.3	1.8E-11	3.1	9.6E-13	1.9	8.1E-20	2.2
1972	6.8E-10	2.2	7.0E-11	3.3	1.5E-11	3.0	9.6E-13	1.9	6.6E-20	2.2
1973	7.0E-10	2.3	7.0E-11	3.3	1.5E-11	3.0	9.6E-13	1.9	6.7E-20	2.3
1974	1.3E-08	2.2	7.3E-11	3.3	2.1E-10	3.5	9.9E-13	2.0	1.2E-18	2.2
1975	1.4E-10	2.2	7.3E-11	3.2	4.8E-12	3.6	9.9E-13	2.0	1.3E-20	2.3
1976	5.5E-11	2.2	7.3E-11	3.5	2.9E-12	4.1	9.9E-13	2.0	5.3E-21	2.3
1977	5.5E-11	2.3	7.3E-11	3.1	3.0E-12	4.2	1.0E-12	2.0	5.3E-21	2.2
1978	3.8E-11	2.2	7.3E-11	3.3	2.5E-12	4.4	9.9E-13	2.0	3.7E-21	2.3
1979	7.6E-11	2.3	7.3E-11	3.1	3.5E-12	3.7	1.0E-12	2.0	7.4E-21	2.3
1980	1.7E-10	2.2	7.3E-11	3.3	5.5E-12	3.4	9.9E-13	2.0	1.6E-20	2.3
1981	1.2E-10	2.2	7.3E-11	3.2	4.5E-12	3.7	1.0E-12	2.0	1.1E-20	2.2
1982	2.7E-10	2.2	7.3E-11	3.3	7.6E-12	3.3	1.0E-12	2.0	2.7E-20	2.2
1983	1.1E-09	2.3	7.3E-11	3.2	2.2E-11	3.0	1.0E-12	2.0	1.0E-19	2.2
1984	1.1E-09	2.2	7.3E-11	3.1	2.2E-11	3.2	1.0E-12	2.0	1.0E-19	2.2
1985	1.3E-10	2.2	7.3E-11	3.2	4.7E-12	3.6	1.0E-12	2.0	1.2E-20	2.2
1986	4.0E-10	2.3	7.3E-11	3.3	1.0E-11	3.3	1.0E-12	1.9	3.9E-20	2.3
1987	2.1E-10	2.2	7.3E-11	3.4	6.5E-12	3.3	1.0E-12	1.9	2.0E-20	2.2
1988	2.1E-10	2.3	7.3E-11	3.2	6.5E-12	3.4	1.0E-12	2.0	2.0E-20	2.2
1989	6.2E-11	2.2	7.3E-11	3.3	3.2E-12	4.2	1.0E-12	1.9	6.0E-21	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240 (continued)
Sector 8
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	GSD	Milk Ingestion GM (Sv/year)	GSD	Beef Ingestion GM (Sv/year)	GSD	Inhalation of Resuspended Particulates GM (Sv/year)	GSD	Immersion in Resuspended Particulates GM (Sv/year)	GSD	Total Dose GM (Sv/year)	GSD
1953	2.5E-17	9.7	2.5E-17	4.9	1.8E-16	3.9	5.6E-15	3.1	5.4E-25	3.1	2.3E-11	2.2
1954	8.7E-16	8.9	8.3E-16	4.5	6.0E-15	4.1	1.9E-13	3.2	1.9E-23	3.1	7.5E-10	2.2
1955	2.0E-15	9.1	1.0E-15	4.6	7.3E-15	3.6	4.4E-13	2.8	4.3E-23	2.8	8.3E-10	2.2
1956	5.5E-15	8.8	3.2E-15	4.5	2.3E-14	4.3	1.2E-12	2.7	1.2E-22	2.6	2.7E-09	2.2
1957	2.0E-13	9.3	1.9E-13	5.1	1.4E-12	4.1	4.4E-11	3.0	4.3E-21	2.9	1.7E-07	2.3
1958	2.6E-13	8.7	5.7E-14	4.2	4.0E-13	3.7	5.7E-11	3.0	5.6E-21	2.8	3.6E-08	2.2
1959	2.8E-13	9.6	3.4E-14	4.1	2.4E-13	3.7	6.3E-11	2.7	6.1E-21	2.6	1.5E-08	2.2
1960	3.1E-13	9.2	3.6E-14	3.9	2.5E-13	3.6	6.8E-11	2.6	6.6E-21	2.7	1.5E-08	2.3
1961	3.3E-13	9.0	4.0E-14	3.9	2.8E-13	3.4	7.4E-11	2.7	7.1E-21	2.7	1.8E-08	2.2
1962	3.9E-13	8.6	6.4E-14	4.5	4.5E-13	3.6	8.5E-11	2.7	8.3E-21	2.6	3.6E-08	2.2
1963	4.5E-13	8.8	7.5E-14	4.1	5.3E-13	3.5	9.9E-11	2.5	9.6E-21	2.6	4.3E-08	2.2
1964	5.0E-13	8.8	6.8E-14	4.1	4.8E-13	3.7	1.1E-10	2.6	1.1E-20	2.6	3.3E-08	2.3
1965	6.1E-13	8.6	1.2E-13	4.1	8.5E-13	3.5	1.3E-10	2.6	1.3E-20	2.5	7.5E-08	2.2
1966	6.1E-13	8.6	3.5E-14	3.9	2.4E-13	3.6	1.3E-10	2.6	1.3E-20	2.7	4.1E-09	2.1
1967	6.2E-13	8.5	3.8E-14	3.9	2.6E-13	3.4	1.4E-10	2.7	1.3E-20	2.6	5.1E-09	2.2
1968	6.2E-13	9.0	3.9E-14	3.9	2.7E-13	3.4	1.4E-10	2.5	1.3E-20	2.5	6.0E-09	2.1
1969	6.5E-13	9.2	5.4E-14	4.0	3.7E-13	3.4	1.4E-10	2.5	1.4E-20	2.5	1.6E-08	2.2
1970	6.6E-13	8.5	3.9E-14	3.8	2.6E-13	3.2	1.5E-10	2.5	1.4E-20	2.5	4.8E-09	2.1
1971	6.6E-13	8.6	3.3E-14	4.2	2.2E-13	3.7	1.5E-10	2.6	1.4E-20	2.6	1.2E-09	2.0
1972	6.6E-13	8.7	3.2E-14	3.9	2.1E-13	3.5	1.5E-10	2.6	1.4E-20	2.6	1.1E-09	1.9
1973	6.6E-13	8.5	3.3E-14	4.0	2.2E-13	3.4	1.5E-10	2.5	1.4E-20	2.5	1.1E-09	1.9
1974	6.8E-13	8.8	5.3E-14	3.6	3.7E-13	3.3	1.5E-10	2.5	1.5E-20	2.6	1.3E-08	2.2
1975	6.8E-13	8.3	3.2E-14	4.2	2.1E-13	3.6	1.5E-10	2.5	1.5E-20	2.5	4.6E-10	1.8
1976	6.8E-13	9.0	3.2E-14	4.0	2.1E-13	3.4	1.5E-10	2.4	1.5E-20	2.4	3.6E-10	2.0
1977	6.8E-13	9.0	3.2E-14	4.4	2.1E-13	3.7	1.5E-10	2.5	1.5E-20	2.6	3.6E-10	1.9
1978	6.8E-13	8.9	3.2E-14	4.1	2.1E-13	3.2	1.5E-10	2.4	1.4E-20	2.4	3.3E-10	1.9
1979	6.8E-13	8.8	3.2E-14	4.0	2.1E-13	3.6	1.5E-10	2.6	1.4E-20	2.5	3.8E-10	1.9
1980	6.8E-13	8.7	3.2E-14	4.2	2.1E-13	3.7	1.5E-10	2.6	1.5E-20	2.6	5.0E-10	1.9
1981	6.8E-13	8.7	3.2E-14	4.1	2.1E-13	3.5	1.5E-10	2.5	1.5E-20	2.5	4.4E-10	1.9
1982	6.8E-13	8.8	3.3E-14	4.0	2.2E-13	3.7	1.5E-10	2.4	1.5E-20	2.5	6.2E-10	1.8
1983	6.8E-13	9.7	3.5E-14	4.1	2.3E-13	3.5	1.5E-10	2.5	1.5E-20	2.6	1.5E-09	2.0
1984	6.8E-13	8.6	3.5E-14	3.9	2.3E-13	3.7	1.5E-10	2.5	1.5E-20	2.5	1.5E-09	1.9
1985	6.8E-13	8.9	3.2E-14	4.1	2.1E-13	3.7	1.5E-10	2.5	1.5E-20	2.5	4.5E-10	1.9
1986	6.8E-13	8.5	3.3E-14	4.1	2.2E-13	3.7	1.5E-10	2.5	1.5E-20	2.5	7.7E-10	1.9
1987	6.8E-13	8.9	3.3E-14	4.0	2.2E-13	3.4	1.5E-10	2.5	1.5E-20	2.4	5.6E-10	1.8
1988	6.8E-13	8.9	3.3E-14	4.3	2.2E-13	3.8	1.5E-10	2.5	1.5E-20	2.5	5.5E-10	1.9
1989	6.8E-13	8.4	3.2E-14	4.2	2.1E-13	3.8	1.5E-10	2.5	1.5E-20	2.5	3.7E-10	2.0

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240
Sector 9
(1953 - 1989)

Year	Inhalation		Soil Ingestion		Vegetable Ingestion		Ground Exposure		Immersion	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	9.6E-12	2.3	1.2E-15	3.6	1.6E-13	3.1	1.6E-17	2.6	9.3E-22	2.3
1954	3.2E-10	2.2	4.1E-14	3.9	5.1E-12	3.2	5.6E-16	2.6	3.1E-20	2.3
1955	3.5E-10	2.2	9.4E-14	3.5	5.7E-12	3.3	1.3E-15	2.3	3.4E-20	2.2
1956	1.1E-09	2.1	2.6E-13	3.2	1.8E-11	3.5	3.5E-15	2.2	1.1E-19	2.3
1957	7.4E-08	2.2	9.4E-12	3.7	1.2E-09	3.5	1.3E-13	2.5	7.1E-18	2.2
1958	1.5E-08	2.2	1.2E-11	3.8	2.5E-10	3.3	1.6E-13	2.4	1.5E-18	2.3
1959	6.4E-09	2.3	1.3E-11	3.4	1.1E-10	3.3	1.8E-13	2.2	6.2E-19	2.3
1960	6.4E-09	2.2	1.4E-11	3.4	1.1E-10	3.4	1.9E-13	2.3	6.2E-19	2.2
1961	7.3E-09	2.2	1.5E-11	3.3	1.2E-10	3.4	2.1E-13	2.2	7.1E-19	2.2
1962	1.5E-08	2.2	1.8E-11	3.4	2.5E-10	3.2	2.5E-13	2.2	1.5E-18	2.2
1963	1.8E-08	2.2	2.1E-11	3.4	2.9E-10	3.4	2.9E-13	2.1	1.7E-18	2.3
1964	1.4E-08	2.2	2.3E-11	3.3	2.2E-10	3.2	3.2E-13	2.1	1.3E-18	2.2
1965	3.2E-08	2.2	2.8E-11	3.2	5.1E-10	3.2	3.8E-13	2.1	3.1E-18	2.2
1966	1.6E-09	2.3	2.8E-11	3.2	2.8E-11	3.2	3.9E-13	2.1	1.5E-19	2.3
1967	2.0E-09	2.2	2.9E-11	3.2	3.5E-11	3.0	3.9E-13	2.1	1.9E-19	2.3
1968	2.4E-09	2.2	2.9E-11	3.3	4.2E-11	3.2	4.0E-13	2.1	2.3E-19	2.2
1969	6.4E-09	2.3	3.0E-11	3.4	1.1E-10	3.3	4.1E-13	2.0	6.2E-19	2.2
1970	1.8E-09	2.3	3.0E-11	3.5	3.2E-11	3.1	4.2E-13	2.1	1.8E-19	2.2
1971	3.6E-10	2.2	3.0E-11	3.4	7.8E-12	3.2	4.2E-13	2.1	3.5E-20	2.3
1972	3.0E-10	2.2	3.1E-11	3.1	6.7E-12	3.2	4.2E-13	2.1	2.9E-20	2.3
1973	3.0E-10	2.2	3.0E-11	3.3	6.7E-12	3.1	4.2E-13	2.1	2.9E-20	2.2
1974	5.5E-09	2.2	3.1E-11	3.3	9.2E-11	3.3	4.3E-13	2.1	5.3E-19	2.3
1975	6.0E-11	2.2	3.1E-11	3.2	2.2E-12	3.5	4.3E-13	2.1	5.8E-21	2.3
1976	2.4E-11	2.3	3.1E-11	3.3	1.3E-12	4.0	4.3E-13	2.0	2.3E-21	2.2
1977	2.4E-11	2.2	3.1E-11	3.2	1.3E-12	4.0	4.3E-13	2.0	2.3E-21	2.3
1978	1.7E-11	2.2	3.1E-11	3.1	1.1E-12	4.7	4.3E-13	2.1	1.6E-21	2.2
1979	3.3E-11	2.2	3.1E-11	3.1	1.5E-12	4.0	4.3E-13	2.0	3.2E-21	2.2
1980	7.4E-11	2.3	3.1E-11	3.3	2.4E-12	3.7	4.3E-13	2.0	7.1E-21	2.2
1981	5.1E-11	2.2	3.1E-11	3.1	2.0E-12	3.7	4.3E-13	2.0	4.9E-21	2.2
1982	1.2E-10	2.2	3.1E-11	3.3	3.3E-12	3.2	4.3E-13	2.1	1.2E-20	2.3
1983	4.6E-10	2.2	3.2E-11	3.3	9.4E-12	3.0	4.3E-13	2.0	4.5E-20	2.2
1984	4.6E-10	2.2	3.2E-11	3.4	9.6E-12	3.1	4.3E-13	2.0	4.5E-20	2.2
1985	5.5E-11	2.3	3.2E-11	3.3	2.0E-12	3.7	4.3E-13	2.0	5.3E-21	2.2
1986	1.7E-10	2.3	3.2E-11	3.1	4.4E-12	3.1	4.3E-13	2.0	1.7E-20	2.2
1987	9.2E-11	2.2	3.2E-11	3.4	2.8E-12	3.4	4.3E-13	2.0	8.9E-21	2.3
1988	9.2E-11	2.2	3.2E-11	3.1	2.8E-12	3.4	4.3E-13	2.0	8.9E-21	2.3
1989	2.7E-11	2.2	3.2E-11	3.3	1.4E-12	4.0	4.3E-13	2.0	2.6E-21	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240 (continued)
Sector 9
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1953	1.1E-17	9.0	1.1E-17	4.7	7.8E-17	4.2	2.4E-15	3.1	2.4E-25	3.1	9.9E-12	2.2
1954	3.8E-16	10.1	3.7E-16	4.6	2.6E-15	4.5	8.4E-14	3.1	8.2E-24	3.1	3.3E-10	2.2
1955	8.7E-16	9.8	4.4E-16	4.5	3.2E-15	4.0	1.9E-13	2.8	1.9E-23	2.8	3.6E-10	2.2
1956	2.4E-15	9.4	1.4E-15	4.7	1.0E-14	4.1	5.3E-13	2.8	5.1E-23	2.9	1.2E-09	2.1
1957	8.8E-14	9.8	8.4E-14	4.6	6.1E-13	4.0	1.9E-11	3.0	1.9E-21	3.1	7.6E-08	2.2
1958	1.1E-13	8.4	2.5E-14	4.5	1.8E-13	3.7	2.5E-11	3.0	2.4E-21	3.0	1.6E-08	2.2
1959	1.2E-13	8.9	1.5E-14	3.9	1.1E-13	3.5	2.7E-11	2.9	2.6E-21	2.9	6.7E-09	2.2
1960	1.3E-13	9.2	1.6E-14	4.2	1.1E-13	3.4	2.9E-11	2.8	2.8E-21	2.8	6.7E-09	2.2
1961	1.5E-13	8.8	1.7E-14	4.2	1.2E-13	3.5	3.2E-11	2.7	3.1E-21	2.7	7.6E-09	2.1
1962	1.7E-13	8.9	2.8E-14	4.3	2.0E-13	3.5	3.7E-11	2.8	3.6E-21	2.8	1.6E-08	2.2
1963	2.0E-13	8.6	3.3E-14	4.3	2.3E-13	3.6	4.3E-11	2.7	4.2E-21	2.7	1.9E-08	2.2
1964	2.2E-13	8.4	2.9E-14	4.1	2.0E-13	3.7	4.8E-11	2.6	4.6E-21	2.6	1.4E-08	2.2
1965	2.6E-13	8.6	5.3E-14	4.4	3.7E-13	3.7	5.8E-11	2.6	5.6E-21	2.6	3.3E-08	2.2
1966	2.6E-13	9.1	1.5E-14	4.1	1.0E-13	3.6	5.8E-11	2.6	5.7E-21	2.6	1.8E-09	2.1
1967	2.7E-13	8.7	1.6E-14	4.1	1.1E-13	3.4	5.9E-11	2.6	5.7E-21	2.6	2.2E-09	2.1
1968	2.7E-13	8.7	1.7E-14	4.0	1.2E-13	3.2	6.0E-11	2.6	5.8E-21	2.7	2.6E-09	2.1
1969	2.8E-13	9.0	2.4E-14	4.3	1.6E-13	3.5	6.2E-11	2.7	6.0E-21	2.5	6.8E-09	2.2
1970	2.8E-13	8.3	1.7E-14	4.2	1.1E-13	3.3	6.3E-11	2.6	6.1E-21	2.6	2.1E-09	2.1
1971	2.8E-13	8.3	1.4E-14	3.8	9.4E-14	3.5	6.3E-11	2.6	6.1E-21	2.7	5.3E-10	2.0
1972	2.8E-13	8.1	1.4E-14	3.8	9.3E-14	3.5	6.3E-11	2.5	6.1E-21	2.6	4.7E-10	1.8
1973	2.8E-13	8.8	1.4E-14	3.9	9.4E-14	3.6	6.3E-11	2.5	6.1E-21	2.5	4.7E-10	1.9
1974	2.9E-13	8.8	2.3E-14	4.1	1.6E-13	3.6	6.5E-11	2.4	6.3E-21	2.5	5.9E-09	2.2
1975	2.9E-13	9.0	1.4E-14	4.0	9.2E-14	3.5	6.5E-11	2.6	6.3E-21	2.6	2.0E-10	1.9
1976	2.9E-13	9.3	1.4E-14	4.1	9.1E-14	3.8	6.5E-11	2.5	6.3E-21	2.5	1.5E-10	2.0
1977	2.9E-13	8.8	1.4E-14	4.1	9.1E-14	3.6	6.5E-11	2.7	6.3E-21	2.6	1.5E-10	2.0
1978	2.9E-13	8.7	1.4E-14	3.9	9.1E-14	3.6	6.5E-11	2.4	6.3E-21	2.5	1.4E-10	2.0
1979	2.9E-13	8.5	1.4E-14	4.4	9.1E-14	3.6	6.5E-11	2.7	6.3E-21	2.6	1.7E-10	2.0
1980	2.9E-13	8.7	1.4E-14	4.2	9.2E-14	3.7	6.5E-11	2.6	6.3E-21	2.5	2.2E-10	1.9
1981	2.9E-13	9.2	1.4E-14	4.0	9.2E-14	3.9	6.5E-11	2.5	6.3E-21	2.5	1.9E-10	1.8
1982	2.9E-13	8.6	1.4E-14	3.9	9.3E-14	3.6	6.5E-11	2.4	6.3E-21	2.5	2.7E-10	1.8
1983	2.9E-13	8.6	1.5E-14	3.7	9.9E-14	3.5	6.5E-11	2.6	6.3E-21	2.6	6.4E-10	1.9
1984	3.0E-13	9.3	1.5E-14	4.3	9.9E-14	3.6	6.5E-11	2.5	6.3E-21	2.5	6.4E-10	2.0
1985	3.0E-13	8.8	1.4E-14	4.1	9.2E-14	3.8	6.5E-11	2.6	6.3E-21	2.6	2.0E-10	1.9
1986	3.0E-13	8.4	1.4E-14	4.2	9.4E-14	3.6	6.5E-11	2.4	6.3E-21	2.5	3.4E-10	1.9
1987	3.0E-13	8.3	1.4E-14	4.2	9.3E-14	3.6	6.5E-11	2.6	6.3E-21	2.6	2.4E-10	1.9
1988	2.9E-13	9.3	1.4E-14	4.1	9.3E-14	3.8	6.5E-11	2.4	6.3E-21	2.4	2.4E-10	1.8
1989	3.0E-13	9.2	1.4E-14	3.9	9.3E-14	3.8	6.5E-11	2.5	6.3E-21	2.5	1.6E-10	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240
Sector 10
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	3.9E-12	2.3	4.7E-16	4.2	6.2E-14	3.3	6.5E-18	2.6	3.8E-22	2.3
1954	1.3E-10	2.2	1.6E-14	3.9	2.0E-12	3.3	2.2E-16	2.5	1.2E-20	2.2
1955	1.4E-10	2.3	3.8E-14	3.6	2.3E-12	3.6	5.2E-16	2.4	1.4E-20	2.2
1956	4.6E-10	2.2	1.0E-13	3.4	7.4E-12	3.4	1.4E-15	2.3	4.4E-20	2.2
1957	2.9E-08	2.2	3.7E-12	3.7	4.7E-10	3.4	5.2E-14	2.5	2.9E-18	2.2
1958	6.1E-09	2.2	4.8E-12	3.6	9.9E-11	3.3	6.6E-14	2.3	5.9E-19	2.3
1959	2.6E-09	2.2	5.3E-12	3.8	4.2E-11	3.5	7.2E-14	2.3	2.5E-19	2.2
1960	2.6E-09	2.2	5.7E-12	3.5	4.2E-11	3.2	7.8E-14	2.3	2.5E-19	2.2
1961	3.0E-09	2.2	6.2E-12	3.3	4.8E-11	3.5	8.5E-14	2.2	2.9E-19	2.3
1962	6.1E-09	2.2	7.2E-12	3.6	9.9E-11	3.3	9.8E-14	2.1	5.9E-19	2.2
1963	7.2E-09	2.3	8.4E-12	3.3	1.2E-10	3.2	1.1E-13	2.2	7.0E-19	2.2
1964	5.5E-09	2.2	9.3E-12	3.4	9.0E-11	3.2	1.3E-13	2.1	5.3E-19	2.2
1965	1.3E-08	2.2	1.1E-11	3.3	2.1E-10	3.3	1.5E-13	2.1	1.2E-18	2.3
1966	6.3E-10	2.3	1.1E-11	3.2	1.1E-11	3.3	1.6E-13	2.0	6.1E-20	2.3
1967	7.9E-10	2.3	1.1E-11	3.4	1.4E-11	3.2	1.6E-13	2.0	7.7E-20	2.2
1968	9.6E-10	2.2	1.2E-11	3.3	1.6E-11	3.5	1.6E-13	2.1	9.3E-20	2.2
1969	2.6E-09	2.2	1.2E-11	3.3	4.3E-11	3.2	1.7E-13	2.0	2.5E-19	2.2
1970	7.4E-10	2.2	1.2E-11	3.1	1.3E-11	3.2	1.7E-13	2.1	7.1E-20	2.3
1971	1.5E-10	2.2	1.2E-11	3.4	3.1E-12	2.9	1.7E-13	2.0	1.4E-20	2.2
1972	1.2E-10	2.2	1.2E-11	3.3	2.7E-12	3.0	1.7E-13	2.0	1.2E-20	2.2
1973	1.2E-10	2.3	1.2E-11	3.4	2.7E-12	3.2	1.7E-13	2.0	1.2E-20	2.2
1974	2.2E-09	2.3	1.3E-11	3.3	3.7E-11	3.1	1.7E-13	2.0	2.1E-19	2.3
1975	2.4E-11	2.2	1.3E-11	3.3	8.6E-13	3.5	1.7E-13	2.0	2.3E-21	2.3
1976	9.6E-12	2.2	1.3E-11	3.4	5.3E-13	3.8	1.7E-13	2.0	9.3E-22	2.2
1977	9.6E-12	2.2	1.3E-11	3.2	5.2E-13	4.3	1.7E-13	2.0	9.3E-22	2.3
1978	6.6E-12	2.2	1.3E-11	3.2	4.3E-13	4.4	1.7E-13	2.0	6.4E-22	2.3
1979	1.3E-11	2.2	1.3E-11	3.2	6.0E-13	3.7	1.7E-13	2.1	1.3E-21	2.2
1980	3.0E-11	2.2	1.3E-11	3.3	9.5E-13	3.3	1.7E-13	2.0	2.9E-21	2.3
1981	2.0E-11	2.3	1.3E-11	3.2	7.9E-13	3.7	1.7E-13	2.0	2.0E-21	2.2
1982	4.8E-11	2.2	1.3E-11	3.4	1.3E-12	3.2	1.7E-13	2.0	4.6E-21	2.3
1983	1.8E-10	2.2	1.3E-11	3.4	3.8E-12	3.2	1.7E-13	2.0	1.8E-20	2.2
1984	1.8E-10	2.2	1.3E-11	3.2	3.8E-12	3.0	1.7E-13	2.0	1.8E-20	2.3
1985	2.2E-11	2.2	1.3E-11	3.4	8.0E-13	3.5	1.7E-13	2.0	2.1E-21	2.2
1986	7.0E-11	2.3	1.3E-11	3.1	1.8E-12	3.3	1.7E-13	2.1	6.8E-21	2.3
1987	3.7E-11	2.2	1.3E-11	3.2	1.1E-12	3.4	1.7E-13	2.0	3.6E-21	2.2
1988	3.7E-11	2.2	1.3E-11	3.2	1.2E-12	3.3	1.7E-13	2.0	3.6E-21	2.2
1989	1.1E-11	2.2	1.3E-11	3.3	5.5E-13	4.1	1.7E-13	2.1	1.1E-21	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240 (continued)
Sector 10
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	GSD	Milk Ingestion GM (Sv/year)	GSD	Beef Ingestion GM (Sv/year)	GSD	Inhalation of Resuspended Particulates GM (Sv/year)	GSD	Immersion in Resuspended Particulates GM (Sv/year)	GSD	Total Dose GM (Sv/year)	GSD
1953	4.4E-18	9.4	4.4E-18	4.8	3.2E-17	4.2	9.8E-16	3.1	9.5E-26	3.2	4.0E-12	2.2
1954	1.5E-16	9.3	1.5E-16	4.8	1.0E-15	4.0	3.4E-14	2.9	3.3E-24	2.8	1.3E-10	2.2
1955	3.5E-16	9.8	1.8E-16	4.5	1.2E-15	4.3	7.8E-14	2.9	7.5E-24	2.8	1.5E-10	2.3
1956	9.5E-16	8.9	5.6E-16	4.6	4.0E-15	3.8	2.1E-13	2.8	2.0E-23	2.8	4.7E-10	2.2
1957	3.5E-14	9.4	3.4E-14	4.5	2.4E-13	4.1	7.7E-12	3.0	7.5E-22	3.0	3.0E-08	2.2
1958	4.5E-14	9.2	9.9E-15	4.2	6.9E-14	3.8	9.9E-12	2.8	9.6E-22	2.9	6.3E-09	2.2
1959	4.9E-14	8.7	6.1E-15	4.3	4.3E-14	3.6	1.1E-11	2.7	1.1E-21	2.8	2.7E-09	2.2
1960	5.3E-14	8.8	6.4E-15	4.2	4.3E-14	3.4	1.2E-11	2.9	1.1E-21	2.8	2.7E-09	2.2
1961	5.8E-14	9.4	6.9E-15	4.2	4.8E-14	3.4	1.3E-11	2.6	1.2E-21	2.7	3.1E-09	2.2
1962	6.7E-14	8.7	1.1E-14	4.3	7.9E-14	3.7	1.5E-11	2.6	1.4E-21	2.7	6.3E-09	2.2
1963	7.8E-14	8.7	1.3E-14	3.9	9.1E-14	3.6	1.7E-11	2.6	1.7E-21	2.7	7.4E-09	2.2
1964	8.6E-14	8.7	1.2E-14	4.2	8.2E-14	3.8	1.9E-11	2.6	1.9E-21	2.6	5.7E-09	2.2
1965	1.1E-13	8.8	2.1E-14	4.4	1.5E-13	3.9	2.3E-11	2.6	2.2E-21	2.5	1.3E-08	2.2
1966	1.1E-13	8.6	6.2E-15	4.1	4.2E-14	3.5	2.3E-11	2.5	2.3E-21	2.5	7.2E-10	2.1
1967	1.1E-13	8.8	6.6E-15	4.1	4.5E-14	3.4	2.4E-11	2.5	2.3E-21	2.6	8.9E-10	2.1
1968	1.1E-13	9.0	7.0E-15	4.3	4.7E-14	3.3	2.4E-11	2.5	2.3E-21	2.6	1.1E-09	2.1
1969	1.1E-13	8.7	9.4E-15	4.1	6.5E-14	3.6	2.5E-11	2.5	2.4E-21	2.5	2.7E-09	2.2
1970	1.1E-13	9.2	6.7E-15	4.0	4.6E-14	3.4	2.5E-11	2.6	2.4E-21	2.7	8.3E-10	2.1
1971	1.1E-13	8.5	5.7E-15	4.3	3.8E-14	3.6	2.5E-11	2.5	2.4E-21	2.6	2.1E-10	1.9
1972	1.1E-13	9.2	5.6E-15	4.2	3.7E-14	3.4	2.5E-11	2.7	2.4E-21	2.7	1.9E-10	1.9
1973	1.1E-13	9.3	5.7E-15	4.1	3.8E-14	3.7	2.5E-11	2.5	2.5E-21	2.5	1.9E-10	1.9
1974	1.2E-13	8.9	9.1E-15	4.0	6.2E-14	3.3	2.6E-11	2.6	2.5E-21	2.5	2.4E-09	2.2
1975	1.2E-13	8.5	5.6E-15	4.0	3.7E-14	3.7	2.6E-11	2.6	2.5E-21	2.6	8.0E-11	1.9
1976	1.2E-13	9.2	5.6E-15	4.3	3.7E-14	3.4	2.6E-11	2.7	2.5E-21	2.7	6.3E-11	2.0
1977	1.2E-13	9.5	5.6E-15	4.0	3.7E-14	3.8	2.6E-11	2.5	2.5E-21	2.5	6.2E-11	1.9
1978	1.2E-13	8.5	5.6E-15	4.0	3.7E-14	3.7	2.6E-11	2.5	2.5E-21	2.6	5.7E-11	2.0
1979	1.2E-13	8.2	5.6E-15	4.1	3.7E-14	3.8	2.6E-11	2.6	2.5E-21	2.7	6.8E-11	1.9
1980	1.2E-13	8.2	5.6E-15	4.3	3.7E-14	3.8	2.6E-11	2.6	2.5E-21	2.6	8.8E-11	1.9
1981	1.2E-13	9.6	5.6E-15	4.1	3.7E-14	3.6	2.6E-11	2.6	2.5E-21	2.6	7.7E-11	1.9
1982	1.2E-13	8.2	5.6E-15	4.4	3.7E-14	3.5	2.6E-11	2.6	2.5E-21	2.6	1.1E-10	1.9
1983	1.2E-13	9.0	6.0E-15	3.9	4.0E-14	3.5	2.6E-11	2.6	2.5E-21	2.6	2.6E-10	1.9
1984	1.2E-13	9.4	6.0E-15	4.0	4.0E-14	3.5	2.6E-11	2.5	2.5E-21	2.5	2.6E-10	1.9
1985	1.2E-13	8.2	5.6E-15	4.0	3.7E-14	3.6	2.6E-11	2.6	2.5E-21	2.6	7.9E-11	1.9
1986	1.2E-13	8.9	5.8E-15	4.3	3.8E-14	3.5	2.6E-11	2.4	2.5E-21	2.4	1.3E-10	1.9
1987	1.2E-13	8.2	5.7E-15	4.3	3.7E-14	3.6	2.6E-11	2.7	2.5E-21	2.7	9.8E-11	1.8
1988	1.2E-13	9.0	5.7E-15	4.0	3.7E-14	3.5	2.6E-11	2.5	2.5E-21	2.5	9.6E-11	1.9
1989	1.2E-13	9.3	5.6E-15	4.3	3.7E-14	3.5	2.6E-11	2.5	2.5E-21	2.5	6.4E-11	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240
Sector 11
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	3.7E-12	2.2	4.5E-16	3.9	5.9E-14	3.2	6.1E-18	2.7	3.5E-22	2.2
1954	1.2E-10	2.2	1.5E-14	3.9	1.9E-12	3.1	2.1E-16	2.6	1.2E-20	2.2
1955	1.3E-10	2.2	3.5E-14	3.6	2.2E-12	3.3	4.8E-16	2.3	1.3E-20	2.2
1956	4.4E-10	2.3	9.7E-14	3.5	7.0E-12	3.2	1.3E-15	2.3	4.2E-20	2.3
1957	2.8E-08	2.3	3.6E-12	3.9	4.5E-10	3.5	4.9E-14	2.5	2.7E-18	2.2
1958	5.7E-09	2.2	4.6E-12	3.7	9.3E-11	3.3	6.2E-14	2.4	5.6E-19	2.2
1959	2.4E-09	2.3	5.0E-12	3.5	4.0E-11	3.4	6.8E-14	2.3	2.4E-19	2.3
1960	2.4E-09	2.3	5.4E-12	3.6	4.0E-11	3.2	7.4E-14	2.3	2.4E-19	2.2
1961	2.8E-09	2.2	5.9E-12	3.6	4.6E-11	3.2	8.0E-14	2.2	2.7E-19	2.2
1962	5.7E-09	2.2	6.8E-12	3.6	9.3E-11	3.3	9.3E-14	2.1	5.6E-19	2.2
1963	6.8E-09	2.2	7.9E-12	3.4	1.1E-10	3.3	1.1E-13	2.2	6.6E-19	2.2
1964	5.2E-09	2.2	8.7E-12	3.5	8.5E-11	3.3	1.2E-13	2.2	5.1E-19	2.2
1965	1.2E-08	2.3	1.1E-11	3.2	1.9E-10	3.4	1.5E-13	2.1	1.2E-18	2.2
1966	5.9E-10	2.3	1.1E-11	3.3	1.1E-11	3.0	1.5E-13	2.1	5.7E-20	2.3
1967	7.5E-10	2.3	1.1E-11	3.5	1.3E-11	3.2	1.5E-13	2.0	7.3E-20	2.3
1968	9.1E-10	2.3	1.1E-11	3.2	1.6E-11	3.3	1.5E-13	2.1	8.8E-20	2.3
1969	2.4E-09	2.2	1.1E-11	3.2	4.0E-11	3.5	1.6E-13	2.1	2.4E-19	2.2
1970	7.0E-10	2.2	1.2E-11	3.1	1.2E-11	3.2	1.6E-13	2.1	6.8E-20	2.2
1971	1.4E-10	2.2	1.2E-11	3.3	2.9E-12	3.0	1.6E-13	2.1	1.3E-20	2.2
1972	1.1E-10	2.2	1.2E-11	3.3	2.5E-12	3.3	1.6E-13	2.0	1.1E-20	2.3
1973	1.2E-10	2.2	1.2E-11	3.2	2.5E-12	3.0	1.6E-13	2.1	1.1E-20	2.2
1974	2.1E-09	2.3	1.2E-11	3.2	3.5E-11	3.4	1.6E-13	2.1	2.0E-19	2.3
1975	2.3E-11	2.2	1.2E-11	3.3	8.3E-13	3.6	1.6E-13	2.0	2.2E-21	2.2
1976	9.1E-12	2.2	1.2E-11	3.3	4.9E-13	4.1	1.6E-13	2.0	8.8E-22	2.3
1977	9.1E-12	2.2	1.2E-11	3.2	4.9E-13	4.0	1.6E-13	2.1	8.8E-22	2.3
1978	6.3E-12	2.2	1.2E-11	3.1	4.1E-13	4.4	1.6E-13	2.1	6.1E-22	2.2
1979	1.3E-11	2.2	1.2E-11	3.2	5.8E-13	4.0	1.6E-13	2.1	1.2E-21	2.3
1980	2.8E-11	2.3	1.2E-11	3.3	9.3E-13	3.5	1.6E-13	2.0	2.7E-21	2.2
1981	1.9E-11	2.3	1.2E-11	3.2	7.3E-13	3.8	1.6E-13	2.1	1.9E-21	2.2
1982	4.5E-11	2.2	1.2E-11	3.4	1.3E-12	3.4	1.6E-13	2.1	4.4E-21	2.2
1983	1.7E-10	2.2	1.2E-11	3.3	3.6E-12	3.0	1.6E-13	2.1	1.7E-20	2.2
1984	1.7E-10	2.2	1.2E-11	3.3	3.5E-12	3.4	1.6E-13	2.0	1.7E-20	2.3
1985	2.1E-11	2.2	1.2E-11	3.2	7.9E-13	3.9	1.6E-13	2.0	2.0E-21	2.3
1986	6.6E-11	2.3	1.2E-11	3.2	1.7E-12	3.1	1.6E-13	2.0	6.4E-21	2.3
1987	3.5E-11	2.2	1.2E-11	3.0	1.1E-12	3.5	1.7E-13	2.1	3.4E-21	2.3
1988	3.5E-11	2.2	1.2E-11	3.4	1.1E-12	3.7	1.7E-13	2.0	3.4E-21	2.2
1989	1.0E-11	2.2	1.2E-11	3.1	5.2E-13	4.1	1.6E-13	2.0	1.0E-21	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240 (continued)
Sector 11
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	GSD	Milk Ingestion GM (Sv/year)	GSD	Beef Ingestion GM (Sv/year)	GSD	Inhalation of Resuspended Particulates GM (Sv/year)	GSD	Immersion in Resuspended Particulates GM (Sv/year)	GSD	Total Dose GM (Sv/year)	GSD
1953	4.2E-18	9.4	4.2E-18	4.9	3.0E-17	4.3	9.2E-16	3.1	8.9E-26	3.1	3.8E-12	2.2
1954	1.4E-16	9.4	1.4E-16	4.9	9.8E-16	3.8	3.2E-14	3.0	3.1E-24	3.0	1.2E-10	2.2
1955	3.3E-16	9.5	1.7E-16	4.7	1.2E-15	4.0	7.2E-14	2.8	7.0E-24	2.8	1.4E-10	2.2
1956	9.1E-16	8.9	5.3E-16	4.5	3.8E-15	4.2	2.0E-13	2.7	1.9E-23	2.7	4.5E-10	2.2
1957	3.3E-14	10.0	3.2E-14	4.8	2.3E-13	4.6	7.4E-12	3.1	7.1E-22	3.1	2.9E-08	2.3
1958	4.3E-14	9.3	9.2E-15	4.7	6.6E-14	3.6	9.4E-12	2.9	9.1E-22	2.8	5.9E-09	2.2
1959	4.7E-14	9.1	5.8E-15	4.2	4.0E-14	3.6	1.0E-11	2.8	9.9E-22	2.9	2.5E-09	2.2
1960	5.0E-14	9.0	5.9E-15	4.3	4.1E-14	3.7	1.1E-11	2.9	1.1E-21	2.8	2.5E-09	2.2
1961	5.5E-14	9.1	6.6E-15	4.3	4.7E-14	3.6	1.2E-11	2.7	1.2E-21	2.8	2.9E-09	2.2
1962	6.4E-14	8.7	1.1E-14	4.2	7.5E-14	3.6	1.4E-11	2.6	1.4E-21	2.7	5.9E-09	2.2
1963	7.4E-14	9.1	1.2E-14	4.2	8.8E-14	3.5	1.6E-11	2.7	1.6E-21	2.8	7.0E-09	2.2
1964	8.2E-14	8.6	1.1E-14	3.9	7.7E-14	3.4	1.8E-11	2.7	1.7E-21	2.8	5.4E-09	2.2
1965	9.9E-14	9.1	2.0E-14	4.1	1.4E-13	3.8	2.2E-11	2.7	2.1E-21	2.7	1.2E-08	2.3
1966	1.0E-13	8.7	5.9E-15	4.0	4.0E-14	3.5	2.2E-11	2.6	2.1E-21	2.6	6.7E-10	2.1
1967	1.0E-13	8.9	6.2E-15	4.4	4.2E-14	3.5	2.2E-11	2.6	2.2E-21	2.6	8.4E-10	2.2
1968	1.0E-13	8.9	6.6E-15	4.0	4.5E-14	3.5	2.3E-11	2.6	2.2E-21	2.6	1.0E-09	2.2
1969	1.1E-13	8.3	9.0E-15	4.0	6.2E-14	3.6	2.4E-11	2.4	2.3E-21	2.5	2.6E-09	2.2
1970	1.1E-13	9.1	6.4E-15	4.3	4.3E-14	3.3	2.4E-11	2.6	2.3E-21	2.5	7.9E-10	2.1
1971	1.1E-13	8.3	5.4E-15	4.2	3.6E-14	3.6	2.4E-11	2.7	2.3E-21	2.6	2.0E-10	1.9
1972	1.1E-13	8.9	5.3E-15	4.3	3.5E-14	3.4	2.4E-11	2.5	2.3E-21	2.6	1.8E-10	1.9
1973	1.1E-13	8.5	5.4E-15	4.3	3.5E-14	3.6	2.4E-11	2.6	2.3E-21	2.7	1.8E-10	1.9
1974	1.1E-13	8.8	8.7E-15	4.0	6.0E-14	3.3	2.5E-11	2.5	2.4E-21	2.5	2.2E-09	2.2
1975	1.1E-13	9.2	5.3E-15	4.1	3.5E-14	3.6	2.5E-11	2.6	2.4E-21	2.6	7.6E-11	1.9
1976	1.1E-13	8.9	5.3E-15	4.4	3.5E-14	3.8	2.5E-11	2.6	2.4E-21	2.6	5.9E-11	2.0
1977	1.1E-13	9.5	5.3E-15	4.4	3.5E-14	4.1	2.5E-11	2.6	2.4E-21	2.7	5.9E-11	2.0
1978	1.1E-13	9.0	5.3E-15	4.3	3.5E-14	3.6	2.5E-11	2.6	2.4E-21	2.6	5.5E-11	2.0
1979	1.1E-13	9.1	5.3E-15	4.3	3.5E-14	3.6	2.5E-11	2.6	2.4E-21	2.6	6.4E-11	2.0
1980	1.1E-13	9.1	5.3E-15	4.4	3.5E-14	3.7	2.5E-11	2.6	2.4E-21	2.7	8.4E-11	1.9
1981	1.1E-13	9.5	5.3E-15	4.0	3.5E-14	3.6	2.5E-11	2.5	2.4E-21	2.5	7.1E-11	1.9
1982	1.1E-13	9.0	5.4E-15	3.8	3.5E-14	3.5	2.5E-11	2.5	2.4E-21	2.6	1.1E-10	1.8
1983	1.1E-13	8.7	5.7E-15	4.2	3.8E-14	3.6	2.5E-11	2.6	2.4E-21	2.6	2.4E-10	2.0
1984	1.1E-13	8.5	5.7E-15	4.2	3.8E-14	3.6	2.5E-11	2.6	2.4E-21	2.6	2.4E-10	1.9
1985	1.1E-13	9.0	5.4E-15	4.1	3.5E-14	3.9	2.5E-11	2.5	2.4E-21	2.5	7.5E-11	1.9
1986	1.1E-13	8.9	5.5E-15	4.3	3.6E-14	3.4	2.5E-11	2.6	2.4E-21	2.6	1.3E-10	1.9
1987	1.1E-13	8.9	5.4E-15	4.2	3.5E-14	3.6	2.5E-11	2.6	2.4E-21	2.7	9.1E-11	1.9
1988	1.1E-13	8.8	5.4E-15	3.8	3.6E-14	3.4	2.5E-11	2.7	2.4E-21	2.6	9.2E-11	1.9
1989	1.1E-13	8.4	5.3E-15	4.2	3.5E-14	3.6	2.5E-11	2.5	2.4E-21	2.5	6.0E-11	2.0

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240
Sector 12
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	1.2E-11	2.2	1.5E-15	3.7	2.0E-13	3.3	2.0E-17	2.6	1.2E-21	2.3
1954	4.0E-10	2.2	5.1E-14	3.6	6.4E-12	3.3	7.0E-16	2.5	3.9E-20	2.2
1955	4.5E-10	2.2	1.2E-13	3.5	7.2E-12	3.1	1.6E-15	2.4	4.3E-20	2.2
1956	1.4E-09	2.3	3.2E-13	3.6	2.3E-11	3.3	4.4E-15	2.2	1.4E-19	2.1
1957	9.2E-08	2.2	1.2E-11	3.8	1.5E-09	3.2	1.6E-13	2.5	8.9E-18	2.3
1958	1.9E-08	2.2	1.5E-11	3.5	3.1E-10	3.2	2.1E-13	2.3	1.9E-18	2.2
1959	8.1E-09	2.2	1.7E-11	3.6	1.3E-10	3.2	2.3E-13	2.2	7.8E-19	2.2
1960	8.1E-09	2.2	1.8E-11	3.3	1.3E-10	3.4	2.5E-13	2.2	7.8E-19	2.2
1961	9.2E-09	2.3	2.0E-11	3.2	1.5E-10	3.2	2.7E-13	2.1	8.9E-19	2.2
1962	1.9E-08	2.2	2.3E-11	3.2	3.1E-10	3.2	3.1E-13	2.1	1.9E-18	2.2
1963	2.3E-08	2.3	2.6E-11	3.3	3.7E-10	3.3	3.6E-13	2.1	2.2E-18	2.2
1964	1.7E-08	2.3	2.9E-11	3.3	2.8E-10	3.2	4.0E-13	2.1	1.7E-18	2.4
1965	4.0E-08	2.2	3.6E-11	3.1	6.5E-10	3.3	4.8E-13	2.0	3.9E-18	2.2
1966	2.0E-09	2.2	3.6E-11	3.4	3.5E-11	3.0	4.9E-13	2.1	1.9E-19	2.2
1967	2.5E-09	2.3	3.6E-11	3.3	4.4E-11	3.2	5.0E-13	2.0	2.4E-19	2.2
1968	3.0E-09	2.2	3.7E-11	3.3	5.2E-11	3.2	5.0E-13	2.0	2.9E-19	2.2
1969	8.1E-09	2.3	3.8E-11	3.5	1.3E-10	3.5	5.2E-13	2.0	7.9E-19	2.2
1970	2.3E-09	2.2	3.8E-11	3.2	4.1E-11	3.2	5.3E-13	2.0	2.2E-19	2.3
1971	4.6E-10	2.2	3.9E-11	3.1	9.8E-12	3.1	5.3E-13	2.0	4.4E-20	2.2
1972	3.8E-10	2.2	3.9E-11	3.2	8.3E-12	3.3	5.3E-13	2.0	3.7E-20	2.2
1973	3.8E-10	2.3	3.9E-11	3.1	8.6E-12	3.0	5.3E-13	2.0	3.7E-20	2.3
1974	6.9E-09	2.2	4.0E-11	3.2	1.2E-10	3.3	5.4E-13	2.0	6.7E-19	2.3
1975	7.5E-11	2.2	4.0E-11	3.3	2.7E-12	3.3	5.4E-13	2.0	7.3E-21	2.2
1976	3.0E-11	2.3	4.0E-11	3.2	1.6E-12	3.8	5.5E-13	2.0	2.9E-21	2.3
1977	3.0E-11	2.2	4.0E-11	3.3	1.6E-12	4.2	5.5E-13	2.0	2.9E-21	2.2
1978	2.1E-11	2.3	4.0E-11	3.2	1.4E-12	4.3	5.4E-13	2.0	2.0E-21	2.3
1979	4.2E-11	2.3	4.0E-11	3.3	2.0E-12	4.1	5.4E-13	1.9	4.0E-21	2.2
1980	9.2E-11	2.2	4.0E-11	3.2	3.1E-12	3.6	5.5E-13	2.0	8.9E-21	2.2
1981	6.4E-11	2.1	4.0E-11	3.3	2.4E-12	3.3	5.5E-13	2.0	6.2E-21	2.2
1982	1.5E-10	2.2	4.0E-11	3.3	4.3E-12	3.2	5.5E-13	2.0	1.5E-20	2.2
1983	5.8E-10	2.2	4.0E-11	3.1	1.2E-11	3.1	5.5E-13	2.0	5.6E-20	2.2
1984	5.8E-10	2.2	4.0E-11	3.3	1.2E-11	3.1	5.5E-13	2.0	5.6E-20	2.2
1985	6.9E-11	2.2	4.0E-11	3.1	2.6E-12	3.7	5.5E-13	2.0	6.7E-21	2.2
1986	2.2E-10	2.3	4.0E-11	3.1	5.4E-12	3.3	5.5E-13	2.1	2.1E-20	2.2
1987	1.2E-10	2.2	4.0E-11	3.2	3.5E-12	3.3	5.5E-13	2.0	1.1E-20	2.2
1988	1.2E-10	2.2	4.0E-11	3.2	3.5E-12	3.4	5.5E-13	2.0	1.1E-20	2.2
1989	3.4E-11	2.2	4.0E-11	3.1	1.7E-12	4.0	5.5E-13	2.0	3.3E-21	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240 (continued)
Sector 12
(1953 - 1989)

Year	Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	1.4E-17	9.2	1.4E-17	4.7	1.0E-16	4.0	3.1E-15	3.1	3.0E-25	3.2	1.2E-11	2.2
1954	4.8E-16	9.3	4.6E-16	4.8	3.3E-15	4.4	1.1E-13	3.0	1.0E-23	3.0	4.1E-10	2.2
1955	1.1E-15	9.4	5.6E-16	4.3	4.0E-15	4.1	2.4E-13	2.7	2.4E-23	2.8	4.6E-10	2.2
1956	3.0E-15	8.5	1.8E-15	4.6	1.3E-14	3.6	6.7E-13	2.8	6.4E-23	2.7	1.5E-09	2.2
1957	1.1E-13	9.6	1.1E-13	5.1	7.6E-13	4.5	2.4E-11	3.1	2.4E-21	3.1	9.5E-08	2.2
1958	1.4E-13	9.5	3.1E-14	4.2	2.2E-13	3.7	3.1E-11	2.8	3.0E-21	2.7	2.0E-08	2.2
1959	1.5E-13	8.8	1.9E-14	4.1	1.3E-13	3.6	3.4E-11	2.6	3.3E-21	2.7	8.4E-09	2.2
1960	1.7E-13	9.4	2.0E-14	4.0	1.4E-13	3.3	3.7E-11	2.7	3.6E-21	2.7	8.4E-09	2.2
1961	1.8E-13	9.1	2.2E-14	3.9	1.5E-13	3.6	4.1E-11	2.7	3.9E-21	2.7	9.6E-09	2.2
1962	2.1E-13	9.3	3.4E-14	4.4	2.4E-13	3.5	4.7E-11	2.7	4.5E-21	2.7	2.0E-08	2.2
1963	2.5E-13	8.5	4.2E-14	4.3	2.9E-13	3.5	5.5E-11	2.5	5.3E-21	2.5	2.3E-08	2.3
1964	2.7E-13	9.1	3.7E-14	3.9	2.6E-13	3.6	6.0E-11	2.6	5.8E-21	2.6	1.8E-08	2.2
1965	3.3E-13	9.1	6.6E-14	4.3	4.7E-13	3.5	7.4E-11	2.5	7.1E-21	2.6	4.1E-08	2.2
1966	3.3E-13	8.6	2.0E-14	4.1	1.3E-13	3.3	7.4E-11	2.5	7.2E-21	2.5	2.2E-09	2.0
1967	3.4E-13	8.9	2.0E-14	4.1	1.4E-13	3.5	7.5E-11	2.5	7.2E-21	2.4	2.8E-09	2.2
1968	3.4E-13	8.8	2.2E-14	3.9	1.4E-13	3.3	7.6E-11	2.4	7.3E-21	2.5	3.3E-09	2.1
1969	3.5E-13	8.8	3.0E-14	4.2	2.0E-13	3.2	7.9E-11	2.5	7.6E-21	2.5	8.6E-09	2.2
1970	3.6E-13	8.8	2.1E-14	3.9	1.5E-13	3.4	7.9E-11	2.5	7.7E-21	2.5	2.6E-09	2.1
1971	3.6E-13	8.3	1.8E-14	3.9	1.2E-13	3.3	8.0E-11	2.5	7.7E-21	2.6	6.7E-10	1.9
1972	3.6E-13	8.6	1.8E-14	4.1	1.2E-13	3.5	8.0E-11	2.5	7.7E-21	2.6	5.8E-10	1.9
1973	3.6E-13	8.9	1.8E-14	3.9	1.2E-13	3.7	8.0E-11	2.5	7.7E-21	2.7	5.9E-10	2.0
1974	3.7E-13	9.0	2.9E-14	4.0	2.0E-13	3.5	8.2E-11	2.5	7.9E-21	2.6	7.4E-09	2.2
1975	3.7E-13	8.4	1.8E-14	4.2	1.2E-13	3.6	8.2E-11	2.6	8.0E-21	2.6	2.6E-10	1.9
1976	3.7E-13	8.8	1.8E-14	4.5	1.2E-13	3.8	8.2E-11	2.7	8.0E-21	2.7	2.0E-10	2.0
1977	3.7E-13	8.8	1.8E-14	3.9	1.2E-13	3.5	8.2E-11	2.5	8.0E-21	2.5	2.0E-10	1.9
1978	3.7E-13	8.7	1.8E-14	4.1	1.2E-13	3.6	8.2E-11	2.5	8.0E-21	2.5	1.8E-10	2.0
1979	3.7E-13	9.4	1.8E-14	4.1	1.2E-13	3.8	8.2E-11	2.5	8.0E-21	2.6	2.1E-10	1.9
1980	3.7E-13	8.3	1.8E-14	4.2	1.2E-13	3.4	8.2E-11	2.5	8.0E-21	2.5	2.8E-10	1.8
1981	3.7E-13	8.1	1.8E-14	4.0	1.2E-13	4.0	8.2E-11	2.6	8.0E-21	2.7	2.4E-10	1.9
1982	3.7E-13	9.3	1.8E-14	4.3	1.2E-13	3.5	8.2E-11	2.5	8.0E-21	2.6	3.4E-10	1.8
1983	3.7E-13	8.5	1.9E-14	4.0	1.2E-13	3.6	8.3E-11	2.6	8.0E-21	2.6	8.1E-10	2.0
1984	3.7E-13	8.6	1.9E-14	4.4	1.3E-13	3.5	8.3E-11	2.6	8.0E-21	2.5	8.1E-10	2.0
1985	3.8E-13	8.5	1.8E-14	4.2	1.2E-13	3.8	8.3E-11	2.4	8.0E-21	2.6	2.4E-10	1.9
1986	3.7E-13	8.6	1.8E-14	4.1	1.2E-13	3.7	8.3E-11	2.5	8.0E-21	2.4	4.2E-10	1.9
1987	3.8E-13	8.9	1.8E-14	4.0	1.2E-13	3.5	8.3E-11	2.5	8.0E-21	2.6	3.0E-10	1.9
1988	3.7E-13	8.8	1.8E-14	4.1	1.2E-13	3.6	8.3E-11	2.5	8.0E-21	2.5	3.0E-10	1.8
1989	3.7E-13	8.7	1.8E-14	3.9	1.2E-13	3.7	8.3E-11	2.6	8.0E-21	2.5	2.0E-10	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240
Denver
(1953 - 1989)

Year	Inhalation		Soil Ingestion		Vegetable Ingestion		Ground Exposure		Immersion	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	4.9E-12	2.2	5.9E-16	3.9	7.8E-14	3.3	8.1E-18	2.7	4.7E-22	2.3
1954	1.6E-10	2.3	2.1E-14	3.9	2.6E-12	3.3	2.8E-16	2.5	1.5E-20	2.2
1955	1.8E-10	2.2	4.7E-14	3.5	2.9E-12	3.2	6.4E-16	2.2	1.7E-20	2.2
1956	5.8E-10	2.3	1.3E-13	3.4	9.3E-12	3.3	1.8E-15	2.2	5.6E-20	2.3
1957	3.7E-08	2.2	4.7E-12	3.5	6.0E-10	3.5	6.4E-14	2.5	3.6E-18	2.2
1958	7.6E-09	2.3	6.0E-12	3.6	1.2E-10	3.2	8.2E-14	2.3	7.4E-19	2.2
1959	3.2E-09	2.3	6.6E-12	3.5	5.3E-11	3.3	9.0E-14	2.3	3.1E-19	2.3
1960	3.2E-09	2.2	7.1E-12	3.5	5.3E-11	3.1	9.8E-14	2.2	3.1E-19	2.3
1961	3.7E-09	2.2	7.8E-12	3.5	6.0E-11	3.4	1.1E-13	2.2	3.6E-19	2.2
1962	7.6E-09	2.2	9.0E-12	3.5	1.2E-10	3.3	1.2E-13	2.2	7.4E-19	2.2
1963	9.0E-09	2.2	1.0E-11	3.2	1.5E-10	3.4	1.4E-13	2.0	8.7E-19	2.3
1964	6.9E-09	2.2	1.2E-11	3.1	1.1E-10	3.2	1.6E-13	2.1	6.7E-19	2.3
1965	1.6E-08	2.3	1.4E-11	3.4	2.6E-10	3.4	1.9E-13	2.0	1.5E-18	2.3
1966	7.9E-10	2.2	1.4E-11	3.4	1.4E-11	3.1	1.9E-13	2.0	7.6E-20	2.3
1967	9.9E-10	2.3	1.4E-11	3.1	1.7E-11	3.1	2.0E-13	2.1	9.6E-20	2.3
1968	1.2E-09	2.3	1.5E-11	3.4	2.1E-11	3.1	2.0E-13	2.1	1.2E-19	2.3
1969	3.2E-09	2.3	1.5E-11	3.3	5.4E-11	3.2	2.1E-13	2.0	3.1E-19	2.2
1970	9.2E-10	2.2	1.5E-11	3.3	1.6E-11	3.2	2.1E-13	2.0	9.0E-20	2.2
1971	1.8E-10	2.2	1.5E-11	3.2	3.9E-12	3.1	2.1E-13	2.1	1.8E-20	2.3
1972	1.5E-10	2.2	1.5E-11	3.1	3.4E-12	3.1	2.1E-13	2.0	1.5E-20	2.3
1973	1.5E-10	2.2	1.5E-11	3.2	3.4E-12	3.1	2.1E-13	2.1	1.5E-20	2.2
1974	2.8E-09	2.2	1.6E-11	3.1	4.6E-11	3.4	2.2E-13	2.0	2.7E-19	2.3
1975	3.0E-11	2.2	1.6E-11	3.3	1.1E-12	3.5	2.2E-13	2.0	2.9E-21	2.3
1976	1.2E-11	2.2	1.6E-11	3.2	6.5E-13	4.2	2.2E-13	2.0	1.2E-21	2.2
1977	1.2E-11	2.2	1.6E-11	3.3	6.5E-13	4.2	2.2E-13	2.0	1.2E-21	2.3
1978	8.3E-12	2.2	1.6E-11	3.3	5.3E-13	4.4	2.2E-13	2.0	8.1E-22	2.2
1979	1.7E-11	2.2	1.6E-11	3.1	7.7E-13	4.0	2.2E-13	2.0	1.6E-21	2.2
1980	3.7E-11	2.2	1.6E-11	3.1	1.2E-12	3.4	2.2E-13	2.0	3.6E-21	2.3
1981	2.5E-11	2.2	1.6E-11	3.2	9.4E-13	3.5	2.2E-13	2.0	2.5E-21	2.2
1982	6.0E-11	2.2	1.6E-11	3.3	1.7E-12	3.4	2.2E-13	2.0	5.8E-21	2.3
1983	2.3E-10	2.3	1.6E-11	3.2	4.9E-12	3.1	2.2E-13	2.0	2.2E-20	2.3
1984	2.3E-10	2.2	1.6E-11	3.2	4.7E-12	3.1	2.2E-13	2.0	2.2E-20	2.2
1985	2.8E-11	2.2	1.6E-11	3.3	1.0E-12	3.5	2.2E-13	2.0	2.7E-21	2.2
1986	8.8E-11	2.2	1.6E-11	3.3	2.2E-12	3.3	2.2E-13	2.0	8.5E-21	2.2
1987	4.6E-11	2.3	1.6E-11	3.3	1.4E-12	3.4	2.2E-13	2.0	4.5E-21	2.3
1988	4.6E-11	2.3	1.6E-11	3.3	1.5E-12	3.3	2.2E-13	2.0	4.5E-21	2.3
1989	1.4E-11	2.2	1.6E-11	3.2	7.1E-13	3.9	2.2E-13	2.0	1.3E-21	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240 (continued)
Denver
(1953 - 1989)

Year	Wheat Ingestion GM (Sv/year)	GSD	Milk Ingestion GM (Sv/year)	GSD	Beef Ingestion GM (Sv/year)	GSD	Inhalation of Resuspended Particulates GM (Sv/year)	GSD	Immersion in Resuspended Particulates GM (Sv/year)	GSD	Total Dose GM (Sv/year)	GSD
1953	5.6E-18	10.0	5.5E-18	4.6	4.0E-17	4.3	1.2E-15	3.2	1.2E-25	3.4	5.0E-12	2.2
1954	1.9E-16	9.3	1.8E-16	4.7	1.3E-15	3.8	4.2E-14	3.2	4.1E-24	3.2	1.6E-10	2.2
1955	4.4E-16	9.4	2.2E-16	4.3	1.6E-15	4.0	9.7E-14	2.7	9.4E-24	2.7	1.8E-10	2.2
1956	1.2E-15	9.6	7.0E-16	4.6	5.1E-15	4.2	2.6E-13	2.7	2.6E-23	2.6	5.9E-10	2.2
1957	4.4E-14	8.9	4.2E-14	5.2	3.0E-13	4.2	9.7E-12	3.0	9.4E-22	3.2	3.8E-08	2.2
1958	5.6E-14	10.1	1.2E-14	4.1	8.7E-14	4.0	1.2E-11	2.7	1.2E-21	2.8	7.9E-09	2.3
1959	6.2E-14	9.1	7.5E-15	4.0	5.3E-14	3.5	1.4E-11	2.6	1.3E-21	2.7	3.4E-09	2.2
1960	6.7E-14	9.7	7.9E-15	4.0	5.6E-14	3.4	1.5E-11	2.7	1.4E-21	2.8	3.4E-09	2.1
1961	7.3E-14	9.2	8.8E-15	4.2	6.0E-14	3.4	1.6E-11	2.7	1.6E-21	2.7	3.9E-09	2.2
1962	8.4E-14	8.9	1.4E-14	4.1	9.9E-14	3.5	1.9E-11	2.5	1.8E-21	2.5	7.9E-09	2.2
1963	9.8E-14	9.1	1.6E-14	4.1	1.2E-13	3.7	2.2E-11	2.7	2.1E-21	2.6	9.3E-09	2.2
1964	1.1E-13	8.4	1.5E-14	4.3	1.0E-13	3.6	2.4E-11	2.5	2.3E-21	2.6	7.2E-09	2.2
1965	1.3E-13	9.0	2.6E-14	4.7	1.9E-13	3.8	2.9E-11	2.6	2.8E-21	2.6	1.6E-08	2.3
1966	1.3E-13	8.9	7.7E-15	4.1	5.2E-14	3.4	2.9E-11	2.5	2.8E-21	2.5	8.9E-10	2.1
1967	1.3E-13	8.2	8.1E-15	3.8	5.5E-14	3.3	3.0E-11	2.6	2.9E-21	2.6	1.1E-09	2.2
1968	1.4E-13	9.2	8.7E-15	4.2	5.8E-14	3.6	3.0E-11	2.5	2.9E-21	2.6	1.3E-09	2.2
1969	1.4E-13	9.0	1.2E-14	4.0	8.0E-14	3.2	3.1E-11	2.5	3.0E-21	2.5	3.4E-09	2.2
1970	1.4E-13	8.5	8.4E-15	4.4	5.7E-14	3.4	3.1E-11	2.5	3.0E-21	2.5	1.0E-09	2.1
1971	1.4E-13	8.7	7.1E-15	3.9	4.7E-14	3.6	3.2E-11	2.5	3.1E-21	2.5	2.7E-10	1.9
1972	1.4E-13	8.8	7.0E-15	4.3	4.7E-14	3.8	3.2E-11	2.4	3.1E-21	2.4	2.3E-10	1.9
1973	1.4E-13	8.6	7.1E-15	4.4	4.7E-14	3.6	3.2E-11	2.5	3.1E-21	2.5	2.4E-10	1.9
1974	1.5E-13	8.9	1.1E-14	3.9	7.8E-14	3.3	3.3E-11	2.5	3.1E-21	2.5	2.9E-09	2.1
1975	1.5E-13	8.5	7.0E-15	4.2	4.6E-14	3.5	3.3E-11	2.4	3.2E-21	2.4	1.0E-10	1.8
1976	1.5E-13	8.9	7.0E-15	4.3	4.6E-14	3.4	3.3E-11	2.5	3.2E-21	2.5	7.8E-11	2.0
1977	1.5E-13	8.9	7.0E-15	4.1	4.6E-14	3.7	3.3E-11	2.5	3.2E-21	2.5	7.8E-11	2.0
1978	1.5E-13	8.6	7.0E-15	4.2	4.6E-14	3.7	3.3E-11	2.5	3.2E-21	2.5	7.2E-11	2.0
1979	1.5E-13	9.0	7.0E-15	3.8	4.6E-14	3.5	3.3E-11	2.5	3.2E-21	2.5	8.4E-11	1.9
1980	1.5E-13	8.7	7.1E-15	4.0	4.7E-14	3.7	3.3E-11	2.6	3.2E-21	2.5	1.1E-10	1.9
1981	1.5E-13	8.4	7.0E-15	4.3	4.6E-14	3.7	3.3E-11	2.5	3.1E-21	2.5	9.5E-11	1.8
1982	1.5E-13	8.7	7.1E-15	4.1	4.7E-14	4.0	3.3E-11	2.5	3.2E-21	2.5	1.4E-10	1.8
1983	1.5E-13	8.6	7.4E-15	4.0	5.0E-14	3.3	3.3E-11	2.5	3.2E-21	2.5	3.2E-10	2.0
1984	1.5E-13	8.8	7.5E-15	4.2	4.9E-14	3.5	3.3E-11	2.6	3.2E-21	2.6	3.3E-10	1.9
1985	1.5E-13	8.6	7.0E-15	3.8	4.6E-14	3.4	3.3E-11	2.5	3.2E-21	2.5	9.8E-11	1.9
1986	1.5E-13	8.9	7.2E-15	4.1	4.7E-14	3.7	3.3E-11	2.6	3.2E-21	2.5	1.7E-10	1.9
1987	1.5E-13	9.1	7.1E-15	3.8	4.7E-14	3.7	3.3E-11	2.5	3.2E-21	2.5	1.2E-10	1.9
1988	1.5E-13	9.0	7.1E-15	4.3	4.7E-14	3.5	3.3E-11	2.5	3.2E-21	2.5	1.2E-10	1.9
1989	1.5E-13	8.7	7.0E-15	4.2	4.6E-14	3.7	3.3E-11	2.6	3.2E-21	2.6	8.1E-11	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240
Lakewood
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	5.7E-12	2.2	7.0E-16	3.8	9.2E-14	3.3	9.6E-18	2.7	5.5E-22	2.2
1954	1.9E-10	2.2	2.4E-14	3.8	3.0E-12	3.3	3.3E-16	2.5	1.8E-20	2.2
1955	2.1E-10	2.2	5.6E-14	3.5	3.4E-12	3.5	7.6E-16	2.3	2.0E-20	2.2
1956	6.8E-10	2.2	1.5E-13	3.4	1.1E-11	3.5	2.1E-15	2.3	6.6E-20	2.1
1957	4.4E-08	2.3	5.6E-12	3.7	7.0E-10	3.2	7.7E-14	2.6	4.2E-18	2.2
1958	9.0E-09	2.3	7.2E-12	3.4	1.5E-10	3.2	9.8E-14	2.4	8.7E-19	2.2
1959	3.8E-09	2.3	7.8E-12	3.4	6.3E-11	3.3	1.1E-13	2.3	3.7E-19	2.2
1960	3.8E-09	2.2	8.5E-12	3.4	6.3E-11	3.2	1.2E-13	2.2	3.7E-19	2.3
1961	4.4E-09	2.2	9.2E-12	3.4	7.1E-11	3.4	1.3E-13	2.2	4.2E-19	2.3
1962	9.0E-09	2.2	1.1E-11	3.5	1.5E-10	3.4	1.5E-13	2.2	8.7E-19	2.2
1963	1.1E-08	2.2	1.3E-11	3.5	1.7E-10	3.2	1.7E-13	2.1	1.0E-18	2.2
1964	8.2E-09	2.2	1.4E-11	3.4	1.3E-10	3.1	1.9E-13	2.1	7.9E-19	2.2
1965	1.9E-08	2.2	1.7E-11	3.2	3.1E-10	3.3	2.3E-13	2.1	1.8E-18	2.2
1966	9.3E-10	2.2	1.7E-11	3.3	1.7E-11	3.2	2.3E-13	2.1	9.0E-20	2.2
1967	1.2E-09	2.2	1.7E-11	3.3	2.0E-11	3.3	2.3E-13	2.1	1.1E-19	2.2
1968	1.4E-09	2.3	1.7E-11	3.3	2.4E-11	3.2	2.4E-13	2.1	1.4E-19	2.3
1969	3.8E-09	2.3	1.8E-11	3.3	6.4E-11	3.2	2.5E-13	2.1	3.7E-19	2.3
1970	1.1E-09	2.3	1.8E-11	3.2	1.9E-11	3.0	2.5E-13	2.0	1.1E-19	2.3
1971	2.2E-10	2.3	1.8E-11	3.3	4.7E-12	3.1	2.5E-13	2.1	2.1E-20	2.2
1972	1.8E-10	2.2	1.8E-11	3.1	4.0E-12	3.0	2.5E-13	2.0	1.7E-20	2.2
1973	1.8E-10	2.2	1.8E-11	3.3	4.0E-12	3.4	2.5E-13	2.0	1.7E-20	2.3
1974	3.3E-09	2.2	1.9E-11	3.2	5.5E-11	3.3	2.6E-13	2.1	3.2E-19	2.3
1975	3.5E-11	2.3	1.9E-11	3.1	1.3E-12	3.8	2.6E-13	2.0	3.4E-21	2.3
1976	1.4E-11	2.3	1.9E-11	3.1	7.5E-13	4.1	2.6E-13	2.1	1.4E-21	2.2
1977	1.4E-11	2.2	1.9E-11	3.2	7.6E-13	4.1	2.6E-13	2.0	1.4E-21	2.2
1978	9.9E-12	2.2	1.9E-11	3.2	6.5E-13	4.4	2.6E-13	2.1	9.5E-22	2.2
1979	2.0E-11	2.3	1.9E-11	3.1	9.4E-13	3.9	2.6E-13	2.0	1.9E-21	2.3
1980	4.4E-11	2.2	1.9E-11	3.2	1.5E-12	3.6	2.6E-13	2.0	4.2E-21	2.2
1981	3.0E-11	2.2	1.9E-11	3.3	1.1E-12	3.7	2.6E-13	2.1	2.9E-21	2.2
1982	7.1E-11	2.2	1.9E-11	3.3	2.0E-12	3.2	2.6E-13	2.0	6.9E-21	2.2
1983	2.7E-10	2.2	1.9E-11	3.4	5.6E-12	2.9	2.6E-13	2.1	2.6E-20	2.2
1984	2.7E-10	2.2	1.9E-11	3.3	5.6E-12	3.0	2.6E-13	2.1	2.6E-20	2.2
1985	3.3E-11	2.2	1.9E-11	3.4	1.2E-12	3.6	2.6E-13	2.1	3.2E-21	2.2
1986	1.0E-10	2.3	1.9E-11	3.1	2.6E-12	3.3	2.6E-13	2.0	1.0E-20	2.2
1987	5.4E-11	2.3	1.9E-11	3.2	1.7E-12	3.5	2.6E-13	2.0	5.3E-21	2.3
1988	5.4E-11	2.2	1.9E-11	3.1	1.7E-12	3.3	2.6E-13	2.1	5.3E-21	2.1
1989	1.6E-11	2.3	1.9E-11	3.2	8.1E-13	4.1	2.6E-13	2.0	1.6E-21	2.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240 (continued)
Lakewood
(1953 - 1989)

Year	Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	6.6E-18	9.3	6.5E-18	4.7	4.7E-17	4.2	1.5E-15	3.2	1.4E-25	3.1	5.9E-12	2.2
1954	2.3E-16	10.1	2.2E-16	4.7	1.5E-15	4.2	5.0E-14	3.0	4.9E-24	3.1	1.9E-10	2.2
1955	5.2E-16	9.4	2.6E-16	4.6	1.9E-15	3.6	1.2E-13	2.7	1.1E-23	2.7	2.2E-10	2.2
1956	1.4E-15	9.0	8.4E-16	4.8	6.0E-15	4.0	3.1E-13	2.8	3.0E-23	2.8	7.0E-10	2.2
1957	5.2E-14	9.5	5.0E-14	4.9	3.6E-13	4.4	1.2E-11	3.1	1.1E-21	3.1	4.5E-08	2.3
1958	6.7E-14	8.8	1.5E-14	4.6	1.0E-13	3.7	1.5E-11	2.8	1.4E-21	2.9	9.3E-09	2.3
1959	7.3E-14	8.8	9.0E-15	4.3	6.3E-14	3.3	1.6E-11	2.8	1.6E-21	2.9	4.0E-09	2.2
1960	7.9E-14	9.4	9.4E-15	4.3	6.7E-14	3.5	1.8E-11	2.9	1.7E-21	2.9	4.0E-09	2.2
1961	8.6E-14	8.9	1.1E-14	4.0	7.3E-14	3.5	1.9E-11	2.7	1.9E-21	2.8	4.5E-09	2.2
1962	1.0E-13	9.2	1.7E-14	4.5	1.2E-13	3.5	2.2E-11	2.7	2.2E-21	2.8	9.3E-09	2.2
1963	1.2E-13	9.1	2.0E-14	4.2	1.4E-13	3.3	2.6E-11	2.6	2.5E-21	2.6	1.1E-08	2.2
1964	1.3E-13	8.9	1.7E-14	4.1	1.2E-13	3.6	2.9E-11	2.6	2.8E-21	2.7	8.5E-09	2.2
1965	1.6E-13	8.6	3.1E-14	4.4	2.2E-13	3.7	3.5E-11	2.6	3.4E-21	2.6	1.9E-08	2.2
1966	1.6E-13	9.6	9.2E-15	4.2	6.2E-14	3.3	3.5E-11	2.6	3.4E-21	2.5	1.1E-09	2.1
1967	1.6E-13	8.9	9.8E-15	4.1	6.6E-14	3.6	3.5E-11	2.7	3.4E-21	2.7	1.3E-09	2.1
1968	1.6E-13	8.1	1.0E-14	3.9	6.9E-14	3.5	3.6E-11	2.6	3.4E-21	2.6	1.6E-09	2.2
1969	1.7E-13	8.7	1.4E-14	3.8	9.4E-14	3.6	3.7E-11	2.5	3.6E-21	2.5	4.0E-09	2.2
1970	1.7E-13	8.9	1.0E-14	4.0	6.8E-14	3.6	3.8E-11	2.6	3.6E-21	2.6	1.2E-09	2.2
1971	1.7E-13	9.0	8.5E-15	4.0	5.7E-14	3.8	3.8E-11	2.6	3.6E-21	2.6	3.2E-10	2.0
1972	1.7E-13	8.8	8.4E-15	4.4	5.6E-14	3.5	3.8E-11	2.5	3.6E-21	2.4	2.7E-10	1.9
1973	1.7E-13	8.7	8.4E-15	4.4	5.5E-14	3.4	3.8E-11	2.6	3.6E-21	2.6	2.8E-10	1.9
1974	1.8E-13	9.1	1.4E-14	4.0	9.4E-14	3.2	3.9E-11	2.6	3.8E-21	2.6	3.5E-09	2.2
1975	1.7E-13	8.4	8.4E-15	4.3	5.5E-14	3.9	3.9E-11	2.5	3.8E-21	2.5	1.2E-10	1.8
1976	1.8E-13	8.8	8.3E-15	4.1	5.4E-14	3.7	3.9E-11	2.5	3.8E-21	2.4	9.1E-11	2.0
1977	1.8E-13	8.8	8.3E-15	4.3	5.5E-14	3.8	3.9E-11	2.5	3.8E-21	2.6	9.2E-11	1.9
1978	1.8E-13	8.8	8.3E-15	4.2	5.4E-14	3.5	3.9E-11	2.6	3.8E-21	2.6	8.6E-11	2.0
1979	1.8E-13	8.8	8.3E-15	4.0	5.5E-14	3.5	3.9E-11	2.6	3.8E-21	2.6	1.0E-10	1.9
1980	1.8E-13	8.7	8.4E-15	4.3	5.5E-14	3.7	3.9E-11	2.7	3.8E-21	2.7	1.3E-10	1.9
1981	1.8E-13	9.2	8.4E-15	4.1	5.5E-14	3.7	3.9E-11	2.6	3.8E-21	2.6	1.2E-10	1.9
1982	1.8E-13	8.9	8.5E-15	4.2	5.6E-14	3.7	3.9E-11	2.4	3.8E-21	2.5	1.6E-10	1.9
1983	1.8E-13	8.3	8.9E-15	4.3	5.9E-14	3.4	3.9E-11	2.4	3.8E-21	2.4	3.8E-10	1.9
1984	1.8E-13	8.4	8.9E-15	4.0	5.9E-14	3.6	3.9E-11	2.7	3.8E-21	2.6	3.8E-10	2.0
1985	1.8E-13	8.9	8.4E-15	4.1	5.5E-14	3.6	3.9E-11	2.5	3.8E-21	2.4	1.2E-10	1.9
1986	1.8E-13	8.7	8.6E-15	4.3	5.7E-14	3.6	3.9E-11	2.6	3.8E-21	2.5	2.0E-10	1.9
1987	1.8E-13	9.0	8.5E-15	4.3	5.6E-14	3.6	3.9E-11	2.6	3.8E-21	2.6	1.4E-10	1.9
1988	1.8E-13	9.0	8.4E-15	4.3	5.5E-14	3.7	3.9E-11	2.5	3.8E-21	2.5	1.4E-10	1.8
1989	1.8E-13	9.0	8.4E-15	4.0	5.5E-14	3.8	3.9E-11	2.6	3.8E-21	2.6	9.5E-11	2.0

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240
Longmont
(1953 - 1989)

Year	Inhalation GM (Sv/year)	Inhalation GSD	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Immersion GM (Sv/year)	Immersion GSD
1953	2.2E-12	2.2	2.6E-16	3.7	3.5E-14	3.4	3.6E-18	2.7	2.1E-22	2.3
1954	7.1E-11	2.3	9.1E-15	3.8	1.1E-12	3.1	1.2E-16	2.6	6.9E-21	2.2
1955	7.9E-11	2.2	2.1E-14	3.6	1.3E-12	3.3	2.9E-16	2.3	7.6E-21	2.2
1956	2.6E-10	2.2	5.7E-14	3.3	4.1E-12	3.4	7.8E-16	2.2	2.5E-20	2.3
1957	1.6E-08	2.3	2.1E-12	4.0	2.7E-10	3.2	2.9E-14	2.6	1.6E-18	2.3
1958	3.4E-09	2.3	2.7E-12	3.5	5.5E-11	3.3	3.7E-14	2.3	3.3E-19	2.2
1959	1.4E-09	2.3	2.9E-12	3.5	2.4E-11	3.5	4.0E-14	2.3	1.4E-19	2.3
1960	1.4E-09	2.2	3.2E-12	3.6	2.3E-11	3.3	4.4E-14	2.2	1.4E-19	2.3
1961	1.6E-09	2.2	3.5E-12	3.6	2.7E-11	3.5	4.8E-14	2.3	1.6E-19	2.2
1962	3.4E-09	2.2	4.0E-12	3.4	5.5E-11	3.2	5.5E-14	2.1	3.3E-19	2.3
1963	4.0E-09	2.2	4.7E-12	3.4	6.5E-11	3.4	6.4E-14	2.1	3.9E-19	2.3
1964	3.1E-09	2.2	5.2E-12	3.3	5.0E-11	3.3	7.1E-14	2.0	3.0E-19	2.2
1965	7.1E-09	2.2	6.3E-12	3.3	1.1E-10	3.2	8.6E-14	2.0	6.9E-19	2.2
1966	3.5E-10	2.3	6.3E-12	3.2	6.2E-12	3.2	8.7E-14	2.1	3.4E-20	2.3
1967	4.4E-10	2.3	6.4E-12	3.3	7.8E-12	3.2	8.8E-14	2.0	4.3E-20	2.3
1968	5.3E-10	2.3	6.5E-12	3.3	9.3E-12	3.2	8.9E-14	2.0	5.2E-20	2.3
1969	1.4E-09	2.2	6.8E-12	3.3	2.4E-11	3.2	9.2E-14	2.0	1.4E-19	2.3
1970	4.1E-10	2.2	6.8E-12	3.3	7.2E-12	3.0	9.3E-14	2.0	4.0E-20	2.3
1971	8.1E-11	2.2	6.8E-12	3.2	1.7E-12	2.9	9.3E-14	2.1	7.8E-21	2.2
1972	6.7E-11	2.2	6.8E-12	3.3	1.5E-12	3.1	9.4E-14	2.1	6.5E-21	2.2
1973	6.8E-11	2.2	6.8E-12	3.3	1.5E-12	3.0	9.4E-14	2.0	6.5E-21	2.3
1974	1.2E-09	2.2	7.0E-12	3.3	2.1E-11	3.3	9.6E-14	2.0	1.2E-19	2.2
1975	1.3E-11	2.3	7.0E-12	3.3	4.7E-13	3.7	9.6E-14	2.0	1.3E-21	2.3
1976	5.3E-12	2.2	7.0E-12	3.2	2.8E-13	4.2	9.6E-14	2.1	5.1E-22	2.2
1977	5.3E-12	2.2	7.0E-12	3.2	2.9E-13	4.2	9.6E-14	2.1	5.2E-22	2.2
1978	3.7E-12	2.3	7.0E-12	3.2	2.4E-13	4.4	9.6E-14	2.0	3.6E-22	2.2
1979	7.4E-12	2.2	7.1E-12	3.4	3.4E-13	4.0	9.7E-14	2.0	7.1E-22	2.3
1980	1.6E-11	2.3	7.0E-12	3.3	5.4E-13	3.6	9.6E-14	2.0	1.6E-21	2.2
1981	1.1E-11	2.2	7.1E-12	3.2	4.3E-13	3.7	9.7E-14	2.1	1.1E-21	2.2
1982	2.7E-11	2.2	7.1E-12	3.3	7.7E-13	3.4	9.7E-14	2.0	2.6E-21	2.2
1983	1.0E-10	2.2	7.1E-12	3.3	2.1E-12	3.1	9.7E-14	2.1	9.9E-21	2.2
1984	1.0E-10	2.2	7.1E-12	3.3	2.1E-12	3.1	9.7E-14	2.0	9.9E-21	2.3
1985	1.2E-11	2.3	7.1E-12	3.3	4.4E-13	3.6	9.7E-14	2.0	1.2E-21	2.3
1986	3.9E-11	2.2	7.1E-12	3.5	1.0E-12	3.2	9.7E-14	2.1	3.8E-21	2.2
1987	2.0E-11	2.3	7.1E-12	3.2	6.2E-13	3.4	9.7E-14	2.0	2.0E-21	2.3
1988	2.1E-11	2.3	7.1E-12	3.4	6.4E-13	3.4	9.7E-14	2.0	2.0E-21	2.3
1989	6.1E-12	2.2	7.1E-12	3.2	3.2E-13	3.9	9.7E-14	2.0	5.9E-22	2.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Routine Airborne Release of Plutonium-239/240 (continued)
Longmont
(1953 - 1989)

Year	Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1953	2.5E-18	9.0	2.5E-18	4.9	1.8E-17	4.2	5.5E-16	3.3	5.3E-26	3.3	2.2E-12	2.2
1954	8.5E-17	9.3	8.0E-17	4.5	5.8E-16	4.0	1.9E-14	3.1	1.8E-24	3.1	7.3E-11	2.2
1955	1.9E-16	9.0	9.8E-17	4.8	7.0E-16	4.2	4.3E-14	2.8	4.2E-24	2.8	8.1E-11	2.2
1956	5.3E-16	9.2	3.1E-16	4.5	2.2E-15	3.9	1.2E-13	2.7	1.1E-23	2.7	2.6E-10	2.2
1957	2.0E-14	9.1	1.9E-14	4.6	1.4E-13	4.5	4.3E-12	3.0	4.2E-22	3.1	1.7E-08	2.3
1958	2.5E-14	8.8	5.5E-15	4.3	3.9E-14	4.0	5.5E-12	2.8	5.4E-22	2.8	3.5E-09	2.2
1959	2.7E-14	8.9	3.4E-15	4.1	2.4E-14	3.6	6.1E-12	2.8	5.9E-22	2.8	1.5E-09	2.2
1960	3.0E-14	8.9	3.4E-15	4.0	2.4E-14	3.4	6.6E-12	2.8	6.4E-22	2.9	1.5E-09	2.2
1961	3.3E-14	9.1	3.9E-15	4.3	2.7E-14	3.5	7.2E-12	2.8	6.9E-22	2.8	1.7E-09	2.2
1962	3.8E-14	8.8	6.2E-15	4.3	4.4E-14	3.9	8.3E-12	2.7	8.1E-22	2.8	3.5E-09	2.2
1963	4.4E-14	8.6	7.2E-15	4.4	5.2E-14	3.5	9.7E-12	2.6	9.4E-22	2.6	4.1E-09	2.2
1964	4.8E-14	9.0	6.4E-15	4.4	4.5E-14	3.6	1.1E-11	2.6	1.0E-21	2.6	3.2E-09	2.2
1965	5.9E-14	8.6	1.2E-14	4.6	8.2E-14	3.7	1.3E-11	2.5	1.3E-21	2.6	7.3E-09	2.2
1966	5.9E-14	8.7	3.5E-15	3.9	2.3E-14	3.4	1.3E-11	2.7	1.3E-21	2.6	4.0E-10	2.1
1967	6.0E-14	8.5	3.6E-15	3.9	2.4E-14	3.4	1.3E-11	2.7	1.3E-21	2.7	4.9E-10	2.1
1968	6.1E-14	9.2	3.8E-15	4.1	2.6E-14	3.4	1.3E-11	2.5	1.3E-21	2.5	5.9E-10	2.2
1969	6.3E-14	8.7	5.3E-15	3.9	3.6E-14	3.4	1.4E-11	2.5	1.4E-21	2.6	1.5E-09	2.2
1970	6.4E-14	9.2	3.8E-15	3.8	2.6E-14	3.3	1.4E-11	2.5	1.4E-21	2.6	4.6E-10	2.0
1971	6.4E-14	8.4	3.2E-15	4.3	2.1E-14	3.8	1.4E-11	2.7	1.4E-21	2.7	1.2E-10	1.9
1972	6.4E-14	8.5	3.2E-15	3.8	2.1E-14	3.7	1.4E-11	2.7	1.4E-21	2.7	1.1E-10	1.9
1973	6.4E-14	9.0	3.2E-15	4.4	2.1E-14	3.6	1.4E-11	2.5	1.4E-21	2.5	1.1E-10	1.9
1974	6.6E-14	8.6	5.1E-15	4.0	3.5E-14	3.3	1.5E-11	2.5	1.4E-21	2.6	1.3E-09	2.2
1975	6.5E-14	9.1	3.1E-15	4.1	2.1E-14	3.7	1.5E-11	2.7	1.4E-21	2.6	4.5E-11	1.9
1976	6.6E-14	8.6	3.1E-15	4.3	2.0E-14	3.8	1.5E-11	2.6	1.4E-21	2.6	3.4E-11	2.0
1977	6.6E-14	8.8	3.1E-15	4.4	2.0E-14	3.7	1.5E-11	2.5	1.4E-21	2.6	3.5E-11	1.9
1978	6.6E-14	8.3	3.1E-15	4.1	2.0E-14	3.9	1.5E-11	2.5	1.4E-21	2.4	3.2E-11	2.0
1979	6.6E-14	9.1	3.1E-15	4.2	2.0E-14	3.7	1.5E-11	2.6	1.4E-21	2.7	3.8E-11	2.0
1980	6.6E-14	8.7	3.1E-15	4.3	2.1E-14	3.5	1.5E-11	2.5	1.4E-21	2.5	4.9E-11	1.9
1981	6.6E-14	8.7	3.1E-15	4.1	2.1E-14	3.7	1.5E-11	2.6	1.4E-21	2.6	4.2E-11	1.9
1982	6.6E-14	8.9	3.2E-15	4.1	2.1E-14	3.7	1.5E-11	2.5	1.4E-21	2.5	6.1E-11	1.8
1983	6.6E-14	8.8	3.3E-15	4.3	2.2E-14	3.7	1.5E-11	2.5	1.4E-21	2.7	1.4E-10	2.0
1984	6.6E-14	8.6	3.3E-15	4.3	2.2E-14	3.4	1.5E-11	2.5	1.4E-21	2.5	1.4E-10	1.9
1985	6.6E-14	8.7	3.2E-15	4.4	2.1E-14	3.6	1.5E-11	2.5	1.4E-21	2.5	4.4E-11	1.9
1986	6.6E-14	9.3	3.2E-15	4.1	2.1E-14	3.6	1.5E-11	2.5	1.4E-21	2.6	7.5E-11	1.9
1987	6.6E-14	8.6	3.2E-15	4.4	2.1E-14	3.7	1.5E-11	2.5	1.4E-21	2.6	5.5E-11	1.8
1988	6.6E-14	8.3	3.2E-15	4.4	2.1E-14	3.7	1.5E-11	2.6	1.4E-21	2.7	5.4E-11	1.9
1989	6.6E-14	9.1	3.1E-15	4.4	2.1E-14	3.6	1.5E-11	2.5	1.4E-21	2.6	3.6E-11	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

PATHWAY-SPECIFIC DOSES ASSOCIATED WITH ROUTINE AIRBORNE RELEASE OF TRITIUM

Inhalation Dose Associated with Routine Airborne Emissions of Tritium (1953-1989)

Year	Sector 1 GM (Sv/year)	Sector 1 GSD	Sector 2 GM (Sv/year)	Sector 2 GSD	Sector 3 GM (Sv/year)	Sector 3 GSD	Sector 4 GM (Sv/year)	Sector 4 GSD	Sector 5 GM (Sv/year)	Sector 5 GSD
1953-1967	6.5E-8	3.1	2.7E-8	3.1	2.5E-8	3.2	8.3E-8	3.2	3.0E-8	3.3
1968-1973	5.5E-8	2.0	2.3E-8	2.0	2.2E-8	2.0	7.1E-8	2.0	2.6E-8	2.0
1974	5.4E-9	2.0	2.3E-9	2.1	2.1E-9	2.1	7.0E-9	2.1	2.5E-9	2.1
1975	8.5E-10	2.0	3.6E-10	2.1	3.3E-10	2.1	1.1E-9	2.1	3.9E-10	2.1
1976	6.8E-10	2.1	2.9E-10	2.1	2.7E-10	2.1	8.6E-10	2.1	3.1E-10	2.0
1977	3.1E-10	2.1	1.3E-10	2.1	1.2E-10	2.1	3.9E-10	2.1	1.4E-10	2.1
1978	5.0E-10	2.1	2.1E-10	2.1	2.0E-10	2.1	6.4E-10	2.1	2.3E-10	2.1
1979	4.8E-10	2.1	2.0E-10	2.1	1.9E-10	2.0	6.1E-10	2.1	2.2E-10	2.0
1980	4.4E-10	2.1	1.8E-10	2.1	1.7E-10	2.1	5.6E-10	2.1	2.0E-10	2.1
1981	2.4E-10	2.1	1.0E-10	2.1	9.4E-11	2.1	3.1E-10	2.1	1.1E-10	2.1
1982	1.3E-10	2.1	5.5E-11	2.1	5.1E-11	2.1	1.7E-10	2.1	6.1E-11	2.1
1983	9.2E-11	2.1	3.9E-11	2.1	3.6E-11	2.0	1.2E-10	2.1	4.2E-11	2.1
1984	7.9E-11	2.0	3.3E-11	2.1	3.1E-11	2.1	1.0E-10	2.1	3.6E-11	2.1
1985	9.2E-11	2.1	3.9E-11	2.1	3.6E-11	2.0	1.2E-10	2.1	4.2E-11	2.0
1986	1.2E-10	2.0	5.2E-11	2.1	4.9E-11	2.0	1.6E-10	2.1	5.8E-11	2.1
1987	9.6E-11	2.1	4.1E-11	2.1	3.8E-11	2.1	1.2E-10	2.1	4.5E-11	2.1
1988	1.5E-11	2.1	6.3E-12	2.1	5.8E-12	2.1	1.9E-11	2.1	6.9E-12	2.1
1989	9.6E-11	2.0	4.1E-11	2.1	3.8E-11	2.1	1.2E-10	2.1	4.5E-11	2.1

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Inhalation Dose Associated with Routine Airborne Emissions of Tritium (continued)
(1953-1989)

Year	Sector 6 GM (Sv/year)	Sector 6 GSD	Sector 7 GM (Sv/year)	Sector 7 GSD	Sector 8 GM (Sv/year)	Sector 8 GSD	Sector 9 GM (Sv/year)	Sector 9 GSD	Sector 10 GM (Sv/year)	Sector 10 GSD
1953-1967	1.2E-8	3.2	1.2E-8	3.2	3.8E-8	3.1	1.5E-8	3.2	6.1E-9	3.2
1968-1973	1.1E-8	1.9	1.0E-8	2.0	3.3E-8	1.9	1.3E-8	2.0	5.2E-9	2.0
1974	1.0E-9	2.1	9.8E-10	2.1	3.2E-9	2.1	1.3E-9	2.1	5.1E-10	2.1
1975	1.6E-10	2.1	1.5E-10	2.1	5.0E-10	2.1	2.0E-10	2.1	8.0E-11	2.1
1976	1.3E-10	2.0	1.2E-10	2.1	4.0E-10	2.0	1.6E-10	2.1	6.4E-11	2.1
1977	5.8E-11	2.0	5.5E-11	2.2	1.8E-10	2.1	7.1E-11	2.1	2.9E-11	2.1
1978	9.6E-11	2.1	9.0E-11	2.1	2.9E-10	2.0	1.2E-10	2.0	4.7E-11	2.1
1979	9.2E-11	2.0	8.6E-11	2.1	2.8E-10	2.1	1.1E-10	2.1	4.5E-11	2.1
1980	8.4E-11	2.1	7.8E-11	2.1	2.6E-10	2.1	1.0E-10	2.1	4.1E-11	2.1
1981	4.6E-11	2.0	4.3E-11	2.1	1.4E-10	2.0	5.5E-11	2.1	2.3E-11	2.1
1982	2.5E-11	2.1	2.3E-11	2.2	7.7E-11	2.1	3.0E-11	2.1	1.2E-11	2.2
1983	1.8E-11	2.1	1.6E-11	2.1	5.4E-11	2.1	2.1E-11	2.1	8.6E-12	2.1
1984	1.5E-11	2.1	1.4E-11	2.1	4.6E-11	2.1	1.8E-11	2.1	7.4E-12	2.1
1985	1.8E-11	2.1	1.6E-11	2.1	5.4E-11	2.1	2.1E-11	2.1	8.6E-12	2.1
1986	2.4E-11	2.1	2.2E-11	2.1	7.3E-11	2.1	2.9E-11	2.0	1.2E-11	2.2
1987	1.8E-11	2.1	1.7E-11	2.1	5.6E-11	2.1	2.2E-11	2.1	9.0E-12	2.0
1988	2.8E-12	2.1	2.7E-12	2.1	8.7E-12	2.0	3.4E-12	2.1	1.4E-12	2.1
1989	1.8E-11	2.1	1.7E-11	2.1	5.7E-11	2.1	2.2E-11	2.1	9.0E-12	2.0

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Inhalation Dose Associated with Routine Airborne Emissions of Tritium (continued) (1953-1989)

Year	Sector 11 GM (Sv/year)	Sector 11 GSD	Sector 12 GM (Sv/year)	Sector 12 GSD	Denver GM (Sv/year)	Denver GSD	Lakewood GM (Sv/year)	Lakewood GSD	Longmont GM (Sv/year)	Longmont GSD
1953-1967	5.7E-9	3.2	1.9E-8	3.2	7.0E-9	3.1	8.6E-9	3.2	3.1E-9	3.1
1968-1973	4.9E-9	2.0	1.6E-8	2.0	6.0E-9	1.9	7.4E-9	2.0	2.6E-9	2.1
1974	4.8E-10	2.1	1.6E-9	2.1	5.9E-10	2.0	7.3E-10	2.1	2.6E-10	2.1
1975	7.5E-11	2.1	2.5E-10	2.1	9.2E-11	2.0	1.1E-10	2.1	4.0E-11	2.1
1976	6.0E-11	2.1	2.0E-10	2.1	7.3E-11	2.1	9.0E-11	2.1	3.2E-11	2.1
1977	2.7E-11	2.1	9.0E-11	2.1	3.3E-11	2.0	4.1E-11	2.1	1.5E-11	2.1
1978	4.4E-11	2.1	1.5E-10	2.1	5.4E-11	2.1	6.7E-11	2.1	2.4E-11	2.1
1979	4.2E-11	2.1	1.4E-10	2.1	5.2E-11	2.1	6.4E-11	2.1	2.3E-11	2.1
1980	3.9E-11	2.1	1.3E-10	2.1	4.7E-11	2.0	5.8E-11	2.1	2.1E-11	2.1
1981	2.1E-11	2.1	7.0E-11	2.1	2.6E-11	2.1	3.2E-11	2.1	1.1E-11	2.1
1982	1.2E-11	2.0	3.8E-11	2.1	1.4E-11	2.0	1.7E-11	2.1	6.2E-12	2.1
1983	8.1E-12	2.1	2.7E-11	2.1	9.9E-12	2.1	1.2E-11	2.1	4.4E-12	2.1
1984	6.9E-12	2.0	2.3E-11	2.1	8.5E-12	2.1	1.0E-11	2.1	3.7E-12	2.1
1985	8.1E-12	2.0	2.7E-11	2.1	9.9E-12	2.1	1.2E-11	2.1	4.4E-12	2.2
1986	1.1E-11	2.1	3.6E-11	2.1	1.3E-11	2.1	1.7E-11	2.1	5.9E-12	2.2
1987	8.5E-12	2.0	2.8E-11	2.1	1.0E-11	2.0	1.3E-11	2.1	4.6E-12	2.1
1988	1.3E-12	2.0	4.3E-12	2.1	1.6E-12	2.0	2.0E-12	2.1	7.1E-13	2.1
1989	8.5E-12	2.0	2.8E-11	2.1	1.0E-11	2.1	1.3E-11	2.1	4.6E-12	2.2

NOTES:

1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

PATHWAY-SPECIFIC DOSES ASSOCIATED WITH ROUTINE AIRBORNE RELEASE OF BERYLLIUM

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium
Sector 1
(1958 - 1989)

Year	Inhalation GM (μg/year)	Inhalation GSD	Soil Ingestion GM (μg/year)	Soil Ingestion GSD	Vegetable Ingestion GM (μg/year)	Vegetable Ingestion GSD	Wheat Ingestion GM (μg/year)	Wheat Ingestion GSD	Milk Ingestion GM (μg/year)	Milk Ingestion GSD
1958	1.4E-04	2.6	3.5E-08	4.3	4.6E-06	3.7	2.3E-09	4.6	3.0E-09	5.1
1959	1.4E-04	2.6	8.3E-08	3.7	4.6E-06	3.8	5.5E-09	4.0	3.4E-09	4.9
1960	1.4E-04	2.7	1.3E-07	3.5	4.6E-06	3.9	8.8E-09	4.1	3.7E-09	4.5
1961	1.1E-04	2.7	1.8E-07	3.5	3.9E-06	3.7	1.2E-08	3.9	3.4E-09	4.2
1962	7.1E-05	2.6	2.0E-07	3.5	2.4E-06	3.7	1.4E-08	3.9	2.6E-09	4.6
1963	1.3E-04	2.6	2.5E-07	3.4	4.3E-06	3.5	1.7E-08	3.7	4.1E-09	4.5
1964	1.3E-04	2.5	3.0E-07	3.4	4.3E-06	3.6	2.0E-08	3.8	4.4E-09	4.4
1965	3.2E-04	2.6	4.1E-07	3.3	1.1E-05	3.5	2.7E-08	3.6	9.1E-09	4.4
1966	3.5E-04	2.6	5.4E-07	3.3	1.2E-05	3.6	3.6E-08	3.7	1.0E-08	4.6
1967	3.4E-04	2.6	6.6E-07	3.3	1.2E-05	3.8	4.4E-08	3.8	1.1E-08	4.7
1968	3.9E-04	2.6	8.1E-07	3.2	1.3E-05	3.6	5.3E-08	3.7	1.3E-08	4.4
1969	2.6E-04	2.6	9.1E-07	3.5	9.0E-06	3.5	6.0E-08	3.6	1.1E-08	4.2
1970	1.5E-04	2.6	9.6E-07	3.1	5.2E-06	3.5	6.4E-08	3.6	8.2E-09	4.2
1971	1.2E-04	2.5	1.0E-06	3.4	4.3E-06	3.4	6.7E-08	3.6	7.7E-09	4.2
1972	1.5E-05	2.5	1.0E-06	3.2	7.2E-07	3.1	6.7E-08	3.5	4.7E-09	4.0
1973	5.4E-05	2.6	1.0E-06	3.3	2.1E-06	3.6	6.8E-08	3.6	6.0E-09	4.0
1974	7.7E-05	2.5	1.1E-06	3.0	2.8E-06	3.1	7.1E-08	3.6	6.7E-09	3.9
1975	4.0E-05	2.5	1.1E-06	3.1	1.6E-06	3.2	7.1E-08	3.8	5.8E-09	4.0
1976	2.8E-05	2.5	1.1E-06	3.3	1.2E-06	3.2	7.2E-08	3.6	5.4E-09	3.6
1977	3.8E-05	2.5	1.1E-06	3.3	1.5E-06	3.2	7.3E-08	3.6	5.9E-09	3.6
1978	1.3E-04	2.4	1.2E-06	3.4	4.7E-06	3.2	7.7E-08	3.6	8.7E-09	4.0
1979	1.1E-05	2.5	1.2E-06	3.2	6.1E-07	2.9	7.7E-08	3.8	5.1E-09	4.0
1980	8.2E-06	2.5	1.2E-06	3.4	4.9E-07	3.0	7.7E-08	3.8	5.0E-09	4.2
1981	1.5E-06	2.5	1.2E-06	3.3	2.0E-07	2.7	7.7E-08	3.7	4.7E-09	3.9
1982	7.7E-07	2.5	1.2E-06	3.2	1.6E-07	3.0	7.7E-08	3.6	4.7E-09	4.1
1983	5.5E-15	2.5	1.2E-06	3.3	1.1E-07	3.9	7.7E-08	3.8	4.7E-09	4.0
1984	2.4E-06	2.5	1.2E-06	3.2	2.4E-07	2.9	7.7E-08	3.4	4.8E-09	4.4
1985	3.8E-06	2.5	1.2E-06	3.3	3.0E-07	2.8	7.7E-08	3.5	4.8E-09	3.9
1986	7.7E-07	2.6	1.2E-06	3.3	1.6E-07	3.2	7.7E-08	3.6	4.7E-09	4.1
1987	1.5E-06	2.5	1.2E-06	3.4	2.0E-07	2.9	7.7E-08	3.9	4.7E-09	4.1
1988	7.7E-07	2.4	1.2E-06	3.2	1.7E-07	2.9	7.7E-08	3.6	4.7E-09	4.2
1989	4.6E-06	2.5	1.2E-06	3.3	3.4E-07	3.0	7.7E-08	3.6	4.9E-09	4.5

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) μg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium (continued)
Sector 1
(1958 - 1989)

Year	Beef Ingestion GM (µg/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (µg/year)	Inhalation of Resuspended Particulates GSD	Total Inhalation GM (µg/year)	Total Inhalation GSD	Total Ingestion GM (µg/year)	Total Ingestion GSD
1958	2.8E-06	4.5	3.5E-08	3.6	1.4E-04	2.6	9.3E-06	3.4
1959	3.1E-06	4.7	8.2E-08	3.1	1.4E-04	2.6	1.0E-05	3.5
1960	3.5E-06	4.3	1.3E-07	2.9	1.4E-04	2.7	1.1E-05	3.3
1961	3.2E-06	3.9	1.7E-07	2.7	1.2E-04	2.7	9.6E-06	3.0
1962	2.4E-06	3.8	2.0E-07	2.7	7.2E-05	2.6	6.8E-06	2.9
1963	3.9E-06	4.2	2.5E-07	2.7	1.3E-04	2.6	1.1E-05	3.0
1964	4.1E-06	4.0	3.0E-07	2.5	1.3E-04	2.5	1.1E-05	2.9
1965	8.6E-06	4.3	4.1E-07	2.5	3.2E-04	2.6	2.6E-05	3.1
1966	9.6E-06	4.1	5.3E-07	2.6	3.5E-04	2.6	2.9E-05	3.0
1967	1.0E-05	4.0	6.5E-07	2.6	3.5E-04	2.6	3.0E-05	3.0
1968	1.2E-05	4.3	8.0E-07	2.7	4.0E-04	2.6	3.5E-05	3.0
1969	9.9E-06	3.6	9.0E-07	2.5	2.7E-04	2.5	2.6E-05	2.7
1970	7.6E-06	4.0	9.5E-07	2.6	1.5E-04	2.6	1.9E-05	2.8
1971	7.0E-06	3.7	1.0E-06	2.5	1.2E-04	2.5	1.7E-05	2.5
1972	4.1E-06	3.7	1.0E-06	2.4	1.7E-05	2.4	8.1E-06	2.5
1973	5.4E-06	3.9	1.0E-06	2.5	5.6E-05	2.5	1.2E-05	2.7
1974	6.1E-06	3.5	1.1E-06	2.5	7.9E-05	2.4	1.3E-05	2.4
1975	5.1E-06	3.7	1.1E-06	2.4	4.2E-05	2.4	1.1E-05	2.5
1976	4.8E-06	3.7	1.1E-06	2.6	3.1E-05	2.4	9.9E-06	2.5
1977	5.2E-06	3.8	1.1E-06	2.5	4.0E-05	2.4	1.1E-05	2.6
1978	7.8E-06	3.6	1.1E-06	2.5	1.3E-04	2.4	1.9E-05	2.5
1979	4.5E-06	4.0	1.1E-06	2.5	1.4E-05	2.3	8.5E-06	2.7
1980	4.3E-06	3.8	1.1E-06	2.6	1.0E-05	2.3	8.0E-06	2.6
1981	4.1E-06	3.9	1.1E-06	2.6	3.1E-06	2.1	7.2E-06	2.8
1982	4.0E-06	3.7	1.1E-06	2.6	2.2E-06	2.1	7.1E-06	2.7
1983	4.0E-06	3.8	1.2E-06	2.4	1.2E-06	2.4	7.0E-06	2.8
1984	4.1E-06	4.0	1.1E-06	2.6	4.1E-06	2.1	7.4E-06	2.8
1985	4.2E-06	3.8	1.1E-06	2.6	5.7E-06	2.2	7.4E-06	2.7
1986	4.0E-06	4.0	1.1E-06	2.7	2.3E-06	2.1	7.0E-06	2.9
1987	4.1E-06	3.9	1.1E-06	2.5	3.1E-06	2.0	7.2E-06	2.8
1988	4.1E-06	3.9	1.1E-06	2.5	2.2E-06	2.1	7.0E-06	2.7
1989	4.2E-06	4.0	1.1E-06	2.6	6.4E-06	2.2	7.6E-06	2.7

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium
Sector 2
(1958 - 1989)

Year	Inhalation GM (µg/year)	Inhalation GSD	Soil Ingestion GM (µg/year)	Soil Ingestion GSD	Vegetable Ingestion GM (µg/year)	Vegetable Ingestion GSD	Wheat Ingestion GM (µg/year)	Wheat Ingestion GSD	Milk Ingestion GM (µg/year)	Milk Ingestion GSD
1958	5.8E-05	2.6	1.5E-08	4.3	1.9E-06	3.6	9.8E-10	4.6	1.3E-09	5.1
1959	5.8E-05	2.6	3.5E-08	3.8	1.9E-06	3.8	2.3E-09	3.8	1.4E-09	5.1
1960	5.8E-05	2.6	5.6E-08	3.5	1.9E-06	3.8	3.7E-09	4.1	1.5E-09	4.8
1961	4.8E-05	2.6	7.4E-08	3.6	1.6E-06	3.7	4.9E-09	3.8	1.5E-09	4.4
1962	3.0E-05	2.6	8.6E-08	3.5	1.0E-06	3.6	5.7E-09	3.8	1.1E-09	4.2
1963	5.3E-05	2.6	1.1E-07	3.2	1.8E-06	3.7	7.0E-09	3.8	1.7E-09	4.1
1964	5.3E-05	2.5	1.3E-07	3.3	1.8E-06	3.5	8.3E-09	3.9	1.9E-09	4.5
1965	1.4E-04	2.6	1.7E-07	3.4	4.6E-06	3.8	1.1E-08	3.8	3.9E-09	4.6
1966	1.5E-04	2.5	2.3E-07	3.2	4.9E-06	3.4	1.5E-08	3.7	4.4E-09	4.8
1967	1.5E-04	2.6	2.8E-07	3.4	4.9E-06	3.5	1.8E-08	3.9	4.6E-09	4.5
1968	1.7E-04	2.7	3.4E-07	3.5	5.6E-06	3.6	2.2E-08	3.9	5.4E-09	4.4
1969	1.1E-04	2.5	3.8E-07	3.0	3.8E-06	3.5	2.5E-08	3.7	4.5E-09	4.6
1970	6.2E-05	2.6	4.1E-07	3.2	2.2E-06	3.6	2.7E-08	3.7	3.4E-09	4.1
1971	5.1E-05	2.6	4.3E-07	3.2	1.8E-06	3.4	2.8E-08	3.6	3.2E-09	4.3
1972	6.5E-06	2.6	4.3E-07	3.5	3.0E-07	2.9	2.8E-08	3.6	2.0E-09	4.1
1973	2.3E-05	2.5	4.4E-07	3.1	8.7E-07	3.3	2.9E-08	3.7	2.5E-09	4.1
1974	3.2E-05	2.5	4.5E-07	3.3	1.2E-06	3.3	3.0E-08	3.6	2.9E-09	3.7
1975	1.7E-05	2.5	4.6E-07	3.2	6.7E-07	3.3	3.0E-08	3.7	2.4E-09	3.9
1976	1.2E-05	2.6	4.6E-07	3.2	5.1E-07	3.1	3.1E-08	3.7	2.3E-09	3.8
1977	1.6E-05	2.5	4.7E-07	3.2	6.4E-07	3.1	3.1E-08	3.8	2.5E-09	3.9
1978	5.5E-05	2.5	4.9E-07	3.3	2.0E-06	3.3	3.2E-08	3.5	3.6E-09	3.9
1979	4.9E-06	2.5	4.9E-07	3.2	2.5E-07	2.8	3.2E-08	3.5	2.2E-09	3.9
1980	3.5E-06	2.4	4.9E-07	3.1	2.0E-07	2.8	3.2E-08	3.7	2.1E-09	4.0
1981	6.5E-07	2.4	4.9E-07	3.2	8.5E-08	3.0	3.2E-08	3.6	2.0E-09	4.3
1982	3.2E-07	2.5	4.9E-07	3.2	6.9E-08	2.9	3.3E-08	3.6	2.0E-09	4.0
1983	2.3E-15	2.5	4.9E-07	3.2	4.6E-08	3.4	3.2E-08	3.5	2.0E-09	4.3
1984	9.9E-07	2.6	4.9E-07	3.3	1.0E-07	2.8	3.2E-08	3.7	2.0E-09	4.1
1985	1.6E-06	2.5	4.9E-07	3.3	1.3E-07	3.0	3.3E-08	3.5	2.0E-09	4.1
1986	3.2E-07	2.5	4.9E-07	3.1	6.8E-08	2.9	3.3E-08	3.6	2.0E-09	4.1
1987	6.5E-07	2.6	4.9E-07	3.4	8.6E-08	2.9	3.3E-08	3.8	2.0E-09	3.9
1988	3.2E-07	2.5	4.9E-07	3.2	6.8E-08	3.0	3.3E-08	3.6	2.0E-09	4.1
1989	1.9E-06	2.5	4.9E-07	3.1	1.4E-07	2.7	3.3E-08	3.3	2.1E-09	4.1

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium (continued)
Sector 2
(1958 - 1989)

Year	Beef Ingestion		Inhalation of Resuspended Particulates		Total Inhalation		Total Ingestion	
	GM (μg/year)	GSD	GM (μg/year)	GSD	GM (μg/year)	GSD	GM (μg/year)	GSD
1958	1.2E-06	4.6	1.5E-08	3.3	5.8E-05	2.6	4.0E-06	3.3
1959	1.3E-06	4.5	3.5E-08	2.9	5.8E-05	2.6	4.2E-06	3.3
1960	1.5E-06	4.1	5.5E-08	2.9	5.8E-05	2.6	4.5E-06	3.0
1961	1.4E-06	4.1	7.3E-08	2.8	4.9E-05	2.6	4.0E-06	3.0
1962	1.1E-06	4.1	8.5E-08	2.8	3.0E-05	2.6	2.9E-06	2.9
1963	1.6E-06	4.1	1.0E-07	2.7	5.4E-05	2.6	4.6E-06	3.0
1964	1.7E-06	4.0	1.2E-07	2.8	5.3E-05	2.5	4.8E-06	2.8
1965	3.7E-06	4.4	1.7E-07	2.6	1.4E-04	2.6	1.1E-05	3.3
1966	4.1E-06	4.2	2.2E-07	2.6	1.5E-04	2.5	1.2E-05	2.9
1967	4.3E-06	4.0	2.8E-07	2.6	1.5E-04	2.6	1.2E-05	3.0
1968	5.1E-06	3.9	3.4E-07	2.5	1.7E-04	2.7	1.5E-05	2.9
1969	4.1E-06	4.0	3.8E-07	2.5	1.1E-04	2.5	1.1E-05	2.8
1970	3.1E-06	3.9	4.0E-07	2.5	6.3E-05	2.6	7.9E-06	2.7
1971	2.9E-06	3.9	4.2E-07	2.5	5.1E-05	2.5	7.0E-06	2.7
1972	1.7E-06	3.7	4.2E-07	2.6	7.2E-06	2.4	3.3E-06	2.6
1973	2.3E-06	3.5	4.3E-07	2.5	2.4E-05	2.5	4.8E-06	2.5
1974	2.6E-06	3.7	4.4E-07	2.5	3.3E-05	2.4	5.7E-06	2.5
1975	2.2E-06	3.7	4.5E-07	2.5	1.8E-05	2.4	4.6E-06	2.5
1976	2.0E-06	3.7	4.5E-07	2.5	1.3E-05	2.5	4.1E-06	2.5
1977	2.2E-06	3.8	4.6E-07	2.5	1.7E-05	2.4	4.5E-06	2.6
1978	3.3E-06	3.7	4.8E-07	2.5	5.6E-05	2.5	7.9E-06	2.5
1979	1.9E-06	3.8	4.8E-07	2.5	5.7E-06	2.3	3.6E-06	2.5
1980	1.8E-06	3.7	4.8E-07	2.4	4.3E-06	2.2	3.3E-06	2.6
1981	1.7E-06	3.7	4.9E-07	2.5	1.3E-06	2.0	3.0E-06	2.7
1982	1.7E-06	3.8	4.8E-07	2.5	9.5E-07	2.0	3.0E-06	2.7
1983	1.7E-06	3.8	4.8E-07	2.6	4.8E-07	2.6	2.9E-06	2.7
1984	1.7E-06	3.7	4.8E-07	2.5	1.7E-06	2.1	3.1E-06	2.6
1985	1.8E-06	3.8	4.8E-07	2.6	2.4E-06	2.2	3.2E-06	2.7
1986	1.7E-06	3.9	4.9E-07	2.5	9.3E-07	2.1	3.0E-06	2.8
1987	1.7E-06	3.7	4.8E-07	2.5	1.3E-06	2.1	3.0E-06	2.7
1988	1.7E-06	3.7	4.8E-07	2.5	9.5E-07	2.0	3.0E-06	2.7
1989	1.8E-06	3.8	4.9E-07	2.5	2.7E-06	2.2	3.2E-06	2.7

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) μg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium
Sector 3
(1958 - 1989)

Year	Inhalation GM (µg/year)	Inhalation GSD	Soil Ingestion GM (µg/year)	Soil Ingestion GSD	Vegetable Ingestion GM (µg/year)	Vegetable Ingestion GSD	Wheat Ingestion GM (µg/year)	Wheat Ingestion GSD	Milk Ingestion GM (µg/year)	Milk Ingestion GSD
1958	5.3E-05	2.7	1.5E-08	4.3	1.6E-06	3.8	9.3E-10	5.0	1.2E-09	5.3
1959	5.6E-05	2.6	3.4E-08	3.6	2.0E-06	3.8	2.2E-09	4.1	1.3E-09	5.1
1960	5.6E-05	2.7	5.1E-08	3.7	1.8E-06	3.7	3.4E-09	4.0	1.5E-09	4.8
1961	4.3E-05	2.6	6.9E-08	3.6	1.4E-06	3.5	4.4E-09	3.6	1.2E-09	4.4
1962	2.8E-05	2.5	7.8E-08	3.6	9.4E-07	3.8	5.0E-09	4.1	1.0E-09	4.7
1963	4.9E-05	2.7	9.7E-08	3.4	1.7E-06	3.9	7.3E-09	3.6	1.6E-09	4.7
1964	5.0E-05	2.5	1.1E-07	3.6	1.9E-06	3.4	8.3E-09	3.8	1.7E-09	4.6
1965	1.2E-04	2.7	1.5E-07	3.5	4.2E-06	3.8	1.0E-08	3.6	3.8E-09	4.5
1966	1.4E-04	2.7	2.1E-07	3.2	4.4E-06	3.8	1.5E-08	3.9	4.1E-09	4.6
1967	1.4E-04	2.5	2.4E-07	3.3	5.2E-06	3.4	1.6E-08	3.5	4.4E-09	4.8
1968	1.5E-04	2.6	3.1E-07	3.4	5.2E-06	3.7	2.3E-08	3.7	5.0E-09	4.1
1969	1.0E-04	2.6	3.3E-07	3.4	3.4E-06	3.5	2.2E-08	3.9	4.2E-09	4.3
1970	5.7E-05	2.6	3.3E-07	3.3	1.9E-06	3.6	2.6E-08	3.8	3.3E-09	4.1
1971	4.6E-05	2.6	4.0E-07	3.1	1.7E-06	3.7	2.5E-08	3.6	3.0E-09	4.1
1972	6.3E-06	2.5	4.2E-07	3.4	2.8E-07	3.1	2.4E-08	3.8	1.6E-09	4.1
1973	2.0E-05	2.5	4.3E-07	3.1	7.8E-07	3.4	2.4E-08	3.7	2.5E-09	3.7
1974	2.9E-05	2.5	3.8E-07	3.6	1.1E-06	3.1	3.1E-08	3.4	2.7E-09	4.0
1975	1.6E-05	2.5	4.0E-07	3.1	6.9E-07	3.4	3.0E-08	3.5	2.3E-09	4.2
1976	1.1E-05	2.3	4.4E-07	3.2	4.8E-07	3.1	3.1E-08	3.8	1.8E-09	4.3
1977	1.4E-05	2.6	4.0E-07	3.5	5.9E-07	3.3	2.9E-08	4.0	2.2E-09	3.7
1978	5.1E-05	2.6	4.7E-07	3.1	1.7E-06	3.6	3.0E-08	3.4	3.3E-09	4.2
1979	4.3E-06	2.4	4.3E-07	3.2	2.3E-07	2.9	3.0E-08	3.6	1.9E-09	3.7
1980	3.5E-06	2.5	4.6E-07	3.3	1.8E-07	2.9	3.0E-08	3.5	1.8E-09	4.4
1981	6.0E-07	2.6	4.5E-07	3.1	8.0E-08	2.9	2.9E-08	3.8	1.8E-09	4.3
1982	3.1E-07	2.6	4.8E-07	3.4	6.3E-08	3.1	3.0E-08	3.7	1.8E-09	4.1
1983	2.1E-15	2.4	4.4E-07	3.3	4.2E-08	3.5	3.0E-08	3.4	1.7E-09	3.9
1984	8.9E-07	2.6	4.2E-07	3.3	9.6E-08	3.0	2.9E-08	3.7	2.0E-09	4.1
1985	1.4E-06	2.4	4.5E-07	3.2	1.2E-07	2.9	3.1E-08	3.6	1.9E-09	4.0
1986	2.9E-07	2.3	4.5E-07	3.2	6.2E-08	3.1	3.2E-08	3.6	1.9E-09	4.2
1987	6.0E-07	2.6	4.4E-07	3.3	8.2E-08	2.9	3.1E-08	3.7	1.7E-09	4.1
1988	2.8E-07	2.5	4.2E-07	3.2	6.1E-08	3.0	2.7E-08	3.5	1.8E-09	4.0
1989	1.8E-06	2.5	4.7E-07	3.2	1.3E-07	3.1	3.0E-08	3.7	1.9E-09	4.4

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium (continued)
Sector 3
(1958 - 1989)

Year	Beef Ingestion GM (µg/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (µg/year)	Inhalation of Resuspended Particulates GSD	Total Inhalation GM (µg/year)	Total Inhalation GSD	Total Ingestion GM (µg/year)	Total Ingestion GSD
1958	1.0E-06	4.8	1.4E-08	3.4	5.3E-05	2.7	3.4E-06	3.5
1959	1.3E-06	4.4	3.3E-08	2.8	5.7E-05	2.6	4.2E-06	3.3
1960	1.4E-06	4.3	5.4E-08	3.1	5.6E-05	2.7	4.3E-06	3.1
1961	1.0E-06	3.9	6.6E-08	2.8	4.3E-05	2.6	3.2E-06	2.8
1962	9.5E-07	3.9	7.9E-08	2.7	2.8E-05	2.5	2.6E-06	3.0
1963	1.4E-06	4.3	9.9E-08	2.7	4.9E-05	2.7	4.1E-06	3.2
1964	1.6E-06	3.9	1.1E-07	2.6	5.1E-05	2.5	4.7E-06	2.8
1965	3.0E-06	4.3	1.5E-07	2.5	1.2E-04	2.7	9.6E-06	3.1
1966	3.6E-06	4.0	2.1E-07	2.6	1.4E-04	2.7	1.1E-05	3.1
1967	4.0E-06	4.2	2.5E-07	2.4	1.5E-04	2.5	1.2E-05	2.9
1968	4.7E-06	4.1	2.9E-07	2.6	1.5E-04	2.6	1.3E-05	3.1
1969	3.9E-06	4.1	3.5E-07	2.6	1.0E-04	2.6	1.0E-05	2.8
1970	2.8E-06	3.7	3.7E-07	2.7	5.8E-05	2.6	7.1E-06	2.6
1971	2.6E-06	3.7	3.8E-07	2.5	4.7E-05	2.6	6.4E-06	2.6
1972	1.7E-06	3.9	3.7E-07	2.5	6.9E-06	2.3	3.2E-06	2.6
1973	2.2E-06	3.7	4.1E-07	2.5	2.0E-05	2.4	4.6E-06	2.5
1974	2.5E-06	4.1	3.9E-07	2.6	3.0E-05	2.4	5.5E-06	2.7
1975	1.9E-06	4.0	3.9E-07	2.5	1.7E-05	2.4	4.3E-06	2.6
1976	1.9E-06	3.6	3.8E-07	2.5	1.1E-05	2.3	3.8E-06	2.5
1977	1.8E-06	3.8	4.2E-07	2.6	1.5E-05	2.5	3.9E-06	2.6
1978	2.9E-06	3.4	4.7E-07	2.5	5.2E-05	2.6	6.9E-06	2.6
1979	1.7E-06	3.7	4.2E-07	2.4	5.0E-06	2.2	3.2E-06	2.6
1980	1.8E-06	3.7	4.5E-07	2.5	4.2E-06	2.3	3.3E-06	2.6
1981	1.4E-06	4.0	4.5E-07	2.5	1.2E-06	2.1	2.6E-06	2.8
1982	1.6E-06	3.9	4.8E-07	2.6	9.3E-07	2.1	2.8E-06	2.8
1983	1.5E-06	3.8	4.2E-07	2.5	4.2E-07	2.5	2.5E-06	2.7
1984	1.5E-06	3.8	4.2E-07	2.6	1.5E-06	2.1	2.7E-06	2.7
1985	1.7E-06	3.8	4.6E-07	2.5	2.1E-06	2.0	3.0E-06	2.7
1986	1.6E-06	3.8	4.5E-07	2.6	8.5E-07	2.1	2.7E-06	2.8
1987	1.7E-06	4.1	4.6E-07	2.4	1.2E-06	2.1	3.0E-06	2.8
1988	1.4E-06	4.1	4.1E-07	2.6	8.1E-07	2.1	2.6E-06	2.8
1989	1.7E-06	3.8	4.6E-07	2.4	2.6E-06	2.2	3.1E-06	2.6

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium
Sector 4
(1958 - 1989)

Year	Inhalation GM (µg/year)	Inhalation GSD	Soil Ingestion GM (µg/year)	Soil Ingestion GSD	Vegetable Ingestion GM (µg/year)	Vegetable Ingestion GSD	Wheat Ingestion GM (µg/year)	Wheat Ingestion GSD	Milk Ingestion GM (µg/year)	Milk Ingestion GSD
1958	1.7E-04	2.7	4.6E-08	4.3	5.6E-06	3.9	2.9E-09	4.7	3.6E-09	5.0
1959	1.7E-04	2.6	1.0E-07	3.8	5.9E-06	3.5	6.5E-09	4.3	4.5E-09	4.9
1960	1.8E-04	2.5	1.7E-07	3.9	6.2E-06	3.6	1.2E-08	4.0	5.0E-09	4.9
1961	1.5E-04	2.4	2.3E-07	3.4	4.8E-06	3.6	1.5E-08	4.0	4.1E-09	4.4
1962	9.9E-05	2.5	2.7E-07	3.5	3.7E-06	3.4	1.8E-08	3.9	3.8E-09	4.2
1963	1.6E-04	2.7	3.1E-07	3.3	5.5E-06	4.0	1.9E-08	3.9	5.5E-09	4.6
1964	1.7E-04	2.7	3.6E-07	3.2	5.6E-06	3.8	2.5E-08	4.1	5.4E-09	4.6
1965	3.7E-04	2.7	5.2E-07	3.4	1.2E-05	3.7	3.4E-08	3.7	1.2E-08	4.7
1966	4.3E-04	2.6	6.6E-07	3.3	1.5E-05	3.7	4.4E-08	3.9	1.4E-08	4.5
1967	4.1E-04	2.6	9.1E-07	3.1	1.3E-05	3.7	5.5E-08	3.9	1.3E-08	4.5
1968	5.0E-04	2.6	1.1E-06	3.6	1.7E-05	3.4	7.5E-08	3.5	1.9E-08	4.3
1969	3.4E-04	2.5	1.0E-06	3.3	1.2E-05	3.3	7.6E-08	4.0	1.3E-08	4.0
1970	1.9E-04	2.5	1.2E-06	3.1	6.1E-06	3.4	8.7E-08	3.5	9.7E-09	3.8
1971	1.4E-04	2.5	1.3E-06	3.2	5.5E-06	3.6	8.6E-08	3.7	9.9E-09	4.1
1972	1.9E-05	2.7	1.2E-06	3.2	9.8E-07	3.0	8.6E-08	3.7	5.8E-09	4.0
1973	6.7E-05	2.5	1.4E-06	3.5	2.4E-06	3.4	9.1E-08	3.6	7.6E-09	3.9
1974	1.0E-04	2.6	1.4E-06	3.2	4.0E-06	3.2	9.6E-08	3.6	9.1E-09	3.8
1975	5.4E-05	2.4	1.4E-06	3.3	2.2E-06	3.3	8.9E-08	3.7	8.0E-09	4.0
1976	3.5E-05	2.5	1.4E-06	3.1	1.5E-06	3.1	9.8E-08	3.8	7.1E-09	4.1
1977	4.4E-05	2.5	1.4E-06	3.4	1.9E-06	3.3	9.8E-08	3.6	6.9E-09	4.1
1978	1.6E-04	2.5	1.4E-06	3.5	5.9E-06	3.5	1.0E-07	3.9	1.1E-08	3.9
1979	1.6E-05	2.5	1.7E-06	3.4	7.8E-07	2.9	9.8E-08	3.7	6.6E-09	4.3
1980	1.0E-05	2.5	1.4E-06	3.3	5.7E-07	2.9	9.7E-08	3.7	5.8E-09	4.1
1981	1.8E-06	2.5	1.5E-06	3.3	2.3E-07	3.0	8.5E-08	3.8	6.0E-09	4.1
1982	9.5E-07	2.6	1.4E-06	3.2	2.2E-07	2.9	1.0E-07	3.3	5.7E-09	4.5
1983	7.4E-15	2.5	1.5E-06	3.5	1.5E-07	3.7	1.1E-07	3.6	6.2E-09	4.1
1984	3.0E-06	2.4	1.5E-06	3.5	3.2E-07	2.9	9.9E-08	3.7	6.5E-09	4.2
1985	5.0E-06	2.6	1.6E-06	3.1	4.1E-07	2.8	9.2E-08	3.4	6.0E-09	4.1
1986	9.5E-07	2.4	1.5E-06	3.3	2.0E-07	3.1	9.7E-08	3.7	5.7E-09	4.2
1987	1.9E-06	2.5	1.5E-06	3.5	2.6E-07	2.9	1.0E-07	3.6	6.2E-09	4.1
1988	9.7E-07	2.5	1.4E-06	3.6	2.3E-07	3.1	9.8E-08	3.8	5.8E-09	4.5
1989	6.0E-06	2.4	1.5E-06	3.4	4.4E-07	3.0	9.8E-08	3.8	5.9E-09	4.1

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium (continued)
Sector 4
(1958 - 1989)

Year	Beef Ingestion GM (μg/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (μg/year)	Inhalation of Resuspended Particulates GSD	Total Inhalation GM (μg/year)	Total Inhalation GSD	Total Ingestion GM (μg/year)	Total Ingestion GSD
1958	3.7E-06	4.7	4.6E-08	3.3	1.7E-04	2.7	1.2E-05	3.6
1959	4.3E-06	4.4	1.0E-07	3.0	1.7E-04	2.6	1.3E-05	3.1
1960	4.6E-06	4.3	1.8E-07	2.9	1.8E-04	2.5	1.4E-05	3.0
1961	4.2E-06	3.8	2.3E-07	2.7	1.5E-04	2.4	1.2E-05	3.0
1962	3.5E-06	4.0	2.6E-07	2.9	9.9E-05	2.5	9.9E-06	2.8
1963	4.9E-06	4.3	3.0E-07	2.8	1.6E-04	2.7	1.4E-05	3.2
1964	5.6E-06	3.9	3.5E-07	2.7	1.7E-04	2.7	1.5E-05	2.9
1965	1.1E-05	4.0	5.0E-07	2.6	3.7E-04	2.7	3.1E-05	3.0
1966	1.3E-05	4.4	6.6E-07	2.5	4.3E-04	2.6	3.7E-05	3.1
1967	1.2E-05	3.8	8.7E-07	2.5	4.2E-04	2.6	3.3E-05	2.9
1968	1.5E-05	4.1	1.0E-06	2.5	5.0E-04	2.6	4.5E-05	2.9
1969	1.2E-05	3.7	1.1E-06	2.5	3.4E-04	2.5	3.2E-05	2.7
1970	9.3E-06	3.8	1.2E-06	2.6	1.9E-04	2.5	2.2E-05	2.7
1971	9.9E-06	3.5	1.2E-06	2.5	1.5E-04	2.4	2.3E-05	2.6
1972	4.7E-06	3.6	1.3E-06	2.5	2.1E-05	2.5	9.3E-06	2.5
1973	7.1E-06	3.7	1.3E-06	2.7	6.9E-05	2.5	1.5E-05	2.5
1974	7.6E-06	3.7	1.3E-06	2.6	1.0E-04	2.5	1.8E-05	2.5
1975	6.6E-06	3.6	1.4E-06	2.6	5.7E-05	2.4	1.4E-05	2.4
1976	5.9E-06	3.7	1.4E-06	2.5	3.7E-05	2.4	1.2E-05	2.5
1977	6.4E-06	3.6	1.3E-06	2.6	4.6E-05	2.4	1.3E-05	2.5
1978	1.0E-05	3.6	1.4E-06	2.6	1.6E-04	2.5	2.4E-05	2.6
1979	6.1E-06	3.5	1.5E-06	2.6	1.8E-05	2.3	1.2E-05	2.5
1980	5.7E-06	3.9	1.4E-06	2.6	1.3E-05	2.3	1.0E-05	2.7
1981	5.1E-06	4.1	1.5E-06	2.5	3.8E-06	2.0	9.0E-06	2.8
1982	5.4E-06	3.9	1.3E-06	2.6	2.7E-06	2.1	8.9E-06	2.9
1983	5.4E-06	4.0	1.4E-06	2.6	1.4E-06	2.6	9.3E-06	2.8
1984	5.4E-06	4.3	1.5E-06	2.7	5.3E-06	2.1	9.7E-06	2.9
1985	6.0E-06	4.1	1.5E-06	2.5	7.4E-06	2.2	1.1E-05	2.8
1986	5.4E-06	3.7	1.6E-06	2.5	2.9E-06	2.1	9.4E-06	2.6
1987	4.9E-06	4.1	1.4E-06	2.6	3.9E-06	2.0	8.8E-06	2.9
1988	5.3E-06	4.1	1.5E-06	2.7	2.9E-06	2.1	9.2E-06	2.9
1989	5.2E-06	3.8	1.5E-06	2.5	8.4E-06	2.1	9.5E-06	2.6

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) μg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium
Sector 5
(1958 - 1989)

Year	Inhalation GM (μg/year)	Inhalation GSD	Soil Ingestion GM (μg/year)	Soil Ingestion GSD	Vegetable Ingestion GM (μg/year)	Vegetable Ingestion GSD	Wheat Ingestion GM (μg/year)	Wheat Ingestion GSD	Milk Ingestion GM (μg/year)	Milk Ingestion GSD
1958	6.0E-05	2.6	1.7E-08	4.3	2.0E-06	3.9	1.1E-09	4.5	1.3E-09	4.8
1959	6.3E-05	2.5	3.7E-08	4.0	2.0E-06	3.5	2.5E-09	4.2	1.5E-09	4.6
1960	6.6E-05	2.6	6.4E-08	3.9	2.3E-06	3.7	3.9E-09	3.9	1.7E-09	5.1
1961	5.0E-05	2.6	8.5E-08	3.7	1.8E-06	3.6	5.4E-09	4.0	1.6E-09	4.3
1962	3.3E-05	2.5	9.3E-08	3.3	1.1E-06	3.9	6.1E-09	3.6	1.3E-09	4.3
1963	5.8E-05	2.6	1.1E-07	3.5	1.9E-06	3.9	8.6E-09	3.7	2.1E-09	4.5
1964	6.3E-05	2.7	1.3E-07	3.5	2.1E-06	3.8	9.6E-09	3.7	2.2E-09	4.2
1965	1.4E-04	2.6	1.8E-07	3.4	5.0E-06	3.4	1.3E-08	3.6	4.0E-09	4.3
1966	1.5E-04	2.7	2.3E-07	3.6	5.4E-06	3.7	1.6E-08	3.7	4.7E-09	4.4
1967	1.7E-04	2.6	3.2E-07	3.3	5.3E-06	3.9	2.2E-08	3.7	4.9E-09	4.3
1968	1.7E-04	2.5	4.0E-07	3.2	5.8E-06	3.7	2.6E-08	3.5	5.5E-09	4.3
1969	1.3E-04	2.7	4.2E-07	3.3	4.4E-06	3.7	2.6E-08	3.5	5.0E-09	4.0
1970	7.1E-05	2.6	4.2E-07	3.4	2.5E-06	3.8	3.0E-08	4.0	4.1E-09	4.0
1971	5.5E-05	2.5	4.7E-07	3.3	2.0E-06	3.5	3.3E-08	3.5	3.6E-09	4.0
1972	6.5E-06	2.4	4.8E-07	3.1	3.1E-07	3.2	3.1E-08	3.8	2.4E-09	3.9
1973	2.4E-05	2.5	4.3E-07	3.5	9.4E-07	3.3	3.1E-08	3.8	2.8E-09	3.9
1974	3.4E-05	2.6	4.9E-07	3.3	1.3E-06	3.6	3.4E-08	3.7	2.8E-09	4.1
1975	1.8E-05	2.5	4.6E-07	3.3	7.5E-07	3.2	3.6E-08	3.8	2.5E-09	4.1
1976	1.3E-05	2.5	4.8E-07	3.3	5.2E-07	3.1	3.4E-08	3.7	2.7E-09	4.1
1977	1.7E-05	2.5	5.2E-07	3.3	6.4E-07	3.4	3.6E-08	3.6	2.8E-09	4.1
1978	6.3E-05	2.5	5.8E-07	3.3	2.2E-06	3.4	3.5E-08	3.9	4.1E-09	4.0
1979	5.3E-06	2.5	5.1E-07	3.4	2.8E-07	3.1	3.6E-08	3.6	2.3E-09	3.9
1980	3.9E-06	2.4	5.4E-07	3.4	2.2E-07	3.0	3.7E-08	4.0	2.2E-09	4.3
1981	7.1E-07	2.6	5.5E-07	3.1	9.1E-08	3.0	3.6E-08	3.8	2.2E-09	4.3
1982	3.6E-07	2.6	5.1E-07	3.2	7.4E-08	3.0	3.6E-08	3.6	2.3E-09	4.0
1983	2.5E-15	2.5	5.3E-07	3.2	4.7E-08	3.4	3.3E-08	3.5	2.1E-09	4.4
1984	1.2E-06	2.5	5.7E-07	3.0	1.2E-07	2.9	3.3E-08	3.7	2.3E-09	4.4
1985	1.9E-06	2.5	5.0E-07	3.4	1.5E-07	2.9	3.4E-08	3.5	2.3E-09	4.0
1986	3.7E-07	2.4	5.5E-07	3.3	7.5E-08	3.3	3.6E-08	3.9	2.0E-09	4.4
1987	6.9E-07	2.5	5.3E-07	3.2	8.9E-08	3.0	3.5E-08	3.6	2.3E-09	4.4
1988	3.6E-07	2.5	5.3E-07	3.3	7.9E-08	3.0	3.7E-08	3.8	2.1E-09	4.2
1989	2.4E-06	2.4	5.9E-07	3.1	1.7E-07	2.8	3.6E-08	3.6	2.4E-09	4.1

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) μg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium (continued)
Sector 5
(1958 - 1989)

Year	Beef Ingestion GM (µg/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (µg/year)	Inhalation of Resuspended Particulates GSD	Total Inhalation GM (µg/year)	Total Inhalation GSD	Total Ingestion GM (µg/year)	Total Ingestion GSD
1958	1.4E-06	4.9	1.7E-08	3.4	6.0E-05	2.6	4.4E-06	3.4
1959	1.4E-06	4.5	3.9E-08	3.3	6.3E-05	2.5	4.5E-06	3.2
1960	1.8E-06	4.6	6.1E-08	3.0	6.6E-05	2.6	5.4E-06	3.2
1961	1.5E-06	4.2	7.9E-08	3.1	5.0E-05	2.6	4.5E-06	2.9
1962	1.2E-06	4.1	9.1E-08	2.6	3.3E-05	2.5	3.2E-06	3.1
1963	1.8E-06	3.7	1.1E-07	2.7	5.8E-05	2.6	5.0E-06	3.0
1964	2.0E-06	4.0	1.4E-07	2.6	6.4E-05	2.7	5.7E-06	2.9
1965	3.6E-06	3.9	1.9E-07	2.7	1.4E-04	2.6	1.1E-05	2.9
1966	4.3E-06	4.1	2.5E-07	2.6	1.5E-04	2.7	1.3E-05	3.0
1967	5.2E-06	3.9	3.2E-07	2.7	1.7E-04	2.6	1.4E-05	3.0
1968	5.3E-06	4.1	3.5E-07	2.5	1.8E-04	2.5	1.5E-05	3.1
1969	4.4E-06	4.1	4.3E-07	2.5	1.3E-04	2.7	1.3E-05	2.9
1970	3.5E-06	3.9	4.4E-07	2.5	7.2E-05	2.5	8.8E-06	2.7
1971	3.2E-06	3.8	4.4E-07	2.5	5.5E-05	2.5	7.8E-06	2.7
1972	2.0E-06	3.6	5.1E-07	2.5	7.3E-06	2.3	3.7E-06	2.5
1973	2.6E-06	3.9	4.7E-07	2.6	2.5E-05	2.5	5.6E-06	2.6
1974	2.6E-06	3.6	4.7E-07	2.7	3.5E-05	2.5	6.1E-06	2.6
1975	2.4E-06	3.6	4.5E-07	2.6	1.9E-05	2.4	4.9E-06	2.6
1976	2.1E-06	3.8	4.9E-07	2.6	1.4E-05	2.4	4.3E-06	2.5
1977	2.2E-06	3.7	5.1E-07	2.5	1.8E-05	2.4	4.6E-06	2.6
1978	3.9E-06	3.8	5.6E-07	2.6	6.4E-05	2.5	9.2E-06	2.7
1979	2.0E-06	4.0	5.3E-07	2.6	6.2E-06	2.3	3.9E-06	2.7
1980	2.0E-06	3.9	5.2E-07	2.6	4.7E-06	2.2	3.7E-06	2.7
1981	1.6E-06	4.2	5.2E-07	2.5	1.4E-06	2.1	3.1E-06	2.9
1982	2.0E-06	3.8	5.5E-07	2.5	1.1E-06	2.0	3.3E-06	2.8
1983	2.0E-06	4.0	5.1E-07	2.8	5.1E-07	2.8	3.3E-06	2.8
1984	1.8E-06	3.9	5.3E-07	2.4	1.9E-06	2.1	3.4E-06	2.6
1985	1.7E-06	3.8	5.2E-07	2.6	2.7E-06	2.1	3.2E-06	2.6
1986	1.7E-06	4.0	5.1E-07	2.4	1.0E-06	2.0	3.1E-06	2.8
1987	1.8E-06	4.1	5.6E-07	2.5	1.4E-06	2.1	3.2E-06	2.9
1988	1.8E-06	4.1	5.5E-07	2.5	1.1E-06	2.1	3.2E-06	2.9
1989	2.0E-06	3.7	5.5E-07	2.8	3.3E-06	2.2	3.6E-06	2.7

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium
Sector 6
(1958 - 1989)

Year	Inhalation GM (µg/year)	Inhalation GSD	Soil Ingestion GM (µg/year)	Soil Ingestion GSD	Vegetable Ingestion GM (µg/year)	Vegetable Ingestion GSD	Wheat Ingestion GM (µg/year)	Wheat Ingestion GSD	Milk Ingestion GM (µg/year)	Milk Ingestion GSD
1958	2.7E-05	2.6	6.6E-09	4.3	8.8E-07	4.0	4.0E-10	4.8	5.3E-10	5.5
1959	2.5E-05	2.6	1.5E-08	3.8	8.8E-07	3.8	9.7E-10	4.1	6.8E-10	4.9
1960	2.6E-05	2.5	2.7E-08	3.6	8.4E-07	3.4	1.7E-09	3.9	7.6E-10	4.8
1961	2.0E-05	2.6	3.1E-08	3.7	7.0E-07	4.2	2.4E-09	3.9	6.0E-10	4.4
1962	1.4E-05	2.6	4.0E-08	3.3	4.6E-07	3.4	2.6E-09	4.0	5.4E-10	4.3
1963	2.7E-05	2.4	4.7E-08	3.3	9.0E-07	3.5	3.4E-09	3.9	8.0E-10	4.3
1964	2.5E-05	2.5	5.8E-08	3.4	8.4E-07	3.5	3.5E-09	4.1	7.9E-10	4.4
1965	6.0E-05	2.6	7.4E-08	3.4	2.2E-06	4.0	5.0E-09	3.5	1.7E-09	4.8
1966	6.9E-05	2.7	1.1E-07	3.3	2.2E-06	3.5	7.0E-09	3.6	2.0E-09	4.4
1967	7.1E-05	2.5	1.2E-07	3.1	2.5E-06	3.5	7.9E-09	3.9	2.0E-09	4.1
1968	7.7E-05	2.6	1.4E-07	3.3	2.7E-06	3.6	1.0E-08	3.6	2.4E-09	4.1
1969	5.0E-05	2.6	1.9E-07	3.2	1.8E-06	3.6	1.2E-08	3.8	1.9E-09	4.3
1970	2.7E-05	2.5	1.8E-07	3.3	9.9E-07	3.3	1.3E-08	3.6	1.6E-09	4.1
1971	2.3E-05	2.6	2.0E-07	3.2	8.5E-07	3.4	1.3E-08	3.6	1.5E-09	3.8
1972	2.9E-06	2.6	1.8E-07	3.3	1.4E-07	3.1	1.2E-08	3.7	9.4E-10	4.1
1973	1.0E-05	2.5	1.8E-07	3.3	3.9E-07	3.2	1.4E-08	3.6	1.0E-09	4.1
1974	1.7E-05	2.7	2.0E-07	2.9	6.2E-07	3.2	1.4E-08	3.7	1.3E-09	3.8
1975	7.4E-06	2.5	2.1E-07	3.0	2.9E-07	3.5	1.2E-08	3.5	1.1E-09	3.8
1976	5.3E-06	2.5	2.1E-07	3.0	2.1E-07	3.2	1.4E-08	3.5	1.1E-09	3.8
1977	7.3E-06	2.4	2.3E-07	3.0	3.2E-07	3.1	1.6E-08	3.5	1.0E-09	3.8
1978	2.7E-05	2.5	2.3E-07	3.3	9.7E-07	3.4	1.5E-08	3.6	1.7E-09	4.1
1979	2.3E-06	2.4	2.1E-07	3.2	1.2E-07	2.8	1.4E-08	3.5	9.4E-10	3.8
1980	1.6E-06	2.7	2.5E-07	3.2	9.5E-08	3.1	1.4E-08	3.4	9.6E-10	3.9
1981	2.8E-07	2.6	1.9E-07	3.4	4.1E-08	3.0	1.6E-08	3.7	8.5E-10	4.2
1982	1.5E-07	2.5	2.1E-07	3.4	3.1E-08	3.1	1.5E-08	3.6	8.8E-10	3.9
1983	1.1E-15	2.5	2.2E-07	3.2	2.2E-08	3.7	1.5E-08	3.6	8.9E-10	4.6
1984	4.4E-07	2.6	2.5E-07	3.1	4.5E-08	3.0	1.6E-08	3.8	1.1E-09	4.1
1985	7.6E-07	2.6	2.1E-07	3.1	6.2E-08	2.8	1.5E-08	3.7	8.1E-10	4.1
1986	1.6E-07	2.6	2.2E-07	3.6	3.4E-08	3.0	1.6E-08	3.6	8.5E-10	3.9
1987	3.0E-07	2.6	2.4E-07	3.1	3.8E-08	2.9	1.4E-08	3.8	9.3E-10	4.0
1988	1.4E-07	2.4	2.1E-07	3.4	2.9E-08	2.9	1.4E-08	3.5	8.9E-10	4.0
1989	8.5E-07	2.4	2.3E-07	3.3	6.3E-08	2.9	1.6E-08	3.5	8.7E-10	4.0

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium (continued)
Sector 6
(1958 - 1989)

Year	Beef Ingestion GM (µg/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (µg/year)	Inhalation of Resuspended Particulates GSD	Total Inhalation GM (µg/year)	Total Inhalation GSD	Total Ingestion GM (µg/year)	Total Ingestion GSD
1958	5.3E-07	5.1	6.5E-09	3.4	2.7E-05	2.6	1.8E-06	3.6
1959	6.0E-07	4.9	1.5E-08	3.1	2.5E-05	2.6	1.9E-06	3.4
1960	6.7E-07	4.5	2.4E-08	2.8	2.7E-05	2.5	2.0E-06	3.1
1961	6.2E-07	3.9	3.3E-08	2.7	2.0E-05	2.6	1.8E-06	3.1
1962	4.6E-07	4.3	3.7E-08	2.6	1.4E-05	2.6	1.3E-06	2.9
1963	7.7E-07	4.0	4.5E-08	2.7	2.7E-05	2.4	2.2E-06	2.8
1964	7.7E-07	3.9	6.0E-08	2.6	2.5E-05	2.4	2.2E-06	2.9
1965	1.6E-06	4.2	7.5E-08	2.6	6.0E-05	2.6	5.1E-06	3.3
1966	1.7E-06	4.3	1.0E-07	2.7	6.9E-05	2.6	5.1E-06	3.0
1967	1.9E-06	4.6	1.1E-07	2.5	7.1E-05	2.5	5.9E-06	3.0
1968	2.1E-06	4.2	1.5E-07	2.6	7.8E-05	2.6	6.5E-06	3.0
1969	1.8E-06	3.8	1.9E-07	2.6	5.1E-05	2.6	5.1E-06	2.7
1970	1.3E-06	3.7	2.0E-07	2.6	2.8E-05	2.4	3.3E-06	2.5
1971	1.4E-06	3.7	1.8E-07	2.6	2.4E-05	2.6	3.3E-06	2.7
1972	8.1E-07	3.7	1.9E-07	2.4	3.2E-06	2.4	1.5E-06	2.6
1973	8.9E-07	4.0	1.8E-07	2.5	1.0E-05	2.4	2.1E-06	2.6
1974	1.2E-06	3.7	2.1E-07	2.6	1.7E-05	2.6	2.8E-06	2.5
1975	9.7E-07	3.8	1.9E-07	2.5	7.7E-06	2.4	2.0E-06	2.6
1976	9.8E-07	3.5	2.1E-07	2.5	5.7E-06	2.4	1.9E-06	2.5
1977	1.0E-06	3.8	2.0E-07	2.6	7.7E-06	2.4	2.1E-06	2.5
1978	1.6E-06	3.6	2.1E-07	2.5	2.7E-05	2.5	3.7E-06	2.6
1979	8.4E-07	3.7	2.3E-07	2.6	2.7E-06	2.2	1.6E-06	2.5
1980	8.7E-07	3.9	2.1E-07	2.5	2.0E-06	2.4	1.6E-06	2.6
1981	7.6E-07	4.1	2.0E-07	2.5	5.7E-07	2.1	1.3E-06	2.9
1982	8.7E-07	3.9	2.4E-07	2.6	4.6E-07	2.1	1.4E-06	2.8
1983	7.4E-07	3.8	1.9E-07	2.6	1.9E-07	2.6	1.3E-06	2.7
1984	8.9E-07	3.8	2.2E-07	2.5	7.7E-07	2.2	1.6E-06	2.7
1985	7.7E-07	3.8	2.0E-07	2.6	1.1E-06	2.2	1.4E-06	2.7
1986	8.5E-07	3.7	2.3E-07	2.6	4.5E-07	2.1	1.4E-06	2.7
1987	7.6E-07	3.8	2.1E-07	2.7	5.8E-07	2.2	1.4E-06	2.7
1988	7.6E-07	3.7	2.2E-07	2.5	4.2E-07	2.0	1.3E-06	2.7
1989	7.6E-07	3.8	2.1E-07	2.4	1.2E-06	2.1	1.4E-06	2.6

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium
Sector 7
(1958 - 1989)

Year	Inhalation GM (µg/year)	Inhalation GSD	Soil Ingestion GM (µg/year)	Soil Ingestion GSD	Vegetable Ingestion GM (µg/year)	Vegetable Ingestion GSD	Wheat Ingestion GM (µg/year)	Wheat Ingestion GSD	Milk Ingestion GM (µg/year)	Milk Ingestion GSD
1958	2.5E-05	2.6	6.3E-09	4.5	8.3E-07	3.5	4.4E-10	4.7	5.5E-10	5.1
1959	2.4E-05	2.5	1.4E-08	3.8	8.2E-07	3.5	8.8E-10	4.0	5.9E-10	4.6
1960	2.5E-05	2.6	2.4E-08	3.7	8.9E-07	3.7	1.7E-09	3.9	6.6E-10	4.4
1961	2.1E-05	2.6	2.9E-08	3.4	7.0E-07	3.9	2.2E-09	3.9	6.1E-10	4.4
1962	1.2E-05	2.6	3.5E-08	3.6	4.1E-07	3.6	2.2E-09	3.9	4.2E-10	4.3
1963	2.2E-05	2.6	4.6E-08	3.3	7.8E-07	3.9	3.0E-09	3.6	7.6E-10	4.2
1964	2.2E-05	2.5	5.2E-08	3.4	7.5E-07	3.6	3.6E-09	3.8	8.1E-10	4.2
1965	5.6E-05	2.7	7.5E-08	3.4	2.0E-06	4.0	4.8E-09	3.7	1.7E-09	4.3
1966	5.8E-05	2.6	9.5E-08	3.3	2.0E-06	3.5	6.2E-09	3.7	1.9E-09	4.5
1967	6.2E-05	2.5	1.2E-07	3.3	2.1E-06	3.6	7.8E-09	3.9	1.9E-09	4.5
1968	6.7E-05	2.5	1.3E-07	3.3	2.4E-06	3.4	9.3E-09	3.8	2.4E-09	4.7
1969	4.4E-05	2.7	1.6E-07	3.1	1.5E-06	3.7	1.1E-08	3.6	1.7E-09	4.1
1970	2.7E-05	2.7	1.7E-07	3.3	8.5E-07	3.6	1.2E-08	3.6	1.6E-09	4.2
1971	2.1E-05	2.5	1.7E-07	3.1	7.6E-07	3.3	1.2E-08	3.7	1.2E-09	4.0
1972	2.8E-06	2.6	1.8E-07	3.2	1.3E-07	3.1	1.2E-08	3.7	8.9E-10	4.0
1973	1.0E-05	2.5	2.0E-07	3.1	4.1E-07	3.6	1.4E-08	3.5	1.2E-09	4.1
1974	1.4E-05	2.5	1.8E-07	3.2	5.4E-07	3.6	1.2E-08	3.5	1.1E-09	4.2
1975	6.7E-06	2.6	1.8E-07	3.2	2.6E-07	3.3	1.4E-08	3.6	9.0E-10	3.8
1976	5.3E-06	2.5	1.9E-07	3.5	2.2E-07	3.1	1.4E-08	3.7	1.0E-09	3.9
1977	6.3E-06	2.5	2.0E-07	3.4	2.5E-07	3.2	1.4E-08	3.7	9.9E-10	4.1
1978	2.6E-05	2.5	2.0E-07	3.3	8.1E-07	3.4	1.4E-08	3.7	1.6E-09	4.1
1979	2.1E-06	2.4	2.2E-07	3.2	1.1E-07	3.0	1.2E-08	3.7	8.8E-10	4.2
1980	1.4E-06	2.5	2.1E-07	3.3	8.6E-08	2.9	1.6E-08	3.7	9.1E-10	4.4
1981	2.7E-07	2.5	2.3E-07	3.2	3.5E-08	3.0	1.3E-08	3.7	9.1E-10	4.1
1982	1.5E-07	2.5	1.9E-07	3.4	3.1E-08	3.2	1.4E-08	3.9	7.7E-10	4.4
1983	9.6E-16	2.6	2.0E-07	3.5	1.9E-08	3.5	1.3E-08	3.6	8.5E-10	4.1
1984	4.3E-07	2.6	2.2E-07	3.0	4.2E-08	3.0	1.4E-08	3.8	9.2E-10	4.0
1985	6.9E-07	2.5	2.0E-07	3.2	5.8E-08	2.9	1.4E-08	3.6	8.7E-10	4.1
1986	1.4E-07	2.4	2.2E-07	3.2	3.0E-08	3.1	1.4E-08	3.8	8.9E-10	3.9
1987	2.7E-07	2.5	2.1E-07	3.5	3.7E-08	2.9	1.4E-08	3.6	8.3E-10	4.4
1988	1.3E-07	2.5	2.1E-07	3.2	2.8E-08	3.1	1.4E-08	3.7	8.8E-10	4.5
1989	8.5E-07	2.5	2.0E-07	3.3	5.5E-08	2.8	1.2E-08	3.4	8.3E-10	4.5

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium (continued)
Sector 7
(1958 - 1989)

Year	Beef Ingestion GM (µg/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (µg/year)	Inhalation of Resuspended Particulates GSD	Total Inhalation GM (µg/year)	Total Inhalation GSD	Total Ingestion GM (µg/year)	Total Ingestion GSD
1958	4.8E-07	5.1	6.4E-09	3.5	2.5E-05	2.6	1.7E-06	3.3
1959	5.5E-07	4.3	1.3E-08	3.0	2.4E-05	2.5	1.8E-06	3.1
1960	6.2E-07	4.2	2.2E-08	2.9	2.5E-05	2.6	2.0E-06	3.1
1961	6.3E-07	4.2	3.1E-08	2.7	2.1E-05	2.6	1.8E-06	3.1
1962	3.9E-07	3.9	3.5E-08	2.8	1.2E-05	2.6	1.1E-06	2.8
1963	7.7E-07	3.9	4.3E-08	2.6	2.2E-05	2.6	2.1E-06	3.0
1964	7.3E-07	4.2	5.4E-08	2.6	2.2E-05	2.5	2.1E-06	2.9
1965	1.6E-06	3.9	7.6E-08	2.5	5.6E-05	2.7	4.7E-06	3.2
1966	1.6E-06	3.9	9.0E-08	2.6	5.8E-05	2.6	4.8E-06	2.9
1967	1.8E-06	4.3	1.1E-07	2.6	6.3E-05	2.5	5.2E-06	3.0
1968	2.2E-06	3.9	1.3E-07	2.7	6.8E-05	2.5	6.0E-06	2.9
1969	1.9E-06	3.8	1.6E-07	2.6	4.5E-05	2.6	4.8E-06	2.8
1970	1.3E-06	3.9	1.8E-07	2.6	2.7E-05	2.6	3.2E-06	2.7
1971	1.2E-06	3.7	1.7E-07	2.7	2.1E-05	2.5	2.9E-06	2.5
1972	8.3E-07	3.8	1.7E-07	2.5	3.1E-06	2.4	1.5E-06	2.7
1973	9.8E-07	3.8	1.6E-07	2.5	1.0E-05	2.5	2.3E-06	2.6
1974	1.1E-06	3.7	1.8E-07	2.4	1.4E-05	2.5	2.6E-06	2.6
1975	8.2E-07	3.6	1.9E-07	2.5	7.1E-06	2.4	1.8E-06	2.5
1976	8.7E-07	3.9	1.9E-07	2.4	5.7E-06	2.4	1.8E-06	2.6
1977	9.9E-07	3.7	1.8E-07	2.5	6.7E-06	2.4	2.0E-06	2.6
1978	1.4E-06	3.6	1.9E-07	2.5	2.6E-05	2.5	3.2E-06	2.6
1979	8.5E-07	3.8	2.0E-07	2.5	2.5E-06	2.2	1.6E-06	2.6
1980	8.1E-07	3.9	2.0E-07	2.4	1.7E-06	2.2	1.5E-06	2.6
1981	7.5E-07	4.0	2.1E-07	2.6	5.7E-07	2.1	1.3E-06	2.8
1982	6.4E-07	3.9	2.1E-07	2.5	4.2E-07	2.1	1.1E-06	2.7
1983	7.2E-07	3.9	2.2E-07	2.5	2.2E-07	2.5	1.2E-06	2.8
1984	7.6E-07	3.9	2.1E-07	2.5	7.3E-07	2.2	1.3E-06	2.7
1985	7.7E-07	3.7	2.0E-07	2.6	9.9E-07	2.2	1.4E-06	2.6
1986	7.9E-07	3.7	2.1E-07	2.5	4.1E-07	2.1	1.4E-06	2.7
1987	7.6E-07	4.0	2.0E-07	2.4	5.5E-07	2.0	1.3E-06	2.9
1988	7.6E-07	3.7	2.2E-07	2.5	4.1E-07	2.1	1.3E-06	2.7
1989	7.5E-07	3.6	2.1E-07	2.6	1.2E-06	2.2	1.3E-06	2.6

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium
Sector 8
(1958 - 1989)

Year	Inhalation GM (μg/year)	Inhalation GSD	Soil Ingestion GM (μg/year)	Soil Ingestion GSD	Vegetable Ingestion GM (μg/year)	Vegetable Ingestion GSD	Wheat Ingestion GM (μg/year)	Wheat Ingestion GSD	Milk Ingestion GM (μg/year)	Milk Ingestion GSD
1958	8.1E-05	2.7	2.0E-08	4.3	2.8E-06	3.7	1.6E-09	4.8	1.9E-09	5.2
1959	8.2E-05	2.6	5.1E-08	3.6	2.6E-06	3.6	3.3E-09	3.8	2.0E-09	4.6
1960	8.3E-05	2.6	8.1E-08	3.4	2.7E-06	3.5	5.1E-09	3.7	2.0E-09	4.9
1961	7.0E-05	2.6	1.0E-07	3.4	2.5E-06	3.6	6.8E-09	3.8	1.9E-09	4.4
1962	4.2E-05	2.6	1.3E-07	3.3	1.5E-06	3.4	7.5E-09	3.8	1.4E-09	4.4
1963	7.1E-05	2.7	1.6E-07	3.4	2.5E-06	3.9	1.1E-08	3.6	2.4E-09	4.4
1964	7.1E-05	2.6	1.8E-07	3.2	2.6E-06	3.6	1.3E-08	3.8	2.6E-09	4.4
1965	1.9E-04	2.8	2.4E-07	3.4	6.4E-06	3.6	1.5E-08	3.4	5.7E-09	4.3
1966	2.1E-04	2.6	3.4E-07	3.5	6.6E-06	3.8	2.1E-08	3.5	5.8E-09	4.1
1967	1.9E-04	2.6	3.5E-07	3.4	6.4E-06	3.6	2.7E-08	3.6	6.2E-09	4.5
1968	2.4E-04	2.6	4.6E-07	3.4	7.8E-06	3.6	3.3E-08	3.7	7.5E-09	4.4
1969	1.6E-04	2.5	5.2E-07	3.3	5.5E-06	3.5	3.7E-08	3.6	5.8E-09	4.4
1970	8.7E-05	2.5	6.4E-07	3.1	3.1E-06	3.6	3.5E-08	4.0	5.2E-09	3.8
1971	7.3E-05	2.4	6.2E-07	3.1	2.4E-06	3.5	4.0E-08	3.8	4.4E-09	3.9
1972	9.2E-06	2.4	6.4E-07	3.2	4.4E-07	3.0	4.2E-08	3.5	2.9E-09	4.2
1973	3.2E-05	2.4	6.9E-07	3.4	1.3E-06	3.3	3.9E-08	3.5	3.8E-09	4.0
1974	4.2E-05	2.6	6.4E-07	3.0	1.6E-06	3.5	4.4E-08	3.5	3.9E-09	3.9
1975	2.2E-05	2.4	6.5E-07	3.2	1.0E-06	3.1	4.6E-08	3.7	3.3E-09	4.1
1976	1.6E-05	2.5	6.4E-07	3.2	6.8E-07	3.0	4.5E-08	3.6	3.6E-09	3.9
1977	2.1E-05	2.3	6.3E-07	3.3	8.0E-07	3.1	4.2E-08	3.6	3.3E-09	4.0
1978	8.0E-05	2.5	6.9E-07	3.2	2.7E-06	3.3	4.4E-08	3.8	5.5E-09	4.3
1979	6.5E-06	2.5	7.1E-07	3.2	3.4E-07	3.0	4.2E-08	3.6	3.3E-09	4.0
1980	5.2E-06	2.5	6.1E-07	3.4	2.9E-07	3.0	4.4E-08	3.7	3.1E-09	4.2
1981	9.1E-07	2.6	6.7E-07	3.3	1.2E-07	3.0	4.6E-08	3.7	2.7E-09	4.3
1982	4.3E-07	2.5	6.4E-07	3.3	9.6E-08	3.0	4.5E-08	3.6	2.8E-09	3.9
1983	3.1E-15	2.5	7.6E-07	3.1	6.5E-08	3.5	4.7E-08	3.4	2.5E-09	4.1
1984	1.4E-06	2.5	6.5E-07	3.3	1.3E-07	2.7	4.2E-08	3.5	3.0E-09	4.0
1985	2.2E-06	2.4	6.8E-07	3.1	1.9E-07	2.8	4.7E-08	3.8	2.9E-09	4.1
1986	4.7E-07	2.6	6.7E-07	3.2	9.4E-08	3.0	4.4E-08	3.6	2.8E-09	4.1
1987	8.3E-07	2.4	7.1E-07	3.1	1.1E-07	2.8	4.4E-08	3.7	2.9E-09	4.3
1988	4.1E-07	2.4	7.2E-07	3.3	9.5E-08	3.0	4.9E-08	3.5	2.7E-09	3.9
1989	2.6E-06	2.5	6.8E-07	3.4	2.0E-07	2.7	4.7E-08	3.7	3.0E-09	3.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) μg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium (continued)
Sector 8
(1958 - 1989)

Year	Beef Ingestion GM (µg/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (µg/year)	Inhalation of Resuspended Particulates GSD	Total Inhalation GM (µg/year)	Total Inhalation GSD	Total Ingestion GM (µg/year)	Total Ingestion GSD
1958	1.6E-06	4.9	2.0E-08	3.3	8.1E-05	2.7	5.7E-06	3.4
1959	1.9E-06	4.4	5.1E-08	2.9	8.2E-05	2.6	5.8E-06	3.3
1960	1.8E-06	4.3	7.4E-08	2.8	8.3E-05	2.6	6.0E-06	3.0
1961	2.0E-06	3.9	1.0E-07	2.6	7.1E-05	2.6	6.1E-06	2.9
1962	1.5E-06	3.8	1.2E-07	2.6	4.3E-05	2.6	4.1E-06	2.7
1963	2.4E-06	4.4	1.4E-07	2.9	7.1E-05	2.7	6.8E-06	3.1
1964	2.5E-06	4.0	1.7E-07	2.6	7.2E-05	2.6	7.0E-06	2.9
1965	5.1E-06	4.3	2.4E-07	2.5	1.9E-04	2.8	1.5E-05	3.0
1966	5.7E-06	4.0	3.1E-07	2.5	2.1E-04	2.6	1.7E-05	3.1
1967	5.9E-06	4.1	3.7E-07	2.7	1.9E-04	2.6	1.7E-05	3.0
1968	7.4E-06	4.1	4.4E-07	2.6	2.4E-04	2.6	2.1E-05	2.9
1969	6.4E-06	4.0	5.2E-07	2.7	1.6E-04	2.5	1.7E-05	2.7
1970	4.3E-06	3.4	5.9E-07	2.3	8.9E-05	2.5	1.1E-05	2.6
1971	3.9E-06	3.6	6.0E-07	2.5	7.4E-05	2.4	9.5E-06	2.5
1972	2.5E-06	3.6	6.2E-07	2.6	1.0E-05	2.3	4.8E-06	2.5
1973	3.4E-06	3.6	6.5E-07	2.6	3.4E-05	2.4	7.4E-06	2.5
1974	3.6E-06	3.3	5.9E-07	2.5	4.3E-05	2.5	7.9E-06	2.4
1975	3.1E-06	3.6	6.0E-07	2.6	2.3E-05	2.3	6.6E-06	2.5
1976	3.0E-06	3.7	6.4E-07	2.5	1.7E-05	2.4	5.9E-06	2.5
1977	2.8E-06	3.5	6.1E-07	2.6	2.2E-05	2.3	5.8E-06	2.4
1978	4.6E-06	3.7	6.9E-07	2.4	8.1E-05	2.5	1.1E-05	2.5
1979	2.6E-06	3.6	6.5E-07	2.7	7.7E-06	2.3	4.8E-06	2.6
1980	2.5E-06	3.6	6.6E-07	2.4	6.3E-06	2.2	4.4E-06	2.6
1981	2.5E-06	4.0	6.9E-07	2.7	1.9E-06	2.1	4.3E-06	2.9
1982	2.3E-06	3.7	6.3E-07	2.4	1.2E-06	2.1	4.0E-06	2.6
1983	2.5E-06	4.2	6.4E-07	2.5	6.4E-07	2.5	4.3E-06	2.9
1984	2.6E-06	3.4	6.8E-07	2.4	2.4E-06	2.1	4.4E-06	2.5
1985	2.6E-06	3.8	6.6E-07	2.4	3.2E-06	2.1	4.6E-06	2.6
1986	2.3E-06	3.5	6.8E-07	2.4	1.4E-06	2.0	4.1E-06	2.6
1987	2.6E-06	4.0	6.4E-07	2.6	1.7E-06	2.1	4.4E-06	2.8
1988	2.4E-06	3.9	7.0E-07	2.5	1.3E-06	2.0	4.3E-06	2.8
1989	2.5E-06	3.7	6.8E-07	2.5	3.6E-06	2.1	4.4E-06	2.6

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium
Sector 9
(1958 - 1989)

Year	Inhalation GM (μg/year)	Inhalation GSD	Soil Ingestion GM (μg/year)	Soil Ingestion GSD	Vegetable Ingestion GM (μg/year)	Vegetable Ingestion GSD	Wheat Ingestion GM (μg/year)	Wheat Ingestion GSD	Milk Ingestion GM (μg/year)	Milk Ingestion GSD
1958	3.3E-05	2.7	8.9E-09	4.5	1.1E-06	3.7	5.7E-10	4.4	6.8E-10	4.9
1959	3.0E-05	2.6	1.8E-08	3.9	9.4E-07	3.8	1.2E-09	4.3	7.6E-10	5.2
1960	3.2E-05	2.6	3.1E-08	3.7	1.2E-06	3.7	2.0E-09	4.1	9.6E-10	4.8
1961	2.7E-05	2.6	4.2E-08	3.5	8.6E-07	3.6	2.4E-09	3.6	8.2E-10	4.4
1962	1.6E-05	2.6	4.1E-08	3.8	5.4E-07	3.7	3.1E-09	3.7	6.1E-10	4.4
1963	2.9E-05	2.8	5.2E-08	3.4	1.1E-06	4.0	3.4E-09	3.7	1.0E-09	4.5
1964	3.1E-05	2.5	7.8E-08	3.1	1.1E-06	3.7	4.7E-09	3.5	1.1E-09	4.4
1965	7.5E-05	2.5	9.5E-08	3.5	2.7E-06	3.7	6.0E-09	3.8	2.0E-09	4.5
1966	8.2E-05	2.5	1.2E-07	3.4	2.8E-06	3.8	8.6E-09	4.0	2.5E-09	4.6
1967	7.5E-05	2.5	1.4E-07	3.4	2.5E-06	3.5	9.9E-09	3.7	2.5E-09	4.2
1968	8.9E-05	2.6	2.1E-07	3.4	3.1E-06	3.6	1.3E-08	3.7	2.9E-09	4.5
1969	6.3E-05	2.5	2.2E-07	3.4	2.1E-06	3.6	1.3E-08	3.7	2.5E-09	4.1
1970	3.2E-05	2.6	2.1E-07	3.3	1.1E-06	3.5	1.7E-08	3.5	2.1E-09	4.2
1971	2.9E-05	2.6	2.2E-07	3.5	9.7E-07	3.5	1.6E-08	3.5	1.9E-09	4.0
1972	3.6E-06	2.4	2.1E-07	3.6	1.7E-07	3.0	1.5E-08	3.8	1.0E-09	4.1
1973	1.2E-05	2.5	2.3E-07	3.2	4.8E-07	3.3	1.6E-08	3.6	1.4E-09	4.1
1974	1.6E-05	2.5	2.5E-07	3.2	6.4E-07	3.4	1.6E-08	3.6	1.6E-09	3.8
1975	9.7E-06	2.5	2.5E-07	3.4	3.9E-07	3.2	1.8E-08	3.7	1.4E-09	4.0
1976	7.1E-06	2.5	2.6E-07	3.3	3.0E-07	3.1	1.8E-08	3.5	1.4E-09	4.0
1977	8.3E-06	2.5	2.7E-07	3.3	3.5E-07	2.9	1.9E-08	3.6	1.5E-09	4.0
1978	3.0E-05	2.5	2.8E-07	3.2	1.0E-06	3.5	1.8E-08	3.6	1.8E-09	4.0
1979	2.7E-06	2.5	2.4E-07	3.2	1.4E-07	3.0	1.7E-08	3.5	1.1E-09	4.1
1980	1.9E-06	2.4	2.7E-07	3.3	1.2E-07	2.8	1.9E-08	3.6	1.2E-09	4.0
1981	3.5E-07	2.5	2.7E-07	3.3	5.0E-08	3.0	1.9E-08	3.6	1.2E-09	4.2
1982	1.9E-07	2.5	2.7E-07	3.2	4.1E-08	2.9	1.9E-08	3.5	1.1E-09	4.0
1983	1.2E-15	2.5	2.5E-07	3.4	2.5E-08	3.7	1.7E-08	3.7	1.1E-09	4.4
1984	5.5E-07	2.6	2.8E-07	3.1	5.6E-08	3.0	1.7E-08	3.7	1.0E-09	4.0
1985	8.9E-07	2.4	2.7E-07	3.2	7.1E-08	2.8	1.8E-08	3.6	1.0E-09	4.0
1986	1.7E-07	2.7	2.7E-07	3.1	3.8E-08	3.1	1.8E-08	3.8	1.0E-09	4.0
1987	3.5E-07	2.5	2.6E-07	3.1	5.1E-08	2.8	1.9E-08	3.5	1.3E-09	4.0
1988	1.8E-07	2.5	2.6E-07	3.3	3.9E-08	3.1	1.9E-08	3.5	1.0E-09	4.1
1989	1.1E-06	2.7	2.4E-07	3.3	7.3E-08	2.8	1.7E-08	3.5	1.0E-09	4.2

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) μg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium (continued)
Sector 9
(1958 - 1989)

Year	Beef Ingestion GM (µg/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (µg/year)	Inhalation of Resuspended Particulates GSD	Total Inhalation GM (µg/year)	Total Inhalation GSD	Total Ingestion GM (µg/year)	Total Ingestion GSD
1958	7.0E-07	4.8	8.0E-09	3.5	3.3E-05	2.7	2.3E-06	3.4
1959	6.8E-07	4.5	1.8E-08	2.9	3.0E-05	2.6	2.1E-06	3.5
1960	8.2E-07	4.3	3.2E-08	2.8	3.2E-05	2.6	2.5E-06	3.2
1961	7.4E-07	3.9	4.0E-08	2.7	2.7E-05	2.6	2.1E-06	2.9
1962	5.0E-07	4.3	4.7E-08	2.7	1.6E-05	2.5	1.5E-06	3.0
1963	1.0E-06	4.5	5.7E-08	2.6	2.9E-05	2.7	2.9E-06	3.2
1964	1.0E-06	3.8	7.2E-08	2.6	3.2E-05	2.5	2.9E-06	2.9
1965	2.1E-06	4.3	9.1E-08	2.5	7.5E-05	2.5	6.4E-06	3.1
1966	2.3E-06	4.3	1.2E-07	2.7	8.2E-05	2.5	6.8E-06	3.2
1967	2.0E-06	4.1	1.5E-07	2.7	7.6E-05	2.5	6.0E-06	2.9
1968	2.7E-06	4.0	1.7E-07	2.6	8.9E-05	2.6	8.0E-06	2.9
1969	2.3E-06	3.7	2.0E-07	2.5	6.4E-05	2.5	6.2E-06	2.8
1970	1.8E-06	3.9	2.3E-07	2.7	3.3E-05	2.6	4.3E-06	2.7
1971	1.7E-06	3.6	2.4E-07	2.6	3.0E-05	2.5	4.0E-06	2.5
1972	8.9E-07	3.6	2.3E-07	2.6	4.0E-06	2.3	1.7E-06	2.5
1973	1.2E-06	3.8	2.3E-07	2.4	1.3E-05	2.4	2.6E-06	2.6
1974	1.3E-06	3.6	2.5E-07	2.5	1.7E-05	2.4	3.0E-06	2.5
1975	1.3E-06	3.7	2.4E-07	2.6	1.0E-05	2.4	2.6E-06	2.5
1976	1.1E-06	3.8	2.4E-07	2.6	7.6E-06	2.4	2.3E-06	2.5
1977	1.2E-06	3.5	2.4E-07	2.5	8.7E-06	2.4	2.5E-06	2.4
1978	1.8E-06	3.7	2.5E-07	2.6	3.0E-05	2.5	4.3E-06	2.6
1979	9.5E-07	3.6	2.3E-07	2.5	3.1E-06	2.3	1.8E-06	2.5
1980	9.2E-07	4.0	2.6E-07	2.7	2.3E-06	2.2	1.8E-06	2.7
1981	1.1E-06	3.7	2.7E-07	2.6	7.4E-07	2.1	1.8E-06	2.7
1982	8.7E-07	4.0	2.7E-07	2.6	5.3E-07	2.1	1.6E-06	2.7
1983	8.8E-07	4.1	2.6E-07	2.5	2.6E-07	2.5	1.5E-06	2.9
1984	8.9E-07	3.7	2.7E-07	2.6	9.7E-07	2.1	1.6E-06	2.6
1985	9.7E-07	3.9	2.5E-07	2.5	1.3E-06	2.0	1.8E-06	2.6
1986	8.7E-07	4.0	2.6E-07	2.5	5.1E-07	2.1	1.6E-06	2.8
1987	9.9E-07	3.6	2.6E-07	2.6	7.2E-07	2.0	1.7E-06	2.5
1988	8.7E-07	4.0	2.5E-07	2.5	5.0E-07	2.1	1.5E-06	2.8
1989	9.8E-07	3.9	2.6E-07	2.5	1.5E-06	2.3	1.7E-06	2.8

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium
Sector 10
(1958 - 1989)

Year	Inhalation GM (µg/year)	Inhalation GSD	Soil Ingestion GM (µg/year)	Soil Ingestion GSD	Vegetable Ingestion GM (µg/year)	Vegetable Ingestion GSD	Wheat Ingestion GM (µg/year)	Wheat Ingestion GSD	Milk Ingestion GM (µg/year)	Milk Ingestion GSD
1958	1.3E-05	2.5	3.2E-09	4.3	4.1E-07	3.8	2.2E-10	5.0	2.7E-10	5.1
1959	1.3E-05	2.6	7.6E-09	3.8	4.4E-07	3.6	4.8E-10	4.4	3.2E-10	4.9
1960	1.3E-05	2.6	1.3E-08	3.5	4.4E-07	3.6	8.2E-10	3.9	3.2E-10	4.4
1961	1.0E-05	2.5	1.8E-08	3.4	3.6E-07	3.6	1.1E-09	3.9	3.2E-10	4.6
1962	7.0E-06	2.7	1.8E-08	3.4	2.2E-07	3.9	1.3E-09	3.9	2.6E-10	4.5
1963	1.2E-05	2.6	2.6E-08	3.3	3.7E-07	3.6	1.5E-09	3.8	3.1E-10	4.3
1964	1.3E-05	2.7	2.9E-08	3.7	4.1E-07	3.6	1.8E-09	3.6	4.7E-10	4.6
1965	2.9E-05	2.6	3.8E-08	3.4	1.0E-06	3.7	2.5E-09	3.9	9.6E-10	4.3
1966	3.4E-05	2.6	4.8E-08	3.3	1.2E-06	3.7	3.2E-09	3.6	9.8E-10	4.6
1967	3.3E-05	2.6	6.0E-08	3.1	1.1E-06	3.5	4.6E-09	3.5	9.2E-10	4.4
1968	3.6E-05	2.6	7.3E-08	3.4	1.2E-06	3.8	4.3E-09	3.8	1.2E-09	4.4
1969	2.6E-05	2.6	8.1E-08	3.5	8.8E-07	3.7	5.7E-09	3.6	9.5E-10	4.6
1970	1.3E-05	2.6	9.1E-08	3.4	4.6E-07	3.5	6.4E-09	3.9	7.3E-10	4.2
1971	1.2E-05	2.4	1.0E-07	3.2	4.1E-07	3.2	6.3E-09	3.6	7.6E-10	3.7
1972	1.4E-06	2.4	9.6E-08	3.2	6.2E-08	2.9	6.6E-09	3.7	4.5E-10	3.7
1973	5.4E-06	2.4	9.8E-08	3.3	2.1E-07	3.4	7.4E-09	3.7	5.7E-10	4.3
1974	7.0E-06	2.6	1.0E-07	3.3	2.5E-07	3.4	6.0E-09	3.6	6.3E-10	3.9
1975	3.7E-06	2.6	1.1E-07	3.1	1.6E-07	3.4	7.2E-09	3.5	5.4E-10	4.1
1976	2.5E-06	2.5	9.5E-08	3.4	1.1E-07	3.1	7.0E-09	3.7	5.6E-10	3.9
1977	3.5E-06	2.5	1.1E-07	3.2	1.5E-07	3.4	7.3E-09	3.5	5.7E-10	4.0
1978	1.2E-05	2.4	1.1E-07	3.1	4.4E-07	3.3	7.6E-09	3.6	7.4E-10	3.9
1979	1.0E-06	2.4	1.1E-07	3.3	5.6E-08	2.9	8.0E-09	3.6	4.4E-10	3.9
1980	7.8E-07	2.6	1.1E-07	3.4	4.6E-08	2.9	7.7E-09	3.4	4.6E-10	4.0
1981	1.4E-07	2.4	1.1E-07	3.3	1.9E-08	2.9	7.3E-09	3.6	4.6E-10	4.2
1982	7.2E-08	2.4	1.1E-07	3.2	1.5E-08	2.9	6.8E-09	3.4	4.2E-10	4.0
1983	5.3E-16	2.5	1.1E-07	3.0	9.5E-09	3.4	7.1E-09	3.5	4.2E-10	4.2
1984	2.2E-07	2.6	1.2E-07	3.2	2.2E-08	3.0	6.6E-09	3.6	4.0E-10	4.2
1985	3.5E-07	2.5	1.1E-07	3.3	2.8E-08	3.0	7.2E-09	3.5	4.0E-10	4.0
1986	7.4E-08	2.4	1.0E-07	3.2	1.5E-08	3.0	6.5E-09	3.6	4.2E-10	3.9
1987	1.4E-07	2.6	9.9E-08	3.3	2.0E-08	2.7	7.6E-09	3.5	4.1E-10	4.1
1988	7.6E-08	2.5	1.1E-07	3.4	1.5E-08	2.9	7.2E-09	3.8	4.5E-10	4.1
1989	4.2E-07	2.5	1.2E-07	3.4	3.3E-08	2.7	7.0E-09	3.6	4.9E-10	4.0

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium (continued)
Sector 10
(1958 - 1989)

Year	Beef Ingestion GM (µg/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (µg/year)	Inhalation of Resuspended Particulates GSD	Total Inhalation GM (µg/year)	Total Inhalation GSD	Total Ingestion GM (µg/year)	Total Ingestion GSD
1958	2.7E-07	4.9	3.3E-09	3.7	1.3E-05	2.5	8.8E-07	3.5
1959	3.2E-07	4.4	6.8E-09	3.2	1.3E-05	2.6	9.7E-07	3.3
1960	3.1E-07	4.1	1.2E-08	2.9	1.3E-05	2.6	9.7E-07	3.1
1961	3.3E-07	4.2	1.6E-08	2.7	1.0E-05	2.5	9.2E-07	3.0
1962	2.4E-07	4.1	1.9E-08	2.8	7.0E-06	2.7	6.5E-07	3.0
1963	3.5E-07	4.5	2.3E-08	2.8	1.2E-05	2.6	9.9E-07	3.0
1964	4.1E-07	4.2	3.0E-08	2.7	1.3E-05	2.6	1.1E-06	3.0
1965	7.8E-07	4.3	3.8E-08	2.8	2.9E-05	2.6	2.4E-06	3.0
1966	9.7E-07	4.4	4.6E-08	2.6	3.4E-05	2.6	2.9E-06	3.1
1967	9.9E-07	4.1	6.1E-08	2.5	3.3E-05	2.6	2.8E-06	3.0
1968	1.0E-06	4.2	7.4E-08	2.7	3.6E-05	2.6	3.0E-06	3.1
1969	1.0E-06	4.0	8.3E-08	2.6	2.6E-05	2.6	2.6E-06	3.0
1970	7.0E-07	3.5	9.2E-08	2.5	1.3E-05	2.5	1.7E-06	2.6
1971	6.6E-07	3.7	9.4E-08	2.5	1.2E-05	2.4	1.6E-06	2.6
1972	3.8E-07	3.7	9.3E-08	2.4	1.6E-06	2.2	7.2E-07	2.6
1973	5.8E-07	3.6	9.5E-08	2.6	5.6E-06	2.4	1.2E-06	2.6
1974	5.4E-07	3.7	9.9E-08	2.6	7.2E-06	2.5	1.2E-06	2.6
1975	4.9E-07	3.7	1.0E-07	2.4	3.9E-06	2.5	1.1E-06	2.5
1976	4.3E-07	3.8	9.3E-08	2.4	2.7E-06	2.4	8.8E-07	2.5
1977	4.5E-07	3.9	9.6E-08	2.6	3.7E-06	2.4	9.9E-07	2.5
1978	7.4E-07	3.7	1.1E-07	2.5	1.2E-05	2.4	1.8E-06	2.6
1979	4.2E-07	3.7	1.1E-07	2.5	1.2E-06	2.3	7.7E-07	2.5
1980	4.2E-07	3.8	1.1E-07	2.5	9.7E-07	2.3	7.7E-07	2.6
1981	3.9E-07	3.8	1.1E-07	2.6	3.0E-07	2.1	6.8E-07	2.7
1982	3.9E-07	3.8	1.1E-07	2.5	2.1E-07	2.1	6.7E-07	2.8
1983	4.0E-07	3.9	1.1E-07	2.6	1.1E-07	2.6	6.7E-07	2.9
1984	4.0E-07	3.8	1.1E-07	2.5	3.8E-07	2.1	6.9E-07	2.7
1985	4.0E-07	3.9	1.1E-07	2.5	5.3E-07	2.2	7.2E-07	2.8
1986	3.9E-07	3.8	1.1E-07	2.5	2.1E-07	2.0	6.6E-07	2.7
1987	3.7E-07	3.5	1.1E-07	2.5	2.9E-07	2.1	6.3E-07	2.6
1988	3.9E-07	4.0	1.1E-07	2.7	2.2E-07	2.1	6.8E-07	2.9
1989	4.2E-07	4.0	1.1E-07	2.5	5.9E-07	2.1	7.6E-07	2.7

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium
Sector 11
(1958 - 1989)

Year	Inhalation GM (μg/year)	Inhalation GSD	Soil Ingestion GM (μg/year)	Soil Ingestion GSD	Vegetable Ingestion GM (μg/year)	Vegetable Ingestion GSD	Wheat Ingestion GM (μg/year)	Wheat Ingestion GSD	Milk Ingestion GM (μg/year)	Milk Ingestion GSD
1958	1.1E-05	2.6	3.2E-09	4.2	3.5E-07	3.6	2.0E-10	4.8	2.1E-10	5.2
1959	1.2E-05	2.5	6.6E-09	3.9	4.2E-07	3.7	4.9E-10	3.8	2.9E-10	4.7
1960	1.2E-05	2.7	1.1E-08	3.8	4.2E-07	3.7	7.6E-10	4.0	3.2E-10	4.3
1961	9.7E-06	2.6	1.6E-08	3.2	3.3E-07	3.6	1.1E-09	3.7	2.9E-10	4.3
1962	6.6E-06	2.6	1.8E-08	3.4	2.1E-07	3.6	1.2E-09	4.0	2.5E-10	4.8
1963	1.1E-05	2.6	2.4E-08	3.2	3.6E-07	3.7	1.4E-09	3.7	3.5E-10	4.4
1964	1.1E-05	2.5	2.5E-08	3.4	3.5E-07	3.6	1.9E-09	3.8	3.7E-10	4.4
1965	2.8E-05	2.5	3.7E-08	3.4	9.4E-07	3.6	2.7E-09	3.6	7.9E-10	4.3
1966	3.0E-05	2.5	4.7E-08	3.3	1.0E-06	3.6	3.2E-09	3.8	9.0E-10	4.5
1967	3.0E-05	2.6	5.8E-08	3.4	9.5E-07	3.4	3.5E-09	3.7	9.6E-10	4.2
1968	3.3E-05	2.6	6.8E-08	3.4	1.2E-06	3.5	4.9E-09	3.6	1.1E-09	4.4
1969	2.3E-05	2.5	8.8E-08	3.1	7.7E-07	3.8	5.4E-09	3.6	9.9E-10	4.4
1970	1.4E-05	2.6	8.0E-08	3.3	4.6E-07	3.5	5.5E-09	3.6	7.1E-10	4.4
1971	9.9E-06	2.5	8.4E-08	3.4	3.5E-07	3.5	6.1E-09	3.7	6.5E-10	4.1
1972	1.4E-06	2.6	9.2E-08	3.3	6.8E-08	3.0	5.5E-09	3.8	4.3E-10	4.0
1973	4.8E-06	2.5	8.6E-08	3.2	1.9E-07	3.2	6.0E-09	3.7	4.6E-10	3.8
1974	6.3E-06	2.5	9.8E-08	3.3	2.3E-07	3.3	6.0E-09	3.6	6.1E-10	3.9
1975	3.5E-06	2.6	9.6E-08	3.2	1.4E-07	3.4	6.2E-09	3.8	5.4E-10	4.0
1976	2.3E-06	2.5	9.8E-08	3.0	9.6E-08	3.1	6.7E-09	3.4	4.2E-10	4.3
1977	3.4E-06	2.6	9.6E-08	3.2	1.4E-07	3.3	6.1E-09	3.5	5.6E-10	4.0
1978	1.1E-05	2.5	8.9E-08	3.1	4.2E-07	3.5	6.7E-09	3.6	7.6E-10	4.1
1979	1.0E-06	2.5	9.9E-08	3.2	5.1E-08	2.9	7.0E-09	3.7	4.7E-10	4.4
1980	6.8E-07	2.5	9.8E-08	3.5	3.9E-08	2.9	6.8E-09	3.5	4.1E-10	4.1
1981	1.4E-07	2.5	9.8E-08	3.2	1.7E-08	3.0	6.0E-09	3.7	4.1E-10	3.9
1982	6.8E-08	2.5	9.3E-08	3.3	1.4E-08	3.1	6.6E-09	3.7	4.2E-10	4.2
1983	4.8E-16	2.5	1.0E-07	3.4	9.4E-09	3.5	6.3E-09	3.5	3.9E-10	4.4
1984	2.0E-07	2.5	1.0E-07	3.1	2.1E-08	2.9	6.6E-09	3.6	3.8E-10	4.3
1985	3.5E-07	2.5	9.8E-08	3.4	2.7E-08	2.8	6.7E-09	3.4	4.5E-10	3.7
1986	6.6E-08	2.5	9.3E-08	3.5	1.5E-08	2.9	7.0E-09	3.6	4.2E-10	4.2
1987	1.4E-07	2.5	9.6E-08	3.3	1.8E-08	2.9	6.7E-09	3.5	4.3E-10	3.9
1988	6.6E-08	2.5	1.0E-07	3.2	1.4E-08	2.9	6.8E-09	3.7	4.3E-10	4.4
1989	4.2E-07	2.5	1.1E-07	3.3	3.1E-08	3.0	6.9E-09	3.4	3.9E-10	3.7

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) μg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium (continued)
Sector 11
(1958 - 1989)

Year	Beef Ingestion GM (μg/year)	GSD	Inhalation of Resuspended Particulates GM (μg/year)	GSD	Total Inhalation GM (μg/year)	GSD	Total Ingestion GM (μg/year)	GSD
1958	2.4E-07	4.5	2.9E-09	3.8	1.1E-05	2.6	7.5E-07	3.3
1959	3.1E-07	4.7	7.1E-09	3.1	1.2E-05	2.5	9.4E-07	3.4
1960	2.9E-07	4.1	1.2E-08	2.6	1.2E-05	2.7	9.2E-07	3.2
1961	2.8E-07	4.1	1.4E-08	2.7	9.8E-06	2.6	8.2E-07	3.0
1962	2.3E-07	3.9	1.8E-08	2.6	6.7E-06	2.6	6.2E-07	2.9
1963	3.2E-07	4.2	2.2E-08	2.6	1.1E-05	2.5	9.4E-07	3.0
1964	3.1E-07	4.0	2.5E-08	2.5	1.1E-05	2.5	9.0E-07	2.9
1965	7.4E-07	3.9	3.8E-08	2.6	2.9E-05	2.5	2.2E-06	2.9
1966	8.7E-07	4.1	4.6E-08	2.8	3.0E-05	2.5	2.6E-06	3.0
1967	8.9E-07	4.0	5.7E-08	2.8	3.0E-05	2.6	2.5E-06	2.9
1968	9.5E-07	4.0	6.8E-08	2.6	3.4E-05	2.6	2.9E-06	2.8
1969	8.4E-07	3.5	8.1E-08	2.5	2.3E-05	2.5	2.3E-06	2.7
1970	6.9E-07	3.6	8.6E-08	2.5	1.4E-05	2.5	1.7E-06	2.6
1971	5.9E-07	3.9	8.5E-08	2.5	1.0E-05	2.5	1.4E-06	2.7
1972	4.0E-07	4.0	8.3E-08	2.6	1.6E-06	2.4	7.6E-07	2.7
1973	4.9E-07	3.7	8.3E-08	2.5	4.9E-06	2.4	1.0E-06	2.6
1974	5.6E-07	3.7	9.8E-08	2.5	6.5E-06	2.4	1.2E-06	2.5
1975	4.7E-07	3.9	9.7E-08	2.6	3.7E-06	2.5	9.8E-07	2.6
1976	4.2E-07	3.7	8.9E-08	2.4	2.5E-06	2.4	8.4E-07	2.6
1977	4.8E-07	3.8	1.0E-07	2.5	3.7E-06	2.5	1.0E-06	2.6
1978	7.3E-07	3.7	9.6E-08	2.6	1.1E-05	2.5	1.7E-06	2.5
1979	3.9E-07	3.8	1.1E-07	2.5	1.2E-06	2.3	7.4E-07	2.6
1980	3.3E-07	3.6	9.1E-08	2.6	8.3E-07	2.3	6.4E-07	2.5
1981	3.7E-07	4.1	1.0E-07	2.5	2.8E-07	2.1	6.4E-07	2.9
1982	3.4E-07	4.0	9.5E-08	2.5	1.9E-07	2.0	6.0E-07	2.8
1983	4.1E-07	3.9	1.0E-07	2.5	1.0E-07	2.5	6.7E-07	2.9
1984	3.9E-07	3.8	1.1E-07	2.5	3.6E-07	2.0	6.7E-07	2.7
1985	3.7E-07	4.2	9.6E-08	2.4	5.1E-07	2.1	6.7E-07	2.8
1986	3.8E-07	3.7	9.7E-08	2.4	1.9E-07	2.0	6.3E-07	2.7
1987	3.7E-07	3.9	9.4E-08	2.5	2.7E-07	2.1	6.2E-07	2.8
1988	3.5E-07	3.9	9.8E-08	2.5	1.9E-07	2.1	6.0E-07	2.8
1989	4.0E-07	3.7	1.0E-07	2.6	5.9E-07	2.2	7.0E-07	2.7

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) μg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium
Sector 12
(1958 - 1989)

Year	Inhalation GM (µg/year)	Inhalation GSD	Soil Ingestion GM (µg/year)	Soil Ingestion GSD	Vegetable Ingestion GM (µg/year)	Vegetable Ingestion GSD	Wheat Ingestion GM (µg/year)	Wheat Ingestion GSD	Milk Ingestion GM (µg/year)	Milk Ingestion GSD
1958	4.1E-05	2.5	1.1E-08	4.3	1.4E-06	3.7	6.8E-10	4.6	8.4E-10	5.4
1959	3.9E-05	2.7	2.4E-08	3.7	1.4E-06	3.5	1.7E-09	3.9	9.9E-10	5.3
1960	3.9E-05	2.5	3.7E-08	3.8	1.3E-06	3.7	2.6E-09	4.1	9.9E-10	4.5
1961	3.3E-05	2.5	5.0E-08	3.5	1.2E-06	3.6	3.3E-09	4.0	9.4E-10	4.3
1962	2.1E-05	2.6	6.0E-08	3.5	7.6E-07	3.7	4.0E-09	3.5	8.3E-10	4.2
1963	3.7E-05	2.7	7.3E-08	3.2	1.4E-06	3.6	5.3E-09	3.8	1.2E-09	4.6
1964	3.7E-05	2.6	8.9E-08	3.3	1.4E-06	3.5	6.0E-09	3.4	1.4E-09	4.5
1965	9.0E-05	2.6	1.3E-07	3.1	3.1E-06	3.6	8.2E-09	3.8	2.8E-09	4.9
1966	9.3E-05	2.5	1.6E-07	3.2	3.3E-06	3.7	1.0E-08	3.8	2.8E-09	4.6
1967	9.4E-05	2.6	1.9E-07	3.1	3.2E-06	3.5	1.3E-08	3.6	2.9E-09	4.0
1968	1.1E-04	2.6	2.4E-07	3.3	3.7E-06	3.5	1.5E-08	3.6	3.7E-09	4.6
1969	8.0E-05	2.5	2.7E-07	3.2	2.7E-06	3.6	1.7E-08	3.6	3.3E-09	4.3
1970	4.3E-05	2.6	2.8E-07	3.3	1.5E-06	3.4	1.8E-08	3.5	2.4E-09	4.0
1971	3.5E-05	2.4	2.9E-07	3.3	1.2E-06	3.3	2.3E-08	3.5	2.3E-09	4.2
1972	4.2E-06	2.5	2.9E-07	3.2	2.0E-07	2.9	2.2E-08	3.6	1.4E-09	4.2
1973	1.5E-05	2.5	3.0E-07	3.3	5.4E-07	3.2	1.9E-08	3.7	1.9E-09	3.8
1974	2.3E-05	2.5	3.2E-07	3.1	8.6E-07	3.4	2.1E-08	3.5	1.9E-09	3.8
1975	1.2E-05	2.3	2.9E-07	3.2	4.7E-07	3.3	2.2E-08	3.4	1.8E-09	3.9
1976	8.2E-06	2.4	3.2E-07	3.2	3.2E-07	3.1	2.0E-08	3.3	1.6E-09	3.8
1977	1.2E-05	2.6	3.3E-07	3.0	4.4E-07	3.3	1.9E-08	3.7	1.7E-09	4.1
1978	3.8E-05	2.6	3.7E-07	3.2	1.4E-06	3.6	2.2E-08	3.5	2.5E-09	4.0
1979	3.6E-06	2.4	3.1E-07	3.2	1.7E-07	3.1	2.0E-08	3.5	1.5E-09	3.9
1980	2.4E-06	2.5	3.7E-07	3.2	1.4E-07	3.0	2.4E-08	3.7	1.4E-09	4.3
1981	4.9E-07	2.5	3.8E-07	2.9	5.8E-08	2.8	2.1E-08	3.5	1.4E-09	4.1
1982	2.3E-07	2.5	3.9E-07	3.1	4.7E-08	2.9	2.2E-08	3.5	1.4E-09	4.4
1983	1.6E-15	2.5	3.0E-07	3.5	3.4E-08	3.6	2.4E-08	3.3	1.3E-09	4.4
1984	7.2E-07	2.5	3.5E-07	3.4	6.4E-08	2.8	2.1E-08	3.6	1.3E-09	4.2
1985	1.1E-06	2.4	3.6E-07	3.3	8.5E-08	2.9	2.3E-08	3.7	1.4E-09	4.1
1986	2.2E-07	2.4	3.2E-07	3.4	4.7E-08	3.1	2.3E-08	3.8	1.5E-09	4.3
1987	4.4E-07	2.6	3.4E-07	3.5	5.6E-08	2.9	2.1E-08	3.7	1.3E-09	4.3
1988	2.1E-07	2.4	3.2E-07	3.2	4.8E-08	2.9	2.2E-08	3.5	1.4E-09	4.0
1989	1.4E-06	2.4	3.3E-07	3.2	9.6E-08	2.7	2.3E-08	3.5	1.4E-09	4.3

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium (continued)
Sector 12
(1958 - 1989)

Year	Beef Ingestion GM (µg/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (µg/year)	Inhalation of Resuspended Particulates GSD	Total Inhalation GM (µg/year)	Total Inhalation GSD	Total Ingestion GM (µg/year)	Total Ingestion GSD
1958	8.3E-07	4.8	1.0E-08	3.3	4.1E-05	2.5	2.9E-06	3.4
1959	1.0E-06	4.4	2.3E-08	2.9	3.9E-05	2.7	3.1E-06	3.2
1960	9.1E-07	4.4	3.8E-08	2.8	3.9E-05	2.5	3.0E-06	3.1
1961	9.2E-07	4.2	5.0E-08	2.6	3.3E-05	2.4	2.8E-06	2.9
1962	7.0E-07	4.0	5.9E-08	2.7	2.1E-05	2.6	2.0E-06	2.9
1963	1.2E-06	4.4	7.6E-08	2.5	3.7E-05	2.7	3.5E-06	3.1
1964	1.2E-06	4.2	9.6E-08	2.6	3.7E-05	2.6	3.6E-06	3.0
1965	2.8E-06	4.2	1.1E-07	2.5	9.0E-05	2.6	7.8E-06	3.1
1966	2.7E-06	3.9	1.6E-07	2.5	9.3E-05	2.5	8.0E-06	2.9
1967	2.9E-06	4.0	1.9E-07	2.5	9.5E-05	2.6	8.3E-06	2.9
1968	3.4E-06	3.8	2.3E-07	2.4	1.1E-04	2.6	9.7E-06	2.8
1969	3.0E-06	3.8	2.6E-07	2.5	8.1E-05	2.5	8.1E-06	2.7
1970	2.3E-06	3.9	2.8E-07	2.5	4.4E-05	2.6	5.5E-06	2.7
1971	2.1E-06	3.9	2.9E-07	2.4	3.6E-05	2.4	5.0E-06	2.6
1972	1.1E-06	3.9	2.9E-07	2.5	4.8E-06	2.3	2.2E-06	2.6
1973	1.6E-06	3.6	3.1E-07	2.5	1.6E-05	2.4	3.3E-06	2.5
1974	1.9E-06	3.6	3.1E-07	2.4	2.4E-05	2.4	4.2E-06	2.5
1975	1.5E-06	3.7	3.2E-07	2.6	1.3E-05	2.3	3.2E-06	2.5
1976	1.4E-06	3.5	3.1E-07	2.4	8.8E-06	2.3	2.7E-06	2.4
1977	1.4E-06	3.8	3.1E-07	2.5	1.2E-05	2.5	3.1E-06	2.4
1978	2.4E-06	3.5	3.5E-07	2.4	3.8E-05	2.6	5.6E-06	2.6
1979	1.3E-06	3.8	3.4E-07	2.4	4.2E-06	2.2	2.4E-06	2.6
1980	1.3E-06	3.9	3.6E-07	2.5	3.0E-06	2.2	2.4E-06	2.7
1981	1.3E-06	3.6	3.4E-07	2.3	9.7E-07	2.0	2.2E-06	2.6
1982	1.4E-06	4.2	3.5E-07	2.5	6.8E-07	2.1	2.3E-06	2.9
1983	1.1E-06	3.7	3.3E-07	2.6	3.3E-07	2.6	1.9E-06	2.8
1984	1.2E-06	3.8	3.3E-07	2.4	1.2E-06	2.1	2.2E-06	2.7
1985	1.2E-06	3.8	3.5E-07	2.5	1.6E-06	2.1	2.2E-06	2.6
1986	1.3E-06	3.7	3.7E-07	2.4	6.7E-07	2.0	2.1E-06	2.8
1987	1.2E-06	4.2	3.5E-07	2.5	9.3E-07	2.1	2.1E-06	2.9
1988	1.2E-06	3.7	3.4E-07	2.5	6.4E-07	2.1	2.1E-06	2.7
1989	1.2E-06	4.0	3.4E-07	2.5	2.0E-06	2.1	2.2E-06	2.8

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium
Denver
(1958 - 1989)

Year	Inhalation GM (µg/year)	Inhalation GSD	Soil Ingestion GM (µg/year)	Soil Ingestion GSD	Vegetable Ingestion GM (µg/year)	Vegetable Ingestion GSD	Wheat Ingestion GM (µg/year)	Wheat Ingestion GSD	Milk Ingestion GM (µg/year)	Milk Ingestion GSD
1958	1.5E-05	2.6	3.8E-09	4.0	4.8E-07	4.0	2.5E-10	4.5	3.0E-10	5.4
1959	1.5E-05	2.6	8.0E-09	3.9	5.2E-07	3.4	6.0E-10	4.2	3.5E-10	4.6
1960	1.5E-05	2.5	1.4E-08	3.8	5.2E-07	3.4	9.6E-10	4.3	3.8E-10	4.4
1961	1.1E-05	2.7	1.8E-08	3.5	3.7E-07	3.7	1.4E-09	4.0	3.5E-10	4.5
1962	7.2E-06	2.5	2.2E-08	3.4	2.6E-07	3.7	1.5E-09	3.8	2.9E-10	4.3
1963	1.3E-05	2.6	2.8E-08	3.3	4.6E-07	3.8	1.9E-09	3.9	4.5E-10	4.3
1964	1.3E-05	2.7	3.6E-08	3.2	4.6E-07	3.5	2.4E-09	3.4	4.8E-10	4.2
1965	3.5E-05	2.6	4.5E-08	3.5	1.2E-06	3.7	3.0E-09	3.9	1.0E-09	4.3
1966	3.7E-05	2.6	5.7E-08	3.4	1.3E-06	3.7	3.9E-09	3.6	1.1E-09	4.3
1967	3.8E-05	2.5	7.2E-08	3.4	1.2E-06	3.6	4.6E-09	3.5	1.3E-09	4.4
1968	4.5E-05	2.7	9.3E-08	3.2	1.6E-06	3.6	5.7E-09	3.6	1.6E-09	4.9
1969	2.6E-05	2.5	9.6E-08	3.1	8.9E-07	3.6	6.7E-09	3.7	1.1E-09	4.0
1970	1.7E-05	2.6	1.0E-07	3.6	5.8E-07	3.7	6.9E-09	3.7	9.2E-10	4.1
1971	1.3E-05	2.3	1.2E-07	3.2	4.6E-07	3.3	6.7E-09	3.5	8.4E-10	4.0
1972	1.6E-06	2.4	1.1E-07	3.3	8.0E-08	2.9	7.9E-09	3.6	4.7E-10	3.7
1973	6.0E-06	2.5	1.1E-07	3.5	2.2E-07	3.4	7.5E-09	3.8	5.9E-10	4.1
1974	8.7E-06	2.5	1.1E-07	3.1	3.4E-07	3.5	7.4E-09	3.5	7.0E-10	4.1
1975	4.5E-06	2.6	1.1E-07	3.1	1.8E-07	3.2	7.1E-09	3.6	7.0E-10	4.2
1976	3.2E-06	2.5	1.1E-07	3.3	1.3E-07	3.4	7.8E-09	3.6	5.9E-10	4.3
1977	4.1E-06	2.5	1.3E-07	3.2	1.4E-07	3.2	7.4E-09	3.6	7.0E-10	4.1
1978	1.5E-05	2.6	1.2E-07	3.4	5.3E-07	3.4	8.6E-09	3.6	1.0E-09	4.0
1979	1.3E-06	2.5	1.4E-07	3.1	6.6E-08	3.1	8.2E-09	3.7	5.5E-10	4.0
1980	8.5E-07	2.5	1.2E-07	3.4	5.1E-08	3.2	8.3E-09	3.7	5.7E-10	4.2
1981	1.7E-07	2.4	1.3E-07	3.1	2.0E-08	3.2	7.4E-09	3.5	5.0E-10	4.2
1982	8.4E-08	2.7	1.3E-07	3.3	1.8E-08	3.1	7.9E-09	3.8	5.2E-10	4.3
1983	5.9E-16	2.5	1.3E-07	3.2	1.2E-08	3.7	8.8E-09	3.7	4.7E-10	4.5
1984	2.4E-07	2.6	1.2E-07	3.4	2.5E-08	2.9	8.5E-09	3.6	4.9E-10	4.2
1985	4.3E-07	2.6	1.2E-07	3.3	3.5E-08	2.9	9.1E-09	3.7	5.3E-10	3.8
1986	8.4E-08	2.6	1.1E-07	3.7	1.9E-08	3.1	9.2E-09	3.6	5.3E-10	4.2
1987	1.7E-07	2.4	1.2E-07	3.4	2.2E-08	2.9	7.9E-09	3.5	4.8E-10	4.0
1988	7.9E-08	2.5	1.2E-07	3.4	1.6E-08	3.0	7.7E-09	3.6	5.9E-10	4.2
1989	4.7E-07	2.5	1.3E-07	3.1	3.5E-08	2.9	8.2E-09	3.6	5.9E-10	4.1

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium (continued)
Denver
(1958 - 1989)

Year	Beef Ingestion GM (μg/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (μg/year)	Inhalation of Resuspended Particulates GSD	Total Inhalation GM (μg/year)	Total Inhalation GSD	Total Ingestion GM (μg/year)	Total Ingestion GSD
1958	3.2E-07	4.6	3.8E-09	3.4	1.5E-05	2.6	1.0E-06	3.5
1959	3.3E-07	4.8	8.4E-09	2.9	1.5E-05	2.6	1.1E-06	3.3
1960	3.9E-07	4.1	1.4E-08	2.9	1.5E-05	2.5	1.2E-06	3.0
1961	3.2E-07	4.1	1.7E-08	2.7	1.1E-05	2.7	9.1E-07	3.1
1962	2.6E-07	4.0	2.2E-08	2.8	7.2E-06	2.5	7.1E-07	2.9
1963	4.3E-07	3.9	2.8E-08	2.6	1.3E-05	2.5	1.2E-06	2.9
1964	4.2E-07	3.7	3.3E-08	2.7	1.3E-05	2.7	1.2E-06	2.8
1965	9.7E-07	4.3	4.1E-08	2.7	3.5E-05	2.6	2.9E-06	3.2
1966	1.1E-06	4.0	5.4E-08	2.5	3.7E-05	2.5	3.3E-06	3.0
1967	1.1E-06	3.8	7.0E-08	2.5	3.8E-05	2.5	3.1E-06	2.9
1968	1.3E-06	3.9	8.2E-08	2.6	4.6E-05	2.7	3.9E-06	2.9
1969	1.1E-06	4.0	9.4E-08	2.5	2.7E-05	2.5	2.8E-06	2.8
1970	7.6E-07	3.5	1.1E-07	2.7	1.7E-05	2.6	2.0E-06	2.6
1971	7.1E-07	3.7	1.1E-07	2.7	1.3E-05	2.3	1.8E-06	2.4
1972	4.4E-07	3.6	1.1E-07	2.5	1.8E-06	2.2	8.4E-07	2.5
1973	6.1E-07	3.8	1.1E-07	2.6	6.3E-06	2.4	1.3E-06	2.5
1974	6.7E-07	3.6	1.1E-07	2.6	9.0E-06	2.5	1.5E-06	2.6
1975	5.1E-07	3.4	1.2E-07	2.4	4.8E-06	2.5	1.1E-06	2.4
1976	5.4E-07	3.6	1.1E-07	2.5	3.4E-06	2.4	1.1E-06	2.5
1977	6.0E-07	3.5	1.2E-07	2.5	4.3E-06	2.4	1.2E-06	2.5
1978	8.2E-07	3.7	1.2E-07	2.4	1.5E-05	2.6	2.0E-06	2.6
1979	4.9E-07	3.9	1.2E-07	2.5	1.5E-06	2.3	9.5E-07	2.5
1980	4.9E-07	3.9	1.2E-07	2.6	1.0E-06	2.3	8.9E-07	2.7
1981	4.3E-07	3.7	1.3E-07	2.5	3.5E-07	2.1	7.8E-07	2.6
1982	4.7E-07	3.8	1.4E-07	2.4	2.5E-07	2.1	8.1E-07	2.7
1983	4.2E-07	4.0	1.3E-07	2.6	1.3E-07	2.6	7.3E-07	2.9
1984	4.1E-07	3.8	1.2E-07	2.6	4.2E-07	2.2	7.5E-07	2.6
1985	4.9E-07	3.7	1.2E-07	2.5	6.3E-07	2.2	8.4E-07	2.7
1986	4.0E-07	4.1	1.2E-07	2.6	2.4E-07	2.1	7.1E-07	2.9
1987	4.4E-07	3.8	1.2E-07	2.6	3.4E-07	2.1	7.5E-07	2.8
1988	4.8E-07	3.5	1.2E-07	2.4	2.3E-07	2.0	8.0E-07	2.6
1989	4.4E-07	3.6	1.3E-07	2.5	6.7E-07	2.2	7.9E-07	2.6

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) μg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium
Lakewood
(1958 - 1989)

Year	Inhalation GM (µg/year)	Inhalation GSD	Soil Ingestion GM (µg/year)	Soil Ingestion GSD	Vegetable Ingestion GM (µg/year)	Vegetable Ingestion GSD	Wheat Ingestion GM (µg/year)	Wheat Ingestion GSD	Milk Ingestion GM (µg/year)	Milk Ingestion GSD
1958	1.8E-05	2.6	4.5E-09	4.3	6.1E-07	3.8	2.9E-10	4.9	4.1E-10	5.2
1959	1.8E-05	2.6	1.0E-08	3.4	6.2E-07	3.5	7.6E-10	3.9	4.3E-10	4.6
1960	1.8E-05	2.4	1.7E-08	3.6	6.3E-07	3.8	1.2E-09	4.1	5.2E-10	4.6
1961	1.5E-05	2.6	2.3E-08	3.6	5.1E-07	3.5	1.4E-09	3.8	4.9E-10	4.2
1962	9.0E-06	2.6	2.8E-08	3.2	3.1E-07	3.7	1.8E-09	3.8	3.6E-10	4.2
1963	1.6E-05	2.7	3.5E-08	3.3	5.4E-07	3.6	2.1E-09	3.7	5.2E-10	4.5
1964	1.7E-05	2.7	4.0E-08	3.3	5.5E-07	3.9	2.6E-09	3.8	5.7E-10	4.3
1965	4.4E-05	2.6	5.4E-08	3.5	1.4E-06	3.8	3.6E-09	3.6	1.3E-09	4.9
1966	4.5E-05	2.5	7.5E-08	3.4	1.6E-06	3.6	4.8E-09	3.6	1.3E-09	4.2
1967	4.5E-05	2.6	9.1E-08	3.2	1.5E-06	3.5	5.6E-09	3.7	1.5E-09	4.1
1968	5.5E-05	2.5	1.2E-07	3.2	1.9E-06	3.5	7.0E-09	3.5	1.7E-09	4.4
1969	3.5E-05	2.6	1.2E-07	3.4	1.2E-06	4.2	7.7E-09	3.4	1.6E-09	4.3
1970	2.0E-05	2.5	1.2E-07	3.5	7.3E-07	3.4	7.8E-09	3.8	1.1E-09	3.8
1971	1.6E-05	2.6	1.4E-07	3.0	5.5E-07	3.4	9.2E-09	3.7	9.6E-10	4.1
1972	1.8E-06	2.5	1.4E-07	3.1	9.9E-08	3.1	9.5E-09	3.6	6.0E-10	4.1
1973	7.3E-06	2.6	1.4E-07	3.2	2.8E-07	3.4	9.3E-09	3.7	7.7E-10	3.7
1974	1.1E-05	2.5	1.5E-07	3.0	3.9E-07	3.3	8.5E-09	3.4	9.3E-10	4.1
1975	5.6E-06	2.7	1.3E-07	3.2	2.2E-07	3.4	9.5E-09	3.7	7.2E-10	4.2
1976	3.7E-06	2.6	1.3E-07	3.3	1.5E-07	3.1	9.3E-09	3.7	7.1E-10	3.9
1977	5.0E-06	2.5	1.5E-07	3.3	2.0E-07	3.2	1.0E-08	3.6	8.0E-10	3.9
1978	1.6E-05	2.5	1.5E-07	3.0	5.7E-07	3.6	1.0E-08	3.7	1.1E-09	3.9
1979	1.5E-06	2.6	1.4E-07	3.2	7.6E-08	2.8	1.1E-08	3.3	6.6E-10	4.2
1980	1.1E-06	2.4	1.4E-07	3.2	6.7E-08	2.9	1.0E-08	3.4	6.0E-10	3.8
1981	2.1E-07	2.5	1.5E-07	3.4	2.9E-08	2.9	1.1E-08	3.7	6.5E-10	4.0
1982	1.0E-07	2.4	1.6E-07	3.2	2.3E-08	2.8	1.1E-08	3.4	5.9E-10	4.0
1983	7.2E-16	2.5	1.6E-07	3.3	1.5E-08	3.7	1.0E-08	3.6	6.7E-10	4.2
1984	3.0E-07	2.5	1.6E-07	3.3	3.4E-08	2.8	1.1E-08	3.5	6.7E-10	4.2
1985	4.9E-07	2.5	1.6E-07	3.4	4.4E-08	2.9	1.0E-08	3.7	6.0E-10	4.1
1986	9.7E-08	2.5	1.5E-07	3.2	2.1E-08	3.0	1.0E-08	3.5	6.2E-10	4.3
1987	2.0E-07	2.5	1.5E-07	3.2	2.8E-08	2.9	1.0E-08	3.7	7.1E-10	3.9
1988	1.0E-07	2.5	1.5E-07	3.4	2.1E-08	3.0	1.0E-08	3.7	6.4E-10	4.2
1989	6.5E-07	2.5	1.6E-07	3.3	4.3E-08	3.0	1.0E-08	3.7	6.5E-10	4.1

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium (continued)
Lakewood
(1958 - 1989)

Year	Beef Ingestion GM (μg/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (μg/year)	Inhalation of Resuspended Particulates GSD	Total Inhalation GM (μg/year)	Total Inhalation GSD	Total Ingestion GM (μg/year)	Total Ingestion GSD
1958	3.8E-07	4.5	4.4E-09	3.5	1.8E-05	2.6	1.2E-06	3.4
1959	4.2E-07	4.8	9.6E-09	2.9	1.8E-05	2.6	1.3E-06	3.3
1960	4.7E-07	4.5	1.7E-08	2.9	1.8E-05	2.4	1.5E-06	3.1
1961	4.3E-07	4.0	2.5E-08	2.8	1.5E-05	2.6	1.3E-06	2.9
1962	3.1E-07	4.1	2.7E-08	2.7	9.1E-06	2.6	8.8E-07	2.9
1963	5.3E-07	4.1	3.3E-08	2.6	1.6E-05	2.7	1.5E-06	3.1
1964	5.5E-07	4.4	4.2E-08	2.5	1.7E-05	2.7	1.5E-06	3.2
1965	1.3E-06	4.4	5.4E-08	2.7	4.4E-05	2.6	3.5E-06	3.1
1966	1.3E-06	3.9	7.1E-08	2.8	4.5E-05	2.5	3.9E-06	2.9
1967	1.4E-06	4.1	8.5E-08	2.7	4.5E-05	2.6	4.0E-06	2.9
1968	1.6E-06	4.0	1.1E-07	2.6	5.6E-05	2.4	4.7E-06	2.8
1969	1.2E-06	4.3	1.2E-07	2.5	3.5E-05	2.6	3.6E-06	3.1
1970	9.5E-07	3.7	1.2E-07	2.6	2.1E-05	2.5	2.4E-06	2.6
1971	1.0E-06	3.6	1.3E-07	2.6	1.7E-05	2.5	2.3E-06	2.6
1972	5.0E-07	3.7	1.3E-07	2.5	2.1E-06	2.3	1.0E-06	2.5
1973	7.5E-07	3.8	1.3E-07	2.5	7.5E-06	2.5	1.6E-06	2.5
1974	8.5E-07	3.6	1.5E-07	2.5	1.1E-05	2.5	1.9E-06	2.5
1975	6.5E-07	3.9	1.4E-07	2.5	5.8E-06	2.6	1.4E-06	2.6
1976	5.7E-07	3.8	1.4E-07	2.5	4.0E-06	2.5	1.2E-06	2.6
1977	7.0E-07	3.7	1.4E-07	2.6	5.3E-06	2.5	1.5E-06	2.5
1978	9.9E-07	3.5	1.4E-07	2.4	1.7E-05	2.5	2.3E-06	2.5
1979	5.2E-07	3.8	1.5E-07	2.4	1.7E-06	2.3	9.8E-07	2.6
1980	5.5E-07	3.4	1.4E-07	2.4	1.4E-06	2.2	1.0E-06	2.5
1981	5.5E-07	3.8	1.6E-07	2.6	4.4E-07	2.1	9.6E-07	2.7
1982	5.2E-07	4.0	1.5E-07	2.7	3.0E-07	2.1	9.3E-07	2.8
1983	5.0E-07	3.7	1.6E-07	2.5	1.6E-07	2.5	8.8E-07	2.8
1984	5.7E-07	3.9	1.5E-07	2.6	5.3E-07	2.1	1.0E-06	2.7
1985	5.8E-07	3.7	1.6E-07	2.5	7.4E-07	2.1	1.0E-06	2.7
1986	5.9E-07	4.0	1.4E-07	2.5	2.8E-07	2.1	9.8E-07	2.9
1987	5.7E-07	4.1	1.5E-07	2.6	4.1E-07	2.1	1.0E-06	2.8
1988	5.5E-07	4.2	1.5E-07	2.5	2.9E-07	2.0	9.5E-07	3.0
1989	5.6E-07	3.8	1.5E-07	2.5	8.9E-07	2.2	1.0E-06	2.7

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) μg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium
Longmont
(1958 - 1989)

Year	Inhalation GM (µg/year)	Inhalation GSD	Soil Ingestion GM (µg/year)	Soil Ingestion GSD	Vegetable Ingestion GM (µg/year)	Vegetable Ingestion GSD	Wheat Ingestion GM (µg/year)	Wheat Ingestion GSD	Milk Ingestion GM (µg/year)	Milk Ingestion GSD
1958	6.7E-06	2.7	1.7E-09	4.6	2.2E-07	3.8	1.0E-10	4.7	1.4E-10	5.3
1959	6.2E-06	2.7	4.0E-09	3.8	2.0E-07	3.6	2.5E-10	4.0	1.5E-10	5.0
1960	6.5E-06	2.6	5.6E-09	3.5	2.1E-07	3.7	4.0E-10	4.0	1.7E-10	5.0
1961	5.5E-06	2.5	8.8E-09	3.5	1.9E-07	3.7	5.8E-10	4.1	1.6E-10	4.5
1962	3.4E-06	2.7	1.0E-08	3.3	1.2E-07	3.7	6.2E-10	3.7	1.2E-10	4.6
1963	5.9E-06	2.6	1.2E-08	3.5	2.0E-07	3.6	7.9E-10	3.6	1.9E-10	4.6
1964	6.0E-06	2.6	1.3E-08	3.4	1.9E-07	3.8	8.4E-10	3.7	1.9E-10	4.0
1965	1.5E-05	2.6	2.0E-08	3.5	5.2E-07	3.7	1.4E-09	3.8	4.1E-10	4.9
1966	1.5E-05	2.7	2.4E-08	3.3	5.4E-07	3.7	1.8E-09	3.7	4.7E-10	4.4
1967	1.6E-05	2.6	3.1E-08	3.4	5.6E-07	3.6	2.0E-09	3.6	5.5E-10	4.3
1968	1.9E-05	2.6	3.6E-08	3.3	6.7E-07	3.5	2.6E-09	3.7	6.2E-10	4.5
1969	1.2E-05	2.5	4.4E-08	3.2	3.9E-07	3.4	3.0E-09	3.4	5.1E-10	4.1
1970	6.9E-06	2.8	4.0E-08	3.4	2.6E-07	3.7	2.7E-09	3.4	3.5E-10	4.1
1971	5.6E-06	2.5	4.9E-08	3.2	1.9E-07	3.5	3.2E-09	3.7	3.8E-10	4.3
1972	7.0E-07	2.5	4.8E-08	3.3	3.4E-08	3.1	3.3E-09	3.8	2.1E-10	4.0
1973	2.5E-06	2.4	4.6E-08	3.1	9.6E-08	3.0	3.1E-09	4.0	2.7E-10	4.0
1974	3.5E-06	2.5	5.4E-08	3.2	1.3E-07	3.3	3.3E-09	3.9	3.5E-10	4.0
1975	1.9E-06	2.5	5.1E-08	3.1	7.6E-08	3.1	3.2E-09	3.7	2.7E-10	3.8
1976	1.6E-06	2.5	4.7E-08	3.3	6.5E-08	3.4	3.6E-09	3.6	2.5E-10	3.8
1977	1.7E-06	2.4	5.3E-08	3.3	6.2E-08	3.2	3.8E-09	3.5	2.6E-10	3.9
1978	6.0E-06	2.4	5.2E-08	3.3	2.2E-07	3.3	3.4E-09	3.7	3.7E-10	4.3
1979	5.8E-07	2.4	5.5E-08	3.1	2.8E-08	3.0	3.4E-09	3.7	2.4E-10	4.4
1980	3.8E-07	2.5	5.1E-08	3.3	2.2E-08	3.2	3.8E-09	3.7	2.6E-10	4.2
1981	7.2E-08	2.5	4.9E-08	3.3	1.0E-08	2.8	4.1E-09	3.5	2.1E-10	4.3
1982	3.3E-08	2.5	5.4E-08	3.3	7.8E-09	2.9	3.7E-09	3.7	2.3E-10	4.1
1983	2.5E-16	2.5	5.5E-08	3.4	5.2E-09	3.7	3.8E-09	3.5	2.1E-10	4.3
1984	1.1E-07	2.4	5.4E-08	3.3	1.1E-08	3.0	3.4E-09	3.9	2.3E-10	4.1
1985	1.8E-07	2.4	6.0E-08	3.3	1.4E-08	2.7	3.3E-09	3.6	2.2E-10	3.8
1986	3.7E-08	2.5	6.1E-08	3.3	7.5E-09	3.0	3.4E-09	3.5	2.3E-10	4.2
1987	7.3E-08	2.6	5.3E-08	3.5	8.9E-09	2.9	3.4E-09	3.8	2.0E-10	4.1
1988	3.6E-08	2.5	5.2E-08	3.4	6.8E-09	3.1	3.3E-09	3.6	2.1E-10	4.1
1989	2.2E-07	2.5	5.3E-08	3.2	1.6E-08	2.9	3.7E-09	3.6	2.3E-10	3.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

Pathway-Specific Doses Associated with Routine Airborne Release of Beryllium (continued)
Longmont
(1958 - 1989)

Year	Beef Ingestion GM (µg/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (µg/year)	Inhalation of Resuspended Particulates GSD	Total Inhalation GM (µg/year)	Total Inhalation GSD	Total Ingestion GM (µg/year)	Total Ingestion GSD
1958	1.5E-07	4.4	1.6E-09	3.7	6.7E-06	2.7	4.6E-07	3.4
1959	1.5E-07	4.3	3.8E-09	3.0	6.2E-06	2.7	4.4E-07	3.3
1960	1.6E-07	4.2	5.8E-09	2.8	6.5E-06	2.6	4.7E-07	3.2
1961	1.4E-07	4.1	8.8E-09	2.8	5.5E-06	2.5	4.4E-07	3.0
1962	1.2E-07	3.8	9.2E-09	2.6	3.5E-06	2.6	3.3E-07	2.8
1963	1.8E-07	4.0	1.2E-08	2.7	5.9E-06	2.5	5.2E-07	2.9
1964	1.9E-07	4.0	1.4E-08	2.7	6.0E-06	2.6	5.2E-07	3.1
1965	4.2E-07	4.0	2.1E-08	2.6	1.5E-05	2.6	1.2E-06	3.0
1966	4.3E-07	4.1	2.5E-08	2.5	1.5E-05	2.7	1.3E-06	3.0
1967	5.1E-07	4.1	2.9E-08	2.6	1.6E-05	2.6	1.4E-06	2.9
1968	6.2E-07	4.1	3.6E-08	2.6	1.9E-05	2.5	1.7E-06	2.9
1969	4.5E-07	3.9	4.4E-08	2.6	1.2E-05	2.5	1.2E-06	2.8
1970	3.3E-07	3.9	4.2E-08	2.6	7.0E-06	2.7	8.7E-07	2.8
1971	3.2E-07	4.1	4.9E-08	2.6	5.7E-06	2.4	7.8E-07	2.8
1972	1.9E-07	3.6	4.7E-08	2.5	7.9E-07	2.4	3.7E-07	2.4
1973	2.3E-07	3.7	4.7E-08	2.7	2.6E-06	2.4	5.1E-07	2.5
1974	3.0E-07	3.8	5.0E-08	2.5	3.6E-06	2.5	6.6E-07	2.6
1975	2.4E-07	3.7	4.9E-08	2.6	2.0E-06	2.4	5.0E-07	2.5
1976	2.4E-07	3.8	5.4E-08	2.6	1.7E-06	2.4	4.9E-07	2.6
1977	2.4E-07	3.6	5.3E-08	2.6	1.8E-06	2.3	4.9E-07	2.5
1978	3.5E-07	3.7	5.4E-08	2.5	6.1E-06	2.4	8.5E-07	2.6
1979	2.1E-07	3.7	5.6E-08	2.4	6.8E-07	2.2	3.9E-07	2.5
1980	2.2E-07	3.9	5.3E-08	2.4	4.7E-07	2.3	4.0E-07	2.7
1981	2.0E-07	3.6	5.5E-08	2.7	1.5E-07	2.1	3.4E-07	2.7
1982	1.7E-07	3.9	4.8E-08	2.6	9.4E-08	2.2	3.1E-07	2.7
1983	1.7E-07	4.1	5.4E-08	2.4	5.4E-08	2.4	3.1E-07	2.9
1984	1.9E-07	3.9	5.6E-08	2.5	1.9E-07	2.1	3.4E-07	2.7
1985	2.1E-07	3.8	5.7E-08	2.5	2.6E-07	2.0	3.6E-07	2.8
1986	2.0E-07	3.8	5.6E-08	2.5	1.1E-07	2.0	3.4E-07	2.9
1987	1.7E-07	3.9	5.2E-08	2.5	1.5E-07	2.1	3.1E-07	2.7
1988	1.8E-07	3.8	5.2E-08	2.5	1.0E-07	2.1	3.2E-07	2.7
1989	2.0E-07	4.0	5.2E-08	2.6	3.0E-07	2.2	3.6E-07	2.7

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) µg = microgram

PATHWAY-SPECIFIC DOSES ASSOCIATED WITH ROUTINE AIRBORNE RELEASE OF VOLATILE SOLVENTS

Inhalation Dose Associated with Routine Airborne Release of Carbon Tetrachloride (1953 - 1989)

Year	Sector 1		Sector 2		Sector 3		Sector 4		Sector 5		Sector 6		Sector 7		Sector 8	
	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD
1953-57	7.8E-02	1.9	3.3E-02	1.9	3.0E-02	1.9	9.9E-02	1.9	3.6E-02	1.9	1.5E-02	1.9	1.4E-02	1.9	4.6E-02	1.9
1958	2.5E-01	1.9	1.1E-01	1.9	9.9E-02	1.9	3.2E-01	1.9	1.2E-01	1.9	4.8E-02	1.9	4.5E-02	1.9	1.5E-01	1.9
1959	4.3E-01	1.9	1.8E-01	1.9	1.7E-01	1.9	5.4E-01	1.9	2.0E-01	1.9	8.2E-02	1.9	7.6E-02	1.9	2.5E-01	1.9
1960	6.2E-01	1.9	2.6E-01	1.9	2.4E-01	1.9	7.9E-01	1.9	2.9E-01	1.9	1.2E-01	1.9	1.1E-01	1.9	3.6E-01	1.9
1961-70	7.8E-01	1.9	3.3E-01	1.9	3.0E-01	1.9	9.9E-01	1.9	3.6E-01	1.9	1.5E-01	1.9	1.4E-01	1.9	4.6E-01	1.9
1971	7.7E-01	1.9	3.3E-01	1.9	3.0E-01	1.9	9.8E-01	1.9	3.6E-01	1.9	1.5E-01	1.9	1.4E-01	1.9	4.5E-01	1.9
1972	7.4E-01	1.9	3.1E-01	1.9	2.9E-01	1.9	9.4E-01	1.9	3.4E-01	1.9	1.4E-01	1.9	1.3E-01	1.9	4.3E-01	1.9
1973	7.0E-01	1.9	3.0E-01	1.9	2.7E-01	1.9	8.9E-01	1.9	3.2E-01	1.9	1.3E-01	1.9	1.3E-01	1.9	4.1E-01	1.9
1974	7.0E-01	1.9	2.9E-01	1.9	2.7E-01	1.9	8.9E-01	1.9	3.2E-01	1.9	1.3E-01	1.9	1.2E-01	1.9	4.1E-01	1.9
1975	6.6E-01	1.9	2.8E-01	1.9	2.6E-01	1.9	8.4E-01	1.9	3.1E-01	1.9	1.3E-01	1.9	1.2E-01	1.9	3.9E-01	1.9
1976	6.6E-01	1.9	2.8E-01	1.9	2.6E-01	1.9	8.4E-01	1.9	3.0E-01	1.9	1.3E-01	1.9	1.2E-01	1.9	3.9E-01	1.9
1977	6.2E-01	1.9	2.6E-01	1.9	2.4E-01	1.9	7.9E-01	1.9	2.9E-01	1.9	1.2E-01	1.9	1.1E-01	1.9	3.7E-01	1.9
1978	6.2E-01	1.9	2.6E-01	1.9	2.4E-01	1.9	7.9E-01	1.9	2.9E-01	1.9	1.2E-01	1.9	1.1E-01	1.9	3.6E-01	1.9
1979	5.9E-01	1.9	2.5E-01	1.9	2.3E-01	1.9	7.5E-01	1.9	2.7E-01	1.9	1.1E-01	1.9	1.0E-01	1.9	3.4E-01	1.9
1980	5.8E-01	1.9	2.4E-01	1.9	2.3E-01	1.9	7.4E-01	1.9	2.7E-01	1.9	1.1E-01	1.9	1.0E-01	1.9	3.4E-01	1.9
1981	5.4E-01	1.9	2.3E-01	1.9	2.1E-01	1.9	6.9E-01	1.9	2.5E-01	1.9	1.0E-01	1.9	9.7E-02	1.9	3.2E-01	1.9
1982	5.4E-01	1.9	2.3E-01	1.9	2.1E-01	1.9	6.9E-01	1.9	2.5E-01	1.9	1.0E-01	1.9	9.6E-02	1.9	3.2E-01	1.9
1983	5.0E-01	1.9	2.1E-01	1.9	2.0E-01	1.9	6.4E-01	1.9	2.3E-01	1.9	9.6E-02	1.9	9.0E-02	1.9	3.0E-01	1.9
1984	5.0E-01	1.9	2.1E-01	1.9	2.0E-01	1.9	6.4E-01	1.9	2.3E-01	1.9	9.6E-02	1.9	8.9E-02	1.9	2.9E-01	1.9
1985	4.7E-01	1.9	2.0E-01	1.9	1.8E-01	1.9	5.9E-01	1.9	2.2E-01	1.9	8.9E-02	1.9	8.3E-02	1.9	2.7E-01	1.9
1986	4.6E-01	1.9	1.9E-01	1.9	1.8E-01	1.9	5.9E-01	1.9	2.1E-01	1.9	8.8E-02	1.9	8.3E-02	1.9	2.7E-01	1.9
1987	4.3E-01	1.9	1.8E-01	1.9	1.7E-01	1.9	5.4E-01	1.9	2.0E-01	1.9	8.2E-02	1.9	7.6E-02	1.9	2.5E-01	1.9
1988	3.9E-01	1.9	1.6E-01	1.9	1.5E-01	1.9	5.0E-01	1.9	1.8E-01	1.9	7.5E-02	1.9	7.0E-02	1.9	2.3E-01	1.9
1989	3.9E-01	1.9	1.6E-01	1.9	1.5E-01	1.9	4.9E-01	1.9	1.8E-01	1.9	7.4E-02	1.9	6.9E-02	1.9	2.3E-01	1.9

NOTES:

1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.

2) GM = Geometric Mean

3) GSD = Geometric Standard Deviation

4) mg = milligrams

5) yr = year

Inhalation Dose Associated with Routine Airborne Release of Carbon Tetrachloride (continued)
(1953 - 1989)

Year	Sector 9		Sector 10		Sector 11		Sector 12		Denver		Lakewood		Longmont	
	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD
1953-57	1.8E-02	1.9	7.3E-03	1.9	6.8E-03	2.0	2.3E-02	1.9	8.4E-03	2.0	1.0E-02	1.9	3.7E-03	1.9
1958	5.8E-02	1.9	2.4E-02	1.9	2.2E-02	2.0	7.4E-02	1.9	2.7E-02	2.0	3.3E-02	1.9	1.2E-02	1.9
1959	9.8E-02	1.9	4.0E-02	1.9	3.8E-02	2.0	1.3E-01	1.9	4.6E-02	2.0	5.7E-02	1.9	2.0E-02	1.9
1960	1.4E-01	1.9	5.8E-02	1.9	5.4E-02	2.0	1.8E-01	1.9	6.7E-02	2.0	8.2E-02	1.9	2.9E-02	1.9
1961-70	1.8E-01	1.9	7.3E-02	1.9	6.8E-02	2.0	2.3E-01	1.9	8.4E-02	2.0	1.0E-01	1.9	3.7E-02	1.9
1971	1.8E-01	1.9	7.3E-02	1.9	6.8E-02	2.0	2.3E-01	1.9	8.3E-02	2.0	1.0E-01	1.9	3.7E-02	1.9
1972	1.7E-01	1.9	6.9E-02	1.9	6.5E-02	2.0	2.2E-01	1.9	7.9E-02	2.0	9.8E-02	1.9	3.5E-02	1.9
1973	1.6E-01	1.9	6.6E-02	1.9	6.2E-02	2.0	2.1E-01	1.9	7.6E-02	2.0	9.3E-02	1.9	3.3E-02	1.9
1974	1.6E-01	1.9	6.6E-02	1.9	6.1E-02	2.0	2.0E-01	1.9	7.5E-02	2.0	9.3E-02	1.9	3.3E-02	1.9
1975	1.5E-01	1.9	6.2E-02	1.9	5.8E-02	2.0	1.9E-01	1.9	7.1E-02	2.0	8.8E-02	1.9	3.1E-02	1.9
1976	1.5E-01	1.9	6.2E-02	1.9	5.8E-02	2.0	1.9E-01	1.9	7.1E-02	2.0	8.8E-02	1.9	3.1E-02	1.9
1977	1.4E-01	1.9	5.9E-02	1.9	5.5E-02	2.0	1.8E-01	1.9	6.7E-02	2.0	8.3E-02	1.9	3.0E-02	1.9
1978	1.4E-01	1.9	5.8E-02	1.9	5.5E-02	2.0	1.8E-01	1.9	6.7E-02	2.0	8.2E-02	1.9	2.9E-02	1.9
1979	1.3E-01	1.9	5.5E-02	1.9	5.1E-02	2.0	1.7E-01	1.9	6.3E-02	2.0	7.8E-02	1.9	2.8E-02	1.9
1980	1.3E-01	1.9	5.4E-02	1.9	5.1E-02	2.0	1.7E-01	1.9	6.2E-02	2.0	7.7E-02	1.9	2.7E-02	1.9
1981	1.3E-01	1.9	5.1E-02	1.9	4.8E-02	2.0	1.6E-01	1.9	5.8E-02	2.0	7.2E-02	1.9	2.6E-02	1.9
1982	1.2E-01	1.9	5.1E-02	1.9	4.7E-02	2.0	1.6E-01	1.9	5.8E-02	2.0	7.2E-02	1.9	2.6E-02	1.9
1983	1.2E-01	1.9	4.7E-02	1.9	4.4E-02	2.0	1.5E-01	1.9	5.4E-02	2.0	6.7E-02	1.9	2.4E-02	1.9
1984	1.2E-01	1.9	4.7E-02	1.9	4.4E-02	2.0	1.5E-01	1.9	5.4E-02	2.0	6.7E-02	1.9	2.4E-02	1.9
1985	1.1E-01	1.9	4.4E-02	1.9	4.1E-02	2.0	1.4E-01	1.9	5.0E-02	2.0	6.2E-02	1.9	2.2E-02	1.9
1986	1.1E-01	1.9	4.3E-02	1.9	4.1E-02	2.0	1.4E-01	1.9	5.0E-02	2.0	6.1E-02	1.9	2.2E-02	1.9
1987	9.8E-02	1.9	4.0E-02	1.9	3.8E-02	2.0	1.3E-01	1.9	4.6E-02	2.0	5.7E-02	1.9	2.0E-02	1.9
1988	9.0E-02	1.9	3.7E-02	1.9	3.4E-02	2.0	1.1E-01	1.9	4.2E-02	2.0	5.2E-02	1.9	1.9E-02	1.9
1989	8.9E-02	1.9	3.6E-02	1.9	3.4E-02	2.0	1.1E-01	1.9	4.2E-02	2.0	5.2E-02	1.9	1.8E-02	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) mg = milligrams
5) yr = year

Inhalation Dose Associated with Routine Airborne Release of Chloroform
(1953 - 1989)

Year	Sector 1		Sector 2		Sector 3		Sector 4		Sector 5		Sector 6		Sector 7		Sector 8	
	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD
1953-74	7.3E-02	1.9	3.1E-02	1.9	2.9E-02	1.9	9.3E-02	1.9	3.4E-02	1.9	1.4E-02	1.9	1.3E-02	1.9	4.3E-02	1.9
1975	7.0E-02	1.9	2.9E-02	1.9	2.7E-02	1.9	8.9E-02	1.9	3.2E-02	1.9	1.3E-02	1.9	1.2E-02	1.9	4.1E-02	1.9
1976	6.6E-02	1.9	2.8E-02	1.9	2.6E-02	1.9	8.4E-02	1.9	3.0E-02	1.9	1.3E-02	1.9	1.2E-02	1.9	3.9E-02	1.9
1977	6.2E-02	1.9	2.6E-02	1.9	2.4E-02	1.9	7.9E-02	1.9	2.9E-02	1.9	1.2E-02	1.9	1.1E-02	1.9	3.7E-02	1.9
1978	5.9E-02	1.9	2.5E-02	1.9	2.3E-02	1.9	7.5E-02	1.9	2.7E-02	1.9	1.1E-02	1.9	1.0E-02	1.9	3.4E-02	1.9
1979	5.5E-02	1.9	2.3E-02	1.9	2.2E-02	1.9	7.0E-02	1.9	2.5E-02	1.9	1.1E-02	1.9	9.8E-03	1.9	3.2E-02	1.9
1980	5.1E-02	1.9	2.2E-02	1.9	2.0E-02	1.9	6.5E-02	1.9	2.4E-02	1.9	9.8E-03	1.9	9.2E-03	1.9	3.0E-02	1.9
1981	4.8E-02	1.9	2.0E-02	1.9	1.9E-02	1.9	6.1E-02	1.9	2.2E-02	1.9	9.1E-03	1.9	8.5E-03	1.9	2.8E-02	1.9
1982	4.4E-02	1.9	1.9E-02	1.9	1.7E-02	1.9	5.6E-02	1.9	2.0E-02	1.9	8.4E-03	1.9	7.9E-03	1.9	2.6E-02	1.9
1983	4.0E-02	1.9	1.7E-02	1.9	1.6E-02	1.9	5.1E-02	1.9	1.9E-02	1.9	7.7E-03	1.9	7.2E-03	1.9	2.4E-02	1.9
1984	3.7E-02	1.9	1.5E-02	1.9	1.4E-02	1.9	4.7E-02	1.9	1.7E-02	1.9	7.0E-03	1.9	6.5E-03	1.9	2.2E-02	1.9
1985	3.3E-02	1.9	1.4E-02	1.9	1.3E-02	1.9	4.2E-02	1.9	1.5E-02	1.9	6.3E-03	1.9	5.9E-03	1.9	1.9E-02	1.9
1986	2.9E-02	1.9	1.2E-02	1.9	1.1E-02	1.9	3.7E-02	1.9	1.4E-02	1.9	5.6E-03	1.9	5.2E-03	1.9	1.7E-02	1.9
1987	2.6E-02	1.9	1.1E-02	1.9	1.0E-02	1.9	3.3E-02	1.9	1.2E-02	1.9	4.9E-03	1.9	4.6E-03	1.9	1.5E-02	1.9
1988	2.2E-02	1.9	9.3E-03	1.9	8.6E-03	1.9	2.8E-02	1.9	1.0E-02	1.9	4.2E-03	1.9	3.9E-03	1.9	1.3E-02	1.9
1989	1.8E-02	1.9	7.7E-03	1.9	7.2E-03	1.9	2.3E-02	1.9	8.5E-03	1.9	3.5E-03	1.9	3.3E-03	1.9	1.1E-02	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) mg = milligrams
5) yr = year

Inhalation Dose Associated with Routine Airborne Release of Chloroform (continued)
(1953 - 1989)

Year	Sector 9		Sector 10		Sector 11		Sector 12		Denver		Lakewood		Longmont	
	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD
1953-74	1.7E-02	1.9	6.9E-03	1.9	6.4E-03	2.0	2.1E-02	1.9	7.9E-03	2.0	9.7E-03	1.9	3.5E-03	1.9
1975	1.6E-02	1.9	6.5E-03	1.9	6.1E-03	2.0	2.0E-02	1.9	7.5E-03	2.0	9.2E-03	1.9	3.3E-03	1.9
1976	1.5E-02	1.9	6.2E-03	1.9	5.8E-03	2.0	1.9E-02	1.9	7.1E-03	2.0	8.8E-03	1.9	3.1E-03	1.9
1977	1.4E-02	1.9	5.9E-03	1.9	5.5E-03	2.0	1.8E-02	1.9	6.7E-03	2.0	8.3E-03	1.9	3.0E-03	1.9
1978	1.4E-02	1.9	5.5E-03	1.9	5.2E-03	2.0	1.7E-02	1.9	6.3E-03	2.0	7.8E-03	1.9	2.8E-03	1.9
1979	1.3E-02	1.9	5.2E-03	1.9	4.8E-03	2.0	1.6E-02	1.9	5.9E-03	2.0	7.3E-03	1.9	2.6E-03	1.9
1980	1.2E-02	1.9	4.8E-03	1.9	4.5E-03	2.0	1.5E-02	1.9	5.5E-03	2.0	6.8E-03	1.9	2.4E-03	1.9
1981	1.1E-02	1.9	4.5E-03	1.9	4.2E-03	2.0	1.4E-02	1.9	5.1E-03	2.0	6.3E-03	1.9	2.3E-03	1.9
1982	1.0E-02	1.9	4.1E-03	1.9	3.9E-03	2.0	1.3E-02	1.9	4.7E-03	2.0	5.8E-03	1.9	2.1E-03	1.9
1983	9.3E-03	1.9	3.8E-03	1.9	3.5E-03	2.0	1.2E-02	1.9	4.3E-03	2.0	5.4E-03	1.9	1.9E-03	1.9
1984	8.4E-03	1.9	3.4E-03	1.9	3.2E-03	2.0	1.1E-02	1.9	3.9E-03	2.0	4.9E-03	1.9	1.7E-03	1.9
1985	7.6E-03	1.9	3.1E-03	1.9	2.9E-03	2.0	9.7E-03	1.9	3.6E-03	2.0	4.4E-03	1.9	1.6E-03	1.9
1986	6.8E-03	1.9	2.8E-03	1.9	2.6E-03	2.0	8.6E-03	1.9	3.2E-03	2.0	3.9E-03	1.9	1.4E-03	1.9
1987	5.9E-03	1.9	2.4E-03	1.9	2.3E-03	2.0	7.5E-03	1.9	2.8E-03	2.0	3.4E-03	1.9	1.2E-03	1.9
1988	5.1E-03	1.9	2.1E-03	1.9	1.9E-03	2.0	6.4E-03	1.9	2.4E-03	2.0	2.9E-03	1.9	1.0E-03	1.9
1989	4.2E-03	1.9	1.7E-03	1.9	1.6E-03	2.0	5.4E-03	1.9	2.0E-03	2.0	2.4E-03	1.9	8.7E-04	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) mg = milligrams
5) yr = year

Inhalation Dose Associated with Routine Airborne Release of Methylene Chloride (1953 - 1989)

Year	Sector 1 GM(mg/yr)	GSD	Sector 2 GM(mg/yr)	GSD	Sector 3 GM(mg/yr)	GSD	Sector 4 GM(mg/yr)	GSD	Sector 5 GM(mg/yr)	GSD	Sector 6 GM(mg/yr)	GSD	Sector 7 GM(mg/yr)	GSD	Sector 8 GM(mg/yr)	GSD
1953-74	6.7E-02	1.9	2.8E-02	1.9	2.6E-02	1.9	8.6E-02	1.9	3.1E-02	1.9	1.3E-02	1.9	1.2E-02	1.9	3.9E-02	1.9
1975	6.3E-02	1.9	2.6E-02	1.9	2.5E-02	1.9	8.0E-02	1.9	2.9E-02	1.9	1.2E-02	1.9	1.1E-02	1.9	3.7E-02	1.9
1976	6.2E-02	1.9	2.6E-02	1.9	2.4E-02	1.9	7.9E-02	1.9	2.9E-02	1.9	1.2E-02	1.9	1.1E-02	1.9	3.7E-02	1.9
1977	5.8E-02	1.9	2.4E-02	1.9	2.3E-02	1.9	7.4E-02	1.9	2.7E-02	1.9	1.1E-02	1.9	1.0E-02	1.9	3.4E-02	1.9
1978	5.3E-02	1.9	2.2E-02	1.9	2.1E-02	1.9	6.8E-02	1.9	2.5E-02	1.9	1.0E-02	1.9	9.5E-03	1.9	3.1E-02	1.9
1979	5.3E-02	1.9	2.2E-02	1.9	2.1E-02	1.9	6.7E-02	1.9	2.4E-02	1.9	1.0E-02	1.9	9.5E-03	1.9	3.1E-02	1.9
1980	4.9E-02	1.9	2.0E-02	1.9	1.9E-02	1.9	6.2E-02	1.9	2.2E-02	1.9	9.3E-03	1.9	8.7E-03	1.9	2.8E-02	1.9
1981	4.4E-02	1.9	1.9E-02	1.9	1.7E-02	1.9	5.6E-02	1.9	2.0E-02	1.9	8.4E-03	1.9	7.9E-03	1.9	2.6E-02	1.9
1982	4.3E-02	1.9	1.8E-02	1.9	1.7E-02	1.9	5.4E-02	1.9	2.0E-02	1.9	8.1E-03	1.9	7.6E-03	1.9	2.5E-02	1.9
1983	3.9E-02	1.9	1.6E-02	1.9	1.5E-02	1.9	5.0E-02	1.9	1.8E-02	1.9	7.5E-03	1.9	7.0E-03	1.9	2.3E-02	1.9
1984	3.6E-02	1.9	1.5E-02	1.9	1.4E-02	1.9	4.6E-02	1.9	1.7E-02	1.9	6.8E-03	1.9	6.4E-03	1.9	2.1E-02	1.9
1985	3.3E-02	1.9	1.4E-02	1.9	1.3E-02	1.9	4.2E-02	1.9	1.5E-02	1.9	6.3E-03	1.9	5.9E-03	1.9	2.0E-02	1.9
1986	3.0E-02	1.9	1.3E-02	1.9	1.2E-02	1.9	3.8E-02	1.9	1.4E-02	1.9	5.7E-03	1.9	5.3E-03	1.9	1.8E-02	1.9
1987	2.7E-02	1.9	1.1E-02	1.9	1.0E-02	1.9	3.4E-02	1.9	1.2E-02	1.9	5.1E-03	1.9	4.7E-03	1.9	1.6E-02	1.9
1988	2.4E-02	1.9	1.0E-02	1.9	9.3E-03	1.9	3.0E-02	1.9	1.1E-02	1.9	4.5E-03	1.9	4.2E-03	1.9	1.4E-02	1.9
1989	2.1E-02	1.9	8.6E-03	1.9	8.0E-03	1.9	2.6E-02	1.9	9.5E-03	1.9	3.9E-03	1.9	3.7E-03	1.9	1.2E-02	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) mg = milligrams
5) yr = year

Inhalation Dose Associated with Routine Airborne Release of Methylene Chloride (continued)
(1953 - 1989)

Year	Sector 9		Sector 10		Sector 11		Sector 12		Denver		Lakewood		Longmont	
	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD
1953-74	1.5E-02	1.9	6.3E-03	1.9	5.9E-03	2.0	2.0E-02	1.9	7.2E-03	2.0	8.9E-03	1.9	3.2E-03	1.9
1975	1.4E-02	1.9	5.9E-03	1.9	5.5E-03	2.0	1.8E-02	1.9	6.7E-03	2.0	8.3E-03	1.9	3.0E-03	1.9
1976	1.4E-02	1.9	5.9E-03	1.9	5.5E-03	2.0	1.8E-02	1.9	6.7E-03	2.0	8.3E-03	1.9	3.0E-03	1.9
1977	1.3E-02	1.9	5.4E-03	1.9	5.1E-03	2.0	1.7E-02	1.9	6.2E-03	2.0	7.7E-03	1.9	2.7E-03	1.9
1978	1.2E-02	1.9	5.0E-03	1.9	4.7E-03	2.0	1.6E-02	1.9	5.7E-03	2.0	7.1E-03	1.9	2.5E-03	1.9
1979	1.2E-02	1.9	5.0E-03	1.9	4.7E-03	2.0	1.6E-02	1.9	5.7E-03	2.0	7.0E-03	1.9	2.5E-03	1.9
1980	1.1E-02	1.9	4.6E-03	1.9	4.3E-03	2.0	1.4E-02	1.9	5.2E-03	2.0	6.4E-03	1.9	2.3E-03	1.9
1981	1.0E-02	1.9	4.1E-03	1.9	3.9E-03	2.0	1.3E-02	1.9	4.7E-03	2.0	5.8E-03	1.9	2.1E-03	1.9
1982	9.8E-03	1.9	4.0E-03	1.9	3.7E-03	2.0	1.2E-02	1.9	4.6E-03	2.0	5.6E-03	1.9	2.0E-03	1.9
1983	9.0E-03	1.9	3.7E-03	1.9	3.4E-03	2.0	1.1E-02	1.9	4.2E-03	2.0	5.2E-03	1.9	1.9E-03	1.9
1984	8.2E-03	1.9	3.4E-03	1.9	3.1E-03	2.0	1.0E-02	1.9	3.9E-03	2.0	4.8E-03	1.9	1.7E-03	1.9
1985	7.6E-03	1.9	3.1E-03	1.9	2.9E-03	2.0	9.7E-03	1.9	3.6E-03	2.0	4.4E-03	1.9	1.6E-03	1.9
1986	6.9E-03	1.9	2.8E-03	1.9	2.6E-03	2.0	8.7E-03	1.9	3.2E-03	2.0	4.0E-03	1.9	1.4E-03	1.9
1987	6.1E-03	1.9	2.5E-03	1.9	2.3E-03	2.0	7.8E-03	1.9	2.9E-03	2.0	3.5E-03	1.9	1.3E-03	1.9
1988	5.5E-03	1.9	2.2E-03	1.9	2.1E-03	2.0	7.0E-03	1.9	2.6E-03	2.0	3.2E-03	1.9	1.1E-03	1.9
1989	4.7E-03	1.9	1.9E-03	1.9	1.8E-03	2.0	6.0E-03	1.9	2.2E-03	2.0	2.7E-03	1.9	9.7E-04	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) mg = milligrams
5) yr = year

Inhalation Dose Associated with Routine Airborne Release of Tetrachloroethylene (1953 - 1989)

Year	Sector 1 GM(mg/yr)	GSD	Sector 2 GM(mg/yr)	GSD	Sector 3 GM(mg/yr)	GSD	Sector 4 GM(mg/yr)	GSD	Sector 5 GM(mg/yr)	GSD	Sector 6 GM(mg/yr)	GSD	Sector 7 GM(mg/yr)	GSD	Sector 8 GM(mg/yr)	GSD
1953-61	1.7E+00	1.9	7.3E-01	1.9	6.8E-01	1.9	2.2E+00	1.9	8.0E-01	1.9	3.3E-01	1.9	3.1E-01	1.9	1.0E+00	1.9
1962	1.5E+00	1.9	6.4E-01	1.9	5.9E-01	1.9	1.9E+00	1.9	7.0E-01	1.9	2.9E-01	1.9	2.7E-01	1.9	8.9E-01	1.9
1963	1.3E+00	1.9	5.4E-01	1.9	5.0E-01	1.9	1.6E+00	1.9	5.9E-01	1.9	2.5E-01	1.9	2.3E-01	1.9	7.5E-01	1.9
1964	1.1E+00	1.9	4.4E-01	1.9	4.1E-01	1.9	1.3E+00	1.9	4.9E-01	1.9	2.0E-01	1.9	1.9E-01	1.9	6.2E-01	1.9
1965	8.3E-01	1.9	3.5E-01	1.9	3.2E-01	1.9	1.1E+00	1.9	3.8E-01	1.9	1.6E-01	1.9	1.5E-01	1.9	4.9E-01	1.9
1966	6.0E-01	1.9	2.5E-01	1.9	2.3E-01	1.9	7.6E-01	1.9	2.8E-01	1.9	1.1E-01	1.9	1.1E-01	1.9	3.5E-01	1.9
1967	5.4E-01	1.9	2.3E-01	1.9	2.1E-01	1.9	6.9E-01	1.9	2.5E-01	1.9	1.0E-01	1.9	9.7E-02	1.9	3.2E-01	1.9
1968	4.9E-01	1.9	2.1E-01	1.9	1.9E-01	1.9	6.2E-01	1.9	2.3E-01	1.9	9.3E-02	1.9	8.7E-02	1.9	2.9E-01	1.9
1969	4.4E-01	1.9	1.8E-01	1.9	1.7E-01	1.9	5.6E-01	1.9	2.0E-01	1.9	8.4E-02	1.9	7.8E-02	1.9	2.6E-01	1.9
1970	3.8E-01	1.9	1.6E-01	1.9	1.5E-01	1.9	4.9E-01	1.9	1.8E-01	1.9	7.3E-02	1.9	6.8E-02	1.9	2.3E-01	1.9
1971	3.3E-01	1.9	1.4E-01	1.9	1.3E-01	1.9	4.2E-01	1.9	1.5E-01	1.9	6.3E-02	1.9	5.9E-02	1.9	1.9E-01	1.9
1972	2.8E-01	1.9	1.2E-01	1.9	1.1E-01	1.9	3.6E-01	1.9	1.3E-01	1.9	5.3E-02	1.9	5.0E-02	1.9	1.6E-01	1.9
1973	2.3E-01	1.9	9.5E-02	1.9	8.8E-02	1.9	2.9E-01	1.9	1.0E-01	1.9	4.3E-02	1.9	4.0E-02	1.9	1.3E-01	1.9
1974	1.7E-01	1.9	7.2E-02	1.9	6.7E-02	1.9	2.2E-01	1.9	7.9E-02	1.9	3.3E-02	1.9	3.1E-02	1.9	1.0E-01	1.9
1975	1.2E-01	1.9	5.0E-02	1.9	4.6E-02	1.9	1.5E-01	1.9	5.4E-02	1.9	2.3E-02	1.9	2.1E-02	1.9	6.9E-02	1.9
1976	6.4E-02	1.9	2.7E-02	1.9	2.5E-02	1.9	8.2E-02	1.9	3.0E-02	1.9	1.2E-02	1.9	1.1E-02	1.9	3.8E-02	1.9
1977	1.0E-02	1.9	4.4E-03	1.9	4.1E-03	1.9	1.3E-02	1.9	4.8E-03	1.9	2.0E-03	1.9	1.9E-03	1.9	6.1E-03	1.9
1978-89	1.0E-02	1.9	4.4E-03	1.9	4.1E-03	1.9	1.3E-02	1.9	4.8E-03	1.9	2.0E-03	1.9	1.9E-03	1.9	6.1E-03	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) mg = milligrams
5) yr = year

Inhalation Dose Associated with Routine Airborne Release of Tetrachloroethylene (continued)
(1953 - 1989)

Year	Sector 9 GM(mg/yr)	Sector 9 GSD	Sector 10 GM(mg/yr)	Sector 10 GSD	Sector 11 GM(mg/yr)	Sector 11 GSD	Sector 12 GM(mg/yr)	Sector 12 GSD	Denver GM(mg/yr)	Denver GSD	Lakewood GM(mg/yr)	Lakewood GSD	Longmont GM(mg/yr)	Longmont GSD
1953-61	4.0E-01	1.9	1.6E-01	1.9	1.5E-01	2.0	5.1E-01	1.9	1.9E-01	2.0	2.3E-01	1.9	8.2E-02	1.9
1962	3.5E-01	1.9	1.4E-01	1.9	1.3E-01	2.0	4.4E-01	1.9	1.6E-01	2.0	2.0E-01	1.9	7.2E-02	1.9
1963	3.0E-01	1.9	1.2E-01	1.9	1.1E-01	2.0	3.8E-01	1.9	1.4E-01	2.0	1.7E-01	1.9	6.1E-02	1.9
1964	2.4E-01	1.9	9.9E-02	1.9	9.3E-02	2.0	3.1E-01	1.9	1.1E-01	2.0	1.4E-01	1.9	5.0E-02	1.9
1965	1.9E-01	1.9	7.8E-02	1.9	7.3E-02	2.0	2.4E-01	1.9	8.9E-02	2.0	1.1E-01	1.9	3.9E-02	1.9
1966	1.4E-01	1.9	5.6E-02	1.9	5.2E-02	2.0	1.7E-01	1.9	6.4E-02	2.0	7.9E-02	1.9	2.8E-02	1.9
1967	1.2E-01	1.9	5.1E-02	1.9	4.8E-02	2.0	1.6E-01	1.9	5.8E-02	2.0	7.2E-02	1.9	2.6E-02	1.9
1968	1.1E-01	1.9	4.6E-02	1.9	4.3E-02	2.0	1.4E-01	1.9	5.2E-02	2.0	6.5E-02	1.9	2.3E-02	1.9
1969	1.0E-01	1.9	4.1E-02	1.9	3.8E-02	2.0	1.3E-01	1.9	4.7E-02	2.0	5.8E-02	1.9	2.1E-02	1.9
1970	8.8E-02	1.9	3.6E-02	1.9	3.4E-02	2.0	1.1E-01	1.9	4.1E-02	2.0	5.1E-02	1.9	1.8E-02	1.9
1971	7.6E-02	1.9	3.1E-02	1.9	2.9E-02	2.0	9.6E-02	1.9	3.5E-02	2.0	4.4E-02	1.9	1.6E-02	1.9
1972	6.4E-02	1.9	2.6E-02	1.9	2.5E-02	2.0	8.2E-02	1.9	3.0E-02	2.0	3.7E-02	1.9	1.3E-02	1.9
1973	5.2E-02	1.9	2.1E-02	1.9	2.0E-02	2.0	6.6E-02	1.9	2.4E-02	2.0	3.0E-02	1.9	1.1E-02	1.9
1974	4.0E-02	1.9	1.6E-02	1.9	1.5E-02	2.0	5.0E-02	1.9	1.8E-02	2.0	2.3E-02	1.9	8.1E-03	1.9
1975	2.7E-02	1.9	1.1E-02	1.9	1.0E-02	2.0	3.5E-02	1.9	1.3E-02	2.0	1.6E-02	1.9	5.6E-03	1.9
1976	1.5E-02	1.9	6.0E-03	1.9	5.6E-03	2.0	1.9E-02	1.9	6.9E-03	2.0	8.5E-03	1.9	3.0E-03	1.9
1977	2.4E-03	1.9	9.8E-04	1.9	9.2E-04	2.0	3.1E-03	1.9	1.1E-03	2.0	1.4E-03	1.9	4.9E-04	1.9
1978-89	2.4E-03	1.9	9.8E-04	1.9	9.2E-04	2.0	3.1E-03	1.9	1.1E-03	2.0	1.4E-03	1.9	4.9E-04	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) mg = milligrams
5) yr = year

Inhalation Dose Associated with Routine Airborne Release of 1,1,1-Trichloroethane (1953 - 1989)

Year	Sector 1		Sector 2		Sector 3		Sector 4		Sector 5		Sector 6		Sector 7		Sector 8	
	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD
1953-57	2.5E-02	1.9	1.0E-02	1.9	9.7E-03	1.9	3.2E-02	1.9	1.1E-02	1.9	4.8E-03	1.9	4.4E-03	1.9	1.5E-02	1.9
1958	8.6E-02	1.9	3.6E-02	1.9	3.4E-02	1.9	1.1E-01	1.9	4.0E-02	1.9	1.6E-02	1.9	1.5E-02	1.9	5.1E-02	1.9
1959	1.5E-01	1.9	6.2E-02	1.9	5.8E-02	1.9	1.9E-01	1.9	6.8E-02	1.9	2.8E-02	1.9	2.6E-02	1.9	8.7E-02	1.9
1960	2.1E-01	1.9	8.8E-02	1.9	8.2E-02	1.9	2.7E-01	1.9	9.7E-02	1.9	4.0E-02	1.9	3.7E-02	1.9	1.2E-01	1.9
1961	2.7E-01	1.9	1.2E-01	1.9	1.1E-01	1.9	3.5E-01	1.9	1.3E-01	1.9	5.2E-02	1.9	4.9E-02	1.9	1.6E-01	1.9
1962	3.4E-01	1.9	1.4E-01	1.9	1.3E-01	1.9	4.3E-01	1.9	1.6E-01	1.9	6.5E-02	1.9	6.0E-02	1.9	2.0E-01	1.9
1963-73	4.0E-01	1.9	1.7E-01	1.9	1.6E-01	1.9	5.1E-01	1.9	1.8E-01	1.9	7.6E-02	1.9	7.1E-02	1.9	2.3E-01	1.9
1974	6.0E-01	1.9	2.5E-01	1.9	2.3E-01	1.9	7.6E-01	1.9	2.8E-01	1.9	1.1E-01	1.9	1.1E-01	1.9	3.5E-01	1.9
1975-84	8.0E-01	1.9	3.3E-01	1.9	3.1E-01	1.9	1.0E+00	1.9	3.7E-01	1.9	1.5E-01	1.9	1.4E-01	1.9	4.7E-01	1.9
1985	7.2E-01	1.9	3.0E-01	1.9	2.8E-01	1.9	9.1E-01	1.9	3.3E-01	1.9	1.4E-01	1.9	1.3E-01	1.9	4.2E-01	1.9
1986	6.2E-01	1.9	2.6E-01	1.9	2.4E-01	1.9	7.9E-01	1.9	2.8E-01	1.9	1.2E-01	1.9	1.1E-01	1.9	3.6E-01	1.9
1987	5.3E-01	1.9	2.2E-01	1.9	2.1E-01	1.9	6.7E-01	1.9	2.4E-01	1.9	1.0E-01	1.9	9.4E-02	1.9	3.1E-01	1.9
1988	4.4E-01	1.9	1.8E-01	1.9	1.7E-01	1.9	5.6E-01	1.9	2.0E-01	1.9	8.4E-02	1.9	7.8E-02	1.9	2.6E-01	1.9
1989	3.5E-01	1.9	1.5E-01	1.9	1.4E-01	1.9	4.4E-01	1.9	1.6E-01	1.9	6.7E-02	1.9	6.2E-02	1.9	2.0E-01	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) mg = milligrams
5) yr = year

Inhalation Dose Associated with Routine Airborne Release of 1,1,1-Trichloroethane (continued)
(1953 - 1989)

Year	Sector 9		Sector 10		Sector 11		Sector 12		Denver		Lakewood		Longmont	
	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD	GM(mg/yr)	GSD
1953-57	5.7E-03	1.9	2.3E-03	1.9	2.2E-03	2.0	7.3E-03	1.9	2.7E-03	2.0	3.3E-03	1.9	1.2E-03	1.9
1958	2.0E-02	1.9	8.1E-03	1.9	7.6E-03	2.0	2.5E-02	1.9	9.3E-03	2.0	1.1E-02	1.9	4.1E-03	1.9
1959	3.4E-02	1.9	1.4E-02	1.9	1.3E-02	2.0	4.3E-02	1.9	1.6E-02	2.0	2.0E-02	1.9	7.0E-03	1.9
1960	4.8E-02	1.9	2.0E-02	1.9	1.8E-02	2.0	6.1E-02	1.9	2.2E-02	2.0	2.8E-02	1.9	9.9E-03	1.9
1961	6.3E-02	1.9	2.6E-02	1.9	2.4E-02	2.0	8.0E-02	1.9	2.9E-02	2.0	3.6E-02	1.9	1.3E-02	1.9
1962	7.8E-02	1.9	3.2E-02	1.9	3.0E-02	2.0	9.9E-02	1.9	3.6E-02	2.0	4.5E-02	1.9	1.6E-02	1.9
1963-73	9.2E-02	1.9	3.7E-02	1.9	3.5E-02	2.0	1.2E-01	1.9	4.3E-02	2.0	5.3E-02	1.9	1.9E-02	1.9
1974	1.4E-01	1.9	5.6E-02	1.9	5.2E-02	2.0	1.7E-01	1.9	6.4E-02	2.0	7.9E-02	1.9	2.8E-02	1.9
1975-84	1.8E-01	1.9	7.5E-02	1.9	7.0E-02	2.0	2.3E-01	1.9	8.6E-02	2.0	1.1E-01	1.9	3.8E-02	1.9
1985	1.6E-01	1.9	6.7E-02	1.9	6.3E-02	2.0	2.1E-01	1.9	7.7E-02	2.0	9.5E-02	1.9	3.4E-02	1.9
1986	1.4E-01	1.9	5.8E-02	1.9	5.4E-02	2.0	1.8E-01	1.9	6.6E-02	2.0	8.2E-02	1.9	2.9E-02	1.9
1987	1.2E-01	1.9	5.0E-02	1.9	4.6E-02	2.0	1.5E-01	1.9	5.7E-02	2.0	7.0E-02	1.9	2.5E-02	1.9
1988	1.0E-01	1.9	4.1E-02	1.9	3.8E-02	2.0	1.3E-01	1.9	4.7E-02	2.0	5.8E-02	1.9	2.1E-02	1.9
1989	8.0E-02	1.9	3.3E-02	1.9	3.1E-02	2.0	1.0E-01	1.9	3.7E-02	2.0	4.6E-02	1.9	1.6E-02	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) mg = milligrams
5) yr = year

Inhalation Dose Associated with Routine Airborne Release of Trichloroethylene (1953 - 1989)

Year	Sector 1 GM(mg/yr)	Sector 1 GSD	Sector 2 GM(mg/yr)	Sector 2 GSD	Sector 3 GM(mg/yr)	Sector 3 GSD	Sector 4 GM(mg/yr)	Sector 4 GSD	Sector 5 GM(mg/yr)	Sector 5 GSD	Sector 6 GM(mg/yr)	Sector 6 GSD	Sector 7 GM(mg/yr)	Sector 7 GSD	Sector 8 GM(mg/yr)	Sector 8 GSD
1953-62	1.2E+00	1.9	5.2E-01	1.9	4.9E-01	1.9	1.6E+00	1.9	5.7E-01	1.9	2.4E-01	1.9	2.2E-01	1.9	7.3E-01	1.9
1963	1.2E+00	1.9	5.0E-01	1.9	4.6E-01	1.9	1.5E+00	1.9	5.5E-01	1.9	2.3E-01	1.9	2.1E-01	1.9	7.0E-01	1.9
1964	1.1E+00	1.9	4.7E-01	1.9	4.4E-01	1.9	1.4E+00	1.9	5.2E-01	1.9	2.1E-01	1.9	2.0E-01	1.9	6.6E-01	1.9
1965	1.1E+00	1.9	4.5E-01	1.9	4.2E-01	1.9	1.4E+00	1.9	4.9E-01	1.9	2.0E-01	1.9	1.9E-01	1.9	6.3E-01	1.9
1966	1.0E+00	1.9	4.2E-01	1.9	4.0E-01	1.9	1.3E+00	1.9	4.7E-01	1.9	1.9E-01	1.9	1.8E-01	1.9	5.9E-01	1.9
1967	9.5E-01	1.9	4.0E-01	1.9	3.7E-01	1.9	1.2E+00	1.9	4.4E-01	1.9	1.8E-01	1.9	1.7E-01	1.9	5.6E-01	1.9
1968	8.9E-01	1.9	3.7E-01	1.9	3.5E-01	1.9	1.1E+00	1.9	4.1E-01	1.9	1.7E-01	1.9	1.6E-01	1.9	5.2E-01	1.9
1969	8.3E-01	1.9	3.5E-01	1.9	3.3E-01	1.9	1.1E+00	1.9	3.8E-01	1.9	1.6E-01	1.9	1.5E-01	1.9	4.9E-01	1.9
1970	7.7E-01	1.9	3.2E-01	1.9	3.0E-01	1.9	9.8E-01	1.9	3.6E-01	1.9	1.5E-01	1.9	1.4E-01	1.9	4.5E-01	1.9
1971	7.2E-01	1.9	3.0E-01	1.9	2.8E-01	1.9	9.1E-01	1.9	3.3E-01	1.9	1.4E-01	1.9	1.3E-01	1.9	4.2E-01	1.9
1972	6.6E-01	1.9	2.8E-01	1.9	2.6E-01	1.9	8.4E-01	1.9	3.0E-01	1.9	1.3E-01	1.9	1.2E-01	1.9	3.9E-01	1.9
1973	6.0E-01	1.9	2.5E-01	1.9	2.3E-01	1.9	7.6E-01	1.9	2.8E-01	1.9	1.1E-01	1.9	1.1E-01	1.9	3.5E-01	1.9
1974	3.8E-01	1.9	1.6E-01	1.9	1.5E-01	1.9	4.8E-01	1.9	1.7E-01	1.9	7.2E-02	1.9	6.7E-02	1.9	2.2E-01	1.9
1975	1.5E-01	1.9	6.3E-02	1.9	5.8E-02	1.9	1.9E-01	1.9	6.9E-02	1.9	2.9E-02	1.9	2.7E-02	1.9	8.8E-02	1.9
1976	1.4E-01	1.9	5.8E-02	1.9	5.4E-02	1.9	1.8E-01	1.9	6.4E-02	1.9	2.6E-02	1.9	2.5E-02	1.9	8.1E-02	1.9
1977	1.3E-01	1.9	5.5E-02	1.9	5.1E-02	1.9	1.7E-01	1.9	6.1E-02	1.9	2.5E-02	1.9	2.3E-02	1.9	7.7E-02	1.9
1978	1.2E-01	1.9	5.0E-02	1.9	4.7E-02	1.9	1.5E-01	1.9	5.5E-02	1.9	2.3E-02	1.9	2.1E-02	1.9	7.0E-02	1.9
1979	1.1E-01	1.9	4.8E-02	1.9	4.5E-02	1.9	1.5E-01	1.9	5.3E-02	1.9	2.2E-02	1.9	2.0E-02	1.9	6.7E-02	1.9
1980	1.0E-01	1.9	4.3E-02	1.9	4.0E-02	1.9	1.3E-01	1.9	4.7E-02	1.9	2.0E-02	1.9	1.8E-02	1.9	6.0E-02	1.9
1981	9.6E-02	1.9	4.0E-02	1.9	3.8E-02	1.9	1.2E-01	1.9	4.4E-02	1.9	1.8E-02	1.9	1.7E-02	1.9	5.6E-02	1.9
1982	8.5E-02	1.9	3.6E-02	1.9	3.3E-02	1.9	1.1E-01	1.9	3.9E-02	1.9	1.6E-02	1.9	1.5E-02	1.9	5.0E-02	1.9
1983	7.3E-02	1.9	3.1E-02	1.9	2.9E-02	1.9	9.3E-02	1.9	3.4E-02	1.9	1.4E-02	1.9	1.3E-02	1.9	4.3E-02	1.9
1984	6.7E-02	1.9	2.8E-02	1.9	2.6E-02	1.9	8.5E-02	1.9	3.1E-02	1.9	1.3E-02	1.9	1.2E-02	1.9	3.9E-02	1.9
1985	5.7E-02	1.9	2.4E-02	1.9	2.2E-02	1.9	7.2E-02	1.9	2.6E-02	1.9	1.1E-02	1.9	1.0E-02	1.9	3.3E-02	1.9
1986	4.8E-02	1.9	2.0E-02	1.9	1.9E-02	1.9	6.1E-02	1.9	2.2E-02	1.9	9.1E-03	1.9	8.5E-03	1.9	2.8E-02	1.9
1987	3.8E-02	1.9	1.6E-02	1.9	1.5E-02	1.9	4.9E-02	1.9	1.8E-02	1.9	7.3E-03	1.9	6.8E-03	1.9	2.3E-02	1.9
1988	2.9E-02	1.9	1.2E-02	1.9	1.1E-02	1.9	3.7E-02	1.9	1.4E-02	1.9	5.6E-03	1.9	5.2E-03	1.9	1.7E-02	1.9
1989	2.0E-02	1.9	8.4E-03	1.9	7.8E-03	1.9	2.5E-02	1.9	9.2E-03	1.9	3.8E-03	1.9	3.6E-03	1.9	1.2E-02	1.9

NOTES:

1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) mg = milligrams
5) yr = year

Inhalation Dose Associated with Routine Airborne Release of Trichloroethylene (continued) (1953 - 1989)

Year	Sector 9 GM(mg/yr)	Sector 9 GSD	Sector 10 GM(mg/yr)	Sector 10 GSD	Sector 11 GM(mg/yr)	Sector 11 GSD	Sector 12 GM(mg/yr)	Sector 12 GSD	Denver GM(mg/yr)	Denver GSD	Lakewood GM(mg/yr)	Lakewood GSD	Longmont GM(mg/yr)	Longmont GSD
1953-62	2.9E-01	1.9	1.2E-01	1.9	1.1E-01	2.0	3.6E-01	1.9	1.3E-01	2.0	1.7E-01	1.9	5.9E-02	1.9
1963	2.7E-01	1.9	1.1E-01	1.9	1.0E-01	2.0	3.5E-01	1.9	1.3E-01	2.0	1.6E-01	1.9	5.6E-02	1.9
1964	2.6E-01	1.9	1.1E-01	1.9	9.9E-02	2.0	3.3E-01	1.9	1.2E-01	2.0	1.5E-01	1.9	5.3E-02	1.9
1965	2.5E-01	1.9	1.0E-01	1.9	9.4E-02	2.0	3.1E-01	1.9	1.2E-01	2.0	1.4E-01	1.9	5.1E-02	1.9
1966	2.3E-01	1.9	9.5E-02	1.9	8.9E-02	2.0	3.0E-01	1.9	1.1E-01	2.0	1.3E-01	1.9	4.8E-02	1.9
1967	2.2E-01	1.9	8.9E-02	1.9	8.4E-02	2.0	2.8E-01	1.9	1.0E-01	2.0	1.3E-01	1.9	4.5E-02	1.9
1968	2.1E-01	1.9	8.4E-02	1.9	7.8E-02	2.0	2.6E-01	1.9	9.6E-02	2.0	1.2E-01	1.9	4.2E-02	1.9
1969	1.9E-01	1.9	7.8E-02	1.9	7.3E-02	2.0	2.4E-01	1.9	8.9E-02	2.0	1.1E-01	1.9	3.9E-02	1.9
1970	1.8E-01	1.9	7.2E-02	1.9	6.8E-02	2.0	2.3E-01	1.9	8.3E-02	2.0	1.0E-01	1.9	3.7E-02	1.9
1971	1.6E-01	1.9	6.7E-02	1.9	6.3E-02	2.0	2.1E-01	1.9	7.7E-02	2.0	9.5E-02	1.9	3.4E-02	1.9
1972	1.5E-01	1.9	6.2E-02	1.9	5.8E-02	2.0	1.9E-01	1.9	7.1E-02	2.0	8.7E-02	1.9	3.1E-02	1.9
1973	1.4E-01	1.9	5.6E-02	1.9	5.2E-02	2.0	1.7E-01	1.9	6.4E-02	2.0	7.9E-02	1.9	2.8E-02	1.9
1974	8.7E-02	1.9	3.6E-02	1.9	3.3E-02	2.0	1.1E-01	1.9	4.1E-02	2.0	5.0E-02	1.9	1.8E-02	1.9
1975	3.4E-02	1.9	1.4E-02	1.9	1.3E-02	2.0	4.4E-02	1.9	1.6E-02	2.0	2.0E-02	1.9	7.1E-03	1.9
1976	3.2E-02	1.9	1.3E-02	1.9	1.2E-02	2.0	4.0E-02	1.9	1.5E-02	2.0	1.8E-02	1.9	6.5E-03	1.9
1977	3.0E-02	1.9	1.2E-02	1.9	1.2E-02	2.0	3.8E-02	1.9	1.4E-02	2.0	1.7E-02	1.9	6.2E-03	1.9
1978	2.8E-02	1.9	1.1E-02	1.9	1.1E-02	2.0	3.5E-02	1.9	1.3E-02	2.0	1.6E-02	1.9	5.7E-03	1.9
1979	2.6E-02	1.9	1.1E-02	1.9	1.0E-02	2.0	3.3E-02	1.9	1.2E-02	2.0	1.5E-02	1.9	5.4E-03	1.9
1980	2.4E-02	1.9	9.6E-03	1.9	9.0E-03	2.0	3.0E-02	1.9	1.1E-02	2.0	1.4E-02	1.9	4.9E-03	1.9
1981	2.2E-02	1.9	9.0E-03	1.9	8.4E-03	2.0	2.8E-02	1.9	1.0E-02	2.0	1.3E-02	1.9	4.5E-03	1.9
1982	1.9E-02	1.9	7.9E-03	1.9	7.4E-03	2.0	2.5E-02	1.9	9.1E-03	2.0	1.1E-02	1.9	4.0E-03	1.9
1983	1.7E-02	1.9	6.9E-03	1.9	6.4E-03	2.0	2.1E-02	1.9	7.9E-03	2.0	9.7E-03	1.9	3.5E-03	1.9
1984	1.5E-02	1.9	6.3E-03	1.9	5.9E-03	2.0	2.0E-02	1.9	7.2E-03	2.0	8.8E-03	1.9	3.2E-03	1.9
1985	1.3E-02	1.9	5.3E-03	1.9	5.0E-03	2.0	1.7E-02	1.9	6.1E-03	2.0	7.5E-03	1.9	2.7E-03	1.9
1986	1.1E-02	1.9	4.5E-03	1.9	4.2E-03	2.0	1.4E-02	1.9	5.1E-03	2.0	6.3E-03	1.9	2.3E-03	1.9
1987	8.8E-03	1.9	3.6E-03	1.9	3.4E-03	2.0	1.1E-02	1.9	4.1E-03	2.0	5.1E-03	1.9	1.8E-03	1.9
1988	6.8E-03	1.9	2.8E-03	1.9	2.6E-03	2.0	8.6E-03	1.9	3.2E-03	2.0	3.9E-03	1.9	1.4E-03	1.9
1989	4.6E-03	1.9	1.9E-03	1.9	1.7E-03	2.0	5.8E-03	1.9	2.1E-03	2.0	2.6E-03	1.9	9.4E-04	1.9

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) mg = milligrams
5) yr = year

INHALATION DOSES ASSOCIATED WITH AIRBORNE RELEASES OF PLUTONIUM-239/240 AND AMERICIUM-241 FROM THE 1957 AND 1969 FIRES

Inhalation Dose Associated with Airborne Release of Plutonium-239/240 During the 1957 Fire

Location	Inhalation Dose GM (Sv)	GSD
Plume A - 3 miles	1.8E-05	6.2
Plume A - 5 miles	1.5E-05	6.2
Plume A - 8 miles	1.2E-05	6.2
Plume B - 3 miles	9.4E-06	6.2
Plume B - 5 miles	5.5E-06	6.2
Plume B - 8 miles	2.8E-06	6.2
Denver	5.1E-07	6.2
Lakewood	2.5E-09	6.2
Longmont	NA	NA

Notes:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem
5) NA = Not Applicable

Inhalation Dose Associated with Airborne Release of Americium-241 During the 1957 Fire

Location	GM (Sv)	GSD
Plume A - 3 miles	4.1E-06	6.1
Plume A - 5 miles	3.5E-06	6.1
Plume A - 8 miles	2.8E-06	6.1
Plume B - 3 miles	2.1E-06	6.1
Plume B - 5 miles	1.2E-06	6.1
Plume B - 8 miles	6.3E-07	6.1
Denver	1.1E-07	6.1
Lakewood	5.6E-10	6.1
Longmont	NA	NA

Notes:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem
5) NA = Not Applicable

Pathway-Specific Doses Associated with Deposited Plutonium-239/240 as a Result of the 1957 Fire

Location	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD
Plume A - 3 miles	3.1E-10	10.2	7.2E-12	19.8	7.5E-12	8.1	5.1E-12	18.7	1.4E-13	10.6
Plume A - 5 miles	2.7E-10	10.8	6.2E-12	17.7	6.4E-12	8.2	4.4E-12	19.0	1.2E-13	11.9
Plume A - 8 miles	2.1E-10	10.5	4.9E-12	18.2	5.1E-12	8.3	3.5E-12	18.3	9.5E-14	10.8
Plume B - 3 miles	1.6E-10	10.7	3.7E-12	20.3	3.9E-12	8.3	2.6E-12	19.3	7.3E-14	10.9
Plume B - 5 miles	9.5E-11	10.1	2.2E-12	19.5	2.3E-12	8.0	1.6E-12	19.0	4.3E-14	11.0
Plume B - 8 miles	4.9E-11	10.6	1.1E-12	18.8	1.2E-12	8.3	7.9E-13	17.9	2.2E-14	11.0
Denver	8.7E-12	10.1	2.0E-13	20.9	2.1E-13	8.2	1.4E-13	19.6	3.9E-15	10.9
Lakewood	4.3E-14	11.0	9.9E-16	17.5	1.0E-15	8.1	7.0E-16	16.8	1.9E-17	10.7
Longmont	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem
5) NA = Not Applicable

Pathway-Specific Doses Associated with Deposited Plutonium-239/240 as a Result of the 1957 Fire (continued)

Location	Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
Plume A - 3 miles	9.3E-13	10.2	6.5E-10	9.8	6.3E-20	9.9	1.7E-09	6.9
Plume A - 5 miles	7.9E-13	10.7	5.5E-10	8.7	5.3E-20	8.8	1.4E-09	6.3
Plume A - 8 miles	6.3E-13	11.4	4.3E-10	9.3	4.2E-20	9.4	1.1E-09	6.8
Plume B - 3 miles	4.8E-13	10.3	3.3E-10	8.9	3.2E-20	9.2	8.3E-10	6.8
Plume B - 5 miles	2.8E-13	10.5	2.0E-10	9.7	1.9E-20	9.6	5.0E-10	7.0
Plume B - 8 miles	1.4E-13	10.5	1.0E-10	8.6	9.7E-21	8.8	2.6E-10	6.5
Denver	2.6E-14	10.0	1.8E-11	8.8	1.7E-21	8.7	4.5E-11	6.3
Lakewood	1.3E-16	10.6	8.9E-14	8.9	8.6E-24	9.1	2.2E-13	7.2
Longmont	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem
5) NA = Not Applicable

Inhalation Dose Associated with Airborne Release of Plutonium-239/240 During the 1969 Fire

Location	Inhalation Dose	
	GM (Sv)	GSD
Plume C - 3 miles	4.5E-06	4.6
Plume C - 5 miles	1.7E-06	4.6
Plume C - 8 miles	7.6E-07	4.6
Plume D - 3 miles	2.1E-07	4.6
Plume D - 5 miles	7.6E-08	4.6
Plume D - 8 miles	NA	NA
Denver	NA	NA
Lakewood	NA	NA
Longmont	NA	NA

Notes:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem
5) NA = Not Applicable

Inhalation Dose Associated with Airborne Release of Americium-241 During the 1969 Fire

Location	Inhalation Dose GM (Sv)	GSD
Plume C - 3 miles	1.0E-06	4.5
Plume C - 5 miles	3.7E-07	4.5
Plume C - 8 miles	1.7E-07	4.5
Plume D - 3 miles	4.7E-08	4.5
Plume D - 5 miles	1.7E-08	4.5
Plume D - 8 miles	NA	NA
Denver	NA	NA
Lakewood	NA	NA
Longmont	NA	NA

Notes:

1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem
5) NA = Not Applicable

Pathway-Specific Doses Associated with Deposited Plutonium-239/240 as a Result of the 1969 Fire

Location	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD
Plume C - 3 miles	7.7E-11	7.0	1.8E-12	13.4	1.8E-12	4.8	1.3E-12	13.5	3.4E-14	7.8
Plume C - 5 miles	2.9E-11	6.5	6.6E-13	14.2	6.9E-13	5.0	4.7E-13	14.7	1.3E-14	7.9
Plume C - 8 miles	1.3E-11	6.8	3.0E-13	13.9	3.1E-13	4.9	2.1E-13	13.6	5.8E-15	7.5
Plume D - 3 miles	3.6E-12	6.5	8.3E-14	14.2	8.6E-14	5.1	5.8E-14	14.1	1.6E-15	6.9
Plume D - 5 miles	1.3E-12	6.4	3.0E-14	14.2	3.1E-14	4.9	2.1E-14	14.4	5.8E-16	7.9
Plume D - 8 miles	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Denver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lakewood	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Longmont	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem
5) NA = Not Applicable

Pathway-Specific Doses Associated with Deposited Plutonium-239/240 as a Result of the 1969 Fire (continued)

Location	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
Plume C - 3 miles	2.2E-13	7.2	1.6E-10	5.7	1.5E-20	5.8	3.5E-10	4.7
Plume C - 5 miles	8.3E-14	6.6	5.9E-11	5.9	5.7E-21	5.7	1.3E-10	4.6
Plume C - 8 miles	3.8E-14	6.4	2.7E-11	5.7	2.6E-21	5.6	5.9E-11	4.6
Plume D - 3 miles	1.0E-14	6.4	7.4E-12	5.5	7.2E-22	5.5	1.6E-11	4.5
Plume D - 5 miles	3.8E-15	6.7	2.7E-12	6.2	2.6E-22	6.3	5.9E-12	4.7
Plume D - 8 miles	NA	NA	NA	NA	NA	NA	NA	NA
Denver	NA	NA	NA	NA	NA	NA	NA	NA
Lakewood	NA	NA	NA	NA	NA	NA	NA	NA
Longmont	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem
5) NA = Not Applicable

PATHWAY-SPECIFIC DOSES ASSOCIATED WITH AIRBORNE RELEASE OF PLUTONIUM-239/240 AND AMERICIUM-241 FROM THE 903 PAD

Pathway-Specific Doses Associated with Airborne Release of Plutonium-239/240 During the 903 Pad Release

Location	Inhalation GM (Sv)	Inhalation GSD	Immersion GM (Sv)	Immersion GSD	Soil Ingestion GM (Sv)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv)	Vegetable Ingestion GSD	Ground Exposure GM (Sv)	Ground Exposure GSD	Wheat Ingestion GM (Sv)	Wheat Ingestion GSD
Sector 1A	2.1E-06	3.4	2.0E-16	3.5	7.3E-09	4.9	1.7E-06	4.3	1.7E-10	3.5	6.0E-10	11.0
Sector 1B	8.5E-07	3.4	8.2E-17	3.5	2.7E-09	4.8	6.1E-07	4.3	6.4E-11	3.5	2.2E-10	11.1
Sector 2A	5.7E-07	3.5	5.5E-17	3.6	1.8E-09	4.8	4.1E-07	4.1	4.3E-11	3.5	1.5E-10	11.1
Sector 2B	9.6E-08	3.5	9.3E-18	3.5	2.2E-10	4.5	5.1E-08	4.4	5.3E-12	3.4	1.8E-11	11.0
Sector 3A	6.8E-08	3.6	6.6E-18	3.6	1.6E-10	5.0	3.7E-08	4.2	3.9E-12	3.5	1.3E-11	11.7
Sector 3B	6.7E-07	3.5	6.5E-17	3.5	2.4E-09	4.9	5.6E-07	4.0	5.8E-11	3.4	2.0E-10	11.7
Sector 4A	2.2E-06	3.5	2.1E-16	3.5	8.1E-09	5.2	1.9E-06	3.9	1.9E-10	3.5	6.5E-10	10.3
Sector 4B	2.2E-05	3.5	2.1E-15	3.5	1.2E-07	5.1	2.7E-05	4.1	2.8E-09	3.5	9.4E-09	10.1
Sector 5A	9.2E-07	3.5	8.9E-17	3.5	2.7E-09	4.9	6.2E-07	4.2	6.4E-11	3.7	2.2E-10	11.2
Sector 5B	3.6E-07	3.5	3.4E-17	3.5	9.1E-10	5.0	2.1E-07	4.2	2.2E-11	3.6	7.4E-11	10.4
Sector 6A	2.8E-07	3.5	2.7E-17	3.5	7.5E-10	4.9	1.7E-07	4.2	1.8E-11	3.5	6.1E-11	10.2
Sector 6B	4.3E-08	3.5	4.2E-18	3.5	8.9E-11	4.9	2.0E-08	4.0	2.1E-12	3.6	7.2E-12	10.7
Sector 7A	3.1E-08	3.4	3.0E-18	3.5	5.9E-11	4.9	1.4E-08	4.0	1.4E-12	3.6	4.8E-12	11.6
Sector 7B	3.4E-07	3.5	3.3E-17	3.5	1.0E-09	4.6	2.4E-07	4.2	2.5E-11	3.5	8.3E-11	10.2
Sector 8A	8.1E-07	3.4	7.8E-17	3.5	2.3E-09	5.0	5.3E-07	4.2	5.5E-11	3.5	1.9E-10	11.9
Sector 8B	8.2E-06	3.5	8.0E-16	3.5	3.5E-08	4.6	8.0E-06	4.2	8.4E-10	3.5	2.8E-09	11.4
Sector 9A	4.3E-07	3.4	4.2E-17	3.5	1.0E-09	5.2	2.3E-07	4.5	2.4E-11	3.5	8.3E-11	11.0
Sector 9B	1.6E-07	3.6	1.6E-17	3.5	3.4E-10	4.6	7.8E-08	4.2	8.1E-12	3.5	2.7E-11	11.3
Sector 10A	1.4E-07	3.5	1.4E-17	3.5	3.1E-10	4.9	7.1E-08	4.1	7.4E-12	3.5	2.5E-11	11.9
Sector 10B	2.1E-08	3.4	2.0E-18	3.5	2.9E-11	5.1	6.8E-09	4.0	7.0E-13	3.6	2.4E-12	11.4
Sector 11A	1.5E-08	3.6	1.5E-18	3.6	3.0E-11	5.2	6.7E-09	4.2	7.1E-13	3.5	2.4E-12	10.5
Sector 11B	1.7E-07	3.5	1.7E-17	3.5	4.3E-10	4.9	9.9E-08	4.2	1.0E-11	3.5	3.5E-11	12.3
Sector 12A	3.5E-07	3.5	3.3E-17	3.6	7.8E-10	5.0	1.8E-07	4.0	1.9E-11	3.5	6.4E-11	10.3
Sector 12B	3.5E-06	3.5	3.4E-16	3.5	1.2E-08	4.8	2.8E-06	4.2	2.9E-10	3.6	9.9E-10	10.8
Denver	3.6E-07	3.5	3.5E-17	3.4	7.8E-10	5.0	1.8E-07	4.3	1.9E-11	3.5	6.3E-11	10.4
Lakewood	1.7E-07	3.5	1.7E-17	3.5	3.1E-10	5.1	7.1E-08	4.0	7.4E-12	3.6	2.5E-11	11.2
Longmont	4.2E-08	3.5	4.0E-18	3.6	5.9E-11	4.8	1.4E-08	4.1	1.4E-12	3.6	4.8E-12	11.2

Note:
1) E-01 is the same as dividing the value by 10^1; E-02 is the same as dividing the value by 10^2; etc.
2) GM = Geometric Mean
3) Geometric Standard Deviation
4) Sv = Sievert; Sv = 100 rem

Pathway-Specific Doses Associated with Airborne Release of Plutonium-239/240 During the 903 Pad Release (continued)

Location	Milk Ingestion GM (Sv)	Milk Ingestion GSD	Beef Ingestion GM (Sv)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv)	Total Dose GSD
Sector 1A	1.2E-10	5.6	1.6E-10	4.2	1.2E-08	4.9	1.2E-18	4.8	5.4E-06	2.8
Sector 1B	4.3E-11	5.2	5.8E-11	4.2	4.5E-09	4.6	4.4E-19	4.9	2.1E-06	2.6
Sector 2A	2.8E-11	5.6	4.0E-11	4.4	3.1E-09	4.8	3.0E-19	4.7	1.4E-06	2.7
Sector 2B	3.5E-12	5.7	4.8E-12	4.6	3.8E-10	5.2	3.7E-20	5.1	2.1E-07	2.9
Sector 3A	2.6E-12	6.0	3.5E-12	4.6	2.8E-10	4.9	2.7E-20	4.7	1.5E-07	2.8
Sector 3B	3.9E-11	5.6	5.3E-11	4.2	4.1E-09	5.1	4.0E-19	5.1	1.8E-06	2.7
Sector 4A	1.3E-10	5.7	1.8E-10	4.0	1.4E-08	4.8	1.3E-18	4.7	5.8E-06	2.7
Sector 4B	1.9E-09	5.7	2.6E-09	4.3	2.0E-07	5.1	1.9E-17	5.2	7.2E-05	2.6
Sector 5A	4.3E-11	5.5	5.7E-11	4.1	4.5E-09	5.2	4.4E-19	5.2	2.2E-06	2.9
Sector 5B	1.4E-11	5.5	2.0E-11	4.1	1.5E-09	4.9	1.5E-19	4.8	8.0E-07	2.7
Sector 6A	1.2E-11	6.0	1.7E-11	4.1	1.3E-09	4.9	1.2E-19	5.0	6.5E-07	2.8
Sector 6B	1.4E-12	5.6	1.9E-12	4.1	1.5E-10	4.6	1.5E-20	4.6	8.7E-08	2.8
Sector 7A	9.3E-13	5.7	1.3E-12	4.2	1.0E-10	4.7	9.6E-21	4.7	6.1E-08	2.7
Sector 7B	1.6E-11	6.0	2.3E-11	4.3	1.7E-09	4.5	1.7E-19	4.5	8.4E-07	2.7
Sector 8A	3.6E-11	6.5	5.3E-11	4.4	3.9E-09	4.8	3.8E-19	5.1	1.9E-06	2.8
Sector 8B	5.6E-10	5.3	7.6E-10	3.9	6.0E-08	4.8	5.8E-18	4.8	2.4E-05	2.8
Sector 9A	1.6E-11	5.2	2.2E-11	4.0	1.7E-09	4.6	1.7E-19	4.7	9.4E-07	2.8
Sector 9B	5.4E-12	5.6	7.4E-12	4.1	5.7E-10	5.0	5.6E-20	5.1	3.4E-07	2.9
Sector 10A	4.9E-12	5.5	6.8E-12	4.2	5.2E-10	4.6	5.1E-20	4.7	3.0E-07	2.7
Sector 10B	4.7E-13	5.8	6.4E-13	4.0	5.0E-11	5.0	4.8E-21	5.0	3.6E-08	2.7
Sector 11A	4.6E-13	5.8	6.2E-13	4.1	5.0E-11	4.6	4.8E-21	4.7	3.1E-08	2.9
Sector 11B	6.8E-12	5.6	9.3E-12	4.1	7.3E-10	5.0	7.0E-20	5.1	3.8E-07	2.7
Sector 12A	1.2E-11	6.0	1.7E-11	4.0	1.3E-09	5.1	1.3E-19	5.1	7.2E-07	2.7
Sector 12B	1.9E-10	5.9	2.7E-10	4.3	2.1E-08	5.0	2.0E-18	5.0	9.1E-06	2.7
Denver	1.2E-11	6.0	1.7E-11	4.8	1.3E-09	5.0	1.3E-19	5.2	7.8E-07	2.7
Lakewood	5.0E-12	5.9	6.9E-12	4.0	5.3E-10	5.0	5.1E-20	5.2	3.4E-07	2.8
Longmont	9.3E-13	5.7	1.3E-12	4.0	1.0E-10	4.6	9.7E-21	4.6	7.5E-08	2.7

Note:
1) E-01 is the same as dividing the value by 10^1; E-02 is the same as dividing the value by 10^2; etc.
2) GM = Geometric Mean
3) Geometric Standard Deviation
4) Sv = Sievert; Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Plutonium-239/240 After the 903 Pad Release

Location	Soil Ingestion GM (Sv/year)	GSD	Vegetable Ingestion GM (Sv/year)	GSD	Ground Exposure GM (Sv/year)	GSD	Wheat Ingestion GM (Sv/year)	GSD	Milk Ingestion GM (Sv/year)	GSD
Sector 1A	7.3E-09	4.7	1.7E-06	4.3	1.8E-10	3.5	6.0E-10	11.7	1.2E-10	5.3
Sector 1B	2.7E-09	5.2	6.1E-07	4.0	6.4E-11	3.5	2.2E-10	11.7	4.2E-11	5.6
Sector 2A	1.8E-09	5.3	4.1E-07	4.0	4.3E-11	3.5	1.5E-10	11.4	2.8E-11	5.9
Sector 2B	2.2E-10	5.0	5.1E-08	4.4	5.3E-12	3.6	1.8E-11	10.6	3.5E-12	5.4
Sector 3A	1.6E-10	5.3	3.7E-08	3.9	3.9E-12	3.5	1.3E-11	11.2	2.6E-12	5.4
Sector 3B	2.4E-09	4.9	5.6E-07	3.9	5.8E-11	3.5	2.0E-10	10.7	3.9E-11	5.6
Sector 4A	8.1E-09	4.7	1.9E-06	4.4	1.9E-10	3.5	6.5E-10	12.0	1.3E-10	5.3
Sector 4B	1.2E-07	4.6	2.7E-05	4.1	2.8E-09	3.6	9.4E-09	10.7	1.8E-09	5.7
Sector 5A	2.7E-09	5.0	6.1E-07	3.8	6.4E-11	3.6	2.2E-10	11.5	4.2E-11	5.8
Sector 5B	9.2E-10	4.7	2.1E-07	4.3	2.2E-11	3.5	7.4E-11	10.4	1.5E-11	5.7
Sector 6A	7.5E-10	5.0	1.7E-07	4.1	1.8E-11	3.5	6.1E-11	12.4	1.2E-11	5.4
Sector 6B	8.9E-11	4.5	2.0E-08	4.3	2.1E-12	3.6	7.2E-12	9.9	1.4E-12	5.8
Sector 7A	5.9E-11	4.9	1.4E-08	4.1	1.4E-12	3.6	4.8E-12	11.5	9.3E-13	5.8
Sector 7B	1.0E-09	4.9	2.4E-07	4.1	2.5E-11	3.6	8.4E-11	10.6	1.7E-11	6.1
Sector 8A	2.3E-09	4.8	5.3E-07	4.4	5.5E-11	3.6	1.9E-10	11.7	3.6E-11	5.6
Sector 8B	3.5E-08	4.9	8.0E-06	4.1	8.4E-10	3.5	2.8E-09	11.2	5.6E-10	5.6
Sector 9A	1.0E-09	4.9	2.3E-07	4.1	2.4E-11	3.6	8.2E-11	10.9	1.6E-11	5.4
Sector 9B	3.4E-10	5.0	7.8E-08	4.2	8.1E-12	3.6	2.7E-11	10.7	5.4E-12	5.7
Sector 10A	3.1E-10	4.8	7.1E-08	4.0	7.4E-12	3.4	2.5E-11	10.2	4.9E-12	6.0
Sector 10B	2.9E-11	4.6	6.8E-09	4.2	7.1E-13	3.5	2.4E-12	11.8	4.7E-13	5.7
Sector 11A	2.9E-11	4.8	6.8E-09	4.0	7.1E-13	3.5	2.4E-12	11.3	4.6E-13	5.7
Sector 11B	4.3E-10	5.0	9.8E-08	4.3	1.0E-11	3.5	3.5E-11	10.2	6.7E-12	5.7
Sector 12A	7.8E-10	5.1	1.8E-07	4.2	1.9E-11	3.6	6.4E-11	11.1	1.2E-11	5.8
Sector 12B	1.2E-08	4.6	2.8E-06	4.2	2.9E-10	3.5	9.9E-10	12.0	2.0E-10	5.3
Denver	7.8E-10	5.4	1.8E-07	4.0	1.9E-11	3.6	6.3E-11	11.3	1.2E-11	5.6
Lakewood	3.1E-10	4.8	7.2E-08	4.3	7.5E-12	3.6	2.5E-11	11.7	4.9E-12	5.6
Longmont	5.9E-11	4.7	1.4E-08	4.2	1.4E-12	3.6	4.8E-12	10.1	9.3E-13	5.6

Note:

1) E-01 is the same as dividing the value by 10^1; E-02 is the same as dividing the value by 10^2; etc.
2) GM = Geometric Mean
3) Geometric Standard Deviation
4) Sv = Sievert; Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Plutonium-239/240 After the 903 Pad Release (continued)

Location	Beef Ingestion GM (Sv/year)	GSD	Inhalation of Resuspended Particulates GM (Sv/year)	GSD	Immersion in Resuspended Particulates GM (Sv/year)	GSD	Total Dose GM (Sv/year)	GSD
Sector 1A	1.6E-10	4.1	1.2E-08	4.8	1.2E-18	4.9	1.8E-06	4.0
Sector 1B	6.0E-11	4.1	4.5E-09	5.0	4.4E-19	4.9	6.6E-07	3.8
Sector 2A	3.9E-11	4.2	3.1E-09	4.7	3.0E-19	4.7	4.4E-07	3.8
Sector 2B	4.7E-12	3.9	3.8E-10	4.7	3.6E-20	4.8	5.5E-08	4.0
Sector 3A	3.5E-12	4.2	2.8E-10	4.7	2.7E-20	4.9	4.0E-08	3.6
Sector 3B	5.2E-11	4.1	4.1E-09	4.7	4.0E-19	4.9	6.0E-07	3.6
Sector 4A	1.7E-10	4.0	1.4E-08	5.0	1.3E-18	4.9	2.0E-06	4.0
Sector 4B	2.6E-09	4.4	2.0E-07	4.7	1.9E-17	4.8	2.9E-05	3.8
Sector 5A	5.9E-11	4.0	4.5E-09	4.7	4.4E-19	4.6	6.6E-07	3.5
Sector 5B	2.0E-11	4.2	1.6E-09	4.8	1.5E-19	4.9	2.3E-07	4.0
Sector 6A	1.6E-11	4.0	1.3E-09	4.8	1.2E-19	4.8	1.9E-07	3.7
Sector 6B	1.9E-12	4.1	1.5E-10	4.8	1.5E-20	4.8	2.2E-08	4.0
Sector 7A	1.3E-12	4.1	1.0E-10	5.3	9.7E-21	5.1	1.5E-08	3.8
Sector 7B	2.3E-11	4.4	1.8E-09	4.5	1.7E-19	4.4	2.6E-07	3.7
Sector 8A	5.0E-11	4.4	3.9E-09	5.0	3.8E-19	5.0	5.7E-07	4.1
Sector 8B	7.6E-10	4.3	6.0E-08	5.0	5.8E-18	4.9	8.6E-06	3.8
Sector 9A	2.2E-11	4.1	1.7E-09	4.9	1.7E-19	5.1	2.5E-07	3.8
Sector 9B	7.2E-12	4.5	5.8E-10	4.7	5.6E-20	4.9	8.4E-08	3.9
Sector 10A	6.9E-12	4.1	5.3E-10	4.8	5.1E-20	4.8	7.6E-08	3.8
Sector 10B	6.5E-13	4.2	5.0E-11	5.1	4.8E-21	5.1	7.4E-09	3.8
Sector 11A	6.3E-13	3.9	5.0E-11	4.5	4.8E-21	4.6	7.3E-09	3.8
Sector 11B	9.1E-12	4.1	7.3E-10	5.0	7.0E-20	4.9	1.1E-07	3.9
Sector 12A	1.7E-11	4.1	1.3E-09	4.7	1.3E-19	4.9	1.9E-07	3.8
Sector 12B	2.6E-10	4.1	2.1E-08	4.9	2.0E-18	5.1	3.0E-06	3.8
Denver	1.7E-11	4.1	1.3E-09	4.6	1.3E-19	4.6	1.9E-07	3.7
Lakewood	6.7E-12	4.1	5.3E-10	5.2	5.1E-20	5.3	7.8E-08	3.9
Longmont	1.3E-12	4.0	1.0E-10	4.7	9.7E-21	4.7	1.5E-08	3.9

Note:

1) E-01 is the same as dividing the value by 10^1; E-02 is the same as dividing the value by 10^2; etc.
2) GM = Geometric Mean
3) Geometric Standard Deviation
4) Sv = Sievert; Sv = 100 rem

Pathway-Specific Doses Associated with Americium-241 Released During the 903 Pad

Location	Inhalation GM (Sv)	Inhalation GSD	Immersion GM (Sv)	Immersion GSD	Soil Ingestion GM (Sv)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv)	Vegetable Ingestion GSD	Ground Exposure GM (Sv)	Ground Exposure GSD	Wheat Ingestion GM (Sv)	Wheat Ingestion GSD
Sector 1A	6.1E-07	3.5	1.0E-14	3.5	1.8E-09	4.8	4.3E-07	4.0	2.3E-09	3.5	8.3E-10	5.0
Sector 1B	2.5E-07	3.6	4.1E-15	3.5	6.6E-10	4.9	1.5E-07	4.0	8.3E-10	3.5	3.0E-10	5.1
Sector 2A	1.7E-07	3.5	2.8E-15	3.6	4.5E-10	4.9	1.0E-07	4.0	5.6E-10	3.5	2.0E-10	4.9
Sector 2B	2.8E-08	3.6	4.6E-16	3.6	5.5E-11	5.0	1.3E-08	4.3	6.9E-11	3.5	2.5E-11	4.6
Sector 3A	2.0E-08	3.5	3.3E-16	3.5	4.0E-11	5.1	9.4E-09	4.1	5.0E-11	3.5	1.8E-11	5.1
Sector 3B	2.0E-07	3.5	3.3E-15	3.6	6.0E-10	5.2	1.4E-07	4.0	7.6E-10	3.4	2.8E-10	4.7
Sector 4A	6.4E-07	3.5	1.1E-14	3.7	2.0E-09	5.0	4.7E-07	4.2	2.5E-09	3.4	9.1E-10	5.0
Sector 4B	6.4E-06	3.4	1.1E-13	3.5	2.9E-08	4.9	6.7E-06	4.1	3.6E-08	3.5	1.3E-08	4.9
Sector 5A	2.7E-07	3.5	4.5E-15	3.5	6.7E-10	4.7	1.5E-07	4.0	8.3E-10	3.4	3.0E-10	4.7
Sector 5B	1.0E-07	3.5	1.7E-15	3.5	2.3E-10	4.7	5.3E-08	4.1	2.9E-10	3.4	1.0E-10	5.0
Sector 6A	8.2E-08	3.5	1.4E-15	3.5	1.9E-10	4.9	4.3E-08	4.2	2.3E-10	3.5	8.5E-11	5.1
Sector 6B	1.3E-08	3.5	2.1E-16	3.5	2.2E-11	4.7	5.1E-09	4.1	2.8E-11	3.4	1.0E-11	5.1
Sector 7A	9.3E-09	3.5	1.5E-16	3.5	1.5E-11	4.9	3.4E-09	4.4	1.8E-11	3.4	6.7E-12	5.3
Sector 7B	1.0E-07	3.6	1.7E-15	3.6	2.6E-10	4.7	5.9E-08	4.1	3.2E-10	3.4	1.2E-10	5.1
Sector 8A	2.4E-07	3.6	4.0E-15	3.6	5.7E-10	4.8	1.3E-07	4.0	7.2E-10	3.5	2.6E-10	5.1
Sector 8B	2.4E-06	3.5	4.0E-14	3.5	8.6E-09	5.0	2.0E-06	4.2	1.1E-08	3.4	3.9E-09	5.1
Sector 9A	1.3E-07	3.5	2.1E-15	3.5	2.5E-10	4.8	5.8E-08	4.0	3.2E-10	3.5	1.1E-10	4.9
Sector 9B	4.8E-08	3.5	8.0E-16	3.5	8.5E-11	4.9	2.0E-08	4.1	1.1E-10	3.3	3.8E-11	5.1
Sector 10A	4.2E-08	3.4	6.9E-16	3.5	7.7E-11	4.6	1.8E-08	3.9	9.7E-11	3.4	3.5E-11	4.9
Sector 10B	6.1E-09	3.5	1.0E-16	3.4	7.4E-12	5.2	1.7E-09	4.2	9.2E-12	3.5	3.3E-12	4.7
Sector 11A	4.5E-09	3.4	7.4E-17	3.5	7.3E-12	5.0	1.7E-09	4.2	9.2E-12	3.5	3.3E-12	4.9
Sector 11B	5.1E-08	3.4	8.5E-16	3.5	1.1E-10	5.0	2.5E-08	4.1	1.3E-10	3.5	4.9E-11	5.0
Sector 12A	1.0E-07	3.5	1.7E-15	3.6	1.9E-10	4.8	4.5E-08	4.1	2.4E-10	3.4	8.8E-11	5.1
Sector 12B	1.0E-06	3.5	1.7E-14	3.5	3.0E-09	4.7	7.0E-07	4.4	3.8E-09	3.4	1.4E-09	5.4
Denver	1.1E-07	3.5	1.8E-15	3.5	1.9E-10	4.8	4.5E-08	4.1	2.4E-10	3.5	8.8E-11	4.8
Lakewood	5.1E-08	3.5	8.5E-16	3.5	7.7E-11	4.8	1.8E-08	4.3	9.7E-11	3.4	3.5E-11	4.7
Longmont	1.2E-08	3.4	2.0E-16	3.5	1.5E-11	4.9	3.4E-09	3.9	1.8E-11	3.4	6.6E-12	4.8

NOTES:
1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Americium-241 Released During the 903 Pad (continued)

Location	Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv)	GSD	GM (Sv)	GSD	GM (Sv)	GSD	GM (Sv)	GSD	GM (Sv)	GSD
Sector 1A	1.2E-10	5.7	1.6E-10	4.3	3.7E-09	4.8	6.1E-17	4.8	1.5E-06	2.8
Sector 1B	4.3E-11	5.7	6.0E-11	4.2	1.3E-09	4.8	2.2E-17	4.8	5.6E-07	2.8
Sector 2A	2.8E-11	5.2	4.0E-11	4.0	9.0E-10	4.9	1.5E-17	5.0	3.8E-07	2.7
Sector 2B	3.5E-12	5.7	5.0E-12	4.3	1.1E-10	4.7	1.8E-18	4.7	5.7E-08	2.8
Sector 3A	2.6E-12	5.1	3.5E-12	4.1	8.0E-11	4.9	1.3E-18	4.9	4.2E-08	2.7
Sector 3B	3.9E-11	5.3	5.3E-11	4.1	1.2E-09	4.6	2.0E-17	4.6	4.9E-07	2.7
Sector 4A	1.3E-10	5.7	1.8E-10	4.2	4.0E-09	5.1	6.6E-17	5.0	1.6E-06	2.7
Sector 4B	1.9E-09	6.0	2.7E-09	4.3	5.8E-08	4.7	9.6E-16	4.7	1.9E-05	2.7
Sector 5A	4.3E-11	5.5	6.1E-11	4.2	1.3E-09	4.8	2.2E-17	4.7	6.0E-07	2.7
Sector 5B	1.5E-11	5.5	2.0E-11	3.9	4.5E-10	4.8	7.5E-18	4.9	2.2E-07	2.7
Sector 6A	1.2E-11	6.0	1.7E-11	4.4	3.7E-10	4.6	6.2E-18	4.6	1.8E-07	2.8
Sector 6B	1.4E-12	5.4	2.0E-12	4.0	4.4E-11	4.5	7.3E-19	4.5	2.5E-08	2.7
Sector 7A	9.4E-13	6.0	1.4E-12	4.5	2.9E-11	5.1	4.9E-19	5.1	1.8E-08	2.8
Sector 7B	1.6E-11	5.8	2.3E-11	3.9	5.1E-10	4.8	8.5E-18	4.9	2.3E-07	2.7
Sector 8A	3.7E-11	6.1	5.2E-11	4.4	1.1E-09	4.7	1.9E-17	4.7	5.3E-07	2.7
Sector 8B	5.5E-10	5.6	7.6E-10	4.2	1.7E-08	4.9	2.9E-16	4.7	6.4E-06	2.9
Sector 9A	1.6E-11	5.8	2.4E-11	3.9	5.0E-10	4.9	8.4E-18	4.9	2.6E-07	2.7
Sector 9B	5.4E-12	5.9	7.4E-12	4.4	1.7E-10	4.8	2.8E-18	4.9	9.2E-08	2.7
Sector 10A	4.9E-12	6.0	6.7E-12	4.8	1.5E-10	4.8	2.6E-18	4.7	8.2E-08	2.6
Sector 10B	4.7E-13	5.6	6.6E-13	4.0	1.5E-11	4.8	2.4E-19	5.0	1.0E-08	2.8
Sector 11A	4.6E-13	5.5	6.4E-13	3.9	1.5E-11	4.9	2.4E-19	4.9	8.4E-09	2.7
Sector 11B	6.8E-12	5.2	9.4E-12	4.2	2.1E-10	4.9	3.6E-18	5.0	1.1E-07	2.7
Sector 12A	1.2E-11	5.9	1.7E-11	4.3	3.9E-10	4.7	6.4E-18	4.7	2.1E-07	2.8
Sector 12B	1.9E-10	5.3	2.7E-10	4.0	6.1E-09	4.8	1.0E-16	4.7	2.6E-06	2.7
Denver	1.2E-11	5.5	1.8E-11	4.1	3.9E-10	4.8	6.5E-18	4.7	2.1E-07	2.7
Lakewood	4.9E-12	5.6	7.0E-12	4.3	1.5E-10	5.1	2.6E-18	5.1	9.4E-08	2.9
Longmont	9.3E-13	5.9	1.3E-12	4.4	2.9E-11	4.8	4.9E-19	4.8	2.1E-08	2.7

NOTES:

1) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 1A
(1970-1989)

Year	Soil Ingestion GM (Sv/year)	GSD	Vegetable Ingestion GM (Sv/year)	GSD	Ground Exposure GM (Sv/year)	GSD	Wheat Ingestion GM (Sv/year)	GSD	Milk Ingestion GM (Sv/year)	GSD	Beef Ingestion GM (Sv/year)	GSD	Inhalation of Resuspended Particulates GM (Sv/year)	GSD	Immersion in Resuspended Particulates GM (Sv/year)	GSD	Total Dose GM (Sv/year)	GSD
1970	1.9E-09	4.7	4.4E-07	4.1	2.3E-09	3.5	8.5E-10	5.1	1.2E-10	5.4	1.6E-10	4.2	3.7E-09	4.7	6.2E-17	4.6	4.8E-07	3.7
1971	1.9E-09	5.2	4.4E-07	4.1	2.4E-09	3.4	8.6E-10	5.1	1.2E-10	5.7	1.7E-10	4.2	3.8E-09	4.9	6.3E-17	4.9	5.0E-07	3.7
1972	2.0E-09	4.9	4.5E-07	4.1	2.4E-09	3.5	8.8E-10	4.9	1.2E-10	5.9	1.7E-10	4.3	3.9E-09	4.7	6.5E-17	4.9	5.0E-07	3.6
1973	2.0E-09	5.2	4.6E-07	4.2	2.5E-09	3.5	9.0E-10	5.2	1.3E-10	6.0	1.8E-10	4.0	4.0E-09	4.5	6.6E-17	4.6	5.1E-07	3.8
1974	2.0E-09	5.2	4.7E-07	4.2	2.5E-09	3.5	9.1E-10	4.9	1.3E-10	5.8	1.8E-10	4.3	4.0E-09	4.9	6.7E-17	4.9	5.2E-07	3.8
1975	2.0E-09	5.3	4.7E-07	4.0	2.5E-09	3.6	9.2E-10	5.0	1.3E-10	5.9	1.8E-10	4.2	4.1E-09	4.9	6.8E-17	4.9	5.3E-07	3.6
1976	2.1E-09	4.7	4.8E-07	4.4	2.6E-09	3.5	9.4E-10	4.6	1.3E-10	6.0	1.9E-10	4.5	4.1E-09	5.0	6.9E-17	4.9	5.4E-07	3.8
1977	2.1E-09	4.9	4.9E-07	4.1	2.6E-09	3.5	9.5E-10	5.2	1.3E-10	5.3	1.9E-10	3.9	4.2E-09	4.9	7.0E-17	5.0	5.5E-07	3.6
1978	2.1E-09	5.0	4.9E-07	4.1	2.7E-09	3.4	9.6E-10	5.1	1.3E-10	5.4	2.0E-10	4.4	4.3E-09	4.9	7.1E-17	4.9	5.5E-07	3.7
1979	2.1E-09	4.9	5.0E-07	4.1	2.7E-09	3.5	9.7E-10	5.2	1.4E-10	5.5	1.9E-10	4.2	4.3E-09	4.9	7.1E-17	5.0	5.6E-07	3.7
1980	2.2E-09	4.8	5.0E-07	3.9	2.7E-09	3.6	9.9E-10	4.8	1.4E-10	5.7	2.0E-10	4.4	4.4E-09	4.6	7.3E-17	4.6	5.6E-07	3.5
1981	2.2E-09	4.7	5.1E-07	4.2	2.7E-09	3.4	1.0E-09	5.0	1.4E-10	5.3	2.0E-10	4.0	4.4E-09	4.7	7.3E-17	4.8	5.7E-07	3.8
1982	2.2E-09	5.1	5.2E-07	4.3	2.8E-09	3.4	1.0E-09	4.9	1.4E-10	5.4	2.0E-10	4.3	4.5E-09	4.7	7.4E-17	4.8	5.8E-07	3.8
1983	2.2E-09	4.7	5.2E-07	3.9	2.8E-09	3.4	1.0E-09	4.7	1.4E-10	5.4	2.0E-10	4.2	4.5E-09	5.1	7.5E-17	5.1	5.8E-07	3.6
1984	2.3E-09	4.8	5.2E-07	3.9	2.8E-09	3.4	1.0E-09	4.9	1.4E-10	5.8	2.0E-10	4.3	4.5E-09	5.2	7.5E-17	5.2	5.8E-07	3.5
1985	2.3E-09	4.8	5.3E-07	4.0	2.9E-09	3.4	1.0E-09	5.0	1.5E-10	5.7	2.0E-10	4.3	4.6E-09	4.9	7.6E-17	4.9	5.9E-07	3.6
1986	2.3E-09	4.9	5.3E-07	4.3	2.9E-09	3.4	1.0E-09	5.2	1.5E-10	5.9	2.1E-10	4.2	4.6E-09	4.8	7.7E-17	4.9	6.0E-07	3.9
1987	2.3E-09	4.7	5.4E-07	4.2	2.9E-09	3.4	1.1E-09	4.5	1.5E-10	6.0	2.1E-10	4.5	4.7E-09	5.0	7.7E-17	4.9	6.0E-07	3.8
1988	2.3E-09	5.0	5.4E-07	4.2	2.9E-09	3.6	1.1E-09	4.7	1.5E-10	5.9	2.1E-10	4.0	4.7E-09	5.0	7.8E-17	4.9	6.1E-07	3.8
1989	2.3E-09	4.7	5.5E-07	4.3	3.0E-09	3.4	1.1E-09	4.8	1.5E-10	5.7	2.2E-10	4.0	4.7E-09	5.0	7.8E-17	5.1	6.1E-07	3.9

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 1B
(1970-1989)

Year	Soil Ingestion		Vegetable Ingestion		Ground Exposure		Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1970	6.8E-10	5.0	1.6E-07	4.1	8.5E-10	3.6	3.1E-10	4.2	4.3E-11	5.2	6.1E-11	4.1	1.4E-09	5.0	2.2E-17	5.0	1.8E-07	3.7
1971	6.9E-10	4.8	1.6E-07	4.1	8.6E-10	3.5	3.1E-10	4.8	4.4E-11	5.6	6.2E-11	4.2	1.4E-09	4.8	2.3E-17	4.9	1.8E-07	3.7
1972	7.1E-10	4.9	1.6E-07	4.1	8.9E-10	3.4	3.2E-10	4.8	4.5E-11	5.8	6.1E-11	4.4	1.4E-09	4.6	2.4E-17	5.0	1.8E-07	3.7
1973	7.2E-10	5.0	1.7E-07	4.0	9.0E-10	3.5	3.2E-10	4.8	4.6E-11	5.5	6.6E-11	4.2	1.4E-09	4.9	2.4E-17	4.9	1.8E-07	3.6
1974	7.3E-10	5.0	1.7E-07	4.1	9.2E-10	3.5	3.3E-10	4.8	4.6E-11	5.6	6.6E-11	4.0	1.5E-09	4.7	2.4E-17	4.7	1.9E-07	3.6
1975	7.4E-10	5.0	1.7E-07	4.4	9.3E-10	3 5	3.4E-10	4.8	4.7E-11	5.6	6.5E-11	4.5	1.5E-09	5.0	2.5E-17	5.1	1.9E-07	3.9
1976	7.5E-10	5.0	1.7E-07	4.2	9.3E-10	3.4	3.4E-10	5.0	4.9E-11	5.3	6.6E-11	4.1	1.5E-09	4.8	2.5E-17	4.7	2.0E-07	3.7
1977	7.6E-10	5.1	1.8E-07	4.1	9.6E-10	3.5	3.4E-10	5.2	4.9E-11	5.6	6.8E-11	4.0	1.5E-09	4.9	2.5E-17	4.8	2.0E-07	3.7
1978	7.7E-10	4.9	1.8E-07	4.3	9.7E-10	3.5	3.5E-10	4.7	4.9E-11	5.5	6.8E-11	4.2	1.5E-09	4.8	2.6E-17	4.9	2.0E-07	3.9
1979	7.8E-10	4.6	1.8E-07	4.2	9.8E-10	3.4	3.6E-10	4.9	5.0E-11	4.9	6.9E-11	3.9	1.6E-09	5.1	2.6E-17	5.1	2.0E-07	3.8
1980	7.9E-10	5.0	1.8E-07	4.2	9.9E-10	3.6	3.6E-10	5 0	5.1E-11	5.7	7.1E-11	3.9	1.6E-09	5.0	2.6E-17	5.1	2.1E-07	3.7
1981	8.0E-10	5.1	1.9E-07	4.1	1.0E-09	3.4	3.6E-10	4.8	5.1E-11	6.0	7.2E-11	4.2	1.6E-09	5.0	2.6E-17	4.9	2.1E-07	3.6
1982	8 0E-10	4.8	1.9E-07	4.1	1.0E-09	3.3	3 6E-10	4.8	5.2E-11	6.1	7.1E-11	4.3	1.6E-09	5.0	2.7E-17	5.1	2.1E-07	3.7
1983	8.1E-10	4.7	1.9E-07	4.3	1.0E-09	3.4	3.7E-10	4.9	5.2E-11	6.2	7.4E-11	4.5	1.6E-09	4.4	2.7E-17	4.6	2.1E-07	3.8
1984	8 2E-10	4.9	1.9E-07	4.0	1.0E-09	3.5	3.7E-10	4.7	5 2E-11	6.2	7.6E-11	4.3	1.6E-09	5.0	2.7E-17	5.1	2.1E-07	3.7
1985	8.3E-10	4.9	1.9E-07	4.2	1.0E-09	3.4	3 7E-10	4.9	5.3E-11	5.5	7.7E-11	4.0	1.7E-09	4.6	2.8E-17	4.6	2.2E-07	3.7
1986	8.4E-10	4.8	1.9E-07	4.3	1.0E-09	3.4	3.8E-10	4.9	5.3E-11	5.7	7.4E-11	4.2	1.7E-09	5.4	2.8E-17	5.3	2.2E-07	3.8
1987	8.4E-10	4.9	1.9E-07	4.2	1.1E-09	3.5	3.8E-10	4.9	5.3E-11	5.9	7.4E-11	4.1	1.7E-09	4.8	2.8E-17	4.9	2.2E-07	3.9
1988	8.5E-10	4.8	2.0E-07	4.3	1.1E-09	3.5	3.8E-10	5.0	5.5E-11	5.6	7.6E-11	4.2	1.7E-09	5.0	2.8E-17	5.1	2.2E-07	3.8
1989	8.5E-10	5.0	2.0E-07	4.2	1.1E-09	3.5	3.9E-10	4.8	5.4E-11	5.8	7.5E-11	4.2	1.7E-09	4.7	2.8E-17	4.8	2.2E-07	3.8

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert, 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 2A
(1970-1989)

Year	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1970	4.5E-10	4.8	1.1E-07	4.0	5.7E-10	3.5	2.1E-10	4.9	2.9E-11	5.4	4.1E-11	4.2	9.1E-10	4.6	1.5E-17	4.5	1.2E-07	3.6
1971	4.6E-10	4.8	1.1E-07	4.2	5.8E-10	3.5	2.1E-10	4.8	3.0E-11	5.2	4.2E-11	4.1	9.3E-10	4.5	1.5E-17	4.5	1.2E-07	3.7
1972	4.8E-10	5.1	1.1E-07	4.2	6.0E-10	3.5	2.2E-10	5.0	3.0E-11	5.7	4.3E-11	4.2	9.6E-10	4.8	1.6E-17	4.7	1.2E-07	3.8
1973	4.8E-10	4.8	1.1E-07	4.0	6.1E-10	3.4	2.2E-10	4.9	3.1E-11	5.5	4.4E-11	4.1	9.7E-10	4.7	1.6E-17	4.9	1.3E-07	3.5
1974	4.9E-10	4.4	1.1E-07	4.3	6.1E-10	3.4	2.2E-10	4.9	3.1E-11	5.2	4.5E-11	4.3	9.9E-10	4.7	1.6E-17	4.7	1.3E-07	3.9
1975	5.0E-10	5.1	1.2E-07	4.2	6.3E-10	3.6	2.3E-10	4.8	3.2E-11	5.5	4.5E-11	4.5	1.0E-09	4.8	1.7E-17	4.9	1.3E-07	3.8
1976	5.0E-10	4.7	1.2E-07	4.3	6.3E-10	3.4	2.3E-10	4.8	3.2E-11	6.1	4.8E-11	4.0	1.0E-09	5.1	1.7E-17	5.3	1.3E-07	3.8
1977	5.1E-10	5.0	1.2E-07	4.1	6.4E-10	3.6	2.3E-10	4.8	3.3E-11	6.0	4.6E-11	4.5	1.0E-09	4.9	1.7E-17	5.0	1.3E-07	3.7
1978	5.2E-10	5.0	1.2E-07	4.3	6.6E-10	3.5	2.4E-10	4.9	3.3E-11	5.9	4.8E-11	4.3	1.0E-09	5.0	1.7E-17	4.8	1.4E-07	3.8
1979	5.2E-10	5.1	1.2E-07	4.1	6.6E-10	3.5	2.4E-10	5.1	3.4E-11	5.8	4.8E-11	4.5	1.1E-09	5.2	1.7E-17	5.1	1.4E-07	3.7
1980	5.3E-10	4.7	1.2E-07	4.1	6.7E-10	3.6	2.4E-10	4.7	3.4E-11	5.8	4.8E-11	4.2	1.1E-09	4.9	1.8E-17	4.9	1.4E-07	3.7
1981	5.4E-10	4.8	1.2E-07	4.1	6.7E-10	3.6	2.4E-10	4.8	3.4E-11	5.5	4.7E-11	4.4	1.1E-09	5.0	1.8E-17	5.1	1.4E-07	3.8
1982	5.4E-10	5.3	1.3E-07	4.3	6.8E-10	3.5	2.5E-10	5.1	3.5E-11	5.8	5.0E-11	4.0	1.1E-09	4.6	1.8E-17	4.5	1.4E-07	3.8
1983	5.5E-10	4.8	1.3E-07	3.9	6.9E-10	3.5	2.5E-10	5.1	3.5E-11	5.7	4.9E-11	4.3	1.1E-09	4.9	1.8E-17	4.9	1.4E-07	3.5
1984	5.5E-10	4.7	1.3E-07	4.2	7.0E-10	3.4	2.5E-10	5.2	3.6E-11	5.9	5.1E-11	4.0	1.1E-09	5.0	1.8E-17	4.9	1.4E-07	3.8
1985	5.6E-10	5.0	1.3E-07	4.2	6.9E-10	3.4	2.5E-10	4.8	3.6E-11	5.4	5.0E-11	4.1	1.1E-09	4.9	1.9E-17	5.0	1.4E-07	3.8
1986	5.7E-10	4.6	1.3E-07	4.1	7.1E-10	3.5	2.5E-10	4.8	3.6E-11	5.8	5.0E-11	4.2	1.1E-09	4.8	1.9E-17	4.7	1.5E-07	3.7
1987	5.7E-10	5.3	1.3E-07	4.0	7.1E-10	3.5	2.6E-10	4.8	3.6E-11	5.8	5.1E-11	4.3	1.1E-09	4.7	1.9E-17	4.8	1.5E-07	3.6
1988	5.7E-10	4.7	1.3E-07	4.3	7.1E-10	3.5	2.6E-10	5.1	3.7E-11	5.2	5.1E-11	3.8	1.1E-09	4.9	1.9E-17	4.9	1.5E-07	3.8
1989	5.7E-10	4.7	1.3E-07	4.1	7.2E-10	3.6	2.6E-10	4.5	3.7E-11	5.8	5.0E-11	4.1	1.2E-09	4.8	1.9E-17	5.0	1.5E-07	3.8

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 2B
(1970-1989)

Year	Soil Ingestion		Vegetable Ingestion		Ground Exposure		Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1970	5.6E-11	4.9	1.3E-08	4.0	7.0E-11	3.5	2.5E-11	5.1	3.6E-12	5.4	5.1E-12	4.3	1.1E-10	5.1	1.9E-18	5.1	1.5E-08	3.6
1971	5.7E-11	4.8	1.3E-08	4.4	7.2E-11	3.5	2.6E-11	4.6	3.7E-12	5.5	4.9E-12	4.3	1.1E-10	4.7	1.9E-18	4.7	1.5E-08	4.0
1972	5.8E-11	5.1	1.4E-08	4.0	7.4E-11	3.4	2.6E-11	5.2	3.7E-12	5.7	5.1E-12	4.0	1.2E-10	5.0	1.9E-18	5.1	1.5E-08	3.6
1973	5.9E-11	4.9	1.4E-08	4.0	7.5E-11	3.5	2.7E-11	4.6	3.8E-12	5.7	5.3E-12	4.1	1.2E-10	4.9	2.0E-18	4.8	1.5E-08	3.6
1974	6.0E-11	4.8	1.4E-08	4.3	7.6E-11	3.5	2.7E-11	5.0	3.8E-12	5.8	5.5E-12	4.3	1.2E-10	5.0	2.0E-18	4.9	1.6E-08	3.9
1975	6.1E-11	4.7	1.4E-08	4.0	7.7E-11	3.5	2.8E-11	4.8	3.9E-12	5.7	5.5E-12	4.1	1.2E-10	4.7	2.0E-18	4.8	1.6E-08	3.7
1976	6.2E-11	4.8	1.4E-08	4.2	7.8E-11	3.5	2.8E-11	5.0	4.0E-12	5.3	5.7E-12	4.3	1.2E-10	4.8	2.1E-18	4.7	1.6E-08	3.7
1977	6.3E-11	4.7	1.5E-08	4.0	7.9E-11	3.5	2.9E-11	5.3	4.0E-12	5.7	5.6E-12	4.4	1.3E-10	4.4	2.1E-18	4.4	1.6E-08	3.7
1978	6.4E-11	4.7	1.5E-08	3.9	8.1E-11	3.4	2.9E-11	4.7	4.1E-12	5.5	5.7E-12	4.2	1.3E-10	4.7	2.1E-18	4.8	1.6E-08	3.5
1979	6.5E-11	5.1	1.5E-08	4.2	8.1E-11	3.5	2.9E-11	4.9	4.1E-12	5.2	5.6E-12	3.8	1.3E-10	5.5	2.2E-18	5.3	1.7E-08	3.7
1980	6.5E-11	5.2	1.5E-08	4.3	8.2E-11	3.5	3.0E-11	5.0	4.2E-12	5.6	6.0E-12	4.4	1.3E-10	4.5	2.2E-18	4.5	1.7E-08	3 8
1981	6.6E-11	5.0	1.5E-08	4.1	8.3E-11	3.5	3.0E-11	5.0	4.2E-12	5.6	5.8E-12	4.1	1.3E-10	5.0	2.2E-18	5.0	1.7E-08	3.7
1982	6.6E-11	4.7	1.6E-08	4.2	8.3E-11	3.4	3.0E-11	5.2	4.3E-12	5.5	5.9E-12	4.0	1.3E-10	4.8	2.2E-18	4.7	1.7E-08	3.7
1983	6.8E-11	4.6	1.6E-08	4.3	8.4E-11	3.4	3.1E-11	5.0	4.3E-12	5.5	6.0E-12	4.1	1.4E-10	4.6	2.2E-18	4.7	1.7E-08	3.8
1984	6.8E-11	4.6	1.6E-08	4.3	8.6E-11	3.5	3.1E-11	5.1	4.3E-12	6.0	6.1E-12	4.5	1.4E-10	4.7	2.3E-18	4.7	1.8E-08	3.9
1985	6.8E-11	5.2	1.6E-08	4.3	8.6E-11	3.5	3.1E-11	4.9	4.4E-12	5.4	6.3E-12	4.2	1.4E-10	4.8	2.3E-18	5.0	1.8E-08	3.8
1986	6.9E-11	4.9	1.6E-08	4.1	8.6E-11	3.6	3.1E-11	4.7	4.4E-12	5.7	6.4E-12	4.5	1.4E-10	4.4	2.3E-18	4.5	1.8E-08	3.8
1987	7.0E-11	4.7	1.6E-08	4.2	8.8E-11	3.5	3.2E-11	4.6	4.4E-12	5.7	6.2E-12	4.0	1.4E-10	4.9	2.3E-18	4.9	1.8E-08	3.8
1988	7.0E-11	5.0	1.6E-08	3.9	8 8E-11	3.5	3.2E-11	5.0	4.5E-12	5.7	6.3E-12	4.3	1.4E-10	4.7	2.3E-18	4.9	1.8E-08	3.6
1989	7.1E-11	5.0	1.6E-08	4.1	8.9E-11	3.5	3.2E-11	5.1	4.5E-12	5.7	6.4E-12	4.2	1.4E-10	4.8	2.4E-18	4.9	1.8E-08	3.7

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 3A
(1970-1989)

Year	Soil Ingestion		Vegetable Ingestion		Ground Exposure		Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1970	4.1E-11	4.8	9.6E-09	4.3	5.2E-11	3.6	1.9E-11	4.8	2.6E-12	5.6	3 6E-12	4.2	8.2E-11	4.8	1.4E-18	4.8	1.1E-08	3.8
1971	4.2E-11	5.0	9.7E-09	4.1	5.3E-11	3.5	1.9E-11	4 6	2.7E-12	6.5	3.7E-12	4.5	8.4E-11	5.1	1.4E-18	5.1	1.1E-08	3.7
1972	4.3E-11	4.6	1.0E-08	4.0	5.4E-11	3.4	1.9E-11	5.2	2.7E-12	5.7	3.8E-12	4.4	8.6E-11	4.7	1.4E-18	4.8	1.1E-08	3.6
1973	4.4E-11	4.4	1.0E-08	4.0	5.5E-11	3.6	2.0E-11	4 7	2.8E-12	5.4	3.8E-12	4.4	8.8E-11	4.7	1.5E-18	4.7	1.1E-08	3.6
1974	4.4E-11	4.7	1.0E-08	4.1	5.6E-11	3.4	2.0E-11	4.6	2.8E-12	5.6	3.9E-12	4.5	8.8E-11	4.9	1.5E-18	4.8	1.1E-08	3.7
1975	4.5E-11	4.7	1.0E-08	4.1	5.6E-11	3.5	2.0E-11	4.9	2.9E-12	6.2	4.0E-12	3 9	9.0E-11	5.0	1.5E-18	4.9	1.2E-08	3.6
1976	4.5E-11	4.8	1.1E-08	4.2	5.7E-11	3.5	2.1E-11	4.7	2.9E-12	5.5	4.1E-12	4.0	9.1E-11	4.8	1.5E-18	4.8	1.2E-08	3.8
1977	4.6E-11	4.9	1.1E-08	4.1	5.8E-11	3.5	2.1E-11	4 9	3.0E-12	5.7	4.2E-12	4.3	9.3E-11	4.9	1.5E-18	5.2	1.2E-08	3.8
1978	4.7E-11	5.0	1.1E-08	4.4	5.9E-11	3.5	2.1E-11	5.1	3.0E-12	5.8	4.2E-12	4.5	9.4E-11	4.9	1.6E-18	4.9	1.2E-08	3.9
1979	4.7E-11	4.7	1.1E-08	4.3	5.9E-11	3.5	2.2E-11	4.9	3.0E-12	5.3	4.2E-12	4.1	9.5E-11	5.0	1.6E-18	5.0	1.2E-08	3.8
1980	4.8E-11	5.1	1.1E-08	4.2	6.0E-11	3.6	2 2E-11	4.9	3.1E-12	5.4	4.4E-12	4.2	9.7E-11	4.6	1.6E-18	4.7	1.2E-08	3.7
1981	4.8E-11	5.1	1.1E-08	3.9	6.1E-11	3.4	2.2E-11	5.0	3.1E-12	5.8	4.3E-12	4.1	9 7E-11	4.6	1.6E-18	4.7	1.2E-08	3.6
1982	4.9E-11	5.2	1.1E-08	4.1	6.1E-11	3.5	2.2E-11	4.6	3.2E-12	5.4	4.3E-12	4.1	9.8E-11	4.5	1.6E-18	4.5	1.3E-08	3.7
1983	4.9E-11	5.0	1.2E-08	4.1	6.2E-11	3.5	2.2E-11	5.0	3.2E-12	5.5	4.4E-12	4.2	9 9E-11	4.9	1.6E-18	6.0	1.3E-08	3.8
1984	5.0E-11	4.9	1.2E-08	4.4	6.3E-11	3.5	2.3E-11	4.9	3.1E-12	5.6	4.3E-12	4.2	1.0E-10	5.1	1.7E-18	5.1	1.3E-08	4 0
1985	5.0E-11	5.0	1.2E-08	4.0	6.3E-11	3.5	2.3E-11	4.9	3.2E-12	5.7	4.5E-12	4.2	1.0E-10	4.8	1.7E-18	4.9	1.3E-08	3.5
1986	5.1E-11	5.1	1.2E-08	4.0	6.4E-11	3.6	2.3E-11	4 9	3.3E-12	5.4	4.5E-12	4.2	1.0E-10	4.8	1.7E-18	4.8	1.3E-08	3.6
1987	5.1E-11	4.8	1.2E-08	4.2	6.4E-11	3.4	2.3E-11	5.1	3 2E-12	6.0	4.6E-12	4.4	1.0E-10	5.0	1.7E-18	5.0	1.3E-08	3.8
1988	5.2E-11	4.7	1.2E-08	4.2	6.5E-11	3.4	2.3E-11	5 0	3.3E-12	5 5	4.7E-12	4.3	1.0E-10	4.8	1.7E-18	4.8	1.3E-08	3.7
1989	5.2E-11	4.7	1.2E-08	4.1	6.5E-11	3.6	2.4E-11	5.1	3.3E-12	5.2	4.6E-12	4.1	1.0E-10	4.5	1.7E-18	4.6	1.3E-08	3.7

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E 01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 3B
(1970-1989)

Year	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1970	6.2E-10	5.1	1.4E-07	4.4	7.7E-10	3.5	2.8E-10	5.2	3.9E-11	5.8	5.5E-11	4.4	1.2E-09	5.2	2.0E-17	5.1	1.6E-07	3.9
1971	6.3E-10	5.1	1.5E-07	3.9	7.9E-10	3.5	2.8E-10	5.0	4.0E-11	5.9	5.5E-11	4.3	1.3E-09	4.8	2.1E-17	4.8	1.6E-07	3.5
1972	6.4E-10	4.7	1.5E-07	4.0	8.1E-10	3.5	2.9E-10	4.7	4.1E-11	5.6	5 7E-11	4.4	1.3E-09	4.7	2.1E-17	4.8	1.7E-07	3.6
1973	6.6E-10	4.4	1.5E-07	4.2	8.2E-10	3.4	3.0E-10	4.6	4.2E-11	5.5	5.8E-11	4.3	1.3E-09	5.0	2.2E-17	5.1	1.7E-07	3.7
1974	6.6E-10	4.6	1.5E-07	4.2	8.3E-10	3.5	3.0E-10	4.8	4.2E-11	6.0	5.9E-11	4.3	1.3E-09	4.8	2.2E-17	4.9	1.7E-07	3.8
1975	6.7E-10	5.1	1.6E-07	4.1	8.5E-10	3.6	3.1E-10	4.9	4.4E-11	5.8	6.0E-11	4.4	1.4E-09	4.8	2.2E-17	4.8	1.8E-07	3.7
1976	6.8E-10	5.1	1.6E-07	4.1	8.6E-10	3.5	3.1E-10	4.9	4.3E-11	5.6	6.1E-11	4.5	1.4E-09	4.8	2.3E-17	5.0	1.8E-07	3.7
1977	6.9E-10	5.1	1.6E-07	4.1	8.7E-10	3.5	3.2E-10	5.1	4.5E-11	5.7	6.3E-11	4.3	1.4E-09	4.5	2.3E-17	4.6	1.8E-07	3.7
1978	7.0E-10	4.5	1.6E-07	4.0	8.9E-10	3.5	3 2E-10	5.0	4.5E-11	5.8	6.4E-11	4.3	1.4E-09	4.9	2.3E-17	5.0	1.8E-07	3.6
1979	7.1E-10	4.9	1.7E-07	4.4	8.9E-10	3.4	3.2E-10	5.3	4.5E-11	5.6	6.4E-11	4.1	1.4E-09	4.7	2.4E-17	4.7	1.9E-07	3.8
1980	7.2E-10	5.1	1.7E-07	3.9	9.1E-10	3.6	3.3E-10	5.0	4.6E-11	5.9	6.7E-11	4.3	1.4E-09	5.3	2.4E-17	5.3	1.9E-07	3.5
1981	7.3E-10	4.7	1.7E-07	4.2	9.2E-10	3.4	3.3E-10	4.8	4.7E-11	5.8	6.5E-11	4.2	1.5E-09	5.0	2.4E-17	5.0	1.9E-07	3.7
1982	7.3E-10	4.7	1.7E-07	4.2	9.2E-10	3.6	3.3E-10	4.8	4.7E-11	5 4	6.8E-11	4.1	1.5E-09	4.9	2.4E-17	4.8	1.9E-07	3.7
1983	7.4E-10	4.8	1.7E-07	4.0	9.3E-10	3.5	3.3E-10	4 9	4.7E-11	5.8	6.8E-11	4.3	1.5E-09	4.8	2.5E-17	4.9	1.9E-07	3.6
1984	7.5E-10	5.2	1.7E-07	4.1	9.4E-10	3.5	3 4E-10	4.6	4.8E-11	5.3	6.8E-11	4.0	1.5E-09	4.5	2.5E-17	4.6	2.0E-07	3.6
1985	7.6E-10	4.7	1.7E-07	4.2	9.5E-10	3.5	3 4E-10	4 8	4.7E-11	5.2	6.6E-11	4.1	1.5E-09	4.8	2.5E-17	4.7	2.0E-07	3.8
1986	7.6E-10	5.2	1.8E-07	4.3	9.5E-10	3.5	3.5E-10	5.1	4.8E-11	5.7	7 0E-11	4.2	1.5E-09	4.6	2.5E-17	4.6	2.0E-07	3.9
1987	7.7E-10	4.9	1.8E-07	3.9	9.6E-10	3.4	3.5E-10	4.9	4.9E-11	5.5	6.9E-11	4.4	1.5E-09	5.0	2.6E-17	5.1	2.0E-07	3.5
1988	7.7E-10	4.7	1.8E-07	4 0	9.7E-10	3.5	3.5E-10	5.1	4.9E-11	5.4	6 8E-11	4.1	1.5E-09	4.9	2.6E-17	4.9	2.0E-07	3.6
1989	7.8E-10	4.8	1.8E-07	3.9	9.8E-10	3.5	3.6E-10	4.9	5.0E-11	5.8	7.2E-11	4.6	1.6E-09	4.6	2.6E-17	4.6	2.0E-07	3.5

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 4A
(1970-1989)

Year	Soil Ingestion GM (Sv/year)	GSD	Vegetable Ingestion GM (Sv/year)	GSD	Ground Exposure GM (Sv/year)	GSD	Wheat Ingestion GM (Sv/year)	GSD	Milk Ingestion GM (Sv/year)	GSD	Beef Ingestion GM (Sv/year)	GSD	Inhalation of Resuspended Particulates GM (Sv/year)	GSD	Immersion in Resuspended Particulates GM (Sv/year)	GSD	Total Dose GM (Sv/year)	GSD
1970	2.1E-09	5.0	4.8E-07	4.3	2.6E-09	3.5	9 3E-10	5.4	1.3E-10	6.1	1.8E-10	4.2	4.1E-09	4.7	6.8E-17	4.8	5.3E-07	3.8
1971	2.1E-09	5.1	4.9E-07	4.2	2.6E-09	3 4	9 4E-10	5.0	1.3E-10	5.6	1.8E-10	4.2	4.2E-09	4.7	7.0E-17	4.8	5.5E-07	3.7
1972	2.1E-09	5.3	4.9E-07	4.3	2.7E-09	3 5	9 7E-10	4 6	1.3E-10	5.7	1.9E-10	4.2	4.3E-09	4.6	7.1E-17	4.6	5.4E-07	3.9
1973	2.2E-09	4.8	5.1E-07	4.2	2.7E-09	3.5	9 8E-10	4 8	1.4E-10	5.7	1.9E-10	4.2	4.3E-09	4.9	7.2E-17	5.0	5.6E-07	3.8
1974	2.2E-09	4.6	5.1E-07	4.2	2.8E-09	3 4	1.0E-09	4 8	1.4E-10	5.7	2.0E-10	4.2	4.4E-09	4.9	7.3E-17	4.9	5.7E-07	3 8
1975	2.2E-09	5.1	5.2E-07	4.1	2.8E-09	3.5	1.0E-09	4.8	1.4E-10	6.2	2.0E-10	4 2	4.5E-09	4.9	7.4E-17	4.9	5.8E-07	3.7
1976	2.3E-09	4.8	5.3E-07	3.9	2 9E-09	3.5	1.0E-09	5 2	1.5E-10	5.6	2.1E-10	4.3	4.6E-09	4.7	7.6E-17	4.9	5.9E-07	3.5
1977	2.3E-09	4.9	5.4E-07	4.2	2.9E-09	3.5	1 0E-09	4.9	1.5E-10	5.6	2.1E-10	4 2	4.6E-09	4.9	7.7E-17	4.8	6.0E-07	3.8
1978	2.3E-09	5.0	5.4E-07	4.1	2.9E-09	3.6	1.1E-09	5 1	1.5E-10	5.6	2.1E-10	3.9	4.7E-09	4.8	7.8E-17	4.8	6.0E-07	3.7
1979	2.4E-09	4.6	5.5E-07	4.2	3.0E-09	3.5	1.1E-09	4.8	1.5E-10	5 6	2.1E-10	4.2	4.8E-09	4.8	7.9E-17	4.8	6 1E-07	3.7
1980	2.4E-09	4.8	5.5E-07	4.0	3.0E 09	3.5	1.1E-09	4.7	1 5E-10	5.8	2.2E-10	4.1	4.8E-09	4.9	8.0E-17	5.0	6.2E-07	3.6
1981	2.4E-09	5.1	5.6E-07	4.3	3.0E-09	3.5	1.1E-09	5.0	1.5E-10	5.3	2 1E-10	4.1	4.8E-09	4.9	8.0E-17	4.9	6.2E-07	3.9
1982	2 4E-09	4.8	5.7E-07	4.0	3.1E-09	3 4	1.1E-09	5.1	1.6E-10	5.8	2.2E-10	4.5	4.9E-09	4.5	8.1E-17	4.5	6.3E-07	3.6
1983	2.5E-09	4.8	5.7E-07	4.4	3.1E-09	3.4	1.1E-09	4 9	1 6E-10	5.9	2.2E-10	4.2	4.9E-09	4.9	8.2E-17	4.9	6.5E-07	3.9
1984	2.5E-09	5.1	5.8E-07	4.2	3.1E-09	3 5	1.1E-09	4.8	1.6E-10	5.9	2.3E-10	4.3	5.0E-09	5.1	8.3E-17	5.3	6.5E-07	3.8
1985	2.5E-09	5.1	5.8E-07	4.1	3.2E-09	3.5	1.1E-09	4.7	1.6E-10	6.1	2 3E-10	4.4	5.0E-09	5.0	8.3E-17	4.8	6.5E-07	3.7
1986	2.5E-09	5.0	5.9E-07	4.0	3.2E-09	3.5	1.1E-09	4.9	1.7E-10	5.4	2.3E-10	4.1	5.1E-09	4.9	8.5E-17	4.7	6.6E-07	3.6
1987	2.6E-09	5.0	5.9E-07	4.0	3.2E-09	3.6	1.2E-09	4 8	1.6E-10	5 8	2.3E-10	4.5	5.1E-09	4.8	8.5E-17	4.9	6.6E-07	3.5
1988	2.6E-09	5.2	5.9E-07	4.0	3.2E-09	3.5	1 2E-09	5.0	1.7E-10	5 9	2 4E-10	4.4	5.2E-09	4.7	8.6E-17	4 6	6.6E-07	3.6
1989	2.6E-09	5.1	6.0E-07	4.1	3.3E-09	3 5	1 2E-09	5 2	1.7E-10	5 7	2.3E-10	4 3	5.2E-09	4.8	8.6E-17	4.9	6.8E-07	3.7

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 4B
(1970-1989)

Year	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1970	3.0E-08	5.1	6.9E-06	4.1	3.7E-08	3.5	1.3E-08	4.5	1.9E-09	6.4	2.7E-09	4.6	5.9E-08	5.1	9.9E-16	5.1	7.7E-06	3.7
1971	3.0E-08	4.9	7.0E-06	4.2	3.8E-08	3.5	1.4E-08	5.0	2.0E-09	5.6	2.7E-09	4.0	6.0E-08	4.9	1.0E-15	4.8	7.9E-06	3.7
1972	3.1E-08	4.7	7.2E-06	4.0	3.8E-08	3.5	1.4E-08	5.1	1.9E-09	5.6	2.7E-09	4.2	6.2E-08	5.4	1.0E-15	5.3	7.9E-06	3.7
1973	3.1E-08	4.7	7.3E-06	4.2	3.9E-08	3.5	1.4E-08	4.7	2.0E-09	5.5	2.8E-09	4.2	6.3E-08	4.8	1.0E-15	4.8	8.1E-06	3.8
1974	3.2E-08	4.9	7.4E-06	4.2	4.0E-08	3.4	1.4E-08	4.8	2.0E-09	6.1	3.0E-09	4.5	6.3E-08	4.9	1.1E-15	4.8	8.2E-06	3.8
1975	3.2E-08	5.0	7.5E-06	4.2	4.1E-08	3.5	1.5E-08	4.6	2.1E-09	5.8	2.9E-09	4.1	6.4E-08	5.1	1.1E-15	5.2	8.4E-06	3.7
1976	3.3E-08	4.9	7.6E-06	4.3	4.1E-08	3.5	1.5E-08	5.4	2.1E-09	5.9	3.0E-09	4.4	6.6E-08	4.8	1.1E-15	4.9	8.4E-06	3.9
1977	3.3E-08	4.9	7.7E-06	4.2	4.2E-08	3.7	1.5E-08	4.5	2.1E-09	5.4	2.9E-09	4.2	6.6E-08	4.8	1.1E-15	4.8	8.6E-06	3.8
1978	3.4E-08	5.0	7.8E-06	3.9	4.2E-08	3.4	1.5E-08	4.6	2.2E-09	5.6	3.0E-09	4.4	6.8E-08	4.7	1.1E-15	4.8	8.7E-06	3.5
1979	3.4E-08	4.8	7.9E-06	4.1	4.3E-08	3.6	1.5E-08	5.0	2.2E-09	5.8	3.0E-09	4.1	6.8E-08	4.9	1.1E-15	5.0	8.8E-06	3.7
1980	3.4E-08	4.9	8.0E-06	4.1	4.3E-0R	3.5	1.6E-08	4.7	2.2E-09	4.9	3.0E-09	3.9	6.9E-08	4.8	1.1E-15	4.8	8.9E-06	3.7
1981	3.5E-08	5.0	8.1E-06	4.0	4.4E-08	3.5	1.6E-08	4.9	2.2E-09	5.6	3.1E-09	3.9	6.9E-08	4.8	1.1E-15	5.0	9.1E-06	3.6
1982	3.5E-08	4.8	8.2E-06	4.1	4.4E-08	3.4	1.6E-08	5 2	2.3E-09	5.1	3.0E-09	4.1	7.0E-08	4.6	1.2E-15	4.8	9.0E-06	3.7
1983	3.5E-08	5.0	8.2E-06	4.2	4.5E-08	3.5	1.6E-08	4 9	2.3E-09	5.8	3.2E-09	4.2	7.1E-08	4.8	1.2E-15	5.0	9.2E-06	3.8
1984	3.6E-08	4.6	8.3E-06	4.3	4.5E-08	3.5	1.6E-08	4.9	2.3E-09	6.1	3.3E-09	4.3	7.2E-08	5.2	1.2E-15	5.2	9.4E-06	3.8
1985	3.6E-08	4.9	8.4E-06	4.0	4.5E-08	3.4	1.6E-08	4.7	2.3E-09	5.7	3.3E-09	4.1	7.2E-08	5.2	1.2E-15	5.2	9.4E-06	3.6
1986	3.6E-08	4.9	8.4E-06	4.4	4.6E-08	3.4	1.6E-08	5.2	2.3E-09	5.6	3.3E-09	4.1	7.3E-08	5.1	1.2E-15	5.0	9.5E-06	3.8
1987	3.7E-08	4.8	8.5E-06	4.2	4.6E-08	3.5	1.7E-08	4.5	2.3E-09	5.7	3.2E-09	4.2	7.4E-08	5.0	1.2E-15	5.1	9.6E-06	3.7
1988	3.7E-08	4.6	8.6E-06	4.1	4.6E-08	3.5	1.7E-08	5.2	2.4E-09	5.4	3.3E-09	4.1	7.4E-08	4.8	1.2E-15	4.9	9.6E-06	3.6
1989	3.7E-08	5.1	8.7E-06	4.2	4.7E-08	3.5	1.7E-08	4.9	2.4E-09	5.9	3.3E-09	4.2	7.5E-08	4.9	1.2E-15	5.0	9.7E-06	3.7

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 5A
(1970-1989)

Year	Soil Ingestion		Vegetable Ingestion		Ground Exposure		Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1970	6.7E-10	4.8	1.6E-07	4.2	8.5E-10	3.5	3.1E-10	5 0	4.4E-11	5.5	6.1E-11	4.3	1.3E-09	4.9	2.2E-17	4.9	1.8E-07	3.7
1971	6.9E-10	4.9	1.6E-07	4.1	8.7E-10	3.4	3.1E-10	5.0	4.4E-11	5.5	6.3E-11	4.1	1.4E-09	4.9	2.3E-17	4.9	1.8E-07	3.7
1972	7.1E-10	5.0	1.6E-07	4.2	8.9E-10	3 4	3 2E-10	5.1	4.5E-11	6.2	6.5E-11	4.4	1.4E-09	5.1	2.4E-17	5.1	1.8E-07	3.7
1973	7.2E-10	4.7	1.7E-07	4.1	9.0E-10	3 5	3.3E-10	5.1	4.6E-11	5.8	6.4E-11	4.1	1.4E-09	4.6	2.4E-17	4.6	1.9E-07	3.7
1974	7.3E-10	4.6	1.7E-07	3.9	9.1E-10	3.7	3.3E-10	4 8	4.6E-11	5.8	6.5E-11	4.0	1.5E-09	4.9	2.4E-17	4 9	1.9E-07	3.6
1975	7.4E-10	4.9	1.7E-07	4.1	9.3E-10	3 5	3 4E-10	4.9	4.8E-11	5.4	6.9E-11	4.0	1.5E-09	4.8	2.4E-17	4.6	1.9E-07	3.6
1976	7.5E-10	4.9	1.8E-07	4.3	9.4E-10	3.5	3.4E-10	5.1	4.8E-11	6.2	6.7E-11	4.6	1.5E-09	5.0	2.5E-17	4.9	2.0E-07	3.9
1977	7.6E-10	4.9	1.8E-07	4.0	9.5E-10	3.5	3.5E-10	5.2	4.9E-11	5.6	6 9E-11	4.1	1.5E-09	4.7	2.5E-17	4.8	2.0E-07	3.5
1978	7.8E-10	4 9	1.8E-07	4.2	9.7E-10	3.4	3.5E-10	4.6	5.0E-11	5 8	7.2E-11	4.2	1.6E-09	4.9	2.6E-17	4.9	2.0E-07	3.7
1979	7.8E-10	5.2	1.8E-07	4.1	9.8E-10	3.6	3.5E-10	5.1	5.0E-11	6 0	7.0E-11	4.3	1.6E-09	4.9	2.6E-17	5.1	2.0E-07	3.7
1980	7.9E-10	4.7	1.8E-07	4.2	9.9E-10	3.6	3.6E-10	4 7	5.1E-11	5 7	7 3E-11	4.1	1.6E-09	5.0	2.6E-17	5.1	2.1E-07	3.8
1981	8.0E-10	4.9	1.9E-07	4.1	1.0E-09	3.4	3.6E-10	4.7	5.1E-11	6.1	7.4E-11	4.2	1.6E-09	4.7	2.7E-17	4.7	2.1E-07	3.7
1982	8.0E-10	4.8	1.9E-07	4.1	1.0E-09	3.5	3.6E-10	5.0	5.2E-11	5.6	7.4E-11	4.1	1.6E-09	5.2	2.7E-17	5.2	2.1E-07	3.7
1983	8.1E-10	4.7	1.9E-07	4.1	1.0E-09	3.5	3.7E-10	5.3	5.2E-11	5.7	7.0E-11	4.2	1.6E-09	5.2	2.7E-17	5.4	2.1E-07	3.7
1984	8.3E-10	4.6	1.9E-07	4.0	1.0E-09	3 5	3 7E-10	4.7	5.3E-11	6.0	7.4E-11	4.5	1.7E-09	4.8	2.7E-17	4.7	2.1E-07	3.7
1985	8.3E-10	4.8	1.9E-07	4.2	1 0E-09	3.5	3.8E-10	4.6	5.3E-11	5.4	7 3E-11	4.1	1.7E-09	4.8	2.8E-17	4.8	2.1E-07	3.8
1986	8.3E-10	4.5	1.9E-07	4.1	1.0E-09	3.5	3.8E-10	5 0	5.3E-11	5.6	7.5E-11	4.2	1.7E-09	4.9	2.8E-17	4.9	2.2E-07	3.8
1987	8.4E-10	4.8	2.0E-07	4.2	1.1E-09	3.5	3 8E-10	5.0	5.3E-11	5.4	7.6E-11	4.1	1.7E-09	5.0	2.8E-17	5 0	2.2E-07	3.8
1988	8.5E-10	4.8	2.0E-07	4.1	1.1E-09	3.4	3.8E-10	5.0	5.4E-11	6.3	7.8E-11	4.5	1.7E-09	4.8	2.8E-17	4.9	2.2E-07	3.7
1989	8.5E-10	5.0	2.0E-07	3.9	1.1E-09	3.5	3.9E-10	4.6	5.4E-11	5.6	7.6E-11	4.2	1 7E-09	4.9	2.8E-17	4.9	2.2E-07	3.5

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 5B
(1970-1989)

Year	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1970	2.3E-10	5.4	5.2E-08	4.0	2.9E-10	3.2	9.9E-11	4.9	1.5E-11	5.6	2.2E-11	4.2	4.8E-10	4.9	7.6E-18	5.0	5.9E-08	3.6
1971	2.5E-10	4.9	5.1E-08	4.4	3.1E-10	3.4	1.1E-10	4.8	1.5E-11	5.3	2.1E-11	4.0	5.2E-10	4.8	8.6E-18	4.8	5.8E-08	3.9
1972	2.4E-10	4.6	5.6E-08	3.9	2.8E-10	3.6	1.1E-10	5.1	1.5E-11	5.6	2.0E-11	4.2	4.2E-10	5.0	6.8E-18	5.0	6.2E-08	3.5
1973	2.1E-10	4.7	6.1E-08	4.4	3.1E-10	3.6	1.2E-10	4.8	1.3E-11	5.4	1.9E-11	4.2	4.1E-10	4.9	7.0E-18	5.0	6.9E-08	3.9
1974	2.4E-10	5.0	5.5E-08	4 4	3.1E-10	3.5	1.1E-10	5.1	1.6E-11	5.9	2.4E-11	4.5	5.2E-10	5.1	8.5E-18	5.0	6.1E-08	4.0
1975	2.6E-10	4.6	5.7E-08	4.0	3.2E-10	3.4	1.2E-10	5.1	1.5E-11	5.7	2.3E-11	4.1	5.3E-10	5.0	8.6E-18	5.0	6.4E-08	3.6
1976	2.4E-10	5.3	5.9E-08	3 9	2.9E-10	3.5	1.2E-10	4.6	1.6E-11	5.8	2.1E-11	4.2	4.9E-10	4.7	8.1E-18	4.8	6.5E-08	3.6
1977	2.7E-10	5.0	6.3E-08	3.9	2.9E-10	3.7	1.2E-10	5 6	1.5E-11	5.6	2.4E-11	4.3	5.5E-10	4.8	9.5E-18	4.7	6.9E-08	3.5
1978	2.9E-10	5.2	6.1E-08	4.1	3.4E-10	3 4	1.2E-10	4.9	1.8E-11	5.3	2.5E-11	4.0	4.9E-10	5.1	8.5E-18	5.1	6.8E-08	3.7
1979	2.6E-10	4.8	7.5E-08	4.1	3.6E-10	3.4	1.2E-10	5.3	1.9E-11	5.9	2.5E-11	4.3	5.0E-10	4.6	8.2E-18	4.5	8.2E-08	3.7
1980	3.1E-10	4.7	6.3E-08	4.1	3.5E-10	3.7	1.3E-10	4.9	2.0E-11	5.8	2.6E-11	4.2	5.6E-10	4.5	9.3E-18	4.5	7.0E-08	3.6
1981	2.7E-10	4.6	7.7E-08	4.1	3.4E-10	3.4	1.3E-10	4.8	2.0E-11	5.8	2.8E-11	4.5	5.1E-10	4.8	8.6E-18	4.8	8.4E-08	3.8
1982	2.5E-10	4.7	6.7E-08	4.0	3.4E-10	3.3	1.3E-10	4.9	1.8E-11	6.3	2.3E-11	4.7	5.1E-10	4.6	8.6E-18	4.6	7.4E-08	3.6
1983	3.0E-10	5.2	7.0E-08	3.9	3.5E-10	3.4	1.3E-10	4 5	1.9E-11	6.1	2.7E-11	4.4	6.0E-10	5.4	1.0E-17	5.2	7.8E-08	3.5
1984	2.6E-10	4.9	6.7E-08	4.1	3.6E-10	3.4	1.2E-10	5.1	1.8E-11	5.4	2.4E-11	4.1	5.3E-10	4.6	8.8E-18	4.7	7.4E-08	3.7
1985	2.5E-10	5.1	5.7E-08	3.9	3.2E-10	3.4	1.2E-10	4.8	1.7E-11	5.8	2.2E-11	4.0	5.3E-10	4.7	9.0E-18	4.8	6.4E-08	3.5
1986	3.0E-10	4.7	7.6E-08	3.9	3.6E-10	3.3	1.3E-10	4.2	1.9E-11	5.3	2.5E-11	3.9	6.3E-10	5.0	1.0E-17	5.0	8.4E-08	3.5
1987	2.7E-10	4.7	7.2E-08	3.9	3.8E-10	3.5	1.3E-10	5.1	2.1E-11	5.6	2.7E-11	4.2	6.0E-10	4.8	9.7E-18	4.9	8.0E-08	3.6
1988	2.6E-10	5.2	7.3E-08	4.4	3.9E-10	3.4	1 3E-10	5.0	2.1E-11	5.8	2.7E-11	4.3	5.7E-10	5.0	9 9E-18	5.0	8.2E-08	3.9
1989	2.6E-10	4.8	6.2E-08	4.1	3.7E-10	3.6	1.3E-10	4.6	1.9E-11	6.2	2.7E-11	4.1	5.4E-10	4.8	8.9E-18	4.8	7.0E-08	3.7

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^{1}; E-02 is the same as the value divided by 10^{2}; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 6A
(1970-1989)

Year	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1970	1.9E-10	4.7	4.4E-08	4.2	2.4E-10	3.5	8.6E-11	5.0	1.2E-11	6 4	1.7E-11	4.3	3.8E-10	4.7	6.3E-18	4.7	5.0E-08	3.8
1971	1.9E-10	5.0	4.5E-08	3.8	2.4E-10	3.4	8.8E-11	5 2	1 2E-11	5.8	1.8E-11	4.2	3.9E-10	4.8	6.4E-18	5.0	5.0E-08	3.5
1972	2.0E-10	4.8	4.6E-08	3.9	2.5E-10	3 4	9 0E-11	5.1	1.3E-11	5.4	1.8E-11	4.0	4.0E-10	4.9	6.6E-18	5.1	5.1E-08	3.5
1973	2.0E-10	4.7	4.7E-08	4.1	2.5E-10	3.4	9.2E-11	5.1	1.3E-11	5.9	1.9E-11	4.1	4.0E-10	4.7	6.7E-18	4.7	5.3E-08	3.7
1974	2.1E-10	4.8	4.8E-08	4.1	2.6E-10	3.4	9 3E-11	5 0	1.3E-11	5 4	1.8E-11	4.2	4.1E-10	4.8	6.8E-18	4.8	5.3E-08	3.6
1975	2.1E-10	5.0	4 8E-08	4.4	2.6E-10	3.5	9.4E-11	4.9	1.3E-11	6.2	1.9E-11	4.4	4.2E-10	4.9	6.9E-18	4.9	5.4E-08	3 9
1976	2.1E-10	5.2	4.9E-08	4.2	2.6E-10	3.6	9.5E-11	4.7	1.3E-11	5 9	1.9E-11	4.2	4.2E-10	4.9	7.0E-18	4.8	5.4E-08	3.8
1977	2.1E-10	5.1	5.0E-08	4.4	2.7E-10	3.6	9.7E-11	4.8	1.4E-11	5.4	1 9E-11	4.3	4.3E-10	4.7	7.1E-18	4.7	5.6E-08	3.8
1978	2.2E-10	5.2	5.1E-08	4.0	2.7E-10	3.5	9.8E-11	5.5	1.4E-11	5.7	1.9E-11	4.2	4.4E-10	4.5	7.2E-18	4.5	5.6E-08	3.6
1979	2.2E-10	4.9	5.1E-08	4.0	2.8E-10	3.4	1.0E-10	5.1	1.4E-11	5.7	2.0E-11	4.4	4.4E-10	4.8	7.3E-18	4.9	5 7E-08	3.7
1980	2.2E-10	5.1	5.1E-08	4.3	2.8E-10	3.6	1.0E-10	4.7	1.4E-11	5.5	2.0E-11	4.1	4.5E-10	4.8	7.5E-18	4.7	5.8E-08	3.8
1981	2.2E-10	4.7	5.2E-08	4.1	2.8E-10	3.5	1.0E-10	4.6	1.4E-11	6.0	2 0E-11	4.1	4.5E-10	4.8	7.5E-18	4.8	5.9E-08	3.7
1982	2.3E-10	4.8	5.3E-08	4.6	2 8E-10	3.4	1.0E-10	4.8	1.4E-11	5.6	2.0E-11	4.3	4.5E-10	4.8	7.5E-18	4.8	5.8E-08	4.2
1983	2.3E-10	5.0	5.3E-08	4.3	2 9E-10	3.5	1.0E-10	5.0	1.5E-11	6.0	2.1E 11	4.3	4.6E-10	4.8	7.6E-18	4.8	5.9E-08	3.8
1984	2.3E-10	4.9	5.4E-08	4.0	2.9E-10	3 5	1.1E-10	5.3	1.5E-11	5.8	2.1E-11	4.7	4.6E-10	5.0	7.7E-18	5.0	6.0E-08	3.6
1985	2.3E-10	5.1	5.4E-08	4.2	2.9E-10	3.4	1.1E-10	4.9	1.5E-11	5.8	2.1E-11	4.3	4.7E-10	4.8	7.7E-18	4.8	6.0E-08	3.7
1986	2.3E-10	4.8	5.4E-08	4.1	2.9E-10	3.5	1.1E-10	5.3	1.5E-11	5.8	2.1E-11	4.1	4.7E-10	5.2	7.8E-18	5.1	6.1E-08	3.7
1987	2.4E-10	4.8	5.5E-08	4.2	3.0E-10	3 5	1.1E-10	5.0	1.5E-11	5.9	2.2E-11	4.4	4.8E-10	4.7	8.0E-18	4.7	6.1E-08	3.8
1988	2.4E-10	4.8	5.6E-08	4.4	3.0E-10	3 4	1.1E-10	4.8	1.5E-11	5.8	2 1E-11	4 5	4.8E-10	4.8	7.9E-18	4.9	6.2E-08	4 0
1989	2.4E-10	4 8	5.5E-08	4.2	3.0E-10	3 3	1.1E-10	4.7	1.5E-11	5.3	2.1E-11	3.9	4.8E-10	4.9	8.0E-18	5.0	6.1E-08	3 8

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 6B
(1970-1989)

Year	Soil Ingestion		Vegetable Ingestion		Ground Exposure		Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1970	2.2E-11	5.2	5.2E-09	4.0	2.8E-11	3.4	1.0E-11	5.1	1.4E-12	5.9	2.0E-12	4.2	4.5E-11	4.9	7.5E-19	5.0	5.8E-09	3.6
1971	2.3E-11	4.9	5.3E-09	4.3	2.9E-11	3.5	1.0E-11	4.8	1.5E-12	5.8	2.1E-12	4.3	4.6E-11	4.8	7.6E-19	4.9	5.9E-09	3.8
1972	2.3E-11	5.0	5.4E-09	4.2	2.9E-11	3.5	1.1E-11	4.8	1.5E-12	5.7	2.1E-12	4.2	4.7E-11	4.6	7.8E-19	4.6	6.1E-09	3.8
1973	2.4E-11	4.8	5.5E-09	4.2	3.0E-11	3.5	1.1E-11	5.0	1.5E-12	5.5	2.0E-12	4.2	4.8E-11	4.9	7.9E-19	4.9	6.2E-09	3.8
1974	2.4E-11	4.7	5.6E-09	4.2	3.0E-11	3.6	1.1E-11	5.0	1.5E-12	5.9	2.1E-12	4.6	4.8E-11	4.6	8.0E-19	4.6	6.2E-09	3.9
1975	2.5E-11	5.4	5.7E-09	4.1	3.1E-11	3.5	1.1E-11	5.1	1.6E-12	5.9	2.2E-12	4.1	4.9E-11	4.7	8.2E-19	4.7	6.5E-09	3.7
1976	2.5E-11	4.9	5.8E-09	4.1	3.1E-11	3.5	1.1E-11	4.6	1.6E-12	5.6	2.2E-12	4.4	5.0E-11	4.6	8.3E-19	4.7	6.4E-09	3.7
1977	2.5E-11	5.0	5.9E-09	4.3	3.2E-11	3.4	1.1E-11	4.9	1.6E-12	5.6	2.3E-12	4.2	5.1E-11	5.0	8.4E-19	5.0	6.6E-09	3.8
1978	2.6E-11	5.1	6.0E-09	4.2	3.2E-11	3.5	1.2E-11	4.7	1.7E-12	5.7	2.3E-12	4.1	5.1E-11	4.7	8.5E-19	4.9	6.7E-09	3.8
1979	2.6E-11	5.0	6.0E-09	4.3	3.2E-11	3.5	1.2E-11	5.0	1.7E-12	5.8	2.3E-12	4.1	5.2E-11	5.0	8.6E-19	4.8	6.8E-09	3.8
1980	2.6E-11	4.8	6.1E-09	4.3	3.3E-11	3.6	1.2E-11	5.0	1.7E-12	6.1	2.3E-12	4.5	5.2E-11	4.7	8.7E-19	4.8	6.8E-09	3.9
1981	2.6E-11	4.8	6.1E-09	4.1	3.3E-11	3.5	1.2E-11	4.6	1.7E-12	6.0	2.3E-12	4.6	5.3E-11	5.2	8.8E-19	5.3	6.8E-09	3.7
1982	2.7E-11	4.7	6.2E-09	4.3	3.3E-11	3.5	1.2E-11	5.1	1.7E-12	5.5	2.4E-12	4.2	5.3E-11	4.8	8.9E-19	5.0	7.1E-09	3.7
1983	2.7E-11	4.9	6.3E-09	4.4	3.4E-11	3.5	1.2E-11	5.0	1.7E-12	5.3	2.4E-12	4.1	5.4E-11	4.7	8.9E-19	4.7	7.1E-09	3.8
1984	2.7E-11	4.7	6.3E-09	4.0	3.4E-11	3.4	1.2E-11	4.9	1.7E-12	6.0	2.5E-12	4.2	5.5E-11	4.6	9.1E-19	4.7	7.0E-09	3.6
1985	2.7E-11	4.8	6.4E-09	4.1	3.4E-11	3.5	1.2E-11	4 9	1.7E-12	5.4	2.4E-12	4.1	5.5E-11	4.8	9.1E-19	4.8	7.1E-09	3.7
1986	2.8E-11	5.1	6.4E-09	4.0	3.5E-11	3 5	1.3E-11	5.1	1.8E-12	5.8	2.6E-12	4.3	5.5E-11	4.9	9.2E-19	5.1	7.2E-09	3.6
1987	2.8E-11	5.1	6.4E-09	4.1	3.5E-11	3.5	1.3E-11	5.0	1.8E-12	5.8	2.6E-12	4.4	5.6E-11	4.9	9.3E-19	4.9	7.2E-09	3.7
1988	2.8E-11	4.8	6.5E-09	4.2	3.5E-11	3.4	1.3E-11	5.0	1.8E-12	5.4	2.6E-12	4.1	5.7E-11	4.9	9.4E-19	4.9	7.3E-09	3.8
1989	2.8E-11	4.8	6.6E-09	4.1	3.6E-11	3.4	1.3E-11	5.0	1.8E-12	5.4	2.5E-12	4.1	5.6E-11	5.0	9.4E-19	5.1	7.3E-09	3.7

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 7A
(1970-1989)

Year	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion In Resuspended Particulates GM (Sv/year)	Immersion In Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1970	1.5E-11	4.6	3.5E-09	4.0	1.9E-11	3.5	6.8E-12	4.8	9.5E-13	5.5	1.3E-12	4.1	3.0E-11	4.6	4.9E-19	4.7	3.9E-09	3.6
1971	1.5E-11	4.3	3.5E-09	4.1	1.9E-11	3.5	6.9E-12	4.9	9.8E-13	5.6	1.4E-12	4.5	3.1E-11	4.4	5.1E-19	4.5	4 0E-09	3.7
1972	1.6E-11	4.9	3.6E-09	4.1	2.0E-11	3.4	7.0E-12	4 6	9.9E-13	5.4	1.4E-12	4.3	3.1E-11	4.7	5.2E-19	4.7	4.0E-09	3.8
1973	1.6E-11	4.7	3.7E-09	4.2	2.0E-11	3.5	7.2E-12	5.2	1 0E-12	5.5	1.4E-12	4.0	3.2E-11	4.6	5.3E-19	4.5	4 1E-09	3.8
1974	1.6E-11	5.0	3.7E-09	4.2	2.0E-11	3.4	7.3E-12	4.8	1.0E-12	5.5	1.5E-12	4.3	3.2E-11	4.5	5.4E-19	4.5	4.2E-09	3.8
1975	1.6E-11	5.0	3.8E-09	4.0	2.0E-11	3.5	7.4E-12	4 8	1.1E-12	6.2	1.5E-12	4.1	3.3E-11	4.8	5.4E-19	4.9	4.2E-09	3.7
1976	1.7E-11	4.5	3.9E-09	4.2	2.1E-11	3.4	7.5E-12	4.8	1.1E-12	5.6	1.5E-12	4.2	3.3E-11	4.5	5.5E-19	4.5	4.3E-09	3.7
1977	1.7E-11	5.2	3.9E-09	4.0	2.1E-11	3 5	7 6E-12	4.7	1.1E-12	5.5	1.5E-12	4.3	3.4E-11	4.7	5.6E-19	4.7	4.3E-09	3.6
1978	1.7E-11	4.6	4.0E-09	4.2	2.1E-11	3.5	7.7E-12	5.0	1.1E-12	6.2	1.5E-12	4.3	3.4E-11	4.7	5.7E-19	4.8	4.4E-09	3.8
1979	1.7E-11	4.7	4.0E-09	4.1	2.2E-11	3.4	7.8E-12	5.1	1.1E-12	5.9	1.6E-12	4.1	3.4E-11	4.4	5.7E-19	4.6	4.4E-09	3.7
1980	1.7E-11	4.8	4.0E-09	4.2	2.2E-11	3.5	7 9E-12	5.1	1.1E-12	6.3	1 6E-12	4.6	3.5E-11	4.6	5.8E-19	4.6	4.5E-09	3.8
1981	1.8E-11	4.9	4.1E-09	4.3	2.2E-11	3.6	8.0E-12	5.0	1.1E-12	6 0	1.6E-12	4.2	3.5E-11	4.8	5.8E-19	4.9	4.6E-09	3.8
1982	1.8E-11	4.8	4.2E-09	4.1	2.2E-11	3.4	8.1E-12	4 8	1.1E-12	6.3	1.6E-12	4.3	3.6E-11	4.9	5.9E-19	4.8	4.6E-09	3.7
1983	1.8E-11	4.8	4.2E-09	3.9	2.2E-11	3.4	8.1E-12	4.8	1.1E-12	5.7	1.6E-12	4.1	3.6E-11	4.6	6.0E-19	4.5	4.6E-09	3.5
1984	1.8E-11	4.9	4.2E-09	4.2	2.3E-11	3.4	8.3E-12	5.1	1.2E-12	5.4	1.7E-12	4.3	3.7E-11	5.1	6.1E-19	5.2	4.8E-09	3.7
1985	1.8E-11	4.9	4.2E-09	4.1	2.3E-11	3.5	8.3E-12	4.9	1.1E-12	5.4	1.6E-12	4.3	3.7E-11	4.6	6.1E-19	4.6	4.7E-09	3.7
1986	1.9E-11	4.6	4.3E-09	4.0	2.3E-11	3.4	8.4E-12	5.0	1.2E-12	5.7	1.7E-12	4.2	3.7E-11	5.1	6.2E-19	5.1	4.8E-09	3.6
1987	1.9E-11	5.0	4.3E-09	4.2	2.3E-11	3.5	8.4E-12	4.8	1.2E-12	5.6	1.7E-12	4.5	3.7E-11	4.8	6.2E-19	4.8	4.8E-09	3.8
1988	1.9E-11	4.5	4.4E-09	4.3	2.3E-11	3.4	8.5E-12	4.8	1.2E-12	5.9	1.7E-12	4.4	3.7E-11	4.8	6.2E-19	4.8	4.8E-09	3.9
1989	1 9E-11	4.8	4.4E-09	4.1	2.4E-11	3.5	8 6E-12	4.8	1 2E-12	5.8	1.7E-12	4.3	3.8E-11	5.1	6 3E-19	5.1	4.9E-09	3 7

Notes:

1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 7B
(1970-1989)

Year	Soil Ingestion		Vegetable Ingestion		Ground Exposure		Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1970	2.6E-10	5.0	6.1E-08	4.1	3.3E-10	3.5	1.2E-10	4.9	1.7E-11	6.1	2.3E-11	4.5	5.2E-10	5.0	8.7E-18	4.7	6.8E-08	3.7
1971	2.7E-10	4.9	6.2E-08	4.0	3.4E-10	3.4	1.2E-10	4.7	1.7E-11	6.2	2.4E-11	4.2	5.4E-10	4.9	8.9E-18	4.7	6.8E-08	3.7
1972	2.7E-10	5.1	6.4E-08	4.2	3.4E-10	3.4	1.2E-10	5.0	1.7E-11	5.6	2.4E-11	4.3	5.5E-10	4.9	9.1E-18	5.0	7.1E-08	3.8
1973	2.8E-10	4.7	6.4E-08	4.2	3.5E-10	3.4	1.3E-10	5.2	1.8E-11	6.0	2.4E-11	4.2	5.5E-10	4.7	9.2E-18	4.6	7.2E-08	3.8
1974	2.8E-10	5.4	6.6E-08	4.1	3.5E-10	3.5	1.3E-10	5.1	1.8E-11	5.5	2.6E-11	4.0	5.6E-10	4.7	9.3E-18	4.8	7.4E-08	3.7
1975	2.8E-10	5.1	6.7E-08	4.1	3.6E-10	3.5	1.3E-10	4 7	1.8E-11	5.6	2.6E-11	4.2	5.7E-10	5.0	9.4E-18	4.9	7.4E-08	3.8
1976	2.9E-10	4.8	6.7E-08	4.1	3.6E-10	3.4	1.3E-10	4.7	1.9E-11	5.7	2.7E-11	4.1	5.8E-10	4.9	9.6E-18	4.9	7.5E-08	3.7
1977	2.9E-10	4.5	6.8E-08	4.1	3.7E-10	3.5	1.3E-10	4.9	1.9E-11	5.6	2.6E-11	4.4	5.9E-10	4.8	9.8E-18	4.8	7.5E-08	3.8
1978	3.0E-10	5.2	6.9E-08	4.0	3.7E-10	3.6	1.4E-10	4 9	1.9E-11	5.9	2.6E-11	4.4	6.0E-10	4.9	1.0E-17	5.0	7.7E-08	3 6
1979	3.0E-10	4.9	7.0E-08	4.1	3.8E-10	3.5	1.4E-10	5.0	1.9E-11	5.8	2.7E-11	4.5	6.0E-10	5.2	1.0E-17	5.1	7.8E-08	3.7
1980	3.1E-10	5.0	7.1E-08	4.0	3.9E-10	3.6	1.4E-10	4.9	2.0E-11	5.6	2.8E-11	4.1	6.2E-10	5.1	1.0E-17	5.2	8.0E-08	3.6
1981	3.1E-10	4.9	7.1E-08	4.1	3 9E-10	3.4	1.4E-10	4.9	2.0E-11	5.6	2.7E-11	4.0	6.2E-10	4.9	1.0E-17	4.8	7.9E-08	3.7
1982	3.1E-10	5.2	7.2E-08	4.3	3.9E-10	3.4	1.4E-10	4.9	2.0E-11	5.8	2.8E-11	4.2	6.2E-10	4.9	1.0E-17	4.9	8.1E-08	3.8
1983	3.1E-10	5.1	7.3E-08	4.2	3.9E-10	3.4	1.4E-10	5.2	2.0E-11	5.3	2.8E-11	4.1	6.3E-10	4.7	1.0E-17	4.8	8.2E-08	3.7
1984	3.2E-10	5.3	7.4E-08	4.2	4.0E-10	3 6	1.4E-10	4.9	2 0E-11	5.8	2.8E-11	4.3	6.4E-10	5.2	1.1E-17	5.4	8.3E-08	3.7
1985	3.2E-10	4.9	7.5E-08	4.3	4.0E-10	3.5	1.4E-10	5.0	2.0E-11	6.1	2.9E-11	4.2	6.4E-10	5.1	1.1E-17	4.9	8.3E-08	3.8
1986	3.2E-10	5.0	7.5E-08	4.3	4.0E-10	3 4	1.5E-10	4.7	2.0E-11	5.6	2.8E-11	4.4	6 5E-10	4.8	1.1E-17	5.0	8.4E-08	3.8
1987	3.3E-10	5.1	7.5E-08	4 2	4.1E-10	3.6	1.5E-10	5.0	2.1E-11	5 9	2.9E-11	4.5	6.5E-10	4.9	1.1E-17	5.0	8.4E-08	3 8
1988	3.3E-10	4.7	7.6E-08	4.1	4.1E 10	3.5	1.5E-10	4 9	2.1E-11	5.7	3.0E-11	4.1	6.6E-10	4.7	1.1E-17	4.7	8.5E-08	3.6
1989	3.3E-10	5.2	7.7E-08	4.0	4.1E-10	3.5	1.5E-10	5.0	2.1E-11	5.9	2.9E-11	4.4	6.6E-10	4.6	1.1E-17	4.6	8.5E-08	3.6

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 8A
(1970-1989)

Year	Soil Ingestion		Vegetable Ingestion		Ground Exposure		Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1970	5.8E-10	4.6	1.4E-07	4.1	7.3E-10	3.4	2.6E-10	4.8	3.7E-11	5.7	5.4E-11	4.0	1.2E-09	5.0	1.9E-17	5.0	1.5E-07	3 6
1971	6.0E-10	4.9	1.4E-07	4.4	7.5E-10	3.5	2.7E-10	5 0	3.9E-11	5.5	5.4E-11	4 0	1.2E-09	5.1	2.0E-17	5.1	1.6E-07	3.9
1972	6.1E-10	4.8	1.4E-07	4.3	7.6E-10	3 5	2.8E-10	5 2	3.9E-11	5.5	5.4E-11	4 0	1.2E-09	4.8	2.0E-17	5.0	1.6E-07	3 9
1973	6.1E-10	4.6	1.4E-07	4.0	7.7E-10	3 4	2.8E-10	4.9	3.9E-11	5.8	5.5E-11	4.3	1.2E-09	4.8	2.0E-17	4.9	1.6E-07	3.7
1974	6.3E-10	5.0	1.5E-07	4.1	7.9E-10	3.5	2.8E-10	4 9	4.0E-11	5.6	5.8E-11	4.3	1.3E-09	5.1	2.1E-17	5 2	1.6E-07	3 7
1975	6.3E-10	5.2	1.5E-07	4.0	8.0E-10	3 5	2.9E-10	4.8	4.1E-11	5.2	5.7E-11	4.1	1.3E-09	4.9	2.1E-17	5.0	1.7E-07	3 6
1976	6.5E-10	4.7	1.5E-07	4.2	8.1E-10	3.4	2.9E-10	4 8	4.1E-11	5.2	5 8E-11	3.9	1.3E-09	4.6	2.1E-17	4.9	1.7E-07	3.7
1977	6.5E-10	4.8	1.5E-07	4.2	8.2E-10	3 5	3.0E-10	4.7	4 2E-11	5 8	5.8E-11	4.5	1.3E-09	4.9	2.2E-17	4.9	1.7E-07	3.8
1978	6.7E-10	5.1	1.5E-07	4.0	8.3E-10	3.4	3 0E 10	4 7	4.2E-11	5.7	6.0E-11	4 4	1.3E-09	4.6	2.2E-17	4.6	1.7E-07	3.6
1979	6.7E-10	4.8	1.6E-07	4.1	8.4E-10	3.5	3.1E-10	5.0	4.3E-11	5.4	6 0E-11	4.2	1.3E-09	4.8	2.2E-17	4.9	1.7E-07	3.7
1980	6.8E-10	4.9	1.6E-07	4.1	8.5E-10	3.5	3 1E-10	5 0	4.3E-11	5.5	6 1E-11	4 1	1.4E-09	4.6	2.3E-17	4.6	1.8E-07	3.7
1981	6.9E-10	4.9	1.6E-07	4.2	8.6E-10	3.4	3.1E-10	4.9	4.4E-11	5.4	6.4E-11	4.1	1.4E-09	4.7	2.3E-17	4.7	1.8E-07	3.7
1982	6.9E-10	5.2	1.6E-07	4.0	8.7E-10	3.4	3.1E-10	5 5	4.5E-11	5.9	6.1E-11	4.3	1.4E-09	4.7	2.3E-17	4.8	1.8E-07	3.6
1983	7.0E-10	4.9	1 6E-07	4.3	8.8E-10	3.5	3.2E-10	4.9	4.5E-11	5.4	6.3E-11	3.9	1.4E-09	4.8	2.3E-17	4.9	1.8E-07	3.8
1984	7.1E-10	4.8	1.6E-07	4.1	8.9E-10	3.5	3.2E-10	4.7	4 5E-11	5.7	6.3E-11	4.1	1.4E-09	4.8	2.4E-17	4.8	1.8E-07	3.7
1985	7.1E-10	4.8	1.6E-07	4.2	9.0E-10	3.4	3 2E-10	5.1	4.6E-11	5.6	6.4E-11	4.2	1 4E-09	5.1	2.4E-17	5.0	1.9E-07	3.7
1986	7.2E-10	5.0	1.7E-07	4.1	9 0E-10	3.5	3.3E-10	5.3	4.6E-11	5.5	6.5E-11	4.2	1.4E-09	4.8	2.4E-17	5.0	1.8E-07	3.7
1987	7.3E-10	4.7	1.7E-07	4.0	9.1E-10	3.5	3.3E-10	5 2	4 6E-11	5.5	6.5E-11	4 5	1.5E-09	4.8	2.4E-17	4.9	1.9E-07	3.6
1988	7.3E-10	4 9	1.7E-07	4.1	9.2E-10	3.4	3 3E-10	4.7	4.6E-11	5.2	6.5E-11	4.3	1 5E-09	4.7	2.4E-17	4.6	1.9E-07	3.7
1989	7.4E-10	4.8	1.7E-07	4.3	9.2E-10	3 5	3.3E-10	5.4	4.7E-11	6.4	6.8E-11	4 4	1.5E-09	4.6	2.4E-17	4.6	1.9E-07	3 9

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 8B
(1970-1989)

Year	Soil Ingestion		Vegetable Ingestion		Ground Exposure		Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion In Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1970	8.9E-09	5.1	2.1E-06	4.0	1.1E-08	3.4	4.0E-09	5.0	5.7E-10	5.6	7.9E-10	4.0	1.8E-08	5.0	2.9E-16	5.0	2.3E-06	3.6
1971	9.0E-09	5.0	2.1E-06	4.1	1.1E-08	3.5	4.1E-09	4.8	5.7E-10	5.4	8.3E-10	4.0	1.8E-08	5.0	3.0E-16	5.0	2.3E-06	3.7
1972	9.3E-09	5.1	2.1E-06	4.2	1.2E-08	3.4	4.2E-09	4.9	5.9E-10	5.9	8.1E-10	4.3	1.9E-08	4.9	3.1E-16	5.1	2.4E-06	3.8
1973	9.4E-09	4.7	2.2E-06	4.2	1.2E-08	3.4	4.3E-09	4.8	6.0E-10	5.3	8.4E-10	4.2	1.9E-08	4.9	3.1E-16	5.1	2.4E-06	3.8
1974	9.5E-09	4.7	2.2E-06	4.3	1.2E-08	3.5	4.3E-09	4.9	6.1E-10	6.2	8.4E-10	4.3	1.9E-08	5.3	3.2E-16	5.3	2.5E-06	3.9
1975	9.7E-09	4.9	2.2E-06	4.0	1.2E-08	3.6	4.4E-09	4.9	6.2E-10	5.4	8.5E-10	4.0	1.9E-08	4.8	3.2E-16	4.8	2.5E-06	3.5
1976	9.8E-09	4.9	2.3E-06	4.0	1.2E-08	3.5	4.4E-09	5.2	6.2E-10	5.4	8.6E-10	4.2	2.0E-08	4.5	3.3E-16	4.5	2.5E-06	3.6
1977	1.0E-08	4.9	2.3E-06	4.5	1.2E-08	3.6	4.5E-09	4.8	6.4E-10	5.5	8.7E-10	4.2	2.0E-08	5.1	3.3E-16	4.9	2.6E-06	4.0
1978	1.0E-08	4.6	2.3E-06	4.2	1.3E-08	3.5	4.6E-09	5.0	6.4E-10	5.7	9.2E-10	4.5	2.0E-08	5.0	3.4E-16	4.9	2.6E-06	3.8
1979	1.0E-08	5.0	2.4E-06	4.1	1.3E-08	3.6	4.6E-09	4.9	6.6E-10	5.8	9.3E-10	4.2	2.0E-08	4.8	3.4E-16	4.9	2.6E-06	3.6
1980	1.0E-08	4.8	2.4E-06	4.2	1.3E-08	3.5	4.7E-09	4.8	6.6E-10	5.9	9.4E-10	4.4	2.1E-08	5.2	3.4E-16	5.1	2.7E-06	3.8
1981	1.0E-08	5.2	2.4E-06	3.9	1.3E-08	3.6	4.7E-09	4.9	6.7E-10	5.9	9.5E-10	4.3	2.1E-08	4.7	3.5E-16	4.7	2.7E-06	3.6
1982	1.1E-08	4.6	2.5E-06	4.0	1.3E-08	3.5	4.8E-09	4.9	6.8E-10	5.6	9.6E-10	4.3	2.1E-08	5.0	3.5E-16	5.0	2.7E-06	3.6
1983	1.1E-08	5.1	2.5E-06	4.1	1.3E-08	3.4	4.8E-09	4.7	6.8E-10	6.0	1.0E-09	4.1	2.1E-08	4.8	3.5E-16	5.0	2.8E-06	3.7
1984	1.1E-08	4.8	2.5E-06	4.0	1.4E-08	3.5	4.9E-09	4.9	6.8E-10	5.5	9.3E-10	4.2	2.2E-08	4.7	3.6E-16	4.9	2.8E-06	3.7
1985	1.1E-08	4.9	2.5E-06	4.1	1.4E-08	3.4	4.9E-09	4.7	6.8E-10	5.9	9.4E-10	4.4	2.2E-08	4.8	3.6E-16	4.7	2.8E-06	3.7
1986	1.1E-08	4.6	2.5E-06	4.1	1.4E-08	3.5	5.0E-09	4.9	6.9E-10	5.2	9.7E-10	4.3	2.2E-08	4.8	3.6E-16	4.8	2.8E-06	3.7
1987	1.1E-08	4.8	2.5E-06	4.3	1.4E-08	3.5	5.0E-09	5.0	7.0E-10	5.9	1.0E-09	4.2	2.2E-08	5.1	3.7E-16	5.1	2.8E-06	3.9
1988	1.1E-08	5.1	2.6E-06	3.9	1.4E-08	3.5	5.0E-09	4.8	7.0E-10	5.0	9.8E-10	4.1	2.2E-08	5.0	3.7E-16	5.1	2.8E-06	3.6
1989	1.1E-08	4.8	2.6E-06	4.1	1.4E-08	3.5	5.1E-09	4.8	7.1E-10	6.3	1.0E-09	4.5	2.2E-08	4.6	3.7E-16	4.6	2.9E-06	3.7

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 9A
(1970-1989)

Year	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1970	2.6E-10	4.6	6.0E-08	4.0	3.2E-10	3.5	1.2E-10	5.2	1.6E-11	5 9	2.4E-11	4.3	5.2E-10	5.1	8.6E-18	5.4	6.7E-08	3.6
1971	2.6E-10	4.9	6.1E-08	4.0	3.3E-10	3.5	1.2E-10	4.8	1.7E-11	5.8	2.3E-11	4.1	5.3E-10	4.9	8.8E-18	5.1	6.8E-08	3.6
1972	2.7E-10	5.0	6.2E-08	4.0	3.4E-10	3.5	1.2E-10	5.0	1.7E-11	5.3	2.4E-11	4.0	5.4E-10	5.0	9.0E-18	5.0	7.0E-08	3.6
1973	2.7E-10	4.7	6.3E-08	4.1	3.4E-10	3.5	1.2E-10	4.8	1.7E-11	6.0	2.4E-11	4.1	5.5E-10	4.9	9.1E-18	4.8	7.0E-08	3.7
1974	2.8E-10	4.6	6.4E-08	4.1	3.5E-10	3.5	1.3E-10	5.1	1.8E-11	5 9	2.5E-11	4.2	5.6E-10	4.6	9.2E-18	4.6	7.1E-08	3.7
1975	2.8E-10	4.9	6.5E-08	4.1	3.5E-10	3.6	1.3E-10	5 0	1.8E-11	5.6	2.5E-11	4.3	5.6E-10	5.0	9.3E-18	4.9	7.3E-08	3.7
1976	2.9E-10	4.8	6.7E-08	4.2	3.6E-10	3.4	1.3E-10	5.0	1.8E-11	5 9	2.6E-11	4.3	5.7E-10	4.8	9.5E-18	4.8	7.5E-08	3.8
1977	2.9E-10	4.9	6.7E-08	3.9	3.6E-10	3.5	1.3E-10	4.9	1.9E-11	5 7	2.6E-11	4.4	5.8E-10	4.9	9.7E-18	4.9	7.5E-08	3.6
1978	3.0E-10	4.7	6.8E-08	4.2	3.7E-10	3.5	1.3E-10	5.1	1.9E-11	5.3	2.6E-11	4.3	5.9E-10	4.4	9.8E-18	4.6	7.6E-08	3.8
1979	3.0E-10	5.1	6.9E-08	4.1	3.7E-10	3.5	1.4E-10	4.9	1.9E-11	6.1	2.7E-11	4.2	6.0E-10	5.0	1.0E-17	5.1	7.7E-08	3.7
1980	3.0E-10	5.0	7.0E-08	4.1	3.8E-10	3.5	1.4E-10	5.3	1.9E-11	5 8	2.8E-11	4.2	6.0E-10	4.9	1.0E-17	5.0	7.9E-08	3.6
1981	3.1E-10	4.9	7.0E-08	4.2	3.8E-10	3.5	1.4E-10	4 8	1.9E-11	5.6	2 7E-11	4.2	6.1E-10	4.7	1.0E-17	4.7	7.8E-08	3.7
1982	3.1E-10	4.8	7.2E-08	4.1	3.8E-10	3.5	1.4E-10	5.0	2 0E-11	6.0	2.8E-11	4.4	6.1E-10	4.9	1.0E-17	5.0	8.0E-08	3.7
1983	3.1E-10	5.2	7.2E-08	4.2	3.9E-10	3.5	1.4E-10	4.9	2.0E-11	5.4	2.8E-11	4.0	6.2E-10	4.8	1.0E-17	4.9	8.1E-08	3.7
1984	3.1E-10	5.1	7.3E-08	4.3	3 9E-10	3.4	1.4E-10	5.2	2 0E-11	6.1	2.8E-11	4.1	6.3E-10	4.7	1.0E-17	4.8	8.2E-08	3.8
1985	3.1E-10	4.4	7.3E-08	4.2	4.0E-10	3 6	1.4E-10	4.9	2.0E-11	5.5	2.9E-11	4.3	6.3E-10	4.5	1.0E-17	4 6	8.2E-08	3.8
1986	3.2E-10	4.8	7.4E-08	4 0	4.0E-10	3 6	1.4E-10	4 8	2.0E-11	5.6	2.8E-11	4.2	6.4E-10	5.1	1.1E-17	4.8	8.3E-08	3 5
1987	3.2E-10	4.8	7.5E-08	4.2	4.0E-10	3.5	1.5E-10	4.9	2.0E-11	5.7	2.8E-11	4.4	6.5E-10	5.0	1.1E-17	5.0	8.4E-08	3.7
1988	3.2E-10	4.8	7.5E-08	4.1	4.1E-10	3.5	1.5E-10	5.5	2 1E-11	5.3	2.8E-11	4.1	6.5E-10	5.1	1.1E-17	5.0	8.5E-08	3.6
1989	3.3E-10	4.7	7.6E-08	4 3	4.1E-10	3.4	1.5E-10	4.8	2.1E-11	5.5	2.9E-11	4.3	6.5E-10	5.0	1.1E-17	4.9	8.5E-08	3.9

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 9B
(1970-1989)

Year	Soil Ingestion		Vegetable Ingestion		Ground Exposure		Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1970	8.7E-11	4.7	2.0E-08	4.4	1.1E-10	3.6	3.9E-11	5.2	5.5E-12	5.8	7.7E-12	4.3	1.7E-10	4.7	2.9E-18	4.8	2.2E-08	3.9
1971	8.8E-11	4.9	2.0E-08	4.0	1.1E-10	3.4	4.0E-11	5.3	5.6E-12	5.6	7.9E-12	4.3	1.8E-10	5.1	2.9E-18	5.1	2.3E-08	3.5
1972	8.9E-11	5.1	2.1E-08	4.2	1.1E-10	3.4	4.1E-11	4.9	5.7E-12	5.4	8.1E-12	4.3	1.8E-10	4.7	3.0E-18	4.8	2.3E-08	3.7
1973	9.1E-11	5.0	2.1E-08	4.0	1.1E-10	3.4	4.1E-11	4.9	5.8E-12	5.6	8.2E-12	4.3	1.8E-10	5.1	3.0E-18	5.2	2.3E-08	3.7
1974	9.2E-11	5.0	2.2E-08	3.8	1.2E-10	3.5	4.2E-11	4.7	5.9E-12	5.8	8.6E-12	4.0	1.8E-10	4.7	3.1E-18	4.9	2.4E-08	3.4
1975	9.4E-11	4.9	2.2E-08	4.0	1.2E-10	3.6	4.3E-11	5.0	6.0E-12	5.5	8.4E-12	4.3	1.9E-10	5.1	3.1E-18	5.1	2.4E-08	3.6
1976	9.5E-11	4.9	2.2E-08	3.9	1.2E-10	3.5	4.3E-11	5 0	6.1E-12	5.6	8.5E-12	4.3	1.9E-10	4.8	3.2E-18	4.8	2.5E-08	3.5
1977	9.6E-11	5.1	2.3E-08	4.0	1.2E-10	3.5	4.4E-11	5.0	6.2E-12	5.6	8.7E-12	4.2	1.9E-10	4.9	3.2E-18	4.9	2.5E-08	3.6
1978	9.8E-11	5.0	2.3E-08	4.2	1.2E-10	3.4	4.5E-11	5.0	6.3E-12	5.3	8.5E-12	4.0	2.0E-10	4.8	3.3E-18	4.8	2.5E-08	3.8
1979	9.9E-11	4.7	2.3E-08	4.3	1.2E-10	3.5	4.5E-11	4.8	6.4E-12	5.9	9.1E-12	4.4	2.0E-10	4.8	3.3E-18	5.0	2.6E-08	3.9
1980	1.0E-10	4.7	2.3E-08	4.2	1.3E-10	3.6	4.5E-11	5.0	6.5E-12	5.5	9.0E-12	4.1	2.0E-10	4.9	3.4E-18	4.9	2.6E-08	3.8
1981	1.0E-10	5.1	2.4E-08	4.2	1.3E-10	3.5	4.6E-11	5.0	6.5E-12	5.8	9.2E-12	4.4	2.0E-10	4.7	3.4E-18	4.7	2.6E-08	3.7
1982	1.0E-10	4.8	2.4E-08	4.0	1.3E-10	3.5	4.6E-11	5.1	6.4E-12	5.5	9.0E-12	4.3	2.0E-10	4.7	3.4E-18	4.9	2.6E-08	3.6
1983	1.0E-10	4.8	2.4E-08	4.0	1.3E-10	3.5	4.7E-11	4.8	6.6E-12	6.0	9.5E-12	4.3	2.1E-10	4.8	3.4E-18	4.8	2.7E-08	3.6
1984	1.0E-10	4.7	2.4E-08	4.1	1.3E-10	3.6	4.7E-11	5.1	6.8E-12	5 2	9.2E-12	4.0	2.1E-10	4.8	3.5E-18	5.0	2.7E-08	3.7
1985	1.1E-10	4.2	2.4E-08	4.2	1.3E-10	3.4	4.8E-11	4 8	6.7E-12	6.5	9.5E-12	4.6	2.1E-10	4.6	3.5E-18	4.6	2.7E-08	3.8
1986	1.1E-10	5.1	2.5E-08	4.1	1.3E-10	3.5	4.8E-11	5.1	6.9E-12	6.3	9.8E-12	4.2	2.1E-10	4.7	3.5E-18	4.8	2.7E-08	3.7
1987	1.1E-10	5.2	2.5E-08	4.1	1 3E-10	3.5	4.9E-11	5.0	6.7E-12	5.3	9.6E-12	4.1	2.1E-10	5.0	3.6E-18	4.9	2.8E-08	3.7
1988	1.1E-10	5.0	2.5E-08	4.3	1.3E-10	3.4	4.9E-11	4.8	6.8E-12	5.4	9.6E-12	4.3	2.2E-10	5.1	3.6E-18	5.2	2.8E-08	3.8
1989	1.1E-10	5.3	2.5E-08	4.2	1.4E-10	3.4	4.9E-11	4 8	6.9E-12	5.7	9.7E-12	4.2	2.2E-10	4.5	3.6E-18	4.6	2.8E-08	3.8

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 10A
(1970-1989)

Year	Soil Ingestion		Vegetable Ingestion		Ground Exposure		Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1970	8.1E-11	4.9	1.8E-08	4.5	1.0E-10	3.4	3.7E-11	4 9	5.0E-12	6.2	7.1E-12	4.7	1.8E-10	4.9	3.0E-18	4.9	2.0E-08	3.9
1971	8.3E-11	4.8	2.1E-08	4.2	1.2E-10	3.5	3.5E-11	4.5	4.8E-12	5.5	7.0E-12	4.1	1.5E-10	4.5	2.6E-18	4.6	2.3E-08	3.7
1972	8.5E-11	5.0	1.7E-08	4.1	9.9E-11	3.5	3.8E-11	5.1	5.2E-12	5.8	7.7E-12	4.1	1.7E-10	4.8	2.7E-18	5.0	1.9E-08	3.6
1973	8.7E-11	4.5	1.7E-08	4.1	1.0E-10	3 5	3.8E-11	4 8	5.4E-12	5.5	7.7E-12	4.1	1.7E-10	4.5	2.8E-18	4.4	1.9E-08	3 6
1974	8.1E-11	4.9	1.9E-08	4.0	1.0E-10	3 6	3.8E-11	4.8	5.5E-12	5.6	7.2E-12	4.4	1.5E-10	4.9	2.6E-18	4.8	2 1E-08	3.7
1975	7.4E-11	5.2	2.1E-08	4.2	1.1E-10	3.4	3.8E-11	4.9	4.9E-12	6.1	7.2E-12	4.1	1.6E-10	5.2	2.6E-18	5.3	2.3E-08	3.8
1976	8.6E-11	4.4	2.2E-08	4.0	1.2E-10	3.4	3.6E-11	4 8	5.6E-12	5.2	8.5E-12	4.0	1.7E-10	4.6	2.8E-18	4.7	2.4E-08	3 6
1977	9.4E-11	4.9	2.1E-08	4.1	1.0E-10	3.3	3.3E-11	4.9	6 2E-12	5 6	9.0E-12	4.5	1.8E-10	4.8	3.1E-18	4.9	2.4E-08	3.7
1978	9.6E-11	4.7	2.0E-08	3.9	1.1E-10	3.5	4 0E-11	4.6	5.7E-12	5.7	8.1E-12	4.2	1.7E-10	4.8	2.8E-18	4.7	2.2E-08	3.5
1979	8.7E-11	4.7	2.1E-08	4.2	1.2E-10	3.7	4.2E-11	5 1	5.6E-12	5.7	8.0E-12	4.1	1.8E-10	4.3	3.0E-18	4.5	2.3E-08	3.6
1980	9.0E-11	4.7	2.2E-08	4.2	1.1E-10	3.7	3.3E-11	4 8	6 5E-12	6.0	8.7E-12	4.7	1.7E-10	4.6	3.0E-18	4.7	2.5E-08	3 7
1981	9.1E-11	4.4	2.1E-08	4.0	1.2E-10	3.5	4.3E-11	4.6	5 6E-12	5.4	8.2E-12	4.2	1.7E-10	4.9	2.8E-18	4.9	2.4E-08	3.6
1982	9.1E-11	4.5	2.2E-08	4.1	1.2E-10	3.6	4.1E-11	5 2	6.7E-12	5.7	8 9E-12	3.9	2.1E-10	4.8	3.4E-18	4.9	2.4E-08	3.7
1983	8.8E-11	4.9	1.9E-08	4.1	1.2E-10	3.6	4.2E-11	4.7	5.7E-12	5.1	8.1E-12	4.1	1.8E-10	5.1	3.0E-18	5.1	2.2E-08	3 6
1984	9.5E-11	5.1	2.1E-08	4.0	1.2E-10	3 6	4.3E-11	4.7	5 5E-12	5.9	8.6E-12	4.5	1.9E-10	4.7	3.1E-18	4.7	2.4E-08	3.6
1985	8.9E-11	4.6	2.0E-08	4.2	1.2E-10	3.5	4.1E-11	5.3	5.5E-12	6.0	7.8E-12	4.3	1.9E-10	4.7	3.1E-18	4.8	2 3E-08	3.7
1986	9.6E-11	4.9	2.4E-08	4.2	1.3E-10	3.7	4.6E-11	4.9	6.9E-12	6.2	8.7E-12	4.1	2.0E-10	4.2	3.2E-18	4.3	2.7E-08	3.8
1987	1.2E-10	4.9	2.3E-08	4.2	1.1E-10	3.5	4.8E-11	4.8	5.9E-12	5.4	8 8E-12	4.3	2.2E-10	4.8	3.8E-18	5.0	2.5E-08	3.8
1988	1.0E-10	4.9	2.3E-08	4.2	1.2E-10	3.4	4.7E-11	4 8	6 0E-12	5.7	9.1E-12	4.4	2.1E-10	4.5	3.5E-18	4.5	2.6E-08	3.7
1989	9.8E-11	4.9	2.3E-08	4 1	1.3E-10	3 6	3.9E-11	5 1	6.7E-12	5.6	9.7E-12	4.0	2.0E-10	4.7	3.4E-18	4 6	2.5E-08	3.6

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 10B
(1970-1989)

Year	Soil Ingestion		Vegetable Ingestion		Ground Exposure		Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1970	7.5E-12	4.7	1.7E-09	4.2	1.0E-11	3.3	3 1E-12	5.0	5.0E-13	6.0	6.5E-13	4.2	1.3E-11	4.8	2.2E-19	4.9	1.9E-09	3.8
1971	7.7E-12	4.7	1.7E-09	4.1	9.1E-12	3.5	3.4E-12	5.0	4.5E-13	5.4	6.5E-13	4.0	1.6E-11	4.5	2.6E-19	4.7	1.9E-09	3.7
1972	7.2E-12	4.9	1.7E-09	3.7	9.8E-12	3.4	3.5E-12	5.5	4.4E-13	5.9	6.5E-13	4.1	1.4E-11	4.9	2.3E-19	4.9	1.9E-09	3.4
1973	7.4E-12	4.5	1.8E-09	4.3	1.0E-11	3.3	3.6E-12	5.2	5.5E-13	5.7	6.7E-13	4.1	1.5E-11	4.6	2.4E-19	4.6	2.0E-09	3.8
1974	7.9E-12	4.7	1.9E-09	4.0	1.1E-11	3.6	3.5E-12	4.9	5.2E-13	5.5	7.0E-13	4.2	1.6E-11	4.8	2.6E-19	4.9	2.1E-09	3.7
1975	7.8E-12	5.2	1.8E-09	4.2	9.9E-12	3.5	3.5E-12	4.9	5.1E-13	5.8	6.6E-13	4.5	1.8E-11	5.0	3.0E-19	5.0	2.1E-09	3.7
1976	8.5E-12	4.8	1.7E-09	4.4	1.1E-11	3.3	3.3E-12	4 9	5.5E-13	5.4	7.4E-13	4.1	1.7E-11	5.1	2.9E-19	5.1	2.0E-09	3.9
1977	8.3E-12	4.6	2.0E-09	4.1	1.0E-11	3.7	3.6E-12	4.7	5.4E-13	5.7	7.2E-13	4.3	1.7E-11	5.0	2.7E-19	5.3	2.2E-09	3.7
1978	7.1E-12	4.7	2.0E-09	4.2	1.1E-11	3.5	3.9E-12	5.5	5.6E-13	5.9	7.2E-13	4.4	1.6E-11	4.8	2.7E-19	4.8	2.2E-09	3.8
1979	9.6E-12	4.8	2.0E-09	4.1	1.1E-11	3.4	4.2E-12	4.8	5.8E-13	5.3	7.5E-13	3.9	1.9E-11	4.6	3.0E-19	4.8	2.3E-09	3.7
1980	7.8E-12	5.2	2.0E-09	4.1	1.0E-11	3.4	4.0E-12	4.9	4.9E-13	5.5	7.5E-13	4.1	1.8E-11	4.6	3.0E-19	4.7	2.2E-09	3.7
1981	8.0E-12	4.8	1.8E-09	3.8	1.3E-11	3.6	3.9E-12	5 0	5.2E-13	5.7	7.4E-13	4.1	1.6E-11	4.9	2.8E-19	4.9	2.1E-09	3.3
1982	8.7E-12	4.9	1.8E-09	4.4	1.2E-11	3.5	4.0E-12	5 3	5 8E-13	6.0	9.1E-13	4.3	1.9E-11	4.6	3.1E-19	4.7	2.1E-09	3.8
1983	9.2E-12	4.8	2.1E-09	4.3	1.0E-11	3.4	4.0E-12	4.9	6.0E-13	6.3	8.8E-13	4.2	1.7E-11	5.0	2.9E-19	5.1	2.3E-09	3.8
1984	8.4E-12	5.1	2.2E-09	4.6	1.2E-11	3.7	4.1E-12	4.6	6.4E-13	6.3	8.1E-13	4.8	1.7E-11	5.1	2.6E-19	5.0	2.4E-09	4.0
1985	8.5E-12	4.8	2.4E-09	4.2	1.2E-11	3.5	4.2E-12	5.0	5.9E-13	5.4	7.9E-13	4.3	1.7E-11	4.4	2.8E-19	4.6	2.6E-09	3.9
1986	9.4E-12	4.9	2.2E-09	4.0	1.2E-11	3.5	4.4E-12	4.4	5.8E-13	6.0	8.2E-13	4.4	1.7E-11	4.8	2.9E-19	5.0	2.4E-09	3.6
1987	1.0E-11	4.9	2.2E-09	3.9	1.3E-11	3.7	4.2E-12	4.6	5.6E-13	5.6	8.1E-13	4.2	2.0E-11	4.8	3.3E-19	4.8	2.5E-09	3.5
1988	8.1E-12	4.8	2.1E-09	4.2	1.1E-11	3.6	4.1E-12	5.3	5 0E-13	5.7	7.1E-13	4.0	1.7E-11	4.7	2.8E-19	4.7	2.4E-09	3.8
1989	1.0E-11	4.5	2.2E-09	4.1	1.2E-11	3.2	4.0E-12	4.9	6.3E-13	6.0	9.1E-13	4.4	1.9E-11	4.4	3.3E-19	4.3	2.5E-09	3.8

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E 01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 11A
(1970-1989)

Year	Soil Ingestion		Vegetable Ingestion		Ground Exposure		Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1970	8.5E-12	4.8	1.7E-09	4.3	8.8E-12	3.7	3.3E-12	5 3	4.9E-13	6.1	7.3E-13	4.6	1.5E-11	5.0	2.5E-19	5.0	1.9E-09	3.9
1971	7.8E-12	4.8	1.6E-09	4.2	1.0E-11	3 4	3.7E-12	4.7	5.1E-13	5.8	6.9E-13	4.7	1.5E-11	4.8	2.4E-19	4.8	1.8E-09	3.8
1972	8.8E-12	4.9	1.6E-09	4.1	1.1E-11	3 4	3.4E-12	4 8	5.1E-13	5.5	7.2E-13	4.1	1.9E-11	4.5	3.3E-19	4.5	1.8E-09	3.6
1973	8.0E-12	4.8	1.9E-09	4.3	9.8E-12	3.7	3 3E-12	4.9	4.9E-13	5.4	6.9E-13	4.3	1.5E-11	4.5	2.6E-19	4.6	2.1E-09	3.9
1974	7.9E-12	4.6	1.8E-09	4.2	1.0E-11	3.8	3.8E-12	5.2	4.9E-13	5.3	6.5E-13	4.0	1.5E-11	4.5	2.4E-19	4.5	2.0E-09	3.8
1975	8.0E-12	4.8	2.0E-09	4.2	1.0E-11	3.5	3.8E-12	5.0	5.3E-13	6.5	7.6E-13	4.5	1.6E-11	4.6	2.6E-19	4.8	2.2E-09	3.7
1976	8.6E-12	4.4	2.0E-09	4.2	1.0E-11	3.4	4.0E-12	5.1	6.5E-13	5.8	8.0E-13	4.2	1.7E-11	4.5	2.8E-19	4.6	2.2E-09	3 8
1977	7.9E-12	4.8	1.8E-09	4.3	1.0E-11	3.5	3.6E-12	4.6	5.3E-13	5.9	7.5E-13	4.2	1.7E-11	4.8	2.8E-19	4.7	2.0E-09	3 8
1978	8.4E-12	4.6	2.0E-09	4.3	1.0E-11	3.5	4.5E-12	4.8	5.5E-13	5.8	7.5E-13	4.2	1.7E-11	4.8	2.9E-19	4.7	2.2E-09	3.9
1979	8.4E-12	5.0	2.0E-09	4.1	1.0E-11	3.7	3.8E-12	5.0	6.0E-13	5.3	8.1E-13	4.2	1.9E-11	4.6	3.2E-19	4.8	2.2E-09	3.7
1980	9.4E-12	4.9	2.0E-09	4.3	1.0E-11	3.4	4.3E-12	4 8	5.1E-13	5 8	7.8E-13	4.3	1.8E-11	4.9	3.0E-19	5.0	2.2E-09	3.9
1981	9.8E-12	4.9	2.0E-09	4.1	1.1E-11	3.6	3.7E-12	5.1	5.7E-13	5.3	7.9E-13	4.1	1.9E-11	5.5	3.0E-19	5.2	2.2E-09	3.7
1982	9.1E-12	5.1	2.2E-09	3.8	9.9E-12	3.4	4.0E-12	4.8	5.7E-13	5.6	7.8E-13	4.3	1.8E-11	5.0	3.0E-19	5.0	2.4E-09	3.4
1983	9.4E-12	5.0	2.0E-09	4.2	1.1E-11	3.4	3 6E-12	4.8	5.2E-13	6.1	8.1E-13	4.5	2.1E-11	4.8	3.5E-19	4.6	2.2E-09	3.8
1984	8.6E-12	4.8	2.2E-09	4.2	1.1E-11	3 4	4.2E-12	4.6	6.3E-13	6.2	8.3E-13	4.3	1.9E-11	4.5	3.1E-19	4.5	2.5E-09	3.8
1985	8.7E-12	4.5	2.1E-09	4.2	1.2E-11	3.4	4.4E-12	4.4	5.6E-13	5.7	8.3E-13	4.4	1.8E-11	5.1	2.9E-19	5.1	2.3E-09	3.7
1986	8.8E-12	4.6	1.8E-09	4.4	1.1E-11	3.5	4.4E-12	5.1	5.6E-13	6.0	7.4E-13	4 3	1.9E-11	4.7	3.1E-19	4.7	2.0E-09	3.8
1987	9.4E-12	4.5	2.2E-09	4.5	1.2E-11	3.5	4.2E-12	4.7	6.2E-13	5.6	8.8E-13	4 2	2.0E-11	4.7	3.2E-19	4.7	2.4E-09	4.0
1988	1.1E-11	4.6	2.3E-09	4.2	1.0E-11	3.5	4.7E-12	4.4	6.2E-13	5.9	9.4E-13	4.4	2.1E-11	4.7	3.4E-19	4.7	2.6E-09	3.8
1989	8.9E-12	5.2	2.3E-09	4.3	1.2E-11	3 6	4 2E-12	4.8	6.7E-13	5.9	8.3E-13	4.5	1.8E-11	5.0	2.9E-19	5 0	2.6E-09	3.8

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 11B
(1970-1989)

Year	Soil Ingestion		Vegetable Ingestion		Ground Exposure		Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1970	1.2E-10	4.5	2.7E-08	4.1	1.3E-10	3.5	5.2E-11	4.5	6.8E-12	5.6	1.0E-11	4.3	2.2E-10	4.6	3.7E-18	4.6	3.0E-08	3.8
1971	1.1E-10	4.7	2.6E-08	4.1	1.4E-10	3.4	4.8E-11	4.8	7.0E-12	5.3	9.8E-12	4.3	2.4E-10	5.1	4.0E-18	5.1	2.9E-08	3.7
1972	9.9E-11	4.9	2.7E-08	4.0	1.4E-10	3.5	5.1E-11	5.0	6.9E-12	5.8	9.7E-12	4.1	2.0E-10	4.9	3.3E-18	5.0	2.9E-08	3.7
1973	1.2E-10	4.8	2.6E-08	4.0	1.5E-10	3.6	5.7E-11	4.3	7.4E-12	5.5	9.8E-12	4.1	2.6E-10	4.3	4.2E-18	4.3	2.8E-08	3.6
1974	1.2E-10	4.6	2.7E-08	4.2	1.5E-10	3.6	5.6E-11	4.9	6.9E-12	5.9	9.8E-12	4.1	2.3E-10	4.2	3.8E-18	4.3	3.0E-08	3.8
1975	9.9E-11	5.2	3.0E-08	4.4	1.3E-10	3.5	5.6E-11	5.0	7.0E-12	5.9	1.1E-11	4.4	2.1E-10	5.0	3.4E-18	5.1	3.3E-08	3.9
1976	1.2E-10	4.5	2.7E-08	4.3	1.5E-10	3.5	5.8E-11	5.1	7.8E-12	5.8	1.1E-11	4.4	2.3E-10	4.8	3.9E-18	4.9	3.0E-08	3.8
1977	1.2E-10	5.0	2.8E-08	3.9	1.6E-10	3.4	5.0E-11	5.0	8.0E-12	5.4	1.0E-11	4.1	2.3E-10	4.8	3.8E-18	4.9	3.1E-08	3.6
1978	1.2E-10	4.9	2.7E-08	4.4	1.6E-10	3.4	5.4E-11	5.0	6.6E-12	6.5	9.6E-12	4.6	2.4E-10	5.3	4.0E-18	5.2	3.1E-08	4.0
1979	1.3E-10	5.2	2.9E-08	4.3	1.5E-10	3.4	5.6E-11	4.6	8.0E-12	6.0	1.2E-11	4.7	2.7E-10	5.1	4.6E-18	5.0	3.3E-08	3.9
1980	1.2E-10	4.6	3.0E-08	4.1	1.6E-10	3.3	6.0E-11	5.3	8.9E-12	5.7	1.2E-11	4.2	2.7E-10	4.9	4.5E-18	5.0	3.4E-08	3.7
1981	1.3E-10	4.8	3.2E-08	4.2	1.6E-10	3.5	5.7E-11	4.9	8.3E-12	5.9	1.2E-11	4.6	2.5E-10	4.6	4.1E-18	4.8	3.5E-08	3.7
1982	1.2E-10	5.1	2.8E-08	4.5	1.6E-10	3.4	5.2E-11	4.9	7.5E-12	5.8	1.1E-11	4.3	2.4E-10	5.0	4.0E-18	4.9	3.1E-08	4.0
1983	1.2E-10	5.0	3.0E-08	4.0	1.5E-10	3.5	5.8E-11	5.1	7.7E-12	6.4	1.1E-11	4.3	2.3E-10	4.4	3.8E-18	4.5	3.3E-08	3.6
1984	1.4E-10	4.4	3.0E-08	4.2	1.7E-10	3.4	6.2E-11	5.0	7.8E-12	5.6	1.2E-11	3.9	2.8E-10	4.6	4.5E-18	4.8	3.4E-08	3.6
1985	1.3E-10	5.0	3.4E-08	3.9	1.6E-10	3.5	6.0E-11	5.2	9.5E-12	5.6	1.3E-11	4.3	2.5E-10	4.9	4.0E-18	5.0	3.7E-08	3.6
1986	1.4E-10	4.6	3.0E-08	4.0	1.6E-10	3.4	5.9E-11	4.9	8.2E-12	5.4	1.1E-11	3.9	2.7E-10	4.7	4.5E-18	4.7	3.4E-08	3.6
1987	1.4E-10	5.2	3.2E-08	3.9	1.6E-10	3.1	6.3E-11	4.6	8.0E-12	5.6	1.2E-11	4.3	3.1E-10	4.8	4.9E-18	4.8	3.6E-08	3.5
1988	1.3E-10	5.0	3.0E-08	4.1	1.6E-10	3.3	6.3E-11	4.6	8.4E-12	6.2	1.1E-11	4.4	2.4E-10	5.2	4.1E-18	5.1	3.4E-08	3.7
1989	1.4E-10	4.9	3.1E-08	4.2	1.8E-10	3.5	6.1E-11	4.9	8.8E-12	5.9	1.2E-11	4.3	3.0E-10	4.7	5.0E-18	4.8	3.5E-08	3.8

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 12A
(1970-1989)

Year	Soil Ingestion		Vegetable Ingestion		Ground Exposure		Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1970	2.0E-10	5.0	4.5E-08	4.2	2.5E-10	3.2	9.1E-11	5.0	1.2E-11	5.4	1.7E-11	4.2	3.9E-10	5.3	6.7E-18	5.4	5.1E-08	3.8
1971	1.9E-10	4.7	4.6E-08	4.3	2.7E-10	3.4	9.2E-11	4.9	1.4E-11	5.9	1.9E-11	4.4	4.0E-10	4.6	6.5E-18	4.7	5.2E-08	3.8
1972	2.2E-10	4.4	4.9E-08	4.1	2.7E-10	3.6	9.4E-11	5.0	1.4E-11	5.6	1.7E-11	4.8	4.4E-10	5.0	7.2E-18	4.9	5.5E-08	3.7
1973	2.1E-10	4.8	5.0E-08	4.2	2.7E-10	3.6	8.8E-11	4.8	1.5E-11	6.1	1.9E-11	4.1	4.2E-10	4.7	7.0E-18	4.6	5.6E-08	3.8
1974	2.4E-10	4.7	4.8E-08	4.5	2.6E-10	3.6	1.0E-10	4.8	1.4E-11	5.7	2.1E-11	4.1	4.3E-10	5.1	7.1E-18	5.1	5.4E-08	3.9
1975	2.4E-10	4.8	5.6E-08	3.8	2.8E-10	3.3	9.3E-11	4.8	1.5E-11	5.4	2.1E-11	3.9	4.7E-10	4.6	7.9E-18	4.7	6.1E-08	3.5
1976	2.0E-10	5.1	5.4E-08	4.1	2.5E-10	3.5	8.9E-11	4.4	1.7E-11	5.2	2.1E-11	4.2	3.9E-10	4.9	6.5E-18	4.9	5.9E-08	3.8
1977	2.0E-10	5.0	5.2E-08	3.9	3.0E-10	3.6	9.8E-11	4.7	1.6E-11	5.6	2.1E-11	4.3	4.2E-10	5.1	6.6E-18	5.2	5.8E-08	3.5
1978	2.1E-10	5.3	5.3E-08	4.4	2.6E-10	3.5	1.0E-10	4.8	1.6E-11	6.3	2.3E-11	4.5	4.3E-10	4.7	7.2E-18	4.7	6.0E-08	3.9
1979	2.4E-10	4.9	5.2E-08	4.2	2.7E-10	3.4	9.9E-11	5.3	1.7E-11	5.3	2.2E-11	3.9	4.7E-10	5.0	7.7E-18	5.2	5.8E-08	3.8
1980	2.2E-10	4.9	5.4E-08	4.4	3.0E-10	3.4	1.1E-10	5.0	1.5E-11	5.5	1.9E-11	4.2	4.4E-10	4.8	7.2E-18	4.8	6.1E-08	3.9
1981	2.3E-10	4.6	5.4E-08	3.9	3.2E-10	3.4	8.9E-11	5.0	1.3E-11	5.8	2.0E-11	4.2	4.9E-10	4.6	8.2E-18	4.6	6.0E-08	3.5
1982	2.3E-10	4.6	5.8E-08	4.3	2.9E-10	3.7	1.0E-10	4.8	1.7E-11	5.2	2.2E-11	4.3	4.6E-10	4.8	7.6E-18	4.8	6.4E-08	3.9
1983	2.4E-10	5.0	5.3E-08	3.8	3.2E-10	3.3	1.1E-10	4.8	1.5E-11	5.7	1.9E-11	4.2	4.6E-10	4.6	7.5E-18	4.7	5.9E-08	3.4
1984	3.0E-10	5.0	5.8E-08	3.9	3.0E-10	3.6	1.2E-10	4.6	1.5E-11	5.5	2.2E-11	4.3	5.6E-10	4.9	9.1E-18	5.0	6.5E-08	3.6
1985	2.4E-10	4.6	5.8E-08	4.1	2.8E-10	3.4	1.1E-10	5.1	1.4E-11	5.3	2.1E-11	3.9	4.8E-10	4.9	8.3E-18	4.9	6.5E-08	3.7
1986	2.2E-10	5.6	5.9E-08	4.3	3.1E-10	3.5	1.3E-10	4.8	1.7E-11	5.8	2.2E-11	4.7	4.7E-10	5.2	7.7E-18	5.0	6.6E-08	3.9
1987	2.5E-10	4.8	5.4E-08	4.2	3.4E-10	3.4	1.1E-10	4.6	1.5E-11	5.2	2.1E-11	4.4	5.0E-10	4.5	8.2E-18	4.4	6.1E-08	3.8
1988	2.4E-10	5.1	5.8E-08	4.1	2.9E-10	3.5	1.1E-10	5.3	1.6E-11	5.8	2.1E-11	4.3	4.7E-10	4.9	8.0E-18	4.9	6.5E-08	3.7
1989	2.3E-10	4.7	6.0E-08	4.0	3.5E-10	3.5	1.1E-10	4.9	1.6E-11	5.6	2.1E-11	4.1	5.0E-10	4.6	8.4E-18	4.5	6.7E-08	3.6

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Sector 12B
(1970-1989)

Year	Soil Ingestion		Vegetable Ingestion		Ground Exposure		Wheat Ingestion		Milk Ingestion		Beef Ingestion		Inhalation of Resuspended Particulates		Immersion in Resuspended Particulates		Total Dose	
	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD	GM (Sv/year)	GSD
1970	3.3E-09	5.1	7.0E-07	4.1	3.5E-09	3.4	1.4E-09	4.9	2.0E-10	5.8	2.7E-10	4.1	7.2E-09	4.9	1.2E-16	4.9	7.9E-07	3.7
1971	2.9E-09	4.6	7.5E-07	3.9	4.0E-09	3.5	1.5E-09	4.9	1.9E-10	5.1	2.6E-10	3.7	6.0E-09	4.3	1.0E-16	4.3	8.3E-07	3.6
1972	3.5E-09	5.2	7.3E-07	4.2	3.9E-09	3.4	1.6E-09	5.2	2.3E-10	5.2	2.9E-10	4.2	6.6E-09	4.8	1.1E-16	4.8	8.1E-07	3.8
1973	3.3E-09	4.7	7.9E-07	4.0	4.2E-09	3.5	1.5E-09	4.6	2.2E-10	6.4	3.3E-10	4.3	6.9E-09	4.6	1.2E-16	4.6	8.9E-07	3.5
1974	3.9E-09	4.6	7.9E-07	4.3	4.3E-09	3.3	1.6E-09	5.4	2.4E-10	5.4	3.3E-10	4.2	8.0E-09	4.4	1.3E-16	4.3	8.9E-07	3.8
1975	3.8E-09	4.9	7.7E-07	3.9	4.5E-09	3.7	1.5E-09	4.5	2.0E-10	5.6	3.2E-10	4.0	7.7E-09	5.3	1.3E-16	5.4	8.7E-07	3.4
1976	3.3E-09	4.6	7.6E-07	4.1	4.1E-09	3.4	1.5E-09	5.0	2.1E-10	5.8	3.0E-10	4.3	6.6E-09	4.9	1.1E-16	4.8	8.5E-07	3 7
1977	3.8E-09	4.7	8.0E-07	4.0	3.8E-09	3.8	1.6E-09	4.8	2.2E-10	5.2	3.0E-10	4.0	7.2E-09	4.6	1.2E-16	4.6	8.8E-07	3.6
1978	3.3E-09	4.7	8.7E-07	4.3	4.5E-09	3.4	1.6E-09	5.4	2.2E-10	5.5	3.0E-10	4.2	5.9E-09	5.0	1.0E-16	4.9	9.6E-07	3.9
1979	3.5E-09	4.8	8.8E-07	4.0	4.0E-09	3.3	1.6E-09	5.1	2.4E-10	5.9	3.3E-10	4.3	7.1E-09	4.5	1.2E-16	4.5	9.8E-07	3.6
1980	3.4E-09	4.7	8.2E-07	4.2	5.1E-09	3.7	1.7E-09	5 0	2.4E-10	5.7	3.3E-10	4.4	6.8E-09	4.4	1.1E-16	4.5	9.1E-07	3.7
1981	3.7E-09	5.0	8.6E-07	4.1	4.5E-09	3.7	1.5E-09	4.5	2.6E-10	6.0	3.3E-10	4.2	7.3E-09	4.9	1.2E-16	5.0	9.6E-07	3.7
1982	3.5E-09	5.3	8.6E-07	4.4	4.6E-09	3.4	1 9E-09	4.7	2.3E-10	5.6	3.2E-10	4.2	7.0E-09	4.9	1.1E-16	4.9	9.6E-07	3.9
1983	4.2E-09	4.9	8.3E-07	4.5	4.3E-09	3.5	1.6E-09	5 0	2.4E-10	5.8	3.6E-10	4.4	8.5E-09	4.3	1.4E-16	4.3	9.3E-07	4.1
1984	3.5E-09	5.0	9.2E-07	4.2	5.0E-09	3.7	1.9E-09	5.6	2.8E-10	5.5	3.3E-10	4.3	7.4E-09	4.8	1.2E-16	4.8	1.0E-06	3.7
1985	4.4E-09	4.4	9.5E-07	4.5	4.7E-09	3.3	1.7E-09	5.1	2.4E-10	5.8	3.2E-10	4.2	8.3E-09	4.7	1.4E-16	4.6	1.1E-06	4.0
1986	3.5E-09	5.0	9.5E-07	3.9	4.8E-09	3.5	1.8E-09	5.1	2.3E-10	5.1	3.1E-10	4.1	6.6E-09	4.6	1.1E-16	4.6	1.0E-06	3.6
1987	4.0E-09	4.9	1.0E-06	3.8	4.8E-09	3.5	1.6E-09	4.9	2.9E-10	5.0	3.8E-10	3.7	8.3E-09	4.5	1.4E-16	4.6	1.1E-06	3.5
1988	3.7E-09	4.8	8.4E-07	4.0	5.1E-09	3.3	1.7E-09	4.7	2.7E-10	6.1	3.3E-10	4.5	7.1E-09	4.9	1.2E-16	5.0	9.3E-07	3.6
1989	4.1E-09	5.1	8.6E-07	4.4	4.8E-09	3.3	1.8E-09	5.0	2.4E-10	5.8	3.4E-10	4.1	8.5E-09	4.8	1.4E-16	4.8	9.7E-07	3.8

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Denver
(1970-1989)

Year	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1970	2.0E-10	4.6	4.9E-08	4.0	2.5E-10	3.6	9.5E-11	5.0	1.4E-11	5.6	1.8E-11	4.2	3.8E-10	5.1	6.4E-18	5.1	5.4E-08	3 7
1971	2.0E-10	5.0	5.2E-08	4.1	2.4E-10	3.6	1 0E-10	5.1	1 4E-11	5.4	1.9E-11	4.1	4.3E-10	4.4	7.3E-18	4.4	5.8E-08	3.7
1972	2.1E-10	4.9	4.6E-08	4.1	2.6E-10	3.6	7.6E-11	5 4	1.2E-11	6.1	1.9E-11	4.3	4.6E-10	4.5	7.7E-18	4.6	5.2E-08	3.7
1973	2.3E-10	4.5	5.1E-08	3.9	3 0E-10	3.3	9.9E-11	4.8	1.2E-11	5.8	1.8E-11	4.1	4.4E-10	4.3	7.3E-18	4.4	5.7E-08	3 5
1974	2.2E-10	5.6	5.1E-08	3.9	2.7E-10	3.7	9.7E-11	5.2	1.3E-11	5.3	2.1E-11	4.1	4.4E-10	5.1	7.3E-18	5.2	5.7E-08	3.5
1975	2.4E-10	5.0	4.9E-08	4.4	2.7E-10	3.5	9.1E-11	5.2	1.4E-11	5.9	2.0E-11	4.5	4.6E-10	5.0	7.8E-18	5.0	5.6E-08	3.8
1976	2.3E-10	5.3	5.1E-08	4.1	2.7E-10	3.7	1.1E-10	5.4	1.2E-11	5.2	1.9E-11	4.4	4.9E-10	4.6	8.0E-18	4.6	5.8E-08	3.7
1977	2.4E-10	5.4	4.7E-08	4.5	3.1E-10	3.4	1.0E-10	4 8	1.3E-11	6.0	1.9E-11	4.1	5.1E-10	4.8	8.2E-18	4.9	5.4E-08	3.9
1978	2.2E-10	4.7	4.9E-08	4.4	2.7E-10	3.2	1.0E-10	5.2	1.3E-11	5.6	1.8E-11	4.0	4.1E-10	4.8	6.8E-18	4.9	5.5E-08	3.9
1979	2.5E-10	5.1	5.5E-08	4.5	2.7E-10	3.4	1.0E-10	4.5	1.5E-11	5.6	2.1E-11	4.3	5.2E-10	4.7	8.6E-18	4.7	6.2E-08	4.1
1980	2.4E-10	4.9	5.3E-08	4.2	3.2E-10	3.7	9.4E-11	4.5	1.3E-11	5.8	2.2E-11	4.0	4.3E-10	5.0	7.0E-18	5.0	5.9E-08	3.8
1981	2.4E-10	4.4	4.9E-08	4.1	2.7E-10	3.3	1.0E-10	4.9	1.3E-11	5.8	1.8E-11	3.9	4.7E-10	4.9	8.0E-18	4.8	5.5E-08	3.7
1982	2.4E-10	4.8	5.4E-08	4.5	3.2E-10	3.6	9.0E-11	4.8	1.4E-11	5.6	2.0E-11	4.2	4.8E-10	5.1	7.9E-18	5.0	6.0E-08	4.0
1983	2.6E-10	4.8	5.3E-08	3.7	2.9E-10	3.6	1.1E-10	4.9	1.6E-11	5.5	2.1E-11	4.3	4.8E-10	4.9	8.1E-18	4.8	5.9E-08	3.4
1984	2.3E-10	4.9	5.9E-08	4.0	3.1E-10	3.3	1.1E-10	5.1	1.5E-11	5.7	2.1E-11	4.3	4.5E-10	5.1	7.3E-18	5.2	6.4E-08	3 7
1985	2.3E-10	5.2	6.0E-08	4.1	3 3E-10	3.3	9.9E-11	5.0	1.6E-11	6.0	2.2E-11	4.0	4.7E-10	5.1	7.9E-18	4.9	6.6E-08	3.7
1986	2.5E-10	4.9	5.1E-08	4.1	3.0E-10	3 4	1.3E-10	4.6	1.4E-11	5.3	2.0E-11	4.1	4.9E-10	4.7	8.0E-18	4.8	5.8E-08	3.6
1987	2.5E-10	5.1	6.0E-08	4.0	3.2E-10	3.6	1.1E-10	5.0	1.5E-11	6.2	2.1E-11	4.3	5.3E-10	4.8	8.5E-18	4.8	6.7E-08	3 6
1988	2.7E-10	4.8	5.6E-08	4.3	3.0E-10	3.6	1 2E-10	5.0	1.7E-11	5.4	2.5E-11	4.4	4.9E-10	4.9	8.3E-18	4.9	6.3E-08	3.9
1989	2.7E-10	4.7	6.1E-08	4.3	3.1E-10	3.4	1 1E-10	4.5	1.6E-11	5 8	2.3E-11	4.3	5.3E-10	4.6	8.7E-18	4.6	6.8E-08	3.8

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Lakewood
(1970-1989)

Year	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1970	8.2E-11	5.2	2.0E-08	3.9	9.9E-11	3.7	3.4E-11	4.5	5.7E-12	5.7	8.0E-12	4.3	1.5E-10	5.4	2.4E-18	5.5	2.2E-08	3.5
1971	7.8E-11	4.9	2.0E-08	3.8	9.7E-11	3.5	3.7E-11	5.4	5.0E-12	5.4	7.2E-12	4.0	1.6E-10	4.7	2.6E-18	4.7	2.2E-08	3.5
1972	7.8E-11	4.8	1.7E-08	4.3	1.1E-10	3.7	3.8E-11	5.0	4.8E-12	5.7	7.0E-12	3.8	1.6E-10	4.8	2.7E-18	4.9	2.0E-08	3.8
1973	8.2E-11	4.6	1.9E-08	4.2	9.9E-11	3.5	4.5E-11	5.2	5.1E-12	5.4	7.7E-12	4.0	1.6E-10	4.7	2.6E-18	4.7	2.2E-08	3.7
1974	7.9E-11	5.3	1.8E-08	4.1	1.1E-10	3.7	4.0E-11	4.9	5.1E-12	6.0	7.5E-12	4.3	1.6E-10	4.9	2.7E-18	5.1	2.1E-08	3.7
1975	8.3E-11	4.7	1.8E-08	4.3	1.1E-10	3.6	4.0E-11	4.8	5.1E-12	5.8	7.5E-12	4.1	1.8E-10	4.7	2.9E-18	4.8	2.0E-08	3.8
1976	7.5E-11	5.2	2.0E-08	4.3	1.1E-10	3.5	4.2E-11	4.9	5.7E-12	6.2	8.0E-12	4.4	1.7E-10	4.5	2.9E-18	4.5	2.2E-08	3.9
1977	9.0E-11	5.1	2.3E-08	4.3	1.1E-10	3.5	4.2E-11	5.1	5.8E-12	6.1	8.8E-12	4.6	1.9E-10	4.8	3.1E-18	4.8	2.5E-08	3.8
1978	9.9E-11	4.8	2.1E-08	4.1	1.2E-10	3.3	4.2E-11	4.6	5.9E-12	5.7	8.1E-12	4.4	1.8E-10	4.9	2.9E-18	5.0	2.3E-08	3.7
1979	9.2E-11	4.7	2.0E-08	4.0	1.2E-10	3.4	4.3E-11	5.2	5.5E-12	5.3	7.4E-12	4.4	1.9E-10	4.6	3.1E-18	4.7	2.2E-08	3.6
1980	1.0E-10	4.7	2.1E-08	4.3	1.1E-10	3.4	3.8E-11	4.9	5.9E-12	5.6	8.6E-12	3.9	1.8E-10	5.1	3.0E-18	5.2	2.4E-08	3.7
1981	8.5E-11	5.1	2.0E-08	4.2	1.1E-10	3.6	4.3E-11	5.1	5.8E-12	6.0	8.3E-12	4.2	1.7E-10	4.9	2.8E-18	5.0	2.2E-08	3.7
1982	9.0E-11	4.8	2.2E-08	4.0	1.2E-10	3.3	4.5E-11	5.2	6.4E-12	5.5	9.1E-12	4.0	1.9E-10	4.8	3.1E-18	4.8	2.5E-08	3.6
1983	8.0E-11	5.0	2.2E-08	4.5	1.2E-10	3.4	4.0E-11	4.9	6.1E-12	6.2	8.1E-12	4.5	1.6E-10	5.0	2.6E-18	5.1	2.4E-08	4.0
1984	9.6E-11	4.8	2.2E-08	3.9	1.2E-10	3.4	4.5E-11	4.9	6.0E-12	5.4	8.2E-12	3.8	2.0E-10	4.5	3.2E-18	4.7	2.4E-08	3 6
1985	1.0E-10	4.5	2.4E-08	4.1	1.3E-10	3.4	4.3E-11	5.0	6.9E-12	6.4	9.5E-12	4.8	1.8E-10	4.7	2.9E-18	4.8	2.6E-08	3.8
1986	1.0E-10	5.0	2.4E-08	4.1	1.2E-10	3.6	4.6E-11	5.3	7.6E-12	5.8	1.0E-11	4.5	2.0E-10	4.8	3.2E-18	4.9	2.6E-08	3 6
1987	8.8E-11	4.7	2.2E-08	4.4	1.3E-10	3.7	4.0E-11	5.0	6.3E-12	5.8	8.7E-12	4.1	1.8E-10	4.7	3.0E-18	4.6	2.5E-08	3.9
1988	1.0E-10	4.8	2.2E-08	3.9	1.3E-10	3.5	4.9E-11	5.4	6.4E-12	5.5	8.9E-12	4.0	2.1E-10	4.9	3.6E-18	4.9	2.4E-08	3.5
1989	9.2E-11	4.2	2.2E-08	4.4	1.4E-10	3.4	4.6E-11	4.6	6.1E-12	5.9	8.7E-12	4.3	2.0E-10	4.6	3.2E-18	4 6	2.5E-08	4.0

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

Pathway-Specific Doses Associated with Deposited Americium-241 as a Result of the 903 Pad Release
Longmont
(1970-1989)

Year	Soil Ingestion GM (Sv/year)	Soil Ingestion GSD	Vegetable Ingestion GM (Sv/year)	Vegetable Ingestion GSD	Ground Exposure GM (Sv/year)	Ground Exposure GSD	Wheat Ingestion GM (Sv/year)	Wheat Ingestion GSD	Milk Ingestion GM (Sv/year)	Milk Ingestion GSD	Beef Ingestion GM (Sv/year)	Beef Ingestion GSD	Inhalation of Resuspended Particulates GM (Sv/year)	Inhalation of Resuspended Particulates GSD	Immersion in Resuspended Particulates GM (Sv/year)	Immersion in Resuspended Particulates GSD	Total Dose GM (Sv/year)	Total Dose GSD
1970	1.4E-11	5.1	3.3E-09	4.0	1.8E-11	3.7	7.2E-12	4.9	8 6E-13	6.0	1.3E-12	4.4	3.1E-11	5.1	5.1E-19	5.0	3.8E-09	3.6
1971	1.4E-11	5.0	3.4E-09	3.9	2.0E-11	3.4	7.5E-12	5.2	8.8E-13	5.3	1.3E-12	4.2	2.9E-11	5.3	4.8E-19	5.3	3.8E-09	3.5
1972	1.7E-11	4.9	3.7E-09	4.1	1.9E-11	3.6	6.9E-12	5.0	9.6E-13	5.8	1.3E-12	4.0	3.2E-11	4.7	5.3E-19	4.7	4.2E-09	3.7
1973	1.7E-11	4.8	3.5E-09	4.1	1.9E-11	3.6	7.8E-12	4.7	9.4E-13	5.6	1.3E-12	4.2	3.5E-11	4.7	5.8E-19	4.7	3.9E-09	3.7
1974	1.4E-11	4.9	3.6E-09	4.1	2.0E-11	3.4	6.8E-12	4.8	9.0E-13	6.4	1.3E-12	4.9	2.8E-11	4.7	4.6E-19	4.8	4.0E-09	3.7
1975	1.6E-11	4.4	4 0E-09	4.4	1.9E-11	3.5	8 0E-12	5.0	1.0E 12	5.1	1.4E-12	4.1	3.2E-11	5.0	5.5E-19	4.9	4.5E-09	3.9
1976	1.5E-11	5.0	4.0E-09	4.2	2.3E-11	3.6	7 7E-12	4.9	1.0E-12	5.6	1.5E-12	3.9	3.3E-11	4.7	5.3E-19	4.8	4.4E-09	3.9
1977	1.8E-11	4.9	3.9E-09	4.2	2.1E-11	3.4	7.4E-12	5.0	1.0E-12	5.9	1.4E-12	4.3	3.8E-11	5.0	6.2E-19	5.1	4.4E-09	3 7
1978	1.8E-11	4.6	4.2E-09	4.2	2.2E-11	3.6	8.4E-12	4.7	1 1E-12	5.3	1.5E-12	4.0	3.5E-11	4.4	5.8E-19	4.5	4.7E-09	3.8
1979	1.8E-11	4.9	3.7E-09	4.3	2.2E-11	3.5	7.6E-12	4.8	1.1E-12	5.5	1.6E-12	4.2	3.5E-11	4.8	5.8E-19	4.9	4.2E-09	3.7
1980	2.0E-11	4.9	4.0E-09	4.2	2.3E-11	3 6	8.0E-12	5.0	9.4E-13	5.8	1.5E-12	3.9	3.7E-11	5.1	6.3E-19	5.2	4.5E-09	3.8
1981	1.8E-11	5.0	3.9E-09	4.1	2.1E-11	3.5	8.2E-12	5.3	9 4E-13	5.7	1.5E-12	4.3	3.6E-11	4.9	6.1E-19	4.7	4.3E-09	3.7
1982	2.1E-11	4.8	4.4E-09	4.1	2.4E-11	3.6	8.4E-12	4 6	1.4E-12	5.7	2.0E-12	4.1	3.9E-11	4.7	6.6E-19	4.8	4.9E-09	3.7
1983	1.8E-11	5.0	4.4E-09	4.2	2.4E-11	3.5	7.8E-12	4.8	1.3E-12	5.8	1.8E-12	4.3	3.9E-11	4.6	6.5E-19	4.6	4.9E-09	3.8
1984	1.9E-11	4.8	4.1E-09	4.4	2.2E-11	3.7	7 6E-12	5.3	1.1E-12	5.9	1.6E-12	4.6	3.3E-11	5.1	5.5E-19	5.1	4.7E-09	4.0
1985	1.7E-11	5.1	4.4E-09	4.1	2.4E-11	3 5	8.2E-12	5 1	1.2E-12	5.2	1.8E-12	4.0	3.4E-11	5.2	5.7E-19	5.2	4.9E-09	3.7
1986	1.9E-11	5.2	3.9E-09	4.5	2.3E-11	3.4	7.6E-12	5.0	1.2E-12	5.7	1.7E-12	4.4	4.2E-11	4.8	6.8E-19	4.8	4.4E-09	4.0
1987	1.8E-11	4.9	4.1E-09	4.3	2.4E-11	3.4	9.1E-12	5.0	1.1E-12	5.9	1.5E-12	4.2	3.4E-11	4.8	5.7E-19	5.0	4.6E-09	3.9
1988	1.9E-11	4.5	4.3E-09	3.8	2.3E-11	3.3	8 9E-12	5.4	1.1E-12	5.8	1.6E-12	4.1	3 5E-11	4.4	5.8E-19	4.3	4.8E-09	3.5
1989	1.7E-11	4.8	4.0E-09	4.4	2.3E-11	3.4	8.1E-12	4 7	1.1E-12	6 0	1.5E-12	4.4	3.5E-11	4 8	5.8E-19	4.7	4.5E-09	3 9

Notes:
1) The dose estimates in this table include the contribution from the decay of deposited plutonium-241.
2) E-01 is the same as the value divided by 10^1; E-02 is the same as the value divided by 10^2; etc.
3) GM = Geometric Mean
4) GSD = Geometric Standard Deviation
5) Sv = Sievert; 1 Sv = 100 rem

APPENDIX M

RADIATION RISK FACTORS
FOR ORGAN DOSES AND EFFECTIVE DOSES

APPENDIX M

RADIATION RISK FACTORS FOR ORGAN DOSES AND EFFECTIVE DOSES

Radiation doses presented in this analysis are expressed in terms of effective doses. Equivalent doses to specific organs can also be calculated, and in some cases, these values can be significantly different than the effective dose for some radionuclides. Organ-specific dose coefficients presented in Table M-1 show that the bone surfaces can be associated with dose equivalents that exceed the estimated committed effective dose equivalent by over a factor of ten after ingestion or inhalation of plutonium-239/240. Other organs sometimes exceed the effective dose values, but not by margins that are as large. Examples include the red bone marrow following ingestion, the lung following inhalation, and the breast during immersion.

To calculate effective doses, an organ weighting factor of 0.01 is applied to the calculated equivalent doses to the bone surfaces to account for the low probability of radiation-induced mortality from bone cancer with respect to the hazard of a similar level of dose applied uniformly over the entire body. This weighting factor, which is also applied to skin doses, is the lowest weighting factor that is applied to any organ of the body. This reflects the relatively low radiation sensitivity of the bone surfaces. Weighting factors of 0.12, 0.12, and 0.05 are applied to red marrow, lung, and breast, respectively.

As stated earlier, a radiation risk ("detriment") conversion factor of 7.3 percent per sievert is used in this analysis for the calculated effective doses. This value combines ICRP's risk factors for fatal cancers, non-fatal cancers, and severe hereditary effects. This risk factor is applied to the calculated effective doses to estimate the risk from estimated intakes of radioactivity and exposures to radiation. Similar risk conversion factors are available for specific organs. The magnitudes of these factors can be used to indicate the relative risks of cancer and hereditary effects from doses to the various organs compared to those from irradiation of the entire body. Risk coefficients for some individual organs are presented below, along with the comparable whole body or "effective" value:

Tissue or Organ	Detriment (%/Sv)
Bone Surfaces	0.07
Breast	0.36
Lung	0.80
Bone Marrow	1.04
"Whole Body" (effective)	7.3

It can be seen from these values that, while individual organ doses from intake of plutonium in some cases are higher than the associated effective doses, lower risk factors for the affected organs result in estimated risks that do not exceed those estimated using effective doses and a whole body risk conversion factor of 7.3% per sievert.

Table M-1

Inhalation and Ingestion Dose Coefficients for Plutonium-239 (Class Y)

Organ	Inhalation $Sv\ Bq^{-1}$	Ingestion $Sv\ Bq^{-1}$	Ground Exposure $Sv\ s^{-1}$ per $Bq\ m^{-2}$	Air Immersion $Sv\ s^{-1}$ per $Bq\ m^{-3}$
Adrenals	6.1×10^{-7}	1.3×10^{-8}	ng	ng
Bladder Wall	6.1×10^{-7}	1.3×10^{-8}	ng	ng
Bone Surfaces	8.7×10^{-4}	1.8×10^{-5}	5.8×10^{-19}	9.5×10^{-18}
Brain	6.1×10^{-7}	1.3×10^{-8}	ng	ng
Breast	6.1×10^{-7}	1.3×10^{-8}	7.8×10^{-19}	7.6×10^{-18}
Stomach	6.1×10^{-7}	1.4×10^{-8}	ng	ng
Small Intestine	6.1×10^{-7}	1.6×10^{-8}	ng	ng
Upper Large Intestine	6.2×10^{-7}	3.0×10^{-8}	ng	ng
Lower Large Intestine	6.4×10^{-7}	6.6×10^{-8}	ng	ng
Kidneys	3.0×10^{-6}	6.3×10^{-8}	ng	ng
Liver	1.9×10^{-4}	4.0×10^{-6}	ng	ng
Lungs	3.2×10^{-4}	1.3×10^{-8}	7.9×10^{-20}	2.7×10^{-18}
Ovaries	1.1×10^{-5}	2.4×10^{-7}	ng	ng
Pancreas	6.1×10^{-7}	1.3×10^{-8}	ng	ng
Red Marrow	4.2×10^{-5}	8.9×10^{-7}	1.2×10^{-20}	2.7×10^{-18}
Skin	6.1×10^{-7}	1.3×10^{-8}	3.7×10^{-18}	1.9×10^{-17}
Spleen	6.1×10^{-7}	1.3×10^{-8}	ng	ng
Testes	1.1×10^{-5}	2.4×10^{-7}	6.1×10^{-19}	4.8×10^{-18}
Thymus	6.1×10^{-7}	1.3×10^{-8}	ng	ng
Thyroid	6.1×10^{-7}	1.3×10^{-8}	1.8×10^{-19}	3.9×10^{-18}
Uterus	6.1×10^{-7}	1.3×10^{-8}	6.1×10^{-19}	4.8×10^{-18}
Effective Dose	8.4×10^{-5}	9.7×10^{-7}	3.7×10^{-19}	4.2×10^{-18}

References: ICRP Publication 56 and Federal Guidance Report 12

ng = value not given for this organ

APPENDIX N

DETERMINATION OF PRELIMINARY RISK ESTIMATES FOR ROUTINELY RELEASED CHEMICALS

APPENDIX N

DETERMINATION OF PRELIMINARY RISK ESTIMATES FOR ROUTINELY RELEASED CHEMICALS

Introduction

The dose estimates calculated for routinely released chemicals that are presented in Appendix M are expressed as the amount of contaminant taken up by the body (*e.g.*, milligrams or mg). However, in the field of chemical risk assessment, chemical dose is more commonly presented in terms of amount of contaminant taken up per unit body weight per unit time (*i.e.*, milligrams per kilograms per day or mg kg^{-1} d^{-1}). Toxicity criteria have been developed by several regulatory agencies that can be used to translate estimates of chemical dose, in mg kg^{-1} d^{-1}, into estimates of health risk. The purpose of this appendix is to describe the steps taken to estimate chemical doses in terms of mg kg^{-1} d^{-1} for the purposes of illustrating some cancer risks associated with chemicals released from the Rocky Flats Plant. The process is slightly different for beryllium and the volatile solvents, so they are described separately below.

Volatile Solvents

Using the dose estimates presented in Appendix L, the highest year or period of release was identified for each of the carcinogenic volatile solvents (i.e., all of the solvents evaluated in the dose assessment except 1,1,1-trichloroethane). Using the predicted air concentration for Sector 12, the inhalation exposure equation provided in Appendix I, and the associated input parameters provided in Appendix J, the chemical dose was estimated for each contaminant in terms of mg kg^{-1} d^{-1} using Monte Carlo simulation. No other exposure equations or input parameters were required, since direct inhalation was identified as the only important exposure pathway for the solvents. The dose estimates, expressed in terms of a geometric mean (GM) and geometric standard deviation (GSD), are shown in Table N-1.

For carcinogenic chemicals, an estimate of excess lifetime cancer risk (incidence) is the product of the chemical dose and the carcinogenic potency slope factor (SF). The SF, which is expressed in units of (mg kg^{-1} $d^{-1})^{-1}$, is defined as the 95 percent upper confidence limit of the probability of a carcinogenic response per unit daily intake of a chemical over a lifetime (70 years). For the purpose of the illustrations presented in this report, SFs developed by the U.S. EPA are used. These criteria were presented in Table 5-1 of the main text, and are duplicated in Table N-1. There is considerable uncertainty in SFs, since they are generally based on long-term animal studies and the application of a very conservative model used to predict the relationship between dose and cancer risk. However, an evaluation of this uncertainty is beyond the scope of Phase I and is not addressed in this report. The cancer risk estimates presented in this illustration are equal to the product of the dose estimate (GM) and the SF. Since the purpose of this illustration is to estimate risks associated with exposure during a single year, the excess lifetime cancer risk estimates are divided by 70, the assumed number of years in a lifetime. The uncertainty in the preliminary annual cancer risk estimate, as described by the GSD, is the same as the uncertainty in the dose estimate. These results are shown in Table N-1 and are also shown graphically in Figure 5-6 of the main text.

TABLE N-1

PRELIMINARY EXCESS LIFETIME CANCER RISK ESTIMATES ASSOCIATED WITH ONE-YEAR EXPOSURE TO AIRBORNE RELEASE OF CHEMICALS FROM THE ROCKY FLATS PLANT - SECTOR 12 (HIGHEST SINGLE-YEAR OR PERIOD)

Material	Highest Year or Period	Inhalation Dose		Ingestion Dose		Inhalation Risk[a]		Ingestion Risk[b]		Total Risk	
		GM ($mg\ kg^{-1}\ d^{-1}$)	GSD	GM ($mg\ kg^{-1}\ d^{-1}$)	GSD	GM	GSD	GM	GSD	GM	GSD
Beryllium	1968	4.4×10^{-12}	2.6	3.9×10^{-13}	2.8	1×10^{-12}	2.6	2×10^{-12}	2.8	4×10^{-12}	2.2
Carbon Tetrachloride	1961-1970	9.3×10^{-6}	1.9	NA	NA	1×10^{-8}	1.9	NA	NA	1×10^{-8}	1.9
Chloroform	1953-1974	8.5×10^{-7}	1.9	NA	NA	2×10^{-9}	1.9	NA	NA	2×10^{-9}	1.9
Methylene Chloride	1953-1974	8.1×10^{-7}	1.9	NA	NA	3×10^{-11}	1.9	NA	NA	3×10^{-11}	1.9
Tetrachloroethylene	1953-1962	2.1×10^{-5}	1.9	NA	NA	6×10^{-10}	1.9	NA	NA	6×10^{-10}	1.9
Trichloroethylene	1953-1962	1.5×10^{-5}	1.9	NA	NA	1×10^{-9}	1.9	NA	NA	1×10^{-9}	1.9

[a] Inhalation Risk = (Inhalation Dose $\times$ $SF_{inhalation}$) $\div$ 70 $\div$ AF

Material	$SF_{inhalation}$ $(mg/kg\text{-}day)^{-1}$	AF
Beryllium	8.4	0.5
Carbon Tetrachloride	0.053	0.65
Chloroform	0.081	0.65
Methylene Chloride	0.0017	0.75
Tetrachloroethylene	0.002	1
Trichloroethylene	0.006	1

[b] Ingestion Risk = (Ingestion Dose $\times$ $SF_{ingestion}$) $\div$ 70 $\div$ AF

Material	$SF_{ingestion}$ $(mg/kg\text{-}day)^{-1}$	AF
Beryllium	4.3	0.01

Notes:

1) 10^{-1} is the same as 0.1 or 1/10; 10^{-2} is the same as 0.01 or 1/100; etc.
2) GM = Geometric Mean
3) GSD = Geometric Standard Deviation
4) SF = Slope Factor
5) AF = Absorption Factor
6) NA = Not Applicable

Beryllium

The methods used to estimate preliminary cancer risks for beryllium are slightly more complicated, since exposure to off-site individuals may have occurred through up to seven exposure pathways. First, as for the volatile solvents, the highest year of exposure was identified from the dose estimates presented in Appendix L. Second, using the predicted air and soil concentrations for Sector 12, the exposure equations provided in Appendix I and the input parameters provided in Appendix J, pathway-specific doses were estimated in terms of mg kg^{-1} d^{-1} using Monte Carlo simulation. In addition, the total doses received through ingestion routes (soil, vegetable, wheat, milk and beef ingestion) and inhalation route (inhalation and inhalation of resuspended particulates) were also estimated using Monte Carlo simulation. These total ingestion and inhalation dose estimates, expressed in terms of a GM and GSD, are also shown in Table N-1.

The U.S. EPA has developed separate SFs for estimating cancer risks associated with exposure to beryllium via ingestion or inhalation. These values are presented in Table 5-1 of the main text and are reproduced in Table N-1. As discussed previously, the uncertainties in the SFs are not being taken into account in this illustration. The preliminary cancer risk estimates are therefore simply the product of the dose estimate (GM) and the SF divided by 70. The uncertainty in these estimates is equal to the GSD associated with the dose estimate. The preliminary cancer estimates for inhalation and ingestion exposures are shown in Table N-1. The total preliminary cancer risk associated with exposure to beryllium via all routes of exposure was estimated using Monte Carlo simulation. These results, expressed in terms of a GM and GSD, are shown in Table N-1 and are also shown graphically in Figure 5-6 of the main text.

The potential for historic releases of beryllium from the Rocky Flats Plant to have caused berylliosis in off-site individuals is not addressed by the analysis in this report. However, Phase II of the study will further examine the off-site risk. It is known that chronic low-level exposure that does not cause acute inflammation of the lungs can cause berylliosis in susceptible individuals. Berylliosis produces scar tissue in the lung, interfering with normal gas exchange. The risks of this effect of beryllium exposure are uncertain at the time. Because berylliosis is an immunologic response, the threshold level that produces effects varies among individuals. a reference concentration limit of 0.01 $\mu g\ m^{-3}$ was recommended for community air by the U.S. Atomic Energy Commission (USAEC) in 1949 based upon findings in the environment of a beryllium production facility. Current EPA regulations limit industrial emissions to levels that produce 30-day average concentrations that do not exceed that value (ATSDR, 1988).

REFERENCES

ATSDR. (1988). Agency for Toxic Substances and Disease Registry. Toxicological Profile for Beryllium. ATSDR/TP-88/07. December 1988.

APPENDIX O

RESOLUTION OF COMMENTS ON THE DRAFT TASK 8 REPORT

APPENDIX O

COMMENTS AND RESPONSES CONCERNING THE DRAFT TASK 8 REPORT "DOSE ASSESSMENT FOR HISTORICAL CONTAMINANT RELEASES FROM ROCKY FLATS"

Comments numbered 1 through 5 were submitted by Mr. Dave Norbury, Hazardous Material and Waste Management Division, Colorado Department of Health, on November 5th, 1993. Comments 6 through 12 were submitted by Mr. Dick Fox, Air Pollution Control Division, Colorado Department of Health, on December 7th, 1993. Comments 13 and 14 were received from Ms. Sally Shaver, Division of Health Assessment and Consultation, Department of Health and Human Services, on December 8th, 1993.

Comment 1. *Contaminants of Concern: The output of Task 2 (and the focus of Task 8) involves the twelve contaminants identified for quantitative evaluation. Although surely discussed in more detail in the Task 2 report, the author should not assume the reader has reviewed all past efforts. More information on these contaminants, including carcinogenic classifications (National Toxicity Program, IARC or ACGIH) and a brief discussion of carcinogenic versus systemic responses, accompanying "threshold" concepts, and reference doses should be included. The reader does not have enough basic Toxicity Assessment Information to understand the types and magnitudes of risks posed by these individual materials.*

Response 1. Identification of contaminants of concern was carried out in Tasks 2, 3, 4 and 5 and a summary of the identification process is provided in the project background section of the Task 8 report. We have attempted to provide some background toxicologic information in describing preliminary risk calculations for the materials of concern in Section 5.0 and Appendix N. For more detailed discussions of concepts of toxicity of the materials of concern, the reader is referred to the references identified in Section 5.0 and any subsequent updates of these documents. The scope of this phase of the work did not include a detailed interpretation of the dose estimates in terms of toxicity or risk, which is a key element of the Phase II work.

Comment 2. *Exposure Pathway Model: The Division strongly recommends including children as a sensitive sub-population. Intake values for rates of inhalation, soil ingestion, and food ingestion (the three primary pathways considered) vary significantly among age groups, and assumptions that a rate "... by adults is generally higher than that of children ..." (and therefore that risks calculated for adults are higher* *than those for children) are not universally valid. Current Division policy for RCRA Corrective Action risk assessment mandates separate evaluation of intakes for children and adults.*

Response 2. Discussion presented in the report explored the fact that under some exposure conditions, chemical and radiation doses received by children and adults can be different. For exposures to radionuclides, radiation doses received by adults are generally higher than those received by children; this is because intake rates of adults are usually higher than those of children. Two noticeable exceptions are incidental soil ingestion and milk ingestion exposure pathways. If one of these two pathways is the dominant contributor to total dose, radiation dose received by a child can be significantly higher than that by an adult. For all the radionuclides of concern evaluated in Task 8, inhalation is the dominant exposure pathway and contributes most to the total dose. Since inhalation rate of children is estimated to be about 32 to 55 percent lower than that of adults (NCRP, 1985) , radiation doses calculated for adults are also likely to be higher than those for children.

[Reference: NCRP (1985). National Council on Radiation Protection and Measurements. "Radiological Assessment: Predicting the Transport, Bioaccumulation, and Uptake by Man of Radionuclides Released to the Environment." NCRP Report No. 76. Bethesda, MD.]

For exposure to chemicals, children generally receive a higher dose than adults. This is because the conventional way of expressing chemical dose is the amount of contaminant inhaled or ingested per body weight per time (*e.g.*, mg kg^{-1} d^{-1}) and the low intake rates of children are more than offset by their low body weights. The overall result is that children receive a higher dose of chemical than adults through most exposure pathways.

As discussed in Section 2.3 of the Task 8 report, intake rates and body weight are only two of the many factors that may affect radiation or chemical doses received by an exposed individual. Other variables include absorption efficiencies, dose conversion factors, exposure characteristics and duration of exposure. It is estimated in the Task 8 report that chemical and radiation doses received by children are likely to be less than a factor of 10 higher or lower than those calculated in the report. Due to the relatively large uncertainties associated with the identified major release events and the magnitudes of the calculated doses, the evaluation of children as a separate sensitive sub-population was not considered to be warranted in the Phase I work.

Comment 3. Release: Section 3.0 discusses airborne releases of the radionuclides, which were carefully monitored, and the volatile organics, which were not monitored. The *release quantities for the non-radionuclides are unknown; the Division therefore encourages the mass-balance approach planned for Phase II in an effort to better identify the amounts of chemicals that cannot be accounted for (and assumed to have been released to the environment).*

Response 3. Historical releases of chemicals into the environment from the Rocky Flats plant were not as well monitored as radionuclides. As described in the Task 5 report, estimates of the amount of chemicals released from the plant were based on inventory records, material usage information and limited air monitoring data. Depending on the quality of information available, there are varying degrees of uncertainty associated with the release estimates developed. The Division's suggestion of using mass-balance approach for deriving chemical release estimates has been forwarded to the Phase II contractor.

Comment 4. Section 4.0 discusses waterborne releases. Because the radionuclides sequester in drainage and reservoir sediments (and are not appreciably present in the drinking water pathway), calculations that consider exposure to elevated concentrations of radionuclides in sediments should be included in the exposure pathway model. It is the Division's understanding that Phase II will include a more detailed analysis of sediments in the down-gradient direction.

Response 4. The Division's concern about contaminants in sediments has been forwarded to the Phase II contractor.

Comment 5. Risk evaluation: The second paragraph of Section 5.1 has a discussion of non-carcinogenic health effects. Including reference doses, the likes of which should be repeated in the overview of Task 2 (per previous comment). However, the Division is unable to find any calculations of non-carcinogenic risks, comparisons to the reference dose, and evaluation of the resulting Hazard Quotient. Some of the chemicals for which carcinogenic slope factors are presented in Table 5-1 also have systemic health effect contributions. A total risk evaluation from dose reconstruction, the overall goal of this effort, should quantitatively present both types of human health risks.

Response 5. The purpose of Phase I is to provide preliminary dose estimates and to identify contaminants, release events and exposure pathways that have a large impact on total dose. Estimation of chemical and radiation doses received by the public in the past 37 years is the end-point of the Phase I study. Potential health impacts associated with the estimated doses will be evaluated in Phase II. However, in order to evaluate the relative importance of various contaminants of concern and release events, preliminary cancer risk calculations were performed for some radionuclides and chemical carcinogens. Therefore, the health risk evaluation carried out in Task 8 is limited in scope.

1,1,1-Trichloroethane is the only contaminant of concern that is not considered to be a carcinogen. In the Task 8 report, noncarcinogenic effects of 1,1,1-trichloroethane are evaluated by comparing the calculated annual doses with the reference dose of the compound (Figure 5-10).

Comment 6. *Executive summary, page 10, third bullet - term microsievert is used with no previous explanation. Define here or in glossary.*

Response 6. The term microsievert is now defined in the glossary provided with the Task 8 report.

Comment 7. *Executive summary, page 11, first full paragraph - the detection method used and the basis of comparison should be listed.*

Response 7. A description of the detection method used and the basis of comparing radioactivity detected in different bodies of water are provided in the Task 5 report. This discussion is an attempt to summarize a very complex data set. It is not practical to provide additional details in the executive summary of the Task 8 report.

Comment 8. *Section 2.1, page 16, first paragraph - adsorption through skin and wound entry should be included even though they are negligible. Wound entry is especially important where beryllium (Be) is concerned.*

Response 8. Dermal absorption and wound entry are two of the many conceivable pathways that are not formally evaluated in the Task 8 report. Identification of potential exposure pathways are discussed in the Task 6 report. The objective of the identification process is to select exposure pathways that are likely to have a contribution to the total dose estimate. Due to the low dermal absorption coefficients of the contaminants of concern described in the Task 6 report and the infrequent occurrence of contaminant absorption through wounds for the off-site population at large, dermal absorption and wound entry are not likely to be important exposure pathways and therefore are not evaluated in Task 8.

Comment 9. *Figure 3-5, Predicted Air Concentrations for Evaluating the 1957 fire and Figure 3-7, Predicted Air Concentrations for Evaluating the 1969 fire - change "Platterville" to Platteville.*

Response 9. The referenced figures have been revised as suggested.

Comment 10. *Appendix B, Table B-1, page 2 - should define f_1, Assume it is the same as in Table 2-1 on page 20 of Volume I, however, should be defined here.*

Response 10. The referenced table no longer appears in Appendix B. As noted, the meaning of the gastrointestinal uptake factor is explained in Section 2.0 and in Table 2-1.

Comment 11. *Appendix F, page 3, first paragraph line 4 - states, "... Figure E-1 can also used to ..." should insert "be" between can and used.*

Response 11. The suggested revision has been made to Appendix F.

Comment 12. *Appendix I, Exposure Pathway Equation for Chemicals, page 11 - $C_{soil(bulk)}$ should be included under "Where:". Assume it is the same as on page 3, however, since all others are repeated with each formula this should be also.*

Response 12. The suggested revision has been made to Appendix I.

Comment 13. *The inhalation rates used in calculating doses from the releases are not consistent.*

Response 13. The primary purpose of Table 2-2 was to illustrate the fact that inhalation rates change with age and level of activity, especially when comparing infants to children or adults. However, this table is not the only source of information that we used to develop a distribution of average adult daily inhalation rates. Other references such as Exposure Factors Handbook (USEPA, 1989), Radiological Assessment: Predicting the Transport, Bioaccumulation, and Uptake by Man of Radionuclides Released to the Environment, NCRP Report No. 76 (NCRP, 1985) and Report of the Task Group on Reference Man, ICRP Publication 23 (ICRP, 1974) were also consulted. Based on information provided in all of these references, we assumed that average adult daily inhalation rate has a triangular distribution with a best estimate of 20 $m^3\ d^{-1}$ and a lower and upper bounds of 9 and 29 $m^3\ d^{-1}$, respectively. The numerical basis for our distribution is detailed below.

- The best estimate for inhalation rate of 20 $m^3\ d^{-1}$ is based primarily on the recommendation in USEPA's Exposure Factors Handbook (1989). This value is recommended to represent average adult inhalation rate in a continuous exposure situation or when specific activity patterns are not known. The 20 $m^3\ d^{-1}$ rate is widely used for exposure assessments. Based on the assumption of 8 hours light working activity, 8 hours nonoccupational activity and 8 hours of resting, ICRP (1974) estimates that average inhalation rate of an adult is about 22 $m^3\ d^{-1}$. However, more recent data presented in USEPA (1985) suggest lower inhalation rates for light and resting activity levels.

- The upper bound value of 29 $m^3\ d^{-1}$ is based on hourly ventilation rates for adult males reported in the USEPA's Exposure Factors Handbook (1989) and assuming 8 hours resting, 10 hours of light activity and 6 hours of moderate activity per day. The resulting upper-bound inhalation rate is 28.6 or 29 $m^3\ d^{-1}$. There was a typographical error in the draft Task 8 report, the upper-bound inhalation rate should have been 29 $m^3\ d^{-1}$ instead of 28 $m^3\ d^{-1}$.) The number of hours assumed for each level of activity is based on professional judgement; however, this value is very close to the reasonable worst-case inhalation rate of 30 $m^3\ d^{-1}$ recommended by the USEPA in the Exposure Factors Handbook (USEPA, 1989).

- The lower bound value of 9 $m^3\ d^{-1}$ is based on hourly ventilation rates for adult females reported in EPA's Exposure Factors Handbook (1989) and assuming 14 hours resting and 10 hours of light activity. The resulting lower-bound inhalation rate is 9.2 or 9 $m^3\ d^{-1}$. The fraction of time assumed for each level of activity is based on professional judgment.

It must be emphasized that inhalation rates developed above represent long-term averages. Inhalation rate measured on a daily basis may fluctuate above or below the bounds stated.

Comment 14. Because of the importance of plutonium inhalation in the overall dose reconstruction, some of the calculations use physiologic models that are outdated.

Response 14. See Appendix B for a discussion of dose coefficient selection. For purposes of this assessment, DCFs derived by the ICRP (1990) and the USEPA (1988 and 1993) were used and are presented in Table 2-1. Specific dose coefficients were obtained from the following documents:

- USEPA (1988). "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion." Federal Guidance Report No. 11. United States Environmental Protection Agency, Office of Radiation Programs, Washington D.C.

- USEPA (1993). "External Exposure to Radionuclides in Air, Water, and Soil." Federal Guidance Report No. 12. United States Environmental Protection Agency, Office of Radiation and Indoor Air, Washington, D.C.

- ICRP (1990). International Commission on Radiological Protection. "Age-Dependent Doses to Members of the Public from Intake of Radionuclides: Part 1." ICRP Publication No. 56. *Annals of the ICRP.* Volume 20, No. 2. Pergamon Press, Oxford.