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Analysis of BIOMOVS II Uranium Mill Tailings Scenario 1.07 with the RESRAD Computer Code

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ACKNOWLEDGMENT

The authors would like to thank Hal Peterson and Andy Wallo III of the U.S. Department of Energy, Office of Environment, Safety and Health, for sponsoring this study and reviewing this report.

NOTATION

The following is a list of the acronyms, initialisms, and abbreviations (including units of measure) that appear in this document.

ACRONYMS, INITIALISMS, AND ABBREVIATIONS

ANL	Argonne National Laboratory
BIOMOVS II	*Bio*spheric *Mo*del *V*alidation *S*tudy: Phase II
DOE	U.S. Department of Energy
QA/QC	quality assurance/quality control
RESRAD	*res*idual *rad*ioactive material guidelines (computer code)
SI	*Système International*
UMT	uranium mill tailings

ELEMENTS AND CHEMICALS

As	arsenic
Cr	chromium
Ni	nickel
Pb-210	lead-210
Po-210	polonium-210
Ra-226	radium-226
Rn-222	radon-222
Th-230	thorium-230
U-234	uranium-234
U-238	uranium-238

UNITS OF MEASURE

Bq	becquerel(s)
d	day(s)
g	gram(s)
ha	hectare(s)
kg	kilogram(s)
km	kilometer(s)
L	liter(s)
m	meter(s)
m^2	square meter(s)
m^3	cubic meter(s)
mg	milligram(s)
s	second(s)
Sv	sievert(s)
yr	year(s)

ANALYSIS OF BIOMOVS II URANIUM MILL TAILINGS SCENARIO 1.07 WITH THE RESRAD COMPUTER CODE

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ABSTRACT

The *res*idual *rad*ioactive material guidelines (RESRAD) computer code developed at Argonne National Laboratory was selected for participation in the model intercomparison test scenario, version 1.07, conducted by the Uranium Mill Tailings Working Group in the second phase of the international Biospheric Model Validation Study. The RESRAD code was enhanced to provide an output attributing radiological dose to the nuclide at the point of exposure, in addition to the existing output attributing radiological dose to the nuclide in the contaminated zone. A conceptual model to account for off-site accumulation following atmospheric deposition was developed and showed the importance of considering this process for this off-site scenario. The RESRAD predictions for the atmospheric release compared well with most of the other models. The peak and steady-state doses and concentrations predicted by RESRAD for the groundwater release also agreed well with most of the other models participating in the study; however, the RESRAD plots showed a later breakthrough time and sharp changes compared with the plots of the predictions of other models. These differences were due to differences in the formulation for the retardation factor and to not considering the effects of longitudinal dispersion.

1 INTRODUCTION

As part of the quality assurance/quality control (QA/QC) program for the *res*idual *rad*ioactive material guidelines (RESRAD) computer code, the U.S. Department of Energy (DOE) sponsored Argonne National Laboratory's (ANL's) participation in the international *Bio*spheric *Mo*del *V*alidation *S*tudy: Phase II (BIOMOVS II). The RESRAD code was one of the nine computer codes selected to participate in the BIOMOVS II Uranium Mill Tailings (UMT) Working Group's scenario version 1.07 computer model comparison study. The results of the model intercomparison

study are described in the BIOMOVS II Technical Report 4 (BIOMOVS II 1995). The present report describes the modeling of the UMT scenario version 1.07 with RESRAD.

1.1 BIOMOVS II

The BIOMOVS II is an international cooperative study to test models designed to quantify the environmental transfer and bioaccumulation of radionuclides and other trace substances (BIOMOVS II 1995). In addition to (1) testing the accuracy of the predictions of environmental assessment models, (2) recommending priorities for future research to improve the accuracy of these predictions, and (3) explaining the differences observed in the predictions of different models participating in this study, BIOMOVS II also serves as a forum for interaction between modelers, aiding in the improvement of models. Various working groups exist within BIOMOVS II, each focusing on a specific issue of environmental modeling.

The UMT Working Group deals with the intercomparison of models that can be used to assess the long-term impacts of contaminants released from UMT. Scenario version 1.07 is the culmination of numerous iterations among the members of this working group in developing a hypothetical scenario, comparing predictions of the intermediate scenarios, and refining and clarifying the scenario to arrive at a reasonably well-defined scenario to serve as the basis for comparison of deterministic predictions of the models participating in the study.

The RESRAD code developers contributed to the development of the scenario, with predictions from RESRAD being submitted for version 1.05, which was the first intermediate scenario for which calculations were performed by the members of the working group. Additional features were incorporated into RESRAD to accommodate the requirements of the scenario as work progressed. This report describes the RESRAD predictions for scenario version 1.07 and the enhancements to the code that occurred during the participation in the study and suggests directions for further additions to the code on the basis of the comparison of RESRAD predictions with those of the other models.

1.2 RESRAD

RESRAD is a computer code developed at ANL for the DOE to calculate site-specific residual radioactive material guidelines and radiological dose and risk to an on-site individual at a radioactively contaminated site. The code is continuously improved and updated in response to suggestions from users and to incorporate new features that facilitate user interaction and increase the capabilities and flexibility of the code. RESRAD-CHEM, which was derived from RESRAD, is used to calculate risks from chemical contaminants. The RESRAD-CHEM database includes 151 chemicals. A recent improvement to RESRAD is the addition of a Latin hypercube-Monte Carlo

preprocessor that allows statistical distributions to be specified in place of single values for input parameters. The code is being extended to include off-site modeling capability.

In the RESRAD code, a pathway analysis method is used in which a pathway sum is calculated to relate the radiological dose and risk to the concentration of a radionuclide in soil. The pathway sum is the total of the pathway factors for each of the applicable routes of exposure. The pathway factor accounts for radioactive decay and ingrowth, transport, transfer, (bio)accumulation, and radiological potency of the contaminant. RESRAD models the following exposure pathways:

- External radiation from the ground;
- Inhalation of contaminated dust, radon and radon progeny, and gaseous airborne radionuclides;
- Ingestion of plant food contaminated by root uptake, foliar deposition, and irrigation water;
- Ingestion of meat and milk contaminated by fodder, livestock water, and soil ingestion;
- Ingestion of fish and aquatic foods contaminated by lake water;
- Ingestion of water from a contaminated well or surface water source; and
- Ingestion of contaminated soil.

1.3 SCENARIO DESCRIPTION

The layout of the hypothetical UMT pile specified for this test scenario (version 1.07) is shown in Figure 1. A 1,000-m-long, 500-m-wide, 10-m-high UMT pile would release contaminants at a constant rate, both to the atmosphere and to the groundwater immediately below it, for a period of 1,000 years. The groundwater flows parallel to the length of the pile and would transport the contaminants to a 10-m-deep well and a river situated 1,000 m from the downgradient edge of the pile. The river flows through a lake in the test region. The test region is a 22.5-degree sector of a 10-km radius centered on the pile. The test region consists of two zones: zone A is within a radius of 5 km from the pile, and zone B is the rest of the test region. The receptors of interest for each zone are located at 2.5 km and at 7.5 km from the pile. Except for a 1-hectare plot of lettuce (located 2.5 km from the UMT pile) that is irrigated with well water, zone A is unirrigated pastureland. Zone B is evenly divided between unirrigated pasture and lettuce fields irrigated with lake water. The scenario stipulates that the leachate from the pile is diluted only by lateral dispersion and that

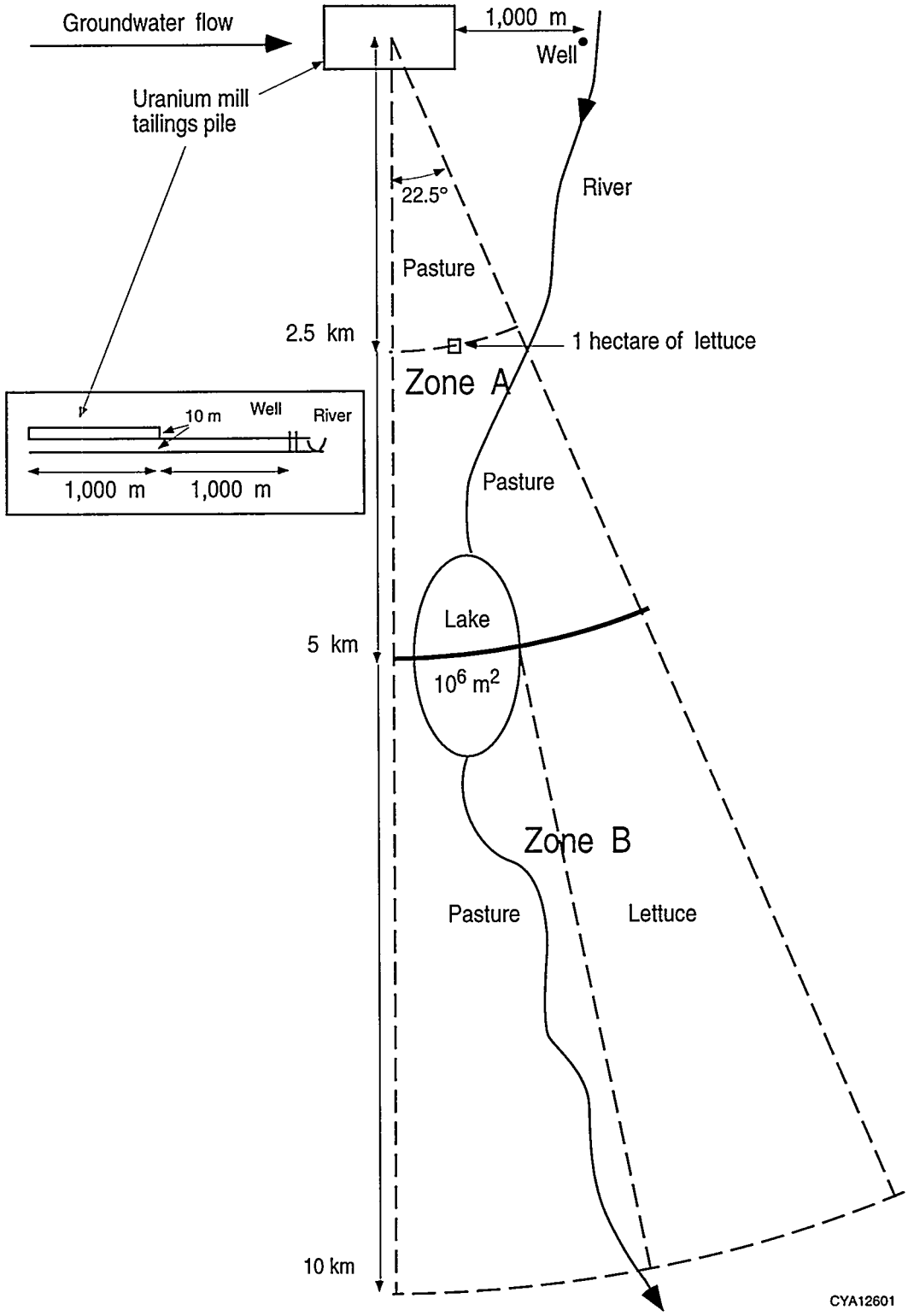

FIGURE 1 Layout of Scenario (Source: Modified from BIOMOVS II 1995)

the river dilutes the contaminants by a factor of 10. Livestock and humans in zone A obtain water from the well, and the lake is the source of water for the occupants of zone B. The atmospheric release is dispersed by wind that has a uniform wind rose.

The scenario required the prediction of the concentration of each contaminant in different media, the annual individual effective dose due to each radionuclide for each exposure pathway, the annual intake of each stable element for each exposure pathway, and the lifetime average risk of cancer incidence from all pathways. Separate predictions were required for the atmospheric source and the groundwater source.

The relevant sections of the scenario issued by the UMT Working Group are reproduced in Appendix A.

2 MODELING THE SCENARIO WITH RESRAD

The application of RESRAD to UMT scenario version 1.07 is described in this chapter. Section 2.1 describes the modifications and additions made to RESRAD, release version 5.13, in order to model the scenario. The procedure used to model the scenario with RESRAD is described in Section 2.2.

2.1 MODIFICATIONS TO RESRAD

Excess cancer risk is reported in two forms in RESRAD. One of the forms allocates the risk to the radionuclides present at the point of exposure. The other form assigns the risk to the nuclide initially present in the contaminated zone. The dose is reported only in one format — as being due to the radionuclides initially present in the contaminated zone. The test scenario requires calculation of the dose from the nuclides present at the point of exposure. Therefore, a module was added to RESRAD to sum the dose due to each nuclide present at the point of exposure arising from all of the parent nuclides present in the contaminated zone.

The test scenario also specifies different interception factors for wet and dry deposition and also for different classes of vegetation (leafy vegetables and pasture). With RESRAD, the same interception factor is used for all classes of vegetation and types of deposition; therefore, the code was modified to accommodate six different interception factors. The following factors dealing with the interception pathway could not be changed by the user: deposition velocity, exposure period, annual yield, and weathering half-life. The values specified in the scenario were written into the modified RESRAD code.

2.2 SIMULATION OF THE SCENARIO WITH RESRAD

2.2.1 General

The test scenario uses SI (*Système International*) units of measure. Although the centimeter-gram-second system of units is used in RESRAD, RESRAD output in SI units can be obtained by specifying the soil concentrations in units of becquerels per gram, the dose factors in units of sieverts per becquerel, and the risk factors in units of risk per becquerel.

The scenario requires a constant release of the contaminants. The leaching model of RESRAD, in the absence of erosion of the contaminated zone, is a first-order rate equation. The amount of contaminants in the contaminated zone decreases exponentially under a first-order leach

model. In such a situation, the release rate can be kept effectively constant by specifying low leach and mass loading rates coupled with a large inventory. Although this procedure minimizes the effect of leaching, the release rate decreases because of radioactive decay.

The scenario also requires that the releases stop after 1,000 years. The RESRAD code does not have a provision to truncate or modify the release after a specified time. Hence, two sets of runs, offset from each other by 1,000 years, were required. The difference between the two outputs gave the output for a truncated release. The offset run was required because radioactive decay, ingrowth, and leaching diminish the concentration of the contaminants to differing extents over the 1,000-year period. The values shown in Table 1 were used in combination with a solids emission rate of 0.01 g s^{-1} to obtain the specified atmospheric release rates.

The dilution factor of the on-site well is computed by RESRAD on the basis of the amount of water contributed to the well from infiltration through the contaminated zone and that from uncontaminated groundwater. A dilution factor of 1/12 was computed for this scenario with RESRAD. Lateral dispersion, computed according to Section K.2 of Appendix K of the RESRAD manual (Yu et al. 1993), leads to a dilution factor of 0.84. Thus the RESRAD output had to be multiplied by 12×0.84 (= 10.08) to meet the requirements of the scenario. Instead of multiplying each of the outputs, multiplying the contaminant concentration by that factor was easier. The combination of values used for the groundwater source is shown in Table 1.

TABLE 1 Input Values of Concentration and Distribution Coefficients of Contaminants in the Tailings

		Activity Concentration in Soil (Bq [or mg] g^{-1})			
		Atmospheric Source		Groundwater Source	
Contaminant	$^{cz}K_d$ (m^3 kg^{-1})	Initial	1,000-yr Offset	Initial	1,000-yr Offset
U-238	6.2	620	619.3	6,250	6,242
U-234	6.2	620	619.3	6,250	6,242
Th-230	1,000	10,000	9,916	100,800	99,949
Ra-226	50	10,000	9,983	100,800	100,629
Pb-210	50	10,000	9,984	100,800	100,639
Po-210	50	10,000	9,983	100,800	100,629
As	500	71.4	71.4	719.7	719.7
Cr	1	7.14	7.089	719.7	71.46
Ni	1	0.714	0.7089	719.7	7.146

2.2.2 Atmospheric Source Term

Because RESRAD version 5.13 was designed for on-site cultivation on the land over the contaminated zone, several precautions were necessary to ensure that the desired off-site end points were obtained. A root depth of zero prevented root uptake from the contaminated zone. The fraction of water from the contaminated site was set to zero to suppress the contribution from the groundwater release. The external radiation, milk, fish, drinking water, soil ingestion, and radon pathways were suppressed. The dust mass loading rate was calculated by using Equation K.2 of Yu et al. (1993). The dust mass loadings for zones A and B were 2.56E-09 and 4.64E-10 g m^{-3}, respectively. An additional run was performed to account for root uptake following atmospheric deposition, as described in Section 2.2.4.

2.2.3 Groundwater Source Term

Setting the cover depth at 1 m, which is greater than the root and mixing depths, ensured that direct root uptake from the contaminated zone and the dust subpathways were suppressed. The RESRAD code includes the assumption that all classes of vegetation are irrigated to the same extent with contaminated water. The scenario required that only lettuce be irrigated. Because no other means of contaminating the livestock fodder for the groundwater release existed, the livestock fodder intake was set to zero to suppress the irrigation of fodder. The RESRAD code also includes the assumption that any excess irrigation water passes through the contaminated zone (on-site cultivation). The infiltration through the contaminated zone was limited to the specified value of 0.1 m yr^{-1} by the proper choice of evapotranspiration coefficient. Because RESRAD version 5.13 did not provide for off-site transport through the saturated zone, the methodology of Section K.2 of Appendix K of Yu et al. (1993) was used to simulate the saturated zone as an unsaturated zone of unit saturation ratio.

2.2.4 Off-Site Accumulation in Soil

In the test scenario, the two receptors are located at distances of 2.25 km and 7.25 km from the edge of the contamination. The agricultural and animal products consumed by the test individuals are also obtained from these same off-site locations. Atmospheric deposition and irrigation with contaminated water will lead to accumulation of contaminants at these off-site locations. The scenario stipulates that the off-site accumulation is removed at a half-life of 100 years. Version 5.13 of RESRAD cannot model this accumulation. Hence, a methodology to compute the off-site accumulation resulting from atmospheric deposition was developed (Appendix B). Because this methodology had not been implemented in the code at that time, the off-site soil content of the contaminants at different times was computed by using a spreadsheet. These off-site soil concentrations were then used in RESRAD runs to predict the external radiation dose and the contribution of root uptake from off-site accumulation due to atmospheric deposition.

3 RESULTS

The tabular results requested by the scenario description are given in Appendix C. The maximum value in each column of each table is shown in bold type. The concentration, dose, and risk data for zone A are shown in Figures 2 through 24 (which are located at the end of Chapter 3). Data for zone B are not plotted because they are simply a rescaling of the zone A figures for all but the fish pathway and the sum over pathways. The fish from the lake are consumed by the receptors in both zones. The atmospheric release output for zone B is 0.18 times the output for zone A; the scaling factor for groundwater release is 0.12.

The radiological dose from the atmospheric release received by the receptor in zone A is shown in Figure 2. The dose from all active pathways increases over time because of the accumulation of contaminants in the off-site location. At the end of the 1,000-year release period, the contaminants that accumulate at the off-site location make up 30% of the radiological dose. Thus the off-site accumulation process makes a significant contribution to the total dose and needs to be considered when the radiological consequences to an off-site receptor are being modeled. This rise over time is noticeable in Figure 12 (dose and intake from the ingestion of lettuce) for Ra-226, which has the highest soil-to-plant transfer factor in this scenario. In Figure 13 (dose and intake from the ingestion of beef), this effect is again most pronounced for Ra-226; however, a noticeable rise occurs in the curves for Cr, Po-210, Ni, As, U-234, and U-238. Root uptake following accumulation has a greater effect on the dose and intake from the ingestion of beef than on the dose and intake from the ingestion of lettuce. This greater effect occurs because the greater crop yield (1.85 kg m^{-2}) and lower foliar interception factor (0.5) of pasture reduce the extent of contamination by foliar interception when compared with lettuce, which has a yield of 1.4 kg m^{-2} and a foliar interception factor of 0.7.

The radiological dose to the receptor in zone A due to the groundwater release is shown in Figure 3. The dose contributions of all pathways mirror the shape of the concentration in groundwater shown in Figure 14 because off-site accumulation of contaminants from irrigation was not taken into account. The first increase in dose is due to the breakthrough of uranium at around 60 years, and the second is due to the breakthrough of radium, lead, and polonium at about 600 years. The dose decreases after 1,000 years and stabilizes at a steady value after 1,600 years, when the uranium and radium that were released in the 1,000-year release period pass the well. The thorium that was released into the aquifer does not break through in the 10,000-year prediction period, but the thorium (and its progeny) formed in transit from the uranium that was released accounts for the constant dose observed from 1,600 years to the end of the forecast horizon. The fluctuations about the steady value during this period, seen in Figure 3, are due to the use of two offset runs to model the truncated release. The two runs give nearly equal results, and rounding off these numbers to three or four significant figures causes these fluctuations when taking the difference

between them. This observation illustrates the importance of providing the user with the option to input a step change in the release from the contaminated zone.

Agreement was good among the predictions of all of the models for the atmospheric release except in the case of off-site accumulation. The results for off-site accumulation varied because some models used a removal half-life that was different from the 100-year value specified in the scenario description (BIOMOVS II 1995). The RESRAD predictions for the atmospheric release compared well with the predictions of the other models in the study (Figures 2 through 18 of BIOMOVS II [1995]).

Considerable differences were found among the predictions of the nine models for the groundwater release. The peak and steady-state values predicted by RESRAD again agreed with the predictions of most of the other models; however, two important differences were seen in the RESRAD predictions. A later breakthrough was predicted by RESRAD, compared with the other models, due to the differences in the formulation for the retardation factor. Sharper changes in the concentration were also predicted by RESRAD, as opposed to the more gradual changes predicted by the other models, which accounted for longitudinal dispersion.

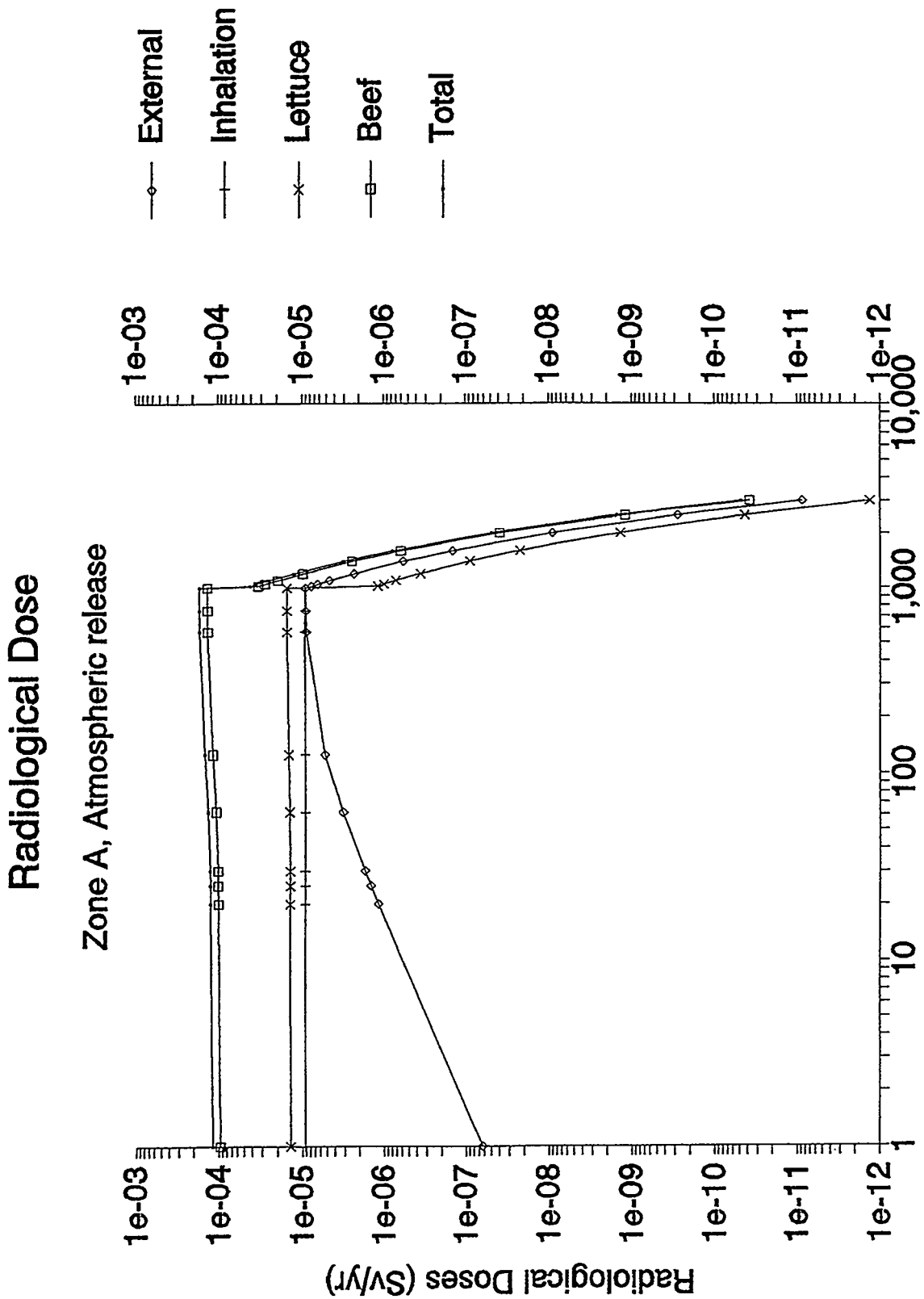

FIGURE 2 Contribution of Pathways to Total Dose from Atmospheric Release

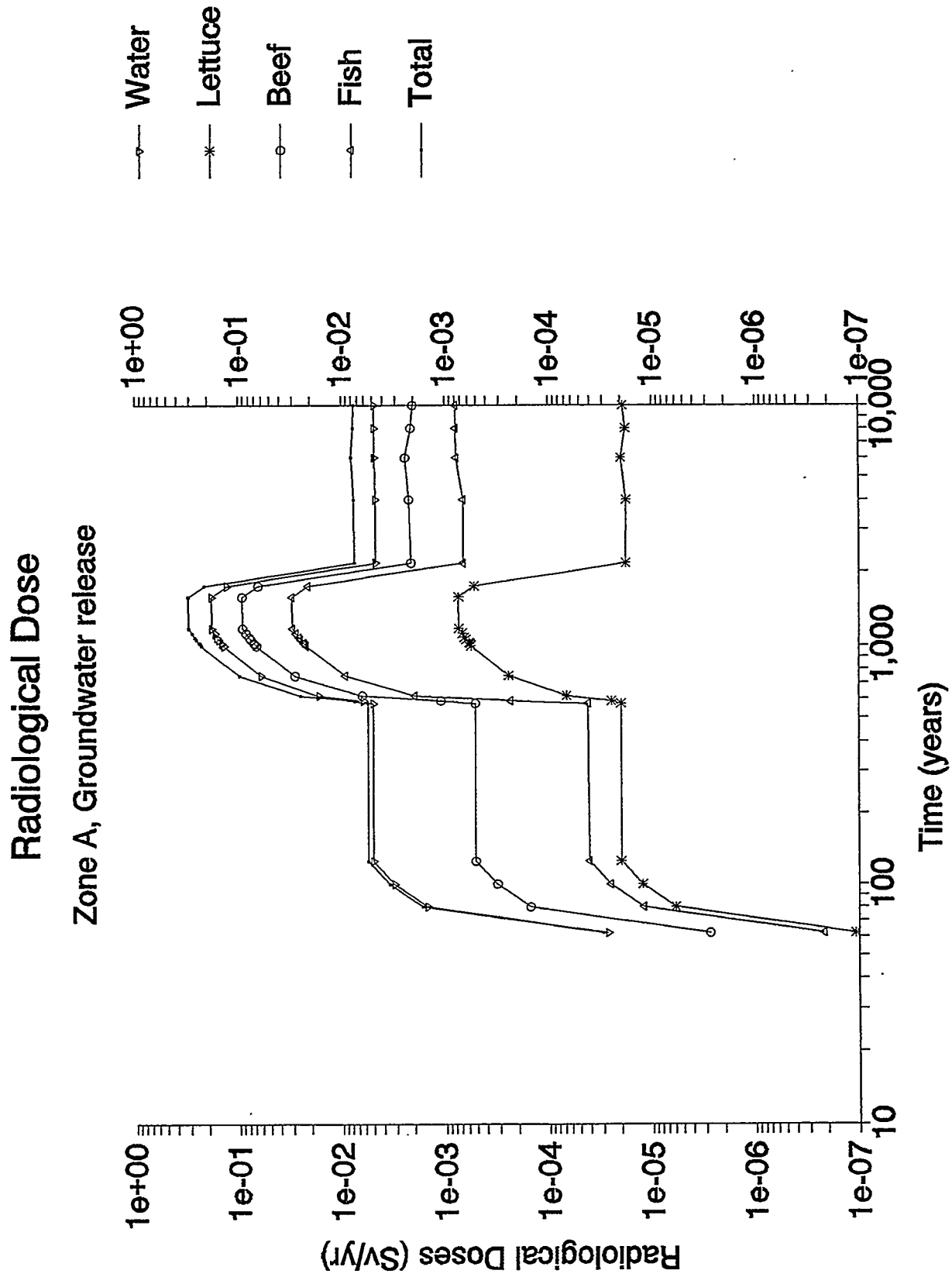

FIGURE 3 Contribution of Pathways to Total Dose from Groundwater Release

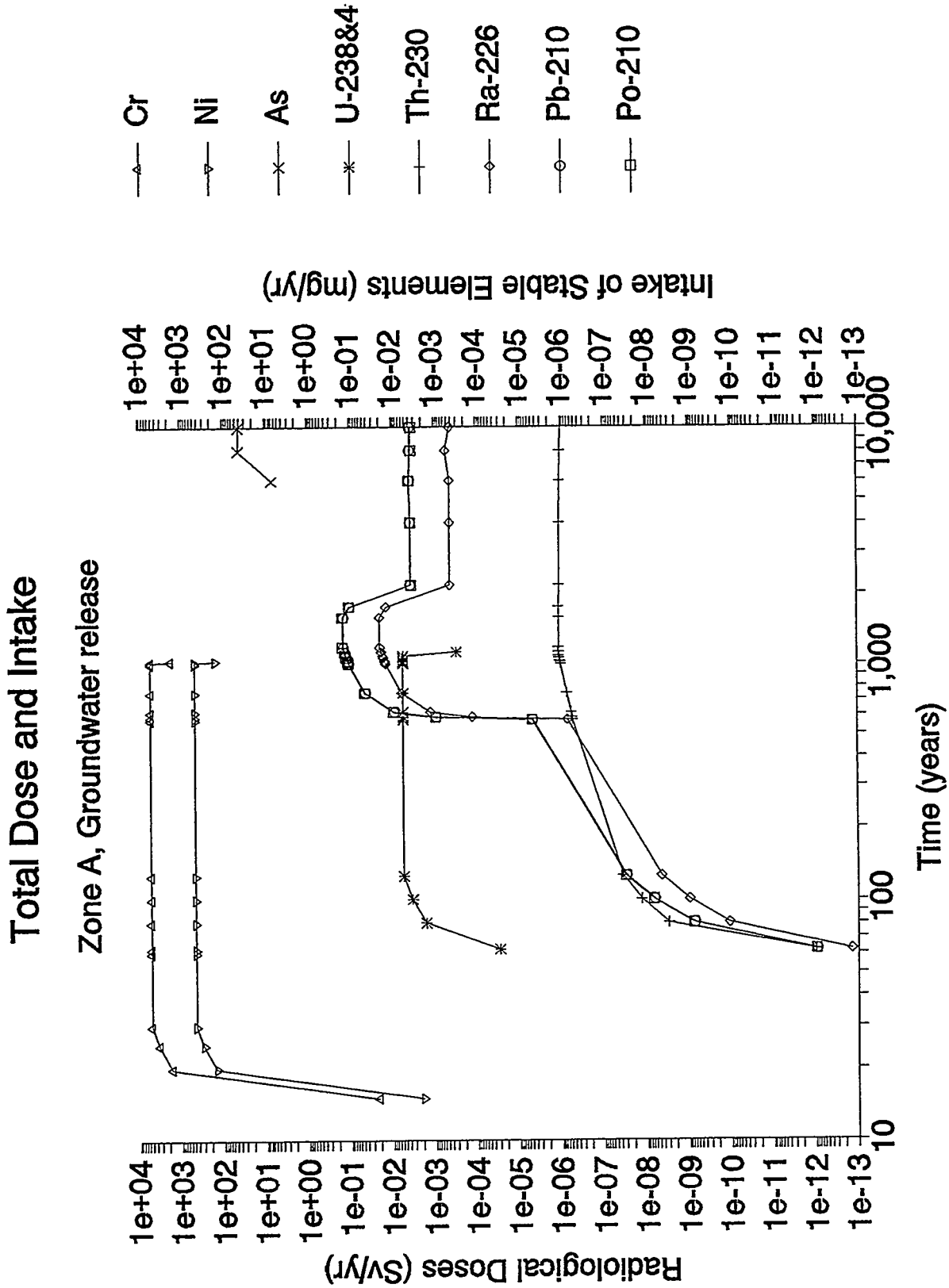

FIGURE 4 Total Radiological Dose from Radionuclides at Point of Exposure and Total Intake of Stable Elements for Groundwater Release

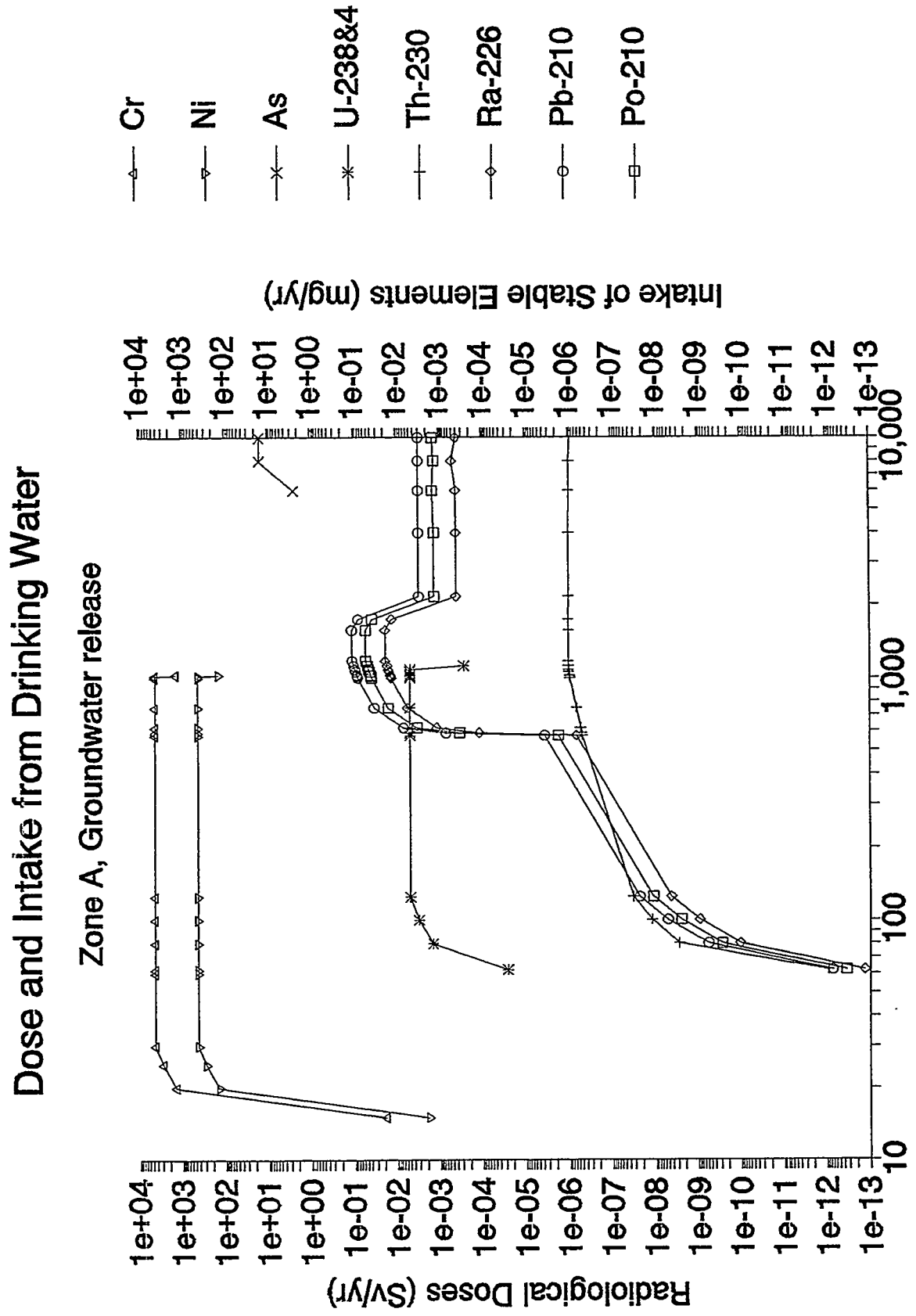

FIGURE 5 Radiological Dose from Radionuclides at Point of Exposure and Intake of Stable Elements Due to Ingestion of Drinking Water for Groundwater Release

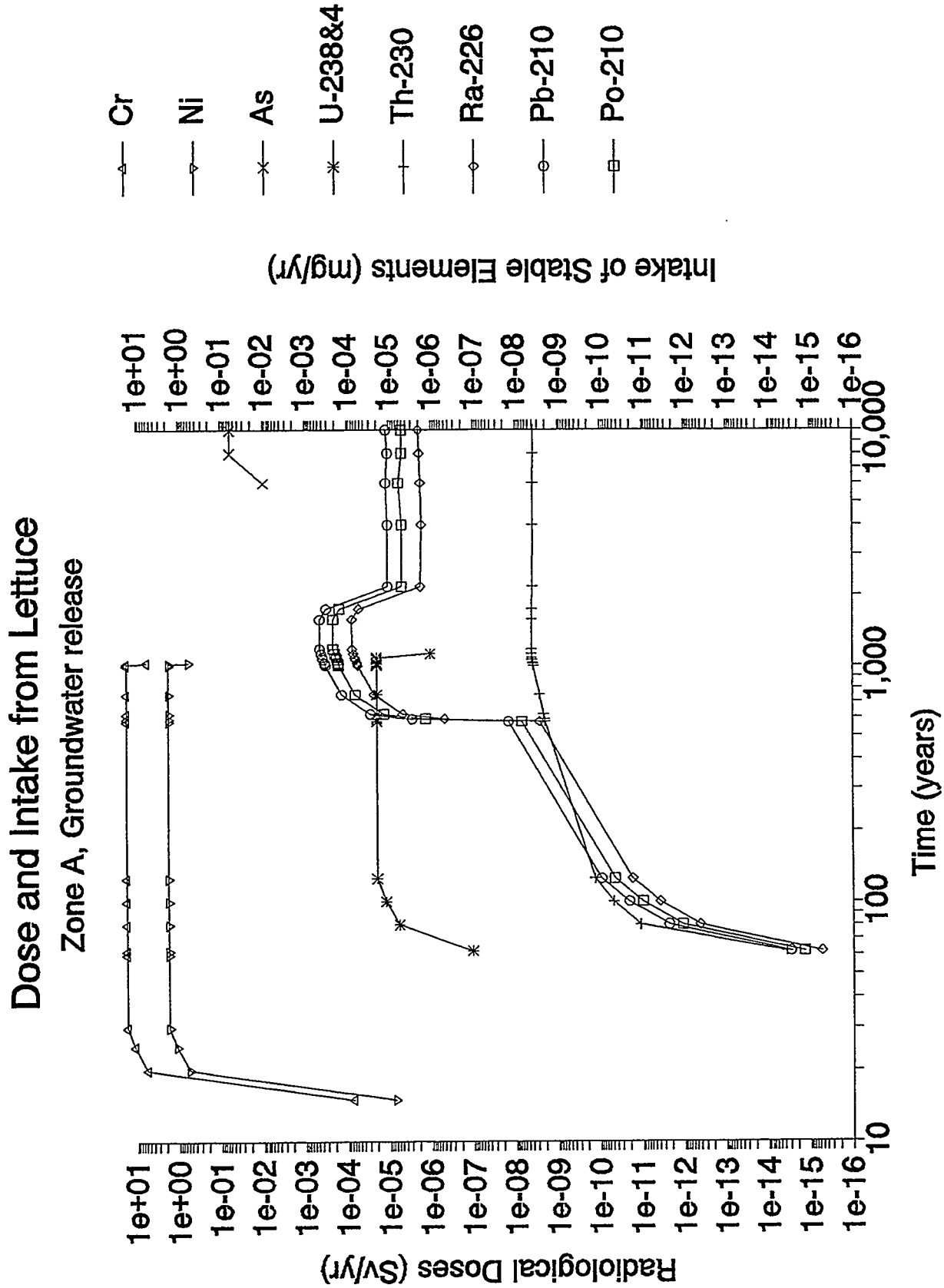

FIGURE 6 Radiological Dose from Radionuclides at Point of Exposure and Intake of Stable Elements Due to Ingestion of Lettuce for Groundwater Release

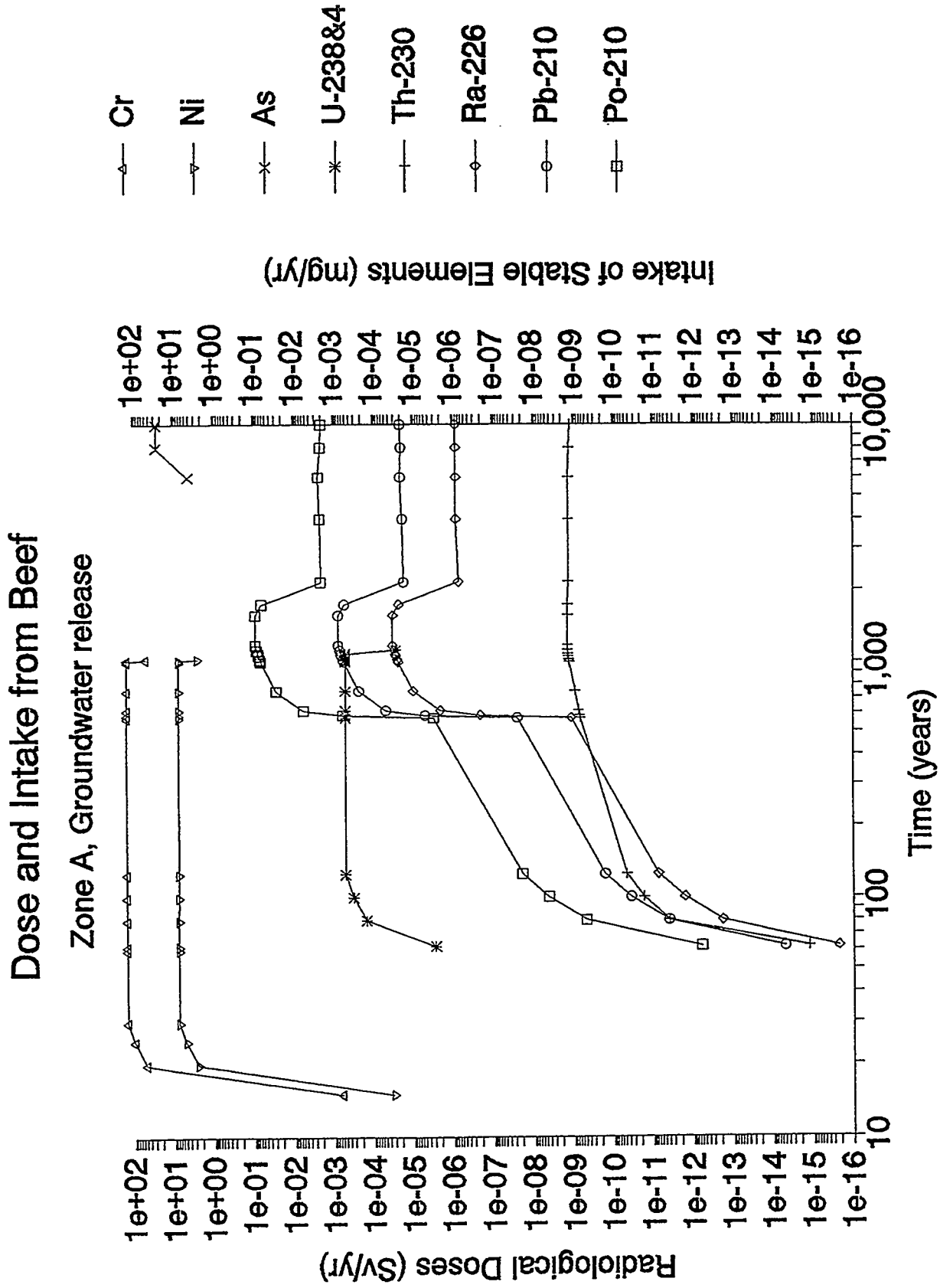

FIGURE 7 Radiological Dose from Radionuclides at Point of Exposure and Intake of Stable Elements Due to Ingestion of Beef for Groundwater Release

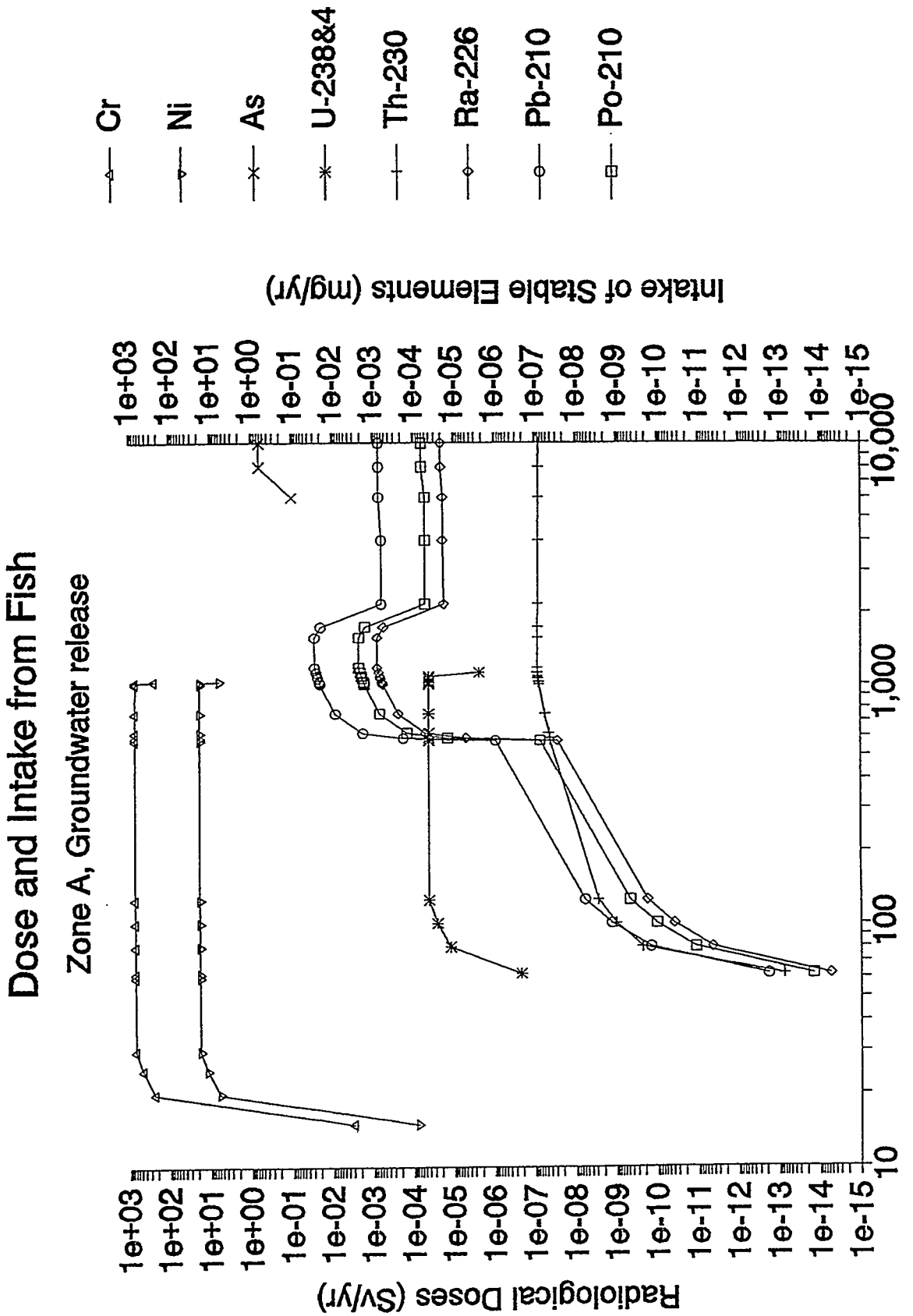

FIGURE 8 Radiological Dose from Radionuclides at Point of Exposure and Intake of Stable Elements Due to Ingestion of Fish for Groundwater Release

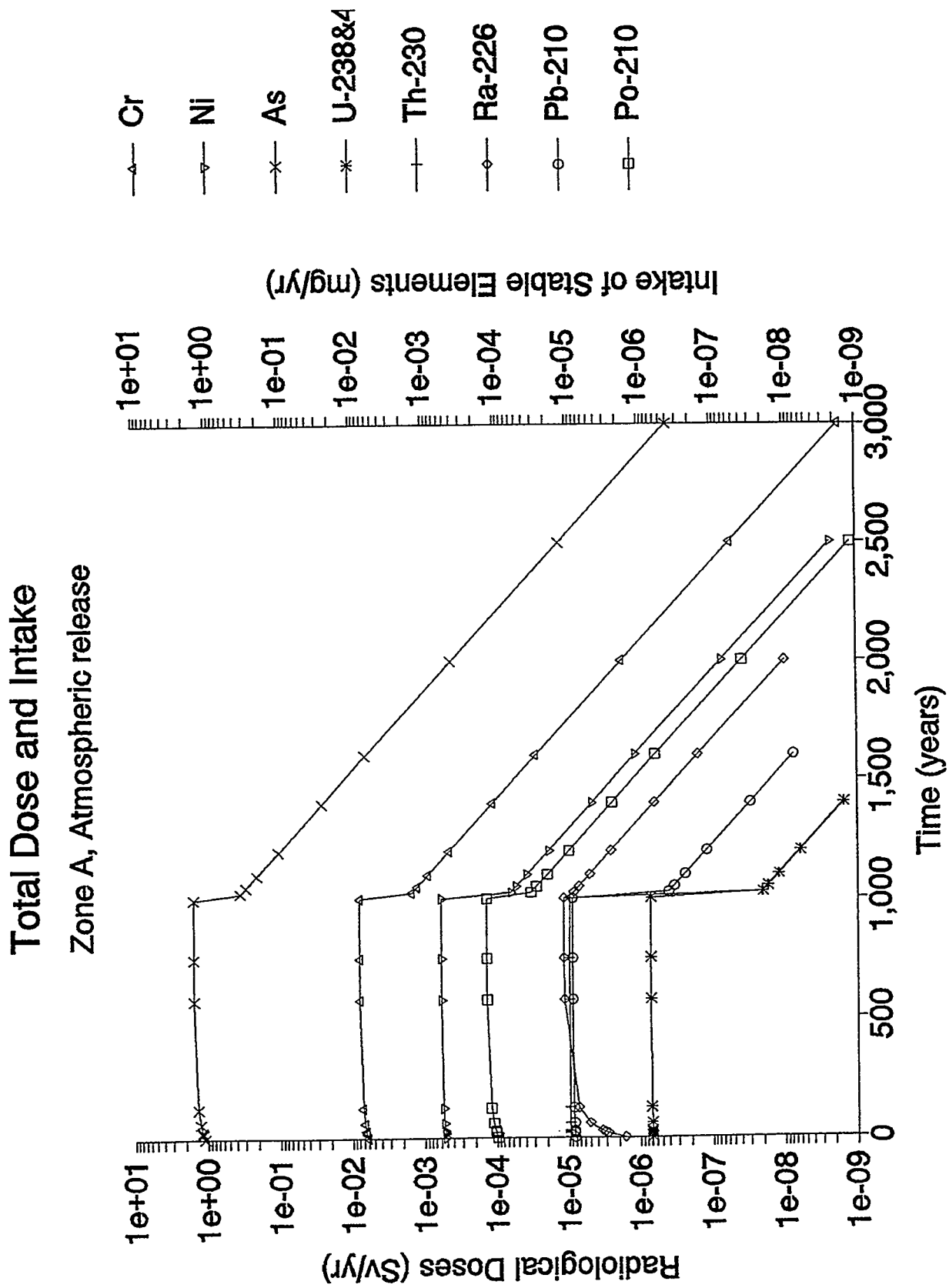

FIGURE 9 Total Radiological Dose from Radionuclides at Point of Exposure and Total Intake of Stable Elements for Atmospheric Release

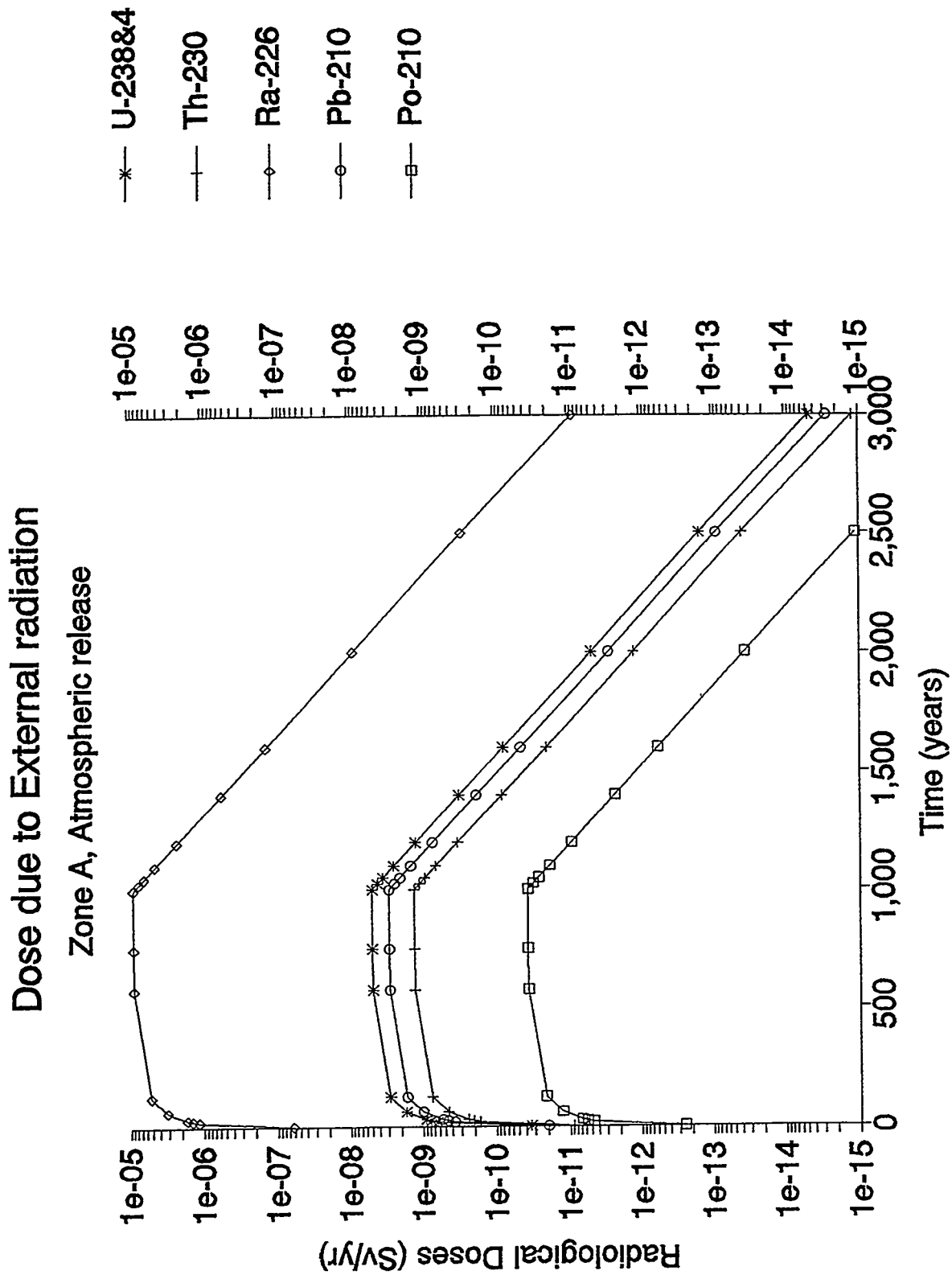

FIGURE 10 Radiological Dose Due to External Radiation from Radionuclides at Point of Exposure for Atmospheric Release

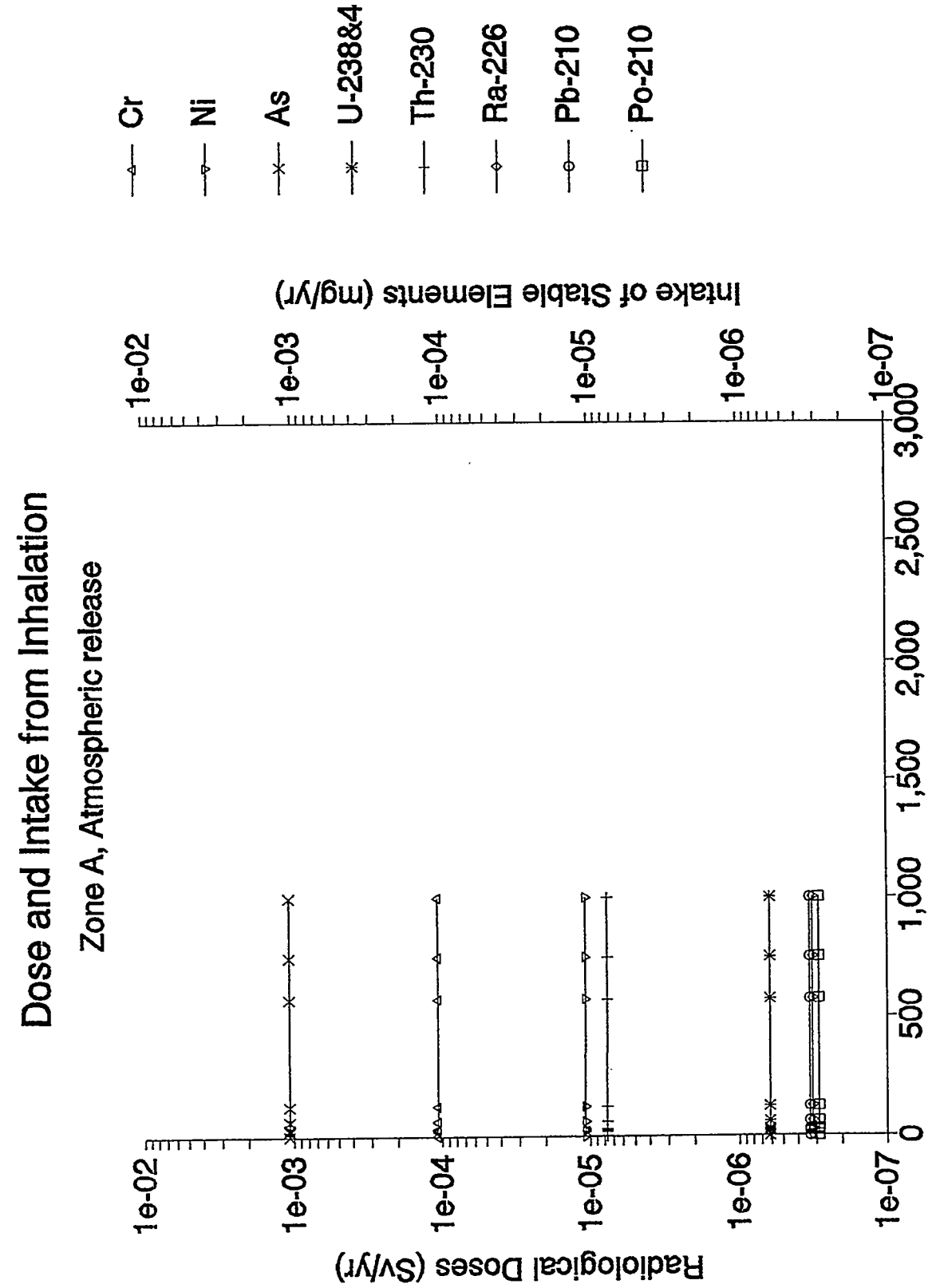

FIGURE 11 Radiological Dose from Radionuclides at Point of Exposure and Intake of Stable Elements Due to Inhalation for Atmospheric Release

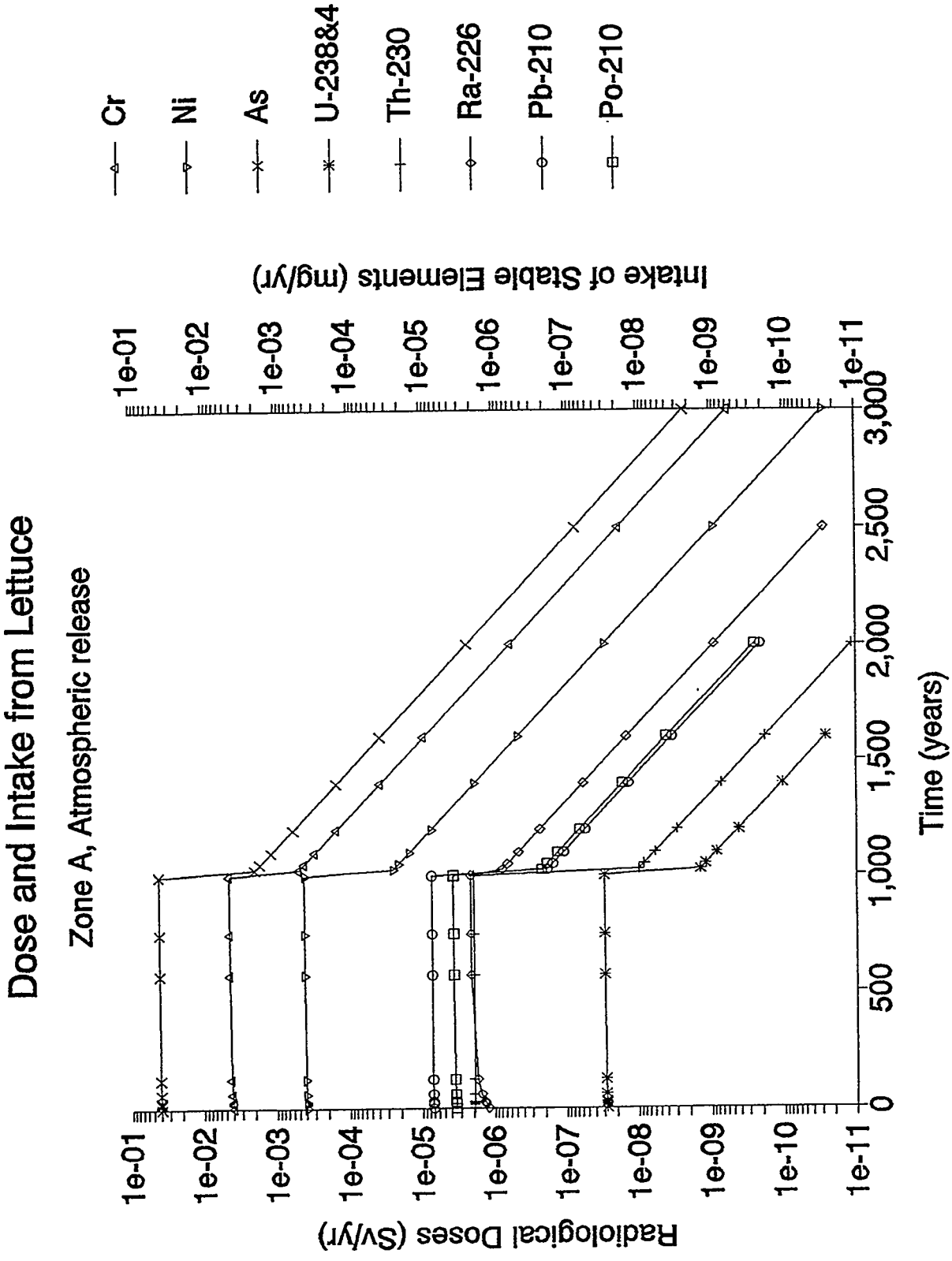

FIGURE 12 Radiological Dose from Radionuclides at Point of Exposure and Intake of Stable Elements Due to Ingestion of Lettuce for Atmospheric Release

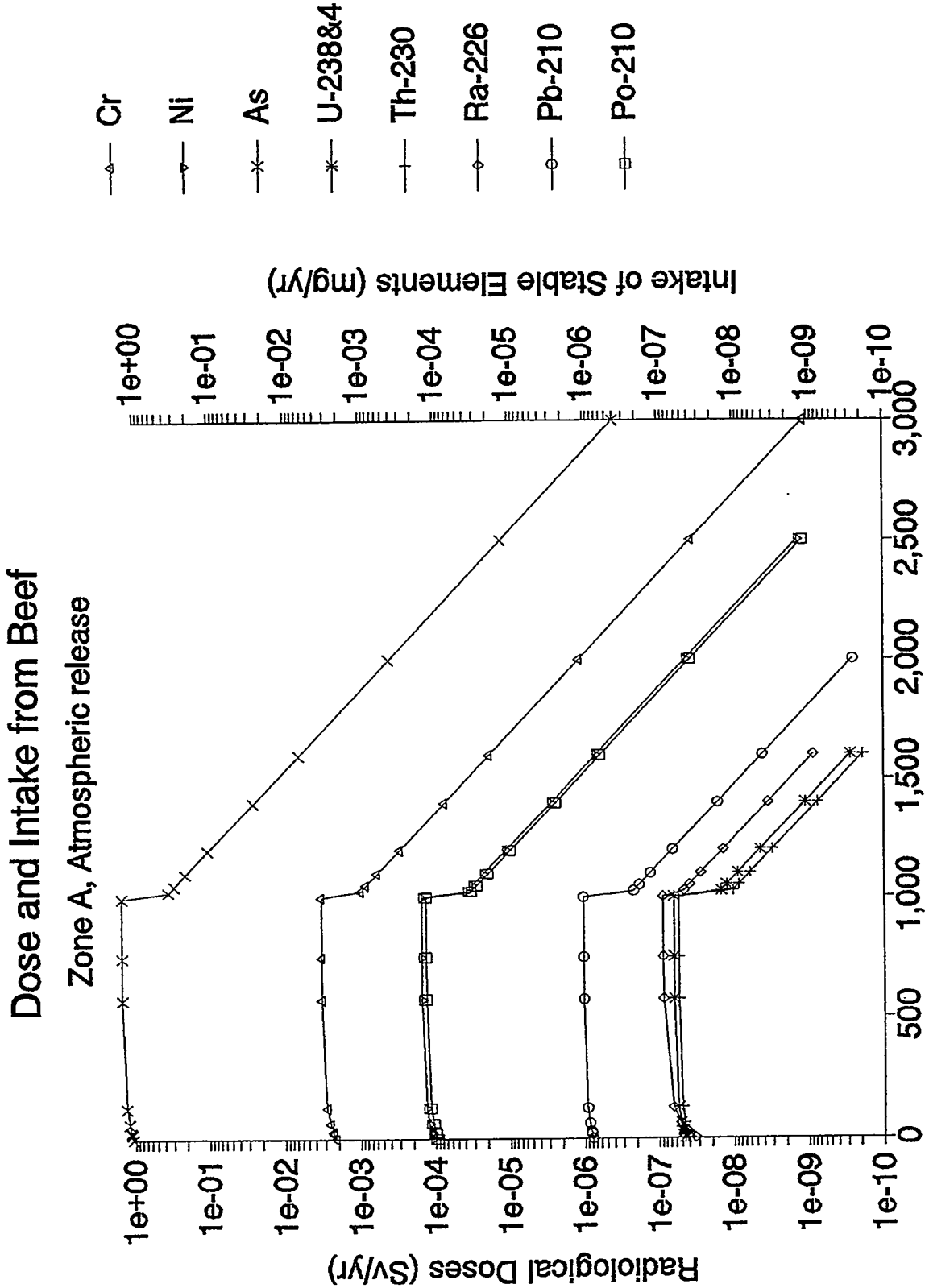

FIGURE 13 Radiological Dose from Radionuclides at Point of Exposure and Intake of Stable Elements Due to Ingestion of Beef for Atmospheric Release

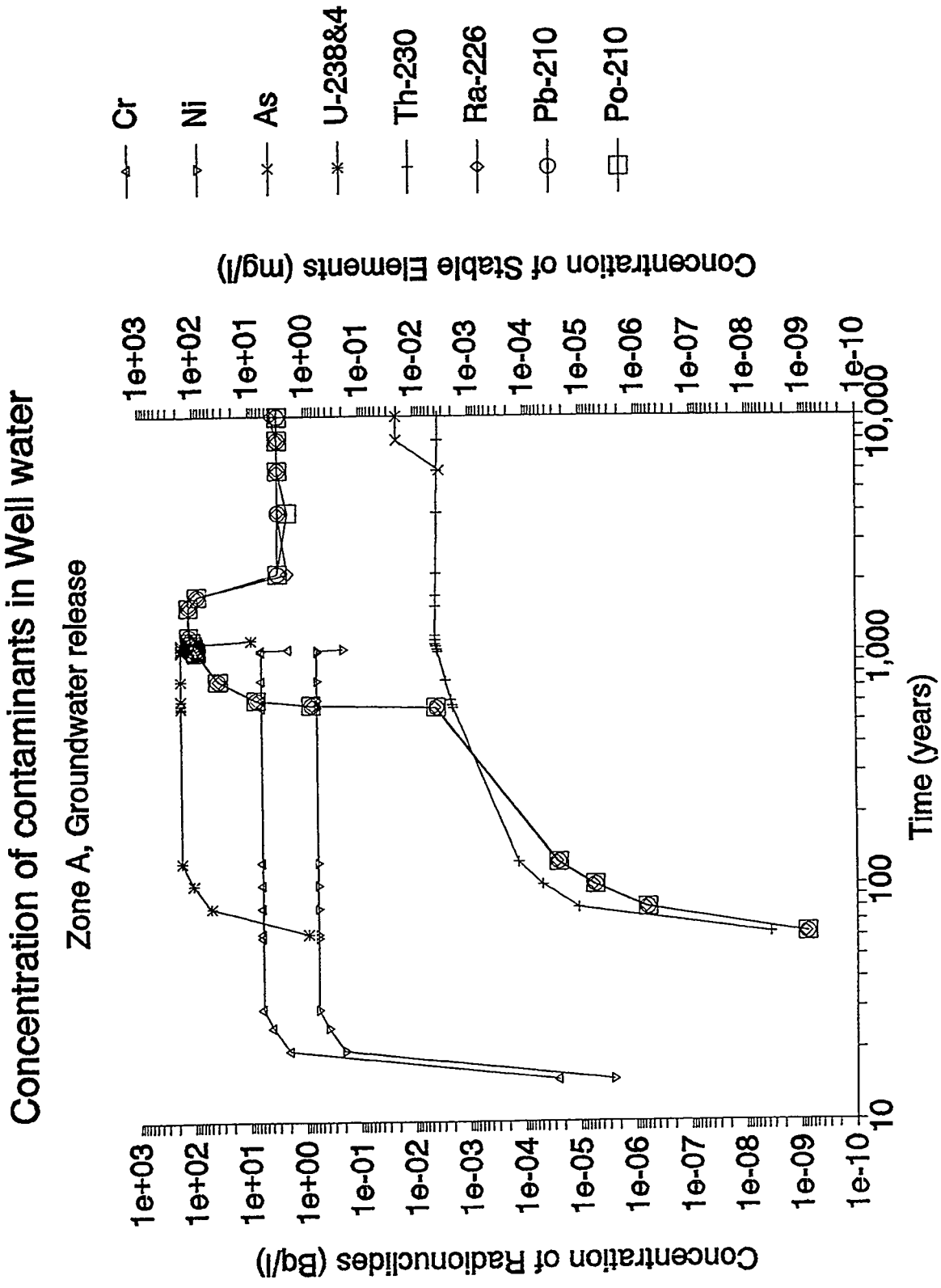

FIGURE 14 Concentrations of Radionuclides and Stable Elements in Well Water Due to Groundwater Release

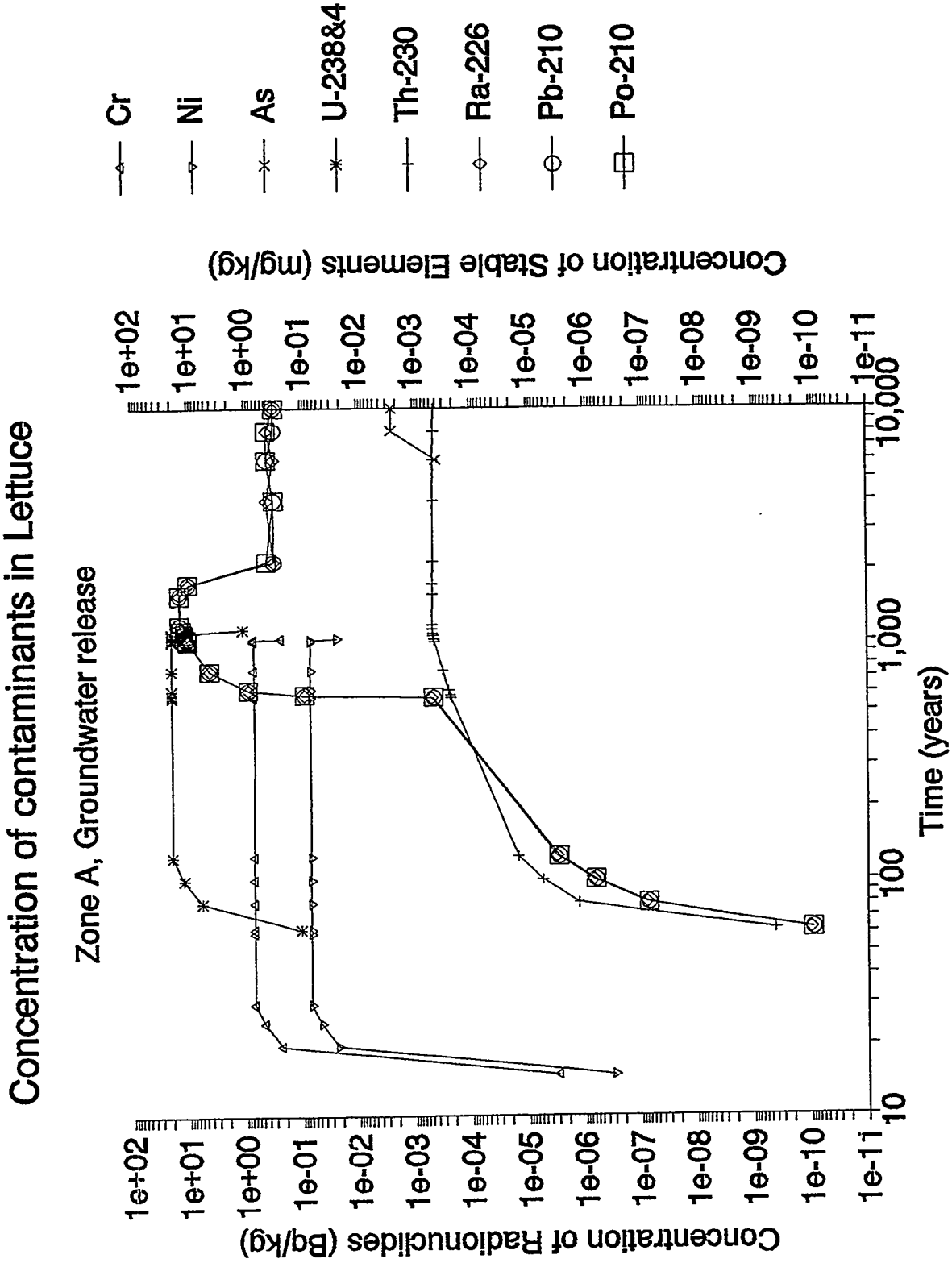

FIGURE 15 Concentrations of Radionuclides and Stable Elements in Lettuce Due to Groundwater Release

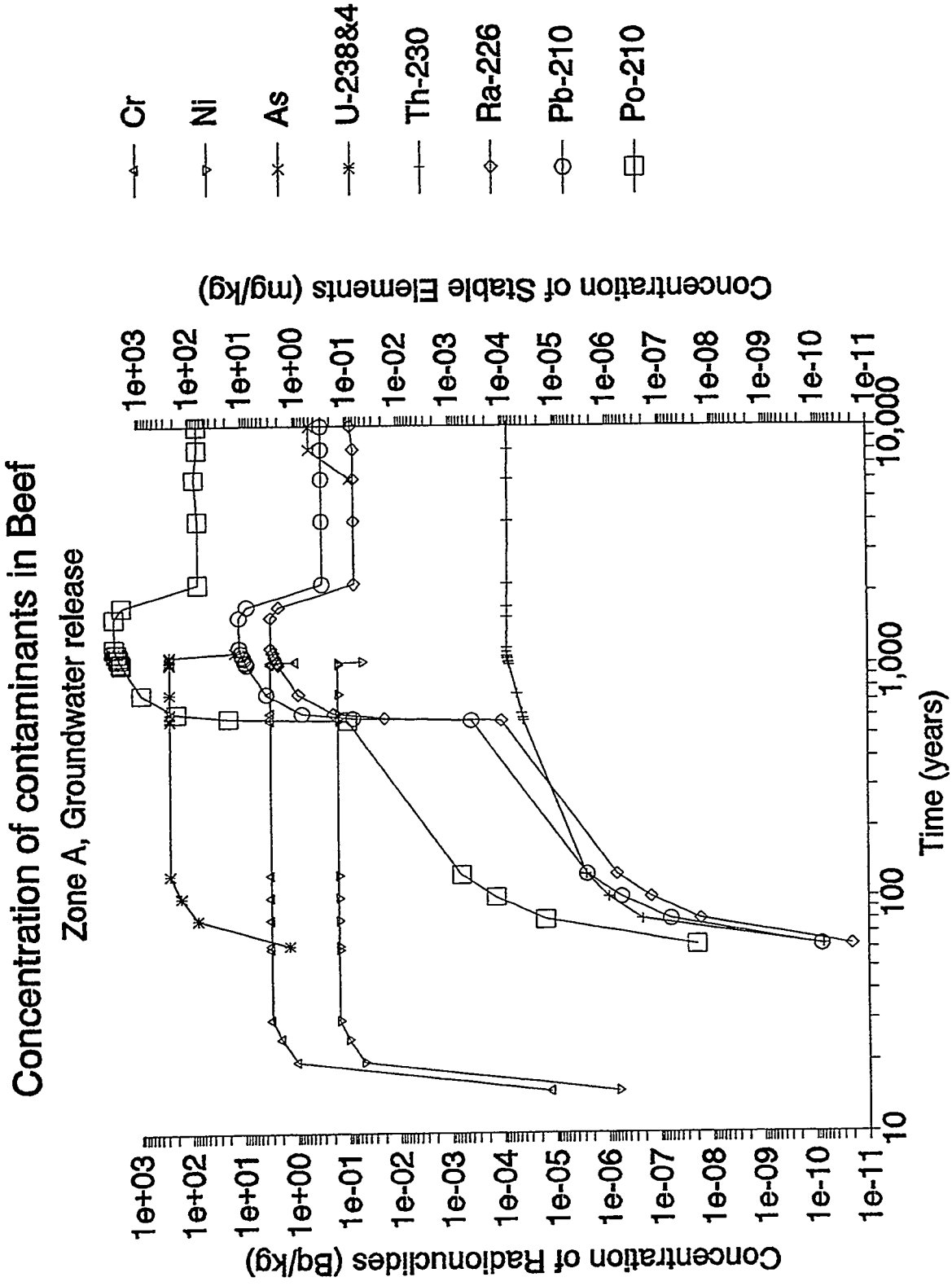

FIGURE 16 Concentrations of Radionuclides and Stable Elements in Beef Due to Groundwater Release

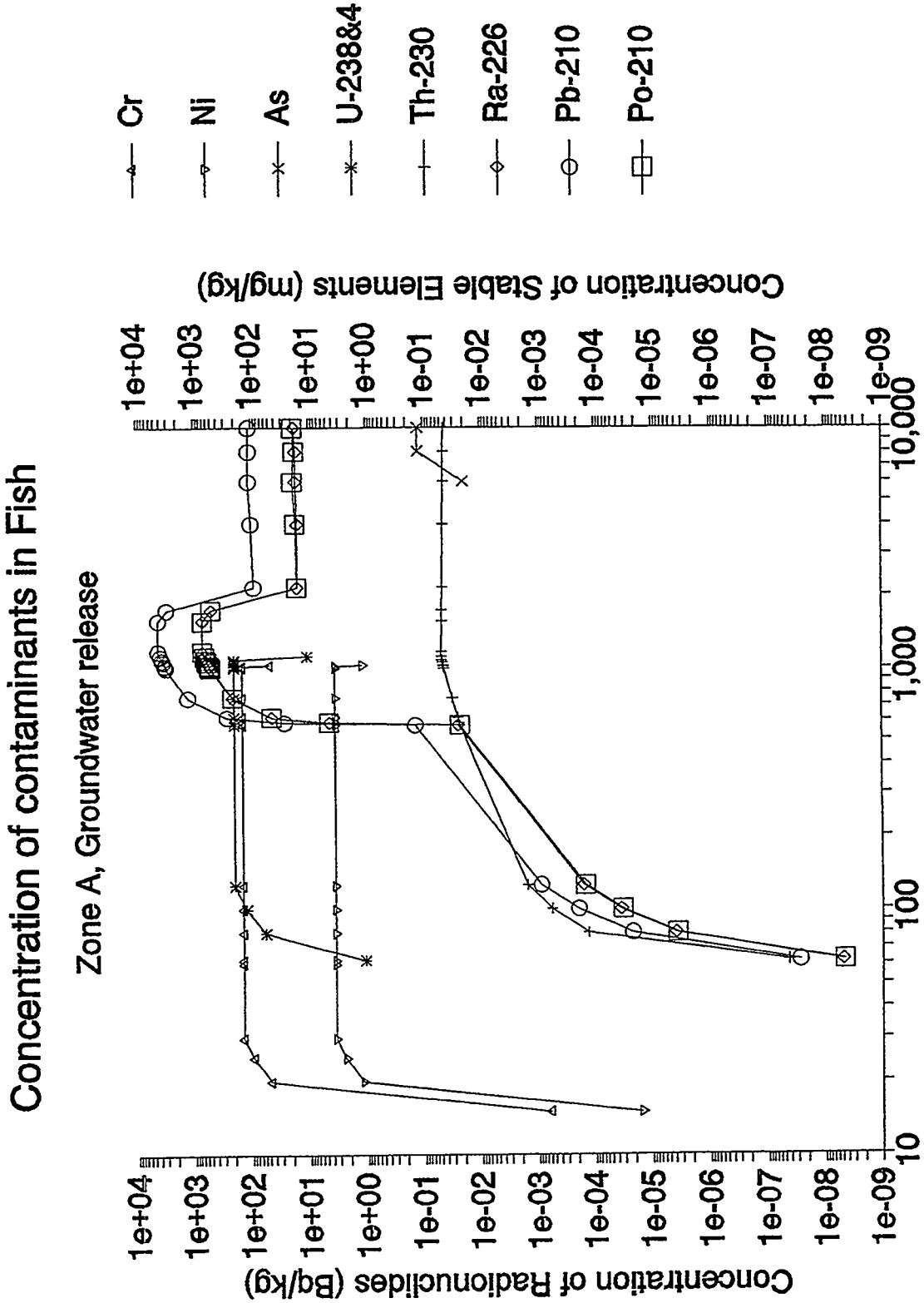

FIGURE 17 Concentrations of Radionuclides and Stable Elements in Fish Due to Groundwater Release

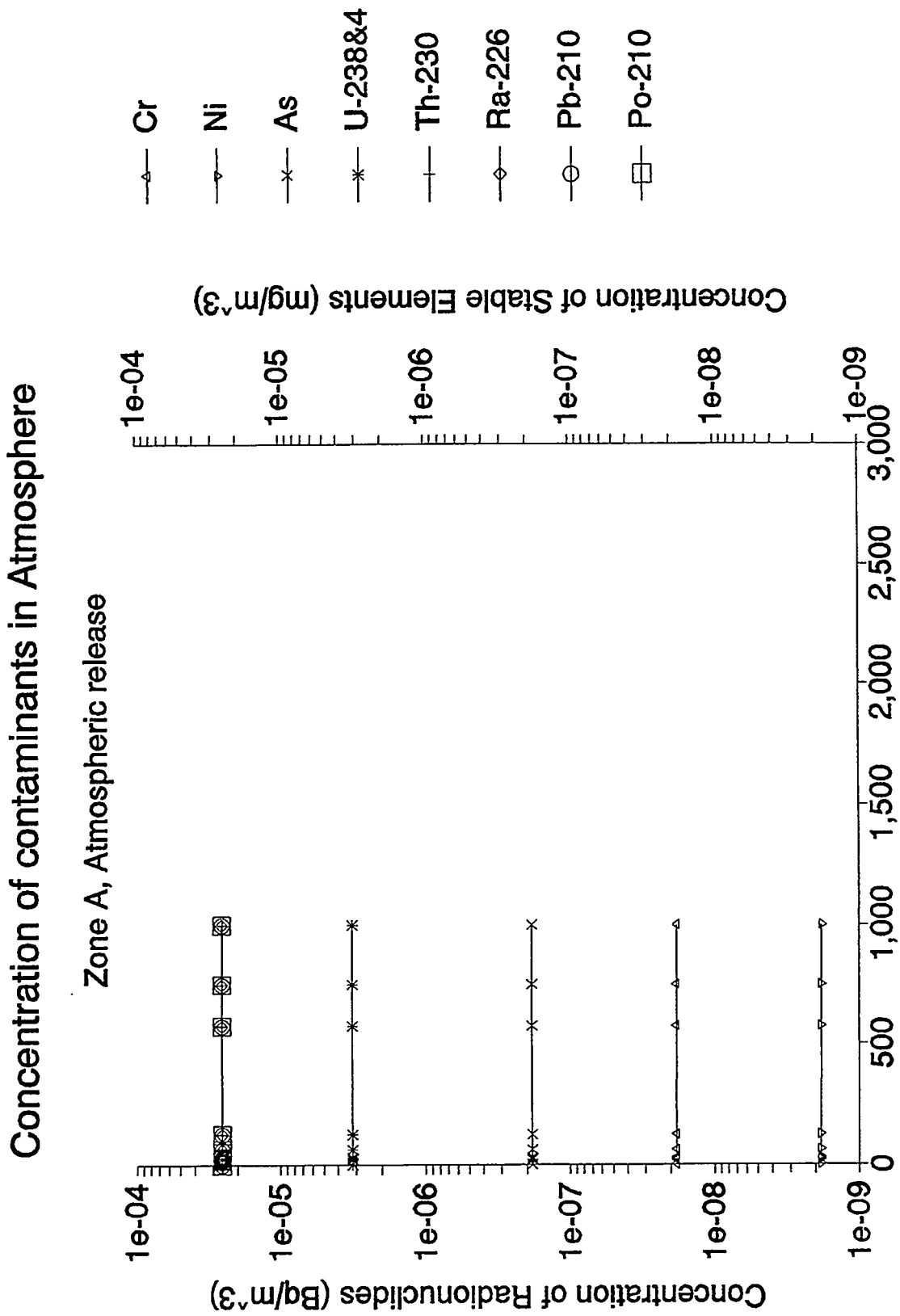

FIGURE 18 Concentrations of Radionuclides and Stable Elements in Air Due to Atmospheric Release

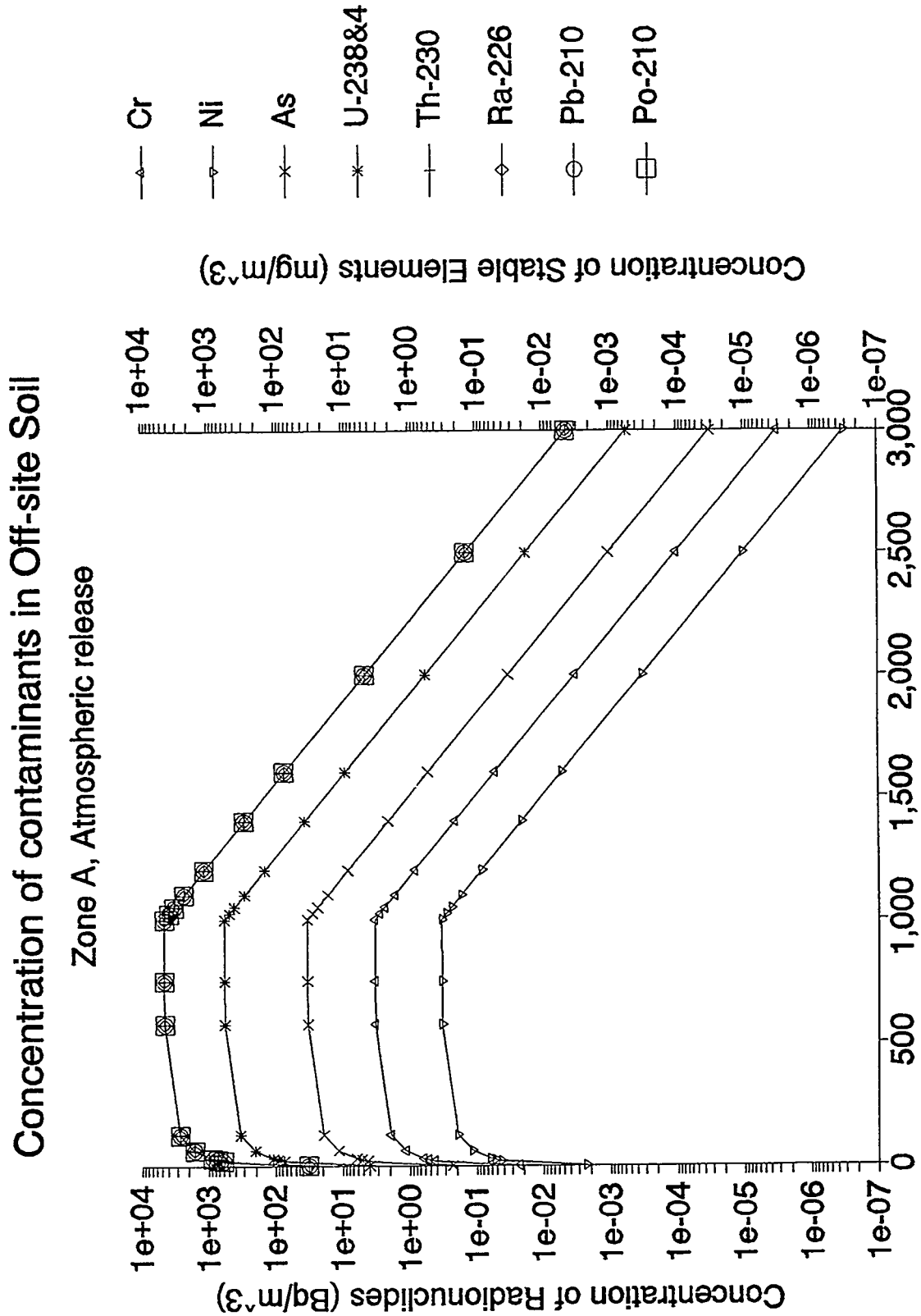

FIGURE 19 Concentrations of Radionuclides and Stable Elements in Off-Site Soil Due to Atmospheric Release

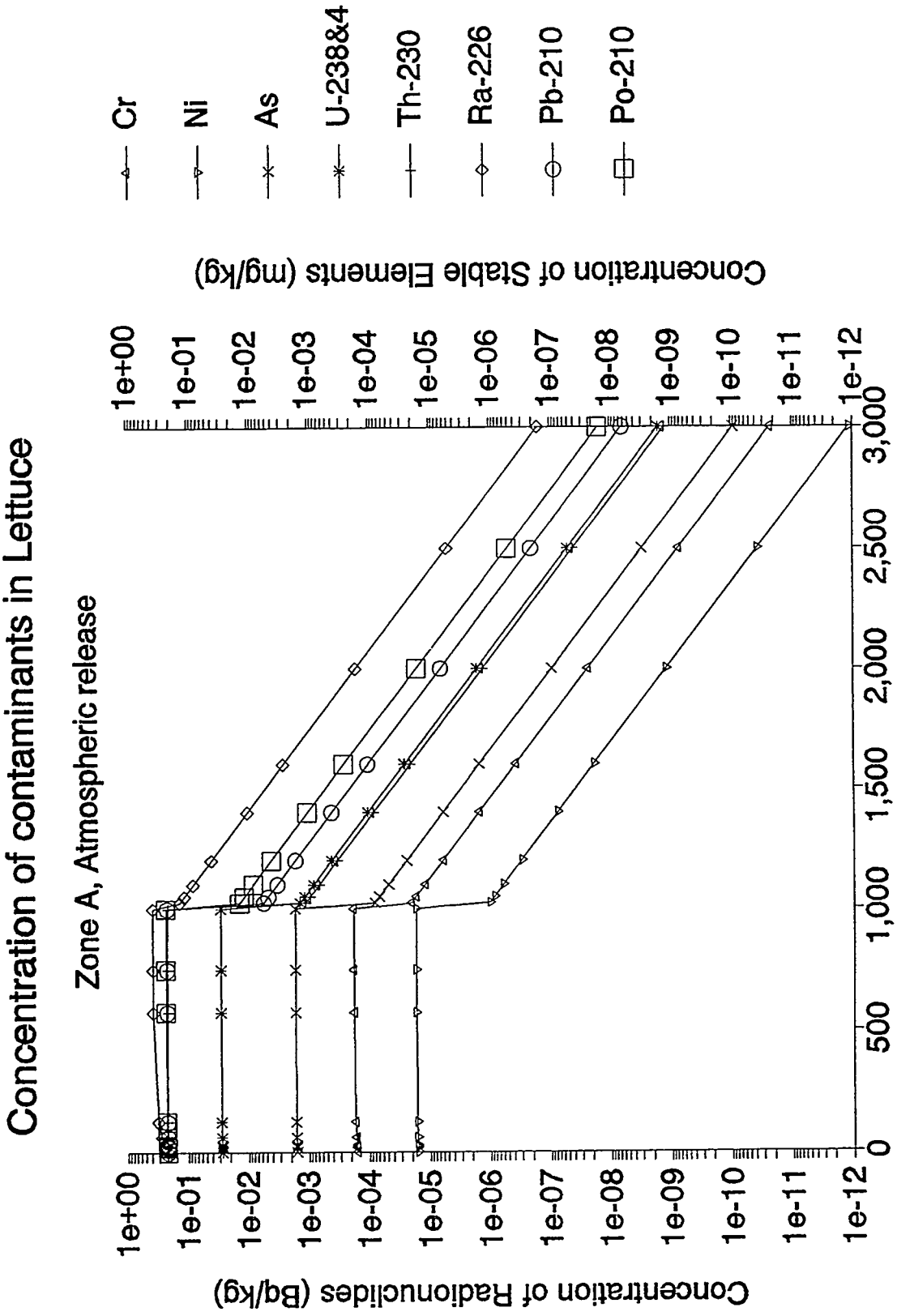

FIGURE 20 Concentrations of Radionuclides and Stable Elements in Lettuce Due to Atmospheric Release

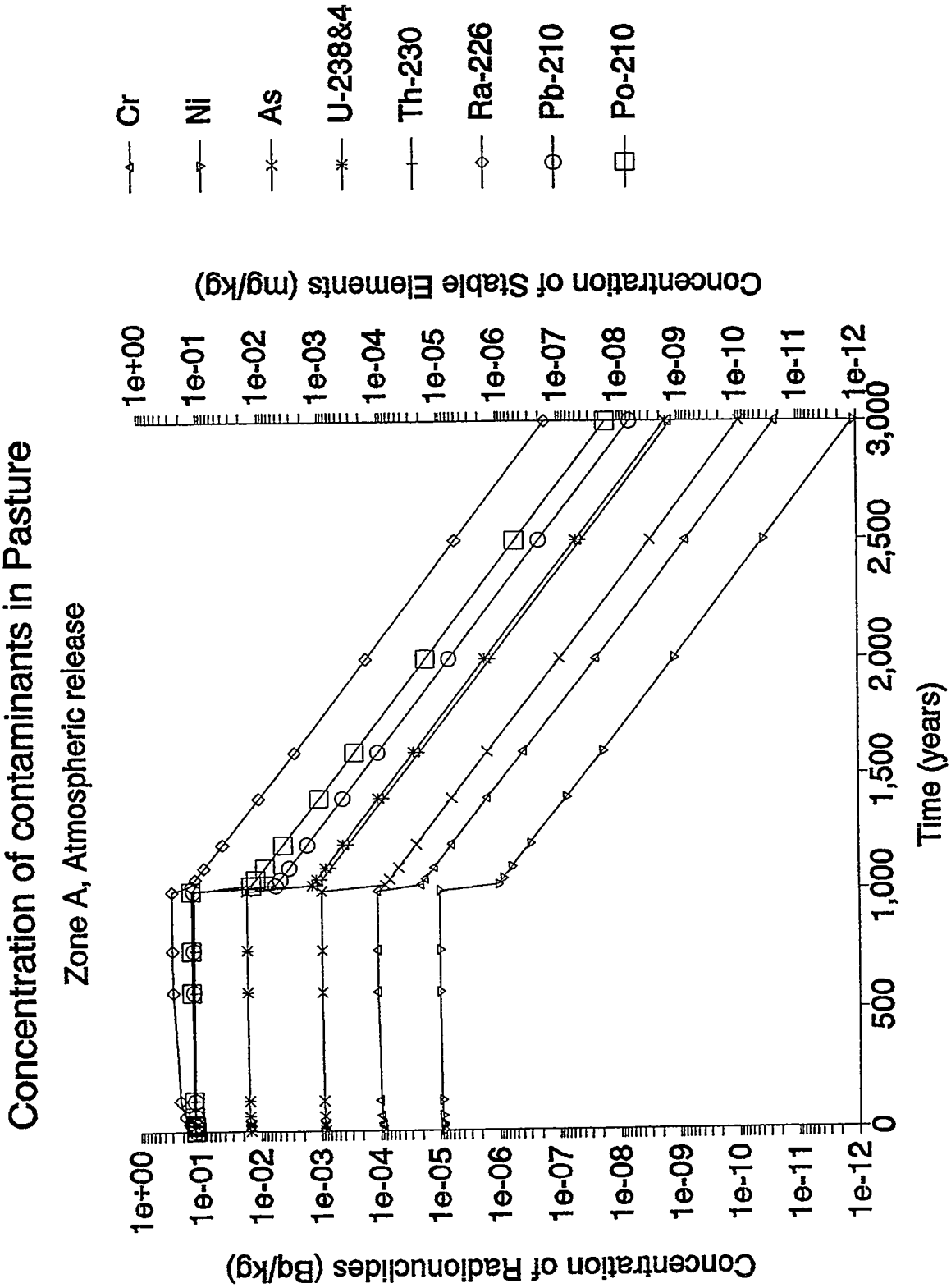

FIGURE 21 Concentrations of Radionuclides and Stable Elements in Pasture Due to Atmospheric Release

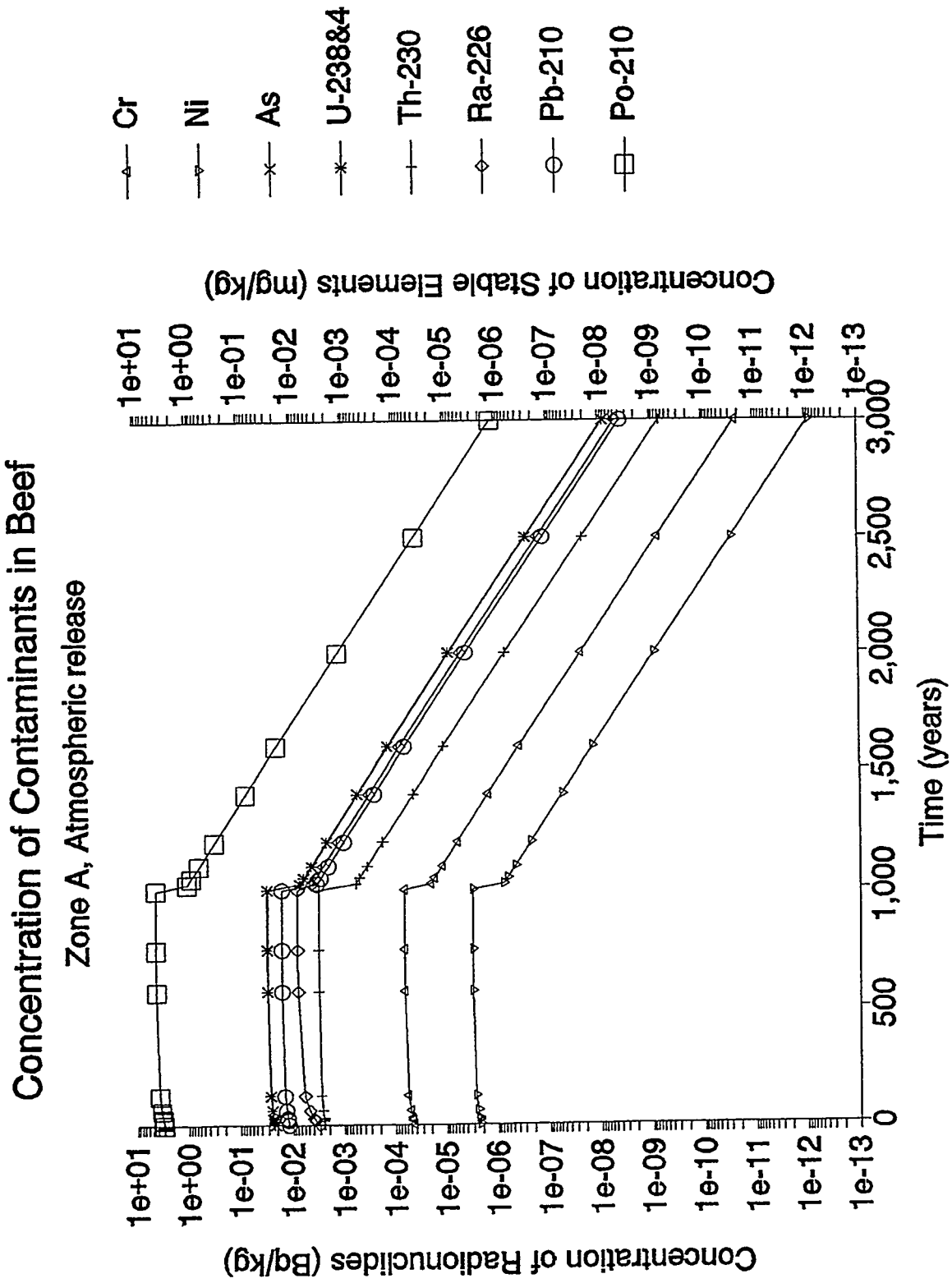

FIGURE 22 Concentrations of Radionuclides and Stable Elements in Beef Due to Atmospheric Release

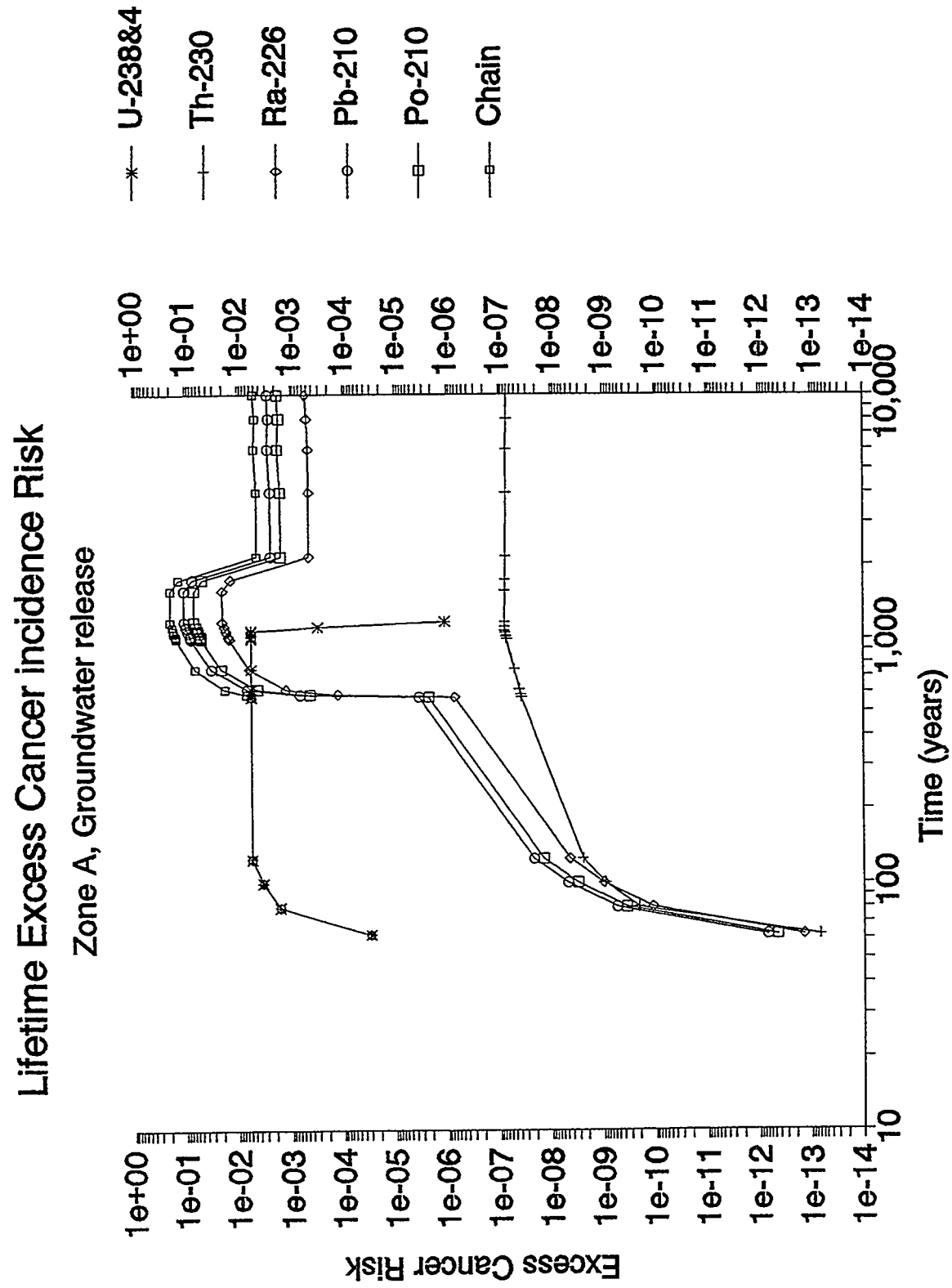

FIGURE 23 Excess Cancer Incidence Risk from Radionuclides at Point of Exposure for Groundwater Release

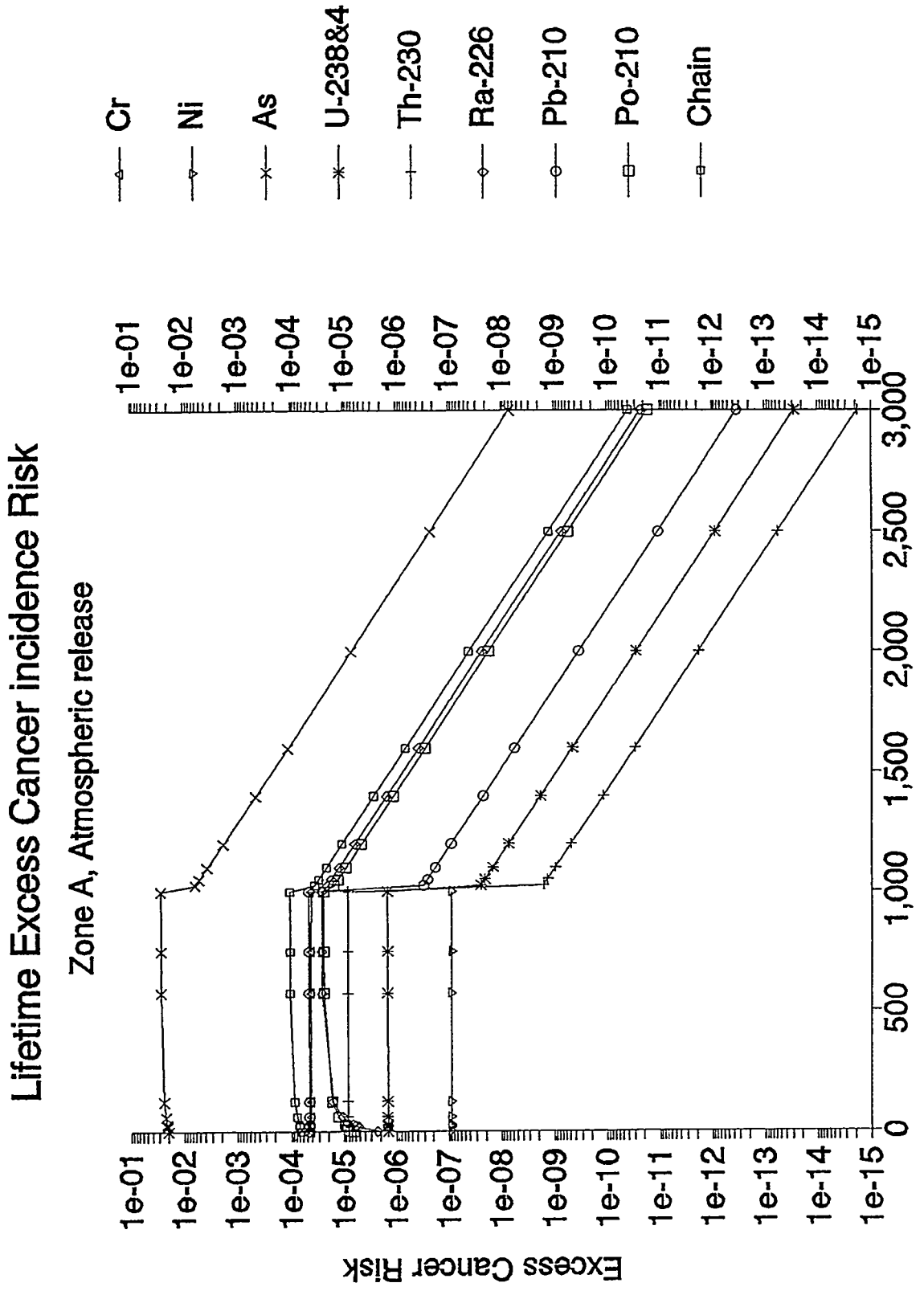

FIGURE 24 Excess Cancer Incidence Risk from Radionuclides at Point of Exposure and from Stable Elements for Atmospheric Release

4 DISCUSSION

4.1 DEVIATIONS FROM SPECIFIED SCENARIO

This scenario did not conform exactly to the conceptual model of RESRAD. Some of these deviations were accommodated as described in Chapter 2. The requirements of the scenario that could not be satisfied are discussed in the following paragraphs.

4.1.1 Off-Site Accumulation in Soil and Resuspension

As discussed in Section 2.2.4, RESRAD version 5.13 does not model off-site accumulation. Although a methodology to compute the off-site accumulation resulting from atmospheric deposition was developed, a corresponding methodology for accumulation due to irrigation had not been developed at the time the RESRAD calculations were performed. Hence, the external radiation dose and the contribution to root uptake from accumulation due to irrigation are not included in these results. The resuspension of contaminated dust from the off-site location was not modeled for either of the releases.

4.1.2 Radon

The radon pathway of RESRAD consists of two subpathways: (1) the diffusion of radon that was generated in the contaminated zone through the uncontaminated cover and the floor or walls of the dwelling, and (2) the release of radon from household water. The scenario specifies the radon release rate from the pile to the atmosphere, and the model is expected to determine the ingrowth during off-site transport and dilution due to dispersion. Because RESRAD version 5.13 is an on-site model and does not compute these effects, the RESRAD radon output was disregarded.

4.1.3 Aquatic System

The aquatic system of this scenario consists of a river feeding into a lake. The characteristics of the lake sediments are specified. Lake-sediment interactions and atmospheric deposition of contaminants into the lake are not considered in RESRAD version 5.13. Only the dilution due to the river was considered in determining the contaminant concentration in the lake.

4.1.4 Dispersion

The scenario specifies a (longitudinal) dispersion coefficient, D_L, of 10^{-3} m^2 s^{-1}. RESRAD version 5.13 does not consider the effects of longitudinal dispersion. A transverse dispersion of one-tenth of the longitudinal dispersion was assumed in the computation of the dilution factor according to Equation K.15 of Yu et al. (1993). Neglecting the longitudinal dispersion will overestimate the breakthrough time of the contaminants. The peak concentration of the slow-moving contaminants, As and Th-230, will also be overestimated.

4.2 SUGGESTIONS TO EXTEND CAPABILITY OF RESRAD

The RESRAD code now can be used to calculate the concentration of contaminants in different media and the radioactive dose attributable to each nuclide at the point of exposure. An off-site residence and cultivation model is also under development. The factors affecting the foliar interception of dust and irrigation water should be amenable to change by the user. The off-site model must include the accumulation of contaminants from atmospheric deposition and contaminated irrigation. The effect of longitudinal dispersion needs to be considered, especially for slow-moving contaminants. The ability to handle a constant release should be provided. The capability to model a step change in the release (could be a decrease due to remediation or could be a truncation due to physical removal of contamination) is essential to analyze different remediation alternatives; this capability should be made available in RESRAD.

5 REFERENCES

BIOMOVS II, 1995, *Long Term Contaminant Migration and Impacts from Uranium Mill Tailings: Comparison of Computer Models Using a Hypothetical Dataset,* Technical Report 4, published by the Swedish Radiation Protection Institute for the BIOMOVS II Steering Committee, Stockholm, Sweden, Nov.

Yu, C., et al., 1993, *Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.0,* ANL/EAD/LD-2, Argonne National Laboratory, Argonne, Ill., Sept.

APPENDIX A:

SCENARIO DESCRIPTION*

* Excerpted from the BIOMOVS II Technical Report 4, *Long Term Contaminant Migration and Impacts from Uranium Mill Tailings: Comparison of Computer Models Using a Hypothetical Dataset* (BIOMOVS II 1995, pp. A1–A13), with permission of the BIOMOVS II Steering Committee.

Appendix A: Uranium Mill Tailings Scenario Description V1.07

URANIUM MILL TAILINGS
Scenario Description V1.07, April 1993

The following sets out the V1.07 scenario as provided to calculating participants. Where clarifications have occurred since, these are noted in italics.

A1. Background

It is not technically feasible to extract all the uranium during processing of uranium ore. The U content of the resulting tailings typically varies between 0.001% and 0.01% and there are associated amounts of toxic elements. The tailings are typically disposed of in the vicinity of the mine or pit, and constitute a potential source of gaseous contaminants (radon) and non-gaseous contaminants including radio elements, such as uranium, thorium, radium and other toxicants such as heavy metals. Both types of release may be important in both the short and long term.

The prediction of transport of radioactive and non-radioactive contaminants from uranium mill tailings into the surrounding environment requires a good understanding of the processes controlling their release and the pathways along which they move. These include release of gases and particulates to air and leaching of contaminants from the tailings into groundwater, rivers, or lakes and their uptake and distribution in biota, soils and sediment.

A2. Objectives

The overall objectives of the Uranium Mill Tailings Working Group are two-fold.

The first is to compare existing models which can be used to assess the long term impact of radioactive releases from uranium mill tailings, involving multiple pathways, multiple contaminants and multiple receptors with a view to understanding the reasons for the differences in model predictions, including uncertainty.

The second objective is to examine how these models can be used to assess the fate of some stable toxic elements in addition to the radionuclides. Consideration is limited to the radiation doses and risks from the U-238 decay chain, since commonly this dominates over the U-235 chain in tailings assessment results and to the chemically induced cancer risk due to intake of 3 stable elements, arsenic, chromium and nickel.

A3. Scope and Work Programme

To achieve the overall objectives described above a step-wise approach has been adopted that starts with a simplified basic case to which the complexities of the real system will be gradually introduced.

In the first step a basic scenario is defined (see section A4). Model results produced according to this description are used as the basis for intercomparison of the models (Type B approach). The source term from the tailings is treated as a simple constant release for a fixed period so that effort can be concentrated on modelling the subsequent transport in the biosphere. Separate consideration is given to the atmospheric and groundwater release source terms. It is anticipated that comparison of the model results will allow differences arising from model structure to be identified and quantified. Values of important parameters are specified in the basic scenario in order to limit the uncertainties arising due to the user's interpretation. Results are to be calculated on a deterministic basis.

In subsequent steps, it is intended that consideration will be given to probabilistic evaluation of the uncertainties and time dependent source terms. Initially, these tests will be carried out as type B tests. However, data are now sought from a variety of sites around the world, representative of different environments, to provide independent datasets for environmental transport model testing (Type A testing). This should permit comparison of the model results taking account of realistic time dependent source terms. *(In fact, no suitable datasets have been identified to date.)*

A4. Basic Scenario Description V1.07

Radioactive and stable toxic contaminants are released continuously for a period of 1000 years from a uranium mill tailings pile into both the atmosphere and the underlying groundwater. After 1000 years the releases stops.

There is an atmospheric release to an agricultural area and a forested area, (see Figure A1). Two zones can be distinguished; zone A which extends from the source (uranium mill tailings pile) out to 5 km, and zone B which extends from 5 km out to 10 km. Contaminants are also released from the uranium mill tailings pile via groundwater and transported to a small river and well that are situated at 1000 m (see Figure A2).

The river flows into a lake that is situated in the agricultural area at the boundary between zones A and B. There are fish in the lake which are consumed by the populations in both zone A and B. Two crops are grown, leafy vegetables (lettuce) and pasture grass. Beef cattle graze the pasture grass. In zone A one hectare of leafy vegetables (lettuce) is grown at the mid-point (2.5 km). The lettuce is irrigated with water from the well. The remaining area is pasture grass and is not irrigated. The Zone B agricultural area is divided into two equal areas of leafy vegetables (lettuce) and pasture grass (see Figure 1). Only the crop of leafy vegetables (lettuce) is irrigated, during the summer months with water from the lake. Drinking water (for livestock and humans), is taken from the well in zone A and the lake in zone B.

For zone A the occupancy is assumed to be at 2.5 km, 60% indoors and 40% outdoors in the vegetable production area. For zone B it is the same but at 7.5 km.

Full details of the source term and the site characteristics are given in the Annex to the scenario description.

A5. Material Requested from Participants

Assuming the characteristics specified in the following Annex for the various scenario components, the following calculations are requested, separately for the atmospheric and groundwater source terms. Please present results as a function of time from the commencement of the release. Please truncate the calculation at 10,000 years, even if the system has not come into equilibrium. This truncation is included since beyond that time the whole surface environment will have been altered significantly.

For zone A calculate the concentration of each contaminant due to each source term in:

- atmosphere (Bq m^{-3}, mg m^{-3})
- well water (Bq l^{-1}, mg l^{-1})
- soil (Bq m^{-3}†, mg m^{-3})
- pasture (Bq kg^{-1} ww*, mg kg^{-1} ww)
- lettuce (Bq kg^{-1} ww, mg kg^{-1} ww)
- beef (Bq kg^{-1} ww, mg kg^{-1} ww) and
- fish (Bq kg^{-1} ww, mg kg^{-1} ww)

*ww is wet weight †See Annex for soil data.

For zone B calculate the concentration of each contaminant due to each source term in:

- river water (Bq l^{-1}, mg l^{-1})
- lake water (Bq l^{-1} , mg l^{-1})
- lake sediment (Bq kg^{-1} ww*, mg kg^{-1} ww)
- soil (Bq m^{-3}, mg m^{-3})
- pasture (Bq kg^{-1} ww, mg kg^{-1} ww)
- lettuce (Bq kg^{-1} ww, mg kg^{-1} ww) and
- beef (Bq kg^{-1} ww, mg kg^{-1} ww)

For each zone, calculate for each source term:

i. the annual individual effective dose (Sv a^{-1}) due to the release of each radionuclide in the U-238 decay series (defined in the Appendix) for each exposure pathway to members of the critical group. The exposure pathways include: ingestion of drinking water, fish, beef and lettuce; external irradiation from the ground; and inhalation of contaminants from the atmospheric source term and suspended from the ground. Factors to convert annual intake into effective dose are provided in the annex;

ii. as for i. but summed over the pathways;

iii. the intake of each stable element (mg a^{-1}) for each pathway;

iv. as for iii. but summed over pathways;

v. lifetime average cancer incidence risk from a years exposure or intake summed over pathways for the U-238 series, and for each stable element. Factors to convert annual intake (Bq a^{-1} or mg a^{-1}) into this quantity are provided in the annex. (The breakdown of risks among pathways can be derived from the other results provided.)

Please provide results as hard copy and on disk in file formats as given in annex.

Participants are also requested to provide:

a one page description of the application of their model to the scenario, noting any ways in which they added to or had to modify the description or site characteristics;

a diagram indicating the components of the model and contaminant transfers;

a brief commentary on the results produced; and

a reference for the model used.

Again, please provide results as hard copy and on disk. Mac disks and Word Perfect are most convenient for the secretariat but PC disks and other word processors would still be very helpful.

In preparing results, participants may wish to take account of the following factors which arise from the scenario description. For the groundwater release, the concentration of contaminants in the leachate is not diluted by mixing with other waters below the tailing pile. Therefore, eventually, the concentrations of long-lived radionuclides and stable contaminants found in the well water could rise to near to the levels in the tailing leachate, although lateral dispersion may reduce these levels by the time the water reaches the well. On entering the river, the leachate is diluted by a factor of ten, so that the long term rise in the river water concentrations would be no more than to one tenth the initial leachate concentration. Concentrations in the lake would rise to similar levels, although there may be additional reductions from the water column due to sedimentation. The water used for well irrigation is given to have no particulate in it. That taken from the lake would have a proportion of activity associated with suspended sediment. Irrigated areas would see an accumulation per m^2 corresponding to the rate of irrigation (m a^{-1}) and the concentration in that water. Given the 100 year half-life in soil, concentrations in soils may be expected to rise for several hundred years and then level off. For the atmospheric source term, the distances of special interest with respect to atmospheric dispersion are 2.5 and 7.5 km, since these are the given locations of the critical groups. Deposition onto ground surfaces can result in accumulation of long-lived and stable contaminants, so that, in the long term, resuspension may contribute significantly to concentrations in air.

Annex to Appendix A: Specification of the Source Term and Receiving Environment Characteristics and Other Data Required

A6. Groundwater Release

A one dimensional model is to be used to calculate the groundwater transport of the contaminants from the uranium mill tailings pile (Figure A2). A simple source term for groundwater release is assumed: a constant concentration of contaminants in the porewater in the tailings. The characteristics of the tailings pile and underlying sandy soil are quantified below.

Uranium Tailings Pile

Surface area	A	=	$5\ 10^5$ m^2,
Height	H	=	10 m
Infiltration	I	=	0.1 m a^{-1}

(These data were retained from the previous scenario description version, V1.06. In fact, given the V1.07 groundwater release source term description above, they are redundant and were confusing to some participants.)

Tailings/Sandy Soil

Darcy velocity	k	=	$1.2\ 10^2$ m^3 m^{-2} a^{-1}
Dispersion coefficient	D_L	=	$1\ 10^{-3}$ m^2 s^{-1}
Dry bulk density	ρ_b	=	$1.4\ 10^3$ kg m^{-3}
Porosity (total effective)	ε	=	40% by volume
Soil distribution coefficient	Kd	=	See Table A2

Table A1: Source Term Values for Groundwater and Atmospheric Release

Contaminant	Constant concentration in pore water †		Constant atmospheric release rate	
U(VI) †	100	Bq l^{-1}	6.2	Bq s^{-1}
Ra-226	200	Bq l^{-1}	$1.0\ 10^2$	Bq s^{-1}
Pb-210	200	Bq l^{-1}	$1.0\ 10^2$	Bq s^{-1}
Po-210	200	Bq l^{-1}	$1.0\ 10^2$	Bq s^{-1}
Th-230	10	Bq l^{-1}	$1.0\ 10^2$	Bq s^{-1}
As	0.14	mg l^{-1}	$7.1\ 10^{-4}$	g s^{-1}
Ni	0.70	mg l^{-1}	$7.1\ 10^{-6}$	g s^{-1}
Cr	7.00	mg l^{-1}	$7.1\ 10^{-5}$	g s^{-1}

† Please assume 100 Bq l^{-1} and 6.2 Bq s^{-1} each of U-238 and of U-234. For the timescales of interest in this study, these two radionuclides can be assumed to be in equilibrium in all parts of the environment. Results for concentrations of U-234 do not therefore need to be separately presented. Results for the doses for the two radionuclides can be added together, under the heading U-238/4, noting that the dose and risk factors for the two radionuclides are very similar. Note that the tailings are depleted in uranium relative to the daughters.

Table A2: Kd Values to be Assumed for Sandy Soil

Element	Kd (m^3 kg^{-1})	Element	Kd (m^3 kg^{-1})
U	$5\ 10^{-3}$		
Ra	$5\ 10^{-2}$	Ni	$1\ 10^{-3}$
Pb	$5\ 10^{-2}$	Cr	$1\ 10^{-3}$
Po	$5\ 10^{-2}$	As	$5\ 10^{-1}$
Th	$1\ 10^{0}$		

A7. Atmospheric Release

A constant solid emission rate from the tailings pile due to wind erosion is assumed for the atmospheric release. The atmospheric release rates are summarized in Table A1. For Rn-222 the release is not related to wind erosion. An emission rate of $2.5\ 10^6$ Bq s^{-1} for Rn-222 is assumed.

The following conditions are assumed during atmospheric release:

Wind Rose Stability category D
Average windspread 3 m s^{-1}
Release height 10 m
Release to 16 sector window (22.5°)
Uniform wind rose (ie wind blows equally in all directions).

Radon daughters sorbed on the Aitken nuclei:

Deposition velocity	$V_{gr} = 10^{-3}$ m s^{-1}

Soil resuspended particles:

Resuspension layer	$R_l = 10^{-2}$ m
Resuspension factor	$R_{fs} = 10^{-9}$ m^{-1}
Deposition velocity	$V_{gs} = 10^{-2}$ ms^{-1} (~10 µm median aerodynamic diameter)

A8. Aquatic System

- A lake is situated in the agricultural area between zone A and B and becomes contaminated through the river (and by aerosols) (Figure A1) . Its physical characteristics which are presented below, are the same as those described in BIOMOVS I, Technical Report 1 scenario B3. All the fish eaten by the people living in the two zones are obtained from this lake.

- the lake characteristics

Dilution factor (D_f), due to the river between the source term and the lake	10^1
Volume of the lake	10^7 m^3
Average depth of the lake	10^1 m
Output flow = input flow	10^8 m^3 a^{-1}

Net evaporation rate	0 m a^{-1}
Suspended sediment load	10 g m^{-3}
Suspended sediment Kd	Soil Kd values x10^2
*Net sediment deposition rate through water column	0.1 m d^{-1}

* For the purposes of this exercise the rate of sediment accumulation in the lake affecting hydraulic residence time will not be considered.

- the upper sediments (aerobic) of the lake

Aerobic sediments Kd	Soil Kd values x 10^1
Porosity	95% by volume
Depth	10^{-1} m
Bulk density	1.05 10^3 kg m^{-3}
Diffusion coefficient	10^{-11} m^2 s^{-1}

- the deeper sediments (anaerobic) of the lake

Anaerobic sediments Kd	Soil Kd values x 10^4
Porosity	90% by volume
Depth	5 10^{-1} m
Bulk density	1.1 10^3 kg m^{-3}
Diffusion coefficient	5 10^{-12} m^2 s^{-1}

- A well is situated in the agricultural area in zone A, 1000 m from the uranium tailings release point (Figure A1). The well has no impact on the groundwater discharge to the river and the well water contains no particulates. The well water is used for drinking, and irrigation of 1 ha of agricultural land situated at the midpoint of zone A (2.5 km).

A9. Agricultural Area

For the winter 6 months of the year there is no vegetation. In the summer 6 months, crops are grown. In zone A water is taken from the well to irrigate a crop of leafy vegetables (lettuce) covering 1 hectare at the midpoint (2.5 km) of zone A. The remaining area is devoted to pasture which is not irrigated.

In zone B irrigation water is drawn from the lake and is used to irrigate the crop of leafy vegetables (lettuce) only. The pasture is not irrigated. The soil properties in the agricultural area are given in section A6 (groundwater release). The additional input data are listed below.

Sandy Soil

Ploughing depth	D_s	=	0.25 m
Ploughing frequency	M	=	1 a^{-1}
Half life of contaminants in soil due to all removal processes except radioactive decay	S_v	=	100 a

Crop Data

Two crops are considered, pasture grass and leafy vegetables. The pasture grass is cut once each season. A 180 day vegetation period is assumed. The vegetation period for leafy vegetables (lettuce) is 90 days. The crop parameters are as follows:

Crops	Y	N_s	T_v	N_l
Leafy vegetables (lettuce)	1.4	0.7	14	0.1
Pasture grass	1.85	0.5	14	0.1

where:

Y annual yield (kg m^{-2} wet weight)
N_s foliar interception fraction for dust (-)
T_v weathering half life for intercepted dust (d)
N_l foliar interception fraction for irrigation water (-)

Irrigation

Those crops which are irrigated are assumed to be irrigated throughout their vegetation period.

Irrigation rate	1 l m^{-2} d^{-1}
Irrigation time	8 hours per day

The transfer of individual elements from soil to crops via root uptake is specified with a transfer factor (TF_{SP}). The transfer factors to be used are listed in Table 3 and are expressed on a fresh weight plant per dry weight soil basis.

Table A3: Soil-to-Plant Transfer Factors

Element	TF_{SP}	Element	TF_{SP}
U	$4\ 10^{-3}$	Ni	$5\ 10^{-3}$
Ra	$5\ 10^{-2}$	Cr	$1\ 10^{-2}$
Pb	$2\ 10^{-3}$	As	$4\ 10^{-3}$
Po	$5\ 10^{-3}$		
Th	$4\ 10^{-4}$		

Animal Data

There is permanent pasture in each zone of the agricultural area and livestock are not transferred between zones. Drinking water for the animals is taken from the well in zone A and from the lake in zone B.

Consumption Values (beef cattle)

Pasture grass	50	kg d^{-1} (wet weight)
Soil	0.5	kg d^{-1} (wet weight)
Water	50	l d^{-1}

Inhalation rate	150	$m^3\ d^{-1}$

The transfer of individual elements to beef and edible portion of fish following ingestion is quantified by a distribution factor (DF). The distribution factors for meat and fish are summarised in Table A4 and are expressed on a wet weight basis.

Table A4: Animal Distribution Factors

Element	DF_m (d kg^{-1}) meat	DF_f (l kg^{-1}) fish
U	$3\ 10^{-2}$	$1\ 10^{1}$
Ra	$5\ 10^{-4}$	$5\ 10^{1}$
Pb	$2\ 10^{-3}$	$3\ 10^{2}$
Po	$5\ 10^{-1}$	$5\ 10^{1}$
Th	$4\ 10^{-4}$	$1\ 10^{2}$
As	$5\ 10^{-1}$	$5\ 10^{1}$
Ni	$5\ 10^{-3}$	$5\ 10^{1}$
Cr	$1\ 10^{-2}$	$2\ 10^{2}$

(Subsequent review of this choice of parameters highlighted that the assumption for Po, 0.5 d kg^{-1}, is very high. More typically a value two orders of magnitude lower is assumed, eg see IAEA Safety Series 57.)

A10. Human Data

The consumption values and percentage occupancy for individuals in the different regions of each zone are listed below. It is assumed that the critical group members are permanently resident in their respective zones. The exposure pathways to be considered are inhalation, ingestion and external exposure.

Diet:	meat (beef)		50 kg a^{-1}
	fish		5 kg a^{-1}
	vegetables (lettuce)		25 kg a^{-1}
	drinking water		21 d^{-1}
Occupancy:	home		60%
	farmland		40%
Indoor reduction of dust relative to outside			50%
Shielding effect of being indoors relative to outside			50%
Indoor radon equilibrium factor			0.5
Outdoor radon equilibrium factor		Zone A	0.1
		Zone B	0.3
Inhalation rate			8400 $m^3\ a^{-1}$

A11. Factors for Converting Annual Intake to Radiation Dose

	Inhalation Sv Bq^{-1}	Ingestion Sv Bq^{-1}
U-238	3.1E-5	4.2E-8
U-234	3.5E-5	3.9E-8
Th-230	5.1E-5	3.5E-7
Ra-226	2.1E-6	2.2E-7
Rn-222*	1.2E-8	Not applicable
Pb-210	2.2E-6	1.3E-6
Po-210	1.9E-6	6.2E-7

Effects of unlisted daughters are included with those of the parents, on the assumption that they must be in equilibrium with the parent at the time of intake. Values listed are committed effective doses to adults for the chemical form giving rise to the highest dose in each case. Data have been taken from Phipps A W, Kendall G M, Stather J W and Fell T P, Committed Equivalent Organ Doses and Committed Effective Doses from Intakes of Radionuclides. National Radiological Protection Board, NRPB-R245, London, HMSO, 1991.

* R245 does not give numbers for Rn-222. The value for Rn-222 is derived from the NRPB Board Statement on Radon in Homes, Documents of the NRPB, volume 1, no1, Chilton, 1990, and is the value of dose arising from Rn-222 and its solid short-lived decay products per Bq of Rn-222 inhaled. If additional or alternative radon dosimetry is adopted, eg involving the radon equilibrium factors listed above, please indicate this with your results.

A12. Factors for Converting Annual Intake to Risk

The radionuclide data given below are taken from Health Effects Assessment Summary Tables, Annual FY 1992, United States Environmental Protection Agency, OERR 9200.6-303 (92-1). They represent the lifetime total excess cancer risk per unit intake or exposure. If the intake occurs over one year, then risk calculated is the lifetime risk from that year's intake. Likewise, for unit activity concentration in the soil, then the figures represent the lifetime risk from one year of exposure. (These numbers will not necessarily give the same risk as would be obtained by multiplying the calculated effective dose by the risk per unit effective dose, eg as assessed by ICRP.)

	Inhalation Risk/Bq	Ingestion Risk/Bq	External Risk/y per Bq/g soil
U-238	1.4E-6	7.6E-10	9.7E-7
U-234	7.0E-7	4.3E-10	8.1E-10
Th-230	7.8E-7	3.5E-10	1.5E-9
Ra-226	8.1E-8	3.2E-9	1.6E-4
Rn-222	2.1E-10	4.6E-11	1.6E-4
Pb-210	3.5E-8	1.4E-8	3.5E-9
Po-210	7.0E-8	4.1E-9	7.8E-10

Effects of unlisted daughters are included with those of the parents. In the case of Ra-226 it is assumed that Rn-222 and its short-lived daughters are also present in equilibrium on intake with the Ra-226.

The following data for metals are also taken from the EPA report. The values represent the same cancer risk as above per mg intake assuming that intake is evenly distributed throughout a year, and so represents the risk per unit annual intake.

	Inhalation Risk/mg	Ingestion Risk/mg
As	6.8E-3	2.5E-4
Cr	5.6E-3	-
Ni	1.2E-4	-

(Risk data of this type are constantly under review, though the basic data for these three elements are unchanged in the 1994 version of the EPA's HEAST tables. The extension of the HEAST carcinogeneity data, based on continuous lifetime exposure, to lifetime risk from an animal intake may be questioned. However, the illustration of the type of calculation which can be done is interesting.)

A13. Requested Format for Results Files

To assist in the collation of results it is suggested that a common file name structure should be used for the results files, as follows.

1st character identifies atmospheric or groundwater source term, A or G

2nd character, zone A or zone B	A or B
3rd character, the medium;	
atmosphere	A
soil	S
pasture	P
lettuce (vegetable)	V
beef	B
fish	F
river water	R
well water	W
lake water	L
lake sediment (mud)	M
sum over pathways (total)	T
4th character, concentration, intake, dose or risk	C, I, D, or R
5th character, contaminant:	
U-238 chain	U
Metals	M

As examples, the dose from the U-238 chain due to ingestion of lettuce in zone A due to the atmospheric source term would be in file AAVDU.data. The metals intake in zone B from all pathways from the groundwater source term for the whole chain would be in file GBTIM. The following is the suggested layout for the data.

Line one. A title line, eg AAVDU, also giving the units in which results are reported. These should be as requested above, but respecifying them is intended to provide an additional check.

BIOMOVS II
TR4

Line two. A header line as follows for the U-238 chain:

Time y | U-238/4 | Th-230 | Ra-226 | Pb-210 | Po-210 | Rn-222 | chain sum

The U-238/4 column should contain the contributions from both radionuclides. In the case of activity, the amounts for each radionuclide are the same. In the case of dose or risk the amounts for each radionuclide are similar. Rn-222 results are put to the end since they are not required for all cases, eg for the groundwater release.

For the metals line 2 becomes:

Time y | arsenic | chromium | nickel

Line three. The results at each time, eg

4E1 1.2E3 1.2E3 1.2E3 1.2E3 1.2E3 1.2E3 7.2E3

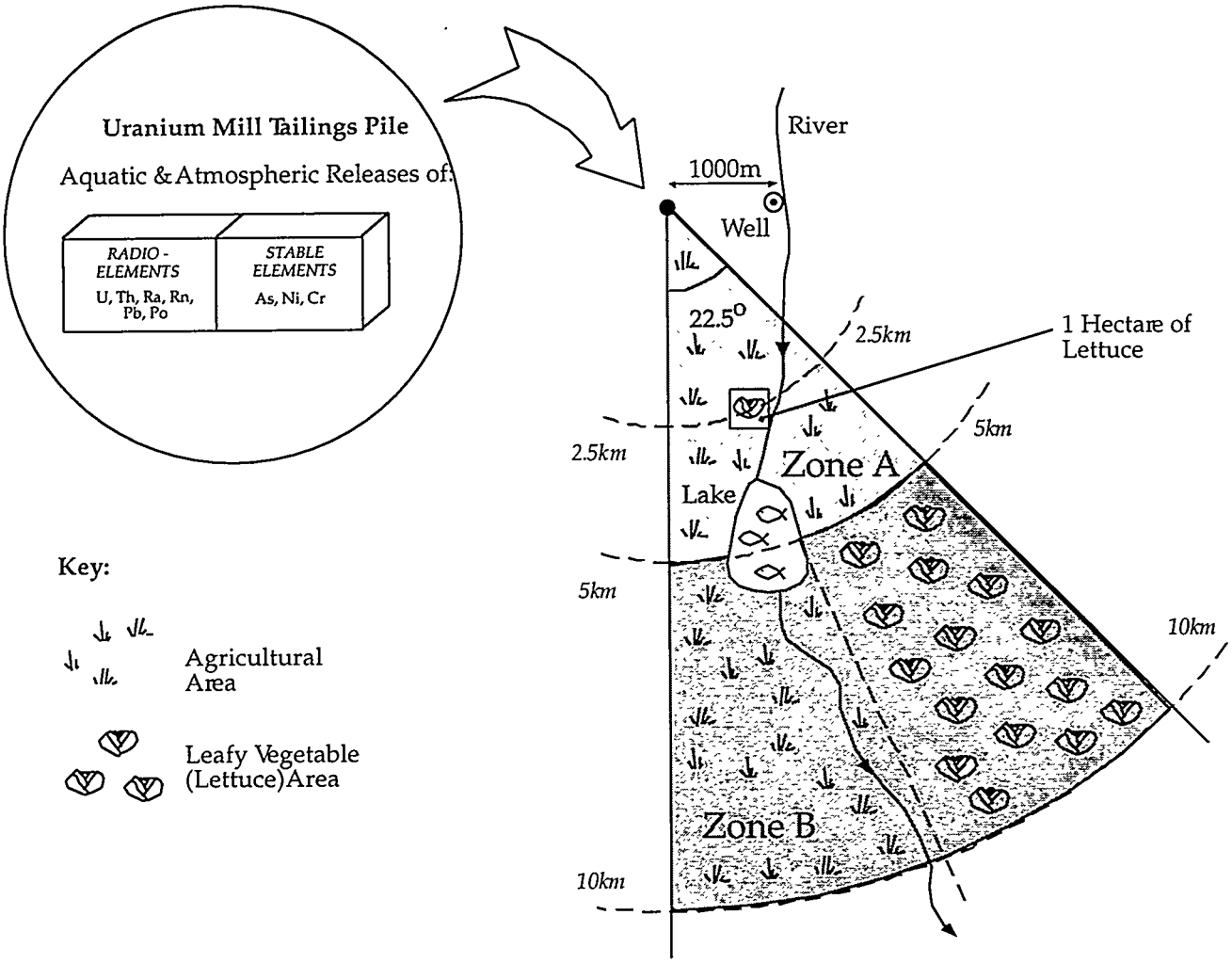

Figure A1: Plan View of Area Surrounding the Uranium Mill Tailings Pile

APPENDIX B:

OFF-SITE ACCUMULATION MODEL

APPENDIX B:

OFF-SITE ACCUMULATION MODEL

The processes that affect the activity concentration off-site are the following:

- Time-dependent deposition of contaminants,
- Uniform mixing in a mixing zone,
- First-order (radioactive) transformations,
- Surface erosion at a constant rate, and
- Adsorption equilibrium controlled release from the mixing zone.

Dimensions

Dimensions include length (L), mass (M), time (T), and activity (A).

Terms

A^o is the off-site area L^2;

$D_i(t)$ is the deposition rate, $AL^{-2}T^{-1}$, of contaminant i;

d_m^o is the off-site depth of mixing, L;

ϵ^o is the off-site surface erosion rate, LT^{-1};

θ^o is the off-site moisture content;

I^o is the off-site infiltration rate, LT^{-1};

$K_{d}^{o}{}_i$ is the off-site distribution coefficient, $L^{-3}M$, of contaminant i;

L_i^o is the off-site leach rate, T^{-1}, of contaminant i;

λ_i is the transformation coefficient, T^{-1}, of contaminant i;

ρ_b^o is the off-site bulk density, ML^{-3};

$R_{d}^{o}{}_i$ is the off-site retardation factor of contaminant i;

$s_i^{\circ}(t)$ is the off-site activity concentration, AM^{-1}, of contaminant *i*; and

t is time, *T*.

Net Change in Mixing Zone

The net change in the number of atoms of *i* in the mixing zone between time *t* and *t+dt* is

$$\frac{\rho_b^{\circ} \times d_m^{\circ} \times A^{\circ}}{\lambda_i} d[s_i^{\circ}(t)] \quad . \tag{B.1}$$

Deposition

The number of atoms of *i* added to the mixing zone because of deposition between time *t* and *t+dt* is

$$\frac{D_i(t) \times A^{\circ} \times dt}{\lambda_i} \quad . \tag{B.2}$$

Radioactive Transformations

The number of atoms of *i* added to the mixing zone because of radioactive transformations of *j* (= *i* – 1), the parent of *i*, between time *t* and *t+dt* is

$$s_j^{\circ}(t) \times \rho_b^{\circ} \times d_m^{\circ} \times A^{\circ} \times dt \quad . \tag{B.3}$$

The number of atoms of *i* removed from the mixing zone because of radioactive transformations of *i* between time *t* and *t+dt* is

$$s_i^{\circ}(t) \times \rho_b^{\circ} \times d_m^{\circ} \times A^{\circ} \times dt \quad . \tag{B.4}$$

Surface Erosion

The number of atoms of *i* removed from the mixing zone because of surface erosion between time *t* and *t+dt* is

$$\frac{s_i^{o}(t) \times \rho_b^{o} \times \epsilon^{o} \times A^{o} \times dt}{\lambda_i} \quad . \tag{B.5}$$

Adsorption Equilibrium Leaching

Let $c_i(t)$ and $s_i'(t)$ denote the activity concentrations of nuclide *i* in the aqueous and solid phases of the mixing zone at time *t*. Then

$$c_i(t) \times \theta^{o} + s_i'(t) \times \rho_b^{o} = s_i^{o}(t) \times \rho_b^{o} \tag{B.6}$$

and

$$s_i'(t) = c_i(t) \times K_{d\,i}^{o} \quad . \tag{B.7}$$

Thus,

$$c_i(t) = \frac{s_i^{o}(t) \times \rho_b^{o}}{\theta^{o} + K_{d\,i}^{o} \times \rho_b^{o}} \quad . \tag{B.8}$$

The number of atoms of *i* removed from the mixing zone because of leaching between time *t* and *t+dt* is

$$\frac{c_i(t) \times A^{o} \times I^{o} \times dt}{\lambda_i} = \frac{s_i^{o}(t) \times \rho_b^{o} \times A^{o} \times I^{o} \times dt}{\theta^{o} \times R_{d\,i}^{o} \times \lambda_i}$$

$$= \frac{L_i^{o} \times s_i^{o}(t) \times \rho_b^{o} \times d_m^{o} \times A^{o} \times dt}{\lambda_i} \quad , \tag{B.9}$$

where

$$L_i^{\circ} = \frac{I^{\circ}}{d_m^{\circ} \times \theta \times R_{d\,i}^{\circ}} \quad .$$

Net Change in Number of Atoms of Nuclide *i* in Time *dt*

$$\frac{\rho_b^{\circ} \times d_m^{\circ} \times A^{\circ}}{\lambda_i} d[s_i^{\circ}(t)] = \frac{D_i(t) \times A^{\circ} \times dt}{\lambda_i} + [s_j^{\circ}(t) - s_i^{\circ}(t)] \times \rho_b^{\circ} \times d_m^{\circ} \times A^{\circ} \times dt$$

$$- \frac{s_i^{\circ}(t) \times \rho_b^{\circ} \times \epsilon^{\circ} \times A^{\circ} \times dt}{\lambda_i}$$

$$- \frac{s_i^{\circ}(t) \times L_i^{\circ} \times \rho_b^{\circ} \times d_m^{\circ} \times A^{\circ} \times dt}{\lambda_i} \quad . \qquad \text{(B.10)}$$

Rearranging and collecting terms,

$$d[s_i^{\circ}(t)] = \frac{D_i(t) \times dt}{\rho_b^{\circ} \times d_m^{\circ}} + \lambda_i \times s_j^{\circ}(t) \times dt - \left(\lambda_i + \frac{\epsilon^{\circ}}{d_m^{\circ}} + L_i^{\circ} \right) s_i^{\circ}(t) \times dt \quad . \qquad \text{(B.11)}$$

Multiplying both sides by

$$e^{\left(\lambda_i + \frac{\epsilon^{\circ}}{d_m^{\circ}} + L_i^{\circ} \right) t}$$

and rearranging,

$$e^{\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)t} d[s_i^o(t)] + \left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right) e^{\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)t} dt \times s_i^o(t)$$

$$= \frac{D_i(t) \times dt}{\rho_b^o \times d_m^o} \times e^{\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)t} + \lambda_i \times s_j^o(t) \times e^{\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)t} \times dt$$

$$d[e^{\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)t} \times s_i^o(t)]$$

$$= \frac{D_i(t) \times dt}{\rho_b^o \times d_m^o} \times e^{\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)t} + \lambda_i \times s_j^o(t) \times e^{\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)t} \times dt \quad . \qquad \text{(B.12)}$$

Integrating over time from zero to *t*,

$$e^{\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)t} \times s_i^o(t) - s_i^o(0) = \frac{1}{\rho_b^o \times d_m^o} \times \int_0^t D_i(t) \times e^{\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)t} \times dt$$

$$+ \lambda_i \times \int_0^t s_j^o(t) \times e^{\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)t} \times dt \qquad \text{(B.13)}$$

and rearranging,

$$s_i^o(t) = s_i^o(0) \times e^{-\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)t} + \frac{e^{-\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)t}}{\rho_b^o \times d_m^o} \times \int_0^t D_i(t) \times e^{\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)t} \times dt$$

$$+ \lambda_i \times e^{-\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)t} \times \int_0^t s_j^o(t) \times e^{\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)t} \times dt \quad . \qquad \text{(B.14)}$$

If $D_i(t)$ is independent of time, as in the UMT case, integration yields

$$s_i^o(t) = s_i^o(0) \times e^{-\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)t} + \frac{D_i \times [1 - e^{-\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)t}]}{\rho_b^o \times d_m^o \times \left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)}$$

$$+ \lambda_i \times e^{-\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)t} \times \int_0^t s_j^o(t) \times e^{\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)t} \times dt \quad . \qquad \text{(B.15)}$$

First Member of Transformation Chain

$$s_1^o(t) = s_1^o(0) \times e^{-\left(\lambda_1 + \frac{\epsilon^o}{d_m^o} + L_1^o\right)t} + \frac{D_1 \times [1 - e^{-\left(\lambda_1 + \frac{\epsilon^o}{d_m^o} + L_1^o\right)t}]}{\rho_b^o \times d_m^o \times \left(\lambda_1 + \frac{\epsilon^o}{d_m^o} + L_1^o\right)}$$

$$s_1^o(t) = C_1^0 + C_1^1 e^{-\left(\lambda_1 + \frac{\epsilon^o}{d_m^o} + L_1^o\right)t} \quad , \qquad \text{(B.16)}$$

where

$$C_1^0 = s_1^o(0) - C_1^1 = \frac{D_1}{\rho_b^o \times d_m^o \times \left(\lambda_1 + \frac{\epsilon^o}{d_m^o} + L_1^o\right)} \quad .$$

Second Member of Transformation Chain

$$s_2^o(t) = s_2^o(0) \times e^{-\left(\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o\right)t} + \frac{D_2 \times \left[1 - e^{-\left(\lambda_2 - \frac{\epsilon^o}{d_m^o} + L_2^o\right)t}\right]}{\rho_b^o \times d_m^o \times \left(\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o\right)}$$

$$+ \lambda_2 \times e^{-\left(\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o\right)t} \times \int_0^t s_1^o(t) \times e^{\left(\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o\right)t} \times dt \quad . \qquad \text{(B.17)}$$

Substituting for $s_1^o(t)$,

$$s_2^o(t) = s_2^o(0) \times e^{-\left(\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o\right)t} + \frac{D_2 \times \left[1 - e^{-\left(\lambda_2 - \frac{\epsilon^o}{d_m^o} + L_2^o\right)t}\right]}{\rho_b^o \times d_m^o \times \left(\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o\right)}$$

$$+ \frac{D_1 \times \lambda_2 \times e^{-\left(\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o\right)t}}{\rho_b^o \times d_m^o \times \left(\lambda_1 + \frac{\epsilon^o}{d_m^o} + L_1^o\right)} \times \int_0^t \left[1 - e^{-\left(\lambda_1 + \frac{\epsilon^o}{d_m^o} + L_1^o\right)t}\right] \times e^{\left(\lambda_2 - \frac{\epsilon^o}{d_m^o} - L_2^o\right)t} \times dt \quad . \qquad \text{(B.18)}$$

Integrating,

$$s_2^o(t) = s_2^o(0) \times e^{-\left(\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o\right)t} + \frac{D_2 \times [1 - e^{-\left(\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o\right)t}]}{\rho_b^o \times d_m^o \times \left(\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o\right)}$$

$$+ \frac{D_1 \times \lambda_2}{\rho_b^o \times d_m^o \times \left(\lambda_1 + \frac{\epsilon^o}{d_m^o} + L_1^o\right)} \left[\frac{[1 - e^{-\left(\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o\right)t}]}{\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o} + \frac{[e^{-\left(\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o\right)t} - e^{-\left(\lambda_1 + \frac{\epsilon^o}{d_m^o} + L_1^o\right)t}]}{\lambda_2 - \lambda_1 + L_2^o - L_1^o} \right]$$

$$s_2^o(t) = C_2^0 + C_2^1 e^{-\left(\lambda_1 + \frac{\epsilon^o}{d_m^o} + L_1^o\right)t} + C_2^2 e^{-\left(\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o\right)t}, \qquad \text{(B.19)}$$

where

$$C_2^0 = \frac{C_1^0 \times \lambda_2}{\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o} + \frac{D_2}{\rho_b^o \times d_m^o \times \left(\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o\right)}$$

$$C_2^1 = \frac{C_1^1 \times \lambda_2}{\lambda_2 - \lambda_1 + L_2^o - L_1^o}$$

$$C_2^2 = s_2^o(0)1 - \frac{C_1^0 \times \lambda_2}{\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o} - \frac{C_1^1 \times \lambda_2}{\lambda_2 - \lambda_1 + L_2^o - L_1^o} - \frac{D_2}{\rho_b^o \times d_m^o \times \left(\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o\right)}$$

$$= s_2^o(0) - C_2^1 - C_2^0 \quad .$$

I^{th} Member of Transformation Chain

$$s_i^{o}(t) = s_i^{o}(0) \times e^{-\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right) t} + \frac{D_i \times \left[1 - e^{-\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right) t}\right]}{\rho_b^o \times d_m^o \times \left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)}$$

$$+ \lambda_i \times e^{-\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right) t} \times \int_0^t s_j^{o}(t) \times e^{\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right) t} \times dt \quad . \qquad \text{(B.20)}$$

If

$$s_j^{o}(t) = C_j^0 + C_j^1 e^{-\left(\lambda_1 + \frac{\epsilon^o}{d_m^o} + L_1^o\right) t} + C_j^2 e^{-\left(\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o\right) t} + \ldots + C_j^j e^{-\left(\lambda_j + \frac{\epsilon^o}{d_m^o} + L_j^o\right) t} \quad ,$$

then

$$s_i^{o}(t) = C_i^0 + C_i^1 e^{-\left(\lambda_1 + \frac{\epsilon^o}{d_m^o} + L_1^o\right) t} + C_i^2 e^{-\left(\lambda_2 + \frac{\epsilon^o}{d_m^o} + L_2^o\right) t} + \ldots + C_i^i e^{-\left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right) t} \quad ,$$

where

$$C_i^0 = \frac{C_j^0 \times \lambda_i}{\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o} + \frac{D_i}{\rho_b^o \times d_m^o \times \left(\lambda_i + \frac{\epsilon^o}{d_m^o} + L_i^o\right)} \quad ,$$

$$C_i^r = \frac{C_j^r \times \lambda_i}{\lambda_i - \lambda_j + L_i^o - L_j^o} \quad , \quad \text{where } 1 \le r \le j \ ,$$

and

$$C_i^i = s_i^{o}(0) - \sum_{r=0}^{j} C_i^r \quad .$$

APPENDIX C:

TABULAR RESULTS REQUESTED IN THE SCENARIO*

* The maximum value in each column of each table is shown in bold type. Capital letters at the beginning of each table title are requested format for results files, as specified in Section A.13 of Appendix A of this report (pages 49 and 50).

APPENDIX C:

TABULAR RESULTS REQUESTED IN THE SCENARIO*

AAACU Concentration in Atmosphere (Bq m^{-3}) in Zone A Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210
1	**3.2E-06**	**2.6E-05**	**2.6E-05**	**2.6E-05**	**2.6E-05**
20	3.2E-06	2.6E-05	2.6E-05	2.6E-05	2.6E-05
25	3.2E-06	2.6E-05	2.6E-05	2.6E-05	2.6E-05
30	3.2E-06	2.6E-05	2.6E-05	2.6E-05	2.6E-05
62	3.2E-06	2.6E-05	2.6E-05	2.6E-05	2.6E-05
125	3.2E-06	2.6E-05	2.6E-05	2.6E-05	2.6E-05
575	3.2E-06	2.6E-05	2.6E-05	2.6E-05	2.6E-05
750	3.2E-06	2.5E-05	2.6E-05	2.6E-05	2.6E-05
1000	3.2E-06	2.5E-05	2.6E-05	2.6E-05	2.6E-05
1025	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1050	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1100	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1200	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1400	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1600	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
2000	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
2500	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
3000	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

AAADU Inhalation Dose in Zone A Due to Atmospheric Release (Sv yr^{-1})

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
1	**6.2E-07**	**7.7E-06**	**3.2E-07**	**3.3E-07**	**2.9E-07**	**9.2E-06**
20	6.2E-07	7.7E-06	3.2E-07	3.3E-07	2.9E-07	9.2E-06
25	6.2E-07	7.7E-06	3.2E-07	3.3E-07	2.9E-07	9.2E-06
30	6.2E-07	7.7E-06	3.2E-07	3.3E-07	2.9E-07	9.2E-06
62	6.2E-07	7.7E-06	3.2E-07	3.3E-07	2.9E-07	9.2E-06
125	6.2E-07	7.7E-06	3.2E-07	3.3E-07	2.9E-07	9.2E-06
575	6.2E-07	7.6E-06	3.2E-07	3.3E-07	2.9E-07	9.2E-06
750	6.2E-07	7.6E-06	3.2E-07	3.3E-07	2.9E-07	9.2E-06
1000	6.2E-07	7.6E-06	3.2E-07	3.3E-07	2.9E-07	9.2E-06
1025	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1050	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1100	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1200	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1400	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1600	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
2000	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
2500	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
3000	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

* The maximum value in each column of each table is shown in bold type. Capital letters at the beginning of each table title are requested format for results files, as specified in Section A.13 of Appendix A of this report (pages 49 and 50).

AAARU Inhalation Cancer Risk in Zone A Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
1	**1.4E-06**	**8.2E-06**	**8.5E-07**	**7.4E-07**	**3.7E-07**	**1.2E-05**
20	1.4E-06	8.2E-06	8.5E-07	7.4E-07	3.7E-07	1.2E-05
25	1.4E-06	8.2E-06	8.5E-07	7.4E-07	3.7E-07	1.2E-05
30	1.4E-06	8.2E-06	8.5E-07	7.4E-07	3.7E-07	1.2E-05
62	1.4E-06	8.2E-06	8.5E-07	7.4E-07	3.7E-07	1.2E-05
125	1.4E-06	8.2E-06	8.5E-07	7.4E-07	3.7E-07	1.2E-05
575	1.4E-06	8.2E-06	8.5E-07	7.4E-07	3.7E-07	1.2E-05
750	1.4E-06	8.2E-06	8.5E-07	7.4E-07	3.7E-07	1.1E-05
1000	1.4E-06	8.2E-06	8.5E-07	7.4E-07	3.7E-07	1.1E-05
1025	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1050	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1100	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1200	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1400	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1600	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
2000	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
2500	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
3000	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

AAACM Concentration in Atmosphere (mg m^{-3}) in Zone A Due to Atmospheric Release

Time (yr)	As	Cr	Ni
1	**1.8E-07**	**1.8E-08**	**1.8E-09**
20	1.8E-07	1.8E-08	1.8E-09
25	1.8E-07	1.8E-08	1.8E-09
30	1.8E-07	1.8E-08	1.8E-09
62	1.8E-07	1.8E-08	1.8E-09
125	1.8E-07	1.8E-08	1.8E-09
575	1.8E-07	1.8E-08	1.8E-09
750	1.8E-07	1.8E-08	1.8E-09
1000	1.8E-07	1.8E-08	1.8E-09
1025	0.0E+00	0.0E+00	0.0E+00
1050	0.0E+00	0.0E+00	0.0E+00
1100	0.0E+00	0.0E+00	0.0E+00
1200	0.0E+00	0.0E+00	0.0E+00
1400	0.0E+00	0.0E+00	0.0E+00
1600	0.0E+00	0.0E+00	0.0E+00
2000	0.0E+00	0.0E+00	0.0E+00
2500	0.0E+00	0.0E+00	0.0E+00
3000	0.0E+00	0.0E+00	0.0E+00

AAAIM Inhalation Intake in Zone A Due to Atmospheric Release (mg yr^{-1})

Time (yr)	As	Cr	Ni
1	**1.1E-03**	**1.1E-04**	**1.1E-05**
20	1.1E-03	1.1E-04	1.1E-05
25	1.1E-03	1.1E-04	1.1E-05
30	1.1E-03	1.1E-04	1.1E-05
62	1.1E-03	1.1E-04	1.1E-05
125	1.1E-03	1.1E-04	1.1E-05
575	1.1E-03	1.1E-04	1.1E-05
750	1.1E-03	1.1E-04	1.1E-05
1000	1.1E-03	1.1E-04	1.1E-05
1025	0.0E+00	0.0E+00	0.0E+00
1050	0.0E+00	0.0E+00	0.0E+00
1100	0.0E+00	0.0E+00	0.0E+00
1200	0.0E+00	0.0E+00	0.0E+00
1400	0.0E+00	0.0E+00	0.0E+00
1600	0.0E+00	0.0E+00	0.0E+00
2000	0.0E+00	0.0E+00	0.0E+00
2500	0.0E+00	0.0E+00	0.0E+00
3000	0.0E+00	0.0E+00	0.0E+00

AAARM Inhalation Cancer Risk in Zone A Due to Atmospheric Release

Time (yr)	As	Cr	Ni
1	**5.1E-04**	**4.2E-05**	**9.0E-08**
20	5.1E-04	4.2E-05	9.0E-08
25	5.1E-04	4.2E-05	9.0E-08
30	5.1E-04	4.2E-05	9.0E-08
62	5.1E-04	4.2E-05	9.0E-08
125	5.1E-04	4.2E-05	9.0E-08
575	5.1E-04	4.2E-05	9.0E-08
750	5.1E-04	4.2E-05	9.0E-08
1000	5.1E-04	4.2E-05	9.0E-08
1025	0.0E+00	0.0E+00	0.0E+00
1050	0.0E+00	0.0E+00	0.0E+00
1100	0.0E+00	0.0E+00	0.0E+00
1200	0.0E+00	0.0E+00	0.0E+00
1400	0.0E+00	0.0E+00	0.0E+00
1600	0.0E+00	0.0E+00	0.0E+00
2000	0.0E+00	0.0E+00	0.0E+00
2500	0.0E+00	0.0E+00	0.0E+00
3000	0.0E+00	0.0E+00	0.0E+00

ABACU Concentration in Atmosphere (Bq m^{-3}) in Zone B Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210
1	**5.8E-07**	**4.6E-06**	**4.6E-06**	**4.6E-06**	**4.6E-06**
20	5.8E-07	4.6E-06	4.6E-06	4.6E-06	4.6E-06
25	5.8E-07	4.6E-06	4.6E-06	4.6E-06	4.6E-06
30	5.8E-07	4.6E-06	4.6E-06	4.6E-06	4.6E-06
62	5.8E-07	4.6E-06	4.6E-06	4.6E-06	4.6E-06
125	5.8E-07	4.6E-06	4.6E-06	4.6E-06	4.6E-06
575	5.7E-07	4.6E-06	4.6E-06	4.6E-06	4.6E-06
750	5.7E-07	4.6E-06	4.6E-06	4.6E-06	4.6E-06
1000	5.7E-07	4.6E-06	4.6E-06	4.6E-06	4.6E-06
1025	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1050	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1100	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1200	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1400	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1600	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
2000	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
2500	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
3000	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

ABADU Inhalation Dose in Zone B Due to Atmospheric Release (Sv yr^{-1})

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
1	**1.1E-07**	**1.4E-06**	**5.7E-08**	**6.0E-08**	**5.2E-08**	**1.7E-06**
20	1.1E-07	1.4E-06	5.7E-08	6.0E-08	5.2E-08	1.7E-06
25	1.1E-07	1.4E-06	5.7E-08	6.0E-08	5.2E-08	1.7E-06
30	1.1E-07	1.4E-06	5.7E-08	6.0E-08	5.2E-08	1.7E-06
62	1.1E-07	1.4E-06	5.7E-08	6.0E-08	5.2E-08	1.7E-06
125	1.1E-07	1.4E-06	5.7E-08	6.0E-08	5.2E-08	1.7E-06
575	1.1E-07	1.4E-06	5.7E-08	6.0E-08	5.2E-08	1.7E-06
750	1.1E-07	1.4E-06	5.7E-08	6.0E-08	5.2E-08	1.7E-06
1000	1.1E-07	1.4E-06	5.7E-08	6.0E-08	5.2E-08	1.7E-06
1025	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1050	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1100	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1200	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1400	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1600	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
2000	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
2500	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
3000	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

ABARU Inhalation Cancer Risk in Zone B Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
1	**2.5E-07**	**1.5E-06**	**1.5E-07**	**1.3E-07**	**6.7E-08**	**2.1E-06**
20	2.5E-07	1.5E-06	1.5E-07	1.3E-07	6.7E-08	2.1E-06
25	2.5E-07	1.5E-06	1.5E-07	1.3E-07	6.7E-08	2.1E-06
30	2.5E-07	1.5E-06	1.5E-07	1.3E-07	6.7E-08	2.1E-06
62	2.5E-07	1.5E-06	1.5E-07	1.3E-07	6.7E-08	2.1E-06
125	2.5E-07	1.5E-06	1.5E-07	1.3E-07	6.7E-08	2.1E-06
575	2.5E-07	1.5E-06	1.5E-07	1.3E-07	6.7E-08	2.1E-06
750	2.5E-07	1.5E-06	1.5E-07	1.3E-07	6.7E-08	2.1E-06
1000	2.5E-07	1.5E-06	1.5E-07	1.3E-07	6.7E-08	2.1E-06
1025	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1050	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1100	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1200	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1400	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1600	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
2000	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
2500	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
3000	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

ABACM Concentration in Atmosphere (mg m^{-3}) in Zone B Due to Atmospheric Release

Time (yr)	As	Cr	Ni
1	**3.3E-08**	**3.3E-09**	**3.3E-10**
20	3.3E-08	3.3E-09	3.3E-10
25	3.3E-08	3.3E-09	3.3E-10
30	3.3E-08	3.3E-09	3.3E-10
62	3.3E-08	3.3E-09	3.3E-10
125	3.3E-08	3.3E-09	3.3E-10
575	3.3E-08	3.3E-09	3.3E-10
750	3.3E-08	3.3E-09	3.3E-10
1000	3.3E-08	3.3E-09	3.3E-10
1025	0.0E+00	0.0E+00	0.0E+00
1050	0.0E+00	0.0E+00	0.0E+00
1100	0.0E+00	0.0E+00	0.0E+00
1200	0.0E+00	0.0E+00	0.0E+00
1400	0.0E+00	0.0E+00	0.0E+00
1600	0.0E+00	0.0E+00	0.0E+00
2000	0.0E+00	0.0E+00	0.0E+00
2500	0.0E+00	0.0E+00	0.0E+00
3000	0.0E+00	0.0E+00	0.0E+00

ABAIM Inhalation Intake in Zone B Due to Atmospheric Release (mg yr^{-1})

Time (yr)	As	Cr	Ni
1	**1.9E-04**	**1.9E-05**	**1.9E-06**
20	1.9E-04	1.9E-05	1.9E-06
25	1.9E-04	1.9E-05	1.9E-06
30	1.9E-04	1.9E-05	1.9E-06
62	1.9E-04	1.9E-05	1.9E-06
125	1.9E-04	1.9E-05	1.9E-06
575	1.9E-04	1.9E-05	1.9E-06
750	1.9E-04	1.9E-05	1.9E-06
1000	1.9E-04	1.9E-05	1.9E-06
1025	0.0E+00	0.0E+00	0.0E+00
1050	0.0E+00	0.0E+00	0.0E+00
1100	0.0E+00	0.0E+00	0.0E+00
1200	0.0E+00	0.0E+00	0.0E+00
1400	0.0E+00	0.0E+00	0.0E+00
1600	0.0E+00	0.0E+00	0.0E+00
2000	0.0E+00	0.0E+00	0.0E+00
2500	0.0E+00	0.0E+00	0.0E+00
3000	0.0E+00	0.0E+00	0.0E+00

ABARM Inhalation Cancer Risk in Zone B Due to Atmospheric Release

Time (yr)	As	Cr	Ni
1	**9.3E-05**	**7.6E-06**	**1.6E-08**
20	9.3E-05	7.6E-06	1.6E-08
25	9.3E-05	7.6E-06	1.6E-08
30	9.3E-05	7.6E-06	1.6E-08
62	9.3E-05	7.6E-06	1.6E-08
125	9.3E-05	7.6E-06	1.6E-08
575	9.3E-05	7.6E-06	1.6E-08
750	9.3E-05	7.6E-06	1.6E-08
1000	9.3E-05	7.6E-06	1.6E-08
1025	0.0E+00	0.0E+00	0.0E+00
1050	0.0E+00	0.0E+00	0.0E+00
1100	0.0E+00	0.0E+00	0.0E+00
1200	0.0E+00	0.0E+00	0.0E+00
1400	0.0E+00	0.0E+00	0.0E+00
1600	0.0E+00	0.0E+00	0.0E+00
2000	0.0E+00	0.0E+00	0.0E+00
2500	0.0E+00	0.0E+00	0.0E+00
3000	0.0E+00	0.0E+00	0.0E+00

AABCU Concentration in Beef (Bq kg^{-1}) in Zone A Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210
1	2.2E-02	2.4E-03	3.1E-03	1.2E-02	3.0E+00
20	2.4E-02	2.5E-03	3.7E-03	1.3E-02	3.2E+00
25	2.4E-02	2.5E-03	3.8E-03	1.3E-02	3.2E+00
30	2.4E-02	2.5E-03	4.0E-03	1.3E-02	3.3E+00
62	2.5E-02	2.7E-03	4.8E-03	1.3E-02	3.5E+00
125	2.7E-02	2.8E-03	5.9E-03	1.4E-02	3.7E+00
575	3.1E-02	3.1E-03	7.9E-03	1.6E-02	4.2E+00
750	3.1E-02	3.1E-03	8.0E-03	1.6E-02	4.3E+00
1000	**3.1E-02**	**3.1E-03**	**8.0E-03**	**1.6E-02**	**4.3E+00**
1025	7.3E-03	5.8E-04	4.2E-03	3.3E-03	1.1E+00
1050	6.1E-03	4.9E-04	3.5E-03	2.8E-03	8.8E-01
1100	4.3E-03	3.5E-04	2.5E-03	2.0E-03	6.2E-01
1200	2.2E-03	1.7E-04	1.2E-03	9.9E-04	3.1E-01
1400	5.4E-04	4.3E-05	3.1E-04	2.5E-04	7.8E-02
1600	1.4E-04	1.1E-05	7.8E-05	6.2E-05	2.0E-02
2000	8.5E-06	6.7E-07	4.9E-06	3.9E-06	1.2E-03
2500	2.6E-07	2.1E-08	1.5E-07	1.2E-07	3.8E-05
3000	8.3E-09	6.5E-10	4.7E-09	3.8E-09	1.2E-06

AABDU Dose from Beef Ingestion in Zone A Due to Atmospheric Release (Sv yr^{-1})

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
1	4.6E-08	4.2E-08	3.4E-08	7.9E-07	9.4E-05	9.5E-05
20	4.8E-08	4.4E-08	4.0E-08	8.2E-07	9.9E-05	1.0E-04
25	4.8E-08	4.4E-08	4.2E-08	8.3E-07	1.0E-04	1.0E-04
30	4.9E-08	4.5E-08	4.3E-08	8.3E-07	1.0E-04	1.0E-04
62	5.2E-08	4.7E-08	5.2E-08	8.8E-07	1.1E-04	1.1E-04
125	5.6E-08	4.9E-08	6.5E-08	9.4E-07	1.2E-04	1.2E-04
575	6.3E-08	5.4E-08	8.7E-08	1.0E-06	1.3E-04	1.3E-04
750	6.3E-08	5.4E-08	8.8E-08	1.0E-06	1.3E-04	1.3E-04
1000	**6.3E-08**	**5.4E-08**	**8.8E-08**	**1.0E-06**	**1.3E-04**	**1.3E-04**
1025	1.5E-08	1.0E-08	4.6E-08	2.2E-07	3.2E-05	3.3E-05
1050	1.2E-08	8.5E-09	3.9E-08	1.8E-07	2.7E-05	2.8E-05
1100	8.8E-09	6.0E-09	2.7E-08	1.3E-07	1.9E-05	1.9E-05
1200	4.4E-09	3.0E-09	1.4E-08	6.5E-08	9.6E-06	9.7E-06
1400	1.1E-09	7.5E-10	3.4E-09	1.6E-08	2.4E-06	2.4E-06
1600	2.7E-10	1.9E-10	8.6E-10	4.0E-09	6.0E-07	6.1E-07
2000	1.7E-11	1.2E-11	5.3E-11	2.5E-10	3.8E-08	3.8E-08
2500	5.3E-13	3.6E-13	1.7E-12	7.9E-12	1.2E-09	1.2E-09
3000	1.7E-14	1.1E-14	5.2E-14	2.5E-13	3.7E-11	3.7E-11

AABRU Cancer Risk from Beef Ingestion in Zone A Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
1	4.7E-08	3.0E-09	3.4E-08	4.3E-05	7.2E-07	4.4E-05
20	4.9E-08	3.1E-09	4.1E-08	4.3E-05	2.9E-06	4.6E-05
25	5.0E-08	3.1E-09	4.3E-08	4.3E-05	3.4E-06	4.7E-05
30	5.0E-08	3.1E-09	4.4E-08	4.3E-05	4.0E-06	4.7E-05
62	5.3E-08	3.3E-09	5.3E-08	4.3E-05	6.8E-06	5.0E-05
125	5.7E-08	3.4E-09	6.6E-08	4.3E-05	1.1E-05	5.5E-05
575	6.4E-08	3.8E-09	8.9E-08	**4.4E-05**	1.8E-05	6.2E-05
750	6.5E-08	3.8E-09	8.9E-08	4.3E-05	1.8E-05	6.2E-05
1000	**6.5E-08**	**3.8E-09**	**9.0E-08**	4.3E-05	**1.8E-05**	**6.2E-05**
1025	1.5E-08	7.1E-10	4.7E-08	1.6E-07	1.5E-05	1.5E-05
1050	1.3E-08	6.0E-10	3.9E-08	1.4E-07	1.3E-05	1.3E-05
1100	9.0E-09	4.2E-10	2.8E-08	9.8E-08	8.9E-06	9.1E-06
1200	4.5E-09	2.1E-10	1.4E-08	4.9E-08	4.5E-06	4.5E-06
1400	1.1E-09	5.3E-11	3.5E-09	1.2E-08	1.1E-06	1.1E-06
1600	2.8E-10	1.3E-11	8.7E-10	3.0E-09	2.8E-07	2.8E-07
2000	1.8E-11	8.2E-13	5.4E-11	1.9E-10	1.7E-08	1.8E-08
2500	5.5E-13	2.5E-14	1.7E-12	5.9E-12	5.4E-10	5.5E-10
3000	1.7E-14	7.9E-16	5.3E-14	1.9E-13	1.7E-11	1.7E-11

AABCM Concentration in Beef (mg kg^{-1}) in Zone A Due to Atmospheric Release

Time (yr)	As	Cr	Ni
1	2.2E-02	4.3E-05	2.2E-06
20	2.3E-02	4.6E-05	2.3E-06
25	2.3E-02	4.7E-05	2.3E-06
30	2.3E-02	4.8E-05	2.3E-06
62	2.5E-02	5.1E-05	2.5E-06
125	2.6E-02	5.7E-05	2.7E-06
575	3.0E-02	6.6E-05	3.0E-06
750	3.0E-02	6.7E-05	3.0E-06
1000	**3.0E-02**	**6.7E-05**	**3.0E-06**
1025	7.0E-03	2.0E-05	7.5E-07
1050	5.9E-03	1.7E-05	6.3E-07
1100	4.2E-03	1.2E-05	4.5E-07
1200	2.1E-03	6.0E-06	2.2E-07
1400	5.2E-04	1.5E-06	5.6E-08
1600	1.3E-04	3.7E-07	1.4E-08
2000	8.1E-06	2.3E-08	8.7E-10
2500	2.5E-07	7.3E-10	2.7E-11
3000	7.9E-09	2.3E-11	8.5E-13

AABIM Intake from Beef Ingestion in Zone A Due to Atmospheric Release (mg yr^{-1})

Time (yr)	As	Cr	Ni
1	1.1E+00	2.2E-03	1.1E-04
20	1.1E+00	2.3E-03	1.1E-04
25	1.1E+00	2.3E-03	1.1E-04
30	1.2E+00	2.4E-03	1.2E-04
62	1.2E+00	2.6E-03	1.2E-04
125	1.3E+00	2.8E-03	1.3E-04
575	1.5E+00	3.3E-03	1.5E-04
750	1.5E+00	3.3E-03	1.5E-04
1000	**1.5E+00**	**3.3E-03**	**1.5E-04**
1025	3.5E-01	1.0E-03	3.8E-05
1050	2.9E-01	8.4E-04	3.2E-05
1100	2.1E-01	6.0E-04	2.2E-05
1200	1.0E-01	3.0E-04	1.1E-05
1400	2.6E-02	7.4E-05	2.8E-06
1600	6.5E-03	1.9E-05	7.0E-07
2000	4.1E-04	1.2E-06	4.4E-08
2500	1.3E-05	3.6E-08	1.4E-09
3000	4.0E-07	1.1E-09	4.3E-11

AABRM Cancer Risk from Beef Ingestion in Zone A Due to Atmospheric Release

Time (yr)	As	Cr	Ni
1	1.9E-02	0.0E+00	0.0E+00
20	2.0E-02	0.0E+00	0.0E+00
25	2.0E-02	0.0E+00	0.0E+00
30	2.0E-02	0.0E+00	0.0E+00
62	2.1E-02	0.0E+00	0.0E+00
125	2.3E-02	0.0E+00	0.0E+00
575	2.6E-02	0.0E+00	0.0E+00
750	2.6E-02	0.0E+00	0.0E+00
1000	**2.6E-02**	0.0E+00	0.0E+00
1025	6.1E-03	0.0E+00	0.0E+00
1050	5.2E-03	0.0E+00	0.0E+00
1100	3.6E-03	0.0E+00	0.0E+00
1200	1.8E-03	0.0E+00	0.0E+00
1400	4.6E-04	0.0E+00	0.0E+00
1600	1.1E-04	0.0E+00	0.0E+00
2000	7.1E-06	0.0E+00	0.0E+00
2500	2.2E-07	0.0E+00	0.0E+00
3000	7.0E-09	0.0E+00	0.0E+00

ABBCU Concentration in Beef (Bq kg^{-1}) in Zone B Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210
1	4.1E-03	4.4E-04	5.5E-04	2.2E-03	5.5E-01
20	4.3E-03	4.5E-04	6.6E-04	2.3E-03	5.8E-01
25	4.3E-03	4.6E-04	6.9E-04	2.3E-03	5.8E-01
30	4.4E-03	4.6E-04	7.2E-04	2.3E-03	5.9E-01
62	4.6E-03	4.8E-04	8.6E-04	2.4E-03	6.3E-01
125	5.0E-03	5.1E-04	1.1E-03	2.6E-03	6.8E-01
575	5.6E-03	5.6E-04	1.4E-03	2.9E-03	7.7E-01
750	5.6E-03	5.6E-04	1.4E-03	2.9E-03	7.7E-01
1000	**5.6E-03**	**5.6E-04**	**1.5E-03**	**2.9E-03**	**7.7E-01**
1025	1.3E-03	1.1E-04	7.6E-04	6.1E-04	1.9E-01
1050	1.1E-03	8.8E-05	6.4E-04	5.1E-04	1.6E-01
1100	7.8E-04	6.2E-05	4.5E-04	3.6E-04	1.1E-01
1200	3.9E-04	3.1E-05	2.3E-04	1.8E-04	5.6E-02
1400	9.8E-05	7.8E-06	5.7E-05	4.5E-05	1.4E-02
1600	2.5E-05	1.9E-06	1.4E-05	1.1E-05	3.5E-03
2000	1.5E-06	1.2E-07	8.8E-07	7.1E-07	2.2E-04
2500	4.8E-08	3.8E-09	2.8E-08	2.2E-08	6.9E-06
3000	1.5E-09	1.2E-10	8.6E-10	6.9E-10	2.1E-07

ABBDU Dose from Beef Ingestion in Zone B Due to Atmospheric Release (Sv yr^{-1})

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
1	8.3E-09	7.7E-09	6.1E-09	1.4E-07	1.7E-05	1.7E-05
20	8.7E-09	7.9E-09	7.3E-09	1.5E-07	1.8E-05	1.8E-05
25	8.8E-09	8.0E-09	7.6E-09	1.5E-07	1.8E-05	1.8E-05
30	8.8E-09	8.1E-09	7.9E-09	1.5E-07	1.8E-05	1.8E-05
62	9.4E-09	8.4E-09	9.5E-09	1.6E-07	1.9E-05	2.0E-05
125	1.0E-08	8.9E-09	1.2E-08	1.7E-07	2.1E-05	2.1E-05
575	1.1E-08	9.8E-09	1.6E-08	1.9E-07	2.4E-05	2.4E-05
750	1.1E-08	9.8E-09	1.6E-08	1.9E-07	2.4E-05	2.4E-05
1000	**1.1E-08**	**9.8E-09**	**1.6E-08**	**1.9E-07**	**2.4E-05**	**2.4E-05**
1025	2.7E-09	1.8E-09	8.4E-09	4.0E-08	5.9E-06	5.9E-06
1050	2.2E-09	1.5E-09	7.0E-09	3.3E-08	5.0E-06	5.0E-06
1100	1.6E-09	1.1E-09	5.0E-09	2.4E-08	3.5E-06	3.5E-06
1200	8.0E-10	5.5E-10	2.5E-09	1.2E-08	1.8E-06	1.8E-06
1400	2.0E-10	1.4E-10	6.2E-10	2.9E-09	4.4E-07	4.4E-07
1600	5.0E-11	3.4E-11	1.6E-10	7.3E-10	1.1E-07	1.1E-07
2000	3.1E-12	2.1E-12	9.7E-12	4.6E-11	6.8E-09	6.9E-09
2500	9.7E-14	6.6E-14	3.0E-13	1.4E-12	2.1E-10	2.2E-10
3000	3.0E-15	2.1E-15	9.4E-15	4.5E-14	6.6E-12	6.7E-12

ABBRU Cancer Risk from Beef Ingestion in Zone B Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
1	8.5E-09	5.4E-10	6.2E-09	7.9E-06	1.3E-07	8.0E-06
20	8.9E-09	5.6E-10	7.4E-09	7.9E-06	5.3E-07	8.4E-06
25	9.0E-09	5.6E-10	7.7E-09	7.9E-06	6.2E-07	8.5E-06
30	9.1E-09	5.7E-10	8.0E-09	7.9E-06	7.2E-07	8.6E-06
62	9.6E-09	5.9E-10	9.7E-09	7.9E-06	1.2E-06	9.1E-06
125	1.0E-08	6.2E-10	1.2E-08	7.9E-06	2.0E-06	9.9E-06
575	1.2E-08	6.8E-10	1.6E-08	7.9E-06	3.3E-06	1.1E-05
750	1.2E-08	6.9E-10	1.6E-08	7.9E-06	3.3E-06	1.1E-05
1000	**1.2E-08**	**6.9E-10**	**1.6E-08**	**7.9E-06**	**3.4E-06**	**1.1E-05**
1025	2.8E-09	1.3E-10	8.5E-09	3.0E-08	2.7E-06	2.8E-06
1050	2.3E-09	1.1E-10	7.2E-09	2.5E-08	2.3E-06	2.3E-06
1100	1.6E-09	7.7E-11	5.1E-09	1.8E-08	1.6E-06	1.6E-06
1200	8.2E-10	3.8E-11	2.5E-09	8.9E-09	8.1E-07	8.2E-07
1400	2.0E-10	9.6E-12	6.3E-10	2.2E-09	2.0E-07	2.1E-07
1600	5.1E-11	2.4E-12	1.6E-10	5.5E-10	5.1E-08	5.1E-08
2000	3.2E-12	1.5E-13	9.9E-12	3.5E-11	3.2E-09	3.2E-09
2500	1.0E-13	4.6E-15	3.1E-13	1.1E-12	9.9E-11	1.0E-10
3000	3.1E-15	1.4E-16	9.6E-15	3.4E-14	3.1E-12	3.1E-12

ABBCM Concentration in Beef ($mg\ kg^{-1}$) in Zone B Due to Atmospheric Release

Time (yr)	As	Cr	Ni
1	3.9E-03	7.8E-06	3.9E-07
20	4.1E-03	8.4E-06	4.1E-07
25	4.1E-03	8.5E-06	4.2E-07
30	4.2E-03	8.6E-06	4.2E-07
62	4.4E-03	9.3E-06	4.5E-07
125	4.8E-03	1.0E-05	4.8E-07
575	5.4E-03	1.2E-05	5.5E-07
750	5.4E-03	1.2E-05	5.5E-07
1000	**5.4E-03**	**1.2E-05**	**5.5E-07**
1025	1.3E-03	3.6E-06	1.4E-07
1050	1.1E-03	3.0E-06	1.1E-07
1100	7.5E-04	2.2E-06	8.1E-08
1200	3.8E-04	1.1E-06	4.0E-08
1400	9.4E-05	2.7E-07	1.0E-08
1600	2.3E-05	6.7E-08	2.5E-09
2000	1.5E-06	4.2E-09	1.6E-10
2500	4.6E-08	1.3E-10	4.9E-12
3000	1.4E-09	4.1E-12	1.5E-13

ABBIM Intake from Beef Ingestion in Zone B Due to Atmospheric Release ($mg\ yr^{-1}$)

Time (yr)	As	Cr	Ni
1	2.0E-01	3.9E-04	2.0E-05
20	2.1E-01	4.2E-04	2.1E-05
25	2.1E-01	4.2E-04	2.1E-05
30	2.1E-01	4.3E-04	2.1E-05
62	2.2E-01	4.7E-04	2.2E-05
125	2.4E-01	5.2E-04	2.4E-05
575	2.7E-01	6.0E-04	2.7E-05
750	2.7E-01	6.0E-04	2.7E-05
1000	**2.7E-01**	**6.0E-04**	**2.7E-05**
1025	6.3E-02	1.8E-04	6.8E-06
1050	5.3E-02	1.5E-04	5.7E-06
1100	3.8E-02	1.1E-04	4.0E-06
1200	1.9E-02	5.4E-05	2.0E-06
1400	4.7E-03	1.3E-05	5.0E-07
1600	1.2E-03	3.4E-06	1.3E-07
2000	7.3E-05	2.1E-07	7.9E-09
2500	2.3E-06	6.6E-09	2.5E-10
3000	7.2E-08	2.1E-10	7.7E-12

ABBRM Cancer Risk from Beef Ingestion in Zone B Due to Atmospheric Release

Time (yr)	As	Cr	Ni
1	3.4E-03	0.0E+00	0.0E+00
20	3.6E-03	0.0E+00	0.0E+00
25	3.6E-03	0.0E+00	0.0E+00
30	3.7E-03	0.0E+00	0.0E+00
62	3.9E-03	0.0E+00	0.0E+00
125	4.2E-03	0.0E+00	0.0E+00
575	4.7E-03	0.0E+00	0.0E+00
750	4.7E-03	0.0E+00	0.0E+00
1000	**4.7E-03**	0.0E+00	0.0E+00
1025	1.1E-03	0.0E+00	0.0E+00
1050	9.3E-04	0.0E+00	0.0E+00
1100	6.6E-04	0.0E+00	0.0E+00
1200	3.3E-04	0.0E+00	0.0E+00
1400	8.2E-05	0.0E+00	0.0E+00
1600	2.1E-05	0.0E+00	0.0E+00
2000	1.3E-06	0.0E+00	0.0E+00
2500	4.0E-08	0.0E+00	0.0E+00
3000	1.3E-09	0.0E+00	0.0E+00

GABCU Concentration in Beef (Bq kg^{-1}) in Zone A
Due to Groundwater Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	1.4E+00	7.2E-11	2.1E-11	7.8E-11	2.0E-08
80	7.5E+01	2.2E-07	1.7E-08	6.2E-08	1.6E-05
100	1.6E+02	9.6E-07	1.5E-07	5.5E-07	1.4E-04
125	**2.5E+02**	2.6E-06	6.6E-07	2.5E-06	6.2E-04
575	2.5E+02	3.9E-05	1.0E-04	3.9E-04	9.7E-02
590	2.5E+02	4.0E-05	1.9E-02	7.6E-02	1.9E+01
620	2.5E+02	4.2E-05	1.8E-01	7.5E-01	1.9E+02
750	2.5E+02	5.3E-05	8.8E-01	3.6E+00	8.9E+02
1000	2.5E+02	7.3E-05	2.1E+00	8.6E+00	2.1E+03
1015	2.5E+02	7.5E-05	2.2E+00	8.9E+00	2.2E+03
1025	2.5E+02	7.5E-05	2.2E+00	9.0E+00	2.3E+03
1060	2.5E+02	7.8E-05	2.4E+00	9.7E+00	2.4E+03
1080	2.5E+02	8.0E-05	2.5E+00	1.0E+01	2.5E+03
1120	1.4E+01	**8.1E-05**	2.7E+00	1.1E+01	2.7E+03
1175	0.0E+00	8.1E-05	2.9E+00	1.2E+01	2.9E+03
1575	0.0E+00	7.9E-05	**2.9E+00**	**1.2E+01**	**3.0E+03**
1750	0.0E+00	8.0E-05	2.1E+00	8.4E+00	2.1E+03
2175	0.0E+00	7.8E-05	7.0E-02	3.0E-01	7.0E+01
4000	0.0E+00	7.6E-05	7.0E-02	3.0E-01	7.0E+01
6000	0.0E+00	7.5E-05	7.0E-02	3.0E-01	8.0E+01
8000	0.0E+00	7.4E-05	7.0E-02	3.0E-01	7.0E+01
10000	0.0E+00	7.3E-05	8.0E-02	3.0E-01	7.0E+01

GBBCU Concentration in Beef (Bq kg^{-1}) in Zone B
Due to Groundwater Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	1.6E-01	8.6E-12	2.5E-12	9.3E-12	2.3E-09
80	8.9E+00	2.6E-08	2.0E-09	7.4E-09	1.8E-06
100	1.9E+01	1.1E-07	1.7E-08	6.5E-08	1.6E-05
125	**3.0E+01**	3.1E-07	7.9E-08	3.0E-07	7.4E-05
575	3.0E+01	4.6E-06	1.2E-05	4.7E-05	1.2E-02
590	3.0E+01	4.7E-06	2.2E-03	9.0E-03	2.3E+00
620	3.0E+01	5.0E-06	2.2E-02	8.9E-02	2.2E+01
750	3.0E+01	6.3E-06	1.0E-01	4.2E-01	1.1E+02
1000	3.0E+01	8.7E-06	2.5E-01	1.0E+00	2.6E+02
1015	3.0E+01	8.9E-06	2.6E-01	1.1E+00	2.6E+02
1025	3.0E+01	9.0E-06	2.7E-01	1.1E+00	2.7E+02
1060	3.0E+01	9.3E-06	2.8E-01	1.2E+00	2.9E+02
1080	3.0E+01	9.5E-06	3.0E-01	1.2E+00	3.0E+02
1120	1.6E+00	**9.6E-06**	3.2E-01	1.3E+00	3.2E+02
1175	0.0E+00	9.6E-06	3.4E-01	1.4E+00	3.5E+02
1575	0.0E+00	9.5E-06	**3.5E-01**	**1.4E+00**	**3.5E+02**
1750	0.0E+00	9.5E-06	2.5E-01	1.0E+00	2.5E+02
2175	0.0E+00	9.2E-06	8.0E-03	3.0E-02	8.0E+00
4000	0.0E+00	9.1E-06	8.0E-03	3.0E-02	8.0E+00
6000	0.0E+00	9.0E-06	8.0E-03	3.0E-02	9.0E+00
8000	0.0E+00	8.7E-06	9.0E-03	4.0E-02	9.0E+00
10000	0.0E+00	8.6E-06	9.0E-03	4.0E-02	9.0E+00

GABDU Dose from Beef Ingestion in Zone A Due to Groundwater Release (Sv yr^{-1})

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	2.8E-06	1.3E-15	2.3E-16	5.1E-15	6.0E-13	2.8E-06
80	1.5E-04	3.8E-12	1.8E-13	4.0E-12	4.8E-10	1.5E-04
100	3.2E-04	1.7E-11	1.6E-12	3.6E-11	4.2E-09	3.2E-04
125	**5.1E-04**	4.6E-11	7.3E-12	1.6E-10	1.9E-08	5.1E-04
575	5.1E-04	6.8E-10	1.2E-09	2.5E-08	3.0E-06	5.1E-04
590	5.1E-04	7.0E-10	2.1E-07	4.9E-06	5.9E-04	1.1E-03
620	5.1E-04	7.4E-10	2.0E-06	4.9E-05	5.8E-03	6.3E-03
750	5.1E-04	9.2E-10	9.7E-06	2.3E-04	2.8E-02	2.8E-02
1000	5.1E-04	1.3E-09	2.3E-05	5.6E-04	6.6E-02	6.7E-02
1015	5.1E-04	1.3E-09	2.4E-05	5.8E-04	6.9E-02	7.0E-02
1025	5.1E-04	1.3E-09	2.5E-05	5.9E-04	7.0E-02	7.1E-02
1060	5.1E-04	1.4E-09	2.6E-05	6.3E-04	7.5E-02	7.6E-02
1080	5.1E-04	1.4E-09	2.7E-05	6.5E-04	7.8E-02	7.9E-02
1120	2.7E-05	**1.4E-09**	2.9E-05	7.0E-04	8.4E-02	8.4E-02
1175	0.0E+00	1.4E-09	3.2E-05	7.6E-04	9.1E-02	9.2E-02
1575	0.0E+00	1.4E-09	**3.2E-05**	**7.7E-04**	**9.2E-02**	**9.3E-02**
1750	0.0E+00	1.4E-09	2.3E-05	5.4E-04	6.5E-02	6.5E-02
2175	0.0E+00	1.4E-09	7.0E-07	1.7E-05	2.1E-03	2.1E-03
4000	0.0E+00	1.3E-09	8.0E-07	1.8E-05	2.2E-03	2.2E-03
6000	0.0E+00	1.3E-09	8.0E-07	2.0E-05	2.4E-03	2.4E-03
8000	0.0E+00	1.3E-09	8.0E-07	1.9E-05	2.1E-03	2.1E-03
10000	0.0E+00	1.2E-09	8.0E-07	2.0E-05	2.0E-03	2.0E-03

GBBDU Dose from Beef Ingestion in Zone B Due to Groundwater Release (Sv yr^{-1})

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	3.3E-07	1.5E-16	2.7E-17	6.0E-16	7.2E-14	3.3E-07
80	1.8E-05	4.6E-13	2.2E-14	4.8E-13	5.7E-11	1.8E-05
100	3.8E-05	2.0E-12	1.9E-13	4.2E-12	5.0E-10	3.8E-05
125	**6.1E-05**	5.4E-12	8.7E-13	1.9E-11	2.3E-09	6.1E-05
575	6.1E-05	8.1E-11	1.4E-10	3.0E-09	3.6E-07	6.1E-05
590	6.1E-05	8.3E-11	2.4E-08	5.8E-07	7.0E-05	1.3E-04
620	6.1E-05	8.8E-11	2.4E-07	5.8E-06	6.9E-04	7.6E-04
750	6.1E-05	1.1E-10	1.2E-06	2.8E-05	3.3E-03	3.4E-03
1000	6.1E-05	1.5E-10	2.8E-06	6.6E-05	7.9E-03	8.0E-03
1015	6.1E-05	1.6E-10	2.9E-06	6.9E-05	8.2E-03	8.3E-03
1025	6.1E-05	1.6E-10	2.9E-06	7.0E-05	8.3E-03	8.5E-03
1060	6.1E-05	1.6E-10	3.1E-06	7.5E-05	8.9E-03	9.1E-03
1080	6.0E-05	1.7E-10	3.3E-06	7.8E-05	9.3E-03	9.4E-03
1120	3.3E-06	**1.7E-10**	3.5E-06	8.3E-05	1.0E-02	1.0E-02
1175	0.0E+00	1.7E-10	3.8E-06	9.1E-05	1.1E-02	1.1E-02
1575	0.0E+00	1.7E-10	**3.8E-06**	**9.2E-05**	**1.1E-02**	**1.1E-02**
1750	0.0E+00	1.7E-10	2.7E-06	6.5E-05	7.7E-03	7.8E-03
2175	0.0E+00	1.6E-10	9.0E-08	2.1E-06	3.0E-04	3.0E-04
4000	0.0E+00	1.6E-10	8.0E-08	2.1E-06	3.0E-04	3.0E-04
6000	0.0E+00	1.6E-10	9.0E-08	2.4E-06	3.0E-04	3.0E-04
8000	0.0E+00	1.5E-10	9.0E-08	2.3E-06	2.0E-04	2.0E-04
10000	0.0E+00	1.5E-10	1.0E-07	2.0E-06	3.0E-04	3.0E-04

GABRU Cancer Risk from Beef Ingestion in Zone A
Due to Groundwater Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	2.8E-06	8.8E-17	2.3E-16	3.8E-15	2.8E-13	2.8E-06
80	1.6E-04	2.7E-13	1.9E-13	3.0E-12	2.2E-10	1.6E-04
100	3.3E-04	1.2E-12	1.6E-12	2.7E-11	2.0E-09	3.3E-04
125	**5.2E-04**	3.2E-12	7.4E-12	1.2E-10	8.9E-09	5.2E-04
575	5.2E-04	4.7E-11	1.2E-09	1.9E-08	1.4E-06	5.3E-04
590	5.2E-04	4.9E-11	2.1E-07	3.7E-06	2.7E-04	8.0E-04
620	5.2E-04	5.2E-11	2.1E-06	3.7E-05	2.7E-03	3.2E-03
750	5.2E-04	6.4E-11	9.8E-06	1.7E-04	1.3E-02	1.3E-02
1000	5.2E-04	9.0E-11	2.4E-05	4.2E-04	3.1E-02	3.2E-02
1015	5.2E-04	9.1E-11	2.4E-05	4.3E-04	3.2E-02	3.3E-02
1025	5.2E-04	9.2E-11	2.5E-05	4.4E-04	3.2E-02	3.3E-02
1060	5.2E-04	9.6E-11	2.7E-05	4.7E-04	3.5E-02	3.6E-02
1080	5.2E-04	9.8E-11	2.8E-05	4.9E-04	3.6E-02	3.7E-02
1120	2.8E-05	**9.9E-11**	3.0E-05	5.3E-04	3.9E-02	3.9E-02
1175	1.0E-07	9.9E-11	3.2E-05	5.8E-04	4.2E-02	4.3E-02
1575	0.0E+00	9.8E-11	**3.3E-05**	**5.8E-04**	**4.3E-02**	**4.3E-02**
1750	0.0E+00	9.7E-11	2.3E-05	4.1E-04	3.0E-02	3.0E-02
2175	1.0E-07	9.5E-11	7.5E-07	1.3E-05	9.8E-04	9.9E-04
4000	1.0E-07	9.4E-11	7.7E-07	1.4E-05	1.0E-03	1.0E-03
6000	1.0E-07	9.2E-11	7.8E-07	1.5E-05	1.1E-03	1.1E-03
8000	0.0E+00	9.0E-11	8.2E-07	1.5E-05	1.1E-03	1.1E-03
10000	1.0E-07	8.9E-11	8.6E-07	1.5E-05	1.1E-03	1.1E-03

GBBRU Cancer Risk from Beef Ingestion in Zone B
Due to Groundwater Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	3.4E-07	1.1E-17	2.8E-17	4.5E-16	3.3E-14	3.4E-07
80	1.9E-05	3.2E-14	2.2E-14	3.6E-13	2.6E-11	1.9E-05
100	3.9E-05	1.4E-13	1.9E-13	3.2E-12	2.3E-10	3.9E-05
125	**6.2E-05**	3.8E-13	8.8E-13	1.4E-11	1.1E-09	6.2E-05
575	6.2E-05	5.6E-12	1.4E-10	2.3E-09	1.7E-07	6.3E-05
590	6.2E-05	5.8E-12	2.5E-08	4.4E-07	3.2E-05	9.5E-05
620	6.2E-05	6.1E-12	2.5E-07	4.4E-06	3.2E-04	3.9E-04
750	6.2E-05	7.7E-12	1.2E-06	2.1E-05	1.5E-03	1.6E-03
1000	6.2E-05	1.1E-11	2.8E-06	5.0E-05	3.7E-03	3.8E-03
1015	6.2E-05	1.1E-11	2.9E-06	5.2E-05	3.8E-03	3.9E-03
1025	6.2E-05	1.1E-11	3.0E-06	5.3E-05	3.9E-03	4.0E-03
1060	6.2E-05	1.1E-11	3.2E-06	5.7E-05	4.1E-03	4.3E-03
1080	6.2E-05	1.2E-11	3.3E-06	5.9E-05	4.3E-03	4.4E-03
1120	3.4E-06	**1.2E-11**	3.5E-06	6.3E-05	4.6E-03	4.7E-03
1175	0.0E+00	1.2E-11	3.9E-06	6.9E-05	5.0E-03	5.1E-03
1575	0.0E+00	1.2E-11	**3.9E-06**	**6.9E-05**	**5.1E-03**	**5.1E-03**
1750	0.0E+00	1.2E-11	2.7E-06	4.9E-05	3.6E-03	3.6E-03
2175	0.0E+00	1.1E-11	8.9E-08	1.6E-06	1.2E-04	1.2E-04
4000	0.0E+00	1.1E-11	9.0E-08	1.6E-06	1.2E-04	1.2E-04
6000	0.0E+00	1.1E-11	9.3E-08	1.8E-06	1.3E-04	1.3E-04
8000	0.0E+00	1.1E-11	9.7E-08	1.7E-06	1.3E-04	1.3E-04
10000	0.0E+00	1.1E-11	1.0E-07	1.8E-06	1.3E-04	1.3E-04

GABCM Concentration in Beef (mg kg^{-1}) in Zone A Due to Groundwater Release

Time (yr)	As	Cr	Ni
15	0.0E+00	1.3E-05	6.4E-07
20	0.0E+00	1.0E+00	5.0E-02
25	0.0E+00	2.0E+00	1.0E-01
30	0.0E+00	**3.0E+00**	**1.5E-01**
60	0.0E+00	3.0E+00	1.5E-01
62	0.0E+00	3.0E+00	1.5E-01
80	0.0E+00	3.0E+00	1.5E-01
100	0.0E+00	3.0E+00	1.5E-01
125	0.0E+00	3.0E+00	1.5E-01
575	0.0E+00	3.0E+00	1.5E-01
590	0.0E+00	3.0E+00	1.5E-01
620	0.0E+00	3.0E+00	1.5E-01
750	0.0E+00	3.0E+00	1.5E-01
1000	0.0E+00	3.0E+00	1.5E-01
1015	0.0E+00	3.0E+00	1.5E-01
1025	0.0E+00	9.9E-01	5.0E-02
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	8.4E-02	0.0E+00	0.0E+00
8000	**5.1E-01**	0.0E+00	0.0E+00
10000	5.1E-01	0.0E+00	0.0E+00

GBBCM Concentration in Beef (mg kg^{-1}) in Zone B Due to Groundwater Release

Time (yr)	As	Cr	Ni
15	0.0E+00	1.5E-06	7.6E-08
20	0.0E+00	1.2E-01	6.0E-03
25	0.0E+00	2.4E-01	1.2E-02
30	0.0E+00	**3.6E-01**	**1.8E-02**
60	0.0E+00	3.6E-01	1.8E-02
62	0.0E+00	3.6E-01	1.8E-02
80	0.0E+00	3.6E-01	1.8E-02
100	0.0E+00	3.6E-01	1.8E-02
125	0.0E+00	3.6E-01	1.8E-02
575	0.0E+00	3.6E-01	1.8E-02
590	0.0E+00	3.6E-01	1.8E-02
620	0.0E+00	3.6E-01	1.8E-02
750	0.0E+00	3.6E-01	1.8E-02
1000	0.0E+00	3.5E-01	1.8E-02
1015	0.0E+00	3.5E-01	1.8E-02
1025	0.0E+00	1.2E-01	5.9E-03
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	1.0E-02	0.0E+00	0.0E+00
8000	6.1E-02	0.0E+00	0.0E+00
10000	**6.2E-02**	0.0E+00	0.0E+00

GABIM Intake from Beef Ingestion in Zone A Due to Groundwater Release (mg yr^{-1})

Time (yr)	As	Cr	Ni
15	0.0E+00	6.4E-04	3.2E-05
20	0.0E+00	5.0E+01	2.5E+00
25	0.0E+00	1.0E+02	5.0E+00
30	0.0E+00	**1.5E+02**	**7.5E+00**
60	0.0E+00	1.5E+02	7.5E+00
62	0.0E+00	1.5E+02	7.5E+00
80	0.0E+00	1.5E+02	7.5E+00
100	0.0E+00	1.5E+02	7.5E+00
125	0.0E+00	1.5E+02	7.5E+00
575	0.0E+00	1.5E+02	7.5E+00
590	0.0E+00	1.5E+02	7.5E+00
620	0.0E+00	1.5E+02	7.5E+00
750	0.0E+00	1.5E+02	7.5E+00
1000	0.0E+00	1.5E+02	7.4E+00
1015	0.0E+00	1.5E+02	7.4E+00
1025	0.0E+00	5.0E+01	2.5E+00
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	4.2E+00	0.0E+00	0.0E+00
8000	**2.6E+01**	0.0E+00	0.0E+00
10000	2.6E+01	0.0E+00	0.0E+00

GBBIM Intake from Beef Ingestion in Zone B Due to Groundwater Release (mg yr^{-1})

Time (yr)	As	Cr	Ni
15	0.0E+00	7.6E-05	3.8E-06
20	0.0E+00	5.9E+00	3.0E-01
25	0.0E+00	1.2E+01	5.9E-01
30	0.0E+00	**1.8E+01**	**8.9E-01**
60	0.0E+00	1.8E+01	8.9E-01
62	0.0E+00	1.8E+01	8.9E-01
80	0.0E+00	1.8E+01	8.9E-01
100	0.0E+00	1.8E+01	8.9E-01
125	0.0E+00	1.8E+01	8.9E-01
575	0.0E+00	1.8E+01	8.9E-01
590	0.0E+00	1.8E+01	8.9E-01
620	0.0E+00	1.8E+01	8.9E-01
750	0.0E+00	1.8E+01	8.9E-01
1000	0.0E+00	1.8E+01	8.9E-01
1015	0.0E+00	1.8E+01	8.9E-01
1025	0.0E+00	5.9E+00	3.0E-01
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	5.0E-01	0.0E+00	0.0E+00
8000	**3.1E+00**	0.0E+00	0.0E+00
10000	3.1E+00	0.0E+00	0.0E+00

GABRM Cancer Risk from Beef Ingestion in Zone A Due to Groundwater Release

Time (yr)	As	Cr	Ni
15	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00
62	0.0E+00	0.0E+00	0.0E+00
80	0.0E+00	0.0E+00	0.0E+00
100	0.0E+00	0.0E+00	0.0E+00
125	0.0E+00	0.0E+00	0.0E+00
575	0.0E+00	0.0E+00	0.0E+00
590	0.0E+00	0.0E+00	0.0E+00
620	0.0E+00	0.0E+00	0.0E+00
750	0.0E+00	0.0E+00	0.0E+00
1000	0.0E+00	0.0E+00	0.0E+00
1015	0.0E+00	0.0E+00	0.0E+00
1025	0.0E+00	0.0E+00	0.0E+00
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	7.3E-02	0.0E+00	0.0E+00
8000	**4.5E-01**	0.0E+00	0.0E+00
10000	4.5E-01	0.0E+00	0.0E+00

GBBRM Cancer Risk from Beef Ingestion in Zone B Due to Groundwater Release

Time (yr)	As	Cr	Ni
15	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00
62	0.0E+00	0.0E+00	0.0E+00
80	0.0E+00	0.0E+00	0.0E+00
100	0.0E+00	0.0E+00	0.0E+00
125	0.0E+00	0.0E+00	0.0E+00
575	0.0E+00	0.0E+00	0.0E+00
590	0.0E+00	0.0E+00	0.0E+00
620	0.0E+00	0.0E+00	0.0E+00
750	0.0E+00	0.0E+00	0.0E+00
1000	0.0E+00	0.0E+00	0.0E+00
1015	0.0E+00	0.0E+00	0.0E+00
1025	0.0E+00	0.0E+00	0.0E+00
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	8.7E-03	0.0E+00	0.0E+00
8000	**5.4E-02**	0.0E+00	0.0E+00
10000	5.4E-02	0.0E+00	0.0E+00

GAFCU Concentration in Fish (Bq kg^{-1}) in Zone A
Due to Groundwater Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	1.1E+00	4.3E-08	5.0E-09	2.8E-08	4.6E-09
80	5.9E+01	1.3E-04	3.9E-06	2.2E-05	3.7E-06
100	1.2E+02	5.7E-04	3.5E-05	2.0E-04	3.3E-05
125	**2.0E+02**	1.6E-03	1.6E-04	8.9E-04	1.5E-04
575	2.0E+02	2.3E-02	2.5E-02	1.4E-01	2.3E-02
590	2.0E+02	2.4E-02	4.4E+00	2.7E+01	4.5E+00
620	2.0E+02	2.5E-02	4.4E+01	2.7E+02	4.4E+01
750	2.0E+02	3.1E-02	2.1E+02	1.3E+03	2.1E+02
1000	2.0E+02	4.4E-02	5.0E+02	3.1E+03	5.1E+02
1015	2.0E+02	4.4E-02	5.2E+02	3.2E+03	5.3E+02
1025	2.0E+02	4.5E-02	5.3E+02	3.2E+03	5.4E+02
1060	2.0E+02	4.7E-02	5.7E+02	3.5E+03	5.8E+02
1080	2.0E+02	4.7E-02	5.9E+02	3.6E+03	6.0E+02
1120	1.1E+01	**4.8E-02**	6.3E+02	3.8E+03	6.4E+02
1175	0.0E+00	4.8E-02	6.9E+02	4.2E+03	7.0E+02
1575	0.0E+00	4.8E-02	**6.9E+02**	**4.2E+03**	**7.0E+02**
1750	0.0E+00	4.7E-02	4.9E+02	3.0E+03	5.0E+02
2175	0.0E+00	4.6E-02	1.6E+01	9.0E+01	1.6E+01
4000	0.0E+00	4.5E-02	1.6E+01	1.0E+02	1.7E+01
6000	0.0E+00	4.4E-02	1.7E+01	1.1E+02	1.9E+01
8000	0.0E+00	4.4E-02	1.7E+01	1.1E+02	1.8E+01
10000	0.0E+00	4.3E-02	1.8E+01	1.1E+02	1.9E+01

GAFCM Concentration in Fish (mg kg^{-1}) in Zone A Due to Groundwater Release

Time (yr)	As	Cr	Ni
15	0.0E+00	6.1E-04	1.5E-05
20	0.0E+00	4.8E+01	1.2E+00
25	0.0E+00	9.5E+01	2.4E+00
30	0.0E+00	**1.4E+02**	**3.6E+00**
60	0.0E+00	1.4E+02	3.6E+00
62	0.0E+00	1.4E+02	3.6E+00
80	0.0E+00	1.4E+02	3.6E+00
100	0.0E+00	1.4E+02	3.6E+00
125	0.0E+00	1.4E+02	3.6E+00
575	0.0E+00	1.4E+02	3.6E+00
590	0.0E+00	1.4E+02	3.6E+00
620	0.0E+00	1.4E+02	3.6E+00
750	0.0E+00	1.4E+02	3.6E+00
1000	0.0E+00	1.4E+02	3.5E+00
1015	0.0E+00	1.4E+02	3.5E+00
1025	0.0E+00	4.7E+01	1.2E+00
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	2.0E-02	0.0E+00	0.0E+00
8000	**1.2E-01**	0.0E+00	0.0E+00
10000	1.2E-01	0.0E+00	0.0E+00

GAFDU Dose from Fish Ingestion in Zone A Due to Groundwater Release (Sv yr^{-1})

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	2.2E-07	7.5E-14	5.5E-15	1.8E-13	1.4E-14	2.2E-07
80	1.2E-05	2.3E-10	4.3E-12	1.4E-10	1.1E-11	1.2E-05
100	2.5E-05	1.0E-09	3.8E-11	1.3E-09	1.0E-10	2.5E-05
125	**4.1E-05**	2.7E-09	1.7E-10	5.8E-09	4.6E-10	4.1E-05
575	4.1E-05	4.0E-08	2.7E-08	9.1E-07	7.2E-08	4.2E-05
590	4.1E-05	4.1E-08	4.9E-06	1.8E-04	1.4E-05	2.3E-04
620	4.1E-05	4.4E-08	4.8E-05	1.7E-03	1.4E-04	2.0E-03
750	4.1E-05	5.5E-08	2.3E-04	8.3E-03	6.6E-04	9.2E-03
1000	4.1E-05	7.6E-08	5.5E-04	2.0E-02	1.6E-03	2.2E-02
1015	4.1E-05	7.8E-08	5.7E-04	2.1E-02	1.6E-03	2.3E-02
1025	4.1E-05	7.9E-08	5.8E-04	2.1E-02	1.7E-03	2.3E-02
1060	4.1E-05	8.2E-08	6.3E-04	2.3E-02	1.8E-03	2.5E-02
1080	4.0E-05	8.3E-08	6.5E-04	2.3E-02	1.9E-03	2.6E-02
1120	2.3E-06	**8.4E-08**	7.0E-04	2.5E-02	2.0E-03	2.8E-02
1175	0.0E+00	8.4E-08	7.6E-04	2.7E-02	2.2E-03	3.0E-02
1575	0.0E+00	8.3E-08	**7.6E-04**	**2.7E-02**	**2.2E-03**	**3.0E-02**
1750	0.0E+00	8.2E-08	5.4E-04	1.9E-02	1.5E-03	2.1E-02
2175	0.0E+00	8.1E-08	1.7E-05	6.0E-04	5.0E-05	6.7E-04
4000	0.0E+00	8.0E-08	1.8E-05	6.0E-04	5.0E-05	6.7E-04
6000	0.0E+00	7.8E-08	1.8E-05	7.0E-04	5.0E-05	7.7E-04
8000	0.0E+00	7.7E-08	2.0E-05	7.0E-04	6.0E-05	7.8E-04
10000	0.0E+00	7.6E-08	2.0E-05	7.0E-04	6.0E-05	7.8E-04

GAFIM Intake from Fish Ingestion in Zone A Due to Groundwater Release (mg yr^{-1})

Time (yr)	As	Cr	Ni
15	0.0E+00	3.0E-03	7.6E-05
20	0.0E+00	2.4E+02	5.9E+00
25	0.0E+00	4.8E+02	1.2E+01
30	0.0E+00	**7.1E+02**	**1.8E+01**
60	0.0E+00	7.1E+02	1.8E+01
62	0.0E+00	7.1E+02	1.8E+01
80	0.0E+00	7.1E+02	1.8E+01
100	0.0E+00	7.1E+02	1.8E+01
125	0.0E+00	7.1E+02	1.8E+01
575	0.0E+00	7.1E+02	1.8E+01
590	0.0E+00	7.1E+02	1.8E+01
620	0.0E+00	7.1E+02	1.8E+01
750	0.0E+00	7.1E+02	1.8E+01
1000	0.0E+00	7.1E+02	1.8E+01
1015	0.0E+00	7.1E+02	1.8E+01
1025	0.0E+00	2.4E+02	5.9E+00
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	1.0E-01	0.0E+00	0.0E+00
8000	**6.1E-01**	0.0E+00	0.0E+00
10000	6.1E-01	0.0E+00	0.0E+00

GAFRU Cancer Risk from Fish Ingestion in Zone A
Due to Groundwater Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	2.3E-07	5.3E-15	5.6E-15	1.4E-13	6.7E-15	2.3E-07
80	1.2E-05	1.6E-11	4.4E-12	1.1E-10	5.3E-12	1.2E-05
100	2.6E-05	7.0E-11	3.9E-11	9.6E-10	4.7E-11	2.6E-05
125	**4.2E-05**	1.9E-10	1.8E-10	4.3E-09	2.1E-10	4.2E-05
575	4.2E-05	2.8E-09	2.8E-08	6.8E-07	3.3E-08	4.2E-05
590	4.2E-05	2.9E-09	5.0E-06	1.3E-04	6.5E-06	1.9E-04
620	4.2E-05	3.1E-09	4.9E-05	1.3E-03	6.4E-05	1.5E-03
750	4.2E-05	3.8E-09	2.3E-04	6.2E-03	3.0E-04	6.8E-03
1000	4.2E-05	5.3E-09	5.6E-04	1.5E-02	7.3E-04	1.6E-02
1015	4.2E-05	5.4E-09	5.8E-04	1.5E-02	7.6E-04	1.7E-02
1025	4.2E-05	5.5E-09	5.9E-04	1.6E-02	7.7E-04	1.7E-02
1060	4.2E-05	5.7E-09	6.4E-04	1.7E-02	8.3E-04	1.8E-02
1080	4.1E-05	5.8E-09	6.6E-04	1.8E-02	8.6E-04	1.9E-02
1120	2.3E-06	**5.9E-09**	7.1E-04	1.9E-02	9.2E-04	2.1E-02
1175	0.0E+00	5.9E-09	7.7E-04	2.1E-02	1.0E-03	2.2E-02
1575	0.0E+00	5.8E-09	**7.8E-04**	**2.1E-02**	**1.0E-03**	**2.3E-02**
1750	0.0E+00	5.8E-09	5.5E-04	1.5E-02	7.1E-04	1.6E-02
2175	0.0E+00	5.7E-09	1.8E-05	4.7E-04	2.3E-05	5.1E-04
4000	0.0E+00	5.6E-09	1.8E-05	4.8E-04	2.4E-05	5.2E-04
6000	0.0E+00	5.5E-09	1.9E-05	5.4E-04	2.6E-05	5.8E-04
8000	0.0E+00	5.4E-09	2.0E-05	5.2E-04	2.5E-05	5.6E-04
10000	0.0E+00	5.3E-09	2.1E-05	5.5E-04	2.7E-05	6.0E-04

GAFRM Cancer Risk from Fish Ingestion in Zone A Due to Groundwater Release

Time (yr)	As	Cr	Ni
15	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00
62	0.0E+00	0.0E+00	0.0E+00
80	0.0E+00	0.0E+00	0.0E+00
100	0.0E+00	0.0E+00	0.0E+00
125	0.0E+00	0.0E+00	0.0E+00
575	0.0E+00	0.0E+00	0.0E+00
590	0.0E+00	0.0E+00	0.0E+00
620	0.0E+00	0.0E+00	0.0E+00
750	0.0E+00	0.0E+00	0.0E+00
1000	0.0E+00	0.0E+00	0.0E+00
1015	0.0E+00	0.0E+00	0.0E+00
1025	0.0E+00	0.0E+00	0.0E+00
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	1.7E-03	0.0E+00	0.0E+00
8000	**1.1E-02**	0.0E+00	0.0E+00
10000	1.1E-02	0.0E+00	0.0E+00

GBLCU Concentration in Lake Water (Bq L^{-1}) in Zone B Due to Groundwater Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	1.1E-01	4.3E-10	9.9E-11	9.3E-11	9.3E-11
80	5.9E+00	1.3E-06	7.9E-08	7.4E-08	7.4E-08
100	1.2E+01	5.7E-06	6.9E-07	6.5E-07	6.5E-07
125	**2.0E+01**	1.6E-05	3.2E-06	3.0E-06	3.0E-06
575	2.0E+01	2.3E-04	5.0E-04	4.7E-04	4.6E-04
590	2.0E+01	2.4E-04	8.9E-02	9.0E-02	9.0E-02
620	2.0E+01	2.5E-04	8.8E-01	8.9E-01	8.9E-01
750	2.0E+01	3.1E-04	4.2E+00	4.2E+00	4.2E+00
1000	2.0E+01	4.4E-04	1.0E+01	1.0E+01	1.0E+01
1015	2.0E+01	4.4E-04	1.0E+01	1.1E+01	1.1E+01
1025	2.0E+01	4.5E-04	1.1E+01	1.1E+01	1.1E+01
1060	2.0E+01	4.7E-04	1.1E+01	1.2E+01	1.2E+01
1080	2.0E+01	4.7E-04	1.2E+01	1.2E+01	1.2E+01
1120	1.1E+00	**4.8E-04**	1.3E+01	1.3E+01	1.3E+01
1175	0.0E+00	4.8E-04	1.4E+01	1.4E+01	1.4E+01
1575	0.0E+00	4.8E-04	**1.4E+01**	**1.4E+01**	**1.4E+01**
1750	0.0E+00	4.7E-04	9.8E+00	1.0E+01	1.0E+01
2175	0.0E+00	4.6E-04	3.0E-01	3.0E-01	3.0E-01
4000	0.0E+00	4.5E-04	3.0E-01	3.0E-01	3.0E-01
6000	0.0E+00	4.4E-04	4.0E-01	3.0E-01	3.0E-01
8000	0.0E+00	4.4E-04	3.0E-01	4.0E-01	4.0E-01
10000	0.0E+00	4.3E-04	4.0E-01	4.0E-01	4.0E-01

GBLCM Concentration in Lake Water (mg L^{-1}) in Zone B Due to Groundwater Release

Time (yr)	As	Cr	Ni
15	0.0E+00	3.0E-06	3.0E-07
20	0.0E+00	2.4E-01	2.4E-02
25	0.0E+00	4.8E-01	4.8E-02
30	0.0E+00	**7.1E-01**	**7.1E-02**
60	0.0E+00	7.1E-01	7.1E-02
62	0.0E+00	7.1E-01	7.1E-02
80	0.0E+00	7.1E-01	7.1E-02
100	0.0E+00	7.1E-01	7.1E-02
125	0.0E+00	7.1E-01	7.1E-02
575	0.0E+00	7.1E-01	7.1E-02
590	0.0E+00	7.1E-01	7.1E-02
620	0.0E+00	7.1E-01	7.1E-02
750	0.0E+00	7.1E-01	7.1E-02
1000	0.0E+00	7.1E-01	7.1E-02
1015	0.0E+00	7.1E-01	7.1E-02
1025	0.0E+00	2.4E-01	2.4E-02
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	4.0E-04	0.0E+00	0.0E+00
8000	2.4E-03	0.0E+00	0.0E+00
10000	**2.5E-03**	0.0E+00	0.0E+00

GBLDU Dose from Drinking Water in Zone B Due to Groundwater Release (Sv yr^{-1})

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	3.2E-06	1.1E-13	1.6E-14	8.8E-14	4.2E-14	3.2E-06
80	1.8E-04	3.3E-10	1.3E-11	7.0E-11	3.3E-11	1.8E-04
100	3.7E-04	1.5E-09	1.1E-10	6.2E-10	2.9E-10	3.7E-04
125	**5.9E-04**	4.0E-09	5.1E-10	2.8E-09	1.3E-09	5.9E-04
575	5.9E-04	5.9E-08	8.0E-08	4.4E-07	2.1E-07	5.9E-04
590	5.9E-04	6.0E-08	1.4E-05	8.5E-05	4.1E-05	7.3E-04
620	5.9E-04	6.4E-08	1.4E-04	8.4E-04	4.0E-04	2.0E-03
750	5.9E-04	8.0E-08	6.7E-04	4.0E-03	1.9E-03	7.2E-03
1000	5.9E-04	1.1E-07	1.6E-03	9.7E-03	4.6E-03	1.7E-02
1015	5.9E-04	1.1E-07	1.7E-03	1.0E-02	4.8E-03	1.7E-02
1025	5.9E-04	1.2E-07	1.7E-03	1.0E-02	4.9E-03	1.7E-02
1060	5.9E-04	1.2E-07	1.8E-03	1.1E-02	5.2E-03	1.9E-02
1080	5.9E-04	1.2E-07	1.9E-03	1.1E-02	5.4E-03	1.9E-02
1120	3.1E-05	**1.2E-07**	2.0E-03	1.2E-02	5.8E-03	2.0E-02
1175	0.0E+00	1.2E-07	2.2E-03	1.3E-02	6.3E-03	2.2E-02
1575	0.0E+00	1.2E-07	**2.2E-03**	**1.3E-02**	**6.4E-03**	**2.2E-02**
1750	0.0E+00	1.2E-07	1.6E-03	9.4E-03	4.5E-03	1.5E-02
2175	0.0E+00	1.2E-07	5.0E-05	3.0E-04	1.4E-04	4.9E-04
4000	0.0E+00	1.2E-07	5.0E-05	3.0E-04	1.4E-04	4.9E-04
6000	0.0E+00	1.1E-07	6.0E-05	4.0E-04	1.7E-04	6.3E-04
8000	0.0E+00	1.1E-07	6.0E-05	3.0E-04	1.6E-04	5.2E-04
10000	0.0E+00	1.1E-07	6.0E-05	4.0E-04	1.6E-04	6.2E-04

GBLIM Intake from Drinking Water in Zone B Due to Groundwater Release (mg yr^{-1})

Time (yr)	As	Cr	Ni
15	0.0E+00	2.2E-03	2.2E-04
20	0.0E+00	1.7E+02	1.7E+01
25	0.0E+00	3.5E+02	3.5E+01
30	0.0E+00	**5.2E+02**	**5.2E+01**
60	0.0E+00	5.2E+02	5.2E+01
62	0.0E+00	5.2E+02	5.2E+01
80	0.0E+00	5.2E+02	5.2E+01
100	0.0E+00	5.2E+02	5.2E+01
125	0.0E+00	5.2E+02	5.2E+01
575	0.0E+00	5.2E+02	5.2E+01
590	0.0E+00	5.2E+02	5.2E+01
620	0.0E+00	5.2E+02	5.2E+01
750	0.0E+00	5.2E+02	5.2E+01
1000	0.0E+00	5.2E+02	5.2E+01
1015	0.0E+00	5.2E+02	5.2E+01
1025	0.0E+00	1.7E+02	1.7E+01
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	2.9E-01	0.0E+00	0.0E+00
8000	**1.8E+00**	0.0E+00	0.0E+00
10000	1.8E+00	0.0E+00	0.0E+00

GBLRU Cancer risk from Drinking Water in Zone B
Due to Groundwater Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	3.3E-06	7.7E-15	1.6E-14	6.6E-14	1.9E-14	3.3E-06
80	1.8E-04	2.3E-11	1.3E-11	5.3E-11	1.5E-11	1.8E-04
100	3.8E-04	1.0E-10	1.1E-10	4.7E-10	1.4E-10	3.8E-04
125	**6.1E-04**	2.8E-10	5.1E-10	2.1E-09	6.2E-10	6.1E-04
575	6.1E-04	4.1E-09	8.1E-08	3.3E-07	9.7E-08	6.1E-04
590	6.1E-04	4.2E-09	1.5E-05	6.4E-05	1.9E-05	7.1E-04
620	6.1E-04	4.5E-09	1.4E-04	6.4E-04	1.9E-04	1.6E-03
750	6.1E-04	5.6E-09	6.8E-04	3.0E-03	8.9E-04	5.2E-03
1000	6.1E-04	7.8E-09	1.6E-03	7.3E-03	2.1E-03	1.2E-02
1015	6.1E-04	7.9E-09	1.7E-03	7.5E-03	2.2E-03	1.2E-02
1025	6.1E-04	8.0E-09	1.7E-03	7.7E-03	2.3E-03	1.2E-02
1060	6.1E-04	8.3E-09	1.9E-03	8.3E-03	2.4E-03	1.3E-02
1080	6.0E-04	8.5E-09	1.9E-03	8.6E-03	2.5E-03	1.4E-02
1120	3.3E-05	**8.6E-09**	2.1E-03	9.2E-03	2.7E-03	1.4E-02
1175	0.0E+00	8.6E-09	2.3E-03	1.0E-02	2.9E-03	1.5E-02
1575	0.0E+00	8.5E-09	**2.3E-03**	**1.0E-02**	**3.0E-03**	**1.5E-02**
1750	0.0E+00	8.5E-09	1.6E-03	7.1E-03	2.1E-03	1.1E-02
2175	0.0E+00	8.3E-09	5.2E-05	2.3E-04	6.7E-05	3.5E-04
4000	0.0E+00	8.1E-09	5.3E-05	2.4E-04	6.9E-05	3.6E-04
6000	0.0E+00	8.0E-09	5.4E-05	2.6E-04	7.7E-05	3.9E-04
8000	0.0E+00	7.8E-09	5.7E-05	2.5E-04	7.4E-05	3.8E-04
10000	0.0E+00	7.7E-09	6.0E-05	2.6E-04	7.7E-05	4.0E-04

GBLRM Cancer Risk from Drinking Water in Zone B Due to Groundwater Release

Time (yr)	As	Cr	Ni
15	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00
62	0.0E+00	0.0E+00	0.0E+00
80	0.0E+00	0.0E+00	0.0E+00
100	0.0E+00	0.0E+00	0.0E+00
125	0.0E+00	0.0E+00	0.0E+00
575	0.0E+00	0.0E+00	0.0E+00
590	0.0E+00	0.0E+00	0.0E+00
620	0.0E+00	0.0E+00	0.0E+00
750	0.0E+00	0.0E+00	0.0E+00
1000	0.0E+00	0.0E+00	0.0E+00
1015	0.0E+00	0.0E+00	0.0E+00
1025	0.0E+00	0.0E+00	0.0E+00
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	5.1E-03	0.0E+00	0.0E+00
8000	**3.1E-02**	0.0E+00	0.0E+00
10000	3.1E-02	0.0E+00	0.0E+00

AAVCU Concentration in Lettuce (Bq kg^{-1}) in Zone A Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210
1	2.7E-02	2.2E-01	2.2E-01	2.2E-01	2.2E-01
20	2.8E-02	2.2E-01	2.4E-01	2.2E-01	2.2E-01
25	2.8E-02	2.2E-01	2.5E-01	2.2E-01	2.2E-01
30	2.8E-02	2.2E-01	2.5E-01	2.2E-01	2.2E-01
62	2.8E-02	2.2E-01	2.8E-01	2.2E-01	2.3E-01
125	2.8E-02	2.2E-01	3.2E-01	2.2E-01	2.3E-01
575	2.9E-02	2.2E-01	3.8E-01	2.3E-01	2.4E-01
750	2.9E-02	2.2E-01	3.9E-01	2.3E-01	2.4E-01
1000	**2.9E-02**	**2.2E-01**	**3.9E-01**	**2.3E-01**	**2.4E-01**
1025	1.4E-03	1.1E-03	1.4E-01	5.6E-03	1.4E-02
1050	1.2E-03	9.4E-04	1.2E-01	4.7E-03	1.2E-02
1100	8.2E-04	6.6E-04	8.3E-02	3.3E-03	8.3E-03
1200	4.1E-04	3.3E-04	4.1E-02	1.7E-03	4.1E-03
1400	1.0E-04	8.3E-05	1.0E-02	4.1E-04	1.0E-03
1600	2.6E-05	2.1E-05	2.6E-03	1.0E-04	2.6E-04
2000	1.6E-06	1.3E-06	1.6E-04	6.5E-06	1.6E-05
2500	5.0E-08	4.0E-08	5.0E-06	2.0E-07	5.0E-07
3000	1.6E-09	1.2E-09	1.6E-07	6.3E-09	1.6E-08

AAVDU Dose from Lettuce Ingestion in Zone A
Due to Atmospheric Release (Sv yr^{-1})

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
1	2.8E-08	1.9E-06	1.2E-06	7.2E-06	3.4E-06	1.4E-05
20	2.8E-08	1.9E-06	1.3E-06	7.2E-06	3.5E-06	1.4E-05
25	2.8E-08	1.9E-06	1.4E-06	7.2E-06	3.5E-06	1.4E-05
30	2.8E-08	1.9E-06	1.4E-06	7.2E-06	3.5E-06	1.4E-05
62	2.8E-08	1.9E-06	1.5E-06	7.3E-06	3.5E-06	1.4E-05
125	2.9E-08	1.9E-06	1.7E-06	7.3E-06	3.6E-06	1.5E-05
575	2.9E-08	1.9E-06	2.1E-06	7.4E-06	3.7E-06	1.5E-05
750	2.9E-08	1.9E-06	2.1E-06	7.4E-06	3.7E-06	1.5E-05
1000	**2.9E-08**	**1.9E-06**	**2.1E-06**	**7.4E-06**	**3.7E-06**	**1.5E-05**
1025	1.4E-09	9.8E-09	7.7E-07	1.8E-07	2.2E-07	1.2E-06
1050	1.2E-09	8.2E-09	6.5E-07	1.5E-07	1.8E-07	9.9E-07
1100	8.3E-10	5.8E-09	4.6E-07	1.1E-07	1.3E-07	7.0E-07
1200	4.2E-10	2.9E-09	2.3E-07	5.4E-08	6.4E-08	3.5E-07
1400	1.0E-10	7.2E-10	5.7E-08	1.3E-08	1.6E-08	8.7E-08
1600	2.6E-11	1.8E-10	1.4E-08	3.4E-09	4.0E-09	2.2E-08
2000	1.6E-12	1.1E-11	8.9E-10	2.1E-10	2.5E-10	1.4E-09
2500	5.1E-14	3.5E-13	2.8E-11	6.6E-12	7.8E-12	4.3E-11
3000	1.6E-15	1.1E-14	8.7E-13	2.0E-13	2.4E-13	1.3E-12

AAVRU Cancer Risk from Lettuce Ingestion in Zone A
Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
1	2.9E-08	1.4E-07	1.2E-06	1.6E-06	5.4E-06	8.4E-06
20	2.9E-08	1.4E-07	1.4E-06	1.6E-06	5.4E-06	8.6E-06
25	2.9E-08	1.4E-07	1.4E-06	1.6E-06	5.4E-06	8.6E-06
30	2.9E-08	1.4E-07	1.4E-06	1.6E-06	5.4E-06	8.6E-06
62	2.9E-08	1.4E-07	1.6E-06	1.6E-06	5.5E-06	8.8E-06
125	3.0E-08	1.4E-07	1.8E-06	1.7E-06	5.5E-06	9.1E-06
575	3.0E-08	1.4E-07	2.2E-06	1.7E-06	5.5E-06	9.6E-06
750	3.0E-08	1.4E-07	2.2E-06	1.7E-06	5.5E-06	9.6E-06
1000	**3.0E-08**	**1.4E-07**	**2.2E-06**	**1.7E-06**	**5.5E-06**	**9.6E-06**
1025	1.4E-09	6.8E-10	7.8E-07	1.4E-07	1.0E-07	1.0E-06
1050	1.2E-09	5.7E-10	6.6E-07	1.2E-07	8.4E-08	8.6E-07
1100	8.6E-10	4.1E-10	4.6E-07	8.1E-08	6.0E-08	6.1E-07
1200	4.3E-10	2.0E-10	2.3E-07	4.1E-08	3.0E-08	3.0E-07
1400	1.1E-10	5.1E-11	5.8E-08	1.0E-08	7.4E-09	7.6E-08
1600	2.7E-11	1.3E-11	1.5E-08	2.5E-09	1.9E-09	1.9E-08
2000	1.7E-12	7.9E-13	9.1E-10	1.6E-10	1.2E-10	1.2E-09
2500	5.2E-14	2.5E-14	2.8E-11	4.9E-12	3.6E-12	3.7E-11
3000	1.6E-15	7.6E-16	8.8E-13	1.5E-13	1.1E-13	1.2E-12

AAVCM Concentration in Lettuce (mg kg^{-1}) in Zone A Due to Atmospheric Release

Time (yr)	As	Cr	Ni
1	1.6E-03	1.6E-04	1.6E-05
20	1.6E-03	1.6E-04	1.6E-05
25	1.6E-03	1.6E-04	1.6E-05
30	1.6E-03	1.6E-04	1.6E-05
62	1.6E-03	1.7E-04	1.6E-05
125	1.6E-03	1.7E-04	1.6E-05
575	1.7E-03	1.8E-04	1.7E-05
750	1.7E-03	1.8E-04	1.7E-05
1000	**1.7E-03**	**1.8E-04**	**1.7E-05**
1025	8.0E-05	2.0E-05	1.0E-06
1050	6.7E-05	1.7E-05	8.4E-07
1100	4.8E-05	1.2E-05	6.0E-07
1200	2.4E-05	6.0E-06	3.0E-07
1400	6.0E-06	1.5E-06	7.4E-08
1600	1.5E-06	3.7E-07	1.9E-08
2000	9.3E-08	2.3E-08	1.2E-09
2500	2.9E-09	7.3E-10	3.6E-11
3000	9.1E-11	2.3E-11	1.1E-12

AAVIM Intake from Lettuce Ingestion in Zone A Due to Atmospheric Release (mg yr^{-1})

Time (yr)	As	Cr	Ni
1	3.9E-02	4.0E-03	3.9E-04
20	4.0E-02	4.0E-03	4.0E-04
25	4.0E-02	4.0E-03	4.0E-04
30	4.0E-02	4.1E-03	4.0E-04
62	4.0E-02	4.2E-03	4.0E-04
125	4.1E-02	4.3E-03	4.1E-04
575	4.2E-02	4.5E-03	4.2E-04
750	4.2E-02	4.5E-03	4.2E-04
1000	**4.2E-02**	**4.5E-03**	**4.2E-04**
1025	2.0E-03	5.0E-04	2.5E-05
1050	1.7E-03	4.2E-04	2.1E-05
1100	1.2E-03	3.0E-04	1.5E-05
1200	6.0E-04	1.5E-04	7.4E-06
1400	1.5E-04	3.7E-05	1.9E-06
1600	3.7E-05	9.3E-06	4.6E-07
2000	2.3E-06	5.8E-07	2.9E-08
2500	7.3E-08	1.8E-08	9.1E-10
3000	2.3E-09	5.7E-10	2.8E-11

AAVRM Cancer Risk from Lettuce Ingestion in Zone A Due to Atmospheric Release

Time (yr)	As	Cr	Ni
1	6.9E-04	0.0E+00	0.0E+00
20	7.0E-04	0.0E+00	0.0E+00
25	7.0E-04	0.0E+00	0.0E+00
30	7.0E-04	0.0E+00	0.0E+00
62	7.1E-04	0.0E+00	0.0E+00
125	7.1E-04	0.0E+00	0.0E+00
575	7.3E-04	0.0E+00	0.0E+00
750	7.3E-04	0.0E+00	0.0E+00
1000	**7.3E-04**	0.0E+00	0.0E+00
1025	3.5E-05	0.0E+00	0.0E+00
1050	2.9E-05	0.0E+00	0.0E+00
1100	2.1E-05	0.0E+00	0.0E+00
1200	1.0E-05	0.0E+00	0.0E+00
1400	2.6E-06	0.0E+00	0.0E+00
1600	6.5E-07	0.0E+00	0.0E+00
2000	4.1E-08	0.0E+00	0.0E+00
2500	1.3E-09	0.0E+00	0.0E+00
3000	4.0E-11	0.0E+00	0.0E+00

ABVCU Concentration in Lettuce (Bq kg^{-1}) in Zone B
Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210
1	5.0E-03	4.0E-02	4.0E-02	4.0E-02	4.0E-02
20	5.0E-03	4.0E-02	4.4E-02	4.0E-02	4.0E-02
25	5.0E-03	4.0E-02	4.5E-02	4.0E-02	4.1E-02
30	5.0E-03	4.0E-02	4.6E-02	4.0E-02	4.1E-02
62	5.1E-03	4.0E-02	5.1E-02	4.1E-02	4.1E-02
125	5.1E-03	4.0E-02	5.8E-02	4.1E-02	4.2E-02
575	5.3E-03	4.0E-02	7.0E-02	4.1E-02	4.3E-02
750	5.3E-03	4.0E-02	7.0E-02	4.1E-02	4.3E-02
1000	**5.3E-03**	**4.0E-02**	**7.0E-02**	**4.1E-02**	**4.3E-02**
1025	2.5E-04	2.0E-04	2.5E-02	1.0E-03	2.5E-03
1050	2.1E-04	1.7E-04	2.1E-02	8.6E-04	2.1E-03
1100	1.5E-04	1.2E-04	1.5E-02	6.0E-04	1.5E-03
1200	7.5E-05	6.0E-05	7.5E-03	3.0E-04	7.5E-04
1400	1.9E-05	1.5E-05	1.9E-03	7.6E-05	1.9E-04
1600	4.7E-06	3.7E-06	4.7E-04	1.9E-05	4.7E-05
2000	2.9E-07	2.3E-07	2.9E-05	1.2E-06	2.9E-06
2500	9.2E-09	7.3E-09	9.2E-07	3.7E-08	9.2E-08
3000	2.9E-10	2.3E-10	2.9E-08	1.1E-09	2.9E-09

ABVDU Dose from Lettuce Ingestion in Zone B
Due to Atmospheric Release (Sv yr^{-1})

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
1	5.0E-09	3.5E-07	2.2E-07	1.3E-06	6.2E-07	2.5E-06
20	5.1E-09	3.5E-07	2.4E-07	1.3E-06	6.3E-07	2.5E-06
25	5.1E-09	3.5E-07	2.5E-07	1.3E-06	6.3E-07	2.5E-06
30	5.1E-09	3.5E-07	2.5E-07	1.3E-06	6.3E-07	2.5E-06
62	5.1E-09	3.5E-07	2.8E-07	1.3E-06	6.4E-07	2.6E-06
125	5.2E-09	3.5E-07	3.2E-07	1.3E-06	6.5E-07	2.6E-06
575	5.3E-09	3.5E-07	3.8E-07	1.3E-06	6.7E-07	2.7E-06
750	5.3E-09	3.5E-07	3.9E-07	1.3E-06	6.7E-07	2.7E-06
1000	**5.3E-09**	**3.5E-07**	**3.9E-07**	**1.3E-06**	**6.7E-07**	**2.7E-06**
1025	2.5E-10	1.8E-09	1.4E-07	3.3E-08	3.9E-08	2.1E-07
1050	2.1E-10	1.5E-09	1.2E-07	2.8E-08	3.3E-08	1.8E-07
1100	1.5E-10	1.1E-09	8.3E-08	2.0E-08	2.3E-08	1.3E-07
1200	7.6E-11	5.3E-10	4.1E-08	9.8E-09	1.2E-08	6.4E-08
1400	1.9E-11	1.3E-10	1.0E-08	2.4E-09	2.9E-09	1.6E-08
1600	4.7E-12	3.3E-11	2.6E-09	6.1E-10	7.3E-10	4.0E-09
2000	3.0E-13	2.0E-12	1.6E-10	3.8E-11	4.6E-11	2.5E-10
2500	9.2E-15	6.3E-14	5.0E-12	1.2E-12	1.4E-12	7.7E-12
3000	2.9E-16	2.0E-15	1.6E-13	3.7E-14	4.4E-14	2.4E-13

ABVRU Cancer Risk from Lettuce Ingestion in Zone B Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
1	5.2E-09	**2.5E-08**	2.3E-07	2.9E-07	9.8E-07	1.5E-06
20	5.2E-09	2.5E-08	2.5E-07	2.9E-07	9.8E-07	1.6E-06
25	5.2E-09	2.5E-08	2.5E-07	2.9E-07	9.9E-07	1.6E-06
30	5.2E-09	2.5E-08	2.6E-07	2.9E-07	9.9E-07	1.6E-06
62	5.3E-09	2.5E-08	2.8E-07	3.0E-07	9.9E-07	1.6E-06
125	5.4E-09	2.5E-08	3.2E-07	3.0E-07	9.9E-07	1.7E-06
575	5.5E-09	2.5E-08	3.9E-07	3.2E-07	1.0E-06	1.7E-06
750	5.5E-09	2.5E-08	3.9E-07	3.2E-07	1.0E-06	1.7E-06
1000	**5.5E-09**	2.4E-08	**3.9E-07**	**3.2E-07**	**1.0E-06**	**1.7E-06**
1025	2.6E-10	1.2E-10	1.4E-07	2.5E-08	1.8E-08	1.9E-07
1050	2.2E-10	1.0E-10	1.2E-07	2.1E-08	1.5E-08	1.6E-07
1100	1.6E-10	7.4E-11	8.4E-08	1.5E-08	1.1E-08	1.1E-07
1200	7.8E-11	3.7E-11	4.2E-08	7.4E-09	5.4E-09	5.5E-08
1400	1.9E-11	9.2E-12	1.1E-08	1.8E-09	1.4E-09	1.4E-08
1600	4.9E-12	2.3E-12	2.6E-09	4.6E-10	3.4E-10	3.4E-09
2000	3.0E-13	1.4E-13	1.6E-10	2.9E-11	2.1E-11	2.1E-10
2500	9.5E-15	4.4E-15	5.1E-12	9.0E-13	6.6E-13	6.7E-12
3000	3.0E-16	1.4E-16	1.6E-13	2.8E-14	2.1E-14	2.1E-13

ABVCM Concentration in Lettuce (mg kg^{-1}) in Zone B Due to Atmospheric Release

Time (yr)	As	Cr	Ni
1	2.9E-04	2.9E-05	2.9E-06
20	2.9E-04	2.9E-05	2.9E-06
25	2.9E-04	2.9E-05	2.9E-06
30	2.9E-04	2.9E-05	2.9E-06
62	2.9E-04	3.0E-05	2.9E-06
125	3.0E-04	3.1E-05	3.0E-06
575	3.0E-04	3.3E-05	3.1E-06
750	3.0E-04	3.3E-05	3.1E-06
1000	**3.0E-04**	**3.3E-05**	**3.1E-06**
1025	1.4E-05	3.6E-06	1.8E-07
1050	1.2E-05	3.0E-06	1.5E-07
1100	8.6E-06	2.2E-06	1.1E-07
1200	4.3E-06	1.1E-06	5.4E-08
1400	1.1E-06	2.7E-07	1.3E-08
1600	2.7E-07	6.7E-08	3.4E-09
2000	1.7E-08	4.2E-09	2.1E-10
2500	5.2E-10	1.3E-10	6.6E-12
3000	1.6E-11	4.1E-12	2.1E-13

ABVIM Intake from Lettuce Ingestion in Zone B Due to Atmospheric Release (mg yr^{-1})

Time (yr)	As	Cr	Ni
1	7.2E-03	7.2E-04	7.2E-05
20	7.2E-03	7.3E-04	7.2E-05
25	7.2E-03	7.3E-04	7.2E-05
30	7.2E-03	7.4E-04	7.3E-05
62	7.3E-03	7.5E-04	7.3E-05
125	7.4E-03	7.8E-04	7.5E-05
575	7.6E-03	8.2E-04	**7.7E-05**
750	7.6E-03	8.2E-04	7.6E-05
1000	**7.6E-03**	**8.2E-04**	7.6E-05
1025	3.6E-04	9.0E-05	4.5E-06
1050	3.0E-04	7.6E-05	3.8E-06
1100	2.2E-04	5.4E-05	2.7E-06
1200	1.1E-04	2.7E-05	1.3E-06
1400	2.7E-05	6.7E-06	3.4E-07
1600	6.7E-06	1.7E-06	8.4E-08
2000	4.2E-07	1.0E-07	5.2E-09
2500	1.3E-08	3.3E-09	1.6E-10
3000	4.1E-10	1.0E-10	5.1E-12

ABVRM Cancer Risk from Lettuce Ingestion in Zone B Due to Atmospheric Release

Time (yr)	As	Cr	Ni
1	1.3E-04	0.0E+00	0.0E+00
20	1.3E-04	0.0E+00	0.0E+00
25	1.3E-04	0.0E+00	0.0E+00
30	1.3E-04	0.0E+00	0.0E+00
62	1.3E-04	0.0E+00	0.0E+00
125	1.3E-04	0.0E+00	0.0E+00
575	1.3E-04	0.0E+00	0.0E+00
750	1.3E-04	0.0E+00	0.0E+00
1000	**1.3E-04**	0.0E+00	0.0E+00
1025	6.3E-06	0.0E+00	0.0E+00
1050	5.3E-06	0.0E+00	0.0E+00
1100	3.8E-06	0.0E+00	0.0E+00
1200	1.9E-06	0.0E+00	0.0E+00
1400	4.7E-07	0.0E+00	0.0E+00
1600	1.2E-07	0.0E+00	0.0E+00
2000	7.3E-09	0.0E+00	0.0E+00
2500	2.3E-10	0.0E+00	0.0E+00
3000	7.2E-12	0.0E+00	0.0E+00

GAVCU Concentration in Lettuce (Bq kg^{-1}) in Zone A Due to Groundwater Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	1.1E-01	4.2E-10	9.9E-11	9.1E-11	9.1E-11
80	5.9E+00	1.3E-06	7.8E-08	7.3E-08	7.3E-08
100	1.2E+01	5.6E-06	6.9E-07	6.4E-07	6.4E-07
125	**2.0E+01**	1.5E-05	3.1E-06	2.9E-06	2.9E-06
575	2.0E+01	2.3E-04	4.9E-04	4.6E-04	4.6E-04
590	2.0E+01	2.3E-04	8.8E-02	8.9E-02	8.9E-02
620	2.0E+01	2.5E-04	8.7E-01	8.7E-01	8.8E-01
750	2.0E+01	3.1E-04	4.2E+00	4.2E+00	4.2E+00
1000	2.0E+01	4.3E-04	1.0E+01	1.0E+01	1.0E+01
1015	2.0E+01	4.4E-04	1.0E+01	1.0E+01	1.0E+01
1025	2.0E+01	4.4E-04	1.1E+01	1.1E+01	1.1E+01
1060	2.0E+01	4.6E-04	1.1E+01	1.1E+01	1.1E+01
1080	2.0E+01	4.7E-04	1.2E+01	1.2E+01	1.2E+01
1120	1.1E+00	**4.7E-04**	1.3E+01	1.3E+01	1.3E+01
1175	0.0E+00	4.7E-04	1.4E+01	1.4E+01	1.4E+01
1575	0.0E+00	4.7E-04	**1.4E+01**	**1.4E+01**	**1.4E+01**
1750	0.0E+00	4.7E-04	9.8E+00	9.7E+00	9.7E+00
2175	0.0E+00	4.6E-04	3.0E-01	3.0E-01	4.0E-01
4000	0.0E+00	4.5E-04	4.0E-01	3.0E-01	3.0E-01
6000	0.0E+00	4.4E-04	3.0E-01	4.0E-01	4.0E-01
8000	0.0E+00	4.3E-04	4.0E-01	3.0E-01	4.0E-01
10000	0.0E+00	4.2E-04	3.0E-01	3.0E-01	3.0E-01

GBVCU Concentration in Lettuce (Bq kg^{-1}) in Zone B Due to Groundwater Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	1.3E-02	5.0E-11	1.2E-11	1.1E-11	1.1E-11
80	7.0E-01	1.5E-07	9.3E-09	8.6E-09	8.6E-09
100	1.5E+00	6.7E-07	8.2E-08	7.6E-08	7.6E-08
125	**2.3E+00**	1.8E-06	3.7E-07	3.5E-07	3.5E-07
575	2.3E+00	2.7E-05	5.9E-05	5.4E-05	5.4E-05
590	2.3E+00	2.8E-05	1.1E-02	1.1E-02	1.1E-02
620	2.3E+00	2.9E-05	1.0E-01	1.0E-01	1.0E-01
750	2.3E+00	3.7E-05	5.0E-01	5.0E-01	5.0E-01
1000	2.3E+00	5.1E-05	1.2E+00	1.2E+00	1.2E+00
1015	2.3E+00	5.2E-05	1.2E+00	1.2E+00	1.2E+00
1025	2.3E+00	5.3E-05	1.3E+00	1.3E+00	1.3E+00
1060	2.3E+00	5.5E-05	1.4E+00	1.4E+00	1.4E+00
1080	2.3E+00	5.6E-05	1.4E+00	1.4E+00	1.4E+00
1120	1.2E-01	**5.6E-05**	1.5E+00	1.5E+00	1.5E+00
1175	0.0E+00	5.6E-05	1.6E+00	1.6E+00	1.6E+00
1575	0.0E+00	5.6E-05	**1.6E+00**	**1.6E+00**	**1.6E+00**
1750	0.0E+00	5.5E-05	1.2E+00	1.2E+00	1.2E+00
2175	0.0E+00	5.4E-05	4.0E-02	4.0E-02	3.0E-02
4000	0.0E+00	5.3E-05	4.0E-02	4.0E-02	4.0E-02
6000	0.0E+00	5.3E-05	4.0E-02	4.0E-02	4.0E-02
8000	0.0E+00	5.1E-05	4.0E-02	4.0E-02	4.0E-02
10000	0.0E+00	5.0E-05	4.0E-02	4.0E-02	4.0E-02

GAVDU Dose from Lettuce Ingestion in Zone A
Due to Groundwater Release (Sv yr^{-1})

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	1.1E-07	3.7E-15	5.4E-16	3.0E-15	1.4E-15	1.1E-07
80	5.9E-06	1.1E-11	4.3E-13	2.4E-12	1.1E-12	5.9E-06
100	1.2E-05	4.9E-11	3.8E-12	2.1E-11	9.9E-12	1.2E-05
125	**2.0E-05**	1.3E-10	1.7E-11	9.4E-11	4.5E-11	2.0E-05
575	2.0E-05	2.0E-09	2.7E-09	1.5E-08	7.1E-09	2.0E-05
590	2.0E-05	2.0E-09	4.9E-07	2.9E-06	1.4E-06	2.5E-05
620	2.0E-05	2.2E-09	4.8E-06	2.8E-05	1.4E-05	6.7E-05
750	2.0E-05	2.7E-09	2.3E-05	1.4E-04	6.5E-05	2.4E-04
1000	2.0E-05	3.8E-09	5.5E-05	3.3E-04	1.6E-04	5.6E-04
1015	2.0E-05	3.8E-09	5.7E-05	3.4E-04	1.6E-04	5.7E-04
1025	2.0E-05	3.9E-09	5.8E-05	3.4E-04	1.6E-04	5.9E-04
1060	2.0E-05	4.0E-09	6.2E-05	3.7E-04	1.8E-04	6.3E-04
1080	2.0E-05	4.1E-09	6.5E-05	3.8E-04	1.8E-04	6.5E-04
1120	1.1E-06	**4.1E-09**	6.9E-05	4.1E-04	2.0E-04	6.8E-04
1175	0.0E+00	4.1E-09	7.5E-05	4.5E-04	2.1E-04	7.4E-04
1575	0.0E+00	4.1E-09	**7.6E-05**	**4.5E-04**	**2.1E-04**	**7.4E-04**
1750	0.0E+00	4.1E-09	5.4E-05	3.2E-04	1.5E-04	5.2E-04
2175	0.0E+00	4.0E-09	1.8E-06	1.1E-05	5.0E-06	1.8E-05
4000	0.0E+00	3.9E-09	1.7E-06	1.1E-05	5.0E-06	1.8E-05
6000	0.0E+00	3.9E-09	1.8E-06	1.2E-05	6.0E-06	2.0E-05
8000	0.0E+00	3.8E-09	1.9E-06	1.1E-05	5.0E-06	1.8E-05
10000	0.0E+00	3.8E-09	2.0E-06	1.2E-05	5.0E-06	1.9E-05

GBVDU Dose from Lettuce Ingestion in Zone B
Due to Groundwater Release (Sv yr^{-1})

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	1.3E-08	4.4E-16	6.5E-17	3.5E-16	1.7E-16	1.3E-08
80	7.1E-07	1.3E-12	5.1E-14	2.8E-13	1.3E-13	7.1E-07
100	1.5E-06	5.8E-12	4.5E-13	2.5E-12	1.2E-12	1.5E-06
125	**2.4E-06**	1.6E-11	2.1E-12	1.1E-11	5.4E-12	2.4E-06
575	2.4E-06	2.4E-10	3.2E-10	1.8E-09	8.4E-10	2.4E-06
590	2.4E-06	2.4E-10	5.8E-08	3.4E-07	1.6E-07	2.9E-06
620	2.4E-06	2.6E-10	5.7E-07	3.4E-06	1.6E-06	7.9E-06
750	2.4E-06	3.2E-10	2.7E-06	1.6E-05	7.7E-06	2.9E-05
1000	2.4E-06	4.5E-10	6.6E-06	3.9E-05	1.9E-05	6.6E-05
1015	2.4E-06	4.6E-10	6.8E-06	4.0E-05	1.9E-05	6.8E-05
1025	2.4E-06	4.6E-10	6.9E-06	4.1E-05	2.0E-05	7.0E-05
1060	2.4E-06	4.8E-10	7.4E-06	4.4E-05	2.1E-05	7.5E-05
1080	2.4E-06	4.9E-10	7.7E-06	4.6E-05	2.2E-05	7.7E-05
1120	1.3E-07	**4.9E-10**	8.3E-06	4.9E-05	2.3E-05	8.1E-05
1175	0.0E+00	4.9E-10	9.0E-06	5.3E-05	2.5E-05	8.8E-05
1575	0.0E+00	4.9E-10	**9.1E-06**	**5.4E-05**	**2.6E-05**	**8.8E-05**
1750	0.0E+00	4.9E-10	6.4E-06	3.8E-05	1.8E-05	6.2E-05
2175	0.0E+00	4.8E-10	2.0E-07	1.2E-06	5.0E-07	1.9E-06
4000	0.0E+00	4.7E-10	2.1E-07	1.3E-06	6.0E-07	2.1E-06
6000	0.0E+00	4.6E-10	2.1E-07	1.4E-06	6.0E-07	2.2E-06
8000	0.0E+00	4.4E-10	2.7E-07	1.3E-06	7.0E-07	2.3E-06
10000	0.0E+00	4.4E-10	3.0E-07	1.4E-06	6.0E-07	2.3E-06

GAVRU Cancer Risk from Lettuce Ingestion in Zone A
Due to Groundwater Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	1.1E-07	2.6E-16	5.5E-16	2.2E-15	6.6E-16	1.1E-07
80	6.1E-06	7.9E-13	4.4E-13	1.8E-12	5.2E-13	6.1E-06
100	1.3E-05	3.4E-12	3.9E-12	1.6E-11	4.6E-12	1.3E-05
125	**2.1E-05**	9.4E-12	1.8E-11	7.1E-11	2.1E-11	2.1E-05
575	2.0E-05	1.4E-10	2.8E-09	1.1E-08	3.3E-09	2.1E-05
590	2.0E-05	1.4E-10	4.9E-07	2.2E-06	6.4E-07	2.4E-05
620	2.0E-05	1.5E-10	4.9E-06	2.1E-05	6.3E-06	5.3E-05
750	2.0E-05	1.9E-10	2.3E-05	1.0E-04	3.0E-05	1.8E-04
1000	2.0E-05	2.6E-10	5.6E-05	2.5E-04	7.2E-05	3.9E-04
1015	2.0E-05	2.7E-10	5.8E-05	2.5E-04	7.4E-05	4.1E-04
1025	2.0E-05	2.7E-10	5.9E-05	2.6E-04	7.6E-05	4.2E-04
1060	2.0E-05	2.8E-10	6.3E-05	2.8E-04	8.2E-05	4.4E-04
1080	2.0E-05	2.9E-10	6.6E-05	2.9E-04	8.5E-05	4.6E-04
1120	1.1E-06	**2.9E-10**	7.1E-05	3.1E-04	9.1E-05	4.7E-04
1175	1.0E-09	2.9E-10	7.7E-05	3.4E-04	9.9E-05	5.1E-04
1575	1.0E-09	2.9E-10	**7.8E-05**	**3.4E-04**	**1.0E-04**	**5.2E-04**
1750	1.0E-09	2.8E-10	5.5E-05	2.4E-04	7.0E-05	3.6E-04
2175	1.0E-09	2.8E-10	1.8E-06	7.8E-06	2.3E-06	1.2E-05
4000	0.0E+00	2.7E-10	1.8E-06	8.0E-06	2.3E-06	1.2E-05
6000	1.0E-09	2.7E-10	1.9E-06	8.9E-06	2.6E-06	1.3E-05
8000	1.0E-09	2.6E-10	1.9E-06	8.5E-06	2.5E-06	1.3E-05
10000	1.0E-09	2.6E-10	2.0E-06	8.9E-06	2.7E-06	1.4E-05

GBVRU Cancer Risk from Lettuce Ingestion in Zone B
Due to Groundwater Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	1.3E-08	3.1E-17	6.6E-17	2.7E-16	7.8E-17	1.3E-08
80	7.3E-07	9.4E-14	5.2E-14	2.1E-13	6.2E-14	7.3E-07
100	1.5E-06	4.1E-13	4.6E-13	1.9E-12	5.5E-13	1.5E-06
125	**2.4E-06**	1.1E-12	2.1E-12	8.5E-12	2.5E-12	2.4E-06
575	2.4E-06	1.7E-11	3.3E-10	1.3E-09	3.9E-10	2.4E-06
590	2.4E-06	1.7E-11	5.9E-08	2.6E-07	7.6E-08	2.8E-06
620	2.4E-06	1.8E-11	5.8E-07	2.6E-06	7.5E-07	6.3E-06
750	2.4E-06	2.2E-11	2.8E-06	1.2E-05	3.6E-06	2.1E-05
1000	2.4E-06	3.1E-11	6.7E-06	2.9E-05	8.6E-06	4.7E-05
1015	2.4E-06	3.2E-11	6.9E-06	3.0E-05	8.9E-06	4.8E-05
1025	2.4E-06	3.2E-11	7.0E-06	3.1E-05	9.1E-06	4.9E-05
1060	2.4E-06	3.3E-11	7.6E-06	3.3E-05	9.7E-06	5.3E-05
1080	2.4E-06	3.4E-11	7.8E-06	3.4E-05	1.0E-05	5.5E-05
1120	1.3E-07	**3.4E-11**	8.4E-06	3.7E-05	1.1E-05	5.6E-05
1175	0.0E+00	3.4E-11	9.2E-06	4.0E-05	1.2E-05	6.1E-05
1575	0.0E+00	3.4E-11	**9.2E-06**	**4.0E-05**	**1.2E-05**	**6.2E-05**
1750	0.0E+00	3.4E-11	6.5E-06	2.8E-05	8.4E-06	4.3E-05
2175	0.0E+00	3.3E-11	2.1E-07	9.2E-07	2.7E-07	1.4E-06
4000	0.0E+00	3.3E-11	2.2E-07	9.5E-07	2.8E-07	1.4E-06
6000	0.0E+00	3.2E-11	2.2E-07	1.1E-06	3.1E-07	1.6E-06
8000	0.0E+00	3.1E-11	2.3E-07	1.0E-06	3.0E-07	1.6E-06
10000	0.0E+00	3.1E-11	2.4E-07	1.1E-06	3.1E-07	1.6E-06

GAVCM Concentration in Lettuce (mg kg^{-1}) in Zone A Due to Groundwater Release

Time (yr)	As	Cr	Ni
15	0.0E+00	3.0E-06	3.0E-07
20	0.0E+00	2.4E-01	2.3E-02
25	0.0E+00	4.7E-01	4.7E-02
30	0.0E+00	**7.0E-01**	**7.0E-02**
60	0.0E+00	7.0E-01	7.0E-02
62	0.0E+00	7.0E-01	7.0E-02
80	0.0E+00	7.0E-01	7.0E-02
100	0.0E+00	7.0E-01	7.0E-02
125	0.0E+00	7.0E-01	7.0E-02
575	0.0E+00	7.0E-01	7.0E-02
590	0.0E+00	7.0E-01	7.0E-02
620	0.0E+00	7.0E-01	7.0E-02
750	0.0E+00	7.0E-01	7.0E-02
1000	0.0E+00	7.0E-01	7.0E-02
1015	0.0E+00	7.0E-01	7.0E-02
1025	0.0E+00	2.3E-01	2.3E-02
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	3.9E-04	0.0E+00	0.0E+00
8000	**2.4E-03**	0.0E+00	0.0E+00
10000	2.4E-03	0.0E+00	0.0E+00

GBVCM Concentration in Lettuce (mg kg^{-1}) in Zone B Due to Groundwater Release

Time (yr)	As	Cr	Ni
15	0.0E+00	3.6E-07	3.6E-08
20	0.0E+00	2.8E-02	2.8E-03
25	0.0E+00	5.6E-02	5.6E-03
30	0.0E+00	**8.4E-02**	**8.4E-03**
60	0.0E+00	8.4E-02	8.4E-03
62	0.0E+00	8.4E-02	8.4E-03
80	0.0E+00	8.4E-02	8.4E-03
100	0.0E+00	8.4E-02	8.4E-03
125	0.0E+00	8.4E-02	8.4E-03
575	0.0E+00	8.4E-02	8.3E-03
590	0.0E+00	8.4E-02	8.3E-03
620	0.0E+00	8.3E-02	8.3E-03
750	0.0E+00	8.3E-02	8.3E-03
1000	0.0E+00	8.3E-02	8.3E-03
1015	0.0E+00	8.3E-02	8.3E-03
1025	0.0E+00	2.8E-02	2.8E-03
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	4.7E-05	0.0E+00	0.0E+00
8000	**2.9E-04**	0.0E+00	0.0E+00
10000	2.8E-04	0.0E+00	0.0E+00

GAVIM Intake from Lettuce Ingestion in Zone A Due to Groundwater Release (mg yr^{-1})

Time (yr)	As	Cr	Ni
15	0.0E+00	7.5E-05	7.5E-06
20	0.0E+00	5.9E+00	5.9E-01
25	0.0E+00	1.2E+01	1.2E+00
30	0.0E+00	**1.8E+01**	**1.8E+00**
60	0.0E+00	1.8E+01	1.8E+00
62	0.0E+00	1.8E+01	1.8E+00
80	0.0E+00	1.8E+01	1.8E+00
100	0.0E+00	1.8E+01	1.8E+00
125	0.0E+00	1.8E+01	1.8E+00
575	0.0E+00	1.8E+01	1.8E+00
590	0.0E+00	1.8E+01	1.8E+00
620	0.0E+00	1.8E+01	1.8E+00
750	0.0E+00	1.8E+01	1.7E+00
1000	0.0E+00	1.7E+01	1.7E+00
1015	0.0E+00	1.7E+01	1.7E+00
1025	0.0E+00	5.8E+00	5.8E-01
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	9.8E-03	0.0E+00	0.0E+00
8000	**6.0E-02**	0.0E+00	0.0E+00
10000	6.0E-02	0.0E+00	0.0E+00

GBVIM Intake from Lettuce Ingestion in Zone B Due to Groundwater Release (mg yr^{-1})

Time (yr)	As	Cr	Ni
15	0.0E+00	8.9E-06	8.9E-07
20	0.0E+00	7.0E-01	7.0E-02
25	0.0E+00	1.4E+00	1.4E-01
30	0.0E+00	**2.1E+00**	**2.1E-01**
60	0.0E+00	2.1E+00	2.1E-01
62	0.0E+00	2.1E+00	2.1E-01
80	0.0E+00	2.1E+00	2.1E-01
100	0.0E+00	2.1E+00	2.1E-01
125	0.0E+00	2.1E+00	2.1E-01
575	0.0E+00	2.1E+00	2.1E-01
590	0.0E+00	2.1E+00	2.1E-01
620	0.0E+00	2.1E+00	2.1E-01
750	0.0E+00	2.1E+00	2.1E-01
1000	0.0E+00	2.1E+00	2.1E-01
1015	0.0E+00	2.1E+00	2.1E-01
1025	0.0E+00	6.9E-01	6.9E-02
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	1.2E-03	0.0E+00	0.0E+00
8000	**7.2E-03**	0.0E+00	0.0E+00
10000	7.2E-03	0.0E+00	0.0E+00

GAVRM Cancer Risk from Lettuce Ingestion in Zone A Due to Groundwater Release

Time (yr)	As	Cr	Ni
15	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00
62	0.0E+00	0.0E+00	0.0E+00
80	0.0E+00	0.0E+00	0.0E+00
100	0.0E+00	0.0E+00	0.0E+00
125	0.0E+00	0.0E+00	0.0E+00
575	0.0E+00	0.0E+00	0.0E+00
590	0.0E+00	0.0E+00	0.0E+00
620	0.0E+00	0.0E+00	0.0E+00
750	0.0E+00	0.0E+00	0.0E+00
1000	0.0E+00	0.0E+00	0.0E+00
1015	0.0E+00	0.0E+00	0.0E+00
1025	0.0E+00	0.0E+00	0.0E+00
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	1.7E-04	0.0E+00	0.0E+00
8000	**1.1E-03**	0.0E+00	0.0E+00
10000	1.1E-03	0.0E+00	0.0E+00

GBVRM Cancer Risk from Lettuce Ingestion in Zone B Due to Groundwater Release

Time (yr)	As	Cr	Ni
15	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00
62	0.0E+00	0.0E+00	0.0E+00
80	0.0E+00	0.0E+00	0.0E+00
100	0.0E+00	0.0E+00	0.0E+00
125	0.0E+00	0.0E+00	0.0E+00
575	0.0E+00	0.0E+00	0.0E+00
590	0.0E+00	0.0E+00	0.0E+00
620	0.0E+00	0.0E+00	0.0E+00
750	0.0E+00	0.0E+00	0.0E+00
1000	0.0E+00	0.0E+00	0.0E+00
1015	0.0E+00	0.0E+00	0.0E+00
1025	0.0E+00	0.0E+00	0.0E+00
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	2.1E-05	0.0E+00	0.0E+00
8000	**1.3E-04**	0.0E+00	0.0E+00
10000	1.3E-04	0.0E+00	0.0E+00

AAPCU Concentration in Pasture (Bq kg^{-1}) in Zone A
Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210
1	1.5E-02	1.2E-01	1.2E-01	1.2E-01	1.2E-01
20	1.5E-02	1.2E-01	1.4E-01	1.2E-01	1.2E-01
25	1.5E-02	1.2E-01	1.5E-01	1.2E-01	1.2E-01
30	1.5E-02	1.2E-01	1.5E-01	1.2E-01	1.2E-01
62	1.6E-02	1.2E-01	1.8E-01	1.2E-01	1.3E-01
125	1.6E-02	1.2E-01	2.2E-01	1.2E-01	1.3E-01
575	1.7E-02	1.2E-01	2.8E-01	1.3E-01	1.4E-01
750	1.7E-02	1.2E-01	2.9E-01	1.3E-01	1.4E-01
1000	**1.7E-02**	**1.2E-01**	**2.9E-01**	**1.3E-01**	**1.4E-01**
1025	1.4E-03	1.1E-03	1.4E-01	5.6E-03	1.4E-02
1050	1.2E-03	9.4E-04	1.2E-01	4.7E-03	1.2E-02
1100	8.2E-04	6.6E-04	8.3E-02	3.3E-03	8.3E-03
1200	4.1E-04	3.3E-04	4.1E-02	1.7E-03	4.1E-03
1400	1.0E-04	8.3E-05	1.0E-02	4.1E-04	1.0E-03
1600	2.6E-05	2.1E-05	2.6E-03	1.0E-04	2.6E-04
2000	1.6E-06	1.3E-06	1.6E-04	6.5E-06	1.6E-05
2500	5.0E-08	4.0E-08	5.0E-06	2.0E-07	5.0E-07
3000	1.6E-09	1.2E-09	1.6E-07	6.3E-09	1.6E-08

ABPCU Concentration in Pasture (Bq kg^{-1}) in Zone B
Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210
1	2.7E-03	2.2E-02	2.2E-02	2.2E-02	2.2E-02
20	2.8E-03	2.2E-02	2.6E-02	2.2E-02	2.2E-02
25	2.8E-03	2.2E-02	2.7E-02	2.2E-02	2.2E-02
30	2.8E-03	2.2E-02	2.8E-02	2.2E-02	2.2E-02
62	2.8E-03	2.2E-02	3.2E-02	2.2E-02	2.3E-02
125	2.9E-03	2.2E-02	3.9E-02	2.3E-02	2.4E-02
575	3.0E-03	2.2E-02	5.1E-02	2.3E-02	2.5E-02
750	3.0E-03	2.2E-02	5.2E-02	2.3E-02	2.5E-02
1000	**3.0E-03**	**2.2E-02**	**5.2E-02**	**2.3E-02**	**2.5E-02**
1025	2.5E-04	2.0E-04	2.5E-02	1.0E-03	2.5E-03
1050	2.1E-04	1.7E-04	2.1E-02	8.6E-04	2.1E-03
1100	1.5E-04	1.2E-04	1.5E-02	6.0E-04	1.5E-03
1200	7.5E-05	6.0E-05	7.5E-03	3.0E-04	7.5E-04
1400	1.9E-05	1.5E-05	1.9E-03	7.6E-05	1.9E-04
1600	4.7E-06	3.7E-06	4.7E-04	1.9E-05	4.7E-05
2000	2.9E-07	2.3E-07	2.9E-05	1.2E-06	2.9E-06
2500	9.2E-09	7.3E-09	9.2E-07	3.7E-08	9.2E-08
3000	2.9E-10	2.3E-10	2.9E-08	1.1E-09	2.9E-09

AAPCM Concentration in Pasture (mg kg^{-1}) in Zone A Due to Atmospheric Release

Time (yr)	As	Cr	Ni
1	8.6E-04	8.6E-05	8.6E-06
20	8.7E-04	8.9E-05	8.8E-06
25	8.8E-04	9.0E-05	8.8E-06
30	8.8E-04	9.1E-05	8.8E-06
62	9.0E-04	9.5E-05	9.0E-06
125	9.2E-04	1.0E-04	9.3E-06
575	9.6E-04	1.1E-04	9.8E-06
750	9.6E-04	1.1E-04	9.8E-06
1000	**9.6E-04**	**1.1E-04**	**9.8E-06**
1025	8.0E-05	2.0E-05	1.0E-06
1050	6.7E-05	1.7E-05	8.4E-07
1100	4.8E-05	1.2E-05	6.0E-07
1200	2.4E-05	6.0E-06	3.0E-07
1400	6.0E-06	1.5E-06	7.4E-08
1600	1.5E-06	3.7E-07	1.9E-08
2000	9.3E-08	2.3E-08	1.2E-09
2500	2.9E-09	7.3E-10	3.6E-11
3000	9.1E-11	2.3E-11	1.1E-12

ABPCM Concentration in Pasture (mg kg^{-1}) in Zone B Due to Atmospheric Release

Time (yr)	As	Cr	Ni
1	1.6E-04	1.6E-05	1.6E-06
20	1.6E-04	1.6E-05	1.6E-06
25	1.6E-04	1.6E-05	1.6E-06
30	1.6E-04	1.6E-05	1.6E-06
62	1.6E-04	1.7E-05	1.6E-06
125	1.7E-04	1.8E-05	1.7E-06
575	1.7E-04	2.0E-05	1.8E-06
750	1.7E-04	2.0E-05	1.8E-06
1000	**1.7E-04**	**2.0E-05**	**1.8E-06**
1025	1.4E-05	3.6E-06	1.8E-07
1050	1.2E-05	3.0E-06	1.5E-07
1100	8.6E-06	2.2E-06	1.1E-07
1200	4.3E-06	1.1E-06	5.4E-08
1400	1.1E-06	2.7E-07	1.3E-08
1600	2.7E-07	6.7E-08	3.4E-09
2000	1.7E-08	4.2E-09	2.1E-10
2500	5.2E-10	1.3E-10	6.6E-12
3000	1.6E-11	4.1E-12	2.1E-13

AASCU Concentration in Soil (Bq m^{-3}) in Zone A Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210
1	4.0E+00	3.2E+01	3.2E+01	3.2E+01	3.2E+01
20	7.5E+01	6.0E+02	6.0E+02	6.0E+02	6.0E+02
25	9.2E+01	7.4E+02	7.4E+02	7.4E+02	7.4E+02
30	1.1E+02	8.7E+02	8.7E+02	8.7E+02	8.7E+02
62	2.0E+02	1.6E+03	1.6E+03	1.6E+03	1.6E+03
125	3.4E+02	2.7E+03	2.7E+03	2.7E+03	2.7E+03
575	5.7E+02	4.6E+03	4.6E+03	4.6E+03	4.6E+03
750	5.8E+02	4.6E+03	4.6E+03	4.6E+03	4.6E+03
1000	**5.8E+02**	**4.6E+03**	**4.7E+03**	**4.7E+03**	**4.7E+03**
1025	4.9E+02	3.9E+03	3.9E+03	3.9E+03	3.9E+03
1050	4.1E+02	3.3E+03	3.3E+03	3.3E+03	3.3E+03
1100	2.9E+02	2.3E+03	2.3E+03	2.3E+03	2.3E+03
1200	1.4E+02	1.2E+03	1.2E+03	1.2E+03	1.2E+03
1400	3.6E+01	2.9E+02	2.9E+02	2.9E+02	2.9E+02
1600	9.0E+00	7.2E+01	7.3E+01	7.3E+01	7.3E+01
2000	5.6E-01	4.5E+00	4.5E+00	4.5E+00	4.5E+00
2500	1.8E-02	1.4E-01	1.4E-01	1.4E-01	1.4E-01
3000	5.5E-04	4.4E-03	4.4E-03	4.4E-03	4.4E-03

AASDU External (Ground) Irradiation in Zone A
Due to Atmospheric Release (Sv yr^{-1})

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
1	3.4E-11	8.9E-12	6.3E-08	2.0E-11	2.5E-13	6.3E-08
20	6.4E-10	1.7E-10	1.2E-06	3.7E-10	4.7E-12	1.2E-06
25	7.8E-10	2.1E-10	1.4E-06	4.6E-10	5.8E-12	1.4E-06
30	9.2E-10	2.4E-10	1.7E-06	5.4E-10	6.9E-12	1.7E-06
62	1.7E-09	4.5E-10	3.2E-06	1.0E-09	1.3E-11	3.2E-06
125	2.9E-09	7.5E-10	5.3E-06	1.7E-09	2.1E-11	5.3E-06
575	4.8E-09	1.3E-09	8.9E-06	2.8E-09	3.6E-11	8.9E-06
750	4.9E-09	1.3E-09	9.0E-06	2.9E-09	3.6E-11	9.0E-06
1000	**4.9E-09**	**1.3E-09**	**9.1E-06**	**2.9E-09**	**3.6E-11**	**9.1E-06**
1025	4.1E-09	1.1E-09	7.6E-06	2.4E-09	3.1E-11	7.6E-06
1050	3.5E-09	9.1E-10	6.4E-06	2.0E-09	2.6E-11	6.4E-06
1100	2.5E-09	6.5E-10	4.5E-06	1.4E-09	1.8E-11	4.5E-06
1200	1.2E-09	3.2E-10	2.3E-06	7.2E-10	9.1E-12	2.3E-06
1400	3.1E-10	8.0E-11	5.7E-07	1.8E-10	2.3E-12	5.7E-07
1600	7.7E-11	2.0E-11	1.4E-07	4.5E-11	5.7E-13	1.4E-07
2000	4.8E-12	1.3E-12	8.8E-09	2.8E-12	3.6E-14	8.8E-09
2500	1.5E-13	3.9E-14	2.8E-10	8.7E-14	1.1E-15	2.8E-10
3000	4.7E-15	1.2E-15	8.6E-12	2.7E-15	3.5E-17	8.6E-12

AASRU Cancer Risk from External (Ground)
Irradiation in Zone A Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210
1	6.4E-11	1.7E-12	1.6E-07	3.9E-12	8.2E-13
20	1.2E-09	3.2E-11	3.0E-06	7.3E-11	1.5E-11
25	1.5E-09	3.9E-11	3.7E-06	8.9E-11	1.9E-11
30	1.7E-09	4.6E-11	4.4E-06	1.1E-10	2.2E-11
62	3.2E-09	8.5E-11	8.1E-06	2.0E-10	4.1E-11
125	5.4E-09	1.4E-10	1.4E-05	3.3E-10	6.9E-11
575	9.1E-09	2.4E-10	2.3E-05	5.5E-10	1.2E-10
750	9.2E-09	2.4E-10	2.3E-05	5.6E-10	1.2E-10
1000	**9.3E-09**	**2.4E-10**	**2.3E-05**	**5.6E-10**	**1.2E-10**
1025	7.8E-09	2.0E-10	2.0E-05	4.7E-10	9.9E-11
1050	6.6E-09	1.7E-10	1.6E-05	4.0E-10	8.4E-11
1100	4.6E-09	1.2E-10	1.2E-05	2.8E-10	5.9E-11
1200	2.3E-09	6.1E-11	5.8E-06	1.4E-10	3.0E-11
1400	5.8E-10	1.5E-11	1.5E-06	3.5E-11	7.4E-12
1600	1.5E-10	3.8E-12	3.6E-07	8.8E-12	1.8E-12
2000	9.1E-12	2.4E-13	2.3E-08	5.5E-13	1.2E-13
2500	2.8E-13	7.3E-15	7.1E-10	1.7E-14	3.6E-15
3000	8.9E-15	2.3E-16	2.2E-11	5.3E-16	1.1E-16

ABSCU Concentration in Soil (Bq m^{-3}) in Zone B
Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210
1	7.2E-01	5.8E+00	5.8E+00	5.8E+00	5.8E+00
20	1.4E+01	1.1E+02	1.1E+02	1.1E+02	1.1E+02
25	1.7E+01	1.3E+02	1.3E+02	1.3E+02	1.3E+02
30	2.0E+01	1.6E+02	1.6E+02	1.6E+02	1.6E+02
62	3.7E+01	2.9E+02	2.9E+02	2.9E+02	2.9E+02
125	6.1E+01	4.9E+02	4.9E+02	4.9E+02	4.9E+02
575	1.0E+02	8.3E+02	8.3E+02	8.3E+02	8.3E+02
750	1.0E+02	8.4E+02	8.4E+02	8.4E+02	8.4E+02
1000	**1.0E+02**	**8.4E+02**	**8.4E+02**	**8.4E+02**	**8.4E+02**
1025	8.8E+01	7.1E+02	7.1E+02	7.1E+02	7.1E+02
1050	7.4E+01	6.0E+02	6.0E+02	6.0E+02	6.0E+02
1100	5.2E+01	4.2E+02	4.2E+02	4.2E+02	4.2E+02
1200	2.6E+01	2.1E+02	2.1E+02	2.1E+02	2.1E+02
1400	6.5E+00	5.2E+01	5.3E+01	5.3E+01	5.3E+01
1600	1.6E+00	1.3E+01	1.3E+01	1.3E+01	1.3E+01
2000	1.0E-01	8.2E-01	8.2E-01	8.2E-01	8.2E-01
2500	3.2E-03	2.5E-02	2.6E-02	2.6E-02	2.6E-02
3000	1.0E-04	7.9E-04	8.0E-04	8.0E-04	8.0E-04

ABSDU External (Ground) Irradiation in Zone B
Due to Atmospheric Release (Sv yr^{-1})

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
1	6.2E-12	1.6E-12	1.1E-08	3.6E-12	4.6E-14	1.1E-08
20	1.2E-10	3.0E-11	2.1E-07	6.8E-11	8.6E-13	2.1E-07
25	1.4E-10	3.7E-11	2.6E-07	8.3E-11	1.1E-12	2.6E-07
30	1.7E-10	4.4E-11	3.1E-07	9.8E-11	1.2E-12	3.1E-07
62	3.1E-10	8.2E-11	5.8E-07	1.8E-10	2.3E-12	5.8E-07
125	5.2E-10	1.4E-10	9.5E-07	3.0E-10	3.8E-12	9.6E-07
575	8.8E-10	2.3E-10	1.6E-06	5.1E-10	6.5E-12	1.6E-06
750	8.9E-10	2.3E-10	1.6E-06	5.2E-10	6.6E-12	1.6E-06
1000	**8.9E-10**	**2.3E-10**	**1.6E-06**	**5.2E-10**	**6.6E-12**	**1.6E-06**
1025	7.5E-10	2.0E-10	1.4E-06	4.4E-10	5.6E-12	1.4E-06
1050	6.3E-10	1.7E-10	1.2E-06	3.7E-10	4.7E-12	1.2E-06
1100	4.5E-10	1.2E-10	8.2E-07	2.6E-10	3.3E-12	8.2E-07
1200	2.2E-10	5.8E-11	4.1E-07	1.3E-10	1.7E-12	4.1E-07
1400	5.6E-11	1.5E-11	1.0E-07	3.3E-11	4.1E-13	1.0E-07
1600	1.4E-11	3.6E-12	2.6E-08	8.1E-12	1.0E-13	2.6E-08
2000	8.7E-13	2.3E-13	1.6E-09	5.1E-13	6.5E-15	1.6E-09
2500	2.7E-14	7.1E-15	5.0E-11	1.6E-14	2.0E-16	5.0E-11
3000	8.5E-16	2.2E-16	1.6E-12	4.9E-16	6.3E-18	1.6E-12

ABSRU Cancer Risk from External (Ground) Irradiation in Zone B Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210
1	1.2E-11	3.1E-13	2.9E-08	7.1E-13	1.5E-13
20	2.2E-10	5.7E-12	5.5E-07	1.3E-11	2.8E-12
25	2.7E-10	7.0E-12	6.7E-07	1.6E-11	3.4E-12
30	3.2E-10	8.3E-12	7.9E-07	1.9E-11	4.0E-12
62	5.9E-10	1.5E-11	1.5E-06	3.6E-11	7.5E-12
125	9.8E-10	2.6E-11	2.5E-06	5.9E-11	1.2E-11
575	1.7E-09	4.3E-11	4.2E-06	1.0E-10	2.1E-11
750	1.7E-09	4.4E-11	4.2E-06	1.0E-10	2.1E-11
1000	**1.7E-09**	**4.4E-11**	**4.2E-06**	**1.0E-10**	**2.1E-11**
1025	1.4E-09	3.7E-11	3.6E-06	8.6E-11	1.8E-11
1050	1.2E-09	3.1E-11	3.0E-06	7.2E-11	1.5E-11
1100	8.4E-10	2.2E-11	2.1E-06	5.1E-11	1.1E-11
1200	4.2E-10	1.1E-11	1.1E-06	2.5E-11	5.4E-12
1400	1.1E-10	2.7E-12	2.6E-07	6.4E-12	1.3E-12
1600	2.6E-11	6.9E-13	6.6E-08	1.6E-12	3.3E-13
2000	1.6E-12	4.3E-14	4.1E-09	9.9E-14	2.1E-14
2500	5.1E-14	1.3E-15	1.3E-10	3.1E-15	6.5E-16
3000	1.6E-15	4.1E-17	4.0E-12	9.7E-17	2.0E-17

AASCM Concentration in Soil (mg m^{-3}) in Zone A Due to Atmospheric Release

Time (yr)	As	Cr	Ni
1	2.3E-01	2.3E-02	2.3E-03
20	4.3E+00	4.3E-01	4.3E-02
25	5.3E+00	5.3E-01	5.3E-02
30	6.3E+00	6.3E-01	6.3E-02
62	1.2E+01	1.2E+00	1.2E-01
125	1.9E+01	1.9E+00	1.9E-01
575	3.3E+01	3.3E+00	3.3E-01
750	3.3E+01	3.3E+00	3.3E-01
1000	**3.3E+01**	**3.3E+00**	**3.3E-01**
1025	2.8E+01	2.8E+00	2.8E-01
1050	2.4E+01	2.4E+00	2.4E-01
1100	1.7E+01	1.7E+00	1.7E-01
1200	8.3E+00	8.3E-01	8.3E-02
1400	2.1E+00	2.1E-01	2.1E-02
1600	5.2E-01	5.2E-02	5.2E-03
2000	3.2E-02	3.2E-03	3.2E-04
2500	1.0E-03	1.0E-04	1.0E-05
3000	3.2E-05	3.2E-06	3.2E-07

ABSCM Concentration in Soil (mg m^{-3}) in Zone B Due to Atmospheric Release

Time (yr)	As	Cr	Ni
1	4.2E-02	4.2E-03	4.2E-04
20	7.8E-01	7.8E-02	7.8E-03
25	9.6E-01	9.6E-02	9.6E-03
30	1.1E+00	1.1E-01	1.1E-02
62	2.1E+00	2.1E-01	2.1E-02
125	3.5E+00	3.5E-01	3.5E-02
575	5.9E+00	5.9E-01	5.9E-02
750	6.0E+00	6.0E-01	6.0E-02
1000	**6.0E+00**	**6.0E-01**	**6.0E-02**
1025	5.1E+00	5.1E-01	5.1E-02
1050	4.3E+00	4.3E-01	4.3E-02
1100	3.0E+00	3.0E-01	3.0E-02
1200	1.5E+00	1.5E-01	1.5E-02
1400	3.8E-01	3.8E-02	3.8E-03
1600	9.4E-02	9.4E-03	9.4E-04
2000	5.9E-03	5.9E-04	5.9E-05
2500	1.8E-04	1.8E-05	1.8E-06
3000	5.7E-06	5.7E-07	5.7E-08

GAWCU Concentration in Well Water (Bq L^{-1}) in Zone A Due to Groundwater Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	9.1E-01	3.6E-09	8.3E-10	7.8E-10	7.8E-10
80	5.0E+01	1.1E-05	6.6E-07	6.2E-07	6.2E-07
100	1.0E+02	4.8E-05	5.8E-06	5.5E-06	5.5E-06
125	**1.7E+02**	1.3E-04	2.6E-05	2.5E-05	2.5E-05
575	1.7E+02	1.9E-03	4.2E-03	3.9E-03	3.9E-03
590	1.7E+02	2.0E-03	7.5E-01	7.6E-01	7.6E-01
620	1.7E+02	2.1E-03	7.4E+00	7.5E+00	7.5E+00
750	1.7E+02	2.6E-03	3.5E+01	3.6E+01	3.6E+01
1000	1.7E+02	3.7E-03	8.5E+01	8.6E+01	8.6E+01
1015	1.7E+02	3.7E-03	8.7E+01	8.9E+01	8.9E+01
1025	1.7E+02	3.8E-03	8.9E+01	9.0E+01	9.0E+01
1060	1.7E+02	3.9E-03	9.6E+01	9.7E+01	9.7E+01
1080	1.7E+02	4.0E-03	9.9E+01	1.0E+02	1.0E+02
1120	9.0E+00	**4.0E-03**	1.1E+02	1.1E+02	1.1E+02
1175	0.0E+00	4.0E-03	1.2E+02	1.2E+02	1.2E+02
1575	0.0E+00	4.0E-03	**1.2E+02**	**1.2E+02**	**1.2E+02**
1750	0.0E+00	4.0E-03	8.2E+01	8.4E+01	8.4E+01
2175	0.0E+00	3.9E-03	2.0E+00	3.0E+00	3.0E+00
4000	0.0E+00	3.8E-03	3.0E+00	3.0E+00	2.0E+00
6000	0.0E+00	3.7E-03	3.0E+00	3.0E+00	3.0E+00
8000	0.0E+00	3.6E-03	3.0E+00	3.0E+00	3.0E+00
10000	0.0E+00	3.6E-03	4.0E+00	3.0E+00	3.0E+00

GAWCM Concentration in Well Water (mg L^{-1}) in Zone A Due to Groundwater Release

Time (yr)	As	Cr	Ni
15	0.0E+00	2.6E-05	2.6E-06
20	0.0E+00	2.0E+00	2.0E-01
25	0.0E+00	4.0E+00	4.0E-01
30	0.0E+00	**6.0E+00**	**6.0E-01**
60	0.0E+00	6.0E+00	6.0E-01
62	0.0E+00	6.0E+00	6.0E-01
80	0.0E+00	6.0E+00	6.0E-01
100	0.0E+00	6.0E+00	6.0E-01
125	0.0E+00	6.0E+00	6.0E-01
575	0.0E+00	6.0E+00	6.0E-01
590	0.0E+00	6.0E+00	6.0E-01
620	0.0E+00	6.0E+00	6.0E-01
750	0.0E+00	6.0E+00	6.0E-01
1000	0.0E+00	6.0E+00	6.0E-01
1015	0.0E+00	5.9E+00	5.9E-01
1025	0.0E+00	2.0E+00	2.0E-01
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	3.4E-03	0.0E+00	0.0E+00
8000	**2.1E-02**	0.0E+00	0.0E+00
10000	2.1E-02	0.0E+00	0.0E+00

GAWDU Dose from Drinking Water in Zone A
Due to Groundwater Release (Sv yr^{-1})

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	2.7E-05	9.2E-13	1.3E-13	7.4E-13	3.5E-13	2.7E-05
80	1.5E-03	2.8E-09	1.1E-10	5.9E-10	2.8E-10	1.5E-03
100	3.1E-03	1.2E-08	9.4E-10	5.2E-09	2.5E-09	3.1E-03
125	**5.0E-03**	3.3E-08	4.3E-09	2.4E-08	1.1E-08	5.0E-03
575	5.0E-03	4.9E-07	6.7E-07	3.7E-06	1.8E-06	5.0E-03
590	5.0E-03	5.1E-07	1.2E-04	7.2E-04	3.4E-04	6.1E-03
620	5.0E-03	5.4E-07	1.2E-03	7.1E-03	3.4E-03	1.7E-02
750	5.0E-03	6.7E-07	5.6E-03	3.4E-02	1.6E-02	6.1E-02
1000	5.0E-03	9.4E-07	1.4E-02	8.1E-02	3.9E-02	1.4E-01
1015	5.0E-03	9.5E-07	1.4E-02	8.4E-02	4.0E-02	1.4E-01
1025	5.0E-03	9.6E-07	1.4E-02	8.6E-02	4.1E-02	1.5E-01
1060	5.0E-03	1.0E-06	1.5E-02	9.2E-02	4.4E-02	1.6E-01
1080	4.9E-03	1.0E-06	1.6E-02	9.6E-02	4.6E-02	1.6E-01
1120	2.7E-04	**1.0E-06**	1.7E-02	1.0E-01	4.9E-02	1.7E-01
1175	0.0E+00	1.0E-06	1.9E-02	1.1E-01	5.3E-02	1.8E-01
1575	0.0E+00	1.0E-06	**1.9E-02**	**1.1E-01**	**5.4E-02**	**1.8E-01**
1750	0.0E+00	1.0E-06	1.3E-02	7.9E-02	3.8E-02	1.3E-01
2175	0.0E+00	1.0E-06	4.0E-04	3.0E-03	1.3E-03	4.7E-03
4000	0.0E+00	9.8E-07	4.0E-04	3.0E-03	1.3E-03	4.7E-03
6000	0.0E+00	9.6E-07	4.0E-04	3.0E-03	1.4E-03	4.8E-03
8000	0.0E+00	9.5E-07	5.0E-04	3.0E-03	1.3E-03	4.8E-03
10000	0.0E+00	9.2E-07	4.0E-04	3.0E-03	1.4E-03	4.8E-03

GAWIM Intake from Drinking Water in Zone A Due to Groundwater Release (mg yr^{-1})

Time (yr)	As	Cr	Ni
15	0.0E+00	1.9E-02	1.9E-03
20	0.0E+00	1.5E+03	1.5E+02
25	0.0E+00	2.9E+03	2.9E+02
30	0.0E+00	**4.4E+03**	**4.4E+02**
60	0.0E+00	4.4E+03	4.4E+02
62	0.0E+00	4.4E+03	4.4E+02
80	0.0E+00	4.4E+03	4.4E+02
100	0.0E+00	4.4E+03	4.4E+02
125	0.0E+00	4.4E+03	4.4E+02
575	0.0E+00	4.4E+03	4.4E+02
590	0.0E+00	4.4E+03	4.4E+02
620	0.0E+00	4.4E+03	4.4E+02
750	0.0E+00	4.4E+03	4.4E+02
1000	0.0E+00	4.3E+03	4.3E+02
1015	0.0E+00	4.3E+03	4.3E+02
1025	0.0E+00	1.4E+03	1.4E+02
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	2.5E+00	0.0E+00	0.0E+00
8000	**1.5E+01**	0.0E+00	0.0E+00
10000	1.5E+01	0.0E+00	0.0E+00

GAWRU Cancer Risk from Drinking Water in Zone A
Due to Groundwater Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	2.8E-05	6.4E-14	1.4E-13	5.6E-13	1.6E-13	2.8E-05
80	1.5E-03	2.0E-10	1.1E-10	4.4E-10	1.3E-10	1.5E-03
100	3.2E-03	8.6E-10	9.5E-10	3.9E-09	1.1E-09	3.2E-03
125	**5.1E-03**	2.3E-09	4.3E-09	1.8E-08	5.2E-09	5.1E-03
575	5.1E-03	3.5E-08	6.8E-07	2.8E-06	8.2E-07	5.1E-03
590	5.1E-03	3.6E-08	1.2E-04	5.4E-04	1.6E-04	5.9E-03
620	5.1E-03	3.8E-08	1.2E-03	5.3E-03	1.6E-03	1.3E-02
750	5.1E-03	4.7E-08	5.7E-03	2.5E-02	7.5E-03	4.4E-02
1000	5.1E-03	6.6E-08	1.4E-02	6.1E-02	1.8E-02	9.8E-02
1015	5.1E-03	6.7E-08	1.4E-02	6.3E-02	1.9E-02	1.0E-01
1025	5.1E-03	6.7E-08	1.5E-02	6.5E-02	1.9E-02	1.0E-01
1060	5.1E-03	7.0E-08	1.6E-02	6.9E-02	2.0E-02	1.1E-01
1080	5.1E-03	7.1E-08	1.6E-02	7.2E-02	2.1E-02	1.1E-01
1120	2.8E-04	**7.2E-08**	1.7E-02	7.7E-02	2.3E-02	1.2E-01
1175	1.0E-06	7.2E-08	1.9E-02	8.4E-02	2.5E-02	1.3E-01
1575	2.0E-06	7.1E-08	**1.9E-02**	**8.5E-02**	**2.5E-02**	**1.3E-01**
1750	0.0E+00	7.1E-08	1.3E-02	6.0E-02	1.7E-02	9.1E-02
2175	1.0E-06	6.9E-08	4.4E-04	2.0E-03	5.7E-04	3.0E-03
4000	2.0E-06	6.8E-08	4.4E-04	2.0E-03	5.8E-04	3.0E-03
6000	0.0E+00	6.7E-08	4.5E-04	2.2E-03	6.5E-04	3.3E-03
8000	1.0E-06	6.6E-08	4.8E-04	2.1E-03	6.2E-04	3.2E-03
10000	1.0E-06	6.5E-08	5.1E-04	2.2E-03	6.5E-04	3.4E-03

GAWRM Cancer Risk from Drinking Water in Zone A Due to Groundwater Release

Time (yr)	As	Cr	Ni
15	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00
62	0.0E+00	0.0E+00	0.0E+00
80	0.0E+00	0.0E+00	0.0E+00
100	0.0E+00	0.0E+00	0.0E+00
125	0.0E+00	0.0E+00	0.0E+00
575	0.0E+00	0.0E+00	0.0E+00
590	0.0E+00	0.0E+00	0.0E+00
620	0.0E+00	0.0E+00	0.0E+00
750	0.0E+00	0.0E+00	0.0E+00
1000	0.0E+00	0.0E+00	0.0E+00
1015	0.0E+00	0.0E+00	0.0E+00
1025	0.0E+00	0.0E+00	0.0E+00
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	4.3E-02	0.0E+00	0.0E+00
8000	**2.6E-01**	0.0E+00	0.0E+00
10000	2.6E-01	0.0E+00	0.0E+00

AATDU Total Dose in Zone A Due to Atmospheric Release (Sv yr^{-1})

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
1	6.9E-07	**9.7E-06**	1.6E-06	8.3E-06	9.8E-05	1.2E-04
20	6.9E-07	9.7E-06	2.9E-06	8.4E-06	1.0E-04	1.2E-04
25	6.9E-07	9.7E-06	3.2E-06	8.4E-06	1.0E-04	1.3E-04
30	6.9E-07	9.6E-06	3.5E-06	8.4E-06	1.0E-04	1.3E-04
62	7.0E-07	9.7E-06	5.1E-06	8.5E-06	1.1E-04	1.3E-04
125	7.0E-07	9.7E-06	7.4E-06	8.6E-06	1.2E-04	1.5E-04
575	7.1E-07	9.6E-06	1.1E-05	8.8E-06	1.4E-04	1.7E-04
750	7.1E-07	9.6E-06	1.2E-05	8.8E-06	1.4E-04	1.7E-04
1000	**7.1E-07**	9.6E-06	**1.2E-05**	**8.8E-06**	**1.4E-04**	**1.7E-04**
1025	2.0E-08	2.1E-08	8.4E-06	4.0E-07	3.3E-05	4.2E-05
1050	1.7E-08	1.8E-08	7.1E-06	3.4E-07	2.7E-05	3.5E-05
1100	1.2E-08	1.2E-08	5.0E-06	2.4E-07	1.9E-05	2.5E-05
1200	6.0E-09	6.2E-09	2.5E-06	1.2E-07	9.7E-06	1.2E-05
1400	1.5E-09	1.6E-09	6.3E-07	3.0E-08	2.4E-06	3.1E-06
1600	3.8E-10	3.9E-10	1.6E-07	7.5E-09	6.1E-07	7.7E-07
2000	2.4E-11	2.4E-11	9.8E-09	4.7E-10	3.8E-08	4.8E-08
2500	7.4E-13	7.5E-13	3.0E-10	1.5E-11	1.2E-09	1.5E-09
3000	2.3E-14	2.3E-14	9.5E-12	4.5E-13	3.7E-11	4.7E-11

GATDU Total Dose in Zone A Due to Groundwater Release
(Sv yr^{-1})

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	3.0E-05	1.0E-12	1.4E-13	9.3E-13	9.7E-13	3.0E-05
80	1.6E-03	3.0E-09	1.1E-10	7.4E-10	7.7E-10	1.6E-03
100	3.4E-03	1.3E-08	9.8E-10	6.5E-09	6.8E-09	3.4E-03
125	**5.5E-03**	3.6E-08	4.4E-09	3.0E-08	3.1E-08	5.5E-03
575	5.5E-03	5.4E-07	7.0E-07	4.6E-06	4.9E-06	5.5E-03
590	5.5E-03	5.5E-07	1.3E-04	9.0E-04	9.4E-04	7.5E-03
620	5.5E-03	5.8E-07	1.2E-03	8.9E-03	9.3E-03	2.5E-02
750	5.5E-03	7.3E-07	5.9E-03	4.2E-02	4.4E-02	9.8E-02
1000	5.5E-03	1.0E-06	1.4E-02	1.0E-01	1.1E-01	2.3E-01
1015	5.5E-03	1.0E-06	1.5E-02	1.1E-01	1.1E-01	2.4E-01
1025	5.5E-03	1.0E-06	1.5E-02	1.1E-01	1.1E-01	2.4E-01
1060	5.5E-03	1.1E-06	1.6E-02	1.2E-01	1.2E-01	2.6E-01
1080	5.5E-03	1.1E-06	1.7E-02	1.2E-01	1.3E-01	2.7E-01
1120	3.0E-04	**1.1E-06**	1.8E-02	1.3E-01	1.3E-01	2.8E-01
1175	0.0E+00	1.1E-06	1.9E-02	1.4E-01	1.5E-01	3.1E-01
1575	0.0E+00	1.1E-06	**2.0E-02**	**1.4E-01**	**1.5E-01**	**3.1E-01**
1750	0.0E+00	1.1E-06	1.4E-02	1.0E-01	1.0E-01	2.2E-01
2175	0.0E+00	1.1E-06	4.2E-04	3.6E-03	3.5E-03	7.5E-03
4000	0.0E+00	1.1E-06	4.2E-04	3.6E-03	3.6E-03	7.6E-03
6000	0.0E+00	1.0E-06	4.2E-04	3.7E-03	3.9E-03	8.0E-03
8000	0.0E+00	1.0E-06	5.2E-04	3.7E-03	3.5E-03	7.7E-03
10000	0.0E+00	1.0E-06	4.2E-04	3.7E-03	3.5E-03	7.6E-03

AATIM Total Intake in Zone A
Due to Atmospheric Release
(mg yr^{-1})

Time (yr)	As	Cr	Ni
1	1.1E+00	6.2E-03	5.1E-04
20	1.2E+00	6.4E-03	5.2E-04
25	1.2E+00	6.5E-03	5.2E-04
30	1.2E+00	6.5E-03	5.3E-04
62	1.3E+00	6.8E-03	5.4E-04
125	1.4E+00	7.2E-03	5.6E-04
575	1.5E+00	7.9E-03	5.8E-04
750	1.5E+00	8.0E-03	5.8E-04
1000	**1.5E+00**	**8.0E-03**	**5.8E-04**
1025	3.5E-01	1.5E-03	6.3E-05
1050	3.0E-01	1.3E-03	5.3E-05
1100	2.1E-01	8.9E-04	3.7E-05
1200	1.0E-01	4.5E-04	1.9E-05
1400	2.6E-02	1.1E-04	4.6E-06
1600	6.5E-03	2.8E-05	1.2E-06
2000	4.1E-04	1.7E-06	7.3E-08
2500	1.3E-05	5.4E-08	2.3E-09
3000	4.0E-07	1.7E-09	7.1E-11

GATIM Total Intake in Zone A Due to Groundwater Release (mg yr^{-1})

Time (yr)	As	Cr	Ni
15	0.0E+00	2.2E-02	2.0E-03
20	0.0E+00	1.8E+03	1.5E+02
25	0.0E+00	3.5E+03	3.1E+02
30	0.0E+00	**5.3E+03**	**4.6E+02**
60	0.0E+00	5.3E+03	4.6E+02
62	0.0E+00	5.3E+03	4.6E+02
80	0.0E+00	5.3E+03	4.6E+02
100	0.0E+00	5.3E+03	4.6E+02
125	0.0E+00	5.3E+03	4.6E+02
575	0.0E+00	5.2E+03	4.6E+02
590	0.0E+00	5.2E+03	4.6E+02
620	0.0E+00	5.2E+03	4.6E+02
750	0.0E+00	5.2E+03	4.6E+02
1000	0.0E+00	5.2E+03	4.6E+02
1015	0.0E+00	5.2E+03	4.6E+02
1025	0.0E+00	1.7E+03	1.5E+02
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	6.8E+00	0.0E+00	0.0E+00
8000	**4.1E+01**	0.0E+00	0.0E+00
10000	4.1E+01	0.0E+00	0.0E+00

ABTDU Total Dose in Zone B Due to Atmospheric Release (Sv yr^{-1})

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
1	1.2E-07	1.7E-06	3.0E-07	1.5E-06	1.8E-05	2.1E-05
20	1.3E-07	1.7E-06	5.2E-07	1.5E-06	1.9E-05	2.2E-05
25	1.3E-07	1.7E-06	5.7E-07	1.5E-06	1.9E-05	2.3E-05
30	1.3E-07	1.7E-06	6.3E-07	1.5E-06	1.9E-05	2.3E-05
62	1.3E-07	1.7E-06	9.2E-07	1.5E-06	2.0E-05	2.4E-05
125	1.3E-07	**1.8E-06**	1.3E-06	1.6E-06	2.2E-05	2.7E-05
575	1.3E-07	1.7E-06	2.1E-06	1.6E-06	2.5E-05	3.0E-05
750	1.3E-07	1.7E-06	2.1E-06	1.6E-06	2.5E-05	3.0E-05
1000	**1.3E-07**	1.7E-06	**2.1E-06**	**1.6E-06**	**2.5E-05**	**3.0E-05**
1025	3.7E-09	3.8E-09	1.5E-06	7.3E-08	5.9E-06	7.5E-06
1050	3.1E-09	3.2E-09	1.3E-06	6.1E-08	5.0E-06	6.3E-06
1100	2.2E-09	2.3E-09	9.1E-07	4.3E-08	3.5E-06	4.5E-06
1200	1.1E-09	1.1E-09	4.6E-07	2.2E-08	1.8E-06	2.2E-06
1400	2.7E-10	2.8E-10	1.1E-07	5.4E-09	4.4E-07	5.6E-07
1600	6.8E-11	7.0E-11	2.8E-08	1.4E-09	1.1E-07	1.4E-07
2000	4.3E-12	4.4E-12	1.8E-09	8.5E-11	6.9E-09	8.7E-09
2500	1.3E-13	1.4E-13	5.5E-11	2.6E-12	2.1E-10	2.7E-10
3000	4.2E-15	4.2E-15	1.7E-12	8.2E-14	6.7E-12	8.5E-12

GBTDU Total Dose in Zone B Due to Groundwater Release (Sv yr^{-1})

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	3.8E-06	1.9E-13	2.1E-14	2.7E-13	1.3E-13	3.8E-06
80	2.1E-04	5.6E-10	1.7E-11	2.1E-10	1.0E-10	2.1E-04
100	4.3E-04	2.5E-09	1.5E-10	1.9E-09	9.0E-10	4.3E-04
125	**7.0E-04**	6.7E-09	6.8E-10	8.6E-09	4.1E-09	7.0E-04
575	6.9E-04	9.9E-08	1.1E-07	1.4E-06	6.4E-07	7.0E-04
590	6.9E-04	1.0E-07	1.9E-05	2.6E-04	1.2E-04	1.1E-03
620	6.9E-04	1.1E-07	1.9E-04	2.6E-03	1.2E-03	4.7E-03
750	6.9E-04	1.4E-07	9.0E-04	1.2E-02	5.9E-03	2.0E-02
1000	6.9E-04	1.9E-07	2.2E-03	3.0E-02	1.4E-02	4.7E-02
1015	6.9E-04	1.9E-07	2.3E-03	3.1E-02	1.5E-02	4.8E-02
1025	6.9E-04	1.9E-07	2.3E-03	3.1E-02	1.5E-02	4.9E-02
1060	6.9E-04	2.0E-07	2.5E-03	3.4E-02	1.6E-02	5.3E-02
1080	6.9E-04	2.0E-07	2.6E-03	3.5E-02	1.7E-02	5.5E-02
1120	3.7E-05	**2.1E-07**	2.7E-03	3.7E-02	1.8E-02	5.8E-02
1175	0.0E+00	2.1E-07	3.0E-03	4.1E-02	1.9E-02	6.3E-02
1575	0.0E+00	2.0E-07	**3.0E-03**	**4.1E-02**	**2.0E-02**	**6.4E-02**
1750	0.0E+00	2.0E-07	2.1E-03	2.9E-02	1.4E-02	4.5E-02
2175	0.0E+00	2.0E-07	6.7E-05	9.0E-04	4.9E-04	1.5E-03
4000	0.0E+00	2.0E-07	6.8E-05	9.0E-04	4.9E-04	1.5E-03
6000	0.0E+00	1.9E-07	7.8E-05	1.1E-03	5.2E-04	1.7E-03
8000	0.0E+00	1.9E-07	8.0E-05	1.0E-03	4.2E-04	1.5E-03
10000	0.0E+00	1.9E-07	8.0E-05	1.1E-03	5.2E-04	1.7E-03

ABTIM Total Intake in Zone B Due to Atmospheric Release (mg yr^{-1})

Time (yr)	As	Cr	Ni
1	2.0E-01	1.1E-03	9.3E-05
20	2.1E-01	1.2E-03	9.5E-05
25	2.1E-01	1.2E-03	9.5E-05
30	2.2E-01	1.2E-03	9.6E-05
62	2.3E-01	1.2E-03	9.8E-05
125	2.5E-01	1.3E-03	1.0E-04
575	2.8E-01	1.4E-03	1.1E-04
750	2.8E-01	1.4E-03	1.1E-04
1000	**2.8E-01**	**1.4E-03**	**1.1E-04**
1025	6.4E-02	2.7E-04	1.1E-05
1050	5.4E-02	2.3E-04	9.5E-06
1100	3.8E-02	1.6E-04	6.7E-06
1200	1.9E-02	8.1E-05	3.4E-06
1400	4.7E-03	2.0E-05	8.4E-07
1600	1.2E-03	5.0E-06	2.1E-07
2000	7.4E-05	3.1E-07	1.3E-08
2500	2.3E-06	9.8E-09	4.1E-10
3000	7.2E-08	3.1E-10	1.3E-11

GBTIM Total Intake in Zone B Due to Groundwater Release (mg yr^{-1})

Time (yr)	As	Cr	Ni
15	0.0E+00	5.3E-03	3.0E-04
20	0.0E+00	4.2E+02	2.4E+01
25	0.0E+00	8.4E+02	4.7E+01
30	0.0E+00	**1.3E+03**	**7.1E+01**
60	0.0E+00	1.3E+03	7.1E+01
62	0.0E+00	1.3E+03	7.1E+01
80	0.0E+00	1.3E+03	7.1E+01
100	0.0E+00	1.3E+03	7.1E+01
125	0.0E+00	1.3E+03	7.1E+01
575	0.0E+00	1.3E+03	7.1E+01
590	0.0E+00	1.2E+03	7.1E+01
620	0.0E+00	1.2E+03	7.1E+01
750	0.0E+00	1.2E+03	7.1E+01
1000	0.0E+00	1.2E+03	7.1E+01
1015	0.0E+00	1.2E+03	7.1E+01
1025	0.0E+00	4.2E+02	2.4E+01
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	8.9E-01	0.0E+00	0.0E+00
8000	**5.5E+00**	0.0E+00	0.0E+00
10000	5.5E+00	0.0E+00	0.0E+00

AATRU Total Cancer Risk in Zone A Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
1	1.4E-06	**8.4E-06**	2.3E-06	4.6E-05	6.5E-06	6.4E-05
20	1.5E-06	8.4E-06	5.3E-06	4.6E-05	8.7E-06	6.9E-05
25	1.5E-06	8.4E-06	6.0E-06	4.6E-05	9.2E-06	7.1E-05
30	1.5E-06	8.4E-06	6.7E-06	4.6E-05	9.8E-06	7.2E-05
62	1.5E-06	8.4E-06	1.1E-05	4.6E-05	1.3E-05	7.9E-05
125	1.5E-06	8.3E-06	1.6E-05	4.6E-05	1.7E-05	8.9E-05
575	1.5E-06	8.3E-06	2.6E-05	4.6E-05	2.4E-05	1.1E-04
750	1.5E-06	8.3E-06	2.6E-05	4.6E-05	2.4E-05	1.1E-04
1000	**1.5E-06**	8.3E-06	**2.6E-05**	**4.6E-05**	**2.4E-05**	**1.1E-04**
1025	2.4E-08	1.6E-09	2.0E-05	3.0E-07	1.5E-05	3.6E-05
1050	2.1E-08	1.3E-09	1.7E-05	2.5E-07	1.3E-05	3.0E-05
1100	1.5E-08	9.5E-10	1.2E-05	1.8E-07	9.0E-06	2.1E-05
1200	7.3E-09	4.7E-10	6.1E-06	9.0E-08	4.5E-06	1.1E-05
1400	1.8E-09	1.2E-10	1.5E-06	2.2E-08	1.1E-06	2.7E-06
1600	4.5E-10	3.0E-11	3.8E-07	5.6E-09	2.8E-07	6.7E-07
2000	2.8E-11	1.8E-12	2.4E-08	3.5E-10	1.8E-08	4.2E-08
2500	8.9E-13	5.7E-14	7.4E-10	1.1E-11	5.5E-10	1.3E-09
3000	2.8E-14	1.8E-15	2.3E-11	3.4E-13	1.7E-11	4.0E-11

GATRU Total Cancer Risk in Zone A Due to Groundwater Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	3.1E-05	7.0E-14	1.4E-13	7.0E-13	4.5E-13	3.1E-05
80	1.7E-03	2.1E-10	1.1E-10	5.6E-10	3.6E-10	1.7E-03
100	3.5E-03	9.3E-10	1.0E-09	4.9E-09	3.2E-09	3.5E-03
125	**5.7E-03**	2.5E-09	4.5E-09	2.2E-08	1.4E-08	5.7E-03
575	5.7E-03	3.8E-08	7.1E-07	3.5E-06	2.3E-06	5.7E-03
590	5.7E-03	3.9E-08	1.3E-04	6.8E-04	4.4E-04	6.9E-03
620	5.7E-03	4.1E-08	1.3E-03	6.7E-03	4.3E-03	1.8E-02
750	5.7E-03	5.1E-08	6.0E-03	3.2E-02	2.1E-02	6.4E-02
1000	5.7E-03	7.1E-08	1.4E-02	7.7E-02	4.9E-02	1.5E-01
1015	5.7E-03	7.2E-08	1.5E-02	7.9E-02	5.1E-02	1.5E-01
1025	5.7E-03	7.3E-08	1.5E-02	8.1E-02	5.2E-02	1.5E-01
1060	5.7E-03	7.6E-08	1.6E-02	8.7E-02	5.6E-02	1.7E-01
1080	5.7E-03	7.8E-08	1.7E-02	9.0E-02	5.8E-02	1.7E-01
1120	3.1E-04	**7.8E-08**	1.8E-02	9.7E-02	6.2E-02	1.8E-01
1175	1.1E-06	7.8E-08	2.0E-02	1.1E-01	6.8E-02	1.9E-01
1575	2.0E-06	7.8E-08	**2.0E-02**	**1.1E-01**	**6.8E-02**	**1.9E-01**
1750	1.0E-09	7.7E-08	1.4E-02	7.5E-02	4.8E-02	1.4E-01
2175	1.1E-06	7.6E-08	4.6E-04	2.5E-03	1.6E-03	4.5E-03
4000	2.1E-06	7.4E-08	4.6E-04	2.5E-03	1.6E-03	4.6E-03
6000	1.0E-07	7.3E-08	4.7E-04	2.8E-03	1.8E-03	5.1E-03
8000	1.0E-06	7.2E-08	5.0E-04	2.7E-03	1.7E-03	4.9E-03
10000	1.1E-06	7.0E-08	5.3E-04	2.8E-03	1.8E-03	5.1E-03

AATRM Total Cancer Risk in Zone A Due to Atmospheric Release

Time (yr)	As	Cr	Ni
1	2.0E-02	4.2E-05	9.0E-08
20	2.1E-02	4.2E-05	9.0E-08
25	2.1E-02	4.2E-05	9.0E-08
30	2.1E-02	4.2E-05	9.0E-08
62	2.3E-02	4.2E-05	9.0E-08
125	2.4E-02	4.2E-05	9.0E-08
575	2.7E-02	4.2E-05	9.0E-08
750	2.7E-02	4.2E-05	9.0E-08
1000	**2.7E-02**	**4.2E-05**	**9.0E-08**
1025	6.2E-03	0.0E+00	0.0E+00
1050	5.2E-03	0.0E+00	0.0E+00
1100	3.7E-03	0.0E+00	0.0E+00
1200	1.8E-03	0.0E+00	0.0E+00
1400	4.6E-04	0.0E+00	0.0E+00
1600	1.1E-04	0.0E+00	0.0E+00
2000	7.2E-06	0.0E+00	0.0E+00
2500	2.2E-07	0.0E+00	0.0E+00
3000	7.0E-09	0.0E+00	0.0E+00

GATRM Total Cancer in Zone A
Due to Groundwater Release

Time (yr)	As	Cr	Ni
15	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00
62	0.0E+00	0.0E+00	0.0E+00
80	0.0E+00	0.0E+00	0.0E+00
100	0.0E+00	0.0E+00	0.0E+00
125	0.0E+00	0.0E+00	0.0E+00
575	0.0E+00	0.0E+00	0.0E+00
590	0.0E+00	0.0E+00	0.0E+00
620	0.0E+00	0.0E+00	0.0E+00
750	0.0E+00	0.0E+00	0.0E+00
1000	0.0E+00	0.0E+00	0.0E+00
1015	0.0E+00	0.0E+00	0.0E+00
1025	0.0E+00	0.0E+00	0.0E+00
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	1.2E-01	0.0E+00	0.0E+00
8000	**7.2E-01**	0.0E+00	0.0E+00
10000	7.2E-01	0.0E+00	0.0E+00

ABTRU Total Cancer Risk in Zone B Due to Atmospheric Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
1	2.6E-07	1.5E-06	4.2E-07	8.3E-06	1.2E-06	1.2E-05
20	2.6E-07	1.5E-06	9.6E-07	8.3E-06	1.6E-06	1.3E-05
25	2.6E-07	1.5E-06	1.1E-06	8.3E-06	1.7E-06	1.3E-05
30	2.6E-07	1.5E-06	1.2E-06	8.3E-06	1.8E-06	1.3E-05
62	2.6E-07	1.5E-06	1.9E-06	8.3E-06	2.3E-06	1.4E-05
125	2.7E-07	1.5E-06	2.9E-06	8.3E-06	3.1E-06	1.6E-05
575	2.7E-07	1.5E-06	4.7E-06	8.3E-06	4.4E-06	1.9E-05
750	2.7E-07	1.5E-06	4.8E-06	8.3E-06	4.4E-06	1.9E-05
1000	**2.7E-07**	**1.5E-06**	**4.8E-06**	**8.3E-06**	**4.4E-06**	**1.9E-05**
1025	4.4E-09	2.9E-10	3.7E-06	5.5E-08	2.7E-06	6.5E-06
1050	3.7E-09	2.4E-10	3.1E-06	4.6E-08	2.3E-06	5.5E-06
1100	2.6E-09	1.7E-10	2.2E-06	3.3E-08	1.6E-06	3.9E-06
1200	1.3E-09	8.6E-11	1.1E-06	1.6E-08	8.2E-07	1.9E-06
1400	3.3E-10	2.1E-11	2.8E-07	4.1E-09	2.0E-07	4.8E-07
1600	8.2E-11	5.4E-12	6.9E-08	1.0E-09	5.1E-08	1.2E-07
2000	5.1E-12	3.3E-13	4.3E-09	6.3E-11	3.2E-09	7.5E-09
2500	1.6E-13	1.0E-14	1.3E-10	2.0E-12	9.9E-11	2.4E-10
3000	5.0E-15	3.2E-16	4.2E-12	6.2E-14	3.1E-12	7.3E-12

GBTRU Total Cancer Risk in Zone B Due to Groundwater Release

Time (yr)	U-238&4	Th-230	Ra-226	Pb-210	Po-210	Chain
15	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
62	3.9E-06	1.3E-14	2.2E-14	2.0E-13	5.9E-14	3.9E-06
80	2.1E-04	3.9E-11	1.7E-11	1.6E-10	4.7E-11	2.1E-04
100	4.4E-04	1.7E-10	1.5E-10	1.4E-09	4.2E-10	4.4E-04
125	**7.1E-04**	4.7E-10	6.9E-10	6.5E-09	1.9E-09	7.1E-04
575	7.1E-04	7.0E-09	1.1E-07	1.0E-06	3.0E-07	7.2E-04
590	7.1E-04	7.2E-09	2.0E-05	2.0E-04	5.8E-05	9.9E-04
620	7.1E-04	7.6E-09	1.9E-04	1.9E-03	5.7E-04	3.4E-03
750	7.1E-04	9.5E-09	9.2E-04	9.3E-03	2.7E-03	1.4E-02
1000	7.1E-04	1.3E-08	2.2E-03	2.2E-02	6.5E-03	3.2E-02
1015	7.1E-04	1.3E-08	2.3E-03	2.3E-02	6.8E-03	3.3E-02
1025	7.1E-04	1.4E-08	2.3E-03	2.4E-02	6.9E-03	3.4E-02
1060	7.1E-04	1.4E-08	2.5E-03	2.5E-02	7.4E-03	3.6E-02
1080	7.1E-04	1.4E-08	2.6E-03	2.6E-02	7.7E-03	3.7E-02
1120	3.9E-05	**1.5E-08**	2.8E-03	2.8E-02	8.2E-03	3.9E-02
1175	0.0E+00	1.5E-08	3.0E-03	3.1E-02	9.0E-03	4.3E-02
1575	0.0E+00	1.4E-08	**3.1E-03**	**3.1E-02**	**9.0E-03**	**4.3E-02**
1750	0.0E+00	1.4E-08	2.2E-03	2.2E-02	6.4E-03	3.0E-02
2175	0.0E+00	1.4E-08	7.0E-05	7.0E-04	2.1E-04	9.8E-04
4000	0.0E+00	1.4E-08	7.2E-05	7.2E-04	2.1E-04	1.0E-03
6000	0.0E+00	1.3E-08	7.3E-05	8.0E-04	2.4E-04	1.1E-03
8000	0.0E+00	1.3E-08	7.7E-05	7.7E-04	2.3E-04	1.1E-03
10000	0.0E+00	1.3E-08	8.1E-05	8.1E-04	2.4E-04	1.1E-03

ABTRM Total Cancer Risk in Zone B Due to Atmospheric Release

Time (yr)	As	Cr	Ni
1	3.6E-03	7.6E-06	1.6E-08
20	3.8E-03	7.6E-06	1.6E-08
25	3.8E-03	7.6E-06	1.6E-08
30	3.9E-03	7.6E-06	1.6E-08
62	4.1E-03	7.6E-06	1.6E-08
125	4.4E-03	7.6E-06	1.6E-08
575	4.9E-03	7.6E-06	1.6E-08
750	5.0E-03	7.6E-06	1.6E-08
1000	**5.0E-03**	**7.6E-06**	**1.6E-08**
1025	1.1E-03	0.0E+00	0.0E+00
1050	9.4E-04	0.0E+00	0.0E+00
1100	6.6E-04	0.0E+00	0.0E+00
1200	3.3E-04	0.0E+00	0.0E+00
1400	8.3E-05	0.0E+00	0.0E+00
1600	2.1E-05	0.0E+00	0.0E+00
2000	1.3E-06	0.0E+00	0.0E+00
2500	4.0E-08	0.0E+00	0.0E+00
3000	1.3E-09	0.0E+00	0.0E+00

GBTRM Total Cancer in Zone B
Due to Groundwater Release

Time (yr)	As	Cr	Ni
15	0.0E+00	0.0E+00	0.0E+00
20	0.0E+00	0.0E+00	0.0E+00
25	0.0E+00	0.0E+00	0.0E+00
30	0.0E+00	0.0E+00	0.0E+00
60	0.0E+00	0.0E+00	0.0E+00
62	0.0E+00	0.0E+00	0.0E+00
80	0.0E+00	0.0E+00	0.0E+00
100	0.0E+00	0.0E+00	0.0E+00
125	0.0E+00	0.0E+00	0.0E+00
575	0.0E+00	0.0E+00	0.0E+00
590	0.0E+00	0.0E+00	0.0E+00
620	0.0E+00	0.0E+00	0.0E+00
750	0.0E+00	0.0E+00	0.0E+00
1000	0.0E+00	0.0E+00	0.0E+00
1015	0.0E+00	0.0E+00	0.0E+00
1025	0.0E+00	0.0E+00	0.0E+00
1060	0.0E+00	0.0E+00	0.0E+00
1080	0.0E+00	0.0E+00	0.0E+00
1120	0.0E+00	0.0E+00	0.0E+00
1175	0.0E+00	0.0E+00	0.0E+00
1575	0.0E+00	0.0E+00	0.0E+00
1750	0.0E+00	0.0E+00	0.0E+00
2175	0.0E+00	0.0E+00	0.0E+00
4000	0.0E+00	0.0E+00	0.0E+00
6000	1.6E-02	0.0E+00	0.0E+00
8000	**9.6E-02**	0.0E+00	0.0E+00
10000	9.6E-02	0.0E+00	0.0E+00