ACTION LEVELS FOR RADIONUCLIDES IN SOILS FOR THE ROCKY FLATS CLEANUP AGREEMENT

FINAL

US DEPARTMENT OF ENERGY
US ENVIRONMENTAL PROTECTION AGENCY
COLORADO DEPARTMENT OF PUBLIC HEALTH AND THE ENVIRONMENT

OCTOBER 31, 1996

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ACRONYMS

ALARA	As Low As Reasonably Achievable
ALF	Action Levels and Standards Framework for Surface Water, Ground Water and Soils
ANL	Argonne National Laboratory
CAB	Citizens Advisory Board
CDPHE	Colorado Department of Public Health and the Environment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
DCF	Dose Conversion Factor
DOE	US Department of Energy
EPA	US Environmental Protection Agency
GI	Gastrointestinal
ICRP	International Commission on Radiological Protection
MCL	Maximum Contaminant Level
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NRC	US Nuclear Regulatory Commission
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RME	Reasonable Maximum Exposure
SCM	Site Conceptual Model

EXECUTIVE SUMMARY

INTRODUCTION

During the Rocky Flats Cleanup Agreement (RFCA) negotiations, the Action Levels and Standards Framework for Surface Water, Ground Water and Soils (ALF) Working Group realized that setting soil action levels and cleanup standards for radionuclides was a complex process and could not be completed before public notice of the draft RFCA. The RFCA Attachment 5 states that "The parties commit to expeditiously convene a working group to determine the derivation and application of the 15 mrem per year level as well as the derivation and potential application of the 75 mrem per year level." This summary explains the consensus recommendation of that Working Group.

The Working Group convened in early March 1996 and was composed of personnel from the Department of Energy (DOE), the Environmental Protection Agency (EPA), the Colorado Department of Public Health and Environment (CDPHE) and Kaiser-Hill, L.L.C. The Working Group agreed that its charter was to develop technically defensible standards which will not exceed the 15/75 mrem per year dose limits in ALF. The Working Group recognized that the 15/75 requirement was based on EPA's draft 40CFR196, Radiation Site Cleanup Regulations, which were intended for the release of government property. Because the RFCA preamble and the Rocky Flats Vision identify future land uses for the RFETS, which exclude release of government property and permit no residential land use, pertinent sections of the draft regulation were used as guidance for the Working Group.

Radiation dose was chosen as the primary criterion for assessing radionuclide action levels. The ALF called for the consideration of both radiation dose assessment and radiation risk assessment by the working group in making its recommendations. The use of radiation dose to develop action levels is consistent with EPA's draft 40CFR196, Nuclear Regulatory Commission decommissioning requirement, DOE Order 5400.5, "Radiation Protection of the Public and the Environment", and

DOE's proposed 10CFR834. Since these regulations are all radiation dose based, this is compelling evidence that the radiation protection community is recommending the use of radiation dose to limit environmental levels of radionuclides. In addition, the preamble to draft 40CFR196 compares the risks associated with remediation, transportation and disposal of contaminated soils against the risks of leaving contaminated soils in place at the 15/75 mrem per year dose limit. EPA concluded that the use of a 15/75 mrem dose limit to establish action levels is protective of the public. Furthermore, the dose assessment process incorporates all pertinent facets of EPA's CERCLA risk assessment process. The radionuclide working group agrees with the EPA draft regulation and is recommending the use of a radiation dose basis.

To translate the radiation dose requirements into soil action levels, it is necessary to first model radionuclide transport within the environment to a human receptor and then assess the receptor's radiation dose. The "RESRAD" computer code was chosen to model this complex process. RESRAD was specifically developed to calculate the radiation dose to an individual and also to derive action levels for radionuclides in soil. RESRAD has been verified and validated for use in assessing radioactive material in soils. An asset of the RESRAD code is its capability to assess contaminant transport to a human receptor in air, surface water, ground water and unsaturated zone soils over the 1,000 year modeling period as specified in the draft EPA regulation. This makes it possible to calculate radiation dose and action levels over any applicable exposure routes (e.g., ingestion, inhalation and external irradiation pathways) for a given receptor. RESRAD also has the capability to model multiple exposure scenarios (e.g., residential, open space and office worker) and to assess radioactive daughter products over the 1,000 year modeling period. The radionuclide working group recommends the use of RESRAD in calculating action levels for the RFETS.

SITE CONCEPTUAL MODEL

There are two separate soil types that need to be assessed at the RFETS: surface soils and subsurface soils. Surface soils are defined in the ALF from the surface to a depth of 15 cm. Consistent with the

RFCA preamble and the Rocky Flats Vision, ALF specifies that surface soil action levels would be derived using an open space exposure scenario in the buffer zone and an office worker exposure scenario in the industrial area. Subsurface soils are defined in the ALF from a depth of 15 cm to the top of the ground water table. Per the ALF, subsurface soil action levels are protective of surface water standards through ground water transport of contaminants to surface water. Ground water is not considered a potential drinking water source at RFETS as prescribed in the RFCA preamble and the Rocky Flats Vision.

Per the RFCA preamble and the Rocky Flats Vision, institutional controls may be applied at RFETS. Use of institutional controls may be considered under EPA's draft 40CFR196 when releasing a site. EPA's draft regulation states that any radioactive material in surface soils shall not impart an annual radiation dose to the appropriate human receptor (e.g. an open space receptor in the buffer zone or an office worker receptor in the industrial area) in excess of 15 millirem. Since radiation dose is being examined for a 1,000 year time period, the draft EPA regulation conservatively assumes that institutional controls fail in the future and that a hypothetical resident moves onto the site. Due to the long lived nature of radionuclides at Rocky Flats, the working group is recommending the assessment of a hypothetical future resident. This recommendation was a conscious decision by the working group despite the guidance in the vision which provides for no future residential uses. The annual radiation dose received by this hypothetical future resident will not exceed 85 millirem (Note: The annual radiation dose for this hypothetical individual in EPA's draft 40CFR196 recently changed from 75 mrem to 85 mrem).

There are two action levels that need to be calculated for surface soils. Tier I action levels are numeric levels that, when exceeded, trigger an evaluation, remedial action and/or management action, given the presence of institutional controls. Tier II action levels are numeric levels that, when met, do not require remedial action and/or institutional controls. The final action levels were derived by examining both the hypothetical future resident action levels and the action levels based on the most appropriate land use and then choosing the most conservative action level. The radionuclide working

group recommends adopting the Tier I and Tier II methodology outlined in the "Action Levels and Standards Framework for Radionuclides in Surface Water, Groundwater and Soils (ALF)." Proposed modifications to ALF and a discussion of put-back levels can be found in the document entitled, "Modifications to the Action Levels and Standards Framework." Table ES-1, "Tier I & II Soil Action Levels," outlines the Tier I and Tier II action levels being recommended by the radionuclide working group. The working group is recommending that the hypothetical future resident exposure scenario at the 85 mrem level be the Tier I action level for surficial soils in the buffer zone. The working group is also recommending that the office worker exposure scenario at the 15 mrem level be the Tier I action level for surficial soils in the industrial area. Further, the working group is recommending that the Tier II action level be the hypothetical future resident exposure scenario at the 15 millirem level.

Per the ALF, subsurface soil action levels must be protective of surface water standards through the transport of contaminants in ground water. The ALF requires that subsurface soil action levels be based on the leaching of contaminants to ground water, such that the ground water levels are protective of surface water standards. This concept was discussed by the radionuclide working group and not recommended for use at RFETS. Since the subsurface soils at RFETS are highly heterogeneous, it is not currently possible to accurately model radionuclide transport in these subsurface soils. Therefore, the radionuclide working group currently recommends a conservative approach by applying the Tier I and Tier II surface soil action levels to the subsurface soils. In addition, subsurface soil leaching of radionuclides to ground water is currently being investigated at the RFETS. If an accurate subsurface soil leaching model can be developed for RFETS in the future, and is agreed upon by the RFCA parties, the current working group recommendations may need to be updated.

RESRAD INPUT PARAMETERS

In the RESRAD computer code, there are approximately seventy different inputs that were discussed and agreed upon by the radionuclide working group for each exposure scenario. Site-specific values

were chosen for these inputs whenever possible so that the action levels could be tailored to RFETS. If a site-specific value was not available, the RESRAD default input was used. The RESRAD code was used to evaluate the office worker exposure scenario, the open space exposure scenario and the hypothetical future resident exposure scenario over the 1,000 year modeling period.

RECOMMENDATIONS

The working group recommends that the hypothetical future resident exposure scenario at the 85 mrem level be the Tier I action level for surficial soils in the buffer zone. The working group also recommends that the office worker exposure scenario at the 15 mrem level be the Tier I action level for surficial soils in the industrial area. Further, the working group is recommending that the Tier II action level for the entire site be the hypothetical future resident exposure scenario at the 15 millirem level. Soils with levels of radionuclides at or below the Tier II action level do not require remedial action and/or institutional controls. Although direct exposure to subsurface soils is not anticipated for the hypothetical future resident, open space or office worker exposure scenarios, the radionuclide working group currently recommends conservatively applying the Tier I and Tier II surface soil action levels to the subsurface soils. This subsurface soil recommendation may be updated in the future. Table ES-1 outlines these Tier I and Tier II action levels.

This working group acknowledges that in the future, new regulations, different guidance, improved calculation methods and models and better input parameters will likely become available. As this new information becomes available it will be considered in accordance with paragraph 5 of RFCA.

APPLICATION

Action levels as calculated above are only applicable when a single radionuclide is found in the environment. This is not the case at RFETS. In the environment at RFETS, the uranium (U) isotopes of U-234, U-235 and U-238 are found together, and the americium (Am) and plutonium (Pu)

isotopes of Am-241 and Pu-239/240 are found together. When multiple radionuclides are found in the environment, it must be ensured that the sum of the radiation doses from all radionuclides present does not exceed the action level basis (e.g., a hypothetical future resident assessed at the 15 mrem level).

The action levels for americium and plutonium together can also be calculated since the activity of Am-241 is about 18% of the Pu-239+Pu-240 (Pu-239/240) activity in the environment (Ibrahim, 1996). Given this activity ratio, the action level for Am-241 and Pu-239/240 can be computed so that the sum of their radiation doses equals either 15 or 85 millirem to the appropriate exposure scenario. Table ES-1 includes an example of these adjusted action levels for Am-241 and Pu-239/240 if they are the only radionuclides present in soil. Since the 18% ratio actually varies in the environment, site specific data will be used to make action level comparisons. If uranium is also present in the soil, then the contribution to the radiation dose from the uranium also needs to be assessed so that the Tier I and/or Tier II action level basis is not exceeded.

TABLE ES-1
TIER I & II SOIL ACTION LEVELS

Tier I Action Level For The Buffer Zone (Hypothetical Resident)

Radionuclide	Hypothetical Resident - 85 mrem Annual Radiation Dose (a) (pCi/gram)	Hypothetical Resident - Ratio Sum to 85 mrem Annual Radiation Dose (b) (pCi/gram)
Americium-241	215	117
Plutonium-239/240	1429	651
Uranium-234	1738	
Uranium-235	135	
Uranium-238	586	

Tier I Action Level for The Industrial Area (Office Worker)

Radionuclide	Office Worker - 15 mrem Annual Radiation Dose (a) (pCi/gram)	Office Worker - Ratio Sum to 15 mrem Annual Radiation Dose (b) (pCi/gram)
Americium-241	209	101
Plutonium-239/240	1088	562
Uranium-234	1627	
Uranium-235	113	
Uranium-238	506	

Tier II Action Level For RFETS (Hypothetical Resident)

Radionuclide	Hypothetical Resident - 15 mrem Annual Radiation Dose (a) (pCi/gram)	Hypothetical Resident - Ratio Sum to 15 mrem Annual Radiation Dose (b) (pCi/gram)
Americium-241	38	21
Plutonium-239/240	252	115
Uranium-234	307	
Uranium-235	24	
Uranium-238	103	

(a) - These values apply to single radionuclides only which does not occur in the environment at RFETS. The "Sum of Ratios" method will be applied at RFETS so that the total dose from multiple radionuclides are correctly assessed.

(b) - This example assumes that the Am-241/Pu-239 activity ratio equals 0.18 and that only Pu-239 and Am-241 are present

SECTION 1
INTRODUCTION

During the Rocky Flats Cleanup Agreement (RFCA) negotiations, the Action Levels and Standards Framework for Surface Water, Ground Water and Soils (ALF) Working Group realized that setting soil action levels and cleanup standards for radionuclides was a complex process and could not be completed before public notice of the draft RFCA. Therefore a radionuclide working group was formed to undertake this task. This report discusses the formation of a radionuclide working group, the radionuclide working group's application of the 15/75 mrem methodology as outlined in the draft RFCA and the radionuclide working group's recommendations concerning radionuclide action levels in soils.

Section 2 of this report discusses the formation of the radionuclide working group along with the goals of the working group. The working group members represent the US Department of Energy (DOE), the US Environmental Protection Agency (EPA), the Colorado Department of Public Health and the Environment (CDPHE) and Kaiser-Hill (K-H) , L.L.C.

Section 3 of this report is a regulatory analysis that describes the regulatory basis for deriving radionuclide action levels in soils. Regulations promulgated by the DOE, EPA and Nuclear Regulatory Commission (NRC) are examined.

Section 4 of this report contains the site conceptual model for surface and subsurface soil assessment. The site conceptual model is the basis for the exposure scenarios used to derive action levels for soils.

Section 5 of this report discusses how the soil action levels were developed. The use of the RESRAD computer model is discussed and the action levels for all applicable exposure scenarios are given.

Appendix A of this report discusses the development of the parameter inputs to the RESRAD computer code for the hypothetical future resident exposure scenario, the open space exposure

scenario and the office worker exposure scenario. RESRAD computer code outputs are also in this appendix.

Appendix B of this report discusses the expected chemical form of plutonium in the environment. The chemical form of radioactive material is significant for assessing radiation dose.

Appendix C of this report is an exposure pathway analysis. The exposure pathways applicable to the hypothetical future resident exposure scenario, the open space exposure scenario and the office worker exposure scenario are discussed and delineated.

Appendix D of this report discusses the relative importance of different isotopes of plutonium with respect to human health. The decay of plutonium, the ingrowth of daughters and plutonium toxicity are examined.

SECTION 2
RADIONUCLIDE WORKING GROUP FORMATION AND GOALS

The radionuclide working group convened in early March 1996 and was composed of personnel from the DOE, the EPA, the CDPHE and the K-H Team. The Working Group agreed that its charter was to determine the derivation and application of the 15 mrem per year level as well as the derivation and potential application of the 75 mrem per year level as outlined in the Rocky Flats Cleanup Agreement. The Working Group recognized that the 15/75 requirement was based on EPA's preliminary proposed 40CFR196, Radiation Site Cleanup Regulations.

The goals of the Working Group were:

- To determine and recommend radionuclide action levels for soil;
- To determine and recommend radionuclide put-back levels for soil; and
- To prepare a draft technical justification document which would explain the Working Group's recommendations.

The Working Group believes its recommendations are based on a sound technical, scientific and regulatory foundation. The Working Group has consulted with the Citizens Advisory Board (CAB), the Cities of Broomfield, Westminster, Northglenn and Thornton, and the Rocky Flats Environmental Technology Site (RFETS) expert panel on radionuclide fate and transport concerning any recommendations. Proposed modifications to ALF and a discussion of put-back levels can be found in the document entitled, "Modifications to the Action Levels and Standards Framework."

SECTION 3
REGULATORY ANALYSIS OF RADIONUCLIDES IN SOILS

3.1 Introduction

In order to calculate action levels for radionuclides, a target radiation dose to an individual must be defined. This target radiation dose could be applicable to a current or future individual. After the target radiation dose is selected, the amount of radioactive material in the environment that corresponds to this target radiation dose can be calculated. This calculated value is the action level.

To select the target radiation dose, applicable regulations need to be reviewed so that regulatory requirements are met. Applicable regulations from the DOE, the EPA and the NRC were reviewed. The following radiation dose standards may apply to the assessment and remediation of radionuclides in the environment at the RFETS. These standards were evaluated so that the requirements of both current and proposed radiation protection standards could be assessed.

* DOE Order 5400.5, "Radiation Protection of the Public and the Environment."

* Proposed Title 10 of the Code of Federal Regulations, Part 834, "Radiation Protection of the Public and the Environment," revised August 25, 1995 (Proposed 10CFR834).

* Draft Title 40 of the Code of Federal Regulations, Part 196, "Radiation Site Cleanup Regulations," dated October 21, 1993 (Draft 40CFR196).

* Proposed Title 10 of the Code of Federal Regulations, Parts 20, 30, 40, 50, 51, 70 & 72, "Radiological Criteria for Decommissioning," dated August 22, 1994 (Proposed 10CFR-NRC).

None of the above regulations is based on assessing and remediating radioactive materials based on

risk assessment. EPA is promoting this departure from risk assessment with their draft 40CFR196. Since the DOE, EPA and NRC are promulgating regulations using radiation dose to assess and remediate radioactive material in the environment, risk assessment will not be the basis for calculating action levels.

The requirements of the National Emission Standards for Hazardous Air Pollutants (NESHAPS) are not being considered to develop action levels; however, DOE is obligated to comply with the requirements of NESHAPS as long as RFETS is a DOE site. The DOE currently has a NESHAPS program in place. If monitoring detects a significant increase in emissions of radionuclides to the ambient air that may be due to radionuclides in soils, a source evaluation and mitigating action may be required. The action levels should be consistent with the NESHAPS requirements, since even the worst areas of soil contamination do not currently cause ambient air to exceed the NESHAPS standards.

3.2 DOE Order 5400.5

DOE Order 5400.5 prescribes the use of a 100 millirem annual radiation dose limit as recommended by the International Commission on Radiological Protection (ICRP, 1977). This order includes a recommendation that a 30 mrem radiation dose limit be applied if the actual use of a site is being examined or if the likely future use of a site is being examined. The order states that acceptable levels of radionuclides in soil shall be derived based on an environmental pathway analysis with specific property data where available. The order further states that acceptable residual radionuclide concentrations will be derived using the RESRAD (Argonne, 1993) environmental transport and radiation dose computer code. An As Low As Reasonably Achievable (ALARA) analysis must be a part of the RESRAD analysis. An ALARA analysis tries to reduce the radiation dose limit taking into account economic, social and technical factors.

The actual use or the likely future use exposure scenario represents the individual that could receive

the largest radiation dose. For exposure scenarios considered to be less likely but plausible, the 100 millirem/year limit should not be exceeded. These exposure scenarios could include a resident, an industrial worker and/or a recreational user. Radiation dose is assessed for these exposure scenarios every year in a 1,000 year time period.

3.3 Proposed 10CFR834

The provisions of DOE Order 5400.5 are currently being proposed as 10CFR834. Proposed 10CFR834 reiterates the 100 millirem per year radiation dose standard and also states that the starting point for an ALARA analysis would be 25 to 30 millirem per year. This regulation requires an environmental pathway analysis using approved models such as RESRAD to derive acceptable levels of radionuclides in the soil. With respect to exposure scenarios, 10CFR834 states that the actual and likely use scenarios and the worst plausible use scenario shall be evaluated. The requirement to evaluate the worst plausible use is only a secondary check to ensure that application of the likely use scenario does not overlook an extremely hazardous situation or a very susceptible subgroup. 10CFR834 also recommends that the dose assessment be performed for a 1,000 year time period.

3.4 Draft 40CFR196

Draft 40CFR196 states that a remediation standard of 15 mrem/yr should be used at sites with radioactive material in all environmental media. This radiation dose limit would apply to sites where the future land use is either unrestricted or restricted following remediation activities. If the land use at a site is restricted (e.g., restricting land use to open space use), the 15 mrem/year limit would apply to the restricted land use. If the land use is restricted, draft 40CFR196 also requires the assessment of the unrestricted release exposure scenario (i.e., residential exposure scenario). The radiation dose to be received by an unrestricted release exposure scenario will not exceed 75 mrem/yr (This has recently been updated to 85 mrem/yr.) so that any individual will not receive more than the ICRP recommended dose limit of 100 millirem even if land use restrictions fail in the future. An

ALARA analysis is not required.

EPA performed an extensive regulatory review before promulgating draft 40CFR196. The preamble to draft 40CFR196 compares the risks associated with remediation, transportation and disposal of contaminated soils against the risks of leaving contaminated soils in place at the 15/75 mrem per year dose limit. EPA concluded that the use of a 15/75 mrem dose limit is protective of the public. EPA recognized that the dose assessment process incorporates all pertinent facets of a CERCLA risk assessment process.

A 1,000 year time period also needs to be assessed to comply with the requirements in draft 40CFR196. This requirement came from the fact that many sites contain radionuclides with very long half-lives. The use of this assessment period will ensure that the creation of decay products and the long-term integrity of any land use restrictions are adequately considered.

3.5 Proposed 10CFR-NRC

The proposed NRC decommissioning regulations are directly comparable to the EPA's draft 40CFR196 regulations. The NRC uses a 15 mrem/yr radiation dose limit for both unrestricted and restricted land uses at a site just like the EPA draft standard. If a site is implementing land use restrictions, the NRC allows an individual in the future to receive a radiation dose of 100 millirem instead of 85 millirem. The NRC uses a 1,000 year assessment period and requires that an ALARA analysis be performed.

3.6 Rocky Flats Cleanup Agreement Regulatory Basis

The Radionuclide Action Levels Working Group has decided to use the draft 40CFR196, "Radiation Site Cleanup Regulations," regulations to derive action levels at the RFETS. This decision was made by the working group for the following reasons:

* Remediation activities at the RFETS follow EPA and State of Colorado remediation requirements as outlined in the Rocky Flats Cleanup Agreement (RFCA). For radionuclide remediation, EPA's most current regulations need to be addressed.

* Draft 40CFR196 is based on an extensive review of available radiation protection information.

* Draft 40CFR196 is expected to be promulgated in the near future.

* Draft 40CFR196 is not inconsistent with the requirements of DOE Order 5400.5, proposed 10CFR834 and the proposed NRC decommissioning regulations.

* NRC regulations do not apply to DOE facilities.

SECTION 4
SITE CONCEPTUAL MODEL

4.1 Introduction

The Site Conceptual Model (SCM) outlines the land uses that are expected to be present at the RFETS so that action levels can be calculated for these future land uses. The type of land use is very important since the amount of time an individual may contact radioactive material in the environment is directly related to the selected land use. This contact time is then transformed into an amount of radioactive material inhaled or ingested by the individual. Action levels are derived from the radiation dose associated with radioactive material inhaled and ingested, and from external gamma exposure.

4.2 Land Uses at RFETS

Future activities at RFETS include environmental restoration, decontamination and decommissioning, economic development and waste management. The Rocky Flats Local Impact Initiative is currently working with DOE and local development agencies to encourage business development at RFETS. The Rocky Flats Future Site Uses Working Group has also developed recommendations regarding future use of the RFETS property. Residential development at RFETS has not been recommended by this group or by other planning groups. Commercial and industrial uses of developed portions of the site are considered beneficial. Even though commercial development in undeveloped portions of the property has not been ruled out, preservation of this area as open space is consistent with DOE policy, the Rocky Flats Future Site Working Group recommendations and the Jefferson County Planning Department's recommendations. The Jefferson County Board of Commissioners has also adopted a resolution stating its support of maintaining, in perpetuity, the undeveloped buffer zone as open space (DOE, 1995). Open space use assumes no development in these areas.

The land uses for RFETS are prescribed by the Rocky Flats Cleanup Agreement (RFCA) in the

preamble to that document (RFCA, 1996). The preamble states that cleanup decisions and activities are to be based on open space use and limited industrial use at RFETS. These land uses are consistent with the direction of local government as outlined above. In the near-term condition, the inner and outer buffer zones will be managed and remediated to accommodate open space uses. At the beginning of the intermediate term condition, open space use in these areas will still be applicable. Industrial uses are applicable in the industrial area of the plant in the near and intermediate term conditions. The RFCA prescribes that specific future land uses and post-cleanup designations will be developed in consultation with local governments.

4.3 Surface Soil Assessment

To be consistent with the RFCA (RFCA, 1996), the basis for radionuclide action levels in surface soils is an open space exposure scenario in the buffer zone and an office worker exposure scenario in the industrial area of the plant. Consistent with 40CFR196, the working group agreed that the hypothetical future residential exposure scenario would also be evaluated. Although conservative, the assessment of a residential exposure scenario is inconsistent with current land use recommendations. Surface soils are defined as the top 15 cm of soil.

The open space exposure scenario assumes that an individual visits the buffer zone a limited portion of the year for recreational activities. This individual could hike on trails or wade in the creeks. This individual is assumed to be exposed to radioactive material in soils by directly ingesting the soils, by inhaling resuspended soils and by external gamma exposure from the soils. Appendix C, "Analysis of Exposure Pathways for use in Deriving Action Levels," contains a detailed discussion on the selection of these three exposure pathways. For an account of the amount of time the open space user spends at RFETS, see Appendix A, "Parameter Justification and RESRAD Output." The action level for the open space exposure scenario is the amount of a specific radioactive material in surface soil that would impart an annual radiation dose of 15 millirem to the open space user during the 1,000 year assessment period.

The office worker exposure scenario assumes that an individual works mainly indoors in a building complex surrounded by extensive paved areas or well maintained landscaping. This individual is assumed to breath outside air and ingest soil from outside the building. This individual is assumed to be exposed to radioactive material in soils by directly ingesting the soils, by inhaling resuspended soils and by external gamma exposure from the soils. Appendix C, "Analysis of Exposure Pathways for use in Deriving Action Levels," contains a detailed discussion on the selection of these three exposure pathways. For an account of the amount of time the office worker spends at RFETS, see Appendix A, "Parameter Justification and RESRAD Output." The action level for the office worker exposure scenario is the amount of a specific radioactive material in surface soil that would impart an annual radiation dose of 15 millirem to the office worker during the 1,000 year assessment period.

The hypothetical future residential exposure scenario assumes that an individual resides at RFETS. This individual lives at RFETS all year and eats homegrown produce. This individual is assumed to breath outside air and ingest soil from outside the residence. This individual is assumed to be exposed to radioactive material in soils by directly ingesting the soils, by inhaling resuspended soils, by external gamma exposure from contaminated soil and by ingesting produce grown in contaminated soil. Appendix C, "Analysis of Exposure Pathways for use in Deriving Action Levels," contains a detailed discussion on the selection of these four exposure pathways. For an account of the amount of time the resident spends at RFETS, see Appendix A, "Parameter Justification and RESRAD Output." The action level for the residential exposure scenario is the amount of a specific radioactive material in surface soil that would impart an annual radiation dose of 15 millirem or 85 millirem to the hypothetical resident during the 1,000 year assessment period.

In order to carry out the original weapon-building mission, personnel at RFETS handled plutonium (Pu), americium (Am) and uranium (U) in a number of different operations. Rocky Flats plutonium was composed of Pu-238, Pu-239, Pu-240, Pu-241, Pu-242 and Am-241 (DOE, 1980), and the isotopes of uranium handled at RFETS are U-234, U-235 and U-238. Action levels in soils have been derived for Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Am-241, U-234, U-235 and U-238 in the

environment.

To calculate the radiation dose to an individual, appropriate Dose Conversion Factors (DCF) must be chosen. These DCFs convert the radioactive material present in an exposure route to a radiation dose. The three exposure routes are the ingestion, inhalation and external gamma exposure from radioactive material in soil. DCFs are therefore available for the ingestion, inhalation and external exposure routes. The DCF for each exposure route differs with the chemical form of the radionuclide. The chemical form for americium, uranium and all daughter products were conservatively chosen so that the DCF would be maximized for each exposure route. The DCFs for plutonium were chosen based on the oxide form. For a detailed discussion of the chemical form of plutonium in the environment, see Appendix B, "Analysis of the Chemical Form of Plutonium in the Environment."

4.4 Subsurface Soil Assessment

Subsurface soils are defined from 15 cm below the ground surface to the top of the ground water table. There are no exposure pathways present for the open space, office worker or hypothetical resident exposure scenarios to subsurface soils. Therefore, these exposure scenarios are not appropriate for subsurface soils. For this reason, the RFCA (RFCA, 1996) states that action levels derived for subsurface soils will be protective of surface water standards via ground water transport of radionuclides leached from subsurface soils. The surface water standard for radionuclides is the Maximum Contaminant Level (MCL) as defined by the RFCA.

The SCM for subsurface soils is represented by radionuclides first leaching from subsurface soils to ground water. The radionuclides in ground water are then transported to surface water where the radionuclide concentration cannot exceed the MCL. The subsurface soil action level is the smallest amount of a specific radioactive material in subsurface soil that would impart an MCL in surface water over the 1,000 year assessment period.

This subsurface soil SCM was examined closely by the radionuclide working group. The geohydrology of the RFETS was examined along with the subsurface soil transport properties of plutonium, americium, uranium and their daughter products. Also, the relationship between the subsurface soil SCM and the surface soil SCM was examined. The radionuclide working group came to the conclusion that a subsurface soil action level for radionuclides could not be developed at this time with the subsurface soil SCM defined by the RFCA. This conclusion was based on the variable characteristics of the SCM. This variability is attributable to 1) a water infiltration rate into the soil which varies both areally across the site and within the subsurface soils, 2) radionuclide-specific distribution coefficients that vary spatially within the subsurface soil, 3) a variable distance from a source of radioactive material in the subsurface soil to surface water and 4) a variable soil unsaturated/saturated zone thickness across RFETS. For these reasons, the radionuclide working group has decided to conservatively apply surface soil action levels to subsurface soils.

Currently there are efforts proceeding that may reduce the variability in the subsurface soil SCM. In the future, this variability may be reduced sufficiently to allow the application of the prescribed subsurface soil SCM. If this occurs, the current recommendation of the radionuclide working group may be modified.

SECTION 5
ACTION LEVEL DEVELOPMENT

5.1 Introduction

All of the ingredients for developing action levels for radionuclides in surface soils have been delineated in the preceding sections. A radiation dose limit has been established, the applicable exposure scenarios have been defined and the type of soil to be assessed has been defined. All of these facets allow the calculation of a surface soil action level for the open space exposure scenario, the office worker exposure scenario and the hypothetical future residential exposure scenario. Due to the complex nature of action level development, a computer model must be utilized to derive the action levels. The RESRAD computer model was selected for use since it fulfills all modeling requirements. Action levels were developed for the given exposure scenarios in surface soils. These action levels will be used as Tier I and Tier II action levels in the Action Levels and Standards Framework for Surface Water, Groundwater and Soils (RFCA, 1996).

5.2 Computer Code Requirements

There are a number of different processes that need to be assessed to derive action levels. Due to the complexity of each of these processes, it would be beneficial to have a computer code that would assess each of the following processes. For efficiency and compatibility reasons, the ideal computer code would incorporate all of the following processes. It is also important that the computer code(s) be validated and verified.

The first process that has to be modeled is the transport of radioactive material in surface soil to an individual. This transport can include soil transport in air, surface water, ground water and/or unsaturated zone pore water. For assessing surface soil, the most important environmental transport process for deriving action levels is the air transport process. This is important for the inhalation exposure pathway. All other environmental transport processes serve to decrease the amount of

radioactive material present in surface soil. This decrease in radioactive material over time increases the action level over time. All environmental transport processes modeled must be able to assess the movement of radioactive material and their daughter products over the 1,000 year assessment period.

The second process that needs to be examined is the exposure of a receptor to the radioactive material in the soil. There are four exposure pathways that need to be assessed by the chosen computer code. These pathways include incidental ingestion of soil, inhalation of resuspended soil, external gamma exposure from radionuclides in the soil and ingestion of homegrown produce.

The next process to be concerned with is radiation dosimetry. Once the radioactive material enters the body, a radiation dose must be calculated so that an action level can be derived. There are three modes through which radioactive material can impart radiation dose to an individual. These are through the ingestion of radioactive material, the inhalation of radioactive material and external gamma exposure from radioactive material in soil. All three of these radiation dose modes need to be assessed for each radionuclide. Since a 1,000 year assessment period is required, the radiation dose from daughter products must also be assessed.

5.3 Computer Code Selection

The RESRAD computer code (Argonne, 1993) was selected for use in deriving surface soil action levels because it meets all modeling requirements. RESRAD was developed at Argonne National Laboratory for the US Department of Energy (DOE) so that radiation dose to an individual as well as action levels could be derived for radioactive material in soils. RESRAD can model all four of the above processes in an integrated manner and can assess daughter products over the 1,000 year modeling period. RESRAD has also been validated and verified (Argonne, 1994).

Surface soils can be physically modeled by the RESRAD code. Soils are broken down into layers within the code, and the top layer, at the ground surface, can be a cover or a contaminated zone. For

deriving surface soil action levels, the contaminated zone is considered to be the surface soils with no cover. Underneath the contaminated zone, RESRAD has the capacity to model five separate uncontaminated/unsaturated layers before reaching ground water. This configuration meets the requirements for deriving action levels at the RFETS.

RESRAD can model the required environmental transport processes. It contains an air transport algorithm that looks at resuspension of radioactive material in soils and transport to an individual. The assessment of the air transport pathway is essential to calculating surface soil action levels. Unsaturated zone transport and ground water transport processes are also assessed within the RESRAD code. These two algorithms will allow leaching of radioactive material out of the surface soils for the 1,000 year assessment period. These unsaturated zone transport and ground water transport algorithms could be used in the future to model the leaching of contaminants from subsurface soils at the RFETS. With respect to environmental transport requirements, RESRAD meets the requirements for deriving action levels at RFETS.

The RESRAD code can model the four exposure pathways: incidental ingestion of soil, inhalation of resuspended soil, external gamma exposure from radionuclides in the soil and ingestion of homegrown produce. RESRAD can assess nine exposure pathways in total. These exposure pathways are external gamma exposure, soil inhalation, plant ingestion, meat ingestion, milk ingestion, aquatic food ingestion, drinking water ingestion, soil ingestion and radon exposure. This shows the flexibility of the RESRAD code in assessing many different situations. Exposure pathways can be turned on and off in RESRAD depending on the specific situation. Concerning exposure pathways, this meets the requirements for deriving action levels at the RFETS.

The RESRAD code also has an extensive library of radionuclides in their radiation dosimetry module. This allows the calculation of radiation dose and action levels on the radionuclides of interest and on their daughter products over the 1,000 year modeling period. The radionuclide database includes inhalation, ingestion and external exposure Dose Conversion Factors (DCF). These DCFs are also

available within RESRAD for the different chemical forms of radionuclides. Concerning the use of DCFs, this meets the requirements for deriving action levels at the RFETS.

5.4 RESRAD Parameter Input Development

There were four separate RESRAD computer runs that needed to be performed to obtain all required action levels. These included the following:

* An Open Space Exposure Scenario Assessed at the 15 Millirem Level
* An Office Worker Exposure Scenario Assessed at the 15 Millirem Level
* A Hypothetical Future Resident Assessed at the 15 Millirem Level
* A Hypothetical Future Resident Assessed at the 85 Millirem Level

There were 53 separate input parameters to the RESRAD code for the open space and office worker exposure scenarios. The hypothetical future resident had 83 separate input parameters. The parameters for all of these exposure scenarios were chosen to be as site specific as possible to satisfy the requirements of the site conceptual model. When a site specific parameter was not available, the RESRAD default parameter was used. For a discussion of all parameter inputs with their selected values, see Appendix A, "Parameter Justification and RESRAD Output."

5.5 RESRAD Modeling Results

Table 5-1, "Single Radionuclide Soil Action Levels," outlines the Tier I and Tier II action levels developed using RESRAD. The action levels in this table represent the radionuclide-specific activity in the soil that would impart a maximum radiation dose of either 15 millirem or 85 millirem to the given exposure scenario over the 1,000 year modeling period.

5.6 Use of RESRAD Modeling Results

The action levels outlined above need to be applied in the field. To do this, a number of simplifying assumptions can be made while still assuring the protectiveness of the action levels. This simplification allows implementation of these action levels in an efficient manner.

The first simplification is that the number of radionuclides needing assessment at RFETS can be reduced. All uranium (U) radionuclides present at RFETS (e.g., U-234, U-235 and U-238) in the environment will be assessed with respect to their action levels. Appendix D, "Analysis of Assessment Needs for Rocky Flats Plutonium," outlines the reasons why the only constituents from Rocky Flats plutonium that need to be assessed in the environment are Pu-239, Pu-240 and Am-241. All isotopes of Rocky Flats plutonium were initially assessed for completeness since plutonium in the nuclear fabrication process was composed of Pu-238, Pu-239, Pu-240, Pu-241 and Pu-242 (DOE, 1980). Am-241 is also contained in this mix of plutonium due to its ingrowth from Pu-241 (DOE, 1980). The plutonium found in the environment though will have different activities of plutonium and americium than what is found in the fabrication process because of radionuclide decay and ingrowth over time. In examining this decay and ingrowth with regard to radionuclide toxicity, it is shown in Appendix D that it is necessary to only assess Pu-239, Pu-240 and Am-241 in the environment.

The number of exposure scenarios that need to be examined can also be reduced. The more conservative of the Tier I action level for the open space exposure scenario and the Tier I action level for the hypothetical future resident will be applied in the buffer zone at RFETS. Also, the more conservative of the Tier I action level for the office worker exposure scenario and the Tier I action level for the hypothetical future resident will be applied in the industrial area at RFETS. These comparisons were made and the result is that the Tier I action level in the buffer zone will be based on the hypothetical future resident exposure scenario and that the Tier I action level in the industrial area will be based on the office worker exposure scenario. Table 5-2, "Tier I & II Soil Action Levels," outlines the soil action levels after the above simplifications are made.

To assure that the soil action levels will be protective of human health when multiple radionuclides are present, the sum of the radiation doses from all radionuclides in soil must not exceed the Tier I or Tier II dose limit of 15 millirem or 85 millirem. A "Sum of Ratios" method will be used when more than one radionuclide is present in soils. Table 5-3, "Sum of Ratios Example," outlines this method. First, a ratio is formed for each radionuclide by dividing the activity of the radionuclide found in soils by the appropriate soil action level. This ratio actually represents the fraction of the radiation dose from the action level. In Table 5-3, the action level chosen for comparison is the Tier II action level for RFETS which is the hypothetical future resident assessed at the 15 millirem level. In this example, the radiation dose from U-235 is 1% of 15 millirem or 0.15 millirem at a soil activity of 0.3 pCi/gram. Therefore, when the ratio from each radionuclide is summed, this ratio sum is the fraction of the radiation dose limit for the action level. In Table 5-3, the sum of the ratios is 0.22 or 22% of 15 millirem. In this example, the Tier II action level is not exceeded since the sum of ratios is less than or equal to 1.0. If the sum of ratios exceeded 1.0, the action level would be exceeded.

The action levels for americium and plutonium together can also be calculated since the activity of Am-241 is about 18% of the Pu-239+Pu-240 (Pu-239/240) activity in the environment (Ibrahim, 1996). Given this activity ratio, the action level for Am-241 and Pu-239/240 can be computed so that the sum of their radiation doses equals either 15 or 85 millirem to the appropriate exposure scenario. Table 5-2 includes an example of these adjusted action levels for Am-241 and Pu-239/240 if they are the only radionuclides present in soil. Since the 18% ratio actually varies in the environment, site specific data will be used to make action level comparisons. If uranium is also present in the soil, then the contribution to the radiation dose from the uranium also needs to be assessed so that the Tier I and/or Tier II action level basis is not exceeded.

Chemical action levels are risk-based, and chemical risk is considered additive when multiple chemicals are present. Radionuclide action levels are dose-based, and radiation dose is considered additive when multiple radionuclides are present. Chemicals and radionuclides will be assessed independently on a project-specific basis using methodology that is protective of human health and

the environment. The cumulative effects of chemicals and radionuclides will be assessed on a project-specific basis if the chemical risk and the radionuclide dose are near their respective Tier I action levels.

5.7 Action Level Uncertainties

The calculated values recommended as action levels are based on several assumptions which have associated limitations. These include:

1. The regulatory basis for developing these action levels is EPA's draft rule, 40CFR196, which is not yet final and may be changed before it is promulgated.

2. Any environmental computer model, including the RESRAD model, has inherent limitations with regard to precise simulation of the actual environment. Some of these limitations involve which input parameters are chosen to represent the complex natural setting which may vary across a large site. Environmental transfer factors and dose conversion factors used in the model may not always reflect site-specific conditions.

3. There are inherent uncertainties in estimating either dose or risk from ionizing radiation.

4. Institutional controls will eliminate the ground water ingestion pathway by establishing specific land uses and controls on ground water use. A basic assumption of RFCA is that ground water from contaminated areas of the site is captured, controlled and measured within the surface water system before leaving the site. An additional assumption is that the small amount of shallow ground water is not a sustainable, viable source of residential drinking water.

5. Attachment 5 of RFCA requires subsurface soil action levels to be protective of surface water

standards via ground water, and surface soil action levels to be protective of surface water standards via runoff. Existing data supports the proposition that radionuclides in soil are stable and relatively immobile. This is the basis for determining not to include these transport pathways in the modeling done to develop the proposed action levels. It is also assumed that actions required by the proposed action levels for radionuclides in soil (removals and/or stabilization) will provide sufficient protection for surface water. Those actions will control the worst areas of radiological contamination in soils, and so far, even these areas have not impacted surface water above the 0.15 pCi/L level at the point of compliance.

6. The proposal to set subsurface soil action levels equal to surface soil action levels assumes there will be no uncontrolled human exposure to subsurface soils and presumes that surface soil action levels will be protective of surface water via ground water. It is also assumed that the proposed surface soil action levels are lower than values that any subsurface soil modeling would produce.

This working group acknowledges that in the future, new regulations, different guidance, improved calculation methods and models and better input parameters will likely become available. As this new information becomes available it will be considered in accordance with paragraph 5 of RFCA.

TABLE 5-1
SINGLE RADIONUCLIDE SOIL ACTION LEVELS

Radionuclide	TIER I ACTION LEVEL Open Space Exposure Scenario, Surficial Soils Exposure, 15 Millirem Dose Limit (pCi/gram)	TIER I ACTION LEVEL Office Worker Exposure Scenario, Surficial Soils Exposure, 15 Millirem Dose Limit (pCi/gram)	TIER I ACTION LEVEL Hypothetical Residential Exposure Scenario, Surficial Soils Exposure, 85 Millirem Dose Limit (pCi/gram)	TIER II ACTION LEVEL Hypothetical Residential Exposure Scenario, Surficial Soils Exposure, 15 Millirem Dose Limit (pCi/gram)
Americium-241	1283	209	215	38
Plutonium-238	10580	1164	1529	270
Plutonium-239	9906	1088	1429	252
Plutonium-240	9919	1089	1432	253
Plutonium-241	48020	7801	19830	3499
Plutonium-242	10430	1145	1506	266
Uranium-234	11500	1627	1738	307
Uranium-235	1314	113	135	24
Uranium-238	5079	506	586	103

* The action levels in this table apply to single radionuclides only which does not exist at RFETS. See text for application of these action levels.

TABLE 5-2
TIER I & II SOIL ACTION LEVELS

Tier I Action Level For The Buffer Zone (Hypothetical Resident)

Radionuclide	Hypothetical Resident - 85 mrem Annual Radiation Dose (a) (pCi/gram)	Hypothetical Resident - Ratio Sum to 85 mrem Annual Radiation Dose (b) (pCi/gram)
Americium-241	215	117
Plutonium-239/240	1429	651
Uranium-234	1738	
Uranium-235	135	
Uranium-238	586	

Tier I Action Level for The Industrial Area (Office Worker)

Radionuclide	Office Worker - 15 mrem Annual Radiation Dose (a) (pCi/gram)	Office Worker - Ratio Sum to 15 mrem Annual Radiation Dose (b) (pCi/gram)
Americium-241	209	101
Plutonium-239/240	1088	562
Uranium-234	1627	
Uranium-235	113	
Uranium-238	506	

Tier II Action Level For RFETS (Hypothetical Resident)

Radionuclide	Hypothetical Resident - 15 mrem Annual Radiation Dose (a) (pCi/gram)	Hypothetical Resident - Ratio Sum to 15 mrem Annual Radiation Dose (b) (pCi/gram)
Americium-241	38	21
Plutonium-239/240	252	115
Uranium-234	307	
Uranium-235	24	
Uranium-238	103	

(a) - These values apply to single radionuclides only which does not occur in the environment at RFETS. The "Sum of Ratios" method will be applied at RFETS so that the total dose from multiple radionuclides are correctly assessed.

(b) - This example assumes that the Am-241/Pu-239 activity ratio equals 0.18 and that only Pu-239 and Am-241 are present

TABLE 5-3
SUM OF RATIOS EXAMPLE

15 mrem Residential Action Level Comparison

Radionuclide	Action Level (pCi/gram)	Soil Activity (pCi/gram)	Soil Activity to Action Level Ratio
Americium-241	38	2.6	0.07
Plutonium-239	252	13.8	0.05
Uranium-234	307	6.8	0.02
Uranium-235	24	0.3	0.01
Uranium-238	103	6.4	0.06
		SUM OF RATIOS	0.22

Decision Criteria

SUM OF RATIOS $\leq$ 1: ACTION LEVEL MET
SUM OF RATIOS > 1: ACTION LEVEL EXCEEDED

SECTION 6
REFERENCES

References

Argonne, 1993 - Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.0, Environmental Assessment and Information Sciences Division, Argonne National Laboratory, ANL/EAD/LD-2, September 1993

DOE, 1980 - Final Environmental Impact Statement, Rocky Flats Plant Site, Golden, CO, US Department of Energy, DOE/EIS-0064, April 1980

DOE, 1995 - Phase II RFI/RI Report, 903 Pad, Mound and East Trenches Area, Operable Unit Number 2, Draft Final, US Department of Energy, May 1995

Ibrahim, 1996 - Comparative Distribution of Am-241 and Pu-239/240 in Soils Around the Rocky Flats Environmental Technology Site, Health Physics, Vol. 70, No. 4, April 1996

ICRP, 1977 - International Commission on Radiological Protection (ICRP), Recommendations of the ICRP, ICRP Publication 26, 1977

RFCA, 1996 - Rocky Flats Cleanup Agreement, Joint Agreement between the US Department of Energy, the US Environmental Protection Agency, the Colorado Department of Public Health and Environment and the State of Colorado, dated July 19, 1996

APPENDIX A
PARAMETER JUSTIFICATION AND RESRAD MODELING RESULTS

Introduction

This appendix explains the derivation and use of each of the parameters used as input to the RESRAD computer code in order to calculate the hypothetical residential, open space and office worker action levels. The parameters were chosen to be as site specific as possible so that the characteristics of the Rocky Flats Environmental Technology Site (RFETS) are represented within the RESRAD modeling runs. When a site specific parameter was not available, the RESRAD default parameter was used. The exposure pathways of soil ingestion, soil inhalation, direct irradiation and plant food ingestion were assessed per the requirements of the site conceptual model. Attachment I to this Appendix is a table of all the input parameters to the RESRAD code for each of the exposure scenarios. Attachment II to this appendix is a summary of the Tier I and Tier II surface soil action levels for all exposure scenarios. Attachment III to this appendix is the RESRAD summary output for the hypothetical residential Tier I (85 mrem) action levels. Attachment IV to this appendix is the RESRAD summary output for the hypothetical residential Tier II (15 mrem) action levels. Attachment V to this appendix is the RESRAD summary output for the open space Tier I (15 mrem) action levels. Attachment VI to this appendix is the RESRAD summary output for the office worker Tier I (15 mrem) action levels.

There are a number of exposure parameters outlined below that are applicable to the residential exposure scenario and not applicable to the open space and office worker exposure scenarios. This is because the homegrown produce exposure pathway is assessed in the residential exposure scenario but not in the other exposure scenarios. A number of parameters within the RESRAD code are directly related to the homegrown produce exposure pathway. Also, ground water does not directly contact an open space or an office worker receptor. Therefore, ground water is not a factor in assessing the open space and office worker exposure scenarios. These factors combine to decrease the number of parameters applicable to the open space and office worker exposure scenarios.

Parameter Definition

The **Area of Contaminated Zone** parameter is used to identify a compact area that contains the locations of soil samples with radionuclide concentrations clearly exceeding background levels (Argonne, 1993a). Background levels of radionuclides are those levels naturally present in the environment. This parameter was set at 40,000 square meters (10 acres) for all exposure scenarios. The 10 acre value was developed and approved for use by the Department of Energy (DOE), the Environmental Protection Agency (EPA) and the Colorado Department of Public Health and the Environment (CDPHE) during the development of the CERCLA/RCRA risk assessment process. The 10 acre area reflects the minimum area for a residential neighborhood and was chosen for use with all exposure scenarios for consistency.

The value of 0.15 meter (6 inches) was chosen for the **Thickness of Contaminated Zone** for all exposure scenarios. This parameter is the distance between the uppermost and lowermost soil samples that have radionuclide concentrations clearly above background (Argonne, 1993a). This value is consistent with the definition of surface soils in the proposed Action Level Framework and Standards for Surface Water, Ground Water and Soils (ALF). ALF is outlined in attachment 5 to the Rocky Flats Cleanup Agreement (RFCA, 1996).

The **Length Parallel to Aquifer Flow** was taken as the square root of the contaminated zone area or 200 meters for the residential exposure scenario. Since the open space and office worker exposure scenarios do not require the assessment of the ground water exposure pathway, this parameter is not applicable to them. This parameter is the maximum horizontal distance measured in the contaminated zone, from its upgradient edge to the downgradient edge, along the direction of the groundwater flow in the underlying aquifer (Argonne, 1993a). Therefore, the use of the square root of the contaminated zone area is appropriate. The magnitude of this parameter does not effect the action level since no exposure pathways assess radionuclides leaching to ground water.

The **Radiation Dose Limit** was set at the 85 millirem level for calculation of the Tier I action level for the hypothetical residential exposure scenario and at the 15 millirem level for calculation of the Tier II action level for the hypothetical residential exposure scenario. The **Radiation Dose Limit** was set at the 15 millirem level for calculation of the Tier I action level for the open space and office worker exposure scenarios. The radiation dose used in the RESRAD code is the effective dose equivalent from external radiation plus the committed effective dose equivalent from internal radiation. The radiation dose limit is used to derive action levels (Argonne, 1993a). The Tier I and Tier II radiation dose limits above are consistent with the dose assessment methodology in EPA's preliminary proposed 40CFR196, "Radiation Site Cleanup Regulations." Definitions for radiation dose terms can be found in 40CFR196.

The **Elapsed Time of Waste Placement** term was set to the RESRAD default of 0 years for all exposure scenarios. This parameter is the duration between the placement of radioactive waste on-site and the performance of a radiological survey (Argonne, 1993a). This term is used to calculate site specific leaching properties which is not utilized to calculate action levels. Therefore, the use of the RESRAD default is appropriate.

The time period of interest was chosen as 1,000 years for all exposure scenarios to be consistent with EPA's draft 40CFR196 . The increments at which radiation dose was assessed within each RESRAD run were 1, 3, 10, 30, 100, 300 and 1000 years. These are the default time increments within the RESRAD code. The increments put into the code do not affect the derived action level since RESRAD automatically calculates and reports the lowest action level for each radionuclide over the 1,000 year period.

The **Initial Concentrations of Principal Radionuclides** term was set to 100 pCi/gram for each of Am-241, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, U-234, U-235 and U-238 for all exposure scenarios. An action level is automatically calculated for all principal radionuclides that are given an initial concentration. The action level calculated in the RESRAD code is independent of the

magnitude of the initial concentration. Therefore, the use of 100 pCi/gram flags the RESRAD code to calculate an action level for each of the above radionuclides. A principal radionuclide is a radionuclide with a half-life longer than one-half year. Radionuclides with a half-life of one-half year or less are treated as associated radionuclides. The radionuclides "associated" with a principal radionuclide consist of all decay products down to, but not including, the next principal radionuclide in the chain. It is assumed that all associated radionuclides (except radon daughters) are in secular equilibrium with their principal radionuclide in the contaminated zone and also at the location of human exposure. Only the principal radionuclides in the contaminated zone need input concentrations in the RESRAD code (Argonne, 1993a).

The **Cover Depth** was assumed to be 0 meters for all exposure scenarios. The cover depth is the distance from the ground surface to the location of the uppermost soil sample with radionuclide concentrations that are clearly above background (Argonne, 1993a). The assumption of no cover is consistent with a surface soil exposure where the contaminated soil is assumed to be in the top 0.15 meter of soil. Setting the cover depth equal to 0 is consistent with the ALF.

The **Density of Contaminated Zone, Density of Uncontaminated Zone** and **Density of Saturated Zone** parameters were given the value of 1.8 grams/cc for the residential exposure scenario. The **Density of Contaminated Zone** parameter was given the value of 1.8 grams/cc for the open space and office worker exposure scenarios. The **Density of Uncontaminated Zone** and **Density of Saturated Zone** parameters are not applicable to the open space and office worker exposure scenarios since there is no ground water exposure pathway for these exposure scenarios. The soil bulk density or dry density is the ratio of the mass of the solid phase of the soil to its total volume (Argonne, 1993a). The chosen value was the average of 21 soil density results from the Rocky Flats Alluvium (EG&G, 1995). This soil density was taken from the recently published Hydrogeologic Characterization Report for the Rocky Flats Environmental Technology Site which contains hydrogeologic data applicable to the RFETS.

The **Contaminated Zone Erosion Rate** parameter was chosen to be 0.0000749 meter/year (EG&G, 1992) for all exposure scenarios. The erosion rate is the average volume of soil material that is removed from one place to another by running water, waves and currents, wind or moving ice per unit of ground surface area and per unit time (Argonne, 1993a). Erosion rates within the Woman Creek drainage of RFETS are developed within this report using annual precipitation with the universal soil loss equation. This erosion rate is the best available site specific information available. Erosion due to wind was not taken into account in this analysis since soils lost from the plant areas during high wind events should be replaced by soils eroding upwind of the plant.

A value of 0.3 (EG&G, 1995) was chosen for the **Contaminated Zone Total Porosity, Uncontaminated Zone Total Porosity** and **Saturated Zone Total Porosity** for the residential exposure scenario. A value of 0.3 was also chosen for the **Contaminated Zone Total Porosity** for the open space and office worker exposure scenarios. The **Uncontaminated Zone Total Porosity** and **Saturated Zone Total Porosity** parameters are not applicable to the open space and office worker exposure scenarios since there is no ground water exposure pathway for these exposure scenarios. The total porosity of a porous medium is the ratio of the pore volume to the total volume of a representative sample of the medium (Argonne, 1993a). The total porosity of 0.3 is representative of the alluvium and valley fill, the arapahoe formation and the laramie/fox hills hydrostratigraphic units and was taken from the recently published Hydrogeologic Characterization Report for the Rocky Flats Environmental Technology Site which contains hydrogeologic data applicable to the RFETS.

The **Contaminated Zone Effective Porosity, Uncontaminated Zone Effective Porosity** and **Saturated Zone Effective Porosity** were given a value of 0.1 (EG&G, 1995) for the residential exposure scenario. The **Contaminated Zone Effective Porosity** was also given a value of 0.1 for the open space and office worker exposure scenarios. The **Uncontaminated Zone Effective Porosity** and **Saturated Zone Effective Porosity** parameters are not applicable to the open space and office worker exposure scenarios since there is no ground water exposure pathway for these

exposure scenarios. This effective porosity of 0.1 is applicable to the rocky flats alluvium, valley fill alluvium, colluvium and Arapahoe/Laramie bedrock and was taken from the recently published Hydrogeologic Characterization Report for the Rocky Flats Environmental Technology Site which contains hydrogeologic data applicable to the RFETS. The effective porosity of a porous medium is defined as the ratio of the part of the pore volume where the water can circulate to the total volume of a representative sample of the medium (Argonne, 1993a).

The value of 44.5 meters/year (DOE, 1995a) was given to the **Contaminated Zone Hydraulic Conductivity, the Uncontaminated Zone Hydraulic Conductivity** and the **Saturated Zone Hydraulic Conductivity** for the residential exposure scenario. The value of 44.5 meters/year was also given to the **Contaminated Zone Hydraulic Conductivity** for the open space and office worker exposure scenarios. The **Uncontaminated Zone Hydraulic Conductivity** and the **Saturated Zone Hydraulic Conductivity** parameters are not applicable to the open space and office worker exposure scenarios since there is no ground water exposure pathway for these exposure scenarios. This value is the geometric mean of the hydraulic conductivity field measurements from the colluvium in Operable Unit 1. The reason the colluvium value was chosen is that any radionuclide contamination would need to traverse the colluvium before it entered surface water. This RFETS specific hydraulic conductivity agrees well with the range of hydraulic conductivities given for the colluvium of 38 meters/year to 67 meters/year (EG&G, 1995) which was published in the Hydrogeologic Characterization Report for the Rocky Flats Environmental Technology Site. The reason the colluvium value was chosen is that any radionuclide contamination would need to traverse the colluvium before it entered surface water. The hydraulic conductivity of a soil is a measure of the soil's ability to transmit water when submitted to a hydraulic gradient. Hydraulic conductivity is defined by Darcy's Law (Argonne, 1993a).

The **Contaminated Zone b Parameter** and the **Uncontaminated Zone b Parameter** are set at a value of 10.40 (Argonne, 1993b) for the residential exposure scenario. The **Contaminated Zone b Parameter** is set at a value of 10.40 for the open space and office worker exposure scenarios. The

Uncontaminated Zone b Parameter is not applicable to the open space and office worker exposure scenarios since there is no ground water exposure pathway for these exposure scenarios. There is no **Saturated Zone b Parameter** for any exposure scenario since the water table is assumed to be stable over the modeling period. This value for the soil specific b-parameter is applicable for hydraulic conductivities between 32.6 and 68.4 meter/year and is appropriate given the magnitude of the hydraulic conductivity defined above. The soil-specific b-parameter is an empirical and dimensionless parameter that is used to evaluate the saturation ratio (or the volumetric water saturation) of the soil (Argonne, 1993a).

The **Evapotranspiration Coefficient** was given a value of 0.253 (Argonne, 1993b) for the residential exposure scenario and a value of 0.920 (Argonne, 1993b) for the open space and office worker exposure scenarios. The reason these coefficients are different is that the irrigation rate is assumed to be 1.0 meter/year (Argonne, 1993b) for the residential exposure scenario and 0 meter/year for the open space and office worker exposure scenarios. The evapotranspiration coefficient is the ratio of the total volume of water leaving the ground as the result of evapotranspiration to the total volume of water available within the root zone of the soil during a fixed period of time (Argonne, 1993a). To calculate this parameter, the annual precipitation rate, infiltration rate, runoff coefficient and evapotranspiration rate were needed. Values of 0.381 meter/year, 0.028 meter/year, 0.004 and 0.349 meter/year were assigned to these parameters, respectively. These site specific values were based on information provided in the Operable Unit 2 RFI/RI Report (DOE, 1995a) and represent an infiltration rate of about 7.3% of the annual precipitation and an evapotranspiration rate of about 91.7% of precipitation (RMRS, 1996). The precipitation rate is equal to the sum of the infiltration rate, the runoff rate and the evapotranspiration rate (Argonne, 1993b). The evapotranspiration rate is the total volume of water vapor that is transferred to the atmosphere because of the combined effect of evaporation and transpiration, per unit of the ground surface area and per unit of time at the site (Argonne, 1993a).

The **Precipitation Rate** is the average volume of water in the form of rain, snow, hail or sleet that

falls per unit of area and per unit of time at the site. The precipitation rate was set at 0.381 meter/year (RMRS, 1996) for all exposure scenarios. The precipitation rate is a long term annual average value for RFETS.

The **Irrigation Rate** is the average volume of water that is added to the soil at the site, per unit of surface area and per unit of time (Argonne, 1993a). The irrigation rate has been set at 1.0 meter/year for the residential exposure scenario which is the RESRAD default value for arid regions (Argonne, 1993b). The irrigation rate has been set at 0 meter/year for the open space and office worker exposure scenarios since the irrigation of homegrown produce exposure pathway is not assessed for these exposure scenarios.

The **Irrigation Mode** was set in the overhead configuration for the residential exposure scenario which is the RESRAD default (Argonne, 1993b). This parameter is not applicable for the open space and office worker exposure scenarios since the irrigation of homegrown produce is not assessed for these exposure scenarios. The irrigation mode is the process by which irrigation water is applied to the area of interest. It is assumed within the RESRAD code that the application of irrigation water is controlled and that none of this water is lost to runoff.

The **Runoff Coefficient** is the fraction of the average annual precipitation that does not infiltrate into the soil and is not transferred back to the atmosphere through evapotranspiration (Argonne, 1993a). A site specific value of 0.004 was applied to the runoff coefficient (RMRS, 1996) for all exposure scenarios which was again based on data found in the operable unit 2 RFI/RI Report (DOE, 1995a). The runoff coefficient is a long term annual average value. This fraction represents a runoff of approximately 0.4% of annual precipitation.

The **Watershed Area For Nearby Stream or Pond** was given a value of 8280000 meter^2 (DOE, 1996) for the residential exposure scenario. This parameter is not applicable for the open space and office worker exposure scenarios since ground water transport to surface water is not being assessed

for these exposure scenarios. The value chosen for use represents the surface area of the Woman Creek watershed. This is an appropriate value since the watershed area parameter represents the area of the region draining into the nearby stream or pond located at the vicinity of the site (Argonne, 1993a).

The **Accuracy For Water/Soil Computations** was set at the RESRAD default value of 0.001 for the residential exposure scenario. This parameter is not applicable for the open space and office worker exposure scenarios since there is no ground water exposure pathway for these exposure scenarios. This parameter is the fractional accuracy desired (convergence criterion) in the Romberg integration used to obtain water/soil concentration ratios (Argonne, 1993a).

A value of 0.15 was given to the **Saturated Zone Hydraulic Gradient** (DOE, 1995a) for the residential exposure scenario. This parameter is not applicable for the open space and office worker exposure scenarios since there is no ground water exposure pathway for these exposure scenarios. The site specific value of 0.15 was taken from the hillside of the Woman Creek drainage using the May 1992 alluvial/colluvial water table map. The hydraulic gradient is the change in hydraulic head per unit of distance of the ground water flow in a given direction (Argonne, 1993a).

The **Water Table Drop Rate** was set at a value of 0 meter/year for the residential exposure scenario. This drop rate is the annual rate at which the depth of the water table lowers (Argonne, 1993a). This parameter is not applicable for the open space and office worker exposure scenarios since there is no ground water exposure pathway for these exposure scenarios. The value of 0 meter/year was applied so that the physical ground setting would not change over the 1,000 year modelling period. This parameter value was chosen by professional judgement.

The **Well Pump Intake Depth** is the screened depth of a well within the aquifer (Argonne, 1993a). The well pump intake depth was set at the RESRAD default of 10 meters for the residential exposure scenario. This parameter is not applicable for the open space and office worker exposure scenarios

since there is no ground water exposure pathway for these exposure scenarios. This value over estimates the amount of ground water available for pumping at RFETS.

The **Nondispersion or Mass Balance** parameter selects which of two models will be used for water/soil concentration ratio calculations (Argonne, 1993b). The RESRAD default, nondispersion model was chosen for the residential exposure scenario. This parameter is not applicable for the open space and office worker exposure scenarios since there is no ground water exposure pathway for these exposure scenarios.

The **Well Pumping Rate** was chosen to be 250 m^3/year for the residential exposure scenario which is the RESRAD default (Argonne, 1993b). This parameter is not applicable for the open space and office worker exposure scenarios since there is no ground water exposure pathway for these exposure scenarios. The well pumping rate is the total volume of well water withdrawn for use per individual (Argonne, 1993a). The use of the RESRAD default is not appropriate at the RFETS since ground water will not be used for domestic purposes, but for modeling purposes, it is necessary to specify a source of water for irrigation.

The **Thickness of the Uncontaminated, Unsaturated Zone** was chosen to be 3.0 meters for the residential exposure scenario. This parameter is not applicable for the open space and office worker exposure scenarios since there is no ground water exposure pathway for these exposure scenarios. This thickness is the portion of the uncontaminated zone that lies below the bottom of the contaminated surface soils and above the water table (Argonne, 1993a). The thickness chosen for use is consistent with the depth of the T-3 and T-4 trenches (Kaiser-Hill, 1996). This 3.0 meter thickness was chosen so that the uncontaminated, unsaturated zone thickness will be equivalent to a contaminated unsaturated zone (e.g., the definition for contaminated subsurface soils). Therefore, the physical model will not change from the surface soil model to the subsurface soil model. Subsurface soil modeling will assume that a contaminated, unsaturated zone is located under surface soils to the depth of trenched material at RFETS.

The **Distribution Coefficient** is the ratio of the mass of solute species adsorbed or precipitated on the soils per unit of dry mass of the soil to the solute concentration in the liquids (Argonne, 1993a). The distribution coefficient for Plutonium was taken to be 218 cm^3/gram, and the distribution coefficient for Americium was taken to be 76 cm^3/gram (DOE, 1995a). These values represent the midpoint of the range of distribution coefficients reported in the operable unit 2 RFI/RI Report. The distribution coefficient for Uranium and for all other associated radionuclides was set at the RESRAD default value which is outlined in Attachment I. These values for the distribution coefficient were applied to the residential, open space and office worker exposure scenarios.

The **Inhalation Rate** was set at 7000 m^3/year (DOE, 1995b) for the residential exposure scenario which assumes that the resident inhales dust contaminated air at a rate of 20 m^3/day for 350 days/year. The **Inhalation Rate** was set at 175 m^3/year (DOE, 1995b) for the open space exposure scenario which assumes that the open space user inhales dust contaminated air at a rate of 1.4 m^3/hr, 5 hr/visit for 25 visits/year. The **Inhalation Rate** was set at 1660 m^3/year (DOE, 1995b) for the office worker exposure scenario which assumes that the office worker inhales dust contaminated air at a rate of 0.83 m^3/hr, 8 hr/day for 250 days/year. The inhalation rate is the annual average rate for different activity levels (Argonne, 1993a). These values are the standard EPA Reasonable Maximum Exposure (RME) parameters and were approved for use at the RFETS by DOE, EPA and CDPHE.

The **Mass Loading** parameter is the concentration of soil particles in the air (Argonne, 1993a). This parameter was set at 0.000026 grams/m^3 (Kaiser-Hill, 1995) for all exposure scenarios. Since radiation dose is calculated on an annual basis, this parameter should correspond to the annual average PM-10 (Particulate Matter < 10 micron) concentration expected at the site. The PM-10 concentrations for six air monitors at RFETS were as examined for the years 1990 through 1995. To be conservative, the PM-10 concentration was maximized by using the air monitor closest to the Standley Lake surface water project during construction activities for that project. The average PM-10 concentration from June through October, 1995 from this air monitor was used for the Mass Loading parameter.

The **Dilution Length** was set at the RESRAD default of 3 meters (Argonne, 1993b) for all exposure scenarios. The dilution length is the average mixing height or length for airborne dust used to estimate the dilution process in which resuspended contaminated dust is mixed with uncontaminated dust blown in from off-site (Argonne, 1993b).

The **Exposure Duration** was set at a value of 30 years (DOE, 1995b) for the residential and open space exposure scenarios. The **Exposure Duration** was set at a value of 25 years (DOE, 1995b) for the office worker exposure scenario. The exposure duration is the span of time, in years, during which an individual is expected to spend time on the site (Argonne, 1993b). These values are the standard EPA RME parameters and were approved for use at the RFETS by DOE, EPA and CDPHE.

The **Inhalation Shielding Factor** was set at a value of 1.0 (DOE, 1995b) for all exposure scenarios. This factor is the ratio of the contaminated airborne dust concentrations indoors to the contaminated airborne dust concentrations outdoors (Argonne, 1993a). This factor is also the ratio of the contaminated settled dust concentrations indoors to the contaminated soil concentrations outdoors. This value was set at 1.0 so that the indoor and outdoor air concentrations and soil/dust concentrations are equal. The value of 1.0 allows an individual to be located indoors or outdoors and be exposed to the same concentration of radioactive material in air and in soil/dust.

The **External Gamma Shielding Factor** is the ratio of the external gamma radiation level indoors to the radiation level outdoors (Argonne, 1993a). Concerning external gamma radiation dose, DOE, EPA and CDPHE have approved the use of external gamma shielding factors that take into account the shielding provided by a house or building. Since external gamma radiation dose factors assume that a person is exposed to radioactive material for 24 hrs/day, 365 days/yr, DOE, EPA and CDPHE have also approved the use of a time factor for external gamma radiation dose that takes into account the fraction of time an individual is actually at the contaminated site. Both of these factors have been incorporated into the **External Gamma Shielding Factor** (DOE, 1995b). This shielding factor was

set at a value of 0.8 (DOE, 1995b) for the residential exposure scenario which accounts for building shielding only. The external gamma shielding factor was set at a value of 0.014 (DOE, 1995b) for the open space exposure scenario which only takes into account the fraction of time an open space user is actually at the contaminated site. The external gamma shielding factor was set at a value of 0.17 (DOE, 1995b) for the office worker exposure scenario which takes into account building shielding and the fraction of time an office worker is actually at the office.

The **Indoor Time Fraction** was given a value of 1.0 (DOE, 1995b) for all exposure scenarios. The fraction of time spent indoors is the average fraction of time in a year during which an individual stays inside a house or a building on the contaminated site (Argonne, 1993a). Eventhough an open space user would not be inside a building, it is necessary to assume this so that the external gamma exposure could be correctly assessed for the open space user. Due to the Inhalation Shielding Factor, the air and soil/dust concentrations inside and outside are the same for all exposure scenarios.

The **Outdoor Time Fraction** was given a value of 0 (DOE, 1995b) for all exposure scenarios. The fraction of time spent outdoors on-site is the average fraction of time in a year during which an individual stays outdoors on the contaminated site (Argonne, 1993a). The value of 0 is appropriate since it is assumed that the indoor time fraction is 1.0.

The **Shape Factor** is used to correct for a noncircular-shaped contaminated area on the basis of an ideally circular zone and was set at the RESRAD default value of 1.0 (Argonne, 1993a) for all exposure scenarios.

The **Fruits, Nonleafy Vegetables and Grain Consumption** parameter was set at a value of 40.1 kg/year (DOE, 1995b) for the residential exposure scenario. Since the open space and office worker exposure scenarios do not require the assessment of the ingestion of homegrown produce pathways, this parameter is not applicable to these exposure scenarios. This parameter is an annual dietary factor for human food consumption of fruits, nonleafy vegetables and grains (Argonne, 1993a). This

value is the standard EPA RME parameter and was approved for use at the RFETS by DOE, EPA and CDPHE.

The **Leafy Vegetable Consumption** parameter was set at a value of 2.6 kg/year (DOE, 1995b) for the residential exposure scenario. Since the open space and office worker exposure scenarios do not require the assessment of the ingestion of homegrown produce pathway, this parameter is not applicable to these exposure scenarios. This parameter is an annual dietary factor for human food consumption of leafy vegetables (Argonne, 1993a). This value is the standard EPA RME parameter and was approved for use at the RFETS by DOE, EPA and CDPHE..

The **Soil Ingestion Rate** parameter was given a value of 70 grams/year (DOE, 1995b) for the residential exposure scenario which was derived assuming that a resident ingests soil at a rate of 200 mg/day for 350 days/yr. This ingestion rate is applicable to a child and is being used since radiation dose is regulated on an annual basis. The **Soil Ingestion Rate** parameter was given a value of 2.5 grams/year (DOE, 1995b) for the open space exposure scenario which was derived assuming that the open space user ingests soil at a rate of 100 mg/visit for 25 visits/yr. The **Soil Ingestion Rate** parameter was given a value of 12.5 grams/year (DOE, 1995b) for the office worker exposure scenario which was derived assuming that the office worker ingests soil at a rate of 50 mg/day for 250 days/year. This parameter represents the incidental ingestion rate of soil material or soil dust (Argonne, 1993a). These values are the standard EPA RME parameters and were approved for use at the RFETS by DOE, EPA and CDPHE..

The **Irrigation Water, Contamination Fraction** is the fraction of irrigation water for homegrown produce that is contaminated (Argonne, 1993b) and is given a value of 0.0 for the residential exposure scenario. This is true at RFETS because ground water will not be used for domestic purposes. Since the open space and office worker exposure scenarios do not require the assessment of the ingestion of homegrown produce pathway, this parameter is not applicable to these exposure scenarios.

The **Plant Food, Contamination Fraction** is the fraction of the homegrown produce that is assumed to be contaminated (Argonne, 1993b) and is given a value of 1.0 for the residential exposure scenario. This assumption means that the total plant intake is assumed to be contaminated. Since the open space and office worker exposure scenarios do not require the assessment of the ingestion of homegrown produce pathway, this parameter is not applicable to these exposure scenarios.

The **Mass Loading For Foliar Deposition** parameter was set at the RESRAD default of 0.0001 grams/m^3 (Argonne, 1993b) for the residential exposure scenario. This foliar deposition parameter is the air/soil concentration ratio, specified as the average mass loading of airborne contaminated soil particles in a garden during the growing season (Argonne, 1993b). Since the open space and office worker exposure scenarios do not require the assessment of the ingestion of homegrown produce pathway, this parameter is not applicable to these exposure scenarios.

The **Depth of Soil Mixing Layer** parameter was set at the RESRAD default value of 0.15 meter (Argonne, 1993b) for all exposure scenarios. This mixing layer is the depth over which the surface soil is uniformly mixed and is used in calculating the depth factor for the dust inhalation, soil ingestion and foliar deposition pathways (Argonne, 1993b).

The **Depth of Roots** parameter was set at the RESRAD default value of 0.9 meter for the residential exposure scenario and is considered to be the average root depth of various plants grown in the contaminated zone (Argonne, 1993a). Since the open space and office worker exposure scenarios do not require the assessment of the ingestion of homegrown produce pathway, this parameter is not applicable to these exposure scenarios.

The RESRAD default value of 1.0 was assigned to the **Groundwater Fractional Usage, Irrigation** parameter (Argonne, 1993b) for the residential exposure scenario. Since the open space and office worker exposure scenarios do not require the assessment of the ingestion of homegrown produce pathway, this parameter is not applicable to these exposure scenarios. This irrigation parameter is

the fraction of ground water used to irrigate produce. The use of the RESRAD default is not appropriate at the RFETS since ground water will not be used for domestic purposes, but for modeling purposes, it is necessary to specify a source of water for irrigation. Therefore, ground water was selected for use. The ground water used for irrigation is not considered to be contaminated.

The **Average Storage Time for Fruits, Nonleafy Vegetables and Grain Consumption** was set at the RESRAD default value of 14 days (Argonne, 1993b) for the residential exposure scenario. Since the open space and office worker exposure scenarios do not require the assessment of the ingestion of homegrown produce pathway, this parameter is not applicable to these exposure scenarios. The storage time parameter allows the ingrowth and decay of radionuclides over the storage time specified before ingestion occurs (Argonne, 1993b). Due to the long half-lives of the radionuclides being assessed, this parameter has an insignificant effect on the action level.

The **Average Storage Time for Leafy Vegetables Consumption** was set at the RESRAD default value of 1 day (Argonne, 1993b) for the residential exposure scenario. Since the open space and office worker exposure scenarios do not require the assessment of the ingestion of homegrown produce pathway, this parameter is not applicable to these exposure scenarios. The storage time parameter allows the ingrowth and decay of radionuclides over the storage time specified before ingestion occurs (Argonne, 1993b). Due to the long half-lives of the radionuclides being assessed, this parameter has an insignificant effect on the action level.

The **Average Storage Time for Well Water and Surface Water Use** were both set at the RESRAD default value of 1 day (Argonne, 1993b) for the residential exposure scenario. Since the open space and office worker exposure scenarios do not require the assessment of the ingestion of homegrown produce pathway, this parameter is not applicable to these exposure scenarios. The storage time parameter allows the ingrowth and decay of radionuclides over the storage time specified before ingestion occurs (Argonne, 1993b). Due to the long half-lives of the radionuclides being assessed,

this parameter has an insignificant effect on the action level.

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Attachments

Attachment I - Surface Soil Exposure Parameter Definition
Attachment II - Surface Soil Action Levels
Attachment III - RESRAD Summary Output for the Residential Tier I (85 mrem) Action Levels
Attachment IV - RESRAD Summary Output for the Residential Tier II (15 mrem) Action Levels
Attachment V - RESRAD Summary Output for the Open Space Tier I (15 mrem) Action Levels
Attachment VI - RESRAD Summary Output for the Office Worker Tier I (15 mrem) Action Levels

ATTACHMENT I
SURFACE SOIL EXPOSURE PARAMETER DEFINITION

Contaminated Zone Parameters

RESRAD Parameter	Units	Residential Surface Soils Parameters	Open Space Surface Soils Parameters	Office Worker Surface Soils Parameters
Area of Contaminated Zone	square meters	40,000	40,000	40,000
Thickness of Contaminated Zone	meters	0.15	0.15	0.15
Length Parallel to Aquifer Flow	meters	200	Not Applicable	Not Applicable
Radiation Dose Limit	mrem/year	85 & 15	15	15
Elapsed Time of Waste Placement	years	0	0	0

Initial Concentrations of Principal Radionuclides

RESRAD Parameter	Units	Residential Surface Soils Parameters	Open Space Surface Soils Parameters	Office Worker Surface Soils Parameters
Plutonium-238, 239, 240, 241, 242	pCi/gram	100	100	100
Americium-241	pCi/gram	100	100	100
Uranium-234, 235, 238	pCi/gram	100	100	100

Cover and Contaminated Zone Hydrological Data

RESRAD Parameter	Units	Residential Surface Soils Parameters	Open Space Surface Soils Parameters	Office Worker Surface Soils Parameters
Cover Depth	meters	0	0	0
Density of Contaminated Zone	grams/cm^3	1.8	1.8	1.8
Contaminated Zone Erosion Rate	meters/year	7.49E-05	7.49E-05	7.49E-05
Contaminated Zone Total Porosity	Dimensionless	0.3	0.3	0.3
Contaminated Zone Effective Porosity	Dimensionless	0.1	0.1	0.1
Contaminated Zone Hydraulic Conductivity	meters/year	44.5	44.5	44.5
Contaminated Zone b Parameter	Dimensionless	10.4	10.4	10.4
Evapotranspiration Coefficient	Dimensionless	0.253	0.920	0.920
Precipitation	meters/year	0.381	0.381	0.381
Irrigation	meters/year	1	0.0	0.0
Irrigation Mode	Dimensionless	Overhead	Not Applicable	Not Applicable
Runoff Coefficient	Dimensionless	0.004	0.004	0.004
Watershed Area For Nearby Stream or Pond	meter^2	8280000	Not Applicable	Not Applicable
Accuracy For Water/Soil Computations	Dimensionless	0.001	Not Applicable	Not Applicable

Saturated Zone Hydrological Data

RESRAD Parameter	Units	Residential Surface Soils Parameters	Open Space Surface Soils Parameters	Office Worker Surface Soils Parameters
Density of Saturated Zone	grams/cm3	1.8	Not Applicable	Not Applicable
Saturated Zone Total Porosity	Dimensionless	0.3	Not Applicable	Not Applicable
Saturated Zone Effective Porosity	Dimensionless	0.1	Not Applicable	Not Applicable
Saturated Zone Hydraulic Conductivity	meters/year	44.5	Not Applicable	Not Applicable
Saturated Zone Hydraulic Gradient	Dimensionless	0.15	Not Applicable	Not Applicable
Water Table Drop Rate	meters/year	0	Not Applicable	Not Applicable
Well Pump Intake Depth	Meters Below Water Table	10	Not Applicable	Not Applicable
Nondispersion or Mass Balance	Dimensionless	Nondispersion	Not Applicable	Not Applicable
Well Pumping Rate	m^3/year	250	Not Applicable	Not Applicable

Uncontaminated and Unsaturated Strata Hydrological Data

RESRAD Parameter	Units	Residential Surface Soils Parameters	Open Space Surface Soils Parameters	Office Worker Surface Soils Parameters
Thickness	meters	3	Not Applicable	Not Applicable
Density of Saturated Zone	grams/cm^3	1.8	Not Applicable	Not Applicable
Total Porosity	Dimensionless	0.3	Not Applicable	Not Applicable
Effective Porosity	Dimensionless	0.1	Not Applicable	Not Applicable
Soil-Specific b Parameter	Dimensionless	10.4	Not Applicable	Not Applicable
Hydraulic Conductivity	meters/year	44.5	Not Applicable	Not Applicable

Distribution Coefficients

Radionuclide	Units	Residential Surface Soils Parameters	Open Space Surface Soils Parameters	Office Worker Surface Soils Parameters
Plutonium	cm^3/gram	218	218	218
Americium	cm^3/gram	76	76	76
Uranium	cm^3/gram	50	50	50
Actinium	cm^3/gram	20	20	20
Neptunium	cm^3/gram	-1 (a)	-1 (a)	-1 (a)
Protactinium	cm^3/gram	50	50	50
Lead	cm^3/gram	100	100	100
Radium	cm^3/gram	70	70	70
Thorium	cm^3/gram	60,000	60,000	60,000

(a) - This distribution coefficient is calculated by the RESRAD code based on a correlation with the plant-soil concentration ratio.

Soil Inhalation, Ingestion and External Gamma Parameters

RESRAD Parameter	Units	Residential Surface Soils Parameters	Open Space Surface Soils Parameters	Office Worker Surface Soils Parameters
Inhalation Rate	m^3/year	7000	175	1660
Mass Loading	grams/m^3	0.000026	0.000026	0.000026
Dilution Length	meters	3	3	3
Exposure Duration	years	30	30	25
Inhalation Shielding Factor	dimensionless	1.0	1.0	1.0
External Gamma Shielding Factor	dimensionless	0.8	0.014	0.17
Indoor Time Fraction	dimensionless	1.0	1.0	1.0
Outdoor Time Fraction	dimensionless	0	0	0
Shape Factor	dimensionless	1.0	1.0	1.0

Vegetable and Fruit Ingestion Parameters

RESRAD Parameter	Units	Residential Surface Soils Parameters	Open Space Surface Soils Parameters	Office Worker Surface Soils Parameters
Fruits, Nonleafy Vegetables & Grain Consumption	kg/year	40.1	Not Applicable	Not Applicable
Leafy Vegetable Consumption	kg/year	2.6	Not Applicable	Not Applicable
Soil Ingestion Rate	gram/year	70	2.5	12.5
Irrigation Water, Contamination Fraction	Dimensionless	0	Not Applicable	Not Applicable
Plant Food, Contamination Fraction	Dimensionless	1	Not Applicable	Not Applicable
Mass Loading For Foliar Deposition	grams/m3	0.0001	Not Applicable	Not Applicable
Depth of Soil Mixing Layer	meter	0.15	0.15	0.15
Depth of Roots	meter	0.9	Not Applicable	Not Applicable
Groundwater Fractional Usage, Irrigation	Dimensionless	1	Not Applicable	Not Applicable
Fruits, Nonleafy Vegetables & Grain Consumption, Average Storage Time	days	14	Not Applicable	Not Applicable
Leafy Vegetables, Average Storage Time	days	1	Not Applicable	Not Applicable
Well Water, Average Storage Time	days	1	Not Applicable	Not Applicable
Surface Water, Average Storage Time	days	1	Not Applicable	Not Applicable

ATTACHMENT II
SURFACE SOIL ACTION LEVELS

Radionuclide	TIER I Residential Exposure Scenario, Direct Exposure to Surficial Soils at the 85 Millirem Dose Limit (pCi/gram)	TIER II Residential Exposure Scenario, Direct Exposure to Surficial Soils at the 15 Millirem Dose Limit (pCi/gram)	TIER I Open Space Exposure Scenario, Direct Exposure to Surficial Soils at the 15 Millirem Dose Limit (pCi/gram)	TIER I Office Worker Exposure Scenario, Direct Exposure to Surficial Soils at the 15 Millirem Dose Limit (pCi/gram)
Americium-241	215	38	1283	209
Plutonium-238	1529	270	10580	1164
Plutonium-239	1429	252	9906	1088
Plutonium-240	1432	253	9919	1089
Plutonium-241	19830	3499	48020	7801
Plutonium-242	1506	266	10430	1145
Uranium-234	1738	307	11500	1627
Uranium-235	135	24	1314	113
Uranium-238	586	103	5079	506

ATTACHMENT III
RESRAD SUMMARY OUTPUT FOR THE RESIDENTIAL TIER I (85 MREM) ACTION LEVELS

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Dose Conversion Factor (and Related) Parameter Summary
File: CLASSY.BIN

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.720E+00	6.720E+00	DCF2(1)
B-1	Am-241	4.440E-01	4.440E-01	DCF2(2)
B-1	Np-237+D	5.400E-01	5.400E-01	DCF2(3)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(4)
B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2(5)
B-1	Pu-238	2.880E-01	3.920E-01	DCF2(6)
B-1	Pu-239	3.080E-01	4.290E-01	DCF2(7)
B-1	Pu-240	3.080E-01	4.290E-01	DCF2(8)
B-1	Pu-241+D	4.960E-03	8.250E-03	DCF2(9)
B-1	Pu-242	2.930E-01	4.110E-01	DCF2(11)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2(12)
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(13)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(14)
B-1	Th-229+D	2.160E+00	2.160E+00	DCF2(15)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(16)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(17)
B-1	U-233	1.350E-01	1.350E-01	DCF2(18)
B-1	U-234	1.320E-01	1.320E-01	DCF2(19)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(20)
B-1	U-236	1.250E-01	1.250E-01	DCF2(21)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(22)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3(1)
D-1	Am-241	3.640E-03	3.640E-03	DCF3(2)
D-1	Np-237+D	4.440E-03	4.440E-03	DCF3(3)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(4)
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3(5)
D-1	Pu-238	4.960E-05	3.200E-03	DCF3(6)
D-1	Pu-239	5.180E-05	3.540E-03	DCF3(7)
D-1	Pu-240	5.180E-05	3.540E-03	DCF3(8)
D-1	Pu-241+D	7.660E-07	6.850E-05	DCF3(9)
D-1	Pu-242	4.920E-05	3.360E-03	DCF3(11)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3(12)
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(13)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(14)
D-1	Th-229+D	4.030E-03	4.030E-03	DCF3(15)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(16)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(17)
D-1	U-233	2.890E-04	2.890E-04	DCF3(18)
D-1	U-234	2.830E-04	2.830E-04	DCF3(19)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3(20)
D-1	U-236	2.690E-04	2.690E-04	DCF3(21)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3(22)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: CLASSY.BIN

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Am-241 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(2,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF(2,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(2,3)
D-34				
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF(3,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(3,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(4,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(4,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(5,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(5,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(5,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(6,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(7,3)
D-34				
D-34	Pu-240 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(8,1)
D-34	Pu-240 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(8,2)
D-34	Pu-240 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(8,3)
D-34				
D-34	Pu-241+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Pu-241+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Pu-241+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(9,3)
D-34				
D-34	Pu-242 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(11,1)
D-34	Pu-242 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(11,2)
D-34	Pu-242 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(11,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(12,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(12,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(12,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(13,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(13,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(13,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(14,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(14,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(14,3)
D-34				

Dose Conversion Factor (and Related) Parameter Summary (continued)
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Menu	Parameter	Current Value	Default	Parameter Name
D-34	Th-229+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(15,1)
D-34	Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(15,2)
D-34	Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(15,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(16,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(16,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(16,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(17,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(17,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(17,3)
D-34				
D-34	U-233 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(18,1)
D-34	U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(18,2)
D-34	U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(18,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(19,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(19,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(19,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(20,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(20,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(20,3)
D-34				
D-34	U-236 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(21,1)
D-34	U-236 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(21,2)
D-34	U-236 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(21,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(22,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(22,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(22,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Am-241 , fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Am-241 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5				
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(3,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(3,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(4,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(4,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(5,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(5,2)
D-5				
D-5	Pu-238 , fish	3.000E+01	3.000E+01	BIOFAC(6,1)
D-5	Pu-238 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(6,2)

Dose Conversion Factor (and Related) Parameter Summary (continued)
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Menu	Parameter	Current Value	Default	Parameter Name
D-5	Pu-239 , fish	3.000E+01	3.000E+01	BIOFAC(7,1)
D-5	Pu-239 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(7,2)
D-5	Pu-240 , fish	3.000E+01	3.000E+01	BIOFAC(8,1)
D-5	Pu-240 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(8,2)
D-5	Pu-241+D , fish	3.000E+01	3.000E+01	BIOFAC(9,1)
D-5	Pu-241+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(9,2)
D-5	Pu-242 , fish	3.000E+01	3.000E+01	BIOFAC(11,1)
D-5	Pu-242 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(11,2)
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(12,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(12,2)
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(13,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(13,2)
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(14,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(14,2)
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(15,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(15,2)
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(16,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(16,2)
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(17,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(17,2)
D-5	U-233 , fish	1.000E+01	1.000E+01	BIOFAC(18,1)
D-5	U-233 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(18,2)
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(19,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(19,2)
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(20,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(20,2)
D-5	U-236 , fish	1.000E+01	1.000E+01	BIOFAC(21,1)
D-5	U-236 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(21,2)
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(22,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(22,2)

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	4.000E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	2.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	8.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Am-241	1.000E+02	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Pu-238	1.000E+02	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): Pu-239	1.000E+02	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): Pu-240	1.000E+02	0.000E+00	---	S1(8)
R012	Initial principal radionuclide (pCi/g): Pu-241	1.000E+02	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g): Pu-242	1.000E+02	0.000E+00	---	S1(11)
R012	Initial principal radionuclide (pCi/g): U-234	1.000E+02	0.000E+00	---	S1(19)
R012	Initial principal radionuclide (pCi/g): U-235	1.000E+02	0.000E+00	---	S1(20)
R012	Initial principal radionuclide (pCi/g): U-238	1.000E+02	0.000E+00	---	S1(22)
R012	Concentration in groundwater (pCi/L): Am-241	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): Pu-240	not used	0.000E+00	---	W1(8)
R012	Concentration in groundwater (pCi/L): Pu-241	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L): Pu-242	not used	0.000E+00	---	W1(11)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(19)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(20)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(22)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.800E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	7.490E-05	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	1.000E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.450E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	1.040E+01	5.300E+00	---	BCZ
R013	Humidity in air (g/cm**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	2.530E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	3.810E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.000E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	4.000E-03	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	8.280E+06	1.000E+06	---	WAREA

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.800E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	1.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	4.450E+01	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	1.500E-01	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	3.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.800E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	3.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	1.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	1.040E+01	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	4.450E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Am-241				
R016	Contaminated zone (cm**3/g)	7.600E+01	2.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	7.600E+01	2.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	7.600E+01	2.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.012E-02	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pu-238				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.750E-02	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for Pu-239				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.750E-02	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for Pu-240				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.750E-02	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Pu-241				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.750E-02	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for Pu-242				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCU(11,1)
R016	Saturated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.750E-02	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(19)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(19,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(19)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.611E-02	ALEACH(19)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(19)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(20)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(20,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(20)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.611E-02	ALEACH(20)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(20)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(22)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(22,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(22)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.611E-02	ALEACH(22)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(22)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.895E-01	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Np-237				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.036E+02	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	-1.000E+00	-1.000E+00	2.036E+02	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.036E+02	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.874E-02	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.611E-02	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.811E-02	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(12,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.441E-02	ALEACH(12)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(12)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(13)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(13,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.441E-02	ALEACH(13)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(13)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(14)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(14,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(14)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.361E-05	ALEACH(14)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(14)
R016	Distribution coefficients for daughter Th-229				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(15)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(15,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(15)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.361E-05	ALEACH(15)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(15)
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(16)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(16,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(16)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.361E-05	ALEACH(16)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(16)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(17)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(17,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(17)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.361E-05	ALEACH(17)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(17)
R016	Distribution coefficients for daughter U-233				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(18)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(18,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(18)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.611E-02	ALEACH(18)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(18)
R016	Distribution coefficients for daughter U-236				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(21)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(21,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(21)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.611E-02	ALEACH(21)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(21)
R017	Inhalation rate (m**3/yr)	7.000E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.600E-05	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	1.000E+00	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	8.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	1.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	0.000E+00	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	1 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	4.010E+01	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.600E+00	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	7.000E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	0.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	1.000E+00	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	not used	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	not used	2.000E+01	---	STOR_T(4)
STOR	Fish	not used	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	not used	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	not used	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average annual wind speed (m/sec)	not used	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed

Contaminated Zone Dimensions	
Area:	40000.00 square meters
Thickness:	0.15 meters
Cover Depth:	0.00 meters

Initial Soil Concentrations, pCi/g	
Am-241	1.000E+02
Pu-238	1.000E+02
Pu-239	1.000E+02
Pu-240	1.000E+02
Pu-241	1.000E+02
Pu-242	1.000E+02
U-234	1.000E+02
U-235	1.000E+02
U-238	1.000E+02

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 85 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	1.450E+02	1.365E+02	1.212E+02	8.119E+01	2.973E+01	3.574E+00	8.137E-02	1.144E-03
M(t):	1.706E+00	1.606E+00	1.426E+00	9.552E-01	3.498E-01	4.205E-02	9.572E-04	1.346E-05

Maximum TDOSE(t): 1.450E+02 mrem/yr at t = 0.000E+00 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	3.438E+00	0.0237	7.961E+00	0.0549	0.000E+00	0.0000	2.693E+00	0.0186	0.000E+00	0.0000	0.000E+00	0.0000	2.548E+01	0.1758
Pu-238	1.200E-02	0.0001	5.164E+00	0.0356	0.000E+00	0.0000	3.669E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.472E-01	0.0024
Pu-239	2.280E-02	0.0002	5.523E+00	0.0381	0.000E+00	0.0000	3.833E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.626E-01	0.0025
Pu-240	1.168E-02	0.0001	5.523E+00	0.0381	0.000E+00	0.0000	3.833E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.626E-01	0.0025
Pu-241	1.469E-03	0.0000	8.894E-02	0.0006	0.000E+00	0.0000	5.658E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.362E-03	0.0000
Pu-242	1.016E-02	0.0001	5.254E+00	0.0362	0.000E+00	0.0000	3.640E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.444E-01	0.0024
U-234	3.150E-02	0.0002	2.367E+00	0.0163	0.000E+00	0.0000	5.115E-01	0.0035	0.000E+00	0.0000	0.000E+00	0.0000	1.981E+00	0.0137
U-235	5.827E+01	0.4020	2.206E+00	0.0152	0.000E+00	0.0000	4.826E-01	0.0033	0.000E+00	0.0000	0.000E+00	0.0000	1.869E+00	0.0129
U-238	1.001E+01	0.0691	2.116E+00	0.0146	0.000E+00	0.0000	4.862E-01	0.0034	0.000E+00	0.0000	0.000E+00	0.0000	1.883E+00	0.0130
Total	7.181E+01	0.4954	3.620E+01	0.2497	0.000E+00	0.0000	4.324E+00	0.0298	0.000E+00	0.0000	0.000E+00	0.0000	3.264E+01	0.2251

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.957E+01	0.2730
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.560E+00	0.0384
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.946E+00	0.0410
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.935E+00	0.0409
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.633E-02	0.0007
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.645E+00	0.0389
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.891E+00	0.0337
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.283E+01	0.4334
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.450E+01	0.1000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.450E+02	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	3.265E+00	0.0239	7.556E+00	0.0553	0.000E+00	0.0000	2.556E+00	0.0187	0.000E+00	0.0000	0.000E+00	0.0000	2.418E+01	0.1771
Pu-238	1.170E-02	0.0001	5.032E+00	0.0369	0.000E+00	0.0000	3.575E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.383E-01	0.0025
Pu-239	2.241E-02	0.0002	5.424E+00	0.0397	0.000E+00	0.0000	3.764E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.561E-01	0.0026
Pu-240	1.148E-02	0.0001	5.424E+00	0.0397	0.000E+00	0.0000	3.764E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.561E-01	0.0026
Pu-241	6.576E-03	0.0000	9.528E-02	0.0007	0.000E+00	0.0000	4.746E-03	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.353E-02	0.0003
Pu-242	9.984E-03	0.0001	5.160E+00	0.0378	0.000E+00	0.0000	3.575E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.383E-01	0.0025
U-234	2.919E-02	0.0002	2.192E+00	0.0161	0.000E+00	0.0000	4.738E-01	0.0035	0.000E+00	0.0000	0.000E+00	0.0000	1.835E+00	0.0134
U-235	5.400E+01	0.3955	2.043E+00	0.0150	0.000E+00	0.0000	4.485E-01	0.0033	0.000E+00	0.0000	0.000E+00	0.0000	1.733E+00	0.0127
U-238	9.278E+00	0.0680	1.960E+00	0.0144	0.000E+00	0.0000	4.503E-01	0.0033	0.000E+00	0.0000	0.000E+00	0.0000	1.744E+00	0.0128
Total	6.663E+01	0.4881	3.489E+01	0.2555	0.000E+00	0.0000	4.080E+00	0.0299	0.000E+00	0.0000	0.000E+00	0.0000	3.093E+01	0.2265

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.756E+01	0.2751
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.418E+00	0.0397
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.840E+00	0.0428
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.829E+00	0.0427
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.501E-01	0.0011
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.544E+00	0.0406
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.530E+00	0.0332
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.823E+01	0.4265
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.343E+01	0.0984
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.365E+02	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	2.944E+00	0.0243	6.807E+00	0.0561	0.000E+00	0.0000	2.303E+00	0.0190	0.000E+00	0.0000	0.000E+00	0.0000	2.178E+01	0.1797
Pu-238	1.112E-02	0.0001	4.778E+00	0.0394	0.000E+00	0.0000	3.395E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.213E-01	0.0026
Pu-239	2.163E-02	0.0002	5.232E+00	0.0432	0.000E+00	0.0000	3.631E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.435E-01	0.0028
Pu-240	1.108E-02	0.0001	5.231E+00	0.0431	0.000E+00	0.0000	3.630E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.434E-01	0.0028
Pu-241	1.508E-02	0.0001	1.050E-01	0.0009	0.000E+00	0.0000	1.144E-02	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	1.071E-01	0.0009
Pu-242	9.641E-03	0.0001	4.978E+00	0.0411	0.000E+00	0.0000	3.449E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.263E-01	0.0027
U-234	2.508E-02	0.0002	1.881E+00	0.0155	0.000E+00	0.0000	4.065E-01	0.0034	0.000E+00	0.0000	0.000E+00	0.0000	1.574E+00	0.0130
U-235	4.637E+01	0.3825	1.754E+00	0.0145	0.000E+00	0.0000	3.874E-01	0.0032	0.000E+00	0.0000	0.000E+00	0.0000	1.489E+00	0.0123
U-238	7.966E+00	0.0657	1.681E+00	0.0139	0.000E+00	0.0000	3.864E-01	0.0032	0.000E+00	0.0000	0.000E+00	0.0000	1.496E+00	0.0123
Total	5.738E+01	0.4732	3.245E+01	0.2676	0.000E+00	0.0000	3.635E+00	0.0300	0.000E+00	0.0000	0.000E+00	0.0000	2.779E+01	0.2292

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.384E+01	0.2791
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.144E+00	0.0424
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.634E+00	0.0465
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.622E+00	0.0464
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.386E-01	0.0020
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.348E+00	0.0441
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.887E+00	0.0321
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.000E+01	0.4124
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.153E+01	0.0951
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.212E+02	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	2.050E+00	0.0252	4.722E+00	0.0582	0.000E+00	0.0000	1.598E+00	0.0197	0.000E+00	0.0000	0.000E+00	0.0000	1.511E+01	0.1861
Pu-238	9.307E-03	0.0001	3.986E+00	0.0491	0.000E+00	0.0000	2.833E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	2.680E-01	0.0033
Pu-239	1.913E-02	0.0002	4.612E+00	0.0568	0.000E+00	0.0000	3.201E-02	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	3.028E-01	0.0037
Pu-240	9.794E-03	0.0001	4.608E+00	0.0568	0.000E+00	0.0000	3.198E-02	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	3.026E-01	0.0037
Pu-241	3.145E-02	0.0004	1.166E-01	0.0014	0.000E+00	0.0000	2.429E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	2.291E-01	0.0028
Pu-242	8.530E-03	0.0001	4.388E+00	0.0540	0.000E+00	0.0000	3.041E-02	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	2.877E-01	0.0035
U-234	1.482E-02	0.0002	1.100E+00	0.0136	0.000E+00	0.0000	2.378E-01	0.0029	0.000E+00	0.0000	0.000E+00	0.0000	9.210E-01	0.0113
U-235	2.721E+01	0.3352	1.029E+00	0.0127	0.000E+00	0.0000	2.320E-01	0.0029	0.000E+00	0.0000	0.000E+00	0.0000	8.771E-01	0.0108
U-238	4.673E+00	0.0575	9.835E-01	0.0121	0.000E+00	0.0000	2.260E-01	0.0028	0.000E+00	0.0000	0.000E+00	0.0000	8.752E-01	0.0108
Total	3.403E+01	0.4191	2.555E+01	0.3146	0.000E+00	0.0000	2.440E+00	0.0301	0.000E+00	0.0000	0.000E+00	0.0000	1.918E+01	0.2362

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.348E+01	0.2892
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.292E+00	0.0529
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.966E+00	0.0612
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.953E+00	0.0610
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.014E-01	0.0049
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.715E+00	0.0581
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.274E+00	0.0280
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.935E+01	0.3615
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.757E+00	0.0832
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.119E+01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	7.288E-01	0.0245	1.661E+00	0.0559	0.000E+00	0.0000	5.622E-01	0.0189	0.000E+00	0.0000	0.000E+00	0.0000	5.317E+00	0.1788
Pu-238	5.601E-03	0.0002	2.375E+00	0.0799	0.000E+00	0.0000	1.688E-02	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	1.597E-01	0.0054
Pu-239	1.347E-02	0.0005	3.216E+00	0.1082	0.000E+00	0.0000	2.232E-02	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	2.111E-01	0.0071
Pu-240	6.888E-03	0.0002	3.208E+00	0.1079	0.000E+00	0.0000	2.227E-02	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	2.106E-01	0.0071
Pu-241	2.887E-02	0.0010	7.759E-02	0.0026	0.000E+00	0.0000	2.221E-02	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	2.099E-01	0.0071
Pu-242	6.011E-03	0.0002	3.062E+00	0.1030	0.000E+00	0.0000	2.121E-02	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	2.007E-01	0.0067
U-234	3.643E-03	0.0001	2.382E-01	0.0080	0.000E+00	0.0000	5.142E-02	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	1.993E-01	0.0067
U-235	5.936E+00	0.1996	2.242E-01	0.0075	0.000E+00	0.0000	5.358E-02	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	1.935E-01	0.0065
U-238	1.018E+00	0.0342	2.125E-01	0.0071	0.000E+00	0.0000	4.882E-02	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	1.891E-01	0.0064
Total	7.747E+00	0.2605	1.427E+01	0.4801	0.000E+00	0.0000	8.210E-01	0.0276	0.000E+00	0.0000	0.000E+00	0.0000	6.891E+00	0.2318

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.270E+00	0.2781
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.557E+00	0.0860
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.463E+00	0.1165
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.448E+00	0.1160
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.386E-01	0.0114
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.289E+00	0.1106
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.926E-01	0.0166
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.407E+00	0.2155
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.468E+00	0.0494
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.973E+01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.962E-02	0.0055	4.289E-02	0.0120	0.000E+00	0.0000	1.459E-02	0.0041	0.000E+00	0.0000	0.000E+00	0.0000	1.373E-01	0.0384
Pu-238	9.466E-04	0.0003	3.871E-01	0.1083	0.000E+00	0.0000	2.752E-03	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	2.603E-02	0.0073
Pu-239	3.938E-03	0.0011	9.096E-01	0.2545	0.000E+00	0.0000	6.312E-03	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	5.972E-02	0.0167
Pu-240	2.009E-03	0.0006	9.026E-01	0.2525	0.000E+00	0.0000	6.264E-03	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	5.926E-02	0.0166
Pu-241	1.695E-03	0.0005	3.834E-03	0.0011	0.000E+00	0.0000	1.260E-03	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	1.190E-02	0.0033
Pu-242	1.766E-03	0.0005	8.676E-01	0.2427	0.000E+00	0.0000	6.012E-03	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	5.687E-02	0.0159
U-234	7.462E-04	0.0002	1.765E-03	0.0005	0.000E+00	0.0000	3.385E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	1.386E-03	0.0004
U-235	2.876E-02	0.0080	1.084E-03	0.0003	0.000E+00	0.0000	3.076E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	9.733E-04	0.0003
U-238	4.905E-03	0.0014	9.949E-04	0.0003	0.000E+00	0.0000	2.286E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	8.854E-04	0.0002
Total	6.439E-02	0.0180	3.117E+00	0.8722	0.000E+00	0.0000	3.807E-02	0.0107	0.000E+00	0.0000	0.000E+00	0.0000	3.543E-01	0.0991

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.144E-01	0.0600
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.168E-01	0.1166
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.795E-01	0.2741
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.701E-01	0.2714
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.869E-02	0.0052
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.322E-01	0.2608
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.236E-03	0.0012
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.112E-02	0.0087
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.014E-03	0.0020
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.574E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	3.543E-06	0.0000	1.526E-06	0.0000	0.000E+00	0.0000	2.332E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.886E-06	0.0001
Pu-238	5.966E-06	0.0001	2.157E-03	0.0265	0.000E+00	0.0000	1.534E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	1.451E-04	0.0018
Pu-239	1.171E-04	0.0014	2.446E-02	0.3006	0.000E+00	0.0000	1.697E-04	0.0021	0.000E+00	0.0000	0.000E+00	0.0000	1.606E-03	0.0197
Pu-240	5.942E-05	0.0007	2.390E-02	0.2937	0.000E+00	0.0000	1.659E-04	0.0020	0.000E+00	0.0000	0.000E+00	0.0000	1.569E-03	0.0193
Pu-241	1.710E-07	0.0000	1.503E-07	0.0000	0.000E+00	0.0000	1.129E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.804E-07	0.0000
Pu-242	5.332E-05	0.0007	2.346E-02	0.2883	0.000E+00	0.0000	1.625E-04	0.0020	0.000E+00	0.0000	0.000E+00	0.0000	1.538E-03	0.0189
U-234	7.078E-04	0.0087	5.759E-04	0.0071	0.000E+00	0.0000	8.780E-05	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	4.028E-04	0.0050
U-235	6.983E-09	0.0000	2.589E-10	0.0000	0.000E+00	0.0000	1.028E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.552E-10	0.0000
U-238	2.756E-08	0.0000	2.169E-08	0.0000	0.000E+00	0.0000	3.324E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.521E-08	0.0000
Total	9.474E-04	0.0116	7.455E-02	0.9162	0.000E+00	0.0000	6.037E-04	0.0074	0.000E+00	0.0000	0.000E+00	0.0000	5.266E-03	0.0647

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.229E-05	0.0002
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.323E-03	0.0286
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.635E-02	0.3239
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.569E-02	0.3158
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.145E-07	0.0000
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.521E-02	0.3098
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.774E-03	0.0218
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.600E-09	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.778E-08	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.137E-02	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.644E-10	0.0000	3.078E-11	0.0000	0.000E+00	0.0000	4.615E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.328E-11	0.0000
Pu-238	6.125E-08	0.0001	3.611E-08	0.0000	0.000E+00	0.0000	5.502E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.524E-08	0.0000
Pu-239	4.993E-10	0.0000	6.775E-08	0.0001	0.000E+00	0.0000	4.702E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.448E-09	0.0000
Pu-240	2.623E-10	0.0000	6.272E-08	0.0001	0.000E+00	0.0000	4.353E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.118E-09	0.0000
Pu-241	4.079E-12	0.0000	7.579E-13	0.0000	0.000E+00	0.0000	1.352E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.815E-13	0.0000
Pu-242	2.519E-10	0.0000	6.621E-08	0.0001	0.000E+00	0.0000	4.588E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.340E-09	0.0000
U-234	5.471E-04	0.4780	3.223E-04	0.2817	0.000E+00	0.0000	4.914E-05	0.0429	0.000E+00	0.0000	0.000E+00	0.0000	2.255E-04	0.1970
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	2.040E-08	0.0000	1.202E-08	0.0000	0.000E+00	0.0000	1.832E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.406E-09	0.0000
Total	5.472E-04	0.4781	3.226E-04	0.2819	0.000E+00	0.0000	4.915E-05	0.0429	0.000E+00	0.0000	0.000E+00	0.0000	2.255E-04	0.1971

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.230E-10	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.281E-07	0.0001
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.317E-08	0.0001
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.753E-08	0.0001
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.554E-12	0.0000
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.126E-08	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.144E-03	0.9997
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.265E-08	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.144E-03	1.0000

*Sum of all water independent and dependent pathways.

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	3.957E-01	3.756E-01	3.384E-01	2.348E-01	8.269E-02	2.141E-03	6.224E-08	7.373E-24
Am-241	Np-237	1.000E+00	0.000E+00	5.876E-07	1.642E-06	4.284E-06	6.545E-06	2.645E-06	6.063E-08	8.877E-14
Am-241	U-233	1.000E+00	0.000E+00	3.625E-14	2.848E-13	2.224E-12	7.858E-12	5.097E-12	1.175E-13	1.410E-19
Am-241	Th-229	1.000E+00	0.000E+00	4.114E-17	1.029E-15	2.962E-14	4.088E-13	2.313E-12	3.078E-12	2.142E-12
Am-241	ôDSR(j)		3.957E-01	3.756E-01	3.384E-01	2.348E-01	8.270E-02	2.144E-03	1.229E-07	2.230E-12
Pu-238	Pu-238	1.000E+00	5.560E-02	5.418E-02	5.144E-02	4.292E-02	2.557E-02	4.168E-03	2.323E-05	2.608E-13
Pu-238	U-234	1.000E+00	0.000E+00	1.319E-07	3.572E-07	8.396E-07	9.827E-07	2.037E-07	1.143E-09	1.287E-17
Pu-238	Th-230	1.000E+00	0.000E+00	1.264E-12	1.058E-11	9.334E-11	4.638E-10	1.122E-09	1.123E-09	6.334E-10
Pu-238	Ra-226	1.000E+00	0.000E+00	1.492E-14	3.727E-13	1.057E-11	1.391E-10	6.825E-10	8.201E-10	6.244E-10
Pu-238	Pb-210	1.000E+00	0.000E+00	1.830E-17	1.152E-15	9.762E-14	3.296E-12	3.220E-11	4.080E-11	2.296E-11
Pu-238	ôDSR(j)		5.560E-02	5.418E-02	5.144E-02	4.292E-02	2.557E-02	4.168E-03	2.323E-05	1.281E-09
Pu-239	Pu-239	1.000E+00	5.946E-02	5.840E-02	5.634E-02	4.966E-02	3.463E-02	9.795E-03	2.635E-04	7.317E-10
Pu-239	U-235	1.000E+00	0.000E+00	5.906E-10	1.615E-09	3.927E-09	5.155E-09	1.812E-09	5.362E-11	2.207E-16
Pu-239	Pa-231	1.000E+00	0.000E+00	1.858E-14	1.485E-13	1.115E-12	3.477E-12	1.842E-12	5.093E-14	1.468E-19
Pu-239	Ac-227	1.000E+00	0.000E+00	4.162E-16	9.103E-15	1.768E-13	9.633E-13	6.246E-13	1.790E-14	5.910E-20
Pu-239	ôDSR(j)		5.946E-02	5.840E-02	5.634E-02	4.966E-02	3.463E-02	9.795E-03	2.635E-04	7.317E-10
Pu-240	Pu-240	1.000E+00	5.935E-02	5.829E-02	5.622E-02	4.953E-02	3.448E-02	9.701E-03	2.569E-04	6.753E-10
Pu-240	U-236	1.000E+00	0.000E+00	1.309E-09	3.572E-09	8.655E-09	1.125E-08	3.816E-09	1.014E-10	2.668E-16
Pu-240	Th-232	1.000E+00	0.000E+00	3.578E-19	3.025E-18	2.725E-17	1.430E-16	4.053E-16	4.589E-16	2.604E-16
Pu-240	Ra-228	1.000E+00	0.000E+00	1.321E-19	3.128E-18	7.528E-17	7.222E-16	2.665E-15	3.355E-15	2.580E-15
Pu-240	Th-228	1.000E+00	0.000E+00	1.682E-20	1.070E-18	6.150E-17	9.181E-16	3.906E-15	5.001E-15	3.823E-15
Pu-240	ôDSR(j)		5.935E-02	5.829E-02	5.622E-02	4.953E-02	3.448E-02	9.701E-03	2.569E-04	6.753E-10
Pu-241	Pu-241	1.000E+00	9.633E-04	9.017E-04	7.900E-04	4.973E-04	1.325E-04	1.293E-06	2.309E-12	1.533E-32
Pu-241	Am-241	1.000E+00	0.000E+00	5.997E-04	1.596E-03	3.517E-03	3.253E-03	1.855E-04	7.068E-09	8.504E-25
Pu-241	Np-237	1.000E+00	0.000E+00	4.667E-10	3.832E-09	3.106E-08	1.167E-07	8.428E-08	2.073E-09	3.036E-15
Pu-241	U-233	1.000E+00	0.000E+00	1.983E-17	4.552E-16	1.141E-14	1.091E-13	1.533E-13	4.017E-15	4.823E-21
Pu-241	Th-229	1.000E+00	0.000E+00	1.631E-20	1.214E-18	1.119E-16	4.080E-15	4.815E-14	7.516E-14	5.246E-14
Pu-241	ôDSR(j)		9.633E-04	1.501E-03	2.386E-03	4.014E-03	3.386E-03	1.869E-04	9.144E-09	5.549E-14
Pu-241	Pu-241	2.450E-05	2.360E-08	2.209E-08	1.936E-08	1.218E-08	3.246E-09	3.168E-11	5.657E-17	3.756E-37
Pu-241	Np-237	2.450E-05	0.000E+00	1.430E-11	3.941E-11	9.837E-11	1.356E-10	4.690E-11	1.045E-12	1.530E-18
Pu-241	U-233	2.450E-05	0.000E+00	8.838E-19	6.880E-18	5.206E-17	1.693E-16	9.230E-17	2.025E-18	2.431E-24
Pu-241	Th-229	2.450E-05	0.000E+00	9.992E-22	2.491E-20	7.017E-19	9.149E-18	4.645E-17	5.945E-17	4.133E-17
Pu-241	ôDSR(j)		2.360E-08	2.211E-08	1.939E-08	1.228E-08	3.382E-09	7.858E-11	1.045E-12	4.286E-17
Pu-242	Pu-242	1.000E+00	5.645E-02	5.544E-02	5.348E-02	4.715E-02	3.289E-02	9.322E-03	2.521E-04	7.126E-10
Pu-242	U-238	1.000E+00	0.000E+00	2.147E-11	5.868E-11	1.426E-10	1.866E-10	6.502E-11	1.874E-12	6.918E-18
Pu-242	U-234	1.000E+00	0.000E+00	1.024E-17	8.185E-17	6.143E-16	1.915E-15	1.014E-15	2.799E-17	7.936E-23
Pu-242	Th-230	1.000E+00	0.000E+00	6.437E-23	1.596E-21	4.424E-20	5.555E-19	2.668E-18	3.303E-18	1.878E-18
Pu-242	Ra-226	1.000E+00	0.000E+00	5.753E-25	4.261E-23	3.865E-21	1.357E-19	1.504E-18	2.403E-18	1.851E-18
Pu-242	Pb-210	1.000E+00	0.000E+00	4.419E-28	9.660E-26	2.828E-23	2.693E-21	6.573E-20	1.185E-19	6.773E-20
Pu-242	ôDSR(j)		5.645E-02	5.544E-02	5.348E-02	4.715E-02	3.289E-02	9.322E-03	2.521E-04	7.126E-10

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	4.891E-02	4.530E-02	3.887E-02	2.273E-02	4.911E-03	2.299E-05	5.037E-12	2.159E-35
U-234	Th-230	1.000E+00	0.000E+00	8.850E-07	2.457E-06	6.384E-06	1.064E-05	1.137E-05	1.004E-05	5.658E-06
U-234	Ra-226	1.000E+00	0.000E+00	1.572E-08	1.297E-07	1.073E-06	4.478E-06	7.605E-06	7.336E-06	5.577E-06
U-234	Pb-210	1.000E+00	0.000E+00	2.426E-11	5.221E-10	1.305E-08	1.367E-07	3.961E-07	3.652E-07	2.051E-07
U-234	ÕDSR(j)		4.891E-02	4.530E-02	3.887E-02	2.274E-02	4.926E-03	4.236E-05	1.774E-05	1.144E-05
U-235	U-235	1.000E+00	6.283E-01	5.822E-01	4.999E-01	2.933E-01	6.391E-02	3.085E-04	7.417E-11	4.709E-34
U-235	Pa-231	1.000E+00	0.000E+00	3.685E-05	9.461E-05	1.843E-04	1.195E-04	1.868E-06	1.234E-12	1.817E-35
U-235	Ac-227	1.000E+00	0.000E+00	1.222E-06	8.503E-06	4.124E-05	4.383E-05	8.326E-07	5.948E-13	1.019E-35
U-235	ÕDSR(j)		6.283E-01	5.823E-01	5.000E-01	2.935E-01	6.407E-02	3.112E-04	7.600E-11	4.993E-34
U-238	U-238	1.000E+00	1.450E-01	1.343E-01	1.153E-01	6.757E-02	1.468E-02	7.013E-05	1.633E-11	9.127E-35
U-238	U-234	1.000E+00	0.000E+00	1.289E-07	3.310E-07	6.447E-07	4.177E-07	6.519E-09	4.286E-15	6.128E-38
U-238	Th-230	1.000E+00	0.000E+00	1.243E-12	1.006E-11	7.915E-11	2.937E-10	4.222E-10	3.744E-10	2.109E-10
U-238	Ra-226	1.000E+00	0.000E+00	1.473E-14	3.588E-13	9.323E-12	9.699E-11	2.766E-10	2.735E-10	2.079E-10
U-238	Pb-210	1.000E+00	0.000E+00	1.811E-17	1.117E-15	8.816E-14	2.442E-12	1.396E-11	1.362E-11	7.645E-12
U-238	ÕDSR(j)		1.450E-01	1.343E-01	1.153E-01	6.757E-02	1.468E-02	7.014E-05	6.778E-10	4.265E-10

Branch Fraction is the cumulative factor for the j'th principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life µ 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 85 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	2.148E+02	2.263E+02	2.512E+02	3.619E+02	1.028E+03	3.965E+04	6.918E+08	*3.430E+12
Pu-238	1.529E+03	1.569E+03	1.652E+03	1.981E+03	3.325E+03	2.039E+04	3.659E+06	6.635E+10
Pu-239	1.429E+03	1.455E+03	1.509E+03	1.712E+03	2.455E+03	8.678E+03	3.226E+05	*6.212E+10
Pu-240	1.432E+03	1.458E+03	1.512E+03	1.716E+03	2.465E+03	8.762E+03	3.308E+05	1.259E+11
Pu-241	8.823E+04	5.662E+04	3.563E+04	2.118E+04	2.510E+04	4.549E+05	9.295E+09	*1.030E+14
Pu-242	1.506E+03	1.533E+03	1.589E+03	1.803E+03	2.584E+03	9.118E+03	3.372E+05	*3.923E+09
U-234	1.738E+03	1.876E+03	2.187E+03	3.738E+03	1.726E+04	2.007E+06	4.791E+06	7.430E+06
U-235	1.353E+02	1.460E+02	1.700E+02	2.896E+02	1.327E+03	2.731E+05	*2.160E+06	*2.160E+06
U-238	5.863E+02	6.328E+02	7.372E+02	1.258E+03	5.790E+03	*3.360E+05	*3.360E+05	*3.360E+05

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 0.000E+00 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Am-241	1.000E+02	0.000E+00	3.957E-01	2.148E+02	3.957E-01	2.148E+02
Pu-238	1.000E+02	0.000E+00	5.560E-02	1.529E+03	5.560E-02	1.529E+03
Pu-239	1.000E+02	0.000E+00	5.946E-02	1.429E+03	5.946E-02	1.429E+03
Pu-240	1.000E+02	0.000E+00	5.935E-02	1.432E+03	5.935E-02	1.432E+03
Pu-241	1.000E+02	15.44 þ 0.02	4.287E-03	1.983E+04	9.633E-04	8.823E+04
Pu-242	1.000E+02	0.000E+00	5.645E-02	1.506E+03	5.645E-02	1.506E+03
U-234	1.000E+02	0.000E+00	4.891E-02	1.738E+03	4.891E-02	1.738E+03
U-235	1.000E+02	0.000E+00	6.283E-01	1.353E+02	6.283E-01	1.353E+02
U-238	1.000E+02	0.000E+00	1.450E-01	5.863E+02	1.450E-01	5.863E+02

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
ááááááá	ááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá
Am-241	Am-241	1.000E+00	3.957E+01	3.756E+01	3.384E+01	2.348E+01	8.269E+00	2.141E-01	6.224E-06	7.373E-22
Am-241	Pu-241	1.000E+00	0.000E+00	5.997E-02	1.596E-01	3.517E-01	3.253E-01	1.855E-02	7.068E-07	8.504E-23
Am-241	δDOSE(j):		3.957E+01	3.762E+01	3.400E+01	2.384E+01	8.595E+00	2.327E-01	6.931E-06	8.223E-22
Np-237	Am-241	1.000E+00	0.000E+00	5.876E-05	1.642E-04	4.284E-04	6.545E-04	2.645E-04	6.063E-06	8.877E-12
Np-237	Pu-241	1.000E+00	0.000E+00	4.667E-08	3.832E-07	3.106E-06	1.167E-05	8.428E-06	2.073E-07	3.036E-13
Np-237	Pu-241	2.450E-05	0.000E+00	1.430E-09	3.941E-09	9.837E-09	1.356E-08	4.690E-09	1.045E-10	1.530E-16
Np-237	δDOSE(j):		0.000E+00	5.880E-05	1.646E-04	4.315E-04	6.662E-04	2.729E-04	6.270E-06	9.180E-12
U-233	Am-241	1.000E+00	0.000E+00	3.625E-12	2.848E-11	2.224E-10	7.858E-10	5.097E-10	1.175E-11	1.410E-17
U-233	Pu-241	1.000E+00	0.000E+00	1.983E-15	4.552E-14	1.141E-12	1.091E-11	1.533E-11	4.017E-13	4.823E-19
U-233	Pu-241	2.450E-05	0.000E+00	8.838E-17	6.880E-16	5.206E-15	1.693E-14	9.230E-15	2.025E-16	2.431E-22
U-233	δDOSE(j):		0.000E+00	3.627E-12	2.852E-11	2.235E-10	7.967E-10	5.250E-10	1.215E-11	1.459E-17
Th-229	Am-241	1.000E+00	0.000E+00	4.114E-15	1.029E-13	2.962E-12	4.088E-11	2.313E-10	3.078E-10	2.142E-10
Th-229	Pu-241	1.000E+00	0.000E+00	1.631E-18	1.214E-16	1.119E-14	4.080E-13	4.815E-12	7.516E-12	5.246E-12
Th-229	Pu-241	2.450E-05	0.000E+00	9.992E-20	2.491E-18	7.017E-17	9.149E-16	4.645E-15	5.945E-15	4.133E-15
Th-229	δDOSE(j):		0.000E+00	4.116E-15	1.030E-13	2.973E-12	4.129E-11	2.361E-10	3.153E-10	2.194E-10
Pu-238	Pu-238	1.000E+00	5.560E+00	5.418E+00	5.144E+00	4.292E+00	2.557E+00	4.168E-01	2.323E-03	2.608E-11
U-234	Pu-238	1.000E+00	0.000E+00	1.319E-05	3.572E-05	8.396E-05	9.827E-05	2.037E-05	1.143E-07	1.287E-15
U-234	Pu-242	1.000E+00	0.000E+00	1.024E-15	8.185E-15	6.143E-14	1.915E-13	1.014E-13	2.799E-15	7.936E-21
U-234	U-234	1.000E+00	4.891E+00	4.530E+00	3.887E+00	2.273E+00	4.911E-01	2.299E-03	5.037E-10	0.000E+00
U-234	U-238	1.000E+00	0.000E+00	1.289E-05	3.310E-05	6.447E-05	4.177E-05	6.519E-07	4.286E-13	0.000E+00
U-234	δDOSE(j):		4.891E+00	4.530E+00	3.887E+00	2.273E+00	4.912E-01	2.320E-03	1.148E-07	1.287E-15
Th-230	Pu-238	1.000E+00	0.000E+00	1.264E-10	1.058E-09	9.334E-09	4.638E-08	1.122E-07	1.123E-07	6.334E-08
Th-230	Pu-242	1.000E+00	0.000E+00	6.437E-21	1.596E-19	4.424E-18	5.555E-17	2.668E-16	3.303E-16	1.878E-16
Th-230	U-234	1.000E+00	0.000E+00	8.850E-05	2.457E-04	6.384E-04	1.064E-03	1.137E-03	1.004E-03	5.658E-04
Th-230	U-238	1.000E+00	0.000E+00	1.243E-10	1.006E-09	7.915E-09	2.937E-08	4.222E-08	3.744E-08	2.109E-08
Th-230	δDOSE(j):		0.000E+00	8.850E-05	2.457E-04	6.384E-04	1.064E-03	1.137E-03	1.004E-03	5.659E-04
Ra-226	Pu-238	1.000E+00	0.000E+00	1.492E-12	3.727E-11	1.057E-09	1.391E-08	6.825E-08	8.201E-08	6.244E-08
Ra-226	Pu-242	1.000E+00	0.000E+00	5.753E-23	4.261E-21	3.865E-19	1.357E-17	1.504E-16	2.403E-16	1.851E-16
Ra-226	U-234	1.000E+00	0.000E+00	1.572E-06	1.297E-05	1.073E-04	4.478E-04	7.605E-04	7.336E-04	5.577E-04
Ra-226	U-238	1.000E+00	0.000E+00	1.473E-12	3.588E-11	9.323E-10	9.699E-09	2.766E-08	2.735E-08	2.079E-08
Ra-226	δDOSE(j):		0.000E+00	1.572E-06	1.297E-05	1.073E-04	4.479E-04	7.606E-04	7.337E-04	5.578E-04
Pb-210	Pu-238	1.000E+00	0.000E+00	1.830E-15	1.152E-13	9.762E-12	3.296E-10	3.220E-09	4.080E-09	2.296E-09
Pb-210	Pu-242	1.000E+00	0.000E+00	4.419E-26	9.660E-24	2.828E-21	2.693E-19	6.573E-18	1.185E-17	6.773E-18
Pb-210	U-234	1.000E+00	0.000E+00	2.426E-09	5.221E-08	1.305E-06	1.367E-05	3.961E-05	3.652E-05	2.051E-05
Pb-210	U-238	1.000E+00	0.000E+00	1.811E-15	1.117E-13	8.816E-12	2.442E-10	1.396E-09	1.362E-09	7.645E-10
Pb-210	δDOSE(j):		0.000E+00	2.426E-09	5.221E-08	1.305E-06	1.367E-05	3.961E-05	3.653E-05	2.051E-05
Pu-239	Pu-239	1.000E+00	5.946E+00	5.840E+00	5.634E+00	4.966E+00	3.463E+00	9.795E-01	2.635E-02	7.317E-08
U-235	Pu-239	1.000E+00	0.000E+00	5.906E-08	1.615E-07	3.927E-07	5.155E-07	1.812E-07	5.362E-09	2.207E-14
U-235	U-235	1.000E+00	6.283E+01	5.822E+01	4.999E+01	2.933E+01	6.391E+00	3.085E-02	7.417E-09	0.000E+00
U-235	δDOSE(j):		6.283E+01	5.822E+01	4.999E+01	2.933E+01	6.391E+00	3.085E-02	1.278E-08	2.207E-14

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pa-231	Pu-239	1.000E+00	0.000E+00	1.858E-12	1.485E-11	1.115E-10	3.477E-10	1.842E-10	5.093E-12	1.468E-17
Pa-231	U-235	1.000E+00	0.000E+00	3.685E-03	9.461E-03	1.843E-02	1.195E-02	1.868E-04	1.234E-10	0.000E+00
Pa-231	ÖDOSE(j):		0.000E+00	3.685E-03	9.461E-03	1.843E-02	1.195E-02	1.868E-04	1.285E-10	1.468E-17
Ac-227	Pu-239	1.000E+00	0.000E+00	4.162E-14	9.103E-13	1.768E-11	9.633E-11	6.246E-11	1.790E-12	5.910E-18
Ac-227	U-235	1.000E+00	0.000E+00	1.222E-04	8.503E-04	4.124E-03	4.383E-03	8.326E-05	5.948E-11	0.000E+00
Ac-227	ÖDOSE(j):		0.000E+00	1.222E-04	8.503E-04	4.124E-03	4.383E-03	8.326E-05	6.127E-11	5.910E-18
Pu-240	Pu-240	1.000E+00	5.935E+00	5.829E+00	5.622E+00	4.953E+00	3.448E+00	9.701E-01	2.569E-02	6.753E-08
U-236	Pu-240	1.000E+00	0.000E+00	1.309E-07	3.572E-07	8.655E-07	1.125E-06	3.816E-07	1.014E-08	2.668E-14
Th-232	Pu-240	1.000E+00	0.000E+00	3.578E-17	3.025E-16	2.725E-15	1.430E-14	4.053E-14	4.589E-14	2.604E-14
Ra-228	Pu-240	1.000E+00	0.000E+00	1.321E-17	3.128E-16	7.528E-15	7.222E-14	2.665E-13	3.355E-13	2.580E-13
Th-228	Pu-240	1.000E+00	0.000E+00	1.682E-18	1.070E-16	6.150E-15	9.181E-14	3.906E-13	5.001E-13	3.823E-13
Pu-241	Pu-241	1.000E+00	9.633E-02	9.017E-02	7.900E-02	4.973E-02	1.325E-02	1.293E-04	2.309E-10	0.000E+00
Pu-241	Pu-241	2.450E-05	2.360E-06	2.209E-06	1.936E-06	1.218E-06	3.246E-07	3.168E-09	5.657E-15	0.000E+00
Pu-241	ÖDOSE(j):		9.633E-02	9.017E-02	7.900E-02	4.973E-02	1.325E-02	1.293E-04	2.309E-10	0.000E+00
Pu-242	Pu-242	1.000E+00	5.645E+00	5.544E+00	5.348E+00	4.715E+00	3.289E+00	9.322E-01	2.521E-02	7.126E-08
U-238	Pu-242	1.000E+00	0.000E+00	2.147E-09	5.868E-09	1.426E-08	1.866E-08	6.502E-09	1.874E-10	6.918E-16
U-238	U-238	1.000E+00	1.450E+01	1.343E+01	1.153E+01	6.757E+00	1.468E+00	7.013E-03	1.633E-09	0.000E+00
U-238	ÖDOSE(j):		1.450E+01	1.343E+01	1.153E+01	6.757E+00	1.468E+00	7.013E-03	1.821E-09	6.918E-16

BRF(i) is the branch fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	1.000E+02	9.496E+01	8.563E+01	5.961E+01	2.119E+01	5.669E-01	1.822E-05	3.427E-21
Am-241	Pu-241	1.000E+00	0.000E+00	1.512E-01	4.035E-01	8.926E-01	8.334E-01	4.911E-02	2.069E-06	3.953E-22
Am-241	δS(j):		1.000E+02	9.511E+01	8.603E+01	6.051E+01	2.202E+01	6.160E-01	2.029E-05	3.823E-21
Np-237	Am-241	1.000E+00	0.000E+00	3.127E-05	8.746E-05	2.288E-04	3.516E-04	1.452E-04	3.556E-06	7.167E-12
Np-237	Pu-241	1.000E+00	0.000E+00	2.482E-08	2.041E-07	1.658E-06	6.269E-06	4.627E-06	1.216E-07	2.451E-13
Np-237	Pu-241	2.450E-05	0.000E+00	7.608E-10	2.099E-09	5.252E-09	7.284E-09	2.575E-09	6.130E-11	1.235E-16
Np-237	δS(j):		0.000E+00	3.130E-05	8.767E-05	2.304E-04	3.579E-04	1.498E-04	3.678E-06	7.412E-12
U-233	Am-241	1.000E+00	0.000E+00	6.745E-11	5.508E-10	4.375E-09	1.567E-08	1.054E-08	2.710E-10	5.462E-16
U-233	Pu-241	1.000E+00	0.000E+00	3.591E-14	8.722E-13	2.238E-11	2.175E-10	3.171E-10	9.265E-12	1.868E-17
U-233	Pu-241	2.450E-05	0.000E+00	1.645E-15	1.331E-14	1.024E-13	3.378E-13	1.909E-13	4.671E-15	9.414E-21
U-233	δS(j):		0.000E+00	6.749E-11	5.517E-10	4.398E-09	1.589E-08	1.086E-08	2.803E-10	5.648E-16
Th-229	Am-241	1.000E+00	0.000E+00	2.149E-15	5.396E-14	1.558E-12	2.161E-11	1.243E-10	1.739E-10	1.569E-10
Th-229	Pu-241	1.000E+00	0.000E+00	8.567E-19	6.378E-17	5.886E-15	2.156E-13	2.587E-12	4.247E-12	3.844E-12
Th-229	Pu-241	2.450E-05	0.000E+00	5.248E-20	1.309E-18	3.692E-17	4.836E-16	2.495E-15	3.359E-15	3.029E-15
Th-229	δS(j):		0.000E+00	2.150E-15	5.403E-14	1.564E-12	2.183E-11	1.269E-10	1.782E-10	1.608E-10
Pu-238	Pu-238	1.000E+00	1.000E+02	9.749E+01	9.266E+01	7.757E+01	4.668E+01	7.890E+00	4.912E-02	9.349E-10
U-234	Pu-238	1.000E+00	0.000E+00	2.695E-04	7.311E-04	1.725E-03	2.039E-03	4.382E-04	2.745E-06	5.226E-14
U-234	Pu-242	1.000E+00	0.000E+00	2.078E-14	1.672E-13	1.261E-12	3.973E-12	2.181E-12	6.722E-14	3.222E-19
U-234	U-234	1.000E+00	1.000E+02	9.267E+01	7.958E+01	4.671E+01	1.019E+01	4.946E-02	1.210E-08	8.764E-32
U-234	U-238	1.000E+00	0.000E+00	2.627E-04	6.769E-04	1.324E-03	8.669E-04	1.402E-05	1.030E-11	2.488E-34
U-234	δS(j):		1.000E+02	9.267E+01	7.959E+01	4.671E+01	1.020E+01	4.991E-02	2.757E-06	5.226E-14
Th-230	Pu-238	1.000E+00	0.000E+00	1.234E-09	1.039E-08	9.207E-08	4.623E-07	1.159E-06	1.296E-06	1.232E-06
Th-230	Pu-242	1.000E+00	0.000E+00	6.325E-20	1.570E-18	4.367E-17	5.539E-16	2.757E-15	3.810E-15	3.654E-15
Th-230	U-234	1.000E+00	0.000E+00	8.668E-04	2.414E-03	6.299E-03	1.061E-02	1.175E-02	1.158E-02	1.101E-02
Th-230	U-238	1.000E+00	0.000E+00	1.213E-09	9.876E-09	7.808E-08	2.928E-07	4.363E-07	4.318E-07	4.104E-07
Th-230	δS(j):		0.000E+00	8.668E-04	2.414E-03	6.300E-03	1.061E-02	1.175E-02	1.158E-02	1.101E-02
Ra-226	Pu-238	1.000E+00	0.000E+00	1.772E-13	4.428E-12	1.257E-10	1.659E-09	8.227E-09	1.024E-08	9.748E-09
Ra-226	Pu-242	1.000E+00	0.000E+00	6.833E-24	5.062E-22	4.597E-20	1.619E-18	1.813E-17	3.001E-17	2.890E-17
Ra-226	U-234	1.000E+00	0.000E+00	1.867E-07	1.541E-06	1.276E-05	5.342E-05	9.168E-05	9.161E-05	8.707E-05
Ra-226	U-238	1.000E+00	0.000E+00	1.750E-13	4.263E-12	1.109E-10	1.157E-09	3.334E-09	3.415E-09	3.246E-09
Ra-226	δS(j):		0.000E+00	1.867E-07	1.541E-06	1.276E-05	5.342E-05	9.169E-05	9.163E-05	8.708E-05
Pb-210	Pu-238	1.000E+00	0.000E+00	1.369E-15	1.014E-13	9.181E-12	3.190E-10	3.250E-09	4.602E-09	4.383E-09
Pb-210	Pu-242	1.000E+00	0.000E+00	4.262E-26	9.326E-24	2.740E-21	2.636E-19	6.672E-18	1.343E-17	1.300E-17
Pb-210	U-234	1.000E+00	0.000E+00	1.922E-09	4.698E-08	1.236E-06	1.326E-05	4.000E-05	4.120E-05	3.915E-05
Pb-210	U-238	1.000E+00	0.000E+00	1.355E-15	9.832E-14	8.297E-12	2.365E-10	1.409E-09	1.536E-09	1.460E-09
Pb-210	δS(j):		0.000E+00	1.922E-09	4.698E-08	1.236E-06	1.326E-05	4.000E-05	4.120E-05	3.916E-05
Pu-239	Pu-239	1.000E+00	1.000E+02	9.826E+01	9.488E+01	8.393E+01	5.911E+01	1.733E+01	5.209E-01	2.450E-06
U-235	Pu-239	1.000E+00	0.000E+00	9.400E-08	2.571E-07	6.255E-07	8.223E-07	2.906E-07	8.756E-09	4.119E-14
U-235	U-235	1.000E+00	1.000E+02	9.267E+01	7.959E+01	4.671E+01	1.019E+01	4.948E-02	1.211E-08	8.789E-32
U-235	δS(j):		1.000E+02	9.267E+01	7.959E+01	4.671E+01	1.019E+01	4.948E-02	2.087E-08	4.119E-14

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
ááááááá	ááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá
Pa-231	Pu-239	1.000E+00	0.000E+00	9.847E-13	7.920E-12	5.974E-11	1.882E-10	1.031E-10	3.161E-12	1.487E-17
Pa-231	U-235	1.000E+00	0.000E+00	1.961E-03	5.052E-03	9.883E-03	6.468E-03	1.046E-04	7.663E-11	1.840E-33
Pa-231	ðS(j):		0.000E+00	1.961E-03	5.052E-03	9.883E-03	6.468E-03	1.046E-04	7.979E-11	1.487E-17
Ac-227	Pu-239	1.000E+00	0.000E+00	1.003E-14	2.237E-13	4.385E-12	2.409E-11	1.601E-11	4.938E-13	2.323E-18
Ac-227	U-235	1.000E+00	0.000E+00	2.975E-05	2.097E-04	1.024E-03	1.097E-03	2.135E-05	1.642E-11	4.007E-34
Ac-227	ðS(j):		0.000E+00	2.975E-05	2.097E-04	1.024E-03	1.097E-03	2.135E-05	1.691E-11	2.323E-18
Pu-240	Pu-240	1.000E+00	1.000E+02	9.826E+01	9.486E+01	8.386E+01	5.898E+01	1.720E+01	5.090E-01	2.268E-06
U-236	Pu-240	1.000E+00	0.000E+00	2.825E-06	7.726E-06	1.879E-05	2.468E-05	8.678E-06	2.575E-07	1.147E-12
Th-232	Pu-240	1.000E+00	0.000E+00	7.078E-17	5.991E-16	5.411E-15	2.870E-14	8.434E-14	1.067E-13	1.027E-13
Ra-228	Pu-240	1.000E+00	0.000E+00	2.745E-18	6.503E-17	1.567E-15	1.508E-14	5.626E-14	7.349E-14	7.082E-14
Th-228	Pu-240	1.000E+00	0.000E+00	2.346E-19	1.493E-17	8.585E-16	1.286E-14	5.531E-14	7.346E-14	7.082E-14
Pu-241	Pu-241	1.000E+00	1.000E+02	9.365E+01	8.213E+01	5.187E+01	1.396E+01	1.411E-01	2.812E-07	3.139E-27
Pu-241	Pu-241	2.450E-05	2.450E-03	2.294E-03	2.012E-03	1.271E-03	3.420E-04	3.458E-06	6.890E-12	7.692E-32
Pu-241	ðS(j):		1.000E+02	9.365E+01	8.213E+01	5.188E+01	1.396E+01	1.412E-01	2.812E-07	3.139E-27
Pu-242	Pu-242	1.000E+00	1.000E+02	9.827E+01	9.489E+01	8.395E+01	5.916E+01	1.738E+01	5.251E-01	2.517E-06
U-238	Pu-242	1.000E+00	0.000E+00	1.481E-08	4.050E-08	9.855E-08	1.296E-07	4.587E-08	1.390E-09	6.662E-15
U-238	U-238	1.000E+00	1.000E+02	9.267E+01	7.959E+01	4.671E+01	1.019E+01	4.948E-02	1.211E-08	8.789E-32
U-238	ðS(j):		1.000E+02	9.267E+01	7.959E+01	4.671E+01	1.019E+01	4.948E-02	1.350E-08	6.662E-15
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BRF(i) is the branch fraction of the parent nuclide.

ATTACHMENT IV
RESRAD SUMMARY OUTPUT FOR THE RESIDENTIAL TIER II (15 MREM) ACTION LEVELS

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Dose Conversion Factor (and Related) Parameter Summary
File: CLASSY.BIN

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.720E+00	6.720E+00	DCF2(1)
B-1	Am-241	4.440E-01	4.440E-01	DCF2(2)
B-1	Np-237+D	5.400E-01	5.400E-01	DCF2(3)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(4)
B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2(5)
B-1	Pu-238	2.880E-01	3.920E-01	DCF2(6)
B-1	Pu-239	3.080E-01	4.290E-01	DCF2(7)
B-1	Pu-240	3.080E-01	4.290E-01	DCF2(8)
B-1	Pu-241+D	4.960E-03	8.250E-03	DCF2(9)
B-1	Pu-242	2.930E-01	4.110E-01	DCF2(11)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2(12)
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(13)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(14)
B-1	Th-229+D	2.160E+00	2.160E+00	DCF2(15)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(16)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(17)
B-1	U-233	1.350E-01	1.350E-01	DCF2(18)
B-1	U-234	1.320E-01	1.320E-01	DCF2(19)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(20)
B-1	U-236	1.250E-01	1.250E-01	DCF2(21)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(22)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3(1)
D-1	Am-241	3.640E-03	3.640E-03	DCF3(2)
D-1	Np-237+D	4.440E-03	4.440E-03	DCF3(3)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(4)
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3(5)
D-1	Pu-238	4.960E-05	3.200E-03	DCF3(6)
D-1	Pu-239	5.180E-05	3.540E-03	DCF3(7)
D-1	Pu-240	5.180E-05	3.540E-03	DCF3(8)
D-1	Pu-241+D	7.660E-07	6.850E-05	DCF3(9)
D-1	Pu-242	4.920E-05	3.360E-03	DCF3(11)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3(12)
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(13)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(14)
D-1	Th-229+D	4.030E-03	4.030E-03	DCF3(15)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(16)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(17)
D-1	U-233	2.890E-04	2.890E-04	DCF3(18)
D-1	U-234	2.830E-04	2.830E-04	DCF3(19)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3(20)
D-1	U-236	2.690E-04	2.690E-04	DCF3(21)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3(22)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)

Dose Conversion Factor (and Related) Parameter Summary (continued)
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Menu	Parameter	Current Value	Default	Parameter Name
D-34	Am-241 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(2,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF(2,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(2,3)
D-34				
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF(3,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(3,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(4,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(4,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(5,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(5,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(5,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(6,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(7,3)
D-34				
D-34	Pu-240 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(8,1)
D-34	Pu-240 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(8,2)
D-34	Pu-240 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(8,3)
D-34				
D-34	Pu-241+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Pu-241+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Pu-241+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(9,3)
D-34				
D-34	Pu-242 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(11,1)
D-34	Pu-242 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(11,2)
D-34	Pu-242 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(11,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(12,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(12,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(12,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(13,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(13,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(13,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(14,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(14,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(14,3)
D-34				

Dose Conversion Factor (and Related) Parameter Summary (continued)
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Menu	Parameter	Current Value	Default	Parameter Name
D-34	Th-229+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(15,1)
D-34	Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(15,2)
D-34	Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(15,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(16,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(16,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(16,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(17,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(17,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(17,3)
D-34				
D-34	U-233 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(18,1)
D-34	U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(18,2)
D-34	U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(18,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(19,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(19,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(19,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(20,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(20,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(20,3)
D-34				
D-34	U-236 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(21,1)
D-34	U-236 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(21,2)
D-34	U-236 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(21,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(22,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(22,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(22,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Am-241 , fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Am-241 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5				
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(3,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(3,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(4,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(4,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(5,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(5,2)
D-5				
D-5	Pu-238 , fish	3.000E+01	3.000E+01	BIOFAC(6,1)
D-5	Pu-238 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(6,2)

Dose Conversion Factor (and Related) Parameter Summary (continued)
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Menu	Parameter	Current Value	Default	Parameter Name
D-5	Pu-239 , fish	3.000E+01	3.000E+01	BIOFAC(7,1)
D-5	Pu-239 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(7,2)
D-5				
D-5	Pu-240 , fish	3.000E+01	3.000E+01	BIOFAC(8,1)
D-5	Pu-240 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(8,2)
D-5				
D-5	Pu-241+D , fish	3.000E+01	3.000E+01	BIOFAC(9,1)
D-5	Pu-241+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(9,2)
D-5				
D-5	Pu-242 , fish	3.000E+01	3.000E+01	BIOFAC(11,1)
D-5	Pu-242 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(11,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(12,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(12,2)
D-5				
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(13,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(13,2)
D-5				
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(14,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(14,2)
D-5				
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(15,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(15,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(16,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(16,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(17,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(17,2)
D-5				
D-5	U-233 , fish	1.000E+01	1.000E+01	BIOFAC(18,1)
D-5	U-233 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(18,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(19,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(19,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(20,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(20,2)
D-5				
D-5	U-236 , fish	1.000E+01	1.000E+01	BIOFAC(21,1)
D-5	U-236 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(21,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(22,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(22,2)

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	4.000E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	2.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Am-241	1.000E+02	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Pu-238	1.000E+02	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): Pu-239	1.000E+02	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): Pu-240	1.000E+02	0.000E+00	---	S1(8)
R012	Initial principal radionuclide (pCi/g): Pu-241	1.000E+02	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g): Pu-242	1.000E+02	0.000E+00	---	S1(11)
R012	Initial principal radionuclide (pCi/g): U-234	1.000E+02	0.000E+00	---	S1(19)
R012	Initial principal radionuclide (pCi/g): U-235	1.000E+02	0.000E+00	---	S1(20)
R012	Initial principal radionuclide (pCi/g): U-238	1.000E+02	0.000E+00	---	S1(22)
R012	Concentration in groundwater (pCi/L): Am-241	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): Pu-240	not used	0.000E+00	---	W1(8)
R012	Concentration in groundwater (pCi/L): Pu-241	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L): Pu-242	not used	0.000E+00	---	W1(11)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(19)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(20)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(22)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.800E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	7.490E-05	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	1.000E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.450E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	1.040E+01	5.300E+00	---	BCZ
R013	Humidity in air (g/cm**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	2.530E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	3.810E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.000E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	4.000E-03	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	8.280E+06	1.000E+06	---	WAREA

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.800E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	1.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	4.450E+01	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	1.500E-01	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	3.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.800E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	3.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	1.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	1.040E+01	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	4.450E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Am-241				
R016	Contaminated zone (cm**3/g)	7.600E+01	2.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	7.600E+01	2.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	7.600E+01	2.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.012E-02	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pu-238				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.750E-02	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for Pu-239				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.750E-02	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for Pu-240				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.750E-02	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Pu-241				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.750E-02	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for Pu-242				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCU(11,1)
R016	Saturated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.750E-02	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(19)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(19,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(19)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.611E-02	ALEACH(19)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(19)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(20)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(20,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(20)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.611E-02	ALEACH(20)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(20)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(22)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(22,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(22)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.611E-02	ALEACH(22)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(22)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.895E-01	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Np-237				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.036E+02	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	-1.000E+00	-1.000E+00	2.036E+02	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.036E+02	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.874E-02	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.611E-02	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.811E-02	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(12,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.441E-02	ALEACH(12)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(12)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(13)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(13,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.441E-02	ALEACH(13)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(13)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(14)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(14,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(14)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.361E-05	ALEACH(14)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(14)
R016	Distribution coefficients for daughter Th-229				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(15)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(15,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(15)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.361E-05	ALEACH(15)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(15)
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(16)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(16,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(16)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.361E-05	ALEACH(16)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(16)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(17)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(17,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(17)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.361E-05	ALEACH(17)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(17)
R016	Distribution coefficients for daughter U-233				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(18)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(18,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(18)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.611E-02	ALEACH(18)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(18)
R016	Distribution coefficients for daughter U-236				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(21)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(21,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(21)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.611E-02	ALEACH(21)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(21)
R017	Inhalation rate (m**3/yr)	7.000E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.600E-05	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	1.000E+00	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	8.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	1.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	0.000E+00	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	1 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	4.010E+01	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.600E+00	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	7.000E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	0.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	1.000E+00	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	not used	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	not used	2.000E+01	---	STOR_T(4)
STOR	Fish	not used	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	not used	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	not used	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average annual wind speed (m/sec)	not used	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	40000.00 square meters	Am-241	1.000E+02
Thickness:	0.15 meters	Pu-238	1.000E+02
Cover Depth:	0.00 meters	Pu-239	1.000E+02
		Pu-240	1.000E+02
		Pu-241	1.000E+02
		Pu-242	1.000E+02
		U-234	1.000E+02
		U-235	1.000E+02
		U-238	1.000E+02

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 15 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	1.450E+02	1.365E+02	1.212E+02	8.119E+01	2.973E+01	3.574E+00	8.137E-02	1.144E-03
M(t):	9.665E+00	9.102E+00	8.083E+00	5.413E+00	1.982E+00	2.383E-01	5.424E-03	7.629E-05

Maximum TDOSE(t): 1.450E+02 mrem/yr at t = 0.000E+00 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio-														
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	3.438E+00	0.0237	7.961E+00	0.0549	0.000E+00	0.0000	2.693E+00	0.0186	0.000E+00	0.0000	0.000E+00	0.0000	2.548E+01	0.1758
Pu-238	1.200E-02	0.0001	5.164E+00	0.0356	0.000E+00	0.0000	3.669E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.472E-01	0.0024
Pu-239	2.280E-02	0.0002	5.523E+00	0.0381	0.000E+00	0.0000	3.833E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.626E-01	0.0025
Pu-240	1.168E-02	0.0001	5.523E+00	0.0381	0.000E+00	0.0000	3.833E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.626E-01	0.0025
Pu-241	1.469E-03	0.0000	8.894E-02	0.0006	0.000E+00	0.0000	5.658E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.362E-03	0.0000
Pu-242	1.016E-02	0.0001	5.254E+00	0.0362	0.000E+00	0.0000	3.640E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.444E-01	0.0024
U-234	3.150E-02	0.0002	2.367E+00	0.0163	0.000E+00	0.0000	5.115E-01	0.0035	0.000E+00	0.0000	0.000E+00	0.0000	1.981E+00	0.0137
U-235	5.827E+01	0.4020	2.206E+00	0.0152	0.000E+00	0.0000	4.826E-01	0.0033	0.000E+00	0.0000	0.000E+00	0.0000	1.869E+00	0.0129
U-238	1.001E+01	0.0691	2.116E+00	0.0146	0.000E+00	0.0000	4.862E-01	0.0034	0.000E+00	0.0000	0.000E+00	0.0000	1.883E+00	0.0130
Total	7.181E+01	0.4954	3.620E+01	0.2497	0.000E+00	0.0000	4.324E+00	0.0298	0.000E+00	0.0000	0.000E+00	0.0000	3.264E+01	0.2251

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-														
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.957E+01	0.2730
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.560E+00	0.0384
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.946E+00	0.0410
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.935E+00	0.0409
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.633E-02	0.0007
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.645E+00	0.0389
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.891E+00	0.0337
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.283E+01	0.4334
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.450E+01	0.1000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.450E+02	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	3.265E+00	0.0239	7.556E+00	0.0553	0.000E+00	0.0000	2.556E+00	0.0187	0.000E+00	0.0000	0.000E+00	0.0000	2.418E+01	0.1771
Pu-238	1.170E-02	0.0001	5.032E+00	0.0369	0.000E+00	0.0000	3.575E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.383E-01	0.0025
Pu-239	2.241E-02	0.0002	5.424E+00	0.0397	0.000E+00	0.0000	3.764E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.561E-01	0.0026
Pu-240	1.148E-02	0.0001	5.424E+00	0.0397	0.000E+00	0.0000	3.764E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.561E-01	0.0026
Pu-241	6.576E-03	0.0000	9.528E-02	0.0007	0.000E+00	0.0000	4.746E-03	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.353E-02	0.0003
Pu-242	9.984E-03	0.0001	5.160E+00	0.0378	0.000E+00	0.0000	3.575E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.383E-01	0.0025
U-234	2.919E-02	0.0002	2.192E+00	0.0161	0.000E+00	0.0000	4.738E-01	0.0035	0.000E+00	0.0000	0.000E+00	0.0000	1.835E+00	0.0134
U-235	5.400E+01	0.3955	2.043E+00	0.0150	0.000E+00	0.0000	4.485E-01	0.0033	0.000E+00	0.0000	0.000E+00	0.0000	1.733E+00	0.0127
U-238	9.278E+00	0.0680	1.960E+00	0.0144	0.000E+00	0.0000	4.503E-01	0.0033	0.000E+00	0.0000	0.000E+00	0.0000	1.744E+00	0.0128
Total	6.663E+01	0.4881	3.489E+01	0.2555	0.000E+00	0.0000	4.080E+00	0.0299	0.000E+00	0.0000	0.000E+00	0.0000	3.093E+01	0.2265

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.756E+01	0.2751
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.418E+00	0.0397
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.840E+00	0.0428
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.829E+00	0.0427
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.501E-01	0.0011
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.544E+00	0.0406
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.530E+00	0.0332
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.823E+01	0.4265
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.343E+01	0.0984
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.365E+02	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	2.944E+00	0.0243	6.807E+00	0.0561	0.000E+00	0.0000	2.303E+00	0.0190	0.000E+00	0.0000	0.000E+00	0.0000	2.178E+01	0.1797
Pu-238	1.112E-02	0.0001	4.778E+00	0.0394	0.000E+00	0.0000	3.395E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.213E-01	0.0026
Pu-239	2.163E-02	0.0002	5.232E+00	0.0432	0.000E+00	0.0000	3.631E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.435E-01	0.0028
Pu-240	1.108E-02	0.0001	5.231E+00	0.0431	0.000E+00	0.0000	3.630E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.434E-01	0.0028
Pu-241	1.508E-02	0.0001	1.050E-01	0.0009	0.000E+00	0.0000	1.144E-02	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	1.071E-01	0.0009
Pu-242	9.641E-03	0.0001	4.978E+00	0.0411	0.000E+00	0.0000	3.449E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.263E-01	0.0027
U-234	2.508E-02	0.0002	1.881E+00	0.0155	0.000E+00	0.0000	4.065E-01	0.0034	0.000E+00	0.0000	0.000E+00	0.0000	1.574E+00	0.0130
U-235	4.637E+01	0.3825	1.754E+00	0.0145	0.000E+00	0.0000	3.874E-01	0.0032	0.000E+00	0.0000	0.000E+00	0.0000	1.489E+00	0.0123
U-238	7.966E+00	0.0657	1.681E+00	0.0139	0.000E+00	0.0000	3.864E-01	0.0032	0.000E+00	0.0000	0.000E+00	0.0000	1.496E+00	0.0123
Total	5.738E+01	0.4732	3.245E+01	0.2676	0.000E+00	0.0000	3.635E+00	0.0300	0.000E+00	0.0000	0.000E+00	0.0000	2.779E+01	0.2292

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.384E+01	0.2791
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.144E+00	0.0424
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.634E+00	0.0465
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.622E+00	0.0464
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.386E-01	0.0020
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.348E+00	0.0441
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.887E+00	0.0321
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.000E+01	0.4124
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.153E+01	0.0951
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.212E+02	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	2.050E+00	0.0252	4.722E+00	0.0582	0.000E+00	0.0000	1.598E+00	0.0197	0.000E+00	0.0000	0.000E+00	0.0000	1.511E+01	0.1861
Pu-238	9.307E-03	0.0001	3.986E+00	0.0491	0.000E+00	0.0000	2.833E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	2.680E-01	0.0033
Pu-239	1.913E-02	0.0002	4.612E+00	0.0568	0.000E+00	0.0000	3.201E-02	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	3.028E-01	0.0037
Pu-240	9.794E-03	0.0001	4.608E+00	0.0568	0.000E+00	0.0000	3.198E-02	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	3.026E-01	0.0037
Pu-241	3.145E-02	0.0004	1.166E-01	0.0014	0.000E+00	0.0000	2.429E-02	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	2.291E-01	0.0028
Pu-242	8.530E-03	0.0001	4.388E+00	0.0540	0.000E+00	0.0000	3.041E-02	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	2.877E-01	0.0035
U-234	1.482E-02	0.0002	1.100E+00	0.0136	0.000E+00	0.0000	2.378E-01	0.0029	0.000E+00	0.0000	0.000E+00	0.0000	9.210E-01	0.0113
U-235	2.721E+01	0.3352	1.029E+00	0.0127	0.000E+00	0.0000	2.320E-01	0.0029	0.000E+00	0.0000	0.000E+00	0.0000	8.771E-01	0.0108
U-238	4.673E+00	0.0575	9.835E-01	0.0121	0.000E+00	0.0000	2.260E-01	0.0028	0.000E+00	0.0000	0.000E+00	0.0000	8.752E-01	0.0108
Total	3.403E+01	0.4191	2.555E+01	0.3146	0.000E+00	0.0000	2.440E+00	0.0301	0.000E+00	0.0000	0.000E+00	0.0000	1.918E+01	0.2362

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.348E+01	0.2892
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.292E+00	0.0529
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.966E+00	0.0612
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.953E+00	0.0610
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.014E-01	0.0049
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.715E+00	0.0581
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.274E+00	0.0280
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.935E+01	0.3615
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.757E+00	0.0832
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.119E+01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	7.288E-01	0.0245	1.661E+00	0.0559	0.000E+00	0.0000	5.622E-01	0.0189	0.000E+00	0.0000	0.000E+00	0.0000	5.317E+00	0.1788
Pu-238	5.601E-03	0.0002	2.375E+00	0.0799	0.000E+00	0.0000	1.688E-02	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	1.597E-01	0.0054
Pu-239	1.347E-02	0.0005	3.216E+00	0.1082	0.000E+00	0.0000	2.232E-02	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	2.111E-01	0.0071
Pu-240	6.888E-03	0.0002	3.208E+00	0.1079	0.000E+00	0.0000	2.227E-02	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	2.106E-01	0.0071
Pu-241	2.887E-02	0.0010	7.759E-02	0.0026	0.000E+00	0.0000	2.221E-02	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	2.099E-01	0.0071
Pu-242	6.011E-03	0.0002	3.062E+00	0.1030	0.000E+00	0.0000	2.121E-02	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	2.007E-01	0.0067
U-234	3.643E-03	0.0001	2.382E-01	0.0080	0.000E+00	0.0000	5.142E-02	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	1.993E-01	0.0067
U-235	5.936E+00	0.1996	2.242E-01	0.0075	0.000E+00	0.0000	5.358E-02	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	1.935E-01	0.0065
U-238	1.018E+00	0.0342	2.125E-01	0.0071	0.000E+00	0.0000	4.882E-02	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	1.891E-01	0.0064
Total	7.747E+00	0.2605	1.427E+01	0.4801	0.000E+00	0.0000	8.210E-01	0.0276	0.000E+00	0.0000	0.000E+00	0.0000	6.891E+00	0.2318

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.270E+00	0.2781
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.557E+00	0.0860
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.463E+00	0.1165
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.448E+00	0.1160
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.386E-01	0.0114
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.289E+00	0.1106
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.926E-01	0.0166
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.407E+00	0.2155
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.468E+00	0.0494
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.973E+01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.962E-02	0.0055	4.289E-02	0.0120	0.000E+00	0.0000	1.459E-02	0.0041	0.000E+00	0.0000	0.000E+00	0.0000	1.373E-01	0.0384
Pu-238	9.466E-04	0.0003	3.871E-01	0.1083	0.000E+00	0.0000	2.752E-03	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	2.603E-02	0.0073
Pu-239	3.938E-03	0.0011	9.096E-01	0.2545	0.000E+00	0.0000	6.312E-03	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	5.972E-02	0.0167
Pu-240	2.009E-03	0.0006	9.026E-01	0.2525	0.000E+00	0.0000	6.264E-03	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	5.926E-02	0.0166
Pu-241	1.695E-03	0.0005	3.834E-03	0.0011	0.000E+00	0.0000	1.260E-03	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	1.190E-02	0.0033
Pu-242	1.766E-03	0.0005	8.676E-01	0.2427	0.000E+00	0.0000	6.012E-03	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	5.687E-02	0.0159
U-234	7.462E-04	0.0002	1.765E-03	0.0005	0.000E+00	0.0000	3.385E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	1.386E-03	0.0004
U-235	2.876E-02	0.0080	1.084E-03	0.0003	0.000E+00	0.0000	3.076E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	9.733E-04	0.0003
U-238	4.905E-03	0.0014	9.949E-04	0.0003	0.000E+00	0.0000	2.286E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	8.854E-04	0.0002
Total	6.439E-02	0.0180	3.117E+00	0.8722	0.000E+00	0.0000	3.807E-02	0.0107	0.000E+00	0.0000	0.000E+00	0.0000	3.543E-01	0.0991

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.144E-01	0.0600
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.168E-01	0.1166
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.795E-01	0.2741
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.701E-01	0.2714
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.869E-02	0.0052
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.322E-01	0.2608
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.236E-03	0.0012
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.112E-02	0.0087
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.014E-03	0.0020
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.574E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	3.543E-06	0.0000	1.526E-06	0.0000	0.000E+00	0.0000	2.332E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.886E-06	0.0001
Pu-238	5.966E-06	0.0001	2.157E-03	0.0265	0.000E+00	0.0000	1.534E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	1.451E-04	0.0018
Pu-239	1.171E-04	0.0014	2.446E-02	0.3006	0.000E+00	0.0000	1.697E-04	0.0021	0.000E+00	0.0000	0.000E+00	0.0000	1.606E-03	0.0197
Pu-240	5.942E-05	0.0007	2.390E-02	0.2937	0.000E+00	0.0000	1.659E-04	0.0020	0.000E+00	0.0000	0.000E+00	0.0000	1.569E-03	0.0193
Pu-241	1.710E-07	0.0000	1.503E-07	0.0000	0.000E+00	0.0000	1.129E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.804E-07	0.0000
Pu-242	5.332E-05	0.0007	2.346E-02	0.2883	0.000E+00	0.0000	1.625E-04	0.0020	0.000E+00	0.0000	0.000E+00	0.0000	1.538E-03	0.0189
U-234	7.078E-04	0.0087	5.759E-04	0.0071	0.000E+00	0.0000	8.780E-05	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	4.028E-04	0.0050
U-235	6.983E-09	0.0000	2.589E-10	0.0000	0.000E+00	0.0000	1.028E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.552E-10	0.0000
U-238	2.756E-08	0.0000	2.169E-08	0.0000	0.000E+00	0.0000	3.324E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.521E-08	0.0000
Total	9.474E-04	0.0116	7.455E-02	0.9162	0.000E+00	0.0000	6.037E-04	0.0074	0.000E+00	0.0000	0.000E+00	0.0000	5.266E-03	0.0647

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.229E-05	0.0002
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.323E-03	0.0286
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.635E-02	0.3239
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.569E-02	0.3158
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.145E-07	0.0000
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.521E-02	0.3098
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.774E-03	0.0218
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.600E-09	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.778E-08	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.137E-02	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.644E-10	0.0000	3.078E-11	0.0000	0.000E+00	0.0000	4.615E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.328E-11	0.0000
Pu-238	6.125E-08	0.0001	3.611E-08	0.0000	0.000E+00	0.0000	5.502E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.524E-08	0.0000
Pu-239	4.993E-10	0.0000	6.775E-08	0.0001	0.000E+00	0.0000	4.702E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.448E-09	0.0000
Pu-240	2.623E-10	0.0000	6.272E-08	0.0001	0.000E+00	0.0000	4.353E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.118E-09	0.0000
Pu-241	4.079E-12	0.0000	7.579E-13	0.0000	0.000E+00	0.0000	1.352E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.815E-13	0.0000
Pu-242	2.519E-10	0.0000	6.621E-08	0.0001	0.000E+00	0.0000	4.588E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.340E-09	0.0000
U-234	5.471E-04	0.4780	3.223E-04	0.2817	0.000E+00	0.0000	4.914E-05	0.0429	0.000E+00	0.0000	0.000E+00	0.0000	2.255E-04	0.1970
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	2.040E-08	0.0000	1.202E-08	0.0000	0.000E+00	0.0000	1.832E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.406E-09	0.0000
Total	5.472E-04	0.4781	3.226E-04	0.2819	0.000E+00	0.0000	4.915E-05	0.0429	0.000E+00	0.0000	0.000E+00	0.0000	2.255E-04	0.1971

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.230E-10	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.281E-07	0.0001
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.317E-08	0.0001
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.753E-08	0.0001
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.554E-12	0.0000
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.126E-08	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.144E-03	0.9997
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.265E-08	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.144E-03	1.0000

*Sum of all water independent and dependent pathways.

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	3.957E-01	3.756E-01	3.384E-01	2.348E-01	8.269E-02	2.141E-03	6.224E-08	7.373E-24
Am-241	Np-237	1.000E+00	0.000E+00	5.876E-07	1.642E-06	4.284E-06	6.545E-06	2.645E-06	6.063E-08	8.877E-14
Am-241	U-233	1.000E+00	0.000E+00	3.625E-14	2.848E-13	2.224E-12	7.858E-12	5.097E-12	1.175E-13	1.410E-19
Am-241	Th-229	1.000E+00	0.000E+00	4.114E-17	1.029E-15	2.962E-14	4.088E-13	2.313E-12	3.078E-12	2.142E-12
Am-241	ÕDSR(j)		3.957E-01	3.756E-01	3.384E-01	2.348E-01	8.270E-02	2.144E-03	1.229E-07	2.230E-12
Pu-238	Pu-238	1.000E+00	5.560E-02	5.418E-02	5.144E-02	4.292E-02	2.557E-02	4.168E-03	2.323E-05	2.608E-13
Pu-238	U-234	1.000E+00	0.000E+00	1.319E-07	3.572E-07	8.396E-07	9.827E-07	2.037E-07	1.143E-09	1.287E-17
Pu-238	Th-230	1.000E+00	0.000E+00	1.264E-12	1.058E-11	9.334E-11	4.638E-10	1.122E-09	1.123E-09	6.334E-10
Pu-238	Ra-226	1.000E+00	0.000E+00	1.492E-14	3.727E-13	1.057E-11	1.391E-10	6.825E-10	8.201E-10	6.244E-10
Pu-238	Pb-210	1.000E+00	0.000E+00	1.830E-17	1.152E-15	9.762E-14	3.296E-12	3.220E-11	4.080E-11	2.296E-11
Pu-238	ÕDSR(j)		5.560E-02	5.418E-02	5.144E-02	4.292E-02	2.557E-02	4.168E-03	2.323E-05	1.281E-09
Pu-239	Pu-239	1.000E+00	5.946E-02	5.840E-02	5.634E-02	4.966E-02	3.463E-02	9.795E-03	2.635E-04	7.317E-10
Pu-239	U-235	1.000E+00	0.000E+00	5.906E-10	1.615E-09	3.927E-09	5.155E-09	1.812E-09	5.362E-11	2.207E-16
Pu-239	Pa-231	1.000E+00	0.000E+00	1.858E-14	1.485E-13	1.115E-12	3.477E-12	1.842E-12	5.093E-14	1.468E-19
Pu-239	Ac-227	1.000E+00	0.000E+00	4.162E-16	9.103E-15	1.768E-13	9.633E-13	6.246E-13	1.790E-14	5.910E-20
Pu-239	ÕDSR(j)		5.946E-02	5.840E-02	5.634E-02	4.966E-02	3.463E-02	9.795E-03	2.635E-04	7.317E-10
Pu-240	Pu-240	1.000E+00	5.935E-02	5.829E-02	5.622E-02	4.953E-02	3.448E-02	9.701E-03	2.569E-04	6.753E-10
Pu-240	U-236	1.000E+00	0.000E+00	1.309E-09	3.572E-09	8.655E-09	1.125E-08	3.816E-09	1.014E-10	2.668E-16
Pu-240	Th-232	1.000E+00	0.000E+00	3.578E-19	3.025E-18	2.725E-17	1.430E-16	4.053E-16	4.589E-16	2.604E-16
Pu-240	Ra-228	1.000E+00	0.000E+00	1.321E-19	3.128E-18	7.528E-17	7.222E-16	2.665E-15	3.355E-15	2.580E-15
Pu-240	Th-228	1.000E+00	0.000E+00	1.682E-20	1.070E-18	6.150E-17	9.181E-16	3.906E-15	5.001E-15	3.823E-15
Pu-240	ÕDSR(j)		5.935E-02	5.829E-02	5.622E-02	4.953E-02	3.448E-02	9.701E-03	2.569E-04	6.753E-10
Pu-241	Pu-241	1.000E+00	9.633E-04	9.017E-04	7.900E-04	4.973E-04	1.325E-04	1.293E-06	2.309E-12	1.533E-32
Pu-241	Am-241	1.000E+00	0.000E+00	5.997E-04	1.596E-03	3.517E-03	3.253E-03	1.855E-04	7.068E-09	8.504E-25
Pu-241	Np-237	1.000E+00	0.000E+00	4.667E-10	3.832E-09	3.106E-08	1.167E-07	8.428E-08	2.073E-09	3.036E-15
Pu-241	U-233	1.000E+00	0.000E+00	1.983E-17	4.552E-16	1.141E-14	1.091E-13	1.533E-13	4.017E-15	4.823E-21
Pu-241	Th-229	1.000E+00	0.000E+00	1.631E-20	1.214E-18	1.119E-16	4.080E-15	4.815E-14	7.516E-14	5.246E-14
Pu-241	ÕDSR(j)		9.633E-04	1.501E-03	2.386E-03	4.014E-03	3.386E-03	1.869E-04	9.144E-09	5.549E-14
Pu-241	Pu-241	2.450E-05	2.360E-08	2.209E-08	1.936E-08	1.218E-08	3.246E-09	3.168E-11	5.657E-17	3.756E-37
Pu-241	Np-237	2.450E-05	0.000E+00	1.430E-11	3.941E-11	9.837E-11	1.356E-10	4.690E-11	1.045E-12	1.530E-18
Pu-241	U-233	2.450E-05	0.000E+00	8.838E-19	6.880E-18	5.206E-17	1.693E-16	9.230E-17	2.025E-18	2.431E-24
Pu-241	Th-229	2.450E-05	0.000E+00	9.992E-22	2.491E-20	7.017E-19	9.149E-18	4.645E-17	5.945E-17	4.133E-17
Pu-241	ÕDSR(j)		2.360E-08	2.211E-08	1.939E-08	1.228E-08	3.382E-09	7.858E-11	1.045E-12	4.286E-17
Pu-242	Pu-242	1.000E+00	5.645E-02	5.544E-02	5.348E-02	4.715E-02	3.289E-02	9.322E-03	2.521E-04	7.126E-10
Pu-242	U-238	1.000E+00	0.000E+00	2.147E-11	5.868E-11	1.426E-10	1.866E-10	6.502E-11	1.874E-12	6.918E-18
Pu-242	U-234	1.000E+00	0.000E+00	1.024E-17	8.185E-17	6.143E-16	1.915E-15	1.014E-15	2.799E-17	7.936E-23
Pu-242	Th-230	1.000E+00	0.000E+00	6.437E-23	1.596E-21	4.424E-20	5.555E-19	2.668E-18	3.303E-18	1.878E-18
Pu-242	Ra-226	1.000E+00	0.000E+00	5.753E-25	4.261E-23	3.865E-21	1.357E-19	1.504E-18	2.403E-18	1.851E-18
Pu-242	Pb-210	1.000E+00	0.000E+00	4.419E-28	9.660E-26	2.828E-23	2.693E-21	6.573E-20	1.185E-19	6.773E-20
Pu-242	ÕDSR(j)		5.645E-02	5.544E-02	5.348E-02	4.715E-02	3.289E-02	9.322E-03	2.521E-04	7.126E-10

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	4.891E-02	4.530E-02	3.887E-02	2.273E-02	4.911E-03	2.299E-05	5.037E-12	2.159E-35
U-234	Th-230	1.000E+00	0.000E+00	8.850E-07	2.457E-06	6.384E-06	1.064E-05	1.137E-05	1.004E-05	5.658E-06
U-234	Ra-226	1.000E+00	0.000E+00	1.572E-08	1.297E-07	1.073E-06	4.478E-06	7.605E-06	7.336E-06	5.577E-06
U-234	Pb-210	1.000E+00	0.000E+00	2.426E-11	5.221E-10	1.305E-08	1.367E-07	3.961E-07	3.652E-07	2.051E-07
U-234	ÕDSR(j)		4.891E-02	4.530E-02	3.887E-02	2.274E-02	4.926E-03	4.236E-05	1.774E-05	1.144E-05
U-235	U-235	1.000E+00	6.283E-01	5.822E-01	4.999E-01	2.933E-01	6.391E-02	3.085E-04	7.417E-11	4.709E-34
U-235	Pa-231	1.000E+00	0.000E+00	3.685E-05	9.461E-05	1.843E-04	1.195E-04	1.868E-06	1.234E-12	1.817E-35
U-235	Ac-227	1.000E+00	0.000E+00	1.222E-06	8.503E-06	4.124E-05	4.383E-05	8.326E-07	5.948E-13	1.019E-35
U-235	ÕDSR(j)		6.283E-01	5.823E-01	5.000E-01	2.935E-01	6.407E-02	3.112E-04	7.600E-11	4.993E-34
U-238	U-238	1.000E+00	1.450E-01	1.343E-01	1.153E-01	6.757E-02	1.468E-02	7.013E-05	1.633E-11	9.127E-35
U-238	U-234	1.000E+00	0.000E+00	1.289E-07	3.310E-07	6.447E-07	4.177E-07	6.519E-09	4.286E-15	6.128E-38
U-238	Th-230	1.000E+00	0.000E+00	1.243E-12	1.006E-11	7.915E-11	2.937E-10	4.222E-10	3.744E-10	2.109E-10
U-238	Ra-226	1.000E+00	0.000E+00	1.473E-14	3.588E-13	9.323E-12	9.699E-11	2.766E-10	2.735E-10	2.079E-10
U-238	Pb-210	1.000E+00	0.000E+00	1.811E-17	1.117E-15	8.816E-14	2.442E-12	1.396E-11	1.362E-11	7.645E-12
U-238	ÕDSR(j)		1.450E-01	1.343E-01	1.153E-01	6.757E-02	1.468E-02	7.014E-05	6.778E-10	4.265E-10

Branch Fraction is the cumulative factor for the j'th principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life μ 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 15 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	3.790E+01	3.994E+01	4.433E+01	6.387E+01	1.814E+02	6.997E+03	1.221E+08	*3.430E+12
Pu-238	2.698E+02	2.769E+02	2.916E+02	3.495E+02	5.867E+02	3.598E+03	6.457E+05	1.171E+10
Pu-239	2.522E+02	2.568E+02	2.663E+02	3.021E+02	4.332E+02	1.531E+03	5.692E+04	2.050E+10
Pu-240	2.527E+02	2.573E+02	2.668E+02	3.029E+02	4.350E+02	1.546E+03	5.838E+04	2.221E+10
Pu-241	1.557E+04	9.991E+03	6.287E+03	3.737E+03	4.430E+03	8.027E+04	1.640E+09	*1.030E+14
Pu-242	2.657E+02	2.706E+02	2.805E+02	3.181E+02	4.560E+02	1.609E+03	5.950E+04	*3.923E+09
U-234	3.067E+02	3.311E+02	3.859E+02	6.596E+02	3.045E+03	3.541E+05	8.454E+05	1.311E+06
U-235	2.387E+01	2.576E+01	3.000E+01	5.110E+01	2.341E+02	4.820E+04	*2.160E+06	*2.160E+06
U-238	1.035E+02	1.117E+02	1.301E+02	2.220E+02	1.022E+03	2.139E+05	*3.360E+05	*3.360E+05

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 0.000E+00 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Am-241	1.000E+02	0.000E+00	3.957E-01	3.790E+01	3.957E-01	3.790E+01
Pu-238	1.000E+02	0.000E+00	5.560E-02	2.698E+02	5.560E-02	2.698E+02
Pu-239	1.000E+02	0.000E+00	5.946E-02	2.522E+02	5.946E-02	2.522E+02
Pu-240	1.000E+02	0.000E+00	5.935E-02	2.527E+02	5.935E-02	2.527E+02
Pu-241	1.000E+02	15.44 þ 0.02	4.287E-03	3.499E+03	9.633E-04	1.557E+04
Pu-242	1.000E+02	0.000E+00	5.645E-02	2.657E+02	5.645E-02	2.657E+02
U-234	1.000E+02	0.000E+00	4.891E-02	3.067E+02	4.891E-02	3.067E+02
U-235	1.000E+02	0.000E+00	6.283E-01	2.387E+01	6.283E-01	2.387E+01
U-238	1.000E+02	0.000E+00	1.450E-01	1.035E+02	1.450E-01	1.035E+02

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	3.957E+01	3.756E+01	3.384E+01	2.348E+01	8.269E+00	2.141E-01	6.224E-06	7.373E-22
Am-241	Pu-241	1.000E+00	0.000E+00	5.997E-02	1.596E-01	3.517E-01	3.253E-01	1.855E-02	7.068E-07	8.504E-23
Am-241	δDOSE(j):		3.957E+01	3.762E+01	3.400E+01	2.384E+01	8.595E+00	2.327E-01	6.931E-06	8.223E-22
Np-237	Am-241	1.000E+00	0.000E+00	5.876E-05	1.642E-04	4.284E-04	6.545E-04	2.645E-04	6.063E-06	8.877E-12
Np-237	Pu-241	1.000E+00	0.000E+00	4.667E-08	3.832E-07	3.106E-06	1.167E-05	8.428E-06	2.073E-07	3.036E-13
Np-237	Pu-241	2.450E-05	0.000E+00	1.430E-09	3.941E-09	9.837E-09	1.356E-08	4.690E-09	1.045E-10	1.530E-16
Np-237	δDOSE(j):		0.000E+00	5.880E-05	1.646E-04	4.315E-04	6.662E-04	2.729E-04	6.270E-06	9.180E-12
U-233	Am-241	1.000E+00	0.000E+00	3.625E-12	2.848E-11	2.224E-10	7.858E-10	5.097E-10	1.175E-11	1.410E-17
U-233	Pu-241	1.000E+00	0.000E+00	1.983E-15	4.552E-14	1.141E-12	1.091E-11	1.533E-11	4.017E-13	4.823E-19
U-233	Pu-241	2.450E-05	0.000E+00	8.838E-17	6.880E-16	5.206E-15	1.693E-14	9.230E-15	2.025E-16	2.431E-22
U-233	δDOSE(j):		0.000E+00	3.627E-12	2.852E-11	2.235E-10	7.967E-10	5.250E-10	1.215E-11	1.459E-17
Th-229	Am-241	1.000E+00	0.000E+00	4.114E-15	1.029E-13	2.962E-12	4.088E-11	2.313E-10	3.078E-10	2.142E-10
Th-229	Pu-241	1.000E+00	0.000E+00	1.631E-18	1.214E-16	1.119E-14	4.080E-13	4.815E-12	7.516E-12	5.246E-12
Th-229	Pu-241	2.450E-05	0.000E+00	9.992E-20	2.491E-18	7.017E-17	9.149E-16	4.645E-15	5.945E-15	4.133E-15
Th-229	δDOSE(j):		0.000E+00	4.116E-15	1.030E-13	2.973E-12	4.129E-11	2.361E-10	3.153E-10	2.194E-10
Pu-238	Pu-238	1.000E+00	5.560E+00	5.418E+00	5.144E+00	4.292E+00	2.557E+00	4.168E-01	2.323E-03	2.608E-11
U-234	Pu-238	1.000E+00	0.000E+00	1.319E-05	3.572E-05	8.396E-05	9.827E-05	2.037E-05	1.143E-07	1.287E-15
U-234	Pu-242	1.000E+00	0.000E+00	1.024E-15	8.185E-15	6.143E-14	1.915E-13	1.014E-13	2.799E-15	7.936E-21
U-234	U-234	1.000E+00	4.891E+00	4.530E+00	3.887E+00	2.273E+00	4.911E-01	2.299E-03	5.037E-10	0.000E+00
U-234	U-238	1.000E+00	0.000E+00	1.289E-05	3.310E-05	6.447E-05	4.177E-05	6.519E-07	4.286E-13	0.000E+00
U-234	δDOSE(j):		4.891E+00	4.530E+00	3.887E+00	2.273E+00	4.912E-01	2.320E-03	1.148E-07	1.287E-15
Th-230	Pu-238	1.000E+00	0.000E+00	1.264E-10	1.058E-09	9.334E-09	4.638E-08	1.122E-07	1.123E-07	6.334E-08
Th-230	Pu-242	1.000E+00	0.000E+00	6.437E-21	1.596E-19	4.424E-18	5.555E-17	2.668E-16	3.303E-16	1.878E-16
Th-230	U-234	1.000E+00	0.000E+00	8.850E-05	2.457E-04	6.384E-04	1.064E-03	1.137E-03	1.004E-03	5.658E-04
Th-230	U-238	1.000E+00	0.000E+00	1.243E-10	1.006E-09	7.915E-09	2.937E-08	4.222E-08	3.744E-08	2.109E-08
Th-230	δDOSE(j):		0.000E+00	8.850E-05	2.457E-04	6.384E-04	1.064E-03	1.137E-03	1.004E-03	5.659E-04
Ra-226	Pu-238	1.000E+00	0.000E+00	1.492E-12	3.727E-11	1.057E-09	1.391E-08	6.825E-08	8.201E-08	6.244E-08
Ra-226	Pu-242	1.000E+00	0.000E+00	5.753E-23	4.261E-21	3.865E-19	1.357E-17	1.504E-16	2.403E-16	1.851E-16
Ra-226	U-234	1.000E+00	0.000E+00	1.572E-06	1.297E-05	1.073E-04	4.478E-04	7.605E-04	7.336E-04	5.577E-04
Ra-226	U-238	1.000E+00	0.000E+00	1.473E-12	3.588E-11	9.323E-10	9.699E-09	2.766E-08	2.735E-08	2.079E-08
Ra-226	δDOSE(j):		0.000E+00	1.572E-06	1.297E-05	1.073E-04	4.479E-04	7.606E-04	7.337E-04	5.578E-04
Pb-210	Pu-238	1.000E+00	0.000E+00	1.830E-15	1.152E-13	9.762E-12	3.296E-10	3.220E-09	4.080E-09	2.296E-09
Pb-210	Pu-242	1.000E+00	0.000E+00	4.419E-26	9.660E-24	2.828E-21	2.693E-19	6.573E-18	1.185E-17	6.773E-18
Pb-210	U-234	1.000E+00	0.000E+00	2.426E-09	5.221E-08	1.305E-06	1.367E-05	3.961E-05	3.652E-05	2.051E-05
Pb-210	U-238	1.000E+00	0.000E+00	1.811E-15	1.117E-13	8.816E-12	2.442E-10	1.396E-09	1.362E-09	7.645E-10
Pb-210	δDOSE(j):		0.000E+00	2.426E-09	5.221E-08	1.305E-06	1.367E-05	3.961E-05	3.653E-05	2.051E-05
Pu-239	Pu-239	1.000E+00	5.946E+00	5.840E+00	5.634E+00	4.966E+00	3.463E+00	9.795E-01	2.635E-02	7.317E-08
U-235	Pu-239	1.000E+00	0.000E+00	5.906E-08	1.615E-07	3.927E-07	5.155E-07	1.812E-07	5.362E-09	2.207E-14
U-235	U-235	1.000E+00	6.283E+01	5.822E+01	4.999E+01	2.933E+01	6.391E+00	3.085E-02	7.417E-09	0.000E+00
U-235	δDOSE(j):		6.283E+01	5.822E+01	4.999E+01	2.933E+01	6.391E+00	3.085E-02	1.278E-08	2.207E-14

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pa-231	Pu-239	1.000E+00	0.000E+00	1.858E-12	1.485E-11	1.115E-10	3.477E-10	1.842E-10	5.093E-12	1.468E-17
Pa-231	U-235	1.000E+00	0.000E+00	3.685E-03	9.461E-03	1.843E-02	1.195E-02	1.868E-04	1.234E-10	0.000E+00
Pa-231	ΣDOSE(j):		0.000E+00	3.685E-03	9.461E-03	1.843E-02	1.195E-02	1.868E-04	1.285E-10	1.468E-17
Ac-227	Pu-239	1.000E+00	0.000E+00	4.162E-14	9.103E-13	1.768E-11	9.633E-11	6.246E-11	1.790E-12	5.910E-18
Ac-227	U-235	1.000E+00	0.000E+00	1.222E-04	8.503E-04	4.124E-03	4.383E-03	8.326E-05	5.948E-11	0.000E+00
Ac-227	ΣDOSE(j):		0.000E+00	1.222E-04	8.503E-04	4.124E-03	4.383E-03	8.326E-05	6.127E-11	5.910E-18
Pu-240	Pu-240	1.000E+00	5.935E+00	5.829E+00	5.622E+00	4.953E+00	3.448E+00	9.701E-01	2.569E-02	6.753E-08
U-236	Pu-240	1.000E+00	0.000E+00	1.309E-07	3.572E-07	8.655E-07	1.125E-06	3.816E-07	1.014E-08	2.668E-14
Th-232	Pu-240	1.000E+00	0.000E+00	3.578E-17	3.025E-16	2.725E-15	1.430E-14	4.053E-14	4.589E-14	2.604E-14
Ra-228	Pu-240	1.000E+00	0.000E+00	1.321E-17	3.128E-16	7.528E-15	7.222E-14	2.665E-13	3.355E-13	2.580E-13
Th-228	Pu-240	1.000E+00	0.000E+00	1.682E-18	1.070E-16	6.150E-15	9.181E-14	3.906E-13	5.001E-13	3.823E-13
Pu-241	Pu-241	1.000E+00	9.633E-02	9.017E-02	7.900E-02	4.973E-02	1.325E-02	1.293E-04	2.309E-10	0.000E+00
Pu-241	Pu-241	2.450E-05	2.360E-06	2.209E-06	1.936E-06	1.218E-06	3.246E-07	3.168E-09	5.657E-15	0.000E+00
Pu-241	ΣDOSE(j):		9.633E-02	9.017E-02	7.900E-02	4.973E-02	1.325E-02	1.293E-04	2.309E-10	0.000E+00
Pu-242	Pu-242	1.000E+00	5.645E+00	5.544E+00	5.348E+00	4.715E+00	3.289E+00	9.322E-01	2.521E-02	7.126E-08
U-238	Pu-242	1.000E+00	0.000E+00	2.147E-09	5.868E-09	1.426E-08	1.866E-08	6.502E-09	1.874E-10	6.918E-16
U-238	U-238	1.000E+00	1.450E+01	1.343E+01	1.153E+01	6.757E+00	1.468E+00	7.013E-03	1.633E-09	0.000E+00
U-238	ΣDOSE(j):		1.450E+01	1.343E+01	1.153E+01	6.757E+00	1.468E+00	7.013E-03	1.821E-09	6.918E-16

BRF(i) is the branch fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
ááááááá	ááááááá	áááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá
Am-241	Am-241	1.000E+00	1.000E+02	9.496E+01	8.563E+01	5.961E+01	2.119E+01	5.669E-01	1.822E-05	3.427E-21
Am-241	Pu-241	1.000E+00	0.000E+00	1.512E-01	4.035E-01	8.926E-01	8.334E-01	4.911E-02	2.069E-06	3.953E-22
Am-241	δS(j):		1.000E+02	9.511E+01	8.603E+01	6.051E+01	2.202E+01	6.160E-01	2.029E-05	3.823E-21
Np-237	Am-241	1.000E+00	0.000E+00	3.127E-05	8.746E-05	2.288E-04	3.516E-04	1.452E-04	3.556E-06	7.167E-12
Np-237	Pu-241	1.000E+00	0.000E+00	2.482E-08	2.041E-07	1.658E-06	6.269E-06	4.627E-06	1.216E-07	2.451E-13
Np-237	Pu-241	2.450E-05	0.000E+00	7.608E-10	2.099E-09	5.252E-09	7.284E-09	2.575E-09	6.130E-11	1.235E-16
Np-237	δS(j):		0.000E+00	3.130E-05	8.767E-05	2.304E-04	3.579E-04	1.498E-04	3.678E-06	7.412E-12
U-233	Am-241	1.000E+00	0.000E+00	6.745E-11	5.508E-10	4.375E-09	1.567E-08	1.054E-08	2.710E-10	5.462E-16
U-233	Pu-241	1.000E+00	0.000E+00	3.591E-14	8.722E-13	2.238E-11	2.175E-10	3.171E-10	9.265E-12	1.868E-17
U-233	Pu-241	2.450E-05	0.000E+00	1.645E-15	1.331E-14	1.024E-13	3.378E-13	1.909E-13	4.671E-15	9.414E-21
U-233	δS(j):		0.000E+00	6.749E-11	5.517E-10	4.398E-09	1.589E-08	1.086E-08	2.803E-10	5.648E-16
Th-229	Am-241	1.000E+00	0.000E+00	2.149E-15	5.396E-14	1.558E-12	2.161E-11	1.243E-10	1.739E-10	1.569E-10
Th-229	Pu-241	1.000E+00	0.000E+00	8.567E-19	6.378E-17	5.886E-15	2.156E-13	2.587E-12	4.247E-12	3.844E-12
Th-229	Pu-241	2.450E-05	0.000E+00	5.248E-20	1.309E-18	3.692E-17	4.836E-16	2.495E-15	3.359E-15	3.029E-15
Th-229	δS(j):		0.000E+00	2.150E-15	5.403E-14	1.564E-12	2.183E-11	1.269E-10	1.782E-10	1.608E-10
Pu-238	Pu-238	1.000E+00	1.000E+02	9.749E+01	9.266E+01	7.757E+01	4.668E+01	7.890E+00	4.912E-02	9.349E-10
U-234	Pu-238	1.000E+00	0.000E+00	2.695E-04	7.311E-04	1.725E-03	2.039E-03	4.382E-04	2.745E-06	5.226E-14
U-234	Pu-242	1.000E+00	0.000E+00	2.078E-14	1.672E-13	1.261E-12	3.973E-12	2.181E-12	6.722E-14	3.222E-19
U-234	U-234	1.000E+00	1.000E+02	9.267E+01	7.958E+01	4.671E+01	1.019E+01	4.946E-02	1.210E-08	8.764E-32
U-234	U-238	1.000E+00	0.000E+00	2.627E-04	6.769E-04	1.324E-03	8.669E-04	1.402E-05	1.030E-11	2.488E-34
U-234	δS(j):		1.000E+02	9.267E+01	7.959E+01	4.671E+01	1.020E+01	4.991E-02	2.757E-06	5.226E-14
Th-230	Pu-238	1.000E+00	0.000E+00	1.234E-09	1.039E-08	9.207E-08	4.623E-07	1.159E-06	1.296E-06	1.232E-06
Th-230	Pu-242	1.000E+00	0.000E+00	6.325E-20	1.570E-18	4.367E-17	5.539E-16	2.757E-15	3.810E-15	3.654E-15
Th-230	U-234	1.000E+00	0.000E+00	8.668E-04	2.414E-03	6.299E-03	1.061E-02	1.175E-02	1.158E-02	1.101E-02
Th-230	U-238	1.000E+00	0.000E+00	1.213E-09	9.876E-09	7.808E-08	2.928E-07	4.363E-07	4.318E-07	4.104E-07
Th-230	δS(j):		0.000E+00	8.668E-04	2.414E-03	6.300E-03	1.061E-02	1.175E-02	1.158E-02	1.101E-02
Ra-226	Pu-238	1.000E+00	0.000E+00	1.772E-13	4.428E-12	1.257E-10	1.659E-09	8.227E-09	1.024E-08	9.748E-09
Ra-226	Pu-242	1.000E+00	0.000E+00	6.833E-24	5.062E-22	4.597E-20	1.619E-18	1.813E-17	3.001E-17	2.890E-17
Ra-226	U-234	1.000E+00	0.000E+00	1.867E-07	1.541E-06	1.276E-05	5.342E-05	9.168E-05	9.161E-05	8.707E-05
Ra-226	U-238	1.000E+00	0.000E+00	1.750E-13	4.263E-12	1.109E-10	1.157E-09	3.334E-09	3.415E-09	3.246E-09
Ra-226	δS(j):		0.000E+00	1.867E-07	1.541E-06	1.276E-05	5.342E-05	9.169E-05	9.163E-05	8.708E-05
Pb-210	Pu-238	1.000E+00	0.000E+00	1.369E-15	1.014E-13	9.181E-12	3.190E-10	3.250E-09	4.602E-09	4.383E-09
Pb-210	Pu-242	1.000E+00	0.000E+00	4.262E-26	9.326E-24	2.740E-21	2.636E-19	6.672E-18	1.343E-17	1.300E-17
Pb-210	U-234	1.000E+00	0.000E+00	1.922E-09	4.698E-08	1.236E-06	1.326E-05	4.000E-05	4.120E-05	3.915E-05
Pb-210	U-238	1.000E+00	0.000E+00	1.355E-15	9.832E-14	8.297E-12	2.365E-10	1.409E-09	1.536E-09	1.460E-09
Pb-210	δS(j):		0.000E+00	1.922E-09	4.698E-08	1.236E-06	1.326E-05	4.000E-05	4.120E-05	3.916E-05
Pu-239	Pu-239	1.000E+00	1.000E+02	9.826E+01	9.488E+01	8.393E+01	5.911E+01	1.733E+01	5.209E-01	2.450E-06
U-235	Pu-239	1.000E+00	0.000E+00	9.400E-08	2.571E-07	6.255E-07	8.223E-07	2.906E-07	8.756E-09	4.119E-14
U-235	U-235	1.000E+00	1.000E+02	9.267E+01	7.959E+01	4.671E+01	1.019E+01	4.948E-02	1.211E-08	8.789E-32
U-235	δS(j):		1.000E+02	9.267E+01	7.959E+01	4.671E+01	1.019E+01	4.948E-02	2.087E-08	4.119E-14

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pa-231	Pu-239	1.000E+00	0.000E+00	9.847E-13	7.920E-12	5.974E-11	1.882E-10	1.031E-10	3.161E-12	1.487E-17
Pa-231	U-235	1.000E+00	0.000E+00	1.961E-03	5.052E-03	9.883E-03	6.468E-03	1.046E-04	7.663E-11	1.840E-33
Pa-231	ÕS(j):		0.000E+00	1.961E-03	5.052E-03	9.883E-03	6.468E-03	1.046E-04	7.979E-11	1.487E-17
Ac-227	Pu-239	1.000E+00	0.000E+00	1.003E-14	2.237E-13	4.385E-12	2.409E-11	1.601E-11	4.938E-13	2.323E-18
Ac-227	U-235	1.000E+00	0.000E+00	2.975E-05	2.097E-04	1.024E-03	1.097E-03	2.135E-05	1.642E-11	4.007E-34
Ac-227	ÕS(j):		0.000E+00	2.975E-05	2.097E-04	1.024E-03	1.097E-03	2.135E-05	1.691E-11	2.323E-18
Pu-240	Pu-240	1.000E+00	1.000E+02	9.826E+01	9.486E+01	8.386E+01	5.898E+01	1.720E+01	5.090E-01	2.268E-06
U-236	Pu-240	1.000E+00	0.000E+00	2.825E-06	7.726E-06	1.879E-05	2.468E-05	8.678E-06	2.575E-07	1.147E-12
Th-232	Pu-240	1.000E+00	0.000E+00	7.078E-17	5.991E-16	5.411E-15	2.870E-14	8.434E-14	1.067E-13	1.027E-13
Ra-228	Pu-240	1.000E+00	0.000E+00	2.745E-18	6.503E-17	1.567E-15	1.508E-14	5.626E-14	7.349E-14	7.082E-14
Th-228	Pu-240	1.000E+00	0.000E+00	2.346E-19	1.493E-17	8.585E-16	1.286E-14	5.531E-14	7.346E-14	7.082E-14
Pu-241	Pu-241	1.000E+00	1.000E+02	9.365E+01	8.213E+01	5.187E+01	1.396E+01	1.411E-01	2.812E-07	3.139E-27
Pu-241	Pu-241	2.450E-05	2.450E-03	2.294E-03	2.012E-03	1.271E-03	3.420E-04	3.458E-06	6.890E-12	7.692E-32
Pu-241	ÕS(j):		1.000E+02	9.365E+01	8.213E+01	5.188E+01	1.396E+01	1.412E-01	2.812E-07	3.139E-27
Pu-242	Pu-242	1.000E+00	1.000E+02	9.827E+01	9.489E+01	8.395E+01	5.916E+01	1.738E+01	5.251E-01	2.517E-06
U-238	Pu-242	1.000E+00	0.000E+00	1.481E-08	4.050E-08	9.855E-08	1.296E-07	4.587E-08	1.390E-09	6.662E-15
U-238	U-238	1.000E+00	1.000E+02	9.267E+01	7.959E+01	4.671E+01	1.019E+01	4.948E-02	1.211E-08	8.789E-32
U-238	ÕS(j):		1.000E+02	9.267E+01	7.959E+01	4.671E+01	1.019E+01	4.948E-02	1.350E-08	6.662E-15

BRF(i) is the branch fraction of the parent nuclide.

ATTACHMENT V
RESRAD SUMMARY OUTPUT FOR THE OPEN SPACE TIER I (15 MREM) ACTION LEVELS

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Dose Conversion Factor (and Related) Parameter Summary
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Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.720E+00	6.720E+00	DCF2(1)
B-1	Am-241	4.440E-01	4.440E-01	DCF2(2)
B-1	Np-237+D	5.400E-01	5.400E-01	DCF2(3)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(4)
B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2(5)
B-1	Pu-238	2.880E-01	3.920E-01	DCF2(6)
B-1	Pu-239	3.080E-01	4.290E-01	DCF2(7)
B-1	Pu-240	3.080E-01	4.290E-01	DCF2(8)
B-1	Pu-241+D	4.960E-03	8.250E-03	DCF2(9)
B-1	Pu-242	2.930E-01	4.110E-01	DCF2(11)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2(12)
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(13)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(14)
B-1	Th-229+D	2.160E+00	2.160E+00	DCF2(15)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(16)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(17)
B-1	U-233	1.350E-01	1.350E-01	DCF2(18)
B-1	U-234	1.320E-01	1.320E-01	DCF2(19)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(20)
B-1	U-236	1.250E-01	1.250E-01	DCF2(21)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(22)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3(1)
D-1	Am-241	3.640E-03	3.640E-03	DCF3(2)
D-1	Np-237+D	4.440E-03	4.440E-03	DCF3(3)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(4)
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3(5)
D-1	Pu-238	4.960E-05	3.200E-03	DCF3(6)
D-1	Pu-239	5.180E-05	3.540E-03	DCF3(7)
D-1	Pu-240	5.180E-05	3.540E-03	DCF3(8)
D-1	Pu-241+D	7.660E-07	6.850E-05	DCF3(9)
D-1	Pu-242	4.920E-05	3.360E-03	DCF3(11)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3(12)
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(13)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(14)
D-1	Th-229+D	4.030E-03	4.030E-03	DCF3(15)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(16)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(17)
D-1	U-233	2.890E-04	2.890E-04	DCF3(18)
D-1	U-234	2.830E-04	2.830E-04	DCF3(19)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3(20)
D-1	U-236	2.690E-04	2.690E-04	DCF3(21)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3(22)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)

Dose Conversion Factor (and Related) Parameter Summary (continued)
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Menu	Parameter	Current Value	Default	Parameter Name
D-34	Am-241 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(2,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF(2,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(2,3)
D-34				
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF(3,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(3,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(4,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(4,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(5,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(5,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(5,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(6,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(7,3)
D-34				
D-34	Pu-240 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(8,1)
D-34	Pu-240 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(8,2)
D-34	Pu-240 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(8,3)
D-34				
D-34	Pu-241+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Pu-241+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Pu-241+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(9,3)
D-34				
D-34	Pu-242 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(11,1)
D-34	Pu-242 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(11,2)
D-34	Pu-242 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(11,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(12,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(12,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(12,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(13,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(13,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(13,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(14,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(14,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(14,3)
D-34				

Dose Conversion Factor (and Related) Parameter Summary (continued)
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Menu	Parameter	Current Value	Default	Parameter Name
D-34	Th-229+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(15,1)
D-34	Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(15,2)
D-34	Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(15,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(16,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(16,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(16,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(17,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(17,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(17,3)
D-34				
D-34	U-233 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(18,1)
D-34	U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(18,2)
D-34	U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(18,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(19,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(19,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(19,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(20,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(20,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(20,3)
D-34				
D-34	U-236 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(21,1)
D-34	U-236 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(21,2)
D-34	U-236 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(21,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(22,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(22,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(22,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Am-241 , fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Am-241 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5				
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(3,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(3,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(4,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(4,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(5,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(5,2)
D-5				
D-5	Pu-238 , fish	3.000E+01	3.000E+01	BIOFAC(6,1)
D-5	Pu-238 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(6,2)

Dose Conversion Factor (and Related) Parameter Summary (continued)
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Menu	Parameter	Current Value	Default	Parameter Name
D-5	Pu-239 , fish	3.000E+01	3.000E+01	BIOFAC(7,1)
D-5	Pu-239 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(7,2)
D-5				
D-5	Pu-240 , fish	3.000E+01	3.000E+01	BIOFAC(8,1)
D-5	Pu-240 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(8,2)
D-5				
D-5	Pu-241+D , fish	3.000E+01	3.000E+01	BIOFAC(9,1)
D-5	Pu-241+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(9,2)
D-5				
D-5	Pu-242 , fish	3.000E+01	3.000E+01	BIOFAC(11,1)
D-5	Pu-242 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(11,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(12,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(12,2)
D-5				
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(13,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(13,2)
D-5				
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(14,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(14,2)
D-5				
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(15,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(15,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(16,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(16,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(17,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(17,2)
D-5				
D-5	U-233 , fish	1.000E+01	1.000E+01	BIOFAC(18,1)
D-5	U-233 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(18,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(19,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(19,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(20,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(20,2)
D-5				
D-5	U-236 , fish	1.000E+01	1.000E+01	BIOFAC(21,1)
D-5	U-236 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(21,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(22,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(22,2)

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	4.000E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Am-241	1.000E+02	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Pu-238	1.000E+02	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): Pu-239	1.000E+02	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): Pu-240	1.000E+02	0.000E+00	---	S1(8)
R012	Initial principal radionuclide (pCi/g): Pu-241	1.000E+02	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g): Pu-242	1.000E+02	0.000E+00	---	S1(11)
R012	Initial principal radionuclide (pCi/g): U-234	1.000E+02	0.000E+00	---	S1(19)
R012	Initial principal radionuclide (pCi/g): U-235	1.000E+02	0.000E+00	---	S1(20)
R012	Initial principal radionuclide (pCi/g): U-238	1.000E+02	0.000E+00	---	S1(22)
R012	Concentration in groundwater (pCi/L): Am-241	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): Pu-240	not used	0.000E+00	---	W1(8)
R012	Concentration in groundwater (pCi/L): Pu-241	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L): Pu-242	not used	0.000E+00	---	W1(11)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(19)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(20)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(22)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.800E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	7.490E-05	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	1.000E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.450E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	1.040E+01	5.300E+00	---	BCZ
R013	Humidity in air (g/cm**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.200E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	3.810E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	0.000E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	4.000E-03	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R013	Accuracy for water/soil computations	not used	1.000E-03	Zero shows Simpson's rule.	EPS
R014	Density of saturated zone (g/cm**3)	1.800E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	1.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	4.450E+01	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	1.500E-01	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Am-241				
R016	Contaminated zone (cm**3/g)	7.600E+01	2.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.477E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pu-238				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+03	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+03	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.155E-04	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for Pu-239				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+03	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+03	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.155E-04	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for Pu-240				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+03	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+03	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.155E-04	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Pu-241				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+03	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+03	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.155E-04	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for Pu-242				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+03	---	DCNUCU(11,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+03	---	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.155E-04	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(19)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(19,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(19)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.243E-03	ALEACH(19)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(19)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(20)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(20,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(20)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.243E-03	ALEACH(20)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(20)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(22)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(22,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(22)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.243E-03	ALEACH(22)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(22)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.588E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Np-237				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.036E+02	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	-1.000E+00	-1.000E+00	2.036E+02	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.036E+02	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.520E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.243E-03	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+02	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+02	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.123E-03	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU(12,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.603E-03	ALEACH(12)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(12)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(13)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU(13,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.603E-03	ALEACH(13)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(13)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(14)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(14,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(14)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.874E-06	ALEACH(14)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(14)
R016	Distribution coefficients for daughter Th-229				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(15)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(15,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(15)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.874E-06	ALEACH(15)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(15)
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(16)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(16,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(16)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.874E-06	ALEACH(16)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(16)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(17)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(17,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(17)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.874E-06	ALEACH(17)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(17)
R016	Distribution coefficients for daughter U-233				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(18)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(18,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(18)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.243E-03	ALEACH(18)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(18)
R016	Distribution coefficients for daughter U-236				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(21)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(21,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(21)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.243E-03	ALEACH(21)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(21)
R017	Inhalation rate (m**3/yr)	1.750E+02	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.600E-05	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	1.000E+00	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	1.400E-02	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	1.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	0.000E+00	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	1 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	2.500E+00	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	not used	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	not used	1.000E+00	---	STOR_T(2)
STOR	Milk	not used	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	not used	2.000E+01	---	STOR_T(4)
STOR	Fish	not used	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	not used	7.000E+00	---	STOR_T(6)
STOR	Well water	not used	1.000E+00	---	STOR_T(7)
STOR	Surface water	not used	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	not used	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average annual wind speed (m/sec)	not used	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed

Summary : Open space surface soil exposure at the 15 millirem level
File : \RES561\PUBLIC\OPEN15.DAT

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	40000.00 square meters	Am-241	1.000E+02
Thickness:	0.15 meters	Pu-238	1.000E+02
Cover Depth:	0.00 meters	Pu-239	1.000E+02
		Pu-240	1.000E+02
		Pu-241	1.000E+02
		Pu-242	1.000E+02
		U-234	1.000E+02
		U-235	1.000E+02
		U-238	1.000E+02

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 15 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	3.327E+00	3.319E+00	3.304E+00	3.247E+00	3.083E+00	2.555E+00	1.537E+00	3.092E-01
M(t):	2.218E-01	2.213E-01	2.202E-01	2.165E-01	2.055E-01	1.703E-01	1.024E-01	2.062E-02

Maximum TDOSE(t): 3.327E+00 mrem/yr at t = 0.000E+00 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	6.017E-02	0.0181	1.990E-01	0.0598	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.100E-01	0.2735
Pu-238	2.100E-04	0.0001	1.291E-01	0.0388	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.240E-02	0.0037
Pu-239	3.990E-04	0.0001	1.381E-01	0.0415	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.295E-02	0.0039
Pu-240	2.044E-04	0.0001	1.381E-01	0.0415	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.295E-02	0.0039
Pu-241	2.571E-05	0.0000	2.223E-03	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.915E-04	0.0001
Pu-242	1.778E-04	0.0001	1.313E-01	0.0395	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.230E-02	0.0037
U-234	5.512E-04	0.0002	5.917E-02	0.0178	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.075E-02	0.0213
U-235	1.020E+00	0.3065	5.514E-02	0.0166	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.675E-02	0.0201
U-238	1.752E-01	0.0527	5.290E-02	0.0159	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.725E-02	0.0202
Total	1.257E+00	0.3777	9.051E-01	0.2720	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.166E+00	0.3503

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.169E+00	0.3514
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.417E-01	0.0426
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.514E-01	0.0455
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.512E-01	0.0454
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.441E-03	0.0007
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.438E-01	0.0432
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.305E-01	0.0392
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.142E+00	0.3431
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.954E-01	0.0888
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.327E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	5.998E-02	0.0181	1.983E-01	0.0597	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.067E-01	0.2732
Pu-238	2.082E-04	0.0001	1.280E-01	0.0385	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.229E-02	0.0037
Pu-239	3.988E-04	0.0001	1.379E-01	0.0416	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.294E-02	0.0039
Pu-240	2.043E-04	0.0001	1.379E-01	0.0415	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.294E-02	0.0039
Pu-241	1.185E-04	0.0000	2.428E-03	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.604E-03	0.0005
Pu-242	1.777E-04	0.0001	1.312E-01	0.0395	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.229E-02	0.0037
U-234	5.500E-04	0.0002	5.901E-02	0.0178	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.056E-02	0.0213
U-235	1.017E+00	0.3065	5.500E-02	0.0166	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.662E-02	0.0201
U-238	1.748E-01	0.0527	5.275E-02	0.0159	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.707E-02	0.0202
Total	1.254E+00	0.3777	9.025E-01	0.2719	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.163E+00	0.3504

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.165E+00	0.3510
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.405E-01	0.0423
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.513E-01	0.0456
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.511E-01	0.0455
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.150E-03	0.0013
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.437E-01	0.0433
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.301E-01	0.0392
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.139E+00	0.3432
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.946E-01	0.0888
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.319E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	5.962E-02	0.0180	1.969E-01	0.0596	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.003E-01	0.2725
Pu-238	2.047E-04	0.0001	1.257E-01	0.0380	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.207E-02	0.0037
Pu-239	3.984E-04	0.0001	1.376E-01	0.0417	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.291E-02	0.0039
Pu-240	2.040E-04	0.0001	1.376E-01	0.0417	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.291E-02	0.0039
Pu-241	2.903E-04	0.0001	2.804E-03	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.214E-03	0.0013
Pu-242	1.775E-04	0.0001	1.309E-01	0.0396	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.226E-02	0.0037
U-234	5.478E-04	0.0002	5.869E-02	0.0178	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.017E-02	0.0212
U-235	1.013E+00	0.3066	5.473E-02	0.0166	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.638E-02	0.0201
U-238	1.740E-01	0.0527	5.246E-02	0.0159	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.670E-02	0.0202
Total	1.248E+00	0.3778	8.975E-01	0.2717	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.158E+00	0.3505

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.157E+00	0.3502
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.380E-01	0.0418
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.509E-01	0.0457
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.507E-01	0.0456
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.308E-03	0.0022
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.434E-01	0.0434
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.294E-01	0.0392
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.134E+00	0.3432
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.932E-01	0.0887
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.304E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	5.835E-02	0.0180	1.920E-01	0.0591	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.780E-01	0.2704
Pu-238	1.930E-04	0.0001	1.181E-01	0.0364	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.134E-02	0.0035
Pu-239	3.967E-04	0.0001	1.366E-01	0.0421	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.282E-02	0.0039
Pu-240	2.031E-04	0.0001	1.365E-01	0.0420	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.281E-02	0.0039
Pu-241	7.674E-04	0.0002	3.834E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.143E-02	0.0035
Pu-242	1.769E-04	0.0001	1.300E-01	0.0400	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.218E-02	0.0037
U-234	5.418E-04	0.0002	5.758E-02	0.0177	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.885E-02	0.0212
U-235	9.969E-01	0.3070	5.385E-02	0.0166	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.560E-02	0.0202
U-238	1.712E-01	0.0527	5.147E-02	0.0158	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.543E-02	0.0202
Total	1.229E+00	0.3784	8.800E-01	0.2710	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.138E+00	0.3506

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.128E+00	0.3475
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.296E-01	0.0399
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.498E-01	0.0461
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.495E-01	0.0461
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.603E-02	0.0049
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.424E-01	0.0438
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.270E-01	0.0391
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.116E+00	0.3438
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.881E-01	0.0887
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.247E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	5.488E-02	0.0178	1.787E-01	0.0580	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.172E-01	0.2651
Pu-238	1.631E-04	0.0001	9.880E-02	0.0321	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.494E-03	0.0031
Pu-239	3.922E-04	0.0001	1.338E-01	0.0434	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.255E-02	0.0041
Pu-240	2.006E-04	0.0001	1.335E-01	0.0433	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.252E-02	0.0041
Pu-241	1.445E-03	0.0005	5.196E-03	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.148E-02	0.0070
Pu-242	1.751E-04	0.0001	1.274E-01	0.0413	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.193E-02	0.0039
U-234	5.390E-04	0.0002	5.453E-02	0.0177	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.519E-02	0.0211
U-235	9.530E-01	0.3092	5.172E-02	0.0168	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.377E-02	0.0207
U-238	1.633E-01	0.0530	4.872E-02	0.0158	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.194E-02	0.0201
Total	1.174E+00	0.3809	8.324E-01	0.2700	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.076E+00	0.3491

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.051E+00	0.3409
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.085E-01	0.0352
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.467E-01	0.0476
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.462E-01	0.0474
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.812E-02	0.0091
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.395E-01	0.0453
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.203E-01	0.0390
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.068E+00	0.3466
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.740E-01	0.0889
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.083E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	4.428E-02	0.0173	1.390E-01	0.0544	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.354E-01	0.2487
Pu-238	9.059E-05	0.0000	5.288E-02	0.0207	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.089E-03	0.0020
Pu-239	3.765E-04	0.0001	1.242E-01	0.0486	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.165E-02	0.0046
Pu-240	1.921E-04	0.0001	1.233E-01	0.0482	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.156E-02	0.0045
Pu-241	1.542E-03	0.0006	4.855E-03	0.0019	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.213E-02	0.0087
Pu-242	1.688E-04	0.0001	1.185E-01	0.0464	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.110E-02	0.0043
U-234	6.739E-04	0.0003	4.502E-02	0.0176	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.382E-02	0.0211
U-235	8.148E-01	0.3189	4.595E-02	0.0180	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.882E-02	0.0230
U-238	1.386E-01	0.0543	4.017E-02	0.0157	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.107E-02	0.0200
Total	1.001E+00	0.3917	6.938E-01	0.2715	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.606E-01	0.3368

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.186E-01	0.3204
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.806E-02	0.0227
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.363E-01	0.0533
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.350E-01	0.0528
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.852E-02	0.0112
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.298E-01	0.0508
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.952E-02	0.0389
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.196E-01	0.3599
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.299E-01	0.0900
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.555E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	2.400E-02	0.0156	6.716E-02	0.0437	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.071E-01	0.1998
Pu-238	1.718E-05	0.0000	8.801E-03	0.0057	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.563E-04	0.0006
Pu-239	3.343E-04	0.0002	9.970E-02	0.0649	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.351E-03	0.0061
Pu-240	1.695E-04	0.0001	9.742E-02	0.0634	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.138E-03	0.0059
Pu-241	8.442E-04	0.0005	2.364E-03	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.081E-02	0.0070
Pu-242	1.522E-04	0.0001	9.562E-02	0.0622	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.954E-03	0.0058
U-234	1.823E-03	0.0012	2.589E-02	0.0168	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.107E-02	0.0202
U-235	5.199E-01	0.3383	3.227E-02	0.0210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.455E-02	0.0290
U-238	8.636E-02	0.0562	2.297E-02	0.0149	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.920E-02	0.0190
Total	6.336E-01	0.4123	4.522E-01	0.2943	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.510E-01	0.2935

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.982E-01	0.2591
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.674E-03	0.0063
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.094E-01	0.0712
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.067E-01	0.0694
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.401E-02	0.0091
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.047E-01	0.0681
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.878E-02	0.0383
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.967E-01	0.3883
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.385E-01	0.0901
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.537E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	2.834E-03	0.0092	4.584E-03	0.0148	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.096E-02	0.0678
Pu-238	1.795E-06	0.0000	1.583E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.334E-06	0.0000
Pu-239	2.072E-04	0.0007	4.011E-02	0.1297	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.762E-03	0.0122
Pu-240	1.084E-04	0.0004	3.713E-02	0.1201	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.483E-03	0.0113
Pu-241	9.956E-05	0.0003	1.613E-04	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.376E-04	0.0024
Pu-242	1.044E-04	0.0003	3.920E-02	0.1268	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.671E-03	0.0119
U-234	5.832E-03	0.0189	3.399E-03	0.0110	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.537E-03	0.0147
U-235	1.001E-01	0.3238	6.514E-03	0.0211	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.011E-02	0.0327
U-238	1.512E-02	0.0489	2.819E-03	0.0091	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.584E-03	0.0116
Total	1.244E-01	0.4024	1.339E-01	0.4331	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.085E-02	0.1644

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.838E-02	0.0918
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.096E-05	0.0001
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.408E-02	0.1425
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.072E-02	0.1317
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.984E-04	0.0032
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.298E-02	0.1390
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.377E-02	0.0445
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.168E-01	0.3776
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.152E-02	0.0696
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.092E-01	1.0000

*Sum of all water independent and dependent pathways.

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	1.169E-02	1.165E-02	1.157E-02	1.128E-02	1.051E-02	8.185E-03	3.981E-03	2.825E-04
Am-241	Np-237	1.000E+00	0.000E+00	9.108E-09	2.721E-08	8.939E-08	2.573E-07	7.425E-07	1.491E-06	1.311E-06
Am-241	U-233	1.000E+00	0.000E+00	9.514E-16	8.520E-15	9.306E-14	7.974E-13	7.463E-12	4.114E-11	7.846E-11
Am-241	Th-229	1.000E+00	0.000E+00	9.092E-19	2.446E-17	8.948E-16	2.332E-14	7.637E-13	1.456E-11	1.597E-10
Am-241	ΣDSR(j)		1.169E-02	1.165E-02	1.157E-02	1.128E-02	1.051E-02	8.186E-03	3.982E-03	2.838E-04
Pu-238	Pu-238	1.000E+00	1.417E-03	1.405E-03	1.380E-03	1.296E-03	1.084E-03	5.804E-04	9.652E-05	1.573E-07
Pu-238	U-234	1.000E+00	0.000E+00	3.677E-09	1.090E-08	3.490E-08	9.329E-08	2.095E-07	2.192E-07	3.182E-08
Pu-238	Th-230	1.000E+00	0.000E+00	3.619E-14	3.231E-13	3.490E-12	2.900E-11	2.457E-10	1.091E-09	1.645E-09
Pu-238	Ra-226	1.000E+00	0.000E+00	2.616E-16	7.016E-15	2.539E-13	6.422E-12	1.902E-10	2.828E-09	1.748E-08
Pu-238	Pb-210	1.000E+00	0.000E+00	2.605E-19	2.070E-17	2.394E-15	1.619E-13	1.128E-11	2.496E-10	1.371E-09
Pu-238	ΣDSR(j)		1.417E-03	1.405E-03	1.380E-03	1.296E-03	1.085E-03	5.806E-04	9.674E-05	2.096E-07
Pu-239	Pu-239	1.000E+00	1.514E-03	1.513E-03	1.509E-03	1.498E-03	1.467E-03	1.363E-03	1.094E-03	4.408E-04
Pu-239	U-235	1.000E+00	0.000E+00	1.123E-11	3.358E-11	1.108E-10	3.227E-10	9.704E-10	2.177E-09	2.635E-09
Pu-239	Pa-231	1.000E+00	0.000E+00	3.614E-16	3.239E-15	3.545E-14	3.056E-13	2.920E-12	1.703E-11	3.854E-11
Pu-239	Ac-227	1.000E+00	0.000E+00	1.025E-17	2.708E-16	9.308E-15	2.054E-13	4.195E-12	3.501E-11	9.930E-11
Pu-239	ΣDSR(j)		1.514E-03	1.513E-03	1.509E-03	1.498E-03	1.467E-03	1.363E-03	1.094E-03	4.408E-04
Pu-240	Pu-240	1.000E+00	1.512E-03	1.511E-03	1.507E-03	1.495E-03	1.462E-03	1.350E-03	1.067E-03	4.072E-04
Pu-240	U-236	1.000E+00	0.000E+00	3.651E-11	1.091E-10	3.588E-10	1.036E-09	3.015E-09	6.134E-09	4.879E-09
Pu-240	Th-232	1.000E+00	0.000E+00	1.034E-20	9.281E-20	1.021E-18	8.923E-18	8.954E-17	6.009E-16	2.214E-15
Pu-240	Ra-228	1.000E+00	0.000E+00	2.245E-21	5.704E-20	1.736E-18	2.982E-17	4.366E-16	3.535E-15	1.860E-14
Pu-240	Th-228	1.000E+00	0.000E+00	3.063E-22	2.067E-20	1.463E-18	3.848E-17	6.612E-16	5.547E-15	2.885E-14
Pu-240	ΣDSR(j)		1.512E-03	1.511E-03	1.507E-03	1.495E-03	1.462E-03	1.350E-03	1.067E-03	4.072E-04
Pu-241	Pu-241	1.000E+00	2.441E-05	2.324E-05	2.106E-05	1.493E-05	5.587E-06	1.789E-07	9.531E-12	9.163E-27
Pu-241	Am-241	1.000E+00	0.000E+00	1.826E-05	5.202E-05	1.453E-04	2.756E-04	2.850E-04	1.401E-04	9.941E-06
Pu-241	Np-237	1.000E+00	0.000E+00	7.190E-12	6.249E-11	6.168E-10	4.077E-09	2.003E-08	4.729E-08	4.351E-08
Pu-241	U-233	1.000E+00	0.000E+00	5.027E-19	1.320E-17	4.444E-16	9.321E-15	1.698E-13	1.224E-12	2.567E-12
Pu-241	Th-229	1.000E+00	0.000E+00	3.611E-22	2.861E-20	3.274E-18	2.166E-16	1.498E-14	4.033E-13	5.071E-12
Pu-241	ΣDSR(j)		2.441E-05	4.150E-05	7.308E-05	1.603E-04	2.812E-04	2.852E-04	1.401E-04	9.984E-06
Pu-241	Pu-241	2.450E-05	5.980E-10	5.693E-10	5.160E-10	3.658E-10	1.369E-10	4.383E-12	2.335E-16	2.245E-31
Pu-241	Np-237	2.450E-05	0.000E+00	2.181E-13	6.231E-13	1.761E-12	3.464E-12	4.245E-12	3.613E-12	1.835E-12
Pu-241	U-233	2.450E-05	0.000E+00	2.296E-20	1.996E-19	1.971E-18	1.305E-17	6.465E-17	1.559E-16	1.352E-16
Pu-241	Th-229	2.450E-05	0.000E+00	2.202E-23	5.794E-22	1.964E-20	4.206E-19	8.282E-18	7.589E-17	3.815E-16
Pu-241	ΣDSR(j)		5.980E-10	5.695E-10	5.166E-10	3.676E-10	1.403E-10	8.629E-12	3.613E-12	1.836E-12
Pu-242	Pu-242	1.000E+00	1.438E-03	1.437E-03	1.434E-03	1.424E-03	1.395E-03	1.298E-03	1.047E-03	4.298E-04
Pu-242	U-238	1.000E+00	0.000E+00	4.575E-13	1.368E-12	4.508E-12	1.309E-11	3.892E-11	8.443E-11	8.923E-11
Pu-242	U-234	1.000E+00	0.000E+00	2.863E-19	2.565E-18	2.808E-17	2.420E-16	2.309E-15	1.342E-14	2.969E-14
Pu-242	Th-230	1.000E+00	0.000E+00	1.876E-24	5.047E-23	1.847E-21	4.814E-20	1.577E-18	2.991E-17	2.984E-16
Pu-242	Ra-226	1.000E+00	0.000E+00	3.881E-27	8.178E-25	1.002E-22	7.872E-21	8.725E-19	5.189E-17	2.067E-15
Pu-242	Pb-210	1.000E+00	0.000E+00	0.000E+00	1.742E-27	7.612E-25	1.618E-22	4.367E-20	4.093E-18	1.542E-16
Pu-242	ΣDSR(j)		1.438E-03	1.437E-03	1.434E-03	1.424E-03	1.395E-03	1.298E-03	1.047E-03	4.298E-04

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.305E-03	1.301E-03	1.294E-03	1.269E-03	1.202E-03	9.904E-04	5.659E-04	6.939E-05
U-234	Th-230	1.000E+00	0.000E+00	2.560E-08	7.654E-08	2.522E-07	7.326E-07	2.181E-06	4.754E-06	5.099E-06
U-234	Ra-226	1.000E+00	0.000E+00	2.773E-10	2.488E-09	2.734E-08	2.385E-07	2.377E-06	1.571E-05	5.856E-05
U-234	Pb-210	1.000E+00	0.000E+00	3.674E-13	9.733E-12	3.375E-10	7.620E-09	1.644E-07	1.469E-06	4.629E-06
U-234	ðDSR(j)		1.305E-03	1.301E-03	1.294E-03	1.270E-03	1.203E-03	9.952E-04	5.878E-04	1.377E-04
U-235	U-235	1.000E+00	1.142E-02	1.139E-02	1.134E-02	1.115E-02	1.065E-02	9.040E-03	5.650E-03	1.017E-03
U-235	Pa-231	1.000E+00	0.000E+00	7.336E-07	2.189E-06	7.158E-06	2.033E-05	5.597E-05	9.644E-05	4.060E-05
U-235	Ac-227	1.000E+00	0.000E+00	3.112E-08	2.723E-07	2.744E-06	1.902E-05	9.987E-05	2.197E-04	1.097E-04
U-235	ðDSR(j)		1.142E-02	1.139E-02	1.134E-02	1.116E-02	1.068E-02	9.196E-03	5.967E-03	1.168E-03
U-238	U-238	1.000E+00	2.954E-03	2.946E-03	2.932E-03	2.881E-03	2.740E-03	2.298E-03	1.385E-03	2.150E-04
U-238	U-234	1.000E+00	0.000E+00	3.689E-09	1.101E-08	3.599E-08	1.022E-07	2.808E-07	4.815E-07	1.970E-07
U-238	Th-230	1.000E+00	0.000E+00	3.627E-14	3.251E-13	3.562E-12	3.080E-11	2.977E-10	1.798E-09	4.739E-09
U-238	Ra-226	1.000E+00	0.000E+00	2.619E-16	7.049E-15	2.579E-13	6.721E-12	2.200E-10	4.177E-09	4.350E-08
U-238	Pb-210	1.000E+00	0.000E+00	2.516E-19	2.080E-17	2.424E-15	1.681E-13	1.280E-11	3.590E-10	3.362E-09
U-238	ðDSR(j)		2.954E-03	2.946E-03	2.932E-03	2.881E-03	2.740E-03	2.299E-03	1.385E-03	2.152E-04

Branch Fraction is the cumulative factor for the j'th principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life μ 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 15 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	1.283E+03	1.287E+03	1.297E+03	1.329E+03	1.427E+03	1.832E+03	3.767E+03	5.286E+04
Pu-238	1.058E+04	1.068E+04	1.087E+04	1.157E+04	1.383E+04	2.584E+04	1.551E+05	7.155E+07
Pu-239	9.906E+03	9.917E+03	9.937E+03	1.001E+04	1.022E+04	1.101E+04	1.371E+04	3.403E+04
Pu-240	9.919E+03	9.930E+03	9.953E+03	1.003E+04	1.026E+04	1.111E+04	1.405E+04	3.684E+04
Pu-241	6.146E+05	3.614E+05	2.053E+05	9.359E+04	5.335E+04	5.259E+04	1.070E+05	1.502E+06
Pu-242	1.043E+04	1.044E+04	1.046E+04	1.054E+04	1.075E+04	1.156E+04	1.432E+04	3.490E+04
U-234	1.150E+04	1.153E+04	1.159E+04	1.181E+04	1.247E+04	1.507E+04	2.552E+04	1.089E+05
U-235	1.314E+03	1.317E+03	1.323E+03	1.344E+03	1.404E+03	1.631E+03	2.514E+03	1.285E+04
U-238	5.079E+03	5.091E+03	5.117E+03	5.207E+03	5.474E+03	6.526E+03	1.083E+04	6.970E+04

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 0.000E+00 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Am-241	1.000E+02	0.000E+00	1.169E-02	1.283E+03	1.169E-02	1.283E+03
Pu-238	1.000E+02	0.000E+00	1.417E-03	1.058E+04	1.417E-03	1.058E+04
Pu-239	1.000E+02	0.000E+00	1.514E-03	9.906E+03	1.514E-03	9.906E+03
Pu-240	1.000E+02	0.000E+00	1.512E-03	9.919E+03	1.512E-03	9.919E+03
Pu-241	1.000E+02	56.20 þ 0.06	3.124E-04	4.802E+04	2.441E-05	6.146E+05
Pu-242	1.000E+02	0.000E+00	1.438E-03	1.043E+04	1.438E-03	1.043E+04
U-234	1.000E+02	0.000E+00	1.305E-03	1.150E+04	1.305E-03	1.150E+04
U-235	1.000E+02	0.000E+00	1.142E-02	1.314E+03	1.142E-02	1.314E+03
U-238	1.000E+02	0.000E+00	2.954E-03	5.079E+03	2.954E-03	5.079E+03

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	1.169E+00	1.165E+00	1.157E+00	1.128E+00	1.051E+00	8.185E-01	3.981E-01	2.825E-02
Am-241	Pu-241	1.000E+00	0.000E+00	1.826E-03	5.202E-03	1.453E-02	2.756E-02	2.850E-02	1.401E-02	9.941E-04
Am-241	δDOSE(j):		1.169E+00	1.167E+00	1.162E+00	1.143E+00	1.078E+00	8.470E-01	4.121E-01	2.924E-02
Np-237	Am-241	1.000E+00	0.000E+00	9.108E-07	2.721E-06	8.939E-06	2.573E-05	7.425E-05	1.491E-04	1.311E-04
Np-237	Pu-241	1.000E+00	0.000E+00	7.190E-10	6.249E-09	6.168E-08	4.077E-07	2.003E-06	4.729E-06	4.351E-06
Np-237	Pu-241	2.450E-05	0.000E+00	2.181E-11	6.231E-11	1.761E-10	3.464E-10	4.245E-10	3.613E-10	1.835E-10
Np-237	δDOSE(j):		0.000E+00	9.115E-07	2.727E-06	9.000E-06	2.613E-05	7.625E-05	1.539E-04	1.355E-04
U-233	Am-241	1.000E+00	0.000E+00	9.514E-14	8.520E-13	9.306E-12	7.974E-11	7.463E-10	4.114E-09	7.846E-09
U-233	Pu-241	1.000E+00	0.000E+00	5.027E-17	1.320E-15	4.444E-14	9.321E-13	1.698E-11	1.224E-10	2.567E-10
U-233	Pu-241	2.450E-05	0.000E+00	2.296E-18	1.996E-17	1.971E-16	1.305E-15	6.465E-15	1.559E-14	1.352E-14
U-233	δDOSE(j):		0.000E+00	9.519E-14	8.534E-13	9.350E-12	8.068E-11	7.633E-10	4.236E-09	8.103E-09
Th-229	Am-241	1.000E+00	0.000E+00	9.092E-17	2.446E-15	8.948E-14	2.332E-12	7.637E-11	1.456E-09	1.597E-08
Th-229	Pu-241	1.000E+00	0.000E+00	3.611E-20	2.861E-18	3.274E-16	2.166E-14	1.498E-12	4.033E-11	5.071E-10
Th-229	Pu-241	2.450E-05	0.000E+00	2.202E-21	5.794E-20	1.964E-18	4.206E-17	8.282E-16	7.589E-15	3.815E-14
Th-229	δDOSE(j):		0.000E+00	9.095E-17	2.449E-15	8.981E-14	2.354E-12	7.787E-11	1.496E-09	1.647E-08
Pu-238	Pu-238	1.000E+00	1.417E-01	1.405E-01	1.380E-01	1.296E-01	1.084E-01	5.804E-02	9.652E-03	1.573E-05
U-234	Pu-238	1.000E+00	0.000E+00	3.677E-07	1.090E-06	3.490E-06	9.329E-06	2.095E-05	2.192E-05	3.182E-06
U-234	Pu-242	1.000E+00	0.000E+00	2.863E-17	2.565E-16	2.808E-15	2.420E-14	2.309E-13	1.342E-12	2.969E-12
U-234	U-234	1.000E+00	1.305E-01	1.301E-01	1.294E-01	1.269E-01	1.202E-01	9.904E-02	5.659E-02	6.939E-03
U-234	U-238	1.000E+00	0.000E+00	3.689E-07	1.101E-06	3.599E-06	1.022E-05	2.808E-05	4.815E-05	1.970E-05
U-234	δDOSE(j):		1.305E-01	1.301E-01	1.294E-01	1.269E-01	1.202E-01	9.909E-02	5.666E-02	6.962E-03
Th-230	Pu-238	1.000E+00	0.000E+00	3.619E-12	3.231E-11	3.490E-10	2.900E-09	2.457E-08	1.091E-07	1.645E-07
Th-230	Pu-242	1.000E+00	0.000E+00	1.876E-22	5.047E-21	1.847E-19	4.814E-18	1.577E-16	2.991E-15	2.984E-14
Th-230	U-234	1.000E+00	0.000E+00	2.560E-06	7.654E-06	2.522E-05	7.326E-05	2.181E-04	4.754E-04	5.099E-04
Th-230	U-238	1.000E+00	0.000E+00	3.627E-12	3.251E-11	3.562E-10	3.080E-09	2.977E-08	1.798E-07	4.739E-07
Th-230	δDOSE(j):		0.000E+00	2.560E-06	7.654E-06	2.522E-05	7.326E-05	2.181E-04	4.756E-04	5.105E-04
Ra-226	Pu-238	1.000E+00	0.000E+00	2.616E-14	7.016E-13	2.539E-11	6.422E-10	1.902E-08	2.828E-07	1.748E-06
Ra-226	Pu-242	1.000E+00	0.000E+00	3.881E-25	8.178E-23	1.002E-20	7.872E-19	8.725E-17	5.189E-15	2.067E-13
Ra-226	U-234	1.000E+00	0.000E+00	2.773E-08	2.488E-07	2.734E-06	2.385E-05	2.377E-04	1.571E-03	5.856E-03
Ra-226	U-238	1.000E+00	0.000E+00	2.619E-14	7.049E-13	2.579E-11	6.721E-10	2.200E-08	4.177E-07	4.350E-06
Ra-226	δDOSE(j):		0.000E+00	2.773E-08	2.488E-07	2.734E-06	2.385E-05	2.378E-04	1.572E-03	5.862E-03
Pb-210	Pu-238	1.000E+00	0.000E+00	2.605E-17	2.070E-15	2.394E-13	1.619E-11	1.128E-09	2.496E-08	1.371E-07
Pb-210	Pu-242	1.000E+00	0.000E+00	0.000E+00	1.742E-25	7.612E-23	1.618E-20	4.367E-18	4.093E-16	1.542E-14
Pb-210	U-234	1.000E+00	0.000E+00	3.674E-11	9.733E-10	3.375E-08	7.620E-07	1.644E-05	1.469E-04	4.629E-04
Pb-210	U-238	1.000E+00	0.000E+00	2.516E-17	2.080E-15	2.424E-13	1.681E-11	1.280E-09	3.590E-08	3.362E-07
Pb-210	δDOSE(j):		0.000E+00	3.674E-11	9.733E-10	3.375E-08	7.620E-07	1.645E-05	1.470E-04	4.634E-04
Pu-239	Pu-239	1.000E+00	1.514E-01	1.513E-01	1.509E-01	1.498E-01	1.467E-01	1.363E-01	1.094E-01	4.408E-02
U-235	Pu-239	1.000E+00	0.000E+00	1.123E-09	3.358E-09	1.108E-08	3.227E-08	9.704E-08	2.177E-07	2.635E-07
U-235	U-235	1.000E+00	1.142E+00	1.139E+00	1.134E+00	1.115E+00	1.065E+00	9.040E-01	5.650E-01	1.017E-01
U-235	δDOSE(j):		1.142E+00	1.139E+00	1.134E+00	1.115E+00	1.065E+00	9.040E-01	5.650E-01	1.017E-01

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pa-231	Pu-239	1.000E+00	0.000E+00	3.614E-14	3.239E-13	3.545E-12	3.056E-11	2.920E-10	1.703E-09	3.854E-09
Pa-231	U-235	1.000E+00	0.000E+00	7.336E-05	2.189E-04	7.158E-04	2.033E-03	5.597E-03	9.644E-03	4.060E-03
Pa-231	ÕDOSE(j):		0.000E+00	7.336E-05	2.189E-04	7.158E-04	2.033E-03	5.597E-03	9.644E-03	4.060E-03
Ac-227	Pu-239	1.000E+00	0.000E+00	1.025E-15	2.708E-14	9.308E-13	2.054E-11	4.195E-10	3.501E-09	9.930E-09
Ac-227	U-235	1.000E+00	0.000E+00	3.112E-06	2.723E-05	2.744E-04	1.902E-03	9.987E-03	2.197E-02	1.097E-02
Ac-227	ÕDOSE(j):		0.000E+00	3.112E-06	2.723E-05	2.744E-04	1.902E-03	9.987E-03	2.197E-02	1.097E-02
Pu-240	Pu-240	1.000E+00	1.512E-01	1.511E-01	1.507E-01	1.495E-01	1.462E-01	1.350E-01	1.067E-01	4.072E-02
U-236	Pu-240	1.000E+00	0.000E+00	3.651E-09	1.091E-08	3.588E-08	1.036E-07	3.015E-07	6.134E-07	4.879E-07
Th-232	Pu-240	1.000E+00	0.000E+00	1.034E-18	9.281E-18	1.021E-16	8.923E-16	8.954E-15	6.009E-14	2.214E-13
Ra-228	Pu-240	1.000E+00	0.000E+00	2.245E-19	5.704E-18	1.736E-16	2.982E-15	4.366E-14	3.535E-13	1.860E-12
Th-228	Pu-240	1.000E+00	0.000E+00	3.063E-20	2.067E-18	1.463E-16	3.848E-15	6.612E-14	5.547E-13	2.885E-12
Pu-241	Pu-241	1.000E+00	2.441E-03	2.324E-03	2.106E-03	1.493E-03	5.587E-04	1.789E-05	9.531E-10	9.163E-25
Pu-241	Pu-241	2.450E-05	5.980E-08	5.693E-08	5.160E-08	3.658E-08	1.369E-08	4.383E-10	2.335E-14	0.000E+00
Pu-241	ÕDOSE(j):		2.441E-03	2.324E-03	2.106E-03	1.493E-03	5.587E-04	1.789E-05	9.532E-10	9.163E-25
Pu-242	Pu-242	1.000E+00	1.438E-01	1.437E-01	1.434E-01	1.424E-01	1.395E-01	1.298E-01	1.047E-01	4.298E-02
U-238	Pu-242	1.000E+00	0.000E+00	4.575E-11	1.368E-10	4.508E-10	1.309E-09	3.892E-09	8.443E-09	8.923E-09
U-238	U-238	1.000E+00	2.954E-01	2.946E-01	2.932E-01	2.881E-01	2.740E-01	2.298E-01	1.385E-01	2.150E-02
U-238	ÕDOSE(j):		2.954E-01	2.946E-01	2.932E-01	2.881E-01	2.740E-01	2.298E-01	1.385E-01	2.150E-02

BRF(i) is the branch fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	1.000E+02	9.969E+01	9.908E+01	9.697E+01	9.117E+01	7.349E+01	3.968E+01	4.592E+00
Am-241	Pu-241	1.000E+00	0.000E+00	1.563E-01	4.455E-01	1.249E+00	2.391E+00	2.559E+00	1.397E+00	1.616E-01
Am-241	δS(j):		1.000E+02	9.985E+01	9.953E+01	9.822E+01	9.356E+01	7.604E+01	4.108E+01	4.754E+00
Np-237	Am-241	1.000E+00	0.000E+00	3.233E-05	9.664E-05	3.181E-04	9.204E-04	2.708E-03	5.771E-03	6.785E-03
Np-237	Pu-241	1.000E+00	0.000E+00	2.553E-08	2.220E-07	2.195E-06	1.459E-05	7.306E-05	1.830E-04	2.252E-04
Np-237	Pu-241	2.450E-05	0.000E+00	7.743E-10	2.213E-09	6.265E-09	1.239E-08	1.548E-08	1.398E-08	9.497E-09
Np-237	δS(j):		0.000E+00	3.236E-05	9.687E-05	3.203E-04	9.350E-04	2.781E-03	5.954E-03	7.010E-03
U-233	Am-241	1.000E+00	0.000E+00	7.068E-11	6.337E-10	6.945E-09	6.011E-08	5.830E-07	3.585E-06	1.151E-05
U-233	Pu-241	1.000E+00	0.000E+00	3.735E-14	9.816E-13	3.317E-11	7.026E-10	1.326E-08	1.067E-07	3.767E-07
U-233	Pu-241	2.450E-05	0.000E+00	1.706E-15	1.484E-14	1.471E-13	9.835E-13	5.050E-12	1.358E-11	1.984E-11
U-233	δS(j):		0.000E+00	7.072E-11	6.347E-10	6.978E-09	6.081E-08	5.962E-07	3.692E-06	1.189E-05
Th-229	Am-241	1.000E+00	0.000E+00	2.226E-15	5.992E-14	2.196E-12	5.756E-11	1.923E-09	3.896E-08	5.775E-07
Th-229	Pu-241	1.000E+00	0.000E+00	8.842E-19	7.008E-17	8.036E-15	5.347E-13	3.772E-11	1.079E-09	1.834E-08
Th-229	Pu-241	2.450E-05	0.000E+00	5.392E-20	1.419E-18	4.822E-17	1.038E-15	2.085E-14	2.031E-13	1.380E-12
Th-229	δS(j):		0.000E+00	2.227E-15	6.000E-14	2.204E-12	5.810E-11	1.961E-09	4.004E-08	5.959E-07
Pu-238	Pu-238	1.000E+00	1.000E+02	9.916E+01	9.751E+01	9.193E+01	7.769E+01	4.310E+01	8.009E+00	2.214E-02
U-234	Pu-238	1.000E+00	0.000E+00	2.820E-04	8.370E-04	2.688E-03	7.258E-03	1.690E-02	1.974E-02	4.852E-03
U-234	Pu-242	1.000E+00	0.000E+00	2.195E-14	1.969E-13	2.163E-12	1.883E-11	1.863E-10	1.209E-09	4.527E-09
U-234	U-234	1.000E+00	1.000E+02	9.978E+01	9.933E+01	9.778E+01	9.348E+01	7.988E+01	5.098E+01	1.058E+01
U-234	U-238	1.000E+00	0.000E+00	2.829E-04	8.448E-04	2.772E-03	7.951E-03	2.265E-02	4.337E-02	3.004E-02
U-234	δS(j):		1.000E+02	9.978E+01	9.933E+01	9.778E+01	9.350E+01	7.992E+01	5.104E+01	1.062E+01
Th-230	Pu-238	1.000E+00	0.000E+00	1.271E-09	1.136E-08	1.232E-07	1.034E-06	9.079E-06	4.501E-05	1.148E-04
Th-230	Pu-242	1.000E+00	0.000E+00	6.590E-20	1.775E-18	6.516E-17	1.716E-15	5.826E-14	1.234E-12	2.082E-11
Th-230	U-234	1.000E+00	0.000E+00	8.992E-04	2.691E-03	8.901E-03	2.611E-02	8.058E-02	1.961E-01	3.558E-01
Th-230	U-238	1.000E+00	0.000E+00	1.274E-09	1.143E-08	1.257E-07	1.098E-06	1.100E-05	7.417E-05	3.307E-04
Th-230	δS(j):		0.000E+00	8.992E-04	2.691E-03	8.901E-03	2.611E-02	8.060E-02	1.962E-01	3.562E-01
Ra-226	Pu-238	1.000E+00	0.000E+00	1.837E-13	4.928E-12	1.785E-10	4.527E-09	1.354E-07	2.080E-06	1.594E-05
Ra-226	Pu-242	1.000E+00	0.000E+00	2.725E-24	5.744E-22	7.046E-20	5.549E-18	6.211E-16	3.817E-14	1.885E-12
Ra-226	U-234	1.000E+00	0.000E+00	1.947E-07	1.747E-06	1.922E-05	1.681E-04	1.692E-03	1.156E-02	5.342E-02
Ra-226	U-238	1.000E+00	0.000E+00	1.839E-13	4.951E-12	1.813E-10	4.737E-09	1.566E-07	3.072E-06	3.968E-05
Ra-226	δS(j):		0.000E+00	1.947E-07	1.747E-06	1.922E-05	1.681E-04	1.692E-03	1.156E-02	5.348E-02
Pb-210	Pu-238	1.000E+00	0.000E+00	1.419E-15	1.129E-13	1.310E-11	8.949E-10	6.462E-08	1.597E-06	1.486E-05
Pb-210	Pu-242	1.000E+00	0.000E+00	0.000E+00	9.502E-24	4.166E-21	8.944E-19	2.502E-16	2.619E-14	1.671E-12
Pb-210	U-234	1.000E+00	0.000E+00	2.002E-09	5.308E-08	1.847E-06	4.212E-05	9.423E-04	9.401E-03	5.015E-02
Pb-210	U-238	1.000E+00	0.000E+00	1.371E-15	1.134E-13	1.327E-11	9.291E-10	7.332E-08	2.298E-06	3.642E-05
Pb-210	δS(j):		0.000E+00	2.002E-09	5.308E-08	1.847E-06	4.212E-05	9.424E-04	9.405E-03	5.020E-02
Pu-239	Pu-239	1.000E+00	1.000E+02	9.995E+01	9.984E+01	9.946E+01	9.838E+01	9.470E+01	8.493E+01	5.803E+01
U-235	Pu-239	1.000E+00	0.000E+00	9.835E-08	2.942E-07	9.712E-07	2.834E-06	8.578E-06	1.966E-05	2.749E-05
U-235	U-235	1.000E+00	1.000E+02	9.978E+01	9.933E+01	9.778E+01	9.349E+01	7.991E+01	5.102E+01	1.061E+01
U-235	δS(j):		1.000E+02	9.978E+01	9.933E+01	9.778E+01	9.349E+01	7.991E+01	5.102E+01	1.061E+01

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pa-231	Pu-239	1.000E+00	0.000E+00	1.040E-12	9.330E-12	1.025E-10	8.916E-10	8.811E-09	5.700E-08	2.109E-07
Pa-231	U-235	1.000E+00	0.000E+00	2.111E-03	6.305E-03	2.069E-02	5.933E-02	1.689E-01	3.228E-01	2.222E-01
Pa-231	ÕS(j):		0.000E+00	2.111E-03	6.305E-03	2.069E-02	5.933E-02	1.689E-01	3.228E-01	2.222E-01
Ac-227	Pu-239	1.000E+00	0.000E+00	1.094E-14	2.892E-13	9.966E-12	2.215E-10	4.650E-09	4.214E-08	1.768E-07
Ac-227	U-235	1.000E+00	0.000E+00	3.321E-05	2.908E-04	2.939E-03	2.052E-02	1.107E-01	2.645E-01	1.954E-01
Ac-227	ÕS(j):		0.000E+00	3.321E-05	2.908E-04	2.939E-03	2.052E-02	1.107E-01	2.645E-01	1.954E-01
Pu-240	Pu-240	1.000E+00	1.000E+02	9.994E+01	9.981E+01	9.938E+01	9.815E+01	9.397E+01	8.299E+01	5.371E+01
U-236	Pu-240	1.000E+00	0.000E+00	2.956E-06	8.843E-06	2.918E-05	8.508E-05	2.568E-04	5.836E-04	7.868E-04
Th-232	Pu-240	1.000E+00	0.000E+00	7.295E-17	6.553E-16	7.233E-15	6.387E-14	6.644E-13	4.983E-12	3.116E-11
Ra-228	Pu-240	1.000E+00	0.000E+00	2.845E-18	7.231E-17	2.203E-15	3.794E-14	5.607E-13	4.689E-12	3.044E-11
Th-228	Pu-240	1.000E+00	0.000E+00	2.415E-19	1.630E-17	1.155E-15	3.048E-14	5.295E-13	4.612E-12	3.033E-11
Pu-241	Pu-241	1.000E+00	1.000E+02	9.525E+01	8.642E+01	6.148E+01	2.323E+01	7.711E-01	4.585E-05	7.435E-20
Pu-241	Pu-241	2.450E-05	2.450E-03	2.334E-03	2.117E-03	1.506E-03	5.693E-04	1.889E-05	1.123E-09	1.822E-24
Pu-241	ÕS(j):		1.000E+02	9.525E+01	8.642E+01	6.148E+01	2.323E+01	7.711E-01	4.585E-05	7.435E-20
Pu-242	Pu-242	1.000E+00	1.000E+02	9.995E+01	9.984E+01	9.948E+01	9.846E+01	9.496E+01	8.562E+01	5.961E+01
U-238	Pu-242	1.000E+00	0.000E+00	1.549E-08	4.635E-08	1.530E-07	4.466E-07	1.353E-06	3.111E-06	4.404E-06
U-238	U-238	1.000E+00	1.000E+02	9.978E+01	9.933E+01	9.778E+01	9.349E+01	7.991E+01	5.102E+01	1.061E+01
U-238	ÕS(j):		1.000E+02	9.978E+01	9.933E+01	9.778E+01	9.349E+01	7.991E+01	5.102E+01	1.061E+01

BRF(i) is the branch fraction of the parent nuclide.

ATTACHMENT VI
RESRAD SUMMARY OUTPUT FOR THE OFFICE WORKER TIER I (15 MREM) ACTION LEVELS

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Dose Conversion Factor (and Related) Parameter Summary
File: CLASSY.BIN

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.720E+00	6.720E+00	DCF2(1)
B-1	Am-241	4.440E-01	4.440E-01	DCF2(2)
B-1	Np-237+D	5.400E-01	5.400E-01	DCF2(3)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(4)
B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2(5)
B-1	Pu-238	2.880E-01	3.920E-01	DCF2(6)
B-1	Pu-239	3.080E-01	4.290E-01	DCF2(7)
B-1	Pu-240	3.080E-01	4.290E-01	DCF2(8)
B-1	Pu-241+D	4.960E-03	8.250E-03	DCF2(9)
B-1	Pu-242	2.930E-01	4.110E-01	DCF2(11)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2(12)
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(13)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(14)
B-1	Th-229+D	2.160E+00	2.160E+00	DCF2(15)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(16)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(17)
B-1	U-233	1.350E-01	1.350E-01	DCF2(18)
B-1	U-234	1.320E-01	1.320E-01	DCF2(19)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(20)
B-1	U-236	1.250E-01	1.250E-01	DCF2(21)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(22)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3(1)
D-1	Am-241	3.640E-03	3.640E-03	DCF3(2)
D-1	Np-237+D	4.440E-03	4.440E-03	DCF3(3)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(4)
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3(5)
D-1	Pu-238	4.960E-05	3.200E-03	DCF3(6)
D-1	Pu-239	5.180E-05	3.540E-03	DCF3(7)
D-1	Pu-240	5.180E-05	3.540E-03	DCF3(8)
D-1	Pu-241+D	7.660E-07	6.850E-05	DCF3(9)
D-1	Pu-242	4.920E-05	3.360E-03	DCF3(11)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3(12)
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(13)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(14)
D-1	Th-229+D	4.030E-03	4.030E-03	DCF3(15)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(16)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(17)
D-1	U-233	2.890E-04	2.890E-04	DCF3(18)
D-1	U-234	2.830E-04	2.830E-04	DCF3(19)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3(20)
D-1	U-236	2.690E-04	2.690E-04	DCF3(21)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3(22)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: CLASSY.BIN

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Am-241 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(2,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF(2,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(2,3)
D-34				
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF(3,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(3,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(4,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(4,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(5,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(5,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(5,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(6,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(7,3)
D-34				
D-34	Pu-240 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(8,1)
D-34	Pu-240 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(8,2)
D-34	Pu-240 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(8,3)
D-34				
D-34	Pu-241+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Pu-241+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Pu-241+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(9,3)
D-34				
D-34	Pu-242 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(11,1)
D-34	Pu-242 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(11,2)
D-34	Pu-242 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(11,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(12,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(12,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(12,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(13,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(13,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(13,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(14,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(14,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(14,3)
D-34				

Dose Conversion Factor (and Related) Parameter Summary (continued)
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Menu	Parameter	Current Value	Default	Parameter Name
D-34	Th-229+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(15,1)
D-34	Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(15,2)
D-34	Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(15,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(16,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(16,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(16,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(17,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(17,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(17,3)
D-34				
D-34	U-233 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(18,1)
D-34	U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(18,2)
D-34	U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(18,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(19,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(19,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(19,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(20,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(20,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(20,3)
D-34				
D-34	U-236 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(21,1)
D-34	U-236 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(21,2)
D-34	U-236 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(21,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(22,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(22,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(22,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Am-241 , fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Am-241 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5				
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(3,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(3,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(4,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(4,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(5,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(5,2)
D-5				
D-5	Pu-238 , fish	3.000E+01	3.000E+01	BIOFAC(6,1)
D-5	Pu-238 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(6,2)

Dose Conversion Factor (and Related) Parameter Summary (continued)
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Menu	Parameter	Current Value	Default	Parameter Name
D-5	Pu-239 , fish	3.000E+01	3.000E+01	BIOFAC(7,1)
D-5	Pu-239 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(7,2)
D-5				
D-5	Pu-240 , fish	3.000E+01	3.000E+01	BIOFAC(8,1)
D-5	Pu-240 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(8,2)
D-5				
D-5	Pu-241+D , fish	3.000E+01	3.000E+01	BIOFAC(9,1)
D-5	Pu-241+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(9,2)
D-5				
D-5	Pu-242 , fish	3.000E+01	3.000E+01	BIOFAC(11,1)
D-5	Pu-242 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(11,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(12,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(12,2)
D-5				
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(13,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(13,2)
D-5				
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(14,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(14,2)
D-5				
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(15,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(15,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(16,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(16,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(17,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(17,2)
D-5				
D-5	U-233 , fish	1.000E+01	1.000E+01	BIOFAC(18,1)
D-5	U-233 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(18,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(19,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(19,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(20,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(20,2)
D-5				
D-5	U-236 , fish	1.000E+01	1.000E+01	BIOFAC(21,1)
D-5	U-236 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(21,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(22,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(22,2)

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	4.000E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Am-241	1.000E+02	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Pu-238	1.000E+02	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): Pu-239	1.000E+02	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): Pu-240	1.000E+02	0.000E+00	---	S1(8)
R012	Initial principal radionuclide (pCi/g): Pu-241	1.000E+02	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g): Pu-242	1.000E+02	0.000E+00	---	S1(11)
R012	Initial principal radionuclide (pCi/g): U-234	1.000E+02	0.000E+00	---	S1(19)
R012	Initial principal radionuclide (pCi/g): U-235	1.000E+02	0.000E+00	---	S1(20)
R012	Initial principal radionuclide (pCi/g): U-238	1.000E+02	0.000E+00	---	S1(22)
R012	Concentration in groundwater (pCi/L): Am-241	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): Pu-240	not used	0.000E+00	---	W1(8)
R012	Concentration in groundwater (pCi/L): Pu-241	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L): Pu-242	not used	0.000E+00	---	W1(11)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(19)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(20)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(22)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.800E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	7.490E-05	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	1.000E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.450E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	1.040E+01	5.300E+00	---	BCZ
R013	Humidity in air (g/cm**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.200E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	3.810E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	0.000E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	4.000E-03	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R013	Accuracy for water/soil computations	not used	1.000E-03	Zero shows Simpson's rule.	EPS
R014	Density of saturated zone (g/cm**3)	1.800E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	1.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	4.450E+01	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	1.500E-01	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Am-241				
R016	Contaminated zone (cm**3/g)	7.600E+01	2.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.477E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pu-238				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+03	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+03	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.155E-04	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for Pu-239				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+03	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+03	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.155E-04	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for Pu-240				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+03	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+03	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.155E-04	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Pu-241				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+03	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+03	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.155E-04	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for Pu-242				
R016	Contaminated zone (cm**3/g)	2.180E+02	2.000E+03	---	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+03	---	DCNUCU(11,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+03	---	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.155E-04	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(19)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(19,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(19)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.243E-03	ALEACH(19)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(19)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(20)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(20,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(20)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.243E-03	ALEACH(20)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(20)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(22)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(22,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(22)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.243E-03	ALEACH(22)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(22)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.588E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Np-237				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.036E+02	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	-1.000E+00	-1.000E+00	2.036E+02	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.036E+02	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.520E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.243E-03	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+02	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+02	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.123E-03	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU(12,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.603E-03	ALEACH(12)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(12)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(13)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU(13,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.603E-03	ALEACH(13)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(13)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(14)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(14,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(14)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.874E-06	ALEACH(14)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(14)
R016	Distribution coefficients for daughter Th-229				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(15)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(15,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(15)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.874E-06	ALEACH(15)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(15)
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(16)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(16,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(16)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.874E-06	ALEACH(16)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(16)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(17)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(17,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(17)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.874E-06	ALEACH(17)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(17)
R016	Distribution coefficients for daughter U-233				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(18)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(18,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(18)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.243E-03	ALEACH(18)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(18)
R016	Distribution coefficients for daughter U-236				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(21)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(21,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(21)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.243E-03	ALEACH(21)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(21)
R017	Inhalation rate (m**3/yr)	1.660E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.600E-05	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Exposure duration	2.500E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	1.000E+00	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	1.700E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	1.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	0.000E+00	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	1 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.250E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	not used	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	not used	1.000E+00	---	STOR_T(2)
STOR	Milk	not used	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	not used	2.000E+01	---	STOR_T(4)
STOR	Fish	not used	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	not used	7.000E+00	---	STOR_T(6)
STOR	Well water	not used	1.000E+00	---	STOR_T(7)
STOR	Surface water	not used	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	not used	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average annual wind speed (m/sec)	not used	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed

Summary : Office worker surface soil exposure at the 15 millirem level
File : \RES561\PUBLIC\OFFICE15.DAT

Contaminated Zone Dimensions	
Area:	40000.00 square meters
Thickness:	0.15 meters
Cover Depth:	0.00 meters

Initial Soil Concentrations, pCi/g	
Am-241	1.000E+02
Pu-238	1.000E+02
Pu-239	1.000E+02
Pu-240	1.000E+02
Pu-241	1.000E+02
Pu-242	1.000E+02
U-234	1.000E+02
U-235	1.000E+02
U-238	1.000E+02

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 15 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	2.967E+01	2.960E+01	2.946E+01	2.896E+01	2.753E+01	2.304E+01	1.424E+01	3.036E+00
M(t):	1.978E+00	1.973E+00	1.964E+00	1.931E+00	1.836E+00	1.536E+00	9.492E-01	2.024E-01

Maximum TDOSE(t): 2.967E+01 mrem/yr at t = 0.000E+00 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	7.306E-01	0.0246	1.888E+00	0.0636	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.550E+00	0.1533
Pu-238	2.549E-03	0.0001	1.225E+00	0.0413	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.200E-02	0.0021
Pu-239	4.845E-03	0.0002	1.310E+00	0.0441	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.475E-02	0.0022
Pu-240	2.482E-03	0.0001	1.310E+00	0.0441	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.475E-02	0.0022
Pu-241	3.122E-04	0.0000	2.109E-02	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.575E-04	0.0000
Pu-242	2.159E-03	0.0001	1.246E+00	0.0420	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.150E-02	0.0021
U-234	6.693E-03	0.0002	5.613E-01	0.0189	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.537E-01	0.0119
U-235	1.238E+01	0.4173	5.230E-01	0.0176	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.337E-01	0.0112
U-238	2.128E+00	0.0717	5.018E-01	0.0169	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.363E-01	0.0113
Total	1.526E+01	0.5143	8.585E+00	0.2893	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.828E+00	0.1964

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.169E+00	0.2416
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.289E+00	0.0434
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.379E+00	0.0465
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.377E+00	0.0464
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.236E-02	0.0008
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.310E+00	0.0441
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.217E-01	0.0311
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.324E+01	0.4462
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.966E+00	0.0999
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.967E+01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	7.284E-01	0.0246	1.881E+00	0.0636	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.534E+00	0.1532
Pu-238	2.528E-03	0.0001	1.214E+00	0.0410	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.145E-02	0.0021
Pu-239	4.843E-03	0.0002	1.308E+00	0.0442	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.468E-02	0.0022
Pu-240	2.480E-03	0.0001	1.308E+00	0.0442	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.468E-02	0.0022
Pu-241	1.439E-03	0.0000	2.303E-02	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.019E-03	0.0003
Pu-242	2.158E-03	0.0001	1.245E+00	0.0420	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.144E-02	0.0021
U-234	6.679E-03	0.0002	5.598E-01	0.0189	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.528E-01	0.0119
U-235	1.235E+01	0.4174	5.217E-01	0.0176	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.331E-01	0.0113
U-238	2.123E+00	0.0717	5.004E-01	0.0169	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.353E-01	0.0113
Total	1.523E+01	0.5144	8.561E+00	0.2892	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.815E+00	0.1964

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.143E+00	0.2413
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.278E+00	0.0432
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.378E+00	0.0465
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.375E+00	0.0465
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.249E-02	0.0011
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.308E+00	0.0442
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.192E-01	0.0311
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.321E+01	0.4462
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.958E+00	0.0999
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.960E+01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	7.239E-01	0.0246	1.868E+00	0.0634	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.501E+00	0.1528
Pu-238	2.486E-03	0.0001	1.192E+00	0.0405	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.037E-02	0.0020
Pu-239	4.837E-03	0.0002	1.306E+00	0.0443	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.455E-02	0.0022
Pu-240	2.477E-03	0.0001	1.305E+00	0.0443	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.453E-02	0.0022
Pu-241	3.525E-03	0.0001	2.660E-02	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.107E-02	0.0007
Pu-242	2.156E-03	0.0001	1.242E+00	0.0422	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.131E-02	0.0021
U-234	6.652E-03	0.0002	5.567E-01	0.0189	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.509E-01	0.0119
U-235	1.230E+01	0.4175	5.192E-01	0.0176	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.319E-01	0.0113
U-238	2.113E+00	0.0717	4.977E-01	0.0169	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.335E-01	0.0113
Total	1.516E+01	0.5145	8.513E+00	0.2890	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.789E+00	0.1965

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.093E+00	0.2408
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.255E+00	0.0426
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.375E+00	0.0467
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.372E+00	0.0466
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.119E-02	0.0017
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.306E+00	0.0443
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.142E-01	0.0310
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.315E+01	0.4464
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.944E+00	0.0999
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.946E+01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	7.086E-01	0.0245	1.822E+00	0.0629	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.390E+00	0.1516
Pu-238	2.344E-03	0.0001	1.120E+00	0.0387	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.672E-02	0.0020
Pu-239	4.818E-03	0.0002	1.296E+00	0.0448	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.408E-02	0.0022
Pu-240	2.466E-03	0.0001	1.295E+00	0.0447	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.403E-02	0.0022
Pu-241	9.318E-03	0.0003	3.636E-02	0.0013	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.713E-02	0.0020
Pu-242	2.148E-03	0.0001	1.233E+00	0.0426	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.088E-02	0.0021
U-234	6.579E-03	0.0002	5.462E-01	0.0189	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.442E-01	0.0119
U-235	1.211E+01	0.4180	5.108E-01	0.0176	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.280E-01	0.0113
U-238	2.078E+00	0.0718	4.882E-01	0.0169	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.272E-01	0.0113
Total	1.492E+01	0.5152	8.348E+00	0.2883	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.692E+00	0.1966

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.920E+00	0.2390
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.179E+00	0.0407
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.365E+00	0.0471
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.362E+00	0.0470
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.028E-01	0.0036
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.296E+00	0.0448
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.970E-01	0.0310
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.294E+01	0.4470
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.894E+00	0.0999
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.896E+01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	6.664E-01	0.0242	1.696E+00	0.0616	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.086E+00	0.1484
Pu-238	1.981E-03	0.0001	9.372E-01	0.0340	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.747E-02	0.0017
Pu-239	4.762E-03	0.0002	1.269E+00	0.0461	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.275E-02	0.0023
Pu-240	2.436E-03	0.0001	1.266E+00	0.0460	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.260E-02	0.0023
Pu-241	1.755E-02	0.0006	4.929E-02	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.074E-01	0.0039
Pu-242	2.126E-03	0.0001	1.208E+00	0.0439	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.965E-02	0.0022
U-234	6.545E-03	0.0002	5.172E-01	0.0188	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.259E-01	0.0118
U-235	1.157E+01	0.4203	4.906E-01	0.0178	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.188E-01	0.0116
U-238	1.983E+00	0.0720	4.621E-01	0.0168	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.097E-01	0.0112
Total	1.426E+01	0.5178	7.896E+00	0.2868	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.381E+00	0.1954

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.448E+00	0.2342
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.866E-01	0.0358
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.337E+00	0.0485
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.331E+00	0.0484
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.742E-01	0.0063
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.270E+00	0.0461
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.497E-01	0.0309
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.238E+01	0.4497
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.755E+00	0.1001
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.753E+01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	5.377E-01	0.0233	1.318E+00	0.0572	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.177E+00	0.1379
Pu-238	1.100E-03	0.0000	5.016E-01	0.0218	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.545E-02	0.0011
Pu-239	4.572E-03	0.0002	1.178E+00	0.0512	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.826E-02	0.0025
Pu-240	2.332E-03	0.0001	1.169E+00	0.0508	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.781E-02	0.0025
Pu-241	1.872E-02	0.0008	4.606E-02	0.0020	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.106E-01	0.0048
Pu-242	2.050E-03	0.0001	1.124E+00	0.0488	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.548E-02	0.0024
U-234	8.183E-03	0.0004	4.271E-01	0.0185	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.691E-01	0.0117
U-235	9.894E+00	0.4295	4.358E-01	0.0189	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.941E-01	0.0128
U-238	1.683E+00	0.0731	3.810E-01	0.0165	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.553E-01	0.0111
Total	1.215E+01	0.5275	6.581E+00	0.2857	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.303E+00	0.1868

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.033E+00	0.2185
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.281E-01	0.0229
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.241E+00	0.0539
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.229E+00	0.0534
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.754E-01	0.0076
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.182E+00	0.0513
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.043E-01	0.0306
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.062E+01	0.4612
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.320E+00	0.1007
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.304E+01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	2.914E-01	0.0205	6.371E-01	0.0447	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.535E+00	0.1078
Pu-238	2.086E-04	0.0000	8.348E-02	0.0059	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.281E-03	0.0003
Pu-239	4.059E-03	0.0003	9.457E-01	0.0664	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.676E-02	0.0033
Pu-240	2.059E-03	0.0001	9.241E-01	0.0649	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.569E-02	0.0032
Pu-241	1.025E-02	0.0007	2.242E-02	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.403E-02	0.0038
Pu-242	1.848E-03	0.0001	9.070E-01	0.0637	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.477E-02	0.0031
U-234	2.213E-02	0.0016	2.456E-01	0.0172	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.553E-01	0.0109
U-235	6.312E+00	0.4434	3.061E-01	0.0215	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.227E-01	0.0156
U-238	1.049E+00	0.0737	2.179E-01	0.0153	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.460E-01	0.0103
Total	7.693E+00	0.5403	4.289E+00	0.3013	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.255E+00	0.1584

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.464E+00	0.1731
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.797E-02	0.0062
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.966E-01	0.0700
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.718E-01	0.0683
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.671E-02	0.0061
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.536E-01	0.0670
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.231E-01	0.0297
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.841E+00	0.4805
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.413E+00	0.0992
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.424E+01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	3.441E-02	0.0113	4.349E-02	0.0143	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.048E-01	0.0345
Pu-238	2.180E-05	0.0000	1.502E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.667E-05	0.0000
Pu-239	2.515E-03	0.0008	3.805E-01	0.1253	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.881E-02	0.0062
Pu-240	1.317E-03	0.0004	3.522E-01	0.1160	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.741E-02	0.0057
Pu-241	1.209E-03	0.0004	1.530E-03	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.688E-03	0.0012
Pu-242	1.268E-03	0.0004	3.718E-01	0.1225	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.836E-02	0.0060
U-234	7.081E-02	0.0233	3.224E-02	0.0106	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.269E-02	0.0075
U-235	1.216E+00	0.4005	6.179E-02	0.0204	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.057E-02	0.0167
U-238	1.836E-01	0.0605	2.674E-02	0.0088	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.792E-02	0.0059
Total	1.511E+00	0.4978	1.270E+00	0.4185	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.543E-01	0.0838

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.827E-01	0.0602
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.887E-04	0.0001
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.018E-01	0.1324
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.709E-01	0.1222
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.427E-03	0.0021
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.915E-01	0.1289
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.257E-01	0.0414
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.328E+00	0.4376
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.282E-01	0.0752
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.036E+00	1.0000

*Sum of all water independent and dependent pathways.

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
áááááá	áááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá
Am-241	Am-241	1.000E+00	7.169E-02	7.143E-02	7.093E-02	6.920E-02	6.448E-02	5.032E-02	2.462E-02	1.814E-03
Am-241	Np-237	1.000E+00	0.000E+00	8.289E-08	2.477E-07	8.141E-07	2.347E-06	6.811E-06	1.390E-05	1.301E-05
Am-241	U-233	1.000E+00	0.000E+00	6.770E-15	6.063E-14	6.622E-13	5.675E-12	5.314E-11	2.932E-10	5.626E-10
Am-241	Th-229	1.000E+00	0.000E+00	8.866E-18	2.386E-16	8.730E-15	2.278E-13	7.489E-12	1.444E-10	1.656E-09
Am-241	ÕDSR(j)		7.169E-02	7.143E-02	7.093E-02	6.920E-02	6.448E-02	5.033E-02	2.464E-02	1.827E-03
Pu-238	Pu-238	1.000E+00	1.289E-02	1.278E-02	1.255E-02	1.179E-02	9.866E-03	5.280E-03	8.781E-04	1.432E-06
Pu-238	U-234	1.000E+00	0.000E+00	2.598E-08	7.704E-08	2.466E-07	6.591E-07	1.481E-06	1.549E-06	2.254E-07
Pu-238	Th-230	1.000E+00	0.000E+00	2.658E-13	2.373E-12	2.563E-11	2.130E-10	1.805E-09	8.016E-09	1.212E-08
Pu-238	Ra-226	1.000E+00	0.000E+00	3.132E-15	8.402E-14	3.041E-12	7.692E-11	2.279E-09	3.391E-08	2.104E-07
Pu-238	Pb-210	1.000E+00	0.000E+00	1.317E-18	1.047E-16	1.211E-14	8.189E-13	5.706E-11	1.264E-09	6.975E-09
Pu-238	ÕDSR(j)		1.289E-02	1.278E-02	1.255E-02	1.179E-02	9.866E-03	5.281E-03	8.797E-04	1.887E-06
Pu-239	Pu-239	1.000E+00	1.379E-02	1.378E-02	1.375E-02	1.365E-02	1.337E-02	1.241E-02	9.966E-03	4.018E-03
Pu-239	U-235	1.000E+00	0.000E+00	1.302E-10	3.895E-10	1.285E-09	3.744E-09	1.128E-08	2.540E-08	3.114E-08
Pu-239	Pa-231	1.000E+00	0.000E+00	2.262E-15	2.028E-14	2.220E-13	1.915E-12	1.833E-11	1.077E-10	2.520E-10
Pu-239	Ac-227	1.000E+00	0.000E+00	8.684E-17	2.294E-15	7.888E-14	1.742E-12	3.573E-11	3.017E-10	9.009E-10
Pu-239	ÕDSR(j)		1.379E-02	1.378E-02	1.375E-02	1.365E-02	1.337E-02	1.241E-02	9.966E-03	4.018E-03
Pu-240	Pu-240	1.000E+00	1.377E-02	1.375E-02	1.372E-02	1.362E-02	1.331E-02	1.229E-02	9.718E-03	3.709E-03
Pu-240	U-236	1.000E+00	0.000E+00	2.575E-10	7.694E-10	2.530E-09	7.303E-09	2.126E-08	4.327E-08	3.446E-08
Pu-240	Th-232	1.000E+00	0.000E+00	7.579E-20	6.802E-19	7.481E-18	6.540E-17	6.562E-16	4.404E-15	1.623E-14
Pu-240	Ra-228	1.000E+00	0.000E+00	2.652E-20	6.740E-19	2.051E-17	3.525E-16	5.164E-15	4.190E-14	2.219E-13
Pu-240	Th-228	1.000E+00	0.000E+00	3.674E-21	2.479E-19	1.755E-17	4.617E-16	7.936E-15	6.663E-14	3.475E-13
Pu-240	ÕDSR(j)		1.377E-02	1.375E-02	1.372E-02	1.362E-02	1.331E-02	1.229E-02	9.718E-03	3.709E-03
Pu-241	Pu-241	1.000E+00	2.236E-04	2.129E-04	1.930E-04	1.368E-04	5.119E-05	1.639E-06	8.737E-11	8.418E-26
Pu-241	Am-241	1.000E+00	0.000E+00	1.120E-04	3.190E-04	8.913E-04	1.691E-03	1.752E-03	8.666E-04	6.384E-05
Pu-241	Np-237	1.000E+00	0.000E+00	6.544E-11	5.689E-10	5.618E-09	3.719E-08	1.837E-07	4.409E-07	4.317E-07
Pu-241	U-233	1.000E+00	0.000E+00	3.577E-18	9.393E-17	3.163E-15	6.634E-14	1.209E-12	8.723E-12	1.841E-11
Pu-241	Th-229	1.000E+00	0.000E+00	3.521E-21	2.790E-19	3.194E-17	2.116E-15	1.469E-13	4.001E-12	5.261E-11
Pu-241	ÕDSR(j)		2.236E-04	3.249E-04	5.119E-04	1.028E-03	1.742E-03	1.754E-03	8.671E-04	6.427E-05
Pu-241	Pu-241	2.450E-05	5.478E-09	5.216E-09	4.727E-09	3.351E-09	1.254E-09	4.016E-11	2.141E-15	2.062E-30
Pu-241	Np-237	2.450E-05	0.000E+00	1.985E-12	5.672E-12	1.603E-11	3.160E-11	3.894E-11	3.368E-11	1.821E-11
Pu-241	U-233	2.450E-05	0.000E+00	1.634E-19	1.420E-18	1.402E-17	9.286E-17	4.603E-16	1.111E-15	9.693E-16
Pu-241	Th-229	2.450E-05	0.000E+00	2.148E-22	5.651E-21	1.917E-19	4.108E-18	8.122E-17	7.528E-16	3.957E-15
Pu-241	ÕDSR(j)		5.478E-09	5.218E-09	4.733E-09	3.367E-09	1.286E-09	7.911E-11	3.369E-11	1.822E-11
Pu-242	Pu-242	1.000E+00	1.310E-02	1.308E-02	1.306E-02	1.296E-02	1.270E-02	1.182E-02	9.536E-03	3.915E-03
Pu-242	U-238	1.000E+00	0.000E+00	4.593E-12	1.374E-11	4.528E-11	1.316E-10	3.927E-10	8.610E-10	9.466E-10
Pu-242	U-234	1.000E+00	0.000E+00	2.023E-18	1.812E-17	1.984E-16	1.709E-15	1.632E-14	9.485E-14	2.103E-13
Pu-242	Th-230	1.000E+00	0.000E+00	1.378E-23	3.706E-22	1.356E-20	3.535E-19	1.158E-17	2.198E-16	2.199E-15
Pu-242	Ra-226	1.000E+00	0.000E+00	4.647E-26	9.794E-24	1.200E-21	9.429E-20	1.045E-17	6.224E-16	2.487E-14
Pu-242	Pb-210	1.000E+00	0.000E+00	0.000E+00	8.813E-27	3.851E-24	8.184E-22	2.210E-19	2.072E-17	7.846E-16
Pu-242	ÕDSR(j)		1.310E-02	1.308E-02	1.306E-02	1.296E-02	1.270E-02	1.182E-02	9.536E-03	3.915E-03

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	9.217E-03	9.192E-03	9.142E-03	8.968E-03	8.489E-03	6.998E-03	4.000E-03	4.916E-04
U-234	Th-230	1.000E+00	0.000E+00	1.880E-07	5.620E-07	1.852E-06	5.380E-06	1.602E-05	3.493E-05	3.757E-05
U-234	Ra-226	1.000E+00	0.000E+00	3.321E-09	2.979E-08	3.274E-07	2.857E-06	2.848E-05	1.884E-04	7.047E-04
U-234	Pb-210	1.000E+00	0.000E+00	1.859E-12	4.923E-11	1.707E-09	3.854E-08	8.320E-07	7.438E-06	2.355E-05
U-234	ÖDSR(j)		9.217E-03	9.192E-03	9.142E-03	8.970E-03	8.497E-03	7.043E-03	4.231E-03	1.257E-03
U-235	U-235	1.000E+00	1.324E-01	1.321E-01	1.315E-01	1.294E-01	1.235E-01	1.050E-01	6.591E-02	1.202E-02
U-235	Pa-231	1.000E+00	0.000E+00	4.592E-06	1.370E-05	4.482E-05	1.274E-04	3.514E-04	6.097E-04	2.655E-04
U-235	Ac-227	1.000E+00	0.000E+00	2.636E-07	2.306E-06	2.326E-05	1.614E-04	8.506E-04	1.894E-03	9.954E-04
U-235	ÖDSR(j)		1.324E-01	1.321E-01	1.315E-01	1.294E-01	1.238E-01	1.062E-01	6.841E-02	1.328E-02
U-238	U-238	1.000E+00	2.966E-02	2.958E-02	2.944E-02	2.894E-02	2.755E-02	2.319E-02	1.412E-02	2.281E-03
U-238	U-234	1.000E+00	0.000E+00	2.606E-08	7.775E-08	2.542E-07	7.220E-07	1.984E-06	3.403E-06	1.396E-06
U-238	Th-230	1.000E+00	0.000E+00	2.663E-13	2.387E-12	2.616E-11	2.262E-10	2.186E-09	1.321E-08	3.492E-08
U-238	Ra-226	1.000E+00	0.000E+00	3.137E-15	8.441E-14	3.088E-12	8.050E-11	2.636E-09	5.009E-08	5.235E-07
U-238	Pb-210	1.000E+00	0.000E+00	1.273E-18	1.052E-16	1.226E-14	8.502E-13	6.474E-11	1.818E-09	1.710E-08
U-238	ÖDSR(j)		2.966E-02	2.958E-02	2.944E-02	2.894E-02	2.755E-02	2.320E-02	1.413E-02	2.282E-03

Branch Fraction is the cumulative factor for the j'th principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life μ 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 15 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	2.092E+02	2.100E+02	2.115E+02	2.168E+02	2.326E+02	2.981E+02	6.088E+02	8.210E+03
Pu-238	1.164E+03	1.174E+03	1.195E+03	1.272E+03	1.520E+03	2.840E+03	1.705E+04	7.950E+06
Pu-239	1.088E+03	1.089E+03	1.091E+03	1.099E+03	1.122E+03	1.209E+03	1.505E+03	3.733E+03
Pu-240	1.089E+03	1.091E+03	1.093E+03	1.102E+03	1.127E+03	1.220E+03	1.543E+03	4.044E+03
Pu-241	6.708E+04	4.617E+04	2.930E+04	1.459E+04	8.610E+03	8.551E+03	1.730E+04	2.334E+05
Pu-242	1.145E+03	1.147E+03	1.149E+03	1.157E+03	1.181E+03	1.270E+03	1.573E+03	3.832E+03
U-234	1.627E+03	1.632E+03	1.641E+03	1.672E+03	1.765E+03	2.130E+03	3.546E+03	1.193E+04
U-235	1.133E+02	1.136E+02	1.141E+02	1.159E+02	1.211E+02	1.412E+02	2.193E+02	1.129E+03
U-238	5.058E+02	5.070E+02	5.095E+02	5.183E+02	5.444E+02	6.467E+02	1.062E+03	6.572E+03

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 0.000E+00 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Am-241	1.000E+02	0.000E+00	7.169E-02	2.092E+02	7.169E-02	2.092E+02
Pu-238	1.000E+02	0.000E+00	1.289E-02	1.164E+03	1.289E-02	1.164E+03
Pu-239	1.000E+02	0.000E+00	1.379E-02	1.088E+03	1.379E-02	1.088E+03
Pu-240	1.000E+02	0.000E+00	1.377E-02	1.089E+03	1.377E-02	1.089E+03
Pu-241	1.000E+02	55.69 þ 0.06	1.923E-03	7.801E+03	2.236E-04	6.708E+04
Pu-242	1.000E+02	0.000E+00	1.310E-02	1.145E+03	1.310E-02	1.145E+03
U-234	1.000E+02	0.000E+00	9.217E-03	1.627E+03	9.217E-03	1.627E+03
U-235	1.000E+02	0.000E+00	1.324E-01	1.133E+02	1.324E-01	1.133E+02
U-238	1.000E+02	0.000E+00	2.966E-02	5.058E+02	2.966E-02	5.058E+02

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	7.169E+00	7.143E+00	7.093E+00	6.920E+00	6.448E+00	5.032E+00	2.462E+00	1.814E-01
Am-241	Pu-241	1.000E+00	0.000E+00	1.120E-02	3.190E-02	8.913E-02	1.691E-01	1.752E-01	8.666E-02	6.384E-03
Am-241	ΣDOSE(j):		7.169E+00	7.155E+00	7.125E+00	7.009E+00	6.617E+00	5.207E+00	2.549E+00	1.878E-01
Np-237	Am-241	1.000E+00	0.000E+00	8.289E-06	2.477E-05	8.141E-05	2.347E-04	6.811E-04	1.390E-03	1.301E-03
Np-237	Pu-241	1.000E+00	0.000E+00	6.544E-09	5.689E-08	5.618E-07	3.719E-06	1.837E-05	4.409E-05	4.317E-05
Np-237	Pu-241	2.450E-05	0.000E+00	1.985E-10	5.672E-10	1.603E-09	3.160E-09	3.894E-09	3.368E-09	1.821E-09
Np-237	ΣDOSE(j):		0.000E+00	8.296E-06	2.483E-05	8.198E-05	2.384E-04	6.994E-04	1.434E-03	1.344E-03
U-233	Am-241	1.000E+00	0.000E+00	6.770E-13	6.063E-12	6.622E-11	5.675E-10	5.314E-09	2.932E-08	5.626E-08
U-233	Pu-241	1.000E+00	0.000E+00	3.577E-16	9.393E-15	3.163E-13	6.634E-12	1.209E-10	8.723E-10	1.841E-09
U-233	Pu-241	2.450E-05	0.000E+00	1.634E-17	1.420E-16	1.402E-15	9.286E-15	4.603E-14	1.111E-13	9.693E-14
U-233	ΣDOSE(j):		0.000E+00	6.774E-13	6.073E-12	6.654E-11	5.742E-10	5.434E-09	3.019E-08	5.810E-08
Th-229	Am-241	1.000E+00	0.000E+00	8.866E-16	2.386E-14	8.730E-13	2.278E-11	7.489E-10	1.444E-08	1.656E-07
Th-229	Pu-241	1.000E+00	0.000E+00	3.521E-19	2.790E-17	3.194E-15	2.116E-13	1.469E-11	4.001E-10	5.261E-09
Th-229	Pu-241	2.450E-05	0.000E+00	2.148E-20	5.651E-19	1.917E-17	4.108E-16	8.122E-15	7.528E-14	3.957E-13
Th-229	ΣDOSE(j):		0.000E+00	8.870E-16	2.389E-14	8.763E-13	2.299E-11	7.636E-10	1.484E-08	1.709E-07
Pu-238	Pu-238	1.000E+00	1.289E+00	1.278E+00	1.255E+00	1.179E+00	9.866E-01	5.280E-01	8.781E-02	1.432E-04
U-234	Pu-238	1.000E+00	0.000E+00	2.598E-06	7.704E-06	2.466E-05	6.591E-05	1.481E-04	1.549E-04	2.254E-05
U-234	Pu-242	1.000E+00	0.000E+00	2.023E-16	1.812E-15	1.984E-14	1.709E-13	1.632E-12	9.485E-12	2.103E-11
U-234	U-234	1.000E+00	9.217E-01	9.192E-01	9.142E-01	8.968E-01	8.489E-01	6.998E-01	4.000E-01	4.916E-02
U-234	U-238	1.000E+00	0.000E+00	2.606E-06	7.775E-06	2.542E-05	7.220E-05	1.984E-04	3.403E-04	1.396E-04
U-234	ΣDOSE(j):		9.217E-01	9.192E-01	9.142E-01	8.968E-01	8.490E-01	7.002E-01	4.005E-01	4.932E-02
Th-230	Pu-238	1.000E+00	0.000E+00	2.658E-11	2.373E-10	2.563E-09	2.130E-08	1.805E-07	8.016E-07	1.212E-06
Th-230	Pu-242	1.000E+00	0.000E+00	1.378E-21	3.706E-20	1.356E-18	3.535E-17	1.158E-15	2.198E-14	2.199E-13
Th-230	U-234	1.000E+00	0.000E+00	1.880E-05	5.620E-05	1.852E-04	5.380E-04	1.602E-03	3.493E-03	3.757E-03
Th-230	U-238	1.000E+00	0.000E+00	2.663E-11	2.387E-10	2.616E-09	2.262E-08	2.186E-07	1.321E-06	3.492E-06
Th-230	ΣDOSE(j):		0.000E+00	1.880E-05	5.620E-05	1.852E-04	5.380E-04	1.602E-03	3.495E-03	3.761E-03
Ra-226	Pu-238	1.000E+00	0.000E+00	3.132E-13	8.402E-12	3.041E-10	7.692E-09	2.279E-07	3.391E-06	2.104E-05
Ra-226	Pu-242	1.000E+00	0.000E+00	4.647E-24	9.794E-22	1.200E-19	9.429E-18	1.045E-15	6.224E-14	2.487E-12
Ra-226	U-234	1.000E+00	0.000E+00	3.321E-07	2.979E-06	3.274E-05	2.857E-04	2.848E-03	1.884E-02	7.047E-02
Ra-226	U-238	1.000E+00	0.000E+00	3.137E-13	8.441E-12	3.088E-10	8.050E-09	2.636E-07	5.009E-06	5.235E-05
Ra-226	ΣDOSE(j):		0.000E+00	3.321E-07	2.979E-06	3.275E-05	2.857E-04	2.849E-03	1.885E-02	7.055E-02
Pb-210	Pu-238	1.000E+00	0.000E+00	1.317E-16	1.047E-14	1.211E-12	8.189E-11	5.706E-09	1.264E-07	6.975E-07
Pb-210	Pu-242	1.000E+00	0.000E+00	0.000E+00	8.813E-25	3.851E-22	8.184E-20	2.210E-17	2.072E-15	7.846E-14
Pb-210	U-234	1.000E+00	0.000E+00	1.859E-10	4.923E-09	1.707E-07	3.854E-06	8.320E-05	7.438E-04	2.355E-03
Pb-210	U-238	1.000E+00	0.000E+00	1.273E-16	1.052E-14	1.226E-12	8.502E-11	6.474E-09	1.818E-07	1.710E-06
Pb-210	ΣDOSE(j):		0.000E+00	1.859E-10	4.923E-09	1.707E-07	3.855E-06	8.321E-05	7.441E-04	2.357E-03
Pu-239	Pu-239	1.000E+00	1.379E+00	1.378E+00	1.375E+00	1.365E+00	1.337E+00	1.241E+00	9.966E-01	4.018E-01
U-235	Pu-239	1.000E+00	0.000E+00	1.302E-08	3.895E-08	1.285E-07	3.744E-07	1.128E-06	2.540E-06	3.114E-06
U-235	U-235	1.000E+00	1.324E+01	1.321E+01	1.315E+01	1.294E+01	1.235E+01	1.050E+01	6.591E+00	1.202E+00
U-235	ΣDOSE(j):		1.324E+01	1.321E+01	1.315E+01	1.294E+01	1.235E+01	1.050E+01	6.591E+00	1.202E+00

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pa-231	Pu-239	1.000E+00	0.000E+00	2.262E-13	2.028E-12	2.220E-11	1.915E-10	1.833E-09	1.077E-08	2.520E-08
Pa-231	U-235	1.000E+00	0.000E+00	4.592E-04	1.370E-03	4.482E-03	1.274E-02	3.514E-02	6.097E-02	2.655E-02
Pa-231	ÕDOSE(j):		0.000E+00	4.592E-04	1.370E-03	4.482E-03	1.274E-02	3.514E-02	6.097E-02	2.655E-02
Ac-227	Pu-239	1.000E+00	0.000E+00	8.684E-15	2.294E-13	7.888E-12	1.742E-10	3.573E-09	3.017E-08	9.009E-08
Ac-227	U-235	1.000E+00	0.000E+00	2.636E-05	2.306E-04	2.326E-03	1.614E-02	8.506E-02	1.894E-01	9.954E-02
Ac-227	ÕDOSE(j):		0.000E+00	2.636E-05	2.306E-04	2.326E-03	1.614E-02	8.506E-02	1.894E-01	9.954E-02
Pu-240	Pu-240	1.000E+00	1.377E+00	1.375E+00	1.372E+00	1.362E+00	1.331E+00	1.229E+00	9.718E-01	3.709E-01
U-236	Pu-240	1.000E+00	0.000E+00	2.575E-08	7.694E-08	2.530E-07	7.303E-07	2.126E-06	4.327E-06	3.446E-06
Th-232	Pu-240	1.000E+00	0.000E+00	7.579E-18	6.802E-17	7.481E-16	6.540E-15	6.562E-14	4.404E-13	1.623E-12
Ra-228	Pu-240	1.000E+00	0.000E+00	2.652E-18	6.740E-17	2.051E-15	3.525E-14	5.164E-13	4.190E-12	2.219E-11
Th-228	Pu-240	1.000E+00	0.000E+00	3.674E-19	2.479E-17	1.755E-15	4.617E-14	7.936E-13	6.663E-12	3.475E-11
Pu-241	Pu-241	1.000E+00	2.236E-02	2.129E-02	1.930E-02	1.368E-02	5.119E-03	1.639E-04	8.737E-09	8.418E-24
Pu-241	Pu-241	2.450E-05	5.478E-07	5.216E-07	4.727E-07	3.351E-07	1.254E-07	4.016E-09	2.141E-13	1.923E-28
Pu-241	ÕDOSE(j):		2.236E-02	2.129E-02	1.930E-02	1.368E-02	5.119E-03	1.639E-04	8.737E-09	8.418E-24
Pu-242	Pu-242	1.000E+00	1.310E+00	1.308E+00	1.306E+00	1.296E+00	1.270E+00	1.182E+00	9.536E-01	3.915E-01
U-238	Pu-242	1.000E+00	0.000E+00	4.593E-10	1.374E-09	4.528E-09	1.316E-08	3.927E-08	8.610E-08	9.466E-08
U-238	U-238	1.000E+00	2.966E+00	2.958E+00	2.944E+00	2.894E+00	2.755E+00	2.319E+00	1.412E+00	2.281E-01
U-238	ÕDOSE(j):		2.966E+00	2.958E+00	2.944E+00	2.894E+00	2.755E+00	2.319E+00	1.412E+00	2.281E-01

BRF(i) is the branch fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	1.000E+02	9.969E+01	9.908E+01	9.697E+01	9.117E+01	7.349E+01	3.968E+01	4.592E+00
Am-241	Pu-241	1.000E+00	0.000E+00	1.563E-01	4.455E-01	1.249E+00	2.391E+00	2.559E+00	1.397E+00	1.616E-01
Am-241	δS(j):		1.000E+02	9.985E+01	9.953E+01	9.822E+01	9.356E+01	7.604E+01	4.108E+01	4.754E+00
Np-237	Am-241	1.000E+00	0.000E+00	3.233E-05	9.664E-05	3.181E-04	9.204E-04	2.708E-03	5.771E-03	6.785E-03
Np-237	Pu-241	1.000E+00	0.000E+00	2.553E-08	2.220E-07	2.195E-06	1.459E-05	7.306E-05	1.830E-04	2.252E-04
Np-237	Pu-241	2.450E-05	0.000E+00	7.743E-10	2.213E-09	6.265E-09	1.239E-08	1.548E-08	1.398E-08	9.497E-09
Np-237	δS(j):		0.000E+00	3.236E-05	9.687E-05	3.203E-04	9.350E-04	2.781E-03	5.954E-03	7.010E-03
U-233	Am-241	1.000E+00	0.000E+00	7.068E-11	6.337E-10	6.945E-09	6.011E-08	5.830E-07	3.585E-06	1.151E-05
U-233	Pu-241	1.000E+00	0.000E+00	3.735E-14	9.816E-13	3.317E-11	7.026E-10	1.326E-08	1.067E-07	3.767E-07
U-233	Pu-241	2.450E-05	0.000E+00	1.706E-15	1.484E-14	1.471E-13	9.835E-13	5.050E-12	1.358E-11	1.984E-11
U-233	δS(j):		0.000E+00	7.072E-11	6.347E-10	6.978E-09	6.081E-08	5.962E-07	3.692E-06	1.189E-05
Th-229	Am-241	1.000E+00	0.000E+00	2.226E-15	5.992E-14	2.196E-12	5.756E-11	1.923E-09	3.896E-08	5.775E-07
Th-229	Pu-241	1.000E+00	0.000E+00	8.842E-19	7.008E-17	8.036E-15	5.347E-13	3.772E-11	1.079E-09	1.834E-08
Th-229	Pu-241	2.450E-05	0.000E+00	5.392E-20	1.419E-18	4.822E-17	1.038E-15	2.085E-14	2.031E-13	1.380E-12
Th-229	δS(j):		0.000E+00	2.227E-15	6.000E-14	2.204E-12	5.810E-11	1.961E-09	4.004E-08	5.959E-07
Pu-238	Pu-238	1.000E+00	1.000E+02	9.916E+01	9.751E+01	9.193E+01	7.769E+01	4.310E+01	8.009E+00	2.214E-02
U-234	Pu-238	1.000E+00	0.000E+00	2.820E-04	8.370E-04	2.688E-03	7.258E-03	1.690E-02	1.974E-02	4.852E-03
U-234	Pu-242	1.000E+00	0.000E+00	2.195E-14	1.969E-13	2.163E-12	1.883E-11	1.863E-10	1.209E-09	4.527E-09
U-234	U-234	1.000E+00	1.000E+02	9.978E+01	9.933E+01	9.778E+01	9.348E+01	7.988E+01	5.098E+01	1.058E+01
U-234	U-238	1.000E+00	0.000E+00	2.829E-04	8.448E-04	2.772E-03	7.951E-03	2.265E-02	4.337E-02	3.004E-02
U-234	δS(j):		1.000E+02	9.978E+01	9.933E+01	9.778E+01	9.350E+01	7.992E+01	5.104E+01	1.062E+01
Th-230	Pu-238	1.000E+00	0.000E+00	1.271E-09	1.136E-08	1.232E-07	1.034E-06	9.079E-06	4.501E-05	1.148E-04
Th-230	Pu-242	1.000E+00	0.000E+00	6.590E-20	1.775E-18	6.516E-17	1.716E-15	5.826E-14	1.234E-12	2.082E-11
Th-230	U-234	1.000E+00	0.000E+00	8.992E-04	2.691E-03	8.901E-03	2.611E-02	8.058E-02	1.961E-01	3.558E-01
Th-230	U-238	1.000E+00	0.000E+00	1.274E-09	1.143E-08	1.257E-07	1.098E-06	1.100E-05	7.417E-05	3.307E-04
Th-230	δS(j):		0.000E+00	8.992E-04	2.691E-03	8.901E-03	2.611E-02	8.060E-02	1.962E-01	3.562E-01
Ra-226	Pu-238	1.000E+00	0.000E+00	1.837E-13	4.928E-12	1.785E-10	4.527E-09	1.354E-07	2.080E-06	1.594E-05
Ra-226	Pu-242	1.000E+00	0.000E+00	2.725E-24	5.744E-22	7.046E-20	5.549E-18	6.211E-16	3.817E-14	1.885E-12
Ra-226	U-234	1.000E+00	0.000E+00	1.947E-07	1.747E-06	1.922E-05	1.681E-04	1.692E-03	1.156E-02	5.342E-02
Ra-226	U-238	1.000E+00	0.000E+00	1.839E-13	4.951E-12	1.813E-10	4.737E-09	1.566E-07	3.072E-06	3.968E-05
Ra-226	δS(j):		0.000E+00	1.947E-07	1.747E-06	1.922E-05	1.681E-04	1.692E-03	1.156E-02	5.348E-02
Pb-210	Pu-238	1.000E+00	0.000E+00	1.419E-15	1.129E-13	1.310E-11	8.949E-10	6.462E-08	1.597E-06	1.486E-05
Pb-210	Pu-242	1.000E+00	0.000E+00	0.000E+00	9.502E-24	4.166E-21	8.944E-19	2.502E-16	2.619E-14	1.671E-12
Pb-210	U-234	1.000E+00	0.000E+00	2.002E-09	5.308E-08	1.847E-06	4.212E-05	9.423E-04	9.401E-03	5.015E-02
Pb-210	U-238	1.000E+00	0.000E+00	1.371E-15	1.134E-13	1.327E-11	9.291E-10	7.332E-08	2.298E-06	3.642E-05
Pb-210	δS(j):		0.000E+00	2.002E-09	5.308E-08	1.847E-06	4.212E-05	9.424E-04	9.405E-03	5.020E-02
Pu-239	Pu-239	1.000E+00	1.000E+02	9.995E+01	9.984E+01	9.946E+01	9.838E+01	9.470E+01	8.493E+01	5.803E+01
U-235	Pu-239	1.000E+00	0.000E+00	9.835E-08	2.942E-07	9.712E-07	2.834E-06	8.578E-06	1.966E-05	2.749E-05
U-235	U-235	1.000E+00	1.000E+02	9.978E+01	9.933E+01	9.778E+01	9.349E+01	7.991E+01	5.102E+01	1.061E+01
U-235	δS(j):		1.000E+02	9.978E+01	9.933E+01	9.778E+01	9.349E+01	7.991E+01	5.102E+01	1.061E+01

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pa-231	Pu-239	1.000E+00	0.000E+00	1.040E-12	9.330E-12	1.025E-10	8.916E-10	8.811E-09	5.700E-08	2.109E-07
Pa-231	U-235	1.000E+00	0.000E+00	2.111E-03	6.305E-03	2.069E-02	5.933E-02	1.689E-01	3.228E-01	2.222E-01
Pa-231	ΔS(j):		0.000E+00	2.111E-03	6.305E-03	2.069E-02	5.933E-02	1.689E-01	3.228E-01	2.222E-01
Ac-227	Pu-239	1.000E+00	0.000E+00	1.094E-14	2.892E-13	9.966E-12	2.215E-10	4.650E-09	4.214E-08	1.768E-07
Ac-227	U-235	1.000E+00	0.000E+00	3.321E-05	2.908E-04	2.939E-03	2.052E-02	1.107E-01	2.645E-01	1.954E-01
Ac-227	ΔS(j):		0.000E+00	3.321E-05	2.908E-04	2.939E-03	2.052E-02	1.107E-01	2.645E-01	1.954E-01
Pu-240	Pu-240	1.000E+00	1.000E+02	9.994E+01	9.981E+01	9.938E+01	9.815E+01	9.397E+01	8.299E+01	5.371E+01
U-236	Pu-240	1.000E+00	0.000E+00	2.956E-06	8.843E-06	2.918E-05	8.508E-05	2.568E-04	5.836E-04	7.868E-04
Th-232	Pu-240	1.000E+00	0.000E+00	7.295E-17	6.553E-16	7.233E-15	6.387E-14	6.644E-13	4.983E-12	3.116E-11
Ra-228	Pu-240	1.000E+00	0.000E+00	2.845E-18	7.231E-17	2.203E-15	3.794E-14	5.607E-13	4.689E-12	3.044E-11
Th-228	Pu-240	1.000E+00	0.000E+00	2.415E-19	1.630E-17	1.155E-15	3.048E-14	5.295E-13	4.612E-12	3.033E-11
Pu-241	Pu-241	1.000E+00	1.000E+02	9.525E+01	8.642E+01	6.148E+01	2.323E+01	7.711E-01	4.585E-05	7.435E-20
Pu-241	Pu-241	2.450E-05	2.450E-03	2.334E-03	2.117E-03	1.506E-03	5.693E-04	1.889E-05	1.123E-09	1.822E-24
Pu-241	ΔS(j):		1.000E+02	9.525E+01	8.642E+01	6.148E+01	2.323E+01	7.711E-01	4.585E-05	7.435E-20
Pu-242	Pu-242	1.000E+00	1.000E+02	9.995E+01	9.984E+01	9.948E+01	9.846E+01	9.496E+01	8.562E+01	5.961E+01
U-238	Pu-242	1.000E+00	0.000E+00	1.549E-08	4.635E-08	1.530E-07	4.466E-07	1.353E-06	3.111E-06	4.404E-06
U-238	U-238	1.000E+00	1.000E+02	9.978E+01	9.933E+01	9.778E+01	9.349E+01	7.991E+01	5.102E+01	1.061E+01
U-238	ΔS(j):		1.000E+02	9.978E+01	9.933E+01	9.778E+01	9.349E+01	7.991E+01	5.102E+01	1.061E+01

BRF(i) is the branch fraction of the parent nuclide.

APPENDIX B
ANALYSIS OF THE CHEMICAL FORM OF PLUTONIUM IN THE ENVIRONMENT

Introduction

In order to calculate the radiation dose to an individual from plutonium in the environment, a radiation dose analysis needs to be performed. An important part of this dose analysis is selecting the inhalation and ingestion dose conversion factors that are appropriate to the situation. In the case of plutonium, there are a number of different dose conversion factors available based on the chemical form of the plutonium being assessed. The following analysis will show that plutonium in surface soils is in the oxide form. The appropriate inhalation dose conversion factor for use in surface soils will therefore be based on the Class Y form of plutonium. An f_1 value of 10^{-05} will be appropriate for selecting the ingestion dose conversion factor due to the oxide form of plutonium being present.

Plutonium Dosimetry

The radiation dose received by a person that inhales and/or ingests radioactive material is based on a number of biological factors. These factors include the way radioactive material moves in the lungs and the Gastrointestinal (GI) tract as well as within certain organs and tissues. This movement is examined for each radionuclide so that radionuclide specific Dose Conversion Factors (DCF) can be developed. DCFs are developed so that the radiation dose from a specific type of radioactive material can be related to a radiation dose.

Plutonium deposited in the lung is assumed to be from inhaling suspended plutonium particles. To assess this inhalation exposure, the ICRP Task Group Lung Model is used (ICRP, 1986). This lung model divides the respiratory system into four regions: the nasal passage, the tracheo-bronchiolar region, the pulmonary region and the lung associated lymph nodes. Each region is further subdivided into compartments that correspond to clearance routes from the lung. Radioactive material is

eliminated from the lungs through clearance routes such as translocation to the blood. Three classes of compounds are broadly defined for all radioactive material deposited in the lung based on the length of time the material is retained in the lung: Class D (Clearance half-time of <10 days), Class W (Clearance half-time of 10-100 days) and Class Y (Clearance half-time of >100 days). The DCF for a radioactive material is dependent on its Class D, W or Y designation. The designation of the correct inhalation class is dependent on the chemical form of the radioactive material (i.e., oxides, nitrates, etc.). Therefore, the proper inhalation DCF can be chosen if the chemical form of a radioactive material is known. When classifying plutonium, there are two chemical forms that are important: oxides and all other forms. Oxides of plutonium are designated as being Class Y. All other chemical forms of plutonium are designated as being Class W. There are no chemical forms of plutonium associated with Class D.

Radioactive material can also enter the body through the soil ingestion and food ingestion exposure pathways. Once ingested, radioactive material is transferred to the GI tract where a fraction of the radioactive material will pass through the cells of the mucosa into the blood stream (ICRP, 1986). This fraction of the radioactive material which is transferred to the blood is called the "Fractional Absorption" or f_1. The designation of the correct ingestion f_1 value is dependent on the chemical form of the radioactive material (i.e., oxides, nitrates, etc.). Therefore, the proper ingestion DCF can be chosen if the chemical form of a radioactive material is known. There are three f_1 values for plutonium which relate to the chemical forms of oxides, nitrates and all other forms. These chemical forms are associated with an f_1 value of 10^{-05}, 10^{-04} and 10^{-03}, respectively.

The magnitude of the DCF is based on the destination and fate of the radioactive material after it enters the blood. Radioactive material in the blood deposits in certain organs preferentially or is excreted. For those radioactive materials deposited in organs, the magnitude of the DCF is based on the amount of radiation absorbed by the organ. For plutonium reaching the bloodstream, 50% deposits in the skeleton, and 30% deposits in the liver (ICRP, 1986). The remaining 20% of plutonium is excreted or deposited in a variety of other organs and tissues. The plutonium is retained

in the skeleton with a retention half-time of 50 years. For the liver, the retention half-time is 20 years (ICRP, 1986).

With the above information, inhalation DCFs have been developed for Class W and Class Y plutonium separately. For the ingestion of plutonium, DCFs have been developed for each of the three potential fractional absorptions. All of these DCFs can be found in the Environmental Protection Agency's Federal Guidance Report #11 (EPA, 1988).

Chemical Form of Plutonium in the Environment

The chemical form of plutonium in the environment must now be selected so that an intake of plutonium can be related to a radiation dose through a DCF. The oxide, nitrate and all other chemical forms are the three potential chemical forms of plutonium that need to be assessed.

To understand which chemical form is the most applicable, the physical form of the plutonium must first be examined. In general, plutonium present in surface soils at the Rocky Flats Environmental Technology Site (RFETS) resembles the plutonium originating from the 903 Pad and Lip area. In these areas, drums containing plutonium contaminated solvents leaked to the surrounding soil. Drums were originally placed at the 903 Pad area starting in 1958 and were all removed from the area by 1968. After the drums had leaked, contaminated soils were redistributed in the area by wind and rain action (DOE, 1995). It is assumed that the plutonium in these areas are in the particulate form. A study of plutonium particulate size distributions in the eastern buffer zone showed that plutonium was in the particulate form and had a mean particle size of 0.08 micron (Rockwell, 1975). This same report stated that the particles of plutonium in the 903 Pad area had a mean particle size of 0.3 micron with maximum particle sizes of 2 to 3 microns.

The solvents in the soil at the 903 Pad and Lip either volatilized or leached into the soil fairly quickly. The plutonium particles have therefore been open to the air for about the last 30 to 35 years.

Plutonium is known to convert to plutonium dioxide when exposed to air (ANS, 1980). The rate at which oxidation occurs is based on the temperature and relative humidity of the air. At 25°C and 40% relative humidity, a 0.3 micron particle would be oxidized to plutonium dioxide in about 900 hours or 38 days (ANS, 1980). Since plutonium in the environment at RFETS has been present for a number of years, plutonium in surface soils at RFETS should be in the plutonium dioxide form.

The Operable Unit (OU) 2 Remedial Investigation (RI) Report, human health risk assessment states that plutonium in most natural environments is stable in two oxidation states, Pu III and Pu IV. In acidic environments, Pu III is the dominant species, whereas under alkaline or oxidizing conditions the dominant species is Pu IV which is solid plutonium dioxide. Since the soils at OU 2 are alkaline and oxidizing, solid plutonium dioxide should be present (DOE, 1995).

Additional studies at RFETS have demonstrated low extraction of plutonium from soil, suggesting the presence of an in soluble species (EPA, 1990). EPA states that "analyses of soil samples from Rocky Flats have shown the presence of discrete particles of plutonium (probably the oxide) attached to larger soil particles." EPA further states that, because of the stability of Pu IV relative to other forms of plutonium "most if not all plutonium in environmental...systems is in the Pu IV state."

Based on this data, the working group concluded that the plutonium present in surface soils is in the oxide form. Therefore the inhalation DCF for plutonium will be the Class Y form, and the ingestion DCF will be based on an f_1 factor of 10^{-05}.

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APPENDIX C
ANALYSIS OF EXPOSURE PATHWAYS FOR USE IN DERIVING ACTION LEVELS

Introduction

Per the Rocky Flats Cleanup Agreement (RFCA, 1996), the Rocky Flats Environmental Technology Site (RFETS) will have designated land uses in the future. These uses will include an open space land use in the buffer zone and an office complex within the industrial area of the RFETS. The radiation dose to both of these potential future receptors needs to be assessed. Also, the radiation dose that may be received by a hypothetical future residential receptor needs to be assessed to comply with draft regulations from the Environmental Protection Agency (EPA). Since radiation dose is assessed by examining specific exposure pathways to a human receptor, the exposure pathways to these exposure scenarios need to be defined.

The RESRAD computer code can assess one or more of the following exposure pathways to a potential human receptor:

* External Gamma Exposure,
* Soil Inhalation,
* Plant Ingestion,
* Meat Ingestion,
* Milk Ingestion,
* Aquatic Food Ingestion,
* Ground/Surface Water Ingestion,
* Soil Ingestion, and
* Radon Exposure

Exposure pathways were selected for the hypothetical future residential receptor, the open space user

receptor and the office worker receptor taking into account the specifications of the site conceptual model and the significance of the pathway with respect to radiation dose.

Hypothetical Future Residential Receptor

The exposure pathways of external gamma exposure, soil inhalation, plant ingestion and soil ingestion are being assessed for the hypothetical future residential receptor. The RESRAD exposure pathways of meat ingestion, milk ingestion, aquatic food ingestion, ground/surface water ingestion and radon exposure were deleted from further consideration. The Department of Energy (DOE), the EPA and the Colorado Department of Public Health and the Environment (CDPHE) have agreed that only the pathways of soil ingestion, soil inhalation, external gamma exposure, plant ingestion, dermal exposure, ground water/subsoil VOC inhalation and ground/surface water ingestion may be applicable to the hypothetical future residential exposure scenario (DOE, 1995b). Eventhough the aquatic food ingestion, meat ingestion and milk ingestion exposure pathways are not discussed in this jointly approved exposure pathway document, they will be discussed below.

The aquatic food ingestion exposure pathway, ground/surface water ingestion exposure pathway and the radon exposure pathway are not consistent with the site conceptual model for the hypothetical future resident and were deleted from further consideration. The meat ingestion exposure pathway, milk ingestion exposure pathway and dermal exposure pathway were deleted from consideration since they contribute insignificantly to the total radiation dose.

The aquatic food ingestion pathway was deleted from further consideration since there are no surface water sources that can sustain a fish population. The surface water available on the RFETS is either at a seep on a hillside or at the bottom of the hillside at a surface water stream. Since these surface water sources are dry during much of the year, there is no possibility of a sustained fish population within them.

The ground/surface water ingestion pathway was also dropped from further consideration because the ground water found on the RFETS is not capable of providing enough water to support domestic use (RFCA, 1996). The surface water present on the RFETS is also not appropriate for ingestion since it is dry much of the year.

The ground water/VOC inhalation pathway is considered to be equivalent to the radon exposure pathway within the RESRAD code. Both of the exposure pathways assessed within the radon exposure pathway were dropped from consideration. These two pathways are the migration of radon into a basement vertically from subsurface soils and the emanation of radon from contaminated ground water being used domestically. First, residential dwellings are built into the ground and not built on the top of the ground surface (Even the default value within the RESRAD code for "Foundation Depth Below Ground Surface" is 1 meter (Argonne, 1993). Therefore, it is not possible for radon in surface soils to migrate into a basement. Lastly, since domestic use of ground water is not considered applicable at RFETS (RFCA, 1996), ground water will not be used domestically at the RFETS. Therefore, radon cannot emanate into a dwelling from domestic use of ground water. In addition, the uranium used at RFETS is primarily enriched U-235 and depleted U-238. Neither of these radionuclides will decay to radon or radon daughter products during the 1,000 year period of interest.

The meat ingestion exposure pathway and the milk ingestion exposure pathway were eliminated from consideration since their contribution to radiation dose is insignificant. This is shown by examining the draft Operable Unit (OU) 3 RCRA Facility Investigation/Remedial Investigation (RFI/RI) Report (DOE, 1995c). The exposure pathways of soil ingestion, soil inhalation, external gamma exposure, vegetable consumption, beef consumption and milk consumption were assessed for a residential receptor in this RI Report. This assessment showed that the beef consumption pathway and the milk consumption pathway combined contributed between 0 and 3.1 percent of the total radiation dose to a residential receptor. Due to this small contribution to radiation dose, it is not necessary to assess the beef consumption and milk consumption exposure pathways.

The dermal exposure pathway is also not considered a significant contributor to radiation dose. This is first seen in the RESRAD code where the dermal pathway is not assessed (Argonne, 1993). The RESRAD code only assesses exposure pathways that are significant contributors to radiation dose. Also, dermal uptake of radionuclides is considered a negligible pathway and was not assessed in the OU 2 RI Report human health risk assessment (DOE, 1995a). Dermal exposure has been dropped from consideration for the hypothetical future residential exposure scenario.

Open Space Exposure Scenario

There are three exposure pathways assessed for the open space exposure scenario. These exposure pathways are soil ingestion, soil inhalation and external gamma exposure. The RESRAD exposure pathways of plant ingestion, meat ingestion, milk ingestion, aquatic food ingestion, ground/surface water ingestion and radon exposure were deleted from further consideration. The DOE, the EPA and the CDPHE have agreed that only the pathways of soil ingestion, soil inhalation, external gamma exposure, dermal exposure and incidental ingestion of surface water may be applicable to the open space exposure scenario (DOE, 1995b). Therefore, it has been jointly agreed by DOE, EPA and CDPHE that the exposure pathways of plant ingestion, meat ingestion, milk ingestion, aquatic food ingestion, ground water ingestion and radon exposure are not applicable to the open space exposure scenario. The incidental ingestion of surface water and dermal exposure pathways have been eliminated due to their relatively small contribution to radiation dose.

The incidental ingestion of surface water pathway was not assessed since it is not a significant contributor to radiation dose. This is seen in the OU 2 RFI/RI Report, human health risk assessment where the radiation dose from the surface water ingestion pathway was 0.004% of the total radiation dose received for the open space exposure scenario (DOE, 1995a). Plus, the RESRAD code does not assess insignificant exposure pathways, and surface soil transport to surface water is not assessed within the code (Argonne, 1993). These factors plus the low contribution to radiation dose from this pathway does not warrant its assessment.

The dermal exposure pathway is also not considered a significant contributor to radiation dose. This is first seen in the RESRAD code where the dermal pathway is not assessed (Argonne, 1993). The RESRAD code only assesses exposure pathways that are significant contributors to radiation dose. Also, dermal uptake of radionuclides is considered a negligible pathway and was not assessed in the OU 2 RI Report, human health risk assessment (DOE, 1995a). Therefore, dermal exposure has been dropped from consideration for the open space exposure scenario.

Office Worker Exposure Scenario

There are three exposure pathways assessed for the office worker exposure scenario. These exposure pathways are soil ingestion, soil inhalation and external gamma exposure. The RESRAD exposure pathways of plant ingestion, meat ingestion, milk ingestion, aquatic food ingestion, ground/surface water ingestion and radon exposure were deleted from further consideration. The DOE, the EPA and the CDPHE have agreed that only the pathways of soil ingestion, soil inhalation, external gamma exposure, dermal exposure to soil, ground water/subsoil VOC inhalation and ground water ingestion may be applicable to the office worker exposure scenario (DOE, 1995b). Therefore, it has been jointly agreed by DOE, EPA and CDPHE that the exposure pathways of surface water ingestion, plant ingestion, meat ingestion, milk ingestion and aquatic food ingestion are not applicable to the office worker exposure scenario. The ground water ingestion and ground water/VOC inhalation pathways were eliminated from consideration since they are not compatible with the site conceptual model. The dermal exposure pathway was eliminated from consideration due to its relatively small contribution to radiation dose.

The ground water ingestion pathway was dropped from consideration since it is not compatible with the site conceptual model. Since the ground water found on the RFETS is not capable of providing enough water to support domestic use (RFCA, 1996), it would not be able to support an office complex. This conclusion is supported by the fact that all water currently used at the RFETS is

brought to the plant.

The ground water/VOC inhalation pathway is considered to be equivalent to the radon exposure pathway within the RESRAD code. Both of the exposure pathways assessed within the radon exposure pathway were dropped from consideration since they are not compatible with the site conceptual model. These two pathways are the migration of radon into a basement vertically from subsurface soils and the emanation of radon from contaminated ground water being used within the office complex. First, office buildings are built into the ground and not built on the top of the ground surface (Even the default value within the RESRAD code for "Foundation Depth Below Ground Surface" is 1 meter (Argonne, 1993).). Therefore, it is not possible for radon in surface soils to migrate into a basement. Lastly, since industrial use of ground water is not considered applicable at RFETS, ground water will not be used industrially at the RFETS. Therefore, radon cannot emanate into a building from industrial use of ground water. In addition, the uranium used at RFETS is primarily enriched U-235 and depleted U-238. Neither of these radionuclides will decay to radon or radon daughter products during the 1,000 year period of interest.

The dermal exposure pathway is not considered a significant contributor to radiation dose. This is first seen in the RESRAD code where the dermal pathway is not assessed (Argonne, 1993). The RESRAD code only assesses exposure pathways that are significant contributors to radiation dose. Also, dermal uptake of radionuclides is considered a negligible pathway and was not assessed in the OU 2 RFI/RI Report, human health risk assessment (DOE, 1995a). Therefore, dermal exposure has been dropped from consideration for the office worker exposure scenario.

References

Argonne, 1993 - Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.0, Environmental Assessment and Information Sciences Division, Argonne National Laboratory, ANL/EAD/LD-2, September 1993

DOE, 1995a - Phase II RFI/RI Report, 903 Pad, Mound and East Trenches Area, Operable Unit Number 2, Draft Final, US Department of Energy, May 1995

DOE, 1995b - Site Specific Exposure Factors, DOE Letter 95-DOE-08453, From S. Slaten (DOE) to M. Hestmark (EPA) and J. Schieffelin (CDPHE), June 15, 1995

DOE, 1995c - Draft Resource Conservation and Recovery Act Facility Investigation/Remedial Investigation Report, Operable Unit 3 (Offsite Areas), US Department of Energy, October 1995

RFCA, 1996 - Rocky Flats Cleanup Agreement, Joint Agreement between the US Department of Energy, the US Environmental Protection Agency, the Colorado Department of Public Health and Environment and the State of Colorado, dated July 19, 1996

APPENDIX D
ANALYSIS OF ASSESSMENT NEEDS FOR ROCKY FLATS PLUTONIUM

Introduction

In order to carry out its original mission, the Rocky Flats Environmental Technology Site (RFETS) handled plutonium in fabricating nuclear components. The plutonium used in these operations contained different isotopes of plutonium as well as americium. Rocky Flats plutonium used in the fabrication process was comprised of Pu-238, Pu-239, Pu-240, Pu-241 and Pu-242 (DOE, 1980). Am-241 is also contained in this mix of plutonium due to its ingrowth from Pu-241 (DOE, 1980). The plutonium found in the environment though will have different activities of plutonium and americium than what is found in the fabrication process because of radionuclide decay and ingrowth over time. In examining this decay and ingrowth along with each radionuclides toxicity, it will be shown that only Pu-239/240 and Am-241 need to be assessed within the environment for Rocky Flats plutonium. Uranium will not be discussed in this appendix since all RFETS specific uranium isotopes will be assessed in the environment.

Composition of Rocky Flats Plutonium

The following table outlines the composition of plutonium at RFETS during fabrication processes (DOE, 1980). This table includes an activity for Am-241. The Am-241 activity was derived assuming that the plutonium was produced 10 years before fabrication processes were begun, and Am-241 had this 10 years to ingrow in the Rocky Flats plutonium (DOE, 1980).

Radionuclide	Composition of Rocky Flats Plutonium (% by Weight)	Activity in Rocky Flats Plutonium (Ci/gram)	Half-Life (years)
Pu-238	0.01	1.7E-3	87.74
Pu-239	93.79	5.8E-2	24065
Pu-240	5.8	1.3E-2	6537
Pu-241	0.36	3.7E-1	14.4
Pu-242	0.03	1.2E-6	376300
Am-241		7.5E-3	432.2

The activity found in Rocky Flats plutonium during fabrication processes though is not what is found in the environment. For instance, the plutonium at and around the 903 Pad area of the plant was due to operations occurring primarily in the 1960s. Therefore, this plutonium was deposited in the environment 25 to over 35 years ago. Table 1, "Comparison of Plutonium Relative Activity With Action Levels Over Time", outlines the plutonium and americium activity of Rocky Flats plutonium released to the environment over time. The activity of Rocky Flats plutonium is assessed at years 0, 20, 40, 60, 80, 100, 200, 500 and 1,000 after a release.

In Table 1, the units of the plutonium and americium activity are in picocuries per gram of soil. It has been assumed that the relative activity between the different isotopes in Rocky Flats plutonium stay constant from the fabrication process to initial deposition in the environment. Therefore, there is a linear relationship between the number of curies per gram of Rocky Flats plutonium in the fabrication process to the number of picocuries per gram of Rocky Flats plutonium in soils.

There are a number of trends that can be surmised by examining the radionuclide activities over time.

For Pu-239, Pu-240 and Pu-242, the activity over the 1,000 year period does not change significantly due to the very long half-life of the radionuclides. The Pu-238 activity drops off fairly steadily over the 1,000 year period due to its relatively short half-life of 87.74 years. For Pu-241, the activity drops off quickly over the 1,000 year period due to its short half-life of 14.4 years. Since Am-241 ingrows from the decay of Pu-241, Am-241 activity actually increases in the short term. The Am-241 activity peaks around 70 years after the initial release to the environment and decays away slowly within the 1,000 year assessment period. This slow decay is due to the relatively long half-life of Am-241 of 432.2 years.

Toxicity of Rocky Flats Plutonium

It is important to assess each radionuclides toxicity along with their activity in the environment since different radionuclides have different biological effects. This means that a radionuclide present that has a low activity and a high toxicity may have the same biological effect as a radionuclide present with a high activity and a low toxicity. To assess the toxicity of each radionuclide, the radiation dose based tier I action levels for the residential exposure scenario will be used. The tier I, residential action levels are the radionuclide activities in soil that would impart a radiation dose of 85 millirem to a residential receptor for each radionuclide.

A "Sum of Ratios" method will be used to assess which radionuclides within Rocky Flats plutonium are the major contributors to radiation dose over the 1,000 year assessment period. For a full explanation of this method with an example, see Section 5, "Action Level Development." For this appendix, it can be stated that the radionuclide activity in soil will be divided by the tier I, residential action level. This ratio actually represents the fraction of the radiation dose (85 millirem) imparted to a hypothetical resident at the tier I action level. Therefore, when the ratio from each radionuclide is summed, this sum is the fraction of the tier I, residential action level contributed by all radionuclides present. Table 1 gives the ratio of the soil concentration to the action level for each radionuclide in Rocky Flats plutonium along with the sum of these ratios.

Table 1 also contains the percent contribution to radiation dose from each radionuclide in Rocky Flats plutonium. The percent contribution was found by dividing the ratio of the soil concentration to the action level for a given radionuclide by the sum of all radionuclide ratios within the year of interest. The percent contribution to radiation dose is important since it shows which radionuclides are significant on a human health basis.

Rocky Flats Plutonium Assessment Requirements

In order to ascertain the relative importance of each radionuclide in the Rocky Flats plutonium mix over time, it is necessary to examine the percent contribution to radiation dose of each radionuclide. Also, the percent contribution to radiation dose from a number of radionuclides could be summed for this assessment.

At the time that Rocky Flats plutonium was placed in the environment (Time=0), the sum of the radiation dose contributions from Pu-239, Pu-240, Pu-241 and Am-241 is 98.9%. The contribution to radiation dose from Pu-238 and Pu-242 at this initial time is only 1.1%. Since the contribution to the total radiation dose from Pu-238 and Pu-242 is so small, it is not necessary to assess Pu-238 and Pu-242 in the environment as part of the Rocky Flats plutonium mix on a human health basis. The percent contribution to radiation dose from Pu-238 and Pu-242 over the 1,000 year assessment period steadily decreases. This further supports the premise that the contribution to radiation dose from these radionuclides is insignificant and that these radionuclides do not need to be assessed over the 1,000 year assessment period.

As time proceeds from the initial placement of Rocky Flats plutonium in the environment, the activity of Am-241 increases and the activity of Pu-241 decreases. This means that the relative contribution to radiation dose from Pu-241 decreases over time and that the relative contribution to radiation dose from Am-241 increases over time. 40 years after placement of the Rocky Flats plutonium in the soil, the percent contribution to radiation dose from Pu-241 has dropped from 17.9% to 2.0%. By year

60, the percent contribution from Pu-241 has been reduced to 0.8% and continues to decline after that. Since Rocky Flats plutonium placed in the environment is currently approaching the 40 year mark and is anticipated to be under DOE control well into the next century, it is also not necessary to assess Pu-241 in the environment as part of the Rocky Flats plutonium mix on a human health basis.

The percent contribution to radiation dose from Am-241 increases from year 0 to around year 80 and then decreases as the 1,000 year mark approaches. Therefore, Am-241 contributes a significant percentage of radiation dose over the 1,000 year period of interest. The percent contribution to radiation dose from the sum of Pu-239, Pu-240 and Am-241 needs to be examined since all of these isotopes contribute significantly to radiation dose. At year 40, 97.3% of the radiation dose is contributed by Pu-239, Pu-240 and Am-241. This percentage increases to 98.7% at year 60 and keeps increasing past that point. Due to this, it is necessary to assess the Pu-239, Pu-240 and Am-241 components of Rocky Flats plutonium in the environment in order to assure that human health is protected.

References

DOE, 1980 - Final Environmental Impact Statement, Rocky Flats Plant Site, Golden, CO, US Department of Energy, DOE/EIS-0064, April 1980

Tables

Table D1 - Comparison of Plutonium Activity With Action Levels Over Time

TABLE D1
COMPARISON OF PLUTONIUM ACTIVITY WITH ACTION LEVELS OVER TIME

PLUTONIUM ACTIVITY & ACTION LEVEL COMPARISON

		Time = 0 Years			Time = 20 Years			Time = 40 Years		
Radionuclide	Tier I Residential Action Level (pCi/gram)	Rocky Flats Pu Activity (pCi/gram)	Rocky Flats Pu Activity to Action Level Ratio	Rocky Flats Pu Contribution to Radiation Dose (Percent)	Rocky Flats Pu Activity (pCi/gram)	Rocky Flats Pu Activity Action Level Ratio	Rocky Flats Pu Contribution to Radiation Dose (Percent)	Rocky Flats Pu Activity (pCi/gram)	Rocky Flats Pu Activity Action Level Ratio	Rocky Flats Pu Contribution to Radiation Dose (Percent)
Plutonium-238	1529	1.7E-3	1.1E-6	1.1	1.5E-3	9.5E-7	0.7	1.2E-3	8.1E-7	0.6
Plutonium-239	1429	5.8E-2	4.1E-5	38.8	5.8E-2	4.1E-5	32.1	5.8E-2	4.1E-5	30.5
Plutonium-240	1432	1.3E-2	9.1E-6	8.7	1.3E-2	9.1E-6	7.2	1.3E-2	9.0E-6	6.8
Plutonium-241	19830	3.7E-1	1.9E-5	17.9	1.4E-1	7.1E-6	5.6	5.4E-2	2.7E-6	2.0
Plutonium-242	1506	1.2E-6	8.0E-10	0.0	1.2E-6	8.0E-10	0.0	1.2E-6	8.0E-10	0.0
Americium-241	215	7.5E-3	3.5E-5	33.6	1.5E-2	6.9E-5	54.4	1.7E-2	8.0E-5	60.1
TOTAL			1.0E-4	100.0		1.3E-4	100.0		1.3E-4	100.0
		% (Pu-239+Pu-240+Am241)		81.1	% (Pu-239+Pu-240+Am241)		93.6	% (Pu-239+Pu-240+Am241)		97.3

		Time = 60 Years			Time = 80 Years			Time = 100 Years		
Radionuclide	Tier I Residential Action Level (pCi/gram)	Rocky Flats Pu Activity (pCi/gram)	Rocky Flats Pu Activity Action Level Ratio	Rocky Flats Pu Contribution to Radiation Dose (Percent)	Rocky Flats Pu Activity (pCi/gram)	Rocky Flats Pu Activity Action Level Ratio	Rocky Flats Pu Contribution to Radiation Dose (Percent)	Rocky Flats Pu Activity (pCi/gram)	Rocky Flats Pu Activity Action Level Ratio	Rocky Flats Pu Contribution to Radiation Dose (Percent)
Plutonium-238	1529	1.1E-3	6.9E-7	0.5	9.0E-4	5.9E-7	0.4	7.7E-4	5.0E-7	0.4
Plutonium-239	1429	5.8E-2	4.1E-5	30.3	5.8E-2	4.1E-5	30.6	5.8E-2	4.0E-5	31.1
Plutonium-240	1432	1.3E-2	9.0E-6	6.7	1.3E-2	9.0E-6	6.8	1.3E-2	9.0E-6	6.9
Plutonium-241	19830	2.1E-2	1.0E-6	0.8	7.9E-3	4.0E-7	0.3	3.0E-3	1.5E-7	0.1
Plutonium-242	1506	1.2E-6	8.0E-10	0.0	1.2E-6	8.0E-10	0.0	1.2E-6	8.0E-10	0.0
Americium-241	215	1.8E-2	8.2E-5	61.6	1.8E-2	8.2E-5	61.8	1.7E-2	8.0E-5	61.5
TOTAL			1.3E-4	100.0		1.3E-4	100.0		1.3E-4	100.0
		% (Pu-239+Pu-240+Am241)		98.7	% (Pu-239+Pu-240+Am241)		99.3	% (Pu-239+Pu-240+Am241)		99.5

		Time = 200 Years			Time = 500 Years			Time = 1000 Years		
Radionuclide	Tier I Residential Action Level (pCi/gram)	Rocky Flats Pu Activity (pCi/gram)	Rocky Flats Pu Activity Action Level Ratio	Rocky Flats Pu Contribution to Radiation Dose (Percent)	Rocky Flats Pu Activity (pCi/gram)	Rocky Flats Pu Activity Action Level Ratio	Rocky Flats Pu Contribution to Radiation Dose (Percent)	Rocky Flats Pu Activity (pCi/gram)	Rocky Flats Pu Activity Action Level Ratio	Rocky Flats Pu Contribution to Radiation Dose (Percent)
Plutonium-238	1529	3.5E-4	2.3E-7	0.2	3.3E-5	2.1E-8	0.0	6.3E-7	4.1E-10	0.0
Plutonium-239	1429	5.8E-2	4.0E-5	34.3	5.7E-2	4.0E-5	44.0	5.6E-2	3.9E-5	59.2
Plutonium-240	1432	1.3E-2	8.9E-6	7.5	1.2E-2	8.6E-6	9.4	1.2E-2	8.2E-6	12.3
Plutonium-241	19830	2.4E-5	1.2E-9	0.0	1.3E-11	6.6E-16	0.0	4.7E-22	2.3E-26	0.0
Plutonium-242	1506	1.2E-6	8.0E-10	0.0	1.2E-6	8.0E-10	0.0	1.2E-6	8.0E-10	0.0
Americium-241	215	1.5E-2	6.8E-5	58.0	9.1E-3	4.2E-5	46.5	4.1E-3	1.9E-5	28.5
TOTAL			1.2E-4	100.0		9.1E-5	100.0		6.7E-5	100.0
		% (Pu-239+Pu-240+Am241)		99.8	% (Pu-239+Pu-240+Am241)		100.0	% (Pu-239+Pu-240+Am241)		100.0