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Incentives for Partitioning High-Level Waste

November 1975

Prepared for the U.S. Energy
Research and Development Administration
under Contract AT(45-1):1830

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Pacific Northwest Laboratories

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Printed in the United States of America
Available from
National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22151
Price: Printed Copy $5.45; Microfiche $2.25

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INCENTIVES FOR PARTITIONING HIGH-LEVEL WASTE

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November 1975

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EXECUTIVE SUMMARY

The incentives for separating and eliminating various elements (but particularly the transuranics) from radioactive waste prior to final geologic storage were investigated. Exposure pathways to man were defined, and potential radiation doses to an individual living within the region of influence of the underground storage site were calculated. The accumulated high-level waste (i.e., the fission product waste produced by reprocessing spent fuel) from the U.S. nuclear power economy through the Year 2000 was the assumed radionuclide source, and western U.S. desert subsoil was the assumed geologic medium.

The results of the study showed that for reasonable storage conditions the potential incremental radiation doses would be of the same order as, or less than, doses from natural sources. We therefore concluded that for the situations investigated the incentives for special effort to remove any elements, including the transuranics, from high-level waste are vanishingly small. The study results also showed that incentives exist for converting high-level calcine into glass.

The study required numerous assumptions concerned with the transport of radioactivity from the geologic storage site to man. The assumptions used, on the whole, maximized the estimated potential radiation doses. Thus incentives for removing elements from the waste tended to be maximized. Incentives were also maximized by assuming that elements removed from the waste could be eliminated from the earth without risk.

The conclusion that partitioning incentives are nonexistent--despite assumptions tending to maximize them--is based on comparison of predicted potential radiation doses with routine doses from natural sources. The study found that there are feasible conditions of geologic emplacement where the predicted incremental dose to man is calculated to be as low as one tenth of "background." Although "background" varies with geographic location and consensus standards of allowable incremental dose have not yet been fully established, we concluded that high-level waste in a glass form can safely be placed in selected geologic media.

The methods used in this study can be extended to evaluate any combination of waste type and geologic medium at sites that are candidates for final geologic storage.

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1.0 INTRODUCTION

The projected U.S. nuclear power economy for the 20th and 21st centuries will generate wastes which remain radioactive to some extent for millions of years. Because these wastes are a risk to present and future man, technology for their final storage is currently under development.[1] The final disposition alternatives seek either to isolate the waste from man's environment until the nuclides have decayed to innocuous levels or to eliminate the potentially hazardous long-lived nuclides from the waste. The isolation alternatives include geologic, seabed, and ice sheet final storage; the elimination alternatives include extraterrestrial disposal and transmutation.

For a given waste type (e.g., high-level, cladding hulls, low-level alpha, ore tailings, etc.) and any of these alternatives, there may be some safety incentive* for separating the waste into two or more fractions (partitioning) so that each fraction could be disposed of separately. For example, two frequently proposed alternatives for high-level waste would separate the usually long-lived actinides from the generally short-lived fission products. The actinides would then be eliminated by extraterrestrial disposal or recycled through an existing or specially designed nuclear reactor and transmuted to nuclides with shorter half-lives. The aim of such alternatives would be to reduce the overall risk for high-level waste by eliminating the actinides.

This document reports work to develop a general method for estimating the safety incentives for partitioning nuclear power economy wastes and to apply that method to a single waste type (accumulated high-level waste through the Year 2000 plus all tritium, carbon, and iodine from spent fuel), a single geosphere pathway (leach incident), and a specific set of biosphere pathways. The application of the methodology results in an estimated 50-year accumulated dose (in units of mrem) to an individual living within the region of influence of the underground waste disposal site. A sensitivity analysis was performed on the important geosphere parameters (path length, leach rate, and

* This document evaluates partitioning incentives for minimizing a negative aspect of the waste (its risk to health) but does not evaluate partitioning incentives for maximizing a positive aspect of the waste (its potential resource value).

time of initial release) and on the value for the publicly acceptable release consequences to define the boundaries of the region where incentives exist for various specific partitioning alternatives. Conclusions are drawn from the results, and recommendations for future work are made.

2.0 GENERAL EVALUATION METHOD

A complete evaluation of partitioning incentives requires considering all wastes from the U.S. nuclear power economy, all activities of the waste management system, and all pathways by which the waste can reach man. More specifically such an evaluation requires definition and analysis of each operation related to the disposition of partitioned and unpartitioned wastes from the point where partitioning is contemplated to terminal storage. This evaluation requires analyses of the probabilities of all events or series of events which could release wastes from containment, analyses of the transport of the released nuclides through the geosphere and biosphere, and analyses of the radiation doses to man. Only with such a thorough analysis does one get an estimate of the actual risk to man from partitioned and unpartitioned wastes.

Considering the total waste from the U.S. nuclear power economy, an incentive for partitioning exists only when the sum of the risks for all unpartitioned waste types is both greater than the publicly acceptable risk and greater than the sum of the risks for all partitioned fractions of all waste types. These conditions are expressed by the two inequalities shown below:

$$\sum_{i}^{\substack{\text{all}\\ \text{waste}\\ \text{types}}} R_i > R_a \qquad (1)$$

$$\sum_{i}^{\substack{\text{all}\\ \text{waste}\\ \text{types}}} R_i > \sum_{i}^{\substack{\text{all}\\ \text{waste}\\ \text{types}}} \sum_{j}^{\substack{\text{all}\\ \text{fractions}}} R_{ij} \qquad (2)$$

where: R_a = publicly acceptable risk

R_i = risk from unpartitioned waste of type i

R_{ij} = risk from partitioned waste fraction ij.

The publicly acceptable risk is that risk value which is marginally acceptable to the public at large. The risk for a given unpartitioned waste type or partitioned waste fraction is the sum over all release pathways of the products of the release probability for each pathway multiplied by the release consequences for that pathway. These equalities are expressed by the equations

$$R_i = \sum_{k}^{\substack{\text{waste}\\ \text{management}\\ \text{activities}}} \sum_{l}^{\substack{\text{all release}\\ \text{paths from}\\ \text{each activity}}} P_{ikl} \times C_{ikl} \qquad (1)$$

$$R_{ij} = \sum_{k}^{\substack{\text{waste}\\ \text{management}\\ \text{activities}}} \sum_{l}^{\substack{\text{all release}\\ \text{paths from}\\ \text{each activity}}} P_{ijkl} \times C_{ijkl} \qquad (2)$$

where: P_{ikl} = probability of release by path l from activity k of unpartitioned waste type i

C_{ikl} = consequences of release by path l from activity k of unpartitioned waste type i

P_{ijkl} = probability of release by path l from activity k of partitioned waste fraction ij

C_{ijkl} = consequences of release by path l from activity k of partitioned waste fraction ij.

The probabilities for the various release paths (P_{ikl} and P_{ijkl}) are obtained by fault tree analyses or other similar techniques for all release events from the partitioning operation in the process scheme through terminal storage (or perhaps temporary storage for some wastes). Figure 1 shows high-level waste management schemes for three situations: 1) no partitioning, 2) partitioning and transmutation, and 3) partitioning and extraterrestrial disposal. As shown, there will generally be more potential release paths from a waste management alternative with partitioning because additional processing steps are involved. In addition the transmutati

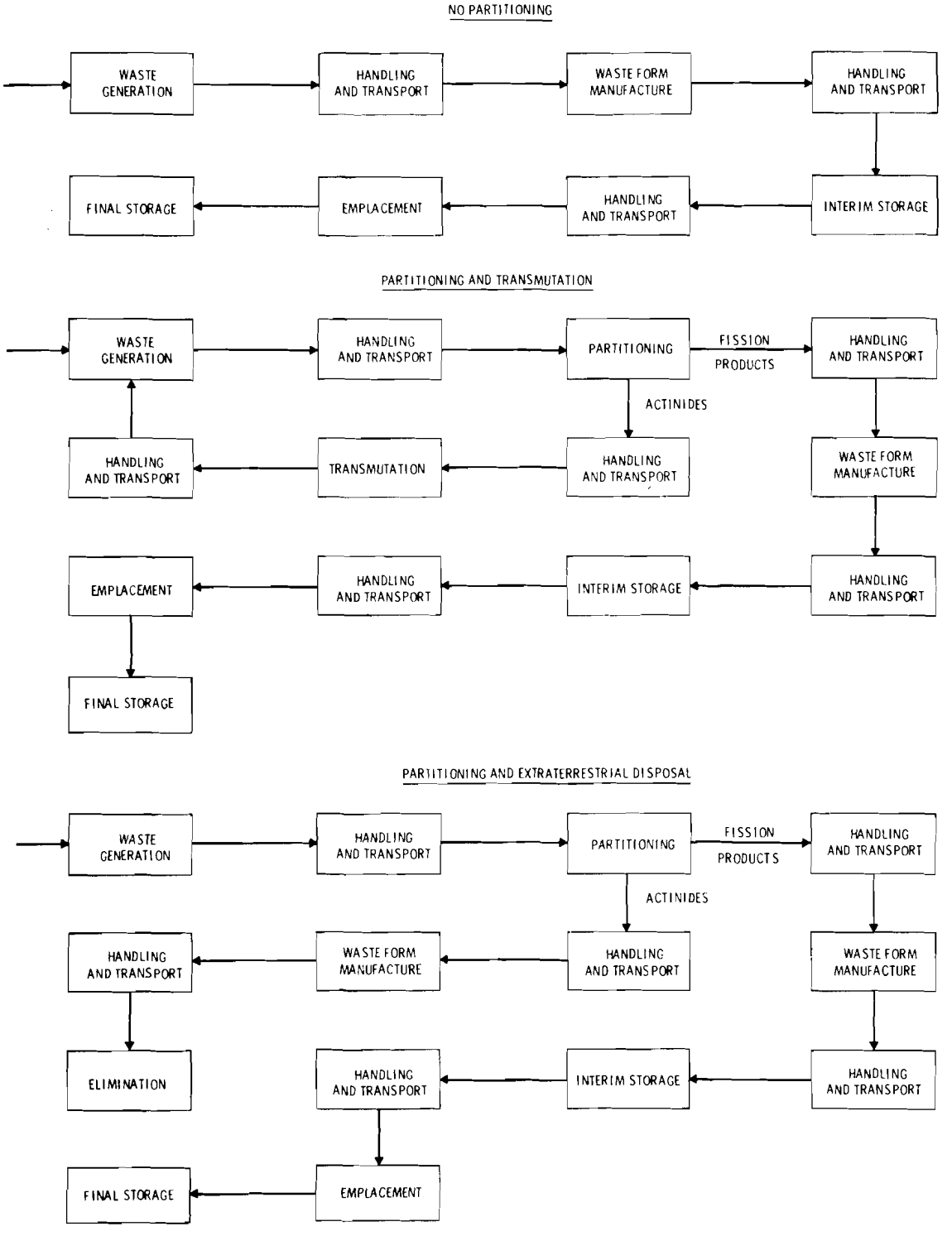

FIGURE 1. Diagrams of Several Waste Management Alternatives for High-Level Waste

alternative creates new wastes (transmuted actinides) which do not necessarily have a lower risk than the actinides themselves. Thus the risk from any given waste type can actually be increased rather than decreased by partitioning.

The consequences for the various release paths (C_{ikl} and C_{ijkl}) are obtained by modeling the transport of the radionuclides through the geosphere and biosphere and calculating their radiation dose to man. The consequences of release by any given path are a function of such things as the radioactive source, waste form, weather conditions, remoteness from man, release event severity, and man's living habits. Thus the consequences of waste release are a strong function of the characteristics of the waste management alternative and an accurate assessment of these consequences can be made only by considering specific alternatives.

The general evaluation method described here represents one extreme in the spectrum of possible methods, i.e., an assessment of the actual risk. At the other extreme are methods which assess the potential hazard from various waste types and compare that hazard to some arbitrary standard in terms of a hazard index.[2] For the hazard index analyses no consideration is given to the probabilities of release or the paths by which the nuclides reach man. For solid and liquid wastes the hazard index from a given waste fraction is characterized by the quantity of water required to dilute each nuclide to its Radiation Concentration Guide value (RCG) for unrestricted water use. For gaseous wastes the hazard index is characterized by the quantity of air required to dilute each individual nuclide to its RCG value for unrestricted use as breathing air. Using the hazard index of naturally occurring ores or high-grade pitchblende as a basis, relative hazards can be calculated for a given waste type at any time after reprocessing.

Evaluating actual risk is a better method for assessing the incentives for partitioning than evaluating potential hazard but requires significant time and manpower and much more data. Therefore, the application of a risk method first on a limited scale, as is done in this study, seems warranted. The results can then support tentative conclusions which can in turn guide more sophisticated evaluations of partitioning incentives and evaluations of conceptual partitioning alternatives should incentives exist.

3.0 SIMPLIFYING AND APPLYING THE METHOD

The general method can be simplified by considering only that waste management activity in Figure 1 which has the greatest risk. This study assumes that the release pathways of greatest risk for partitioned and unpartitioned waste originate from the waste in its final storage setting. Thus attention focuses on the "final storage" blocks in the waste management alternatives shown in Figure 1, and the risks from prestorage processing and transportation are assumed to be insignificant relative to the risk from the stored waste.

The final storage risks result from very low frequency events which can occur over geologic time periods while the prestorage risks result from higher (but still low) frequency events which can occur over only a very short time period (50 to 100 years). A typical final storage event would release a large amount of radioactivity from containment, but because the waste is isolated the dose received by man can be small. A typical prestorage event would release only a small amount of radioactivity from containment, but because the waste is less isolated the dose received by man can be large. These very different characteristics of the final storage and prestorage risks make comparison of their risks difficult. Thus, the validity of the assumption that final storage risks are much greater than prestorage risks may be incapable of unambiguous evaluation. Moreover, focusing on the waste management activity which has the longest time span of occurrence would seem to favor the existence of partitioning incentives, since partitioning followed by either transmutation or extraterrestrial disposal eliminates long-lived nuclides. Thus focusing on the final storage risks makes it unlikely that any partitioning incentive will be overlooked.

Final storage is assumed in geologic media rather than seabed or ice sheet. The superiority of geologic media for the safe final storage of nuclear wastes has not been shown. However, much information exists to suggest that geologic media (as a generic class) are favorable media for waste storage. This fact plus the relatively well developed emplacement

technology, the absence of international political constraints, and the relatively low projected implementation costs make geologic final storage the most likely candidate.

Figure 2 shows release pathways for geologic disposal. Of the three types of geologic formations shown, non-salt formations surrounded by particulate media are assumed for this study. The superiority of non-salt particulate media has not been shown, but the high sorption capacity of such media make them favorable candidates for waste storage. The highest risk path from the storage site through the geosphere to the biosphere is assumed to be the leach incident pathway. The relative risks of the various pathways from final geologic storage have not been evaluated, but the leach incident appears to be the highest probability release event. The previous two assumptions restrict consideration to a geologic formation and a release pathway for which a nuclide migration model has been previously developed.[3] A migration model for salt formations is still under development and cannot be applied at present to evaluating incentives for partitioning.[4,5]

High-level waste is assumed to be the type most likely to have partitioning incentives. All partitioning process alternatives are assumed to be feasible, and all nuclides partitioned from the waste are assumed to have been completely eliminated by extraterrestrial disposal or transmuted to other nuclides, with negligible risk in either case. This latter assumption clearly maximizes the likelihood that partitioning incentives will exist and thus tends to bias the analysis in favor of partitioning. The probability of release from the storage site is given the value "1" so that the analysis considers only release consequences.

Having made the foregoing assumptions, the method applied here estimates "maximum" incentives for partitioning high-level waste disposed in a non-salt particulate geologic medium and released by the leach incident-water transport pathway. The actual incentives would be somewhat less than

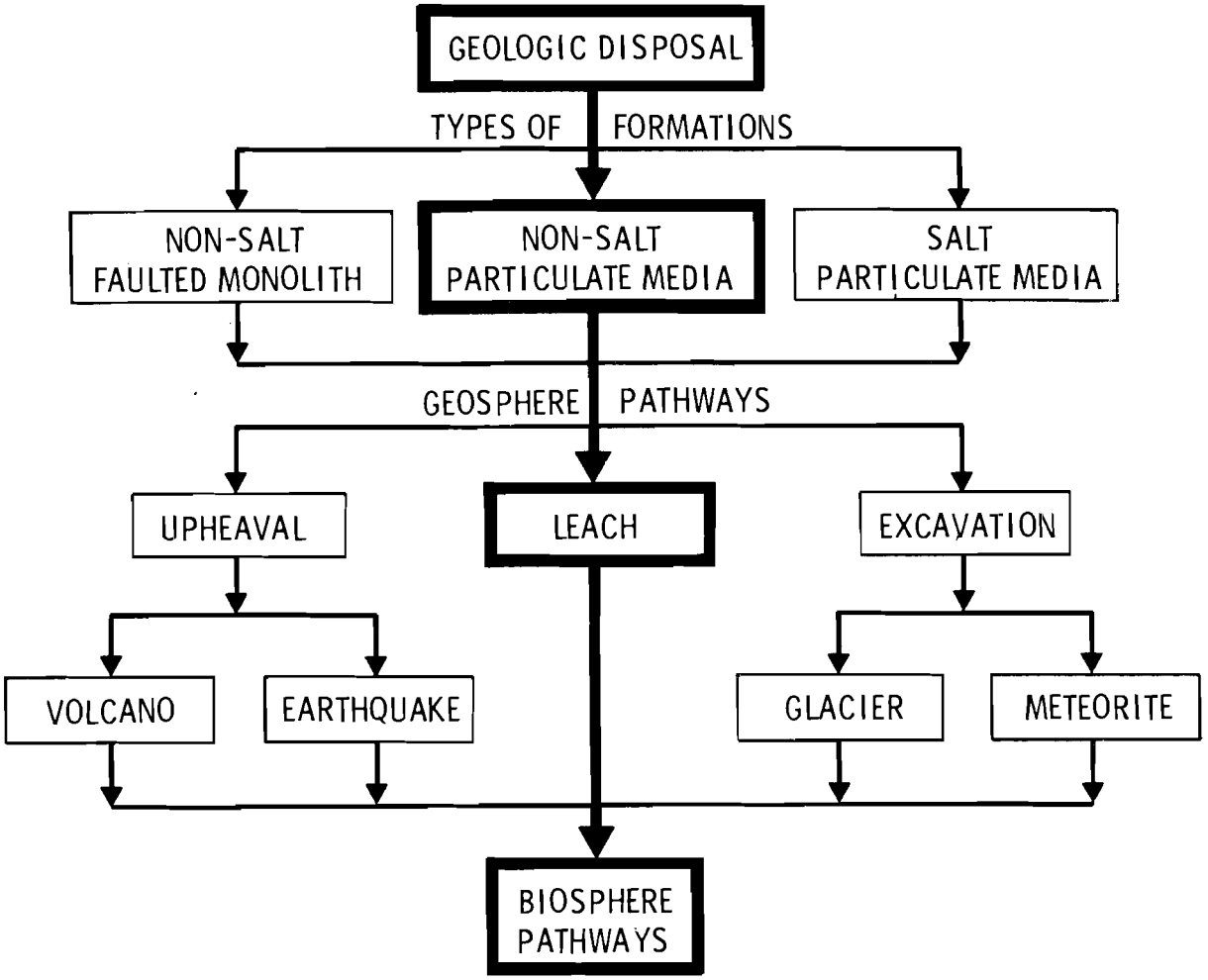

FIGURE 2. Release Pathways from Geologic Disposal

this analysis shows. The existence conditions for partitioning incentives (inequalities 1 and 2) reduce thus:

$$C > C_a \tag{5}$$

$$C > C_\ell^* \tag{6}$$

where: C = consequences from unpartitioned high-level waste released by the leach incident pathway

C_a = publicly acceptable release consequences

C_ℓ = consequences from the low-risk fraction of the partitioned high-level waste.

Evaluating the existence conditions for partitioning incentives requires knowledge both of the publicly acceptable release consequences and the consequences for the release of partitioned and unpartitioned waste from the actual disposal site. At present neither the publicly acceptable release consequences nor the characteristics of the waste management system are known. However, the absence of this crucial information need not deter application of a method for calculating release consequences. After the release consequences have been estimated for a range of values for the important unknowns, "reasonable" values for those unknowns can be assumed and a "best" estimate of partitioning incentives can be made. Furthermore, when needed information is known with more certainty, the calculations necessary for the partitioning decision will already have been made.

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* Using the present method, this inequality will always be satisfied in the strict sense since the high risk fraction has been eliminated without risk. What is really meant here is that the consequences of the unpartitioned waste are significantly greater than those of the partitioned waste. Thus this inequality is satisfied unless the element partitioned has a negligible contribution to the release consequences. We clearly do not want to remove an element which does not contribute significantly to the consequences.

3.1 GEOSPHERE TRANSPORT MODEL

The high-level waste* from the U.S. nuclear power economy through the Year 2000 (see Appendix A for a complete nuclide source inventory) is assumed to be in an underground final storage site in some geologic formation with a surface water body nearby. The geologic formation could be subsoil, porous rock, or faulted rock; but subsoil is assumed here because the retardation of nuclides by subsoil is apparently much greater than that by other types of geologic formations. (See Appendix A for listing of the sorption equilibrium constants.) Thus the presence of other geologic formations at the site can be accounted for by shortening the effective distance between the terminal storage site and man's environment.

Important phenomena of the transport process through soil include: 1) convection, 2) axial and transverse dispersion, 3) radioactive decay, 4) adsorption, 5) ion exchange, 6) colloid filtration, 7) reversible precipitation, and 8) irreversible mineralization. Because studies of groundwater flow in soils suggest that axial convection and dispersion are much greater than transverse convection and dispersion, a one-dimensional transport path (soil column) between the final storage site and the surface water body is assumed. Further, because present methods for measuring the retardation of nuclides for a given soil type combine the effects of the latter five phenomena into one empirical constant for each nuclide, these effects are considered together under the term "sorption."

At some arbitrary time after the waste is deposited, the contents of the site are released at a specified rate to an underground water stream which flows at a constant velocity directly through the soil column to the surface water body. All nuclides are assumed to be soluble, to be present at all times in the same chemical species, and to be in sorption equilibrium at all points in the soil column. The latter assumption should be descriptive of most nuclides since the groundwater moves so slowly (<1 ft/day) that the rates of sorption and desorption are very large relative to the rate of

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* Includes all tritium, carbon, and iodine from the spent fuel leaving the reactors as well as the activation products present in the cladding.

convective transport. The nuclides decay both while adsorbed on the soil and while in solution. A constant axial dispersion coefficient is assumed. Trace concentrations of the dissolved nuclides are assumed in order that the sorption equilibrium constants will be independent of concentration. For reasonable soil column cross-sectional areas this assumption may be invalid very near the soil column inlet (i.e., near the terminal storage site) but should have negligible effect on the predicted nuclide migration rates for soil column lengths of 0.1 mile and greater.

Radionuclides decay in first order chains. Therefore the description of the migration of any given chain member requires the simultaneous description of the migration of all precursors to that chain member. A model for chain migration which embodies all of the preceding assumptions has been developed and solved for both impulse and band releases at the terminal storage site for two and three-member chains.[3] Solutions were also obtained for the special cases when axial dispersion is negligible and two or more chain members have the same sorption equilibrium constant.

The model used for this study assumed band release with axial dispersion for initial inventory contributions only. Thus dispersion is applied only to those nuclides which were at the site at the time of the release incident. Band release assumes that all nuclides are released at the same constant rate from the site. This assumption implies that the waste form retains its original shape (although the waste form gets progressively smaller), and the waste form matrix remains intact as the nuclides are leached out. Thus the resistance to nuclide diffusion through the waste-depleted matrix near the waste form surface is so large that the leach rate of the waste form matrix itself controls the leach rate of the contained nuclides. Neglecting axial dispersion for nuclides created by decay of precursors after the precursors have left the disposal site greatly reduces the numerical difficulties during computer solution of analytical results (see Reference 3, p. 20). This assumption has a negligible effect on the nuclide discharge rates at the exit of the soil column because the differences in migration rates between chain members spread the discharge peaks much more than does axial dispersion. The differential equations, boundary

conditions, and analytical results for single nuclides, two-member chains, and three-member chains used in this study are given in Appendix B.

The nuclides of interest to geosphere migration studies for high-level waste include four large branched, but noninteracting actinide decay systems. The migration of these complex chains was modeled using combinations of single nuclide, two-member chain, and three-member chain calculations. The simplifications used for each of the actinide decay chains are discussed in Appendix C.

The BASIC language computer program GETOUT (GEosphere Transport [out] Of Underground [waste] Treasuries) was used to perform the migration calculations. A general description is provided in Appendix D and a sample output for a complete run is given in Appendix I. The details of this program will be reported in the near future.

Figure 3 shows the radionuclide discharge from the soil column for a typical case. Because the physicochemical nuclide-soil interactions vary for the nuclides, the single nuclide discharges are separated into sharp chromatographic peaks. The peaks for nuclides in the actinide decay chains are more complicated. Figure 4 shows the plutonium peak in detail. In addition to the contributions from the initial inventories of plutonium isotopes, there are contributions from the decay of plutonium precursors, contributions from plutonium descendents, contributions from the descendents of other nuclides, and a contribution from the initial inventory of another nuclide (^{93}Zr) which migrates with the same velocity as plutonium. The biosphere migration calculations and dose results are obtained by looking at the maxima of the peaks, one at a time, and assuming the biosphere receives the inventory of nuclides discharging at the time of the peak maximum. The dotted line in Figure 4 shows this.

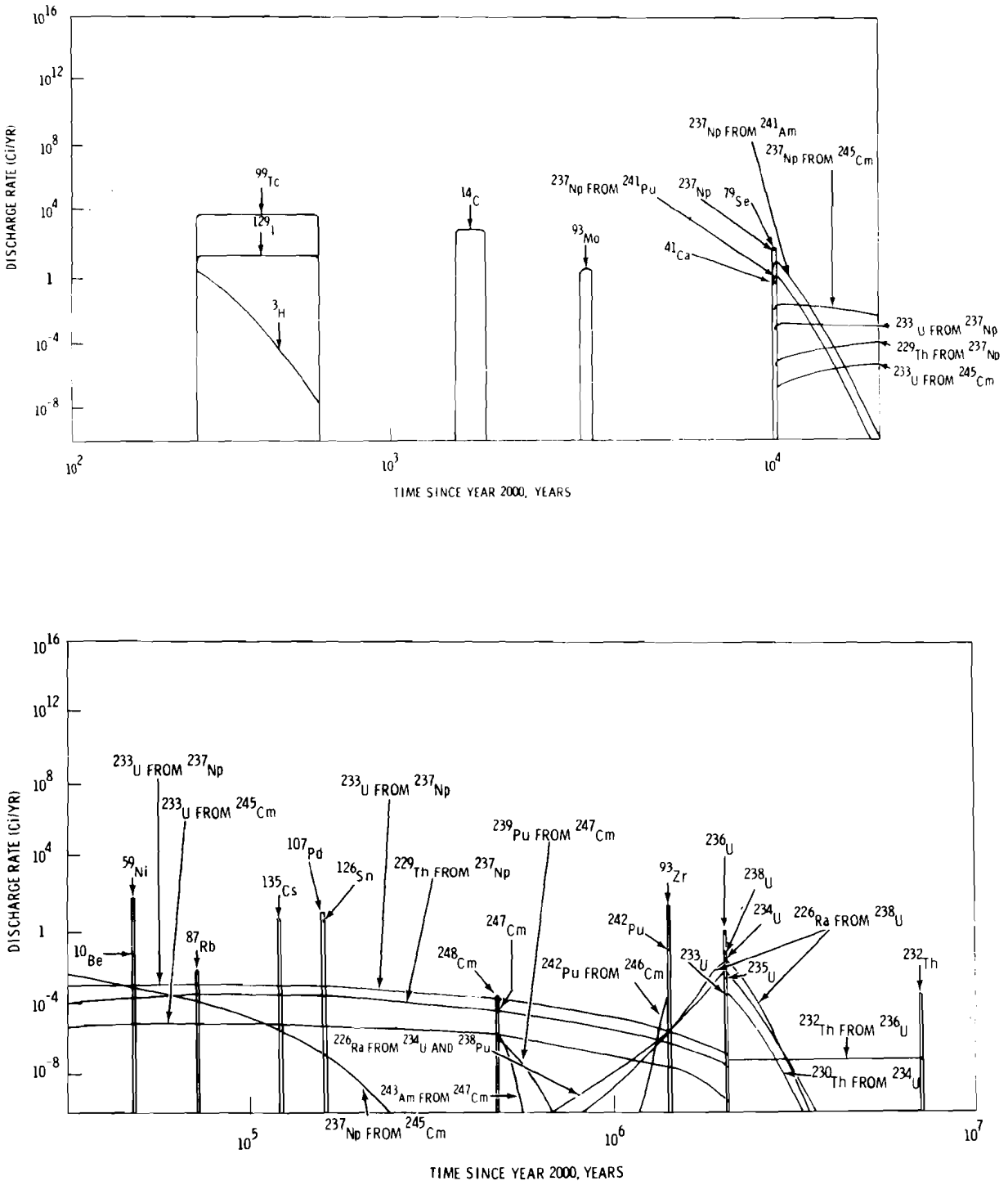

FIGURE 3. Simplified Chromatogram for Typical Nuclide Discharge from Soil Column

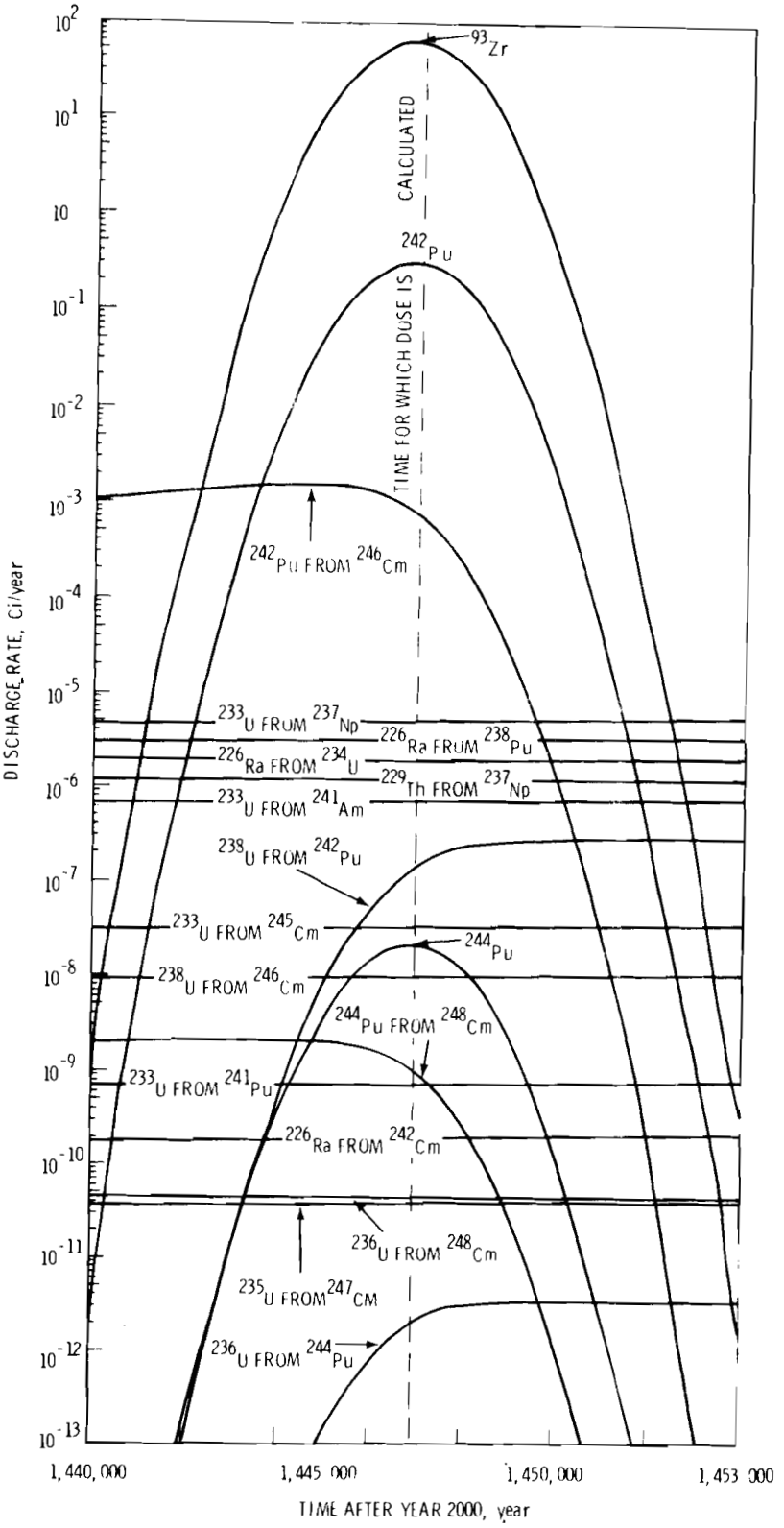

FIGURE 4. Plutonium Peak in Detail

3.2 BIOSPHERE TRANSPORT MODEL

The biosphere transport model follows the pathways of the nuclides from the surface water body to man and calculates the radiation dose. The nuclides are assumed to be diluted by the surface water body (a 10,000 cfs river in this case) and are assumed to reach man by the pathways shown in Figure 5.[6,7] As shown, these pathways include external exposure from shoreline activities and recreation on and in the river and internal exposures from drinking the water, consumption of aquatic food, and consumption of foods grown or raised using river water for irrigation.

The doses are calculated for a so-called "maximum" individual whose dietary and living habits as well as his proximity to the discharge from the soil column maximize those doses. Table 1 summarizes the assumed standard usages of this "maximum" individual. When calculating the dose to the "maximum" individual for each discharge peak, the nuclides are assumed to accumulate in the biosphere for 50 years at those peak discharge rates. The individual is then assumed to be exposed to the accumulated nuclides for the 50 years following that initial 50-year buildup period. Thus the biosphere model likens the surface water body and local biosphere to a large tank with a 100-year holdup time (50-year accumulation and 50-year exposure). At the end of this 100-year period, the contents of this tank are assumed to be dispersed into the regional, national and international biosphere in a manner such that dose consequences are negligible. The long-term accumulation and dispersion of nuclides in the biosphere has not been investigated. Thus, although the assumption made here seems conservative, additional research is needed in this area. The biosphere transport model in the present context implicitly assumes that man's dietary and living habits remain constant throughout geologic time. Appendices E, F, G, and H contain details of the biosphere transport model, dose factors, transfer factors, and a description of the BASIC language computing scheme used for the dose calculations, respectively. The details of the codes used in the computing scheme are reported elsewhere.[7,8]

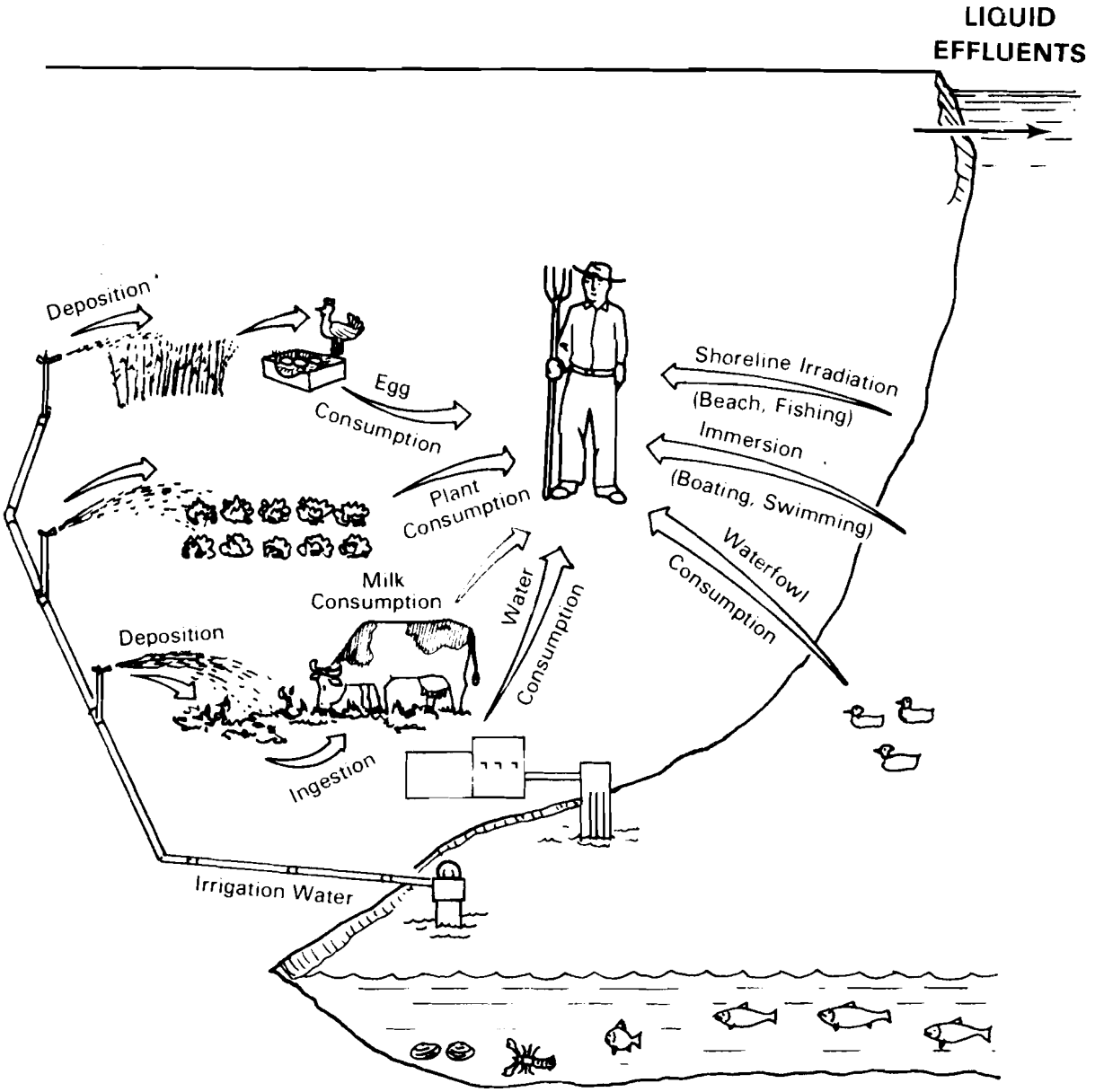

FIGURE 5. Schematic Diagram of Biosphere Transport Pathways

TABLE 1. Standard Usages of the Maximum Individual

Pathway	Annual Usage	Remarks
River Fish, kg	18	
River Invertebrates, kg	18	Divided equally between molluscs and crustaceans
Drinking Water from River, liter	730	
Shoreline Sediments, hr	500	
Water Recreation, hr	200	Divided equally between swimming and boating
Irrigated Produce		
Fresh Leafy Vegetables, kg	30	On basis of 72 kg/yr over 5-month growing season
Other Fresh Aboveground Vegetables, kg	30	On basis of 72 kg/yr over 5-month growing season
Potatoes, kg	110	
Root Vegetables, kg	72	
Berries, kg	30	
Melons, kg	40	
Orchard fruit, kg	265	
Wheat, kg	80	
Other Grain, kg	8.3	On basis of 20 kg/yr over 5-month growing season.
Eggs, kg	30	
Milk & Products, liter	274	On basis of 1 ℓ/d over 9-month grazing season
Meat		
Beef, kg	40	
Pork, kg	40	
Poultry, kg	18	

4.0 RESULTS AND DISCUSSION

4.1 GEOSPHERE-BIOSPHERE TRANSPORT CALCULATIONS

Calculations using the integrated geosphere-biosphere transport model were performed for a base case and parametric variations from that base case. The base case assumed: 1) high-level waste from the U.S. nuclear power economy through the Year 2000 (including all tritium, carbon, and iodine from the spent fuel and the activation products from the cladding), 2) underground disposal in western U.S. desert soil with no salt present, 3) the release begins in the year 2100, 4) a 10 mile path length, 5) a 0.3 wt%/yr leach rate, 6) a water velocity of 1 ft/day, and 7) an axial dispersion coefficient of 0.008 cm^2/min. Assumptions 3, 5, and 6 are all conservative by orders of magnitude from values expected (i.e., the release would not likely occur for at least 1000 to 10,000 years after the Year 2000, a leach rate of 0.001%/yr would be expected for a monolithic borosilicate glass waste form, and a 0.1 ft/day water velocity is typical of western U.S. desert aquifers). The sorption equilibrium constants assumed here (implied by Assumption 2) are best estimates from existing laboratory data for western U.S. desert soils (see Appendix A). These data are limited, particularly for the actinides, and research is needed in this area. Assumption 4 may not be conservative but is near the upper limit of path lengths that would reasonably be expected.*

The values of the parameters used for the geosphere transport calculations are summarized in Table 2. The three parameters varied are measures of variables over which man has some degree of selection or control when designing a management system for nuclear wastes, and it is appropriate to consider incentives for partitioning in that context. The time of initial release from the disposal site after the Year 2000 is a measure of canister integrity and site stability from water penetration; the leach rate is a measure of waste form effectiveness; and the path length is a measure of geosphere isolation.

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* Note that geospheric path length is not necessarily equal to geographic surface distance. The length of the subsoil column separating the underground site from the surface water body can be smaller than the surface distance because of subterranean open channels or larger because of an indirect path of migration.

TABLE 2. Parameter Values of Geosphere Transport Calculations

Time of Initial Release after Year 2000, yr	Leach Rate, %/yr	Path Length, miles
100	0.3	10
100	0.3	3
100	0.3	1
100	0.3	0.3
100	0.3	0.1
100	0.3	0
100,000	0.3	0
100	0.03	10
100	0.003	10
100	0.0003	10
100	0.03	0.1
100	0.003	0.1
100	0.0003	0.1
100	0.0003	1
100	0.00003	0.3
100	0.00003	1
100	0.00003	3
0	0.3	10
1,000	0.3	10
10,000	0.3	10
100,000	0.3	10
1,000,000	0.3	10

4.2 DOSE RESULTS

Tables 3 through 18 detail dose results for the parametric variations. They present the 50-year accumulated skin, body, and incremental organ doses* for the various peaks shown in Figure 3. The time that each peak occurs (starting from Year 2000) is shown along with the critical organ and the controlling nuclides for that organ. Background dose (120 mrem/yr x 50 yr = 6000 mrem) and the National Council on Radiation Protection and Measurement (NCRP) dose limit for organs (1500 mrem/yr x 50 yr = 75,000 mrem) are listed for comparison. As shown, the critical organ is usually bone, but occasionally the GI-LLI, thyroid, or liver dose is greater.

For the base case (Table 3) the doses are above background only for ^{99}Tc and ^{129}I at 250 years, ^{14}C at 1550 years, and ^{237}Np at 14,600 years. Nuclides which are slightly below background levels are ^{126}Sn at 161,000 years and ^{226}Ra at 2,070,000 years. The ^{14}C dose is the most significant at about 50 times background. The combined effects of sorption, decay, and dispersion reduce the doses from actinides other than ^{237}Np and from fission products like ^{90}Sr to below background levels.

4.3 EFFECTS OF IMPORTANT PARAMETERS

Figure 6, a graph of the results from Tables 3, 5, 7, and 8 shows the effect of path length on the incremental bone dose versus time curve. Results are shown for 0, 0.1, 1, and 10 mile path lengths. To make the graph more readable, results for 0.3 and 3 miles (Tables 4 and 6) have not been plotted. The background and NCRP dose limit lines are superimposed for comparison. For a zero path length (a disposal site located in the surface water body itself), all nuclides discharge simultaneously with a bone dose of 600,000 times background, controlled by ^{90}Sr. For a path length of 0.1 miles, incremental doses are at or above background over most of the 100,000-year period required for complete discharge of all nuclides to the biosphere. The largest dose results from ^{90}Sr at 250 years

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* The doses calculated in this study and discussed in this report are incremental doses; i.e., they are in addition to natural background dose. Thus actual doses are obtained from the results in Tables 3 through 18 by adding the background dose to the table entries.

TABLE 3. Summary of 50 Year Accumulated Dose to Maximum Individual*
Time of Initial Release After Yr-2000: 100 Yr
Leach Rate: 0.3%/Yr Path Length: 10 Mile

Years Since Burial	Peak Nuclides	Dose, mrem								Remarks
		Skin	Body	GI-LLI	Thyroid	Bone	Liver	Lung	Kidney	
2.50E2	^{3}H, ^{99}Tc, ^{129}I	1.3E1	2.3E2	2.6E4	1.4E4	5.4E2	8.0E2	7.5E0	1.7E1	GI-LLI: 100% ^{99}Tc
1.55E3	^{14}C	8.0E-3	6.3E4	3.8E4	6.2E4	3.1E5	6.2E4	6.2E4	6.2E4	Bone: 100% ^{14}C
3.73E3	^{93}Mo	4.4E-7	3.5E-1	2.1E0	2.5E-7	2.5E-7	1.3E1	2.5E-7	2.5E-7	Liver: 100% ^{93}Mo
1.46E4	^{41}Ca, ^{79}Se, ^{237}Np, ^{90}Sr	3.1E2	1.3E3	2.0E3	2.7E2	1.2E4	3.5E3	2.7E2	2.7E2	Bone: 96% $^{237}Np+D$
4.85E4	^{10}Be, ^{60}Co, ^{59}Ni	1.0E-2	4.5E1	2.0E1	8.6E-3	2.7E2	9.5E1	8.6E-3	2.2E-2	Bone: 100% ^{59}Ni
7.26E4	^{87}Rb, ^{226}Ra	6.2E-3	9.1E-2	7.1E-2	5.1E-3	5.7E-1	1.2E-1	5.1E-3	1.7E-2	Bone: 58% ^{229}Th, 31% $^{225}Ra+D$
1.45E5	^{135}Cs	6.7E-3	3.5E2	2.0E1	3.8E-3	9.4E2	8.4E2	6.5E2	1.2E-2	Bone, Liver, Lung: 100% ^{135}Cs
1.61E5	^{107}Pd, ^{126}Sn	7.5E2	8.2E2	2.4E3	7.2E2	4.6E3	8.6E2	7.0E2	7.0E2	Bone: 100% $^{126}Sn+D$
3.62E5	^{166M}Ho	1.8E-3	2.1E-2	2.7E-2	1.5E-3	2.3E-1	5.5E-3	1.5E-3	4.8E-3	Bone: 61% ^{229}Th, 33% $^{225}Ra+D$
4.82E5	^{247}Cm	1.3E-3	1.3E-2	1.7E-2	1.1E-3	1.4E-1	7.5E-3	1.1E-3	3.1E-3	Bone: 56% ^{229}Th, 31% $^{225}Ra+D$
1.45E6	^{93}Zr, ^{113M}Cd, ^{243}Am, ^{244}Pu	3.5E-3	7.5E-1	6.6E2	4.4E-4	7.5E0	1.8E0	4.4E-4	2.8E-1	GI-LLI: 100% ^{93M}Nb; Bone: 56% ^{93M}Nb, 34% ^{242}Pu
2.07E6	^{238}U	8.9E-1	1.1E3	2.9E1	7.5E-1	2.4E3	2.9E2	7.5E-1	1.2E1	Bone: 86% $^{226}Ra+D$, 7% $^{210}Pb+D$
2.41E6	^{231}Pa	2.4E-2	3.4E1	7.3E-1	2.1E-2	6.8E1	8.7E0	2.1E-2	2.1E-2	Bone: 88% $^{226}Ra+D$, 7% $^{210}PB+D$
7.23E6	^{232}Th	2.5E-4	6.3E-3	3.7E-2	2.3E-4	9.6E-2	3.1E-3	2.3E-4	2.3E-4	Bone: 44 $^{232}Th+D$, 35% $^{224}Ra+D$ 21 $^{238}Th+D$

*LST008 Dose Input File

Background: 6000 mrem

NCRP Radiation Limit for Organs: 75,000 mrem

TABLE 4. Summary of 50 Year Accumulated Dose to Maximum Individual*
Time of Initial Release After Yr-2000: 100 Yr
Leach Rate: 0.3%/Yr Path Length: 3 Mile

Years Since Burial	Peak Nuclides	Dose, mrem								Remarks
		Skin	Body	GI-LLI	Thyroid	Bone	Liver	Lung	Kidney	
1.4E2	^{3}H, ^{99}Tc, ^{129}I	1.3E1	2.3E2	2.6E4	1.4E4	5.4E2	8.0E2	9.6E0	1.9E1	GI-LLI: 100% ^{99}Tc
5.4E2	^{14}C	9.0E-3	7.1E4	4.3E4	7.0E4	3.5E5	7.0E4	7.0E4	7.0E4	Bone: 100% ^{14}C
1.2E3	^{93}Mo	8.0E-7	6.4E-1	3.8E0	4.5E-7	4.5E-7	2.4E1	4.5E-7	4.5E-7	Liver: 100% ^{99}Mo
4.5E3	^{41}Ca, ^{79}Se, ^{90}Sr, ^{237}Np	3.1E2	1.4E3	2.1E3	2.7E2	1.2E4	3.8E3	2.7E2	2.7E2	Bone: 96% $^{237}Np+D$
1.5E4	^{10}Be, ^{60}Co, ^{159}N	3.0E-2	6.1E1	2.7E1	2.6E-2	3.6E2	1.3E2	2.6E-2	4.0E-2	Bone: ~100% ^{59}Ni
2.2E4	^{87}Rb, ^{226}Ra	1.9E-2	1.7E-1	1.5E-1	1.6E-2	1.2E0	1.8E-1	1.6E-2	3.0E-2	Bone: 38% $^{237}Np+D$, 32% ^{229}Th, 17% $^{225}Ra+D$
4.4E4	^{135}Cs	1.9E-2	4.0E2	2.3E1	1.4E-2	1.1E3	9.7E2	7.3E2	2.4E-2	Bone: 99% ^{135}Cs
4.8E4	^{107}Pd, ^{126}Sn	2.0E3	2.0E3	5.3E3	1.8E3	1.2E4	2.0E3	1.8E3	1.8E3	Bone: ~100% $^{126}Sn+D$
1.1E5	^{166M}Ho	4.5E-1	5.6E1	9.0E-1	3.9E-2	1.1E2	8.8E0	3.9E-2	4.5E-2	Bone: 92% $^{226}Ra+D$, 4% $^{210}PB+D$
1.4E5	^{247}Cm	7.9E-1	1.0E2	1.6E0	6.8E-2	2.1E2	1.6E1	6.8E-2	1.2E-1	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$
4.3E5	^{93}Zr, ^{113M}Cd, ^{243}Am, ^{244}Pu	3.3E0	4.6E3	2.5E3	2.8E0	9.2E3	7.3E2	2.8E0	5.9E0	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$
6.2E5	^{238}U	3.9E1	4.9E4	7.9E2	3.2E1	9.9E4	7.8E3	3.2E1	2.4E2	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$
7.2E5	^{231}Pa	2.3E1	3.3E4	4.7E2	2.0E1	6.5E4	5.0E3	2.0E1	2.0E1	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$
2.2E6	^{232}Th	4.6E-4	1.1E-2	6.6E-2	4.1E-4	1.8E-1	5.6E-3	4.1E-4	4.1E-4	Bone: 46% $^{232}Th+D$, 34% $^{224}Ra+D$, 20% $^{228}Th+D$

*LST020 Dose Input File

Background: 6000 mrem

NCRP Radiation Limit for Organs: 75,000 mrem

TABLE 5. Summary of 50 Year Accumulated Dose to Maximum Individual*
Time of Initial Release After Yr-2000: 100 Yr
Leach Rate: 0.3%/Yr Path Length: 1 Mile

Years Since Burial	Peak Nuclides	Dose, mrem								Remarks
		Skin	Body	GI-LLI	Thyroid	Bone	Liver	Lung	Kidney	
1.2E2	^{3}H, ^{99}Tc, ^{129}I	1.3E1	2.4E2	2.6E4	1.4E4	5.4E2	8.1E2	1.9E1	2.8E1	GI-LLI: 100% ^{99}Tc; Thyroid: 100% ^{129}I
2.5E2	^{14}C	1.3E1	7.4E4	7.0E4	8.7E4	3.7E5	7.4E4	7.4E4	7.4E4	Bone: 100% ^{14}C
4.7E2	^{93}Mo	9.5E-3	7.1E4	4.3E4	7.1E4	3.6E5	7.1E4	7.1E4	7.1E4	Bone: 100% ^{14}C
1.6E3	^{41}Ca, ^{79}Se, ^{90}Sr, ^{237}Np	2.9E2	1.3E3	2.0E3	2.6E2	1.1E4	3.8E3	2.6E2	2.6E2	Bone: 96% $^{237}Np+D$
5.0E3	^{10}Be, ^{59}Ni, ^{60}Co	2.0E-1	6.6E1	3.0E1	1.7E-1	4.0E2	1.4E2	1.7E-1	1.9E-1	Bone: 98% ^{59}Ni
7.4E3	^{226}Ra	6.1E-2	9.1E0	4.5E-1	5.3E-2	2.1E1	1.7E0	5.3E-2	6.7E-2	Bone: 82% $^{226}Ra+D$, 9% $^{237}Np+D$
7.5E3	^{87}Rb	7.1E-2	3.6E1	7.9E-1	6.2E-2	2.3E1	5.8E0	6.2E-2	7.6E-2	Bone: 90% $^{226}Ra+D$, 5% $^{210}Pb+D$
1.5E4	^{135}Cs	2.1E0	3.5E3	6.7E1	2.0E0	7.3E3	1.5E3	7.3E2	2.0E0	Bone: 79% $^{226}Ra+D$, 15% ^{135}Cs
1.6E4	^{107}Pd, ^{126}Sn	2.5E3	6.4E3	6.6E3	2.3E3	2.2E4	3.1E3	2.2E3	2.2E3	Bone: 65% $^{126}Sn+D$, 32% $^{226}Ra+D$
3.6E4	^{166M}Ho	8.3E0	1.2E4	1.7E2	7.5E0	2.4E4	1.9E3	7.5E0	7.5E0	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$
4.8E4	^{247}Cm	2.0E1	1.8E4	3.7E2	1.6E1	3.6E4	3.1E3	1.6E1	1.9E2	Bone: 90% $^{226}Ra+D$, 4% $^{210}Pb+D$
1.4E5	^{93}Zr, ^{113M}Cd, ^{243}Am, ^{244}Pu	5.6E1	7.7E4	6.2E3	4.8E1	1.6E5	1.2E4	4.8E1	1.2E2	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$
2.1E5	^{238}U	1.3E2	1.6E5	2.5E3	1.1E2	3.3E5	2.6E4	1.1E2	5.9E2	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$
2.4E5	^{231}Pa	8.2E1	1.1E5	1.6E3	7.1E1	2.2E5	1.8E4	7.1E1	7.1E1	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$
7.2E5	^{232}Th	2.7E-3	2.6E0	1.5E-1	2.4E-3	5.5E0	4.1E-1	2.4E-3	2.4E-3	Bone: 88% $^{226}Ra+D$, 4% $^{210}Pb+D$

*LST012 Dose Input File

Background: 6000 mrem

NCRP Radiation Limit for Organs: 75,000 mrem

TABLE 6. Summary of 50 Year Accumulated Dose to Maximum Individual*
Time of Initial Release After Yr-2000: 100 Yr
Leach Rate: 0.3%/Yr Path Length: 0.3 Mile

Years Since Burial	Peak Nuclides	Dose, mrem								Remarks
		Skin	Body	GI-LLI	Thyroid	Bone	Liver	Lung	Kidney	
1.0E2	^{3}H, ^{99}Tc, ^{129}I	1.3E1	2.5E2	2.6E4	1.4E4	5.4E2	8.2E2	2.7E1	3.7E1	GI-LLI: 100% ^{99}Tc
1.4E2	^{14}C	1.3E1	7.4E4	7.0E4	8.8E4	3.7E5	7.5E4	7.5E4	7.5E4	Bone: 100% ^{14}C
2.1E2	^{93}Mo	1.3E1	7.4E4	7.0E4	8.7E4	3.7E5	7.4E4	7.4E4	7.4E4	Bone: 100% ^{14}C
5.4E2	^{90}Sr, ^{41}Ca, ^{79}Se, ^{237}Np	3.1E2	2.5E4	4.5E3	2.7E2	1.1E5	3.9E3	2.7E2	2.7E2	Bone: 89% ^{90}Sr, 11% $^{237}Np+D$
1.6E3	^{10}Be, ^{59}Ni	6.5E0	8.5E1	6.5E1	6.0E1	6.6E2	1.7E2	6.0E0	6.0E0	Bone: 61% ^{59}Ni, 38% $^{237}Np+D$
1.7E3	^{60}Co	4.6E0	7.9E1	5.4E1	4.0E0	5.8E2	1.6E2	4.0E0	4.0E0	Bone: 70% ^{59}Ni, 30% $^{237}Np+D$
2.3E3	^{226}Ra	2.2E0	4.2E1	1.2E1	1.9E0	1.3E2	1.5E1	1.9E0	1.9E0	Bone: 64% $^{237}Np+D$, 31% $^{226}Ra+D$
2.4E3	^{87}Rb	1.9E0	2.9E2	1.3E1	1.7E0	6.5E2	5.4E1	1.7E0	1.7E0	Bone: 84% $^{226}Ra+D$, 9% $^{237}Np+D$
4.5E3	^{135}Cs	3.4E0	5.0E3	9.0E1	2.9E0	1.0E4	1.7E3	7.3E2	2.8E0	Bone: 83% $^{226}Ra+D$, 11% ^{135}Cs
5.0E3	^{107}Pd, ^{126}Sn	2.7E3	8.3E3	7.1E3	2.4E3	2.6E4	3.6E3	2.4E3	2.4E3	Bone: 58% $^{126}Sn+D$, 38% $^{226}Ra+D$
1.1E4	^{166M}Ho	1.3E1	1.8E4	2.5E2	1.1E1	3.5E4	2.8E3	1.1E1	1.2E1	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$
1.5E4	^{247}Cm	1.5E2	2.6E4	2.6E3	1.2E2	6.5E4	1.1E4	1.2E2	3.3E3	Bone: 71% $^{226}Ra+D$, 12% $^{245}Cm+D$, 9% ^{241}Am
4.4E4	^{93}Zr, ^{113M}Cd, ^{243}Am, ^{244}Pu	2.1E2	2.1E4	1.5E4	1.6E2	6.7E4	1.0E4	1.6E2	2.1E3	Bone: 56% $^{226}Ra+D$, 26% ^{239}Pu, 12% $^{243}Am+D$
6.2E4	^{238}U	3.9E2	3.3E5	1.0E4	3.3E2	7.1E5	5.3E4	3.1E2	1.9E3	Bone: 86% $^{226}Ra+D$, 5 ^{229}Th
7.3E4	^{231}Pa	4.2E2	5.6E5	7.7E3	3.5E2	1.1E6	8.7E4	3.5E2	3.5E2	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$
2.2E5	^{232}Th	8.7E-2	8.7E1	1.4E0	7.5E-2	1.7E2	1.4E1	7.5E-2	7.5E-2	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$

*LST018 Dose Input File

Background: 6000 mrem

NCRP Radiation Limit for Organs: 75,000 mrem

TABLE 7. Summary of 50 Year Accumulated Dose to Maximum Individual*
Time of Initial Release After Yr-2000: 100 Yr
Leach Rate: 0.3%/Yr Path Length: 0.1 Mile

Years Since Burial	Peak Nuclides	Dose, mrem								Remarks
		Skin	Body	GI-LLI	Thyroid	Bone	Liver	Lung	Kidney	
1.0E2	^{3}H, ^{99}Tc, ^{129}I	1.3E1	2.5E2	2.6E4	1.4E4	5.4E2	8.2E2	2.7E1	3.7E1	GI-LLI: 100% ^{99}Tc
1.2E2	^{14}C	1.3E1	7.4E4	7.0E4	8.8E4	3.7E5	7.5E4	1.8E1	2.8E1	Bone: 100% ^{14}C
1.4E2	^{93}Mo	1.3E1	7.4E4	7.0E4	8.8E4	3.7E5	7.5E4	1.0E1	2.0E1	Bone: 100% ^{14}C
2.5E2	^{41}Ca, ^{79}Se, ^{90}Sr, ^{237}Np	3.2E2	2.6E7	2.6E6	8.8E4	1.0E8	7.8E4	2.6E2	2.7E2	Bone: 100% ^{90}Sr
5.8E2	^{60}Co	1.8E1	1.5E2	1.4E2	1.5E1	2.6E3	3.0E2	1.5E1	1.5E1	Bone: 64% ^{63}Ni, 25% $^{237}Np+D$
6.0E2	^{10}Be, ^{59}Ni	1.7E1	1.8E2	1.5E2	1.5E1	3.1E3	3.6E2	1.5E1	1.5E1	Bone: 66% ^{63}Ni, 21% $^{237}Np+D$, 13% ^{59}Ni
8.4E2	^{226}Ra	1.2E1	1.9E2	9.8E1	1.0E1	1.3E3	2.3E2	1.0E1	1.0E1	Bone: 33% $^{237}Np+D$, 31% ^{59}Ni, 29% ^{63}Ni
9.9E2	^{87}Rb	9.8E0	6.1E2	5.6E1	8.3E0	1.6E3	1.3E2	8.3E0	8.4E0	Bone: 68% $^{226}Ra+D$, 22% $^{237}Np+D$
1.6E3	^{135}Cs	6.9E0	5.2E3	1.2E2	6.0E0	1.1E4	1.7E3	7.3E2	6.0E0	Bone: 83% $^{226}Ra+D$, 10% ^{135}Cs
1.8E3	^{126}Sn, ^{107}Pd	2.7E3	9.1E3	7.3E3	2.5E3	2.9E4	4.7E3	3.1E3	2.4E3	Bone: 56% $^{126}Sn+D$, 37% $^{226}Ra+D$
3.8E3	^{166M}Ho	1.5E1	2.0E4	2.9E2	1.3E1	4.1E4	3.2E3	1.3E1	1.3E1	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$
5.1E3	^{247}Cm	3.0E2	3.1E4	5.5E3	2.4E2	9.4E4	2.0E4	2.4E2	7.2E3	Bone: 59% $^{226}Ra+D$, 19% $^{245}Cm+D$, 15% ^{241}Am
1.5E4	^{93}Zr, ^{243}Am, ^{244}Pu, ^{113M}Cd	3.8E3	1.2E5	6.9E4	3.2E3	4.3E5	1.1E5	3.2E3	9.5E3	Bone: 41% $^{243}Am+D$, 43% $^{226}Ra+D$, 9% ^{239}Pu
2.1E4	^{238}U	1.4E2	8.2E4	1.8E3	1.2E2	1.7E5	1.3E4	1.2E2	2.3E3	Bone: 87% $^{226}Ra+D$, 5% ^{234}U
2.4E4	^{231}Pa	1.1E2	7.5E4	2.5E3	9.1E1	1.5E5	1.2E4	9.1E1	9.1E1	Bone: 88% $^{226}Ra+D$, 4% $^{210}Pb+D$
7.3E4	^{232}Th	8.5E-1	7.6E2	1.1E1	7.4E-1	1.5E3	1.2E2	7.4E-1	7.4E-1	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$

*LST013 Dose Input File

Background: 6000 mrem

NCRP Radiation Limit for Organs: 75,000 mrem

TABLE 8. Summary of 50 Year Accumulated Dose to Maximum Individual*
Time of Initial Release After Yr-2000: 100 Yr
Leach Rate: 0.3%/Yr Path Length: 0 Mile

Years Since Burial	Peak Nuclides	Dose, mrem								Remarks
		Skin	Body	GI-LLI	Thyroid	Bone	Liver	Lung	Kidney	
1.0E2	All	1.2E7	9.7E8	1.3E8	9.7E6	3.6E9	1.6E8	9.6E6	6.7E7	Bone: 96% ^{90}Sr

*LST017 Dose Input File

Background: 6000 mrem

NCRP Radiation Limit for Organs: 75,000 mrem

TABLE 9. Summary of 50 Year Accumulated Dose to Maximum Individual*
Time of Initial Release After Yr-2000: 100 Yr
Leach Rate: 0.03%/Yr Path Length: 10 Mile

Years Since Burial	Peak Nuclides	Dose, mrem								Remarks
		Skin	Body	GI-LLI	Thyroid	Bone	Liver	Lung	Kidney	
2.5E2	^{3}H, ^{99}Tc, ^{129}I	1.3E0	2.3E1	2.6E3	1.4E3	5.4E1	8.0E0	7.5E-1	1.7E0	GI-LLI: 100% ^{99}Tc
1.6E3	^{14}C	8.0E-4	6.2E3	3.8E3	6.2E3	3.1E4	6.2E3	---	---	Bone: 100% ^{14}C
3.7E3	^{93}Mo	6.5E-4	4.8E3	2.9E3	4.8E3	2.4E4	4.8E3	2.5E-8	2.5E-8	Bone: 100% ^{14}C
1.5E4	^{41}Ca, ^{79}Se, ^{237}Np, ^{90}Sr	3.0E1	1.3E2	2.0E2	2.6E1	1.1E3	3.4E2	2.6E1	2.6E1	Bone: 96% $^{237}Np+D$
4.9E4	^{10}Be, ^{59}Ni, ^{60}Co	8.6E-3	4.6E0	2.0E0	7.2E-3	2.7E1	9.4E0	7.2E-3	1.9E-2	Bone: 98% ^{59}Ni
7.3E4	^{226}Ra, ^{87}Rb	5.3E-3	4.2E-2	4.6E-2	4.4E-3	4.0E-1	2.3E-2	4.4E-3	1.5E-2	Bone: 55% ^{229}Th, 30% $^{225}Ra+D$
1.4E5	^{135}Cs	4.2E-3	3.8E1	2.3E0	3.3E-3	1.0E2	9.7E1	7.2E1	1.1E-2	Bone, Liver, Lung: 100% ^{135}Cs
1.6E5	^{107}Pd, ^{126}Sn	9.0E1	9.3E1	2.8E2	8.3E1	5.3E2	9.8E1	8.0E1	8.0E1	Bone: 100% $^{126}Sn+D$
3.6E5	^{166M}Ho	1.5E-3	1.6E-2	2.0E-2	1.3E-3	1.8E-1	4.4E-3	1.3E-3	4.2E-3	Bone: 60% ^{229}Th, 33% $^{225}Ra+D$
4.8E5	^{247}Cm	9.9E-4	9.8E-3	1.2E-2	7.9E-4	1.1E-1	3.7E-3	7.9E-4	2.5E-3	Bone: 59% ^{229}Th, 32% $^{225}Ra+D$
1.4E6	^{93}Zr, ^{113M}Cd, ^{243}Am, ^{244}Pu	2.5E-3	5.5E-1	4.3E2	3.4E-4	5.1E0	1.2E0	3.4E-4	1.9E-1	GI-LLI: 100% ^{93M}Nb; Bone 55% ^{93M}Nb, 36% ^{242}Pu
2.1E6	^{238}U	9.0E-1	1.2E3	2.4E1	7.3E-1	2.4E3	2.2E2	7.3E-1	7.9E0	Bone: 90% $^{226}Ra+D$, 5% $^{210}Pb+D$
2.4E6	^{231}Pa	2.4E-2	3.3E1	5.7E-1	2.1E-2	6.5E1	6.2E0	2.1E-2	2.4E-2	Bone: 91% $^{226}Ra+D$, 5% $^{210}Pb+D$
7.2E6	^{232}Th	2.5E-4	6.2E-3	3.7E-2	2.2E-4	9.5E-2	3.1E-3	2.2E-4	2.2E-4	Bone: 44% $^{232}Th+D$, 35% $^{224}Ra+D$, 21% $^{228}Th+D$

*LST009 Dose Input File

Background: 6000 mrem

NCRP Radiation Limit for Organs: 75,000 mrem

TABLE 10. Summary of 50 Year Accumulated Dose to Maximum Individual*
Time of Initial Release After Yr-2000: 100 Yr
Leach Rate: 0.003%/Yr Path Length: 10 Mile

Years Since Burial	Peak Nuclides	Dose, mrem								Remarks
		Skin	Body	GI-LLI	Thyroid	Bone	Liver	Lung	Kidney	
2.5E2	^{3}H, ^{99}Tc, ^{129}I	1.3E-1	2.3E0	2.6E2	1.4E2	5.4E0	8.0E0	7.5E-2	1.7E-1	GI-LLI: 100% ^{99}Tc
1.7E3	^{14}C	8.0E-5	6.1E2	3.7E2	6.1E2	3.0E3	6.1E2	---	---	Bone: 100% ^{14}C
3.9E3	^{93}Mo	6.0E-5	4.7E2	2.9E2	4.7E2	2.4E3	4.7E2	2.4E-9	2.4E-9	Bone: 100% ^{14}C
1.5E4	^{41}Ca, ^{79}Se, ^{237}Np	3.3E0	1.4E2	9.7E1	1.3E2	7.5E2	1.6E2	2.9E0	2.9E0	Bone: 83% ^{14}C, 16% $^{237}Np+D$
3.1E4	^{90}Sr	2.9E0	2.9E1	2.9E1	2.0E1	2.2E2	4.8E1	2.5E0	2.5E0	Bone: 54% $^{237}Np+D$, 44% ^{14}C
4.8E4	^{10}Be, ^{59}Ni	7.7E-3	5.0E-1	2.6E-1	6.4E-3	3.2E0	9.6E-1	6.4E-3	1.8E-2	Bone: 83% ^{59}Ni, 8% ^{229}Th
6.5E4	^{60}Co	6.2E-3	4.4E-1	2.3E-1	5.1E-3	2.8E0	8.3E-1	5.1E-3	1.6E-2	Bone: 83% ^{59}Ni, 9% ^{229}Th
7.3E4	^{226}Ra	5.7E-3	4.1E-1	2.2E-1	4.7E-3	2.7E0	7.8E-1	4.7E-3	1.6E-2	Bone: 82% ^{59}Ni, 10% ^{229}Th
8.9E4	^{87}Rb	5.1E-3	4.3E-2	5.2E-2	4.1E-3	4.5E-1	1.3E-2	4.1E-3	1.4E-2	Bone: 57% ^{229}Th, 32% $^{225}Ra+D$, 10% ^{233}U
1.4E5	^{135}Cs	4.0E-3	3.9E0	2.7E-1	3.3E-3	1.1E1	9.7E0	7.2E0	1.1E-2	Body, Bone, Liver, Lung: ~100% ^{135}Cs
1.6E5	^{107}Pd, ^{126}Sn	9.0E0	1.3E1	2.8E1	8.3E0	6.4E1	1.9E1	1.5E1	8.0E0	Bone: 83% $^{126}Sn+D$, 16% ^{135}Cs
3.8E5	^{166M}Ho	1.4E-3	1.5E-2	1.8E-2	1.2E-3	1.6E-1	3.9E-3	1.2E-3	4.0E-3	Bone: 60% ^{229}Th, 32% $^{225}Ra+D$
4.8E5	^{247}Cm	9.1E-4	9.3E-3	1.1E-2	7.8E-4	9.9E-2	2.6E-3	7.8E-4	2.6E-3	Bone: 60% ^{229}Th, 32% $^{225}Ra+D$
1.5E6	^{93}Zr, ^{113M}Cd, ^{243}Am, ^{244}Pu	4.3E-4	2.8E-1	4.9E1	1.8E-4	1.0E0	1.8E-1	1.8E-4	2.1E-2	GI-LLI: 100% ^{93M}Nb; Bone: 45% $^{226}Ra+D$, 31% ^{93M}Nb, 19% ^{242}Pu
2.1E6	^{238}U	7.1E-1	1.0E3	1.7E1	6.3E-1	2.0E3	1.9E2	6.3E-1	1.6E0	Bone: 91% $^{226}Ra+D$, 5% $^{210}Pb+D$
2.4E6	^{231}Pa	2.2E-2	3.2E1	5.3E-1	1.9E-2	6.3E1	5.8E0	1.9E-2	2.2E-2	Bone: 91% $^{226}Ra+D$, 5% $^{210}Pb+D$
7.2E6	^{232}Th	9.3E-5	2.3E-3	1.4E-2	8.2E-5	3.6E-2	1.2E-3	8.2E-5	8.2E-5	Bone: 45% $^{232}Th+D$, 35% $^{224}Ra+D$, 21% $^{228}Th+D$

*LSTO10 Dose Input File

Background: 6000 mrem

NCRP Radiation Limit for Organs: 75,000 mrem

TABLE 11. Summary of 50 Year Accumulated Dose to Maximum Individual*
Time of Initial Release After Yr-2000: 100 Yr
Leach Rate: 0.0003%/Yr Path Length: 10 Mile

Years Since Burial	Peak Nuclides	Dose, mrem								Remarks
		Skin	Body	GI-LLI	Thyroid	Bone	Liver	Lung	Kidney	
2.5E2	^{3}H, ^{99}Tc, ^{129}I	1.3E-2	2.3E-1	2.6E-1	1.4E-1	5.4E-1	8.0E-1	7.5E-3	1.7E-2	GI-LLI: 100% ^{99}Tc
2.0E3	^{14}C	1.3E-2	5.9E1	6.1E1	7.3E1	3.0E2	6.0E1	7.5E-3	1.7E-2	Bone: 100% ^{14}C
4.0E3	^{93}Mo	1.3E-2	4.5E1	5.3E1	5.9E1	2.2E2	4.6E1	7.5E-3	1.7E-2	Bone: 100% ^{14}C
1.6E4	^{41}Ca, ^{79}Se, ^{237}Np	3.0E-1	1.2E1	3.3E1	2.5E+1	6.4E1	1.5E1	2.6E-1	2.7E-1	Bone: 82% ^{14}C, 17% $^{237}Np+D$
5.0E4	^{10}Be, ^{59}Ni	3.0E-1	1.5E0	2.5E1	1.5E+1	1.3E1	3.7E0	2.6E-1	2.7E-1	Bone: 84% $^{237}Np+D$
7.4E4	^{87}Rb	2.9E-1	1.3E0	2.4E1	1.4E1	1.2E1	3.1E0	2.5E-1	2.6E-1	Bone: 90% $^{237}Np+D$
1.5E5	^{135}Cs	2.9E-1	1.4E0	2.0E1	1.4E1	1.2E1	3.2E0	9.6E-1	2.6E-1	Bone: 84% $^{237}Np+D$, 8% ^{135}Cs
1.6E5	^{107}Pd, ^{126}Sn	1.2E0	2.3E0	2.2E1	1.5E0	1.7E1	4.1E0	1.8E0	1.1E0	Bone: 59% $^{237}Np+D$, 30% $^{126}Sn+D$
1.8E5	^{90}Sr	1.0E0	2.2E0	2.0E1	1.5E1	1.7E1	3.9E0	1.7E0	9.6E-1	Bone: 62% $^{237}Np+D$, 27% $^{126}Sn+D$
2.2E5	^{60}Co	8.8E-1	1.9E0	1.8E1	1.5E1	1.5E1	3.5E0	1.5E0	8.1E-1	Bone: 65% $^{237}Np+D$, 24% $^{126}Sn+D$
2.4E5	^{226}Ra	7.7E-1	1.7E0	3.3E0	7.1E-1	1.5E1	2.8E0	1.4E0	7.1E-1	Bone: 69% $^{237}Np+D$, 21% $^{126}Sn+D$
4.8E5	^{247}Cm	9.7E-2	1.2E-1	7.9E-1	8.9E-2	7.6E-1	1.8E-1	8.7E-2	9.0E-2	Bone: 75% $^{126}Sn+D$ 8% $^{225}Ra+D$
5.3E5	^{166M}Ho	1.5E-3	1.5E-2	1.8E-2	1.2E-3	1.6E-1	4.0E-3	1.2E-3	4.1E-3	Bone: 59% ^{229}Th, 33% $^{225}Ra+D$
1.4E6	^{93}Zr, ^{244}Pu	9.8E-5	7.2E-2	4.9E0	6.4E-5	2.0E-1	2.6E-2	6.4E-5	2.2E-3	GI-LLI: 100% ^{93M}Nb Bone: 66% $^{226}Ra+D$, 16% ^{93M}Nb
1.6E6	^{113M}Cd, ^{243}Am	4.2E-4	5.4E-1	4.4E0	3.5E-4	1.1E0	1.1E-1	3.5E-4	1.9E-3	GI-LLI: 100% ^{93M}Nb Bone: 88% $^{226}Ra+D$
2.1E6	^{238}U	1.8E-1	2.5E2	4.3E0	1.5E-1	5.0E2	4.7E1	1.5E-1	2.5E-1	Bone: 91% $^{226}Ra+D$
2.4E6	^{231}Pa	1.2E-1	1.8E2	2.9E0	1.1E-1	3.5E2	3.2E1	1.1E-1	1.1E-1	Bone: 91% ^{226}Ra
7.3E6	^{232}Th	9.3E-6	2.4E-4	1.4E-3	8.2E-6	3.6E-3	1.2E-4	8.2E-6	8.2E-6	Bone: 45% $^{232}Th+D$, 35% $^{224}Ra+D$, 21% $^{228}Th+D$

*LSTOll Dose Input File

Background: 6000 mrem

NCRP Radiation Limit for Organs: 75,000 mrem

TABLE 12. Summary of 50 Year Accumulated Dose to Maximum Individual*
Time of Initial Release After Yr-2000: 100 Yr
Leach Rate: 0.03%/Yr Path Length 0.1 Mile

Years Since Burial	Peak Nuclides	Dose, mrem								Remarks
		Skin	Body	GI-LLI	Thyroid	Bone	Liver	Lung	Kidney	
1.0E2	^{3}H, ^{99}Tc, ^{129}I	1.3E0	7.4E3	7.0E3	8.8E3	3.7E4	7.5E3	7.5E3	7.5E3	Bone: 100% ^{14}C
1.4E2	^{14}C, ^{93}Mo	1.3E0	7.4E3	7.0E3	8.8E3	3.7E4	7.5E3	7.5E3	7.5E3	Bone: 100% ^{14}C
2.6E2	^{41}Ca, ^{79}Se, ^{90}Sr, ^{237}Np	3.1E1	2.0E6	2.0E5	8.8E3	7.8E6	7.8E3	7.8E3	7.8E3	Bone: 99% ^{90}Sr
6.2E2	^{10}Be, ^{59}Ni	3.0E1	7.6E3	7.0E3	8.4E3	3.8E4	7.5E3	7.5E3	7.5E3	Bone: 92% ^{14}C
8.6E2	^{226}Ra	3.0E1	7.0E3	6.9E3	8.2E3	3.5E4	7.3E3	7.3E3	7.3E3	Bone: 96% ^{14}C
1.6E3	^{135}Cs	3.1E1	6.9E3	6.5E3	7.6E3	3.3E4	6.9E3	6.9E3	6.9E3	Bone: 93% ^{14}C
1.8E3	^{126}Sn, ^{107}Pd	3.0E2	7.2E3	7.2E3	7.8E3	3.5E4	7.1E3	7.1E3	7.1E3	Bone: 88% ^{14}C
2.2E3	^{60}Co	3.0E2	7.8E3	7.0E3	7.4E3	3.7E4	7.0E3	7.0E3	7.0E3	Bone: 78% ^{14}C, 13% $^{226}Ra+D$
2.5E3	^{87}Rb	3.0E2	8.1E3	6.9E3	7.3E3	3.7E4	6.9E3	6.9E3	6.9E3	Bone: 76% ^{14}C, 16% $^{226}Ra+D$
3.8E3	^{166M}Ho	2.7E2	8.5E3	8.3E2	2.5E2	1.8E4	1.7E3	3.2E2	2.4E2	Bone: 84% $^{226}Ra+D$, 9% $^{126}Sn+D$
5.1E3	^{247}Cm	3.3E1	6.8E3	6.0E2	2.5E1	1.7E4	2.6E3	2.5E1	7.2E2	Bone: 73% $^{226}Ra+D$, 11% $^{225}Cm+D$, 8% ^{241}Am
1.5E4	^{243}Am, ^{93}Zr, ^{244}Pu, ^{113M}Cd	4.3E2	4.7E4	8.0E3	3.7E2	1.1E5	1.7E4	3.7E2	1.0E3	Bone: 72% $^{226}Ra+D$, 18% $^{243}Am+D$
2.2E4	^{238}U	6.9E1	8.1E4	1.3E3	5.9E1	1.6E5	1.2E4	5.9E1	3.2E2	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$
2.5E4	^{231}Pa	6.0E1	6.9E4	1.3E3	5.1E1	1.4E5	1.1E4	5.1E1	5.1E1	Bone: 91% $^{226}Ra+D$, 4% $^{210}Pb+D$
7.4E4	^{232}Th	7.1E-1	9.4E2	1.4E1	6.2E-1	1.9E3	1.5E2	6.2E-1	6.2E-1	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$

*LST014 Dose Input File

Background: 6000 mrem

NCRP Radiation Limit for Organs: 75,000 mrem

TABLE 13. Summary of 50 Year Accumulated Dose to Maximum Individual*
Time of Initial Release After Yr-2000: 100 Yr
Leach Rate: 0.003%/Yr Path Length: 0.1 Mile

Years Since Burial	Peak Nuclides	Dose, mrem								Remarks
		Skin	Body	GI-LLI	Thyroid	Bone	Liver	Lung	Kidney	
1.0E2	^{3}H, ^{99}Tc, ^{129}I	3.0E0	7.3E2	7.1E2	8.6E2	3.7E3	7.6E2	7.6E2	7.6E2	Bone: 96% ^{14}C
2.5E2	^{90}Sr	3.2E0	2.6E5	2.6E4	8.4E2	1.0E6	7.5E2	7.5E2	7.5E2	Bone: 99% ^{90}Sr
5.0E2	^{14}C, ^{93}Mo	3.0E0	1.4E3	7.7E2	8.5E2	6.5E3	7.6E2	7.6E2	7.6E2	Bone: 55% ^{14}C, 43% ^{90}Sr
6.0E2	^{60}Co, ^{79}Se, ^{41}Ca, ^{237}Np, ^{10}Be, ^{59}Ni	3.0E0	7.7E2	7.1E2	8.4E2	3.8E3	7.5E2	7.5E2	7.5E2	Bone: 91% ^{14}C, 6% ^{90}Sr
1.2E3	^{226}Ra, ^{87}Rb	3.1E0	6.9E2	6.7E2	7.9E2	3.4E3	7.0E2	7.0E2	7.0E2	Bone: 95% ^{14}C
1.7E3	^{135}Cs	3.0E1	7.3E2	7.2E2	7.8E2	3.5E3	7.2E2	7.2E2	7.2E2	Bone: 87% ^{14}C, 5% $^{126}Sn+D$
1.5E3	^{107}Pd, ^{126}Sn	3.0E1	7.4E2	7.1E2	7.6E2	3.6E3	7.0E2	7.0E2	7.0E2	Bone: 84% ^{14}C, 8% $^{226}Ra+D$ 5% $^{126}Sn+D$
3.8E3	^{166M}Ho	3.0E1	1.5E3	6.4E2	6.4E2	4.6E3	7.1E2	7.1E2	7.1E2	Bone: 51% ^{14}C, 39% $^{226}Ra+D$
5.3E3	^{247}Cm	3.4E1	2.7E3	6.7E2	6.6E2	7.0E3	9.8E2	3.7E1	9.9E1	Bone: 58% $^{226}Ra+D$, 29% ^{14}C
1.5E4	^{93}Zr, ^{243}Am, ^{244}Pu	8.5E1	2.3E4	1.4E3	3.3E2	4.7E4	4.7E3	2.8E1	1.8E2	Bone: 86% $^{226}Ra+D$, 4% $^{210}Pb+D$, 4% $^{243}Am+D$
2.2E4	^{238}U	8.1E1	4.4E4	1.5E3	2.6E2	9.2E4	7.7E3	6.9E1	1.8E2	Bone: 90% $^{226}Ra+D$, 4% $^{210}Pb+D$
2.5E4	^{231}Pa	8.5E1	5.6E4	1.5E3	2.4E2	1.1E5	9.3E3	8.1E1	1.8E2	Bone: 91% $^{226}Ra+D$, 5% $^{210}Pb+D$
3.1E4	^{113M}Cd	9.6E1	8.2E4	1.8E3	2.2E2	1.7E5	1.3E4	9.0E1	1.5E2	Bone: 92% $^{226}Ra+D$, 5% $^{210}Pb+D$
7.6E4	^{232}Th	1.2E1	1.6E4	2.2E2	1.0E1	3.2E4	2.5E3	1.0E1	1.0E1	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$

*LST015 Dose Input File

Background: 6000 mrem

NCRP Radiation Limit for Organs: 75,000 mrem

TABLE 14. Summary of 50 Year Accumulated Dose to Maximum Individual*
Time of Initial Release After Yr-2000: 100 Yr
Leach Rate: 0.0003%/Yr Path Length: 0.1 Mile

Years Since Burial	Peak Nuclides	Dose, mrem								Remarks
		Skin	Body	GI-LLI	Thyroid	Bone	Liver	Lung	Kidney	
1.0E2	^{3}H, ^{99}Tc, ^{129}I	3.0E-1	4.8E1	5.5E1	6.0E1	2.4E2	5.0E1	5.0E1	5.0E1	Bone: 95% ^{14}C
2.5E2	^{90}Sr	3.2E-1	2.5E4	2.5E3	6.0E1	1.0E5	5.0E1	5.0E1	5.0E1	Bone: ~100% ^{90}Sr
5.9E2	^{60}Co	3.0E-1	5.6E1	5.6E1	6.0E1	2.8E2	5.1E1	5.1E1	5.1E1	Bone: 83% ^{14}C, 12% ^{90}Sr
6.4E2	^{59}Ni	3.0E-1	6.0E1	5.6E1	6.0E1	2.5E2	5.1E1	5.1E1	5.1E1	Bone: 91% ^{14}C, 4% $^{237}Np+D$, 4% ^{90}Sr
8.2E2	^{87}Rb	3.0E-1	5.0E1	5.6E1	6.0E1	2.5E2	5.1E1	5.1E1	5.1E1	Bone: 91% ^{14}C, 4% $^{237}Np+D$, 4% ^{90}Sr
1.6E3	^{135}Cs	3.0E-1	4.8E1	5.5E1	6.0E1	2.4E2	5.2E1	5.2E1	5.2E1	Bone: 94% ^{14}C, 4% $^{237}Np+D$
1.8E3	^{107}Pd, ^{126}Sn	3.0E0	5.1E1	6.3E1	6.3E1	2.6E2	5.4E1	5.4E1	5.4E1	Bone: 89% ^{14}C, 6% $^{126}Sn+D$
4.0E3	^{166M}Ho, ^{14}C, ^{99}Mo	3.0E0	5.1E1	6.2E1	6.3E1	2.6E2	5.4E1	5.4E1	5.4E1	Bone: 89% ^{14}C, 6% $^{126}Sn+D$
5.1E3	^{79}Se, ^{10}Be, ^{226}Ra, ^{41}CA, ^{237}Np, ^{247}Cm	3.0E0	4.6E1	5.9E1	5.8E1	2.3E2	5.0E1	5.0E1	5.0E1	Bone: 88% ^{14}C, 7% $^{126}Sn+D$
1.6E4	^{243}Am, ^{244}Pu, ^{93}Zr, ^{113M}Cd	7.7E0	2.4E3	1.4E2	3.2E1	5.1E3	4.8E2	7.5E0	1.3E1	Bone: 87% $^{226}Ra+D$, 4% $^{210}Pb+D$
2.3E4	^{238}U	6.1E0	5.3E3	1.5E2	2.4E1	1.1E4	8.8E2	5.2E0	1.2E1	Bone: 91% $^{226}Ra+D$, 4% $^{210}Pb+D$
2.6E4	^{231}Pa	6.5E0	6.4E3	1.5E2	2.3E1	1.3E4	1.0E3	5.7E0	1.3E1	Bone: 91% $^{226}Ra+D$, 4% $^{210}Pb+D$
7.9E4	^{232}Th	2.1E1	2.8E4	4.1E2	3.2E1	5.5E4	4.3E3	1.8E1	2.1E1	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$

*LST016 Dose Input File

Background: 6000 mrem

NCRP Radiation Limit for Organs: 75,000 mrem

TABLE 15. Summary of 50 Year Accumulated Dose to Maximum Individual*
Time of Initial Release After Yr-2000: 100 Yr
Leach Rate: 0.0003%/Yr Path Length: 1 Mile

Years Since Burial	Peak Nuclides	Dose, mrem								Remarks
		Skin	Body	GI-LLI	Thyroid	Bone	Liver	Lung	Kidney	
1.2E2	^{3}H, ^{99}Tc, ^{129}I	3.0E-1	4.8E1	5.5E1	6.0E1	2.4E2	5.1E1	5.1E1	5.1E1	Bone: 95% ^{14}C
4.1E3	^{14}C, ^{93}Mo	3.0E-1	4.8E1	5.5E1	6.0E1	2.4E2	5.1E1	5.1E1	5.1E1	Bone: 95% ^{14}C
5.1E3	^{41}Ca, ^{79}Se, ^{237}Np	3.0E-1	4.3E1	5.2E1	5.6E1	2.2E2	4.6E1	4.6E1	4.6E1	Bone: 94% ^{14}C
5.2E3	^{10}Be, ^{59}Ni	3.0E-1	4.3E1	5.2E1	5.6E1	2.2E2	4.6E1	4.6E1	4.6E1	Bone: 94% ^{14}C
1.0E4	^{226}Ra	3.0E-1	2.4E1	4.0E1	3.7E1	1.2E2	2.7E1	2.7E1	2.7E1	Bone: 90% ^{14}C, 9% $^{237}Np+D$
1.1E4	^{87}Rb	3.1E-1	3.6E1	3.9E1	3.4E1	1.4E2	2.6E1	2.6E1	2.6E1	Bone: 71% ^{14}C, 19% $^{226}Ra+D$
1.8E4	^{135}Cs, ^{107}Pd, ^{126}Sn	2.7E0	8.9E1	3.9E1	2.5E1	2.3E2	2.8E1	3.2E0	2.4E0	Bone: 63% $^{226}Ra+D$, 19% ^{14}C, 6% $^{126}Sn+D$
5.0E4	^{247}Cm	2.7E0	1.1E3	4.3E1	1.7E1	2.2E3	1.8E2	3.1E0	2.6E0	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$
1.5E5	^{93}Zr, ^{243}Am, ^{244}Pu	1.0E1	1.2E4	2.0E2	2.0E1	2.5E4	1.9E3	9.4E0	8.9E0	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$
2.0E5	^{166M}Ho	2.1E1	3.0E4	4.1E2	3.2E1	5.7E4	4.5E3	1.9E1	1.8E1	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$
2.1E5	^{238}U	2.4E1	3.1E4	4.5E2	3.4E1	6.3E4	4.9E3	2.1E1	2.2E1	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$
2.4E5	^{231}Pa	2.9E1	4.1E4	5.7E2	4.0E1	8.2E4	6.5E3	2.7E1	2.7E1	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$
3.1E5	^{113M}Cd	3.4E1	4.9E4	6.7E2	4.5E1	9.7E4	7.7E3	3.1E1	3.2E1	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$
7.3E5	^{232}Th	1.4E1	2.0E4	2.7E2	1.2E1	3.9E4	3.1E3	1.2E1	1.2E1	Bone: 92% $^{226}Ra+D$, 4% $^{210}Pb+D$

*LST019 Dose Input File

Background: 6000 mrem

NCRP Radiation Limit for Organs: 75,000 mrem

TABLE 16. Summary of 50 Year Accumulated Dose to Maximum Individual*
Time of Initial Release After Yr-2000: 10,000
Leach Rate: 0.3%/Yr Path Length: 10 Mile

Years Since Burial	Peak Nuclides	Dose, mrem								Remarks
		Skin	Body	GI-LLI	Thyroid	Bone	Liver	Lung	Kidney	
1.0E4	^{3}H, ^{99}Tc, ^{129}I	1.3E1	2.2E2	2.5E4	1.4E4	5.2E2	7.7E2	7.5E0	1.7E1	GI-LLI: 100% ^{99}Tc
1.1E4	^{14}C	2.5E-3	1.9E4	1.1E4	1.9E4	9.4E4	1.9E4	1.9E4	1.9E4	Bone: 100% ^{14}C
1.4E4	^{93}Mo	2.1E-7	1.7E-1	1.0E0	1.2E-7	1.2E-7	6.1E0	1.2E-7	1.2E-7	Liver: 100% ^{93}Mo
2.5E4	^{90}Sr, ^{41}Ca, ^{79}Se, ^{237}Np	3.5E2	1.4E3	2.2E3	3.0E2	1.3E4	3.4E3	3.0E2	3.0E2	Bone: 97% ^{237}Np+D
5.8E4	^{59}Ni, ^{10}Be, ^{60}Co	8.9E-3	4.2E1	1.8E1	7.1E-3	2.5E2	8.7E1	7.1E-3	2.1E-2	Bone: 100% ^{59}Ni
8.2E4	^{87}Rb, ^{226}Ra	5.8E-3	7.2E-2	4.8E-2	4.8E-3	3.6E-1	1.2E-1	4.8E-3	1.7E-2	Bone: 53% ^{229}Th, 29% ^{225}Ra+D, 15% ^{233}U
1.6E5	^{135}Cs	6.5E-3	3.3E2	1.9E1	3.8E-3	8.7E2	8.4E2	6.3E2	1.3E2	Bone: 100% ^{135}Cs
1.7E5	^{126}Sn, ^{107}Pd	7.0E2	7.6E2	2.3E3	6.7E2	4.3E3	8.0E2	6.5E2	6.5E2	Bone: 100% ^{126}Sn+D
4.9E5	^{247}Cm	1.3E-3	1.1E-2	1.4E-2	1.1E-3	1.2E-1	7.0E-3	1.1E-3	3.1E-3	Bone: 55% ^{229}Th, 30% ^{225}Ra+D
1.5E6	^{244}Pu, ^{93}Zr, ^{113M}Cd, ^{243}Am	3.6E-3	8.6E-1	6.6E2	5.2E-4	7.6E0	1.8E0	5.2E-4	2.9E-1	Bone: 55% ^{93M}Nb, 35% ^{242}Pu
2.1E6	^{238}U	1.2E0	1.7E3	2.9E1	1.0E0	3.4E3	3.0E2	1.0E0	9.7E0	Bone: 91% ^{226}Ra+D, 5% ^{210}Pb+D
7.2E6	^{232}Th	2.5E-4	6.2E-3	3.7E-2	2.2E-4	9.5E-2	3.1E-3	2.2E-4	2.2E-4	Bone: 44% ^{232}Th+D, 35% ^{224}Ra+D, 21% ^{228}Th+D

*LST004 Dose Input File

Background: 6000 mrem

NCRP Radiation Limit for Organs: 75,000 mrem

TABLE 17. Summary of 50 Year Accumulated Dose to Maximum Individual*
Time of Initial Release After Yr-2000: 100,000
Leach Rate: 0.3%/Yr Path Length: 10 Mile

Years Since Burial	Peak Nuclides	Dose, mrem								Remarks
		Skin	Body	GI-LLI	Thyroid	Bone	Liver	Lung	Kidney	
1.0E5	^{3}H, ^{99}Tc, ^{129}I	1.3E1	1.7E2	1.8E4	1.4E4	3.9E2	5.8E2	7.5E0	1.7E1	GI-LLI: 100% ^{99}Tc
1.01E5	^{14}C	4.6E-8	3.5E-1	2.1E-1	3.5E-1	1.8E0	3.5E-1	3.5E-1	3.5E-1	Bone: 100% ^{14}C
1.2E5	^{90}Sr, ^{41}Ca, ^{79}Se, ^{237}Np	3.3E2	1.0E3	1.9E3	2.9E2	1.3E4	2.2E3	2.9E2	2.9E2	Bone: 98% ^{237}Np+D
1.5E5	^{59}Ni, ^{60}Co, ^{10}Be	5.9E-3	1.9E1	8.5E0	5.0E-3	1.1E2	4.0E1	5.0E-3	1.8E-2	Bone: 100% ^{59}Ni
2.4E5	^{135}Cs	6.4E-3	3.3E2	1.9E1	3.6E-3	8.7E2	8.4E2	6.1E2	1.2E-2	Bone, Liver: 100% ^{135}Cs
2.6E5	^{126}Sn, ^{107}Pd	3.9E2	4.1E2	1.1E3	3.6E2	2.3E3	4.7E2	3.5E2	3.5E2	Bone: 100% ^{126}Sn+D
2.17E6	^{238}U	1.1E0	1.4E3	2.6E1	9.5E-1	2.9E3	2.5E2	9.5E-1	9.9E0	Bone: 90% ^{226}Ra+D, 5% ^{210}PB+D

*LST005 Dose Input File

Background: 6000 mrem

NCRP Radiation Limit for Organs: 75,000 mrem

TABLE 18. Summary of 50 Year Accumulated Dose to Maximum Individual*
Time of Initial Release After Yr-2000: 1,000,000
Leach Rate: 0.3%/Yr Path Length: 10 Mile

Years Since Burial	Peak Nuclides	Dose, mrem								Remarks
		Skin	Body	GI-LLI	Thyroid	Bone	Liver	Lung	Kidney	
1.0E6	^{3}H, ^{99}Tc, ^{129}I	1.3E1	2.7E1	9.8E2	1.4E4	3.2E1	4.1E1	7.5E0	1.6E1	Thyroid: 100% ^{129}I
1.01E6	^{41}Ca, ^{79}Se, ^{90}Sr, ^{237}Np	2.5E2	5.9E2	1.3E3	2.2E2	9.3E3	1.0E3	2.2E2	2.2E2	Bone: 100% ^{237}Np+D
1.05E6	^{10}Be, ^{60}Co, ^{59}Ni	4.2E-3	2.6E-2	2.5E-2	3.4E-3	2.2E-1	2.2E-2	3.4E-3	1.2E-2	Bone: 38% ^{229}Th, 21% ^{59}Ni, 21% ^{225}Ra+D, 20% ^{233}U
1.14E6	^{135}Cs	4.9E-3	2.7E2	1.6E1	2.7E-3	7.2E2	6.5E2	5.0E2	9.2E-3	Bone: 100% ^{135}Cs
1.16E6	^{107}Pd, ^{126}Sn	7.5E-1	5.3E0	4.3E2	7.3E-1	4.8E0	7.0E1	7.0E-1	7.1E-1	GI-LLI: 100% ^{107}Pd
3.07E6	^{238}U	5.6E-1	5.7E2	1.3E1	4.6E-1	9.3E2	1.1E2	4.6E-1	8.8E0	Bone: 85% ^{226}Ra+D, 7% ^{210}Pb+D

*LST006 Dose Input File

Background: 6000 mrem

NCRP Radiation Limit for Organs: 75,000 mrem

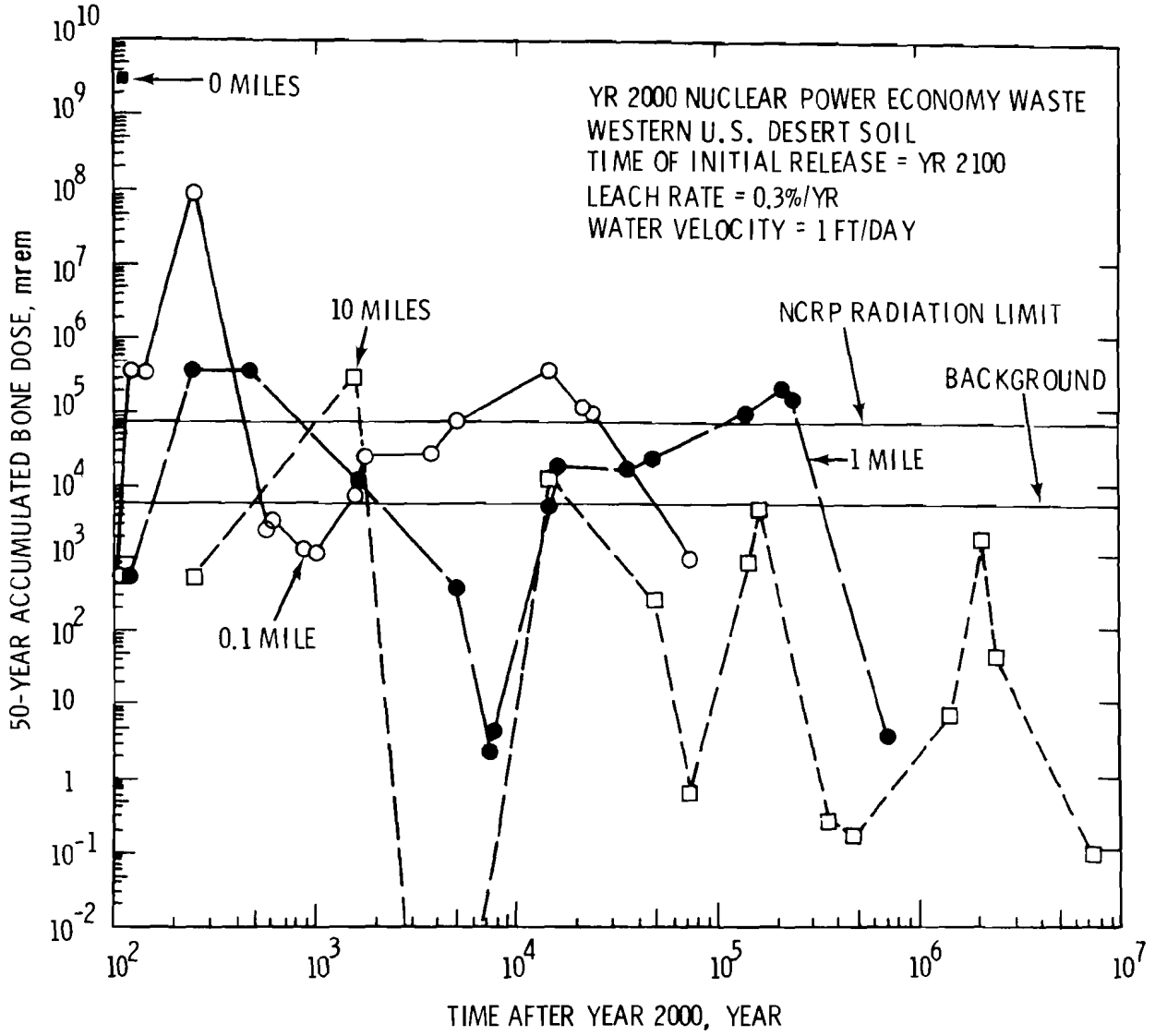

FIGURE 6. The Effect of Path Length on the Bone Dose Versus Time Curve

(17,000 times background). At a 1-mile path length the bone doses are above background over large time periods, but the incremental doses are never greater than the ^{14}C dose (50 times background) which occurs between 250 and 500 years after year 2000. For the 10-mile path length, only the bone dose from ^{14}C (50 times background) at 1500 years and the bone dose from ^{237}Np (2 times background) at 14,600 years are above background. Thus as the distance between the terminal storage site and the biosphere increases, the nuclides discharge to the surface water body over longer time periods and the incremental doses decrease. In particular, the highest incremental dose level was reduced by a factor of 12,000 (600,000/50) by increasing the path length from 0 miles to 10 miles. These results confirm that isolation of the waste from the biosphere can greatly reduce consequences of waste release from containment at the terminal storage site.

Figure 7, a graph of the results from Tables 3, 9, 10, and 11, shows the effect of leach rate on the incremental bone dose versus time curve. Leach rate values shown are 0.3, 0.03, 0.003, and 0.0003%/yr. As before, the background and the NCRP radiation limit lines are superimposed for comparison. The 0.3%/yr curve in Figure 7 (the base case) is exactly the same case as the 10-mile curve in Figure 6. When the leach rate is decreased an order of magnitude to 0.03%/yr, the ^{14}C and ^{237}Np bone doses are decreased an order of magnitude. The ^{14}C dose is now 5 times background. However, the ^{14}C now discharges to the biosphere over a 3333-year period (1/0.03) instead of the 333-year period for the base case. Thus, although the incremental dose to a "maximum" individual is reduced by a factor of 10, there are presumably 10 times as many such "maximum" individuals receiving that incremental dose compared with the base case. For the 0.003%/yr leach rate, the incremental doses are always below background, and the ^{14}C dose is spread out over a 33,333-year period. The results for the 0.0003%/yr leach rate show further redistribution of the doses so that more individuals get lower doses. However, because of radioactive decay the total integrated doses over all time decrease as leach rate decreases.

An interesting and important phenomenon can be understood by examining the bone dose results for the uranium peak at 2.07×10^6 years. As the

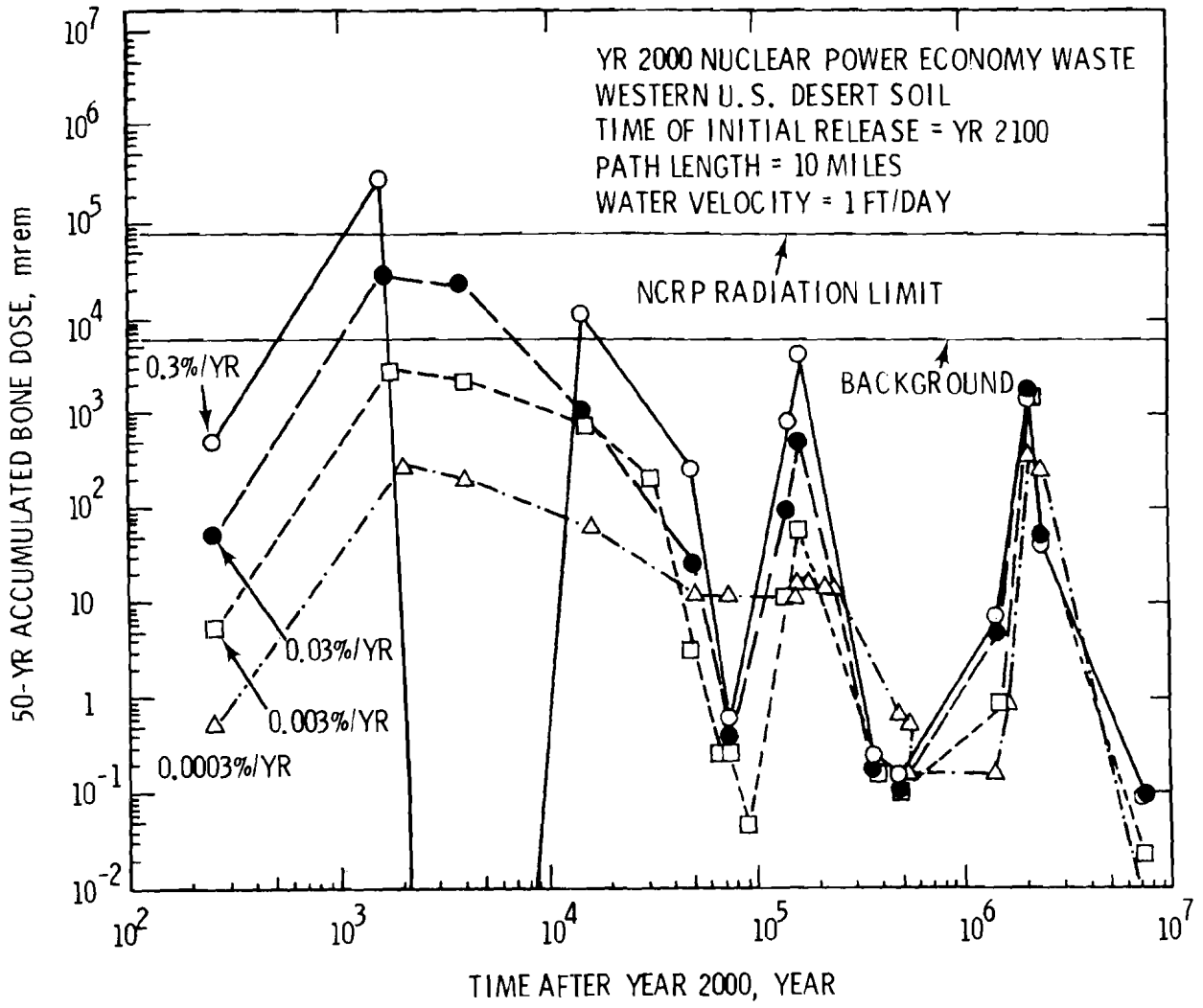

FIGURE 7. The Effect of Leach Rate on the Bone Dose Versus Time Curve

leach rate is decreased from 0.3 to 0.003%/yr, no change is observed in the incremental dose, which is controlled by ^{226}Ra. This happens because the ^{226}Ra is created predominately by decay of the precursors ^{234}U and ^{238}Pu after they have left the final storage site. Because of the differences in the migration rates of radium, uranium, and plutonium, the ^{226}Ra discharge to the biosphere is spread over large time periods and is thus unaffected by leach rate until the leach rate is 0.0003%/yr or less (i.e., until the leach time begins to approach the migration time for uranium). Thus, decreasing the leachability of the waste form greatly reduces the consequences of single nuclide releases from the site but does not reduce the consequences from chain members created after their precursors left the disposal site unless the leach time approaches the migration time of those nuclides through the geosphere.

The results from Tables 3, 16, 17, and 18 are plotted in Figure 8, which shows the effect of the time of initial release after Year 2000 on the controlling doses to critical organs. These results show that increased canister integrity and disposal site stability cannot reduce the base case incremental doses (Table 3) below background unless containment at the disposal site can be reasonably assured for periods of greater than 1,000,000 years. Although the ^{14}C and ^{99}Tc doses disappear if the release can be delayed by 100,000 years and 1,000,000 years, respectively, the ^{129}I and ^{237}Np doses remain at above background levels. However, the results shown in Figure 8 assume a 10-mile path length. As path length decreases, the importance of canister integrity and site stability increases.

4.4 PARTITIONING INCENTIVES

The combined effects of the three waste management control variables shown in Figures 6, 7, and 8 on the incentives for partitioning can best be shown with three-dimensional plots such as Figure 9. The three variables (path length, leach time, and the time of initial release after Year 2000) are plotted on the three axes. Thus an increase in the magnitude of any of the parameters results in greater isolation of the waste from man's

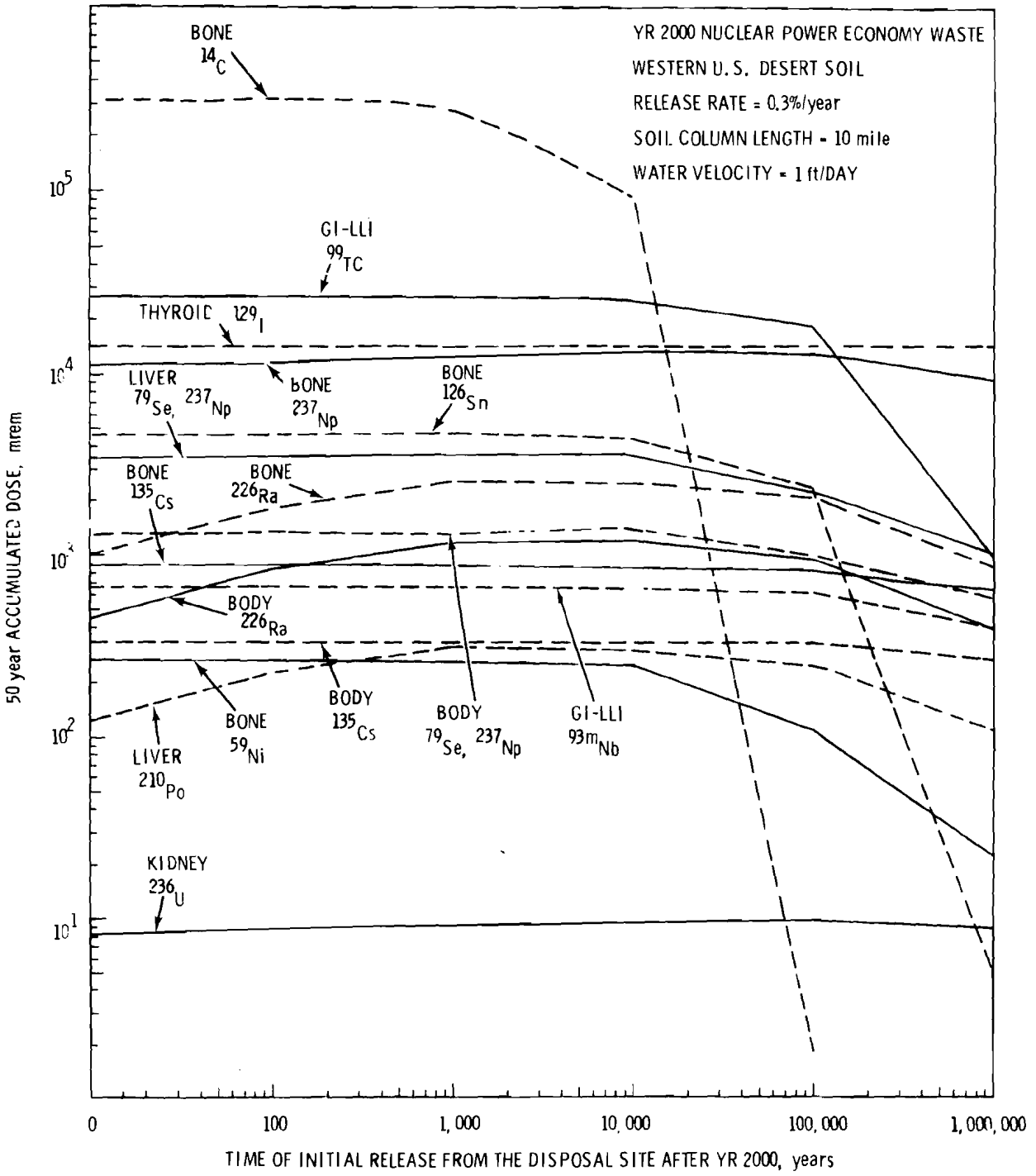

FIGURE 8. The Effect of the Time of Initial Release from the Disposal Site on the 50-Year Accumulated Dose

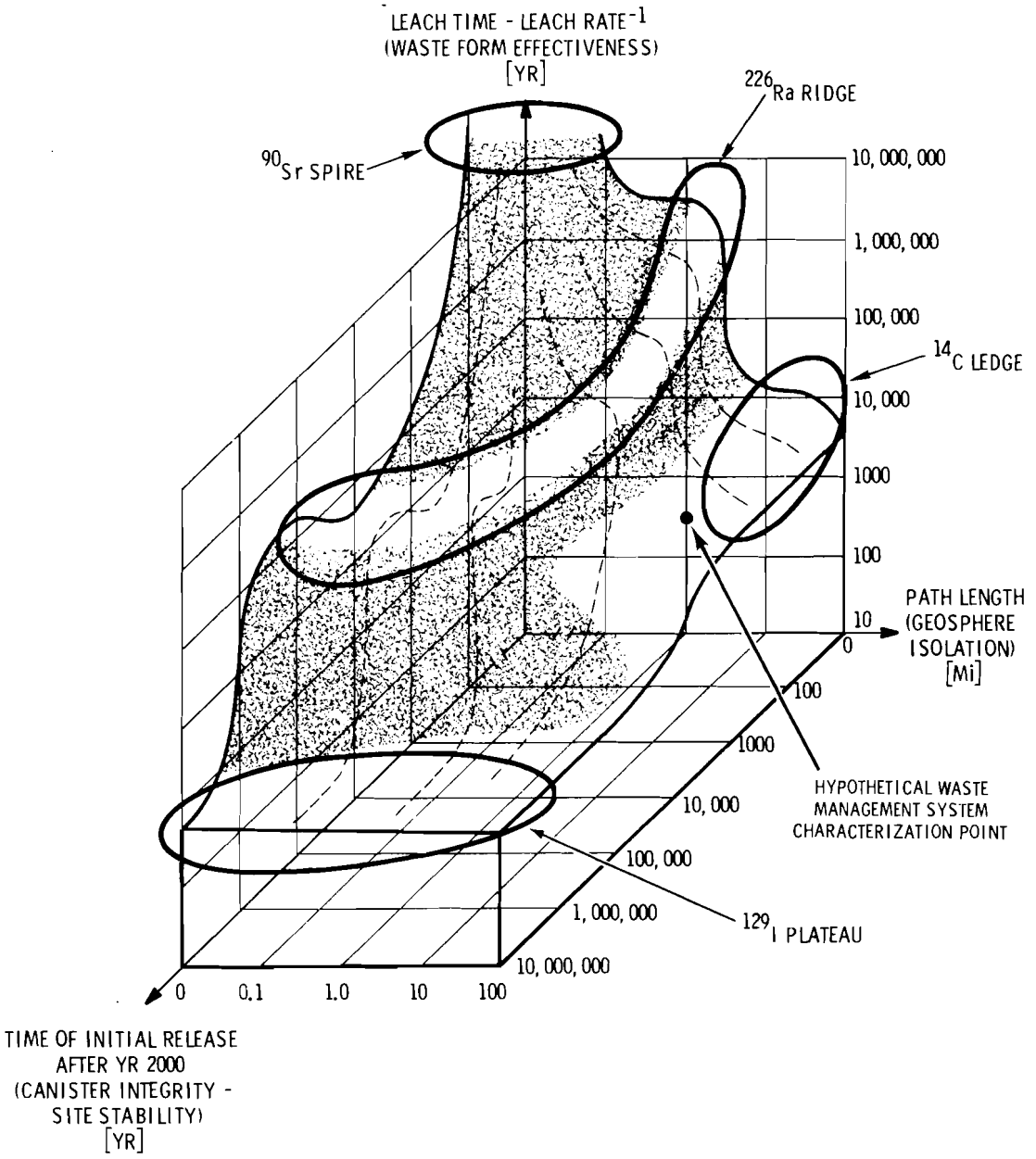

FIGURE 9. Waste Management Control Surface for Incremental Background Dose with No Partitioning

environment. A surface can be located in this three-dimensional space which corresponds to any assumed incremental dose level (e.g., background or NCRP radiation limit). Figure 9 shows such a surface with background as the assumed incremental dose level. Combinations of path length, leach time, and time of initial release which define points located inside or under the surface (i.e., between the surface and the origin) have incremental doses above background; combinations located outside or over have incremental doses below background.

For example, if the waste management system had a borosilicate glass waste form with a leach time of 100,000 years (a 1 ft diameter monolithic cylinder with about a 10^{-6} g/cm^2/day surface flux) and a site located 10 miles from the biosphere in western U.S. desert soil or equivalent, the doses would always be below background regardless of when the release from the disposal site began. Likewise, if the same waste form were contained by a canister which prevented water from contacting the waste form for 10,000 years (but not 100,000 years) the incremental doses would again always be below background even for surface stored waste. On the other hand, a waste management system with a 0.1 mile path length, a 10,000 year leach time, and an initial release 1000 years after Year 2000 would have incremental doses above background.

When plotting these waste management control surfaces, the incremental dose need only be greater than the assumed criterion (e.g., background) at one time during the entire time the waste discharges to the biosphere to cause that point to be inside the surface.

The topographic features of the waste management control surface can be conveniently named according to which nuclides cause them. The ^{90}Sr spire occurs at small path lengths and small times of initial release and reflects the large leach times (small leach rates) required to lower the controlling ^{90}Sr dose to background. The ^{226}Ra ridge occurs at intermediate path lengths and initial release times and denotes the region of the surface where the dose is controlled by the ^{226}Ra created predominately by decay of ^{238}Pu and ^{234}U after they have been released from the disposal site. The ^{14}C ledge and ^{129}I plateau are named in similar fashion.

Figure 9 (or similar graphs) can be used together with the two existence conditions (inequalities 5 and 6 for the simplified treatment here) to determine the partitioning incentives for separation of various elements from the waste. As discussed previously, two things must be known: 1) the publicly acceptable release consequences* must be known and 2) the waste management control variables for the final storage system must be known. Thus the question of "how safe is safe enough?" must be answered and the terminal storage site, container, and waste form must be selected. Using the given value for the publicly acceptable release consequences, a graph similar to Figure 9 is drawn. Then using the given values of the control variables, the point characteristic of the chosen waste management system is located on the graph. If that point is above the control surface, the release consequences are below the publicly acceptable consequences, Inequality 5 is not satisfied, and no partitioning incentive exists. If that point is below the control surface, Inequality 5 is satisfied, and an incentive to partition something from the waste exists if Inequality 6 is also satisfied. What must be separated from the waste and eliminated depends upon where the system characterization point for the chosen system is located under the surface. Therefore, the objective of the partitioning alternative is to separate selected elements from the waste until Inequality 5 is no longer satisfied.

This method can be illustrated by assuming that incremental doses of the order of natural background are the publicly acceptable consequences and the waste management system characterization point is located at a path length of 1 mile, a leach time of 333 years, and an initial release time of 0 years after Year 2000. Since this hypothetical point is below the surface in Figure 9, Inequality 5 is satisfied and incentives for partitioning will exist for separation and elimination of nuclides which lower the release consequences (satisfy Inequality 6).

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* In a complete analysis, which looks at all release paths and their probabilities of occurrence, "consequences" would be replaced by "risk" in this sentence.

If 99% (100 DF) of the plutonium* and uranium (^{238}Pu and ^{234}U) are removed from the waste at the Year 2000, the ^{226}Ra ridge on the waste management control surface disappears as shown in Figure 10. The ^{14}C ledge now becomes much wider in the path length-leach time plane. As shown in Figure 10, elimination of 99% of the plutonium and uranium moves the control surface down toward the characterization point. Thus incentives for partitioning of plutonium and uranium exist for the hypothetical situation.

If a 99% (100 DF) separation of americium (^{241}Am and ^{243}Am) is also made at the Year 2000, the waste management control surface is lowered at very short path lengths (0 to 0.1 miles) and intermediate initial release times (1000 to 100,000 years) as shown in Figure 11. However, the effect of americium separation disappears at a path length of 0.1 miles and thus cannot influence consequences of release from the hypothetical system (which has a 1-mile path). Therefore, Inequality 6 is not satisfied and an incentive for partitioning americium does not exist for this situation.

Figure 12 shows the waste management control surface for 99% elimination of uranium, plutonium, americium, and the remaining actinides. The surface in Figure 12 is identical to that in Figure 11, showing the negligible effect of partitioning actinides other than uranium, plutonium and americium. After 99% of the uranium, plutonium, and americium has been eliminated, ^{90}Sr controls the incremental dose in the initial release time-leach time plane for a 100-year initial release time, ^{14}C controls for a 1000 and 10,000-year release time, ^{99}Tc controls for a 100,000-year release time, and ^{129}I controls for 1,000,000-year release time. In the path length-leach time plane ^{90}Sr controls for path lengths of 0.1 mile and smaller while ^{14}C controls for path lengths greater than 0.1 mile.

Figures 11 and 12 show no incentives for removing and eliminating americium and the remaining actinides. Thus Figure 13 shows the effect of 99% carbon (^{14}C) removal and elimination on the waste management control surface after only uranium and plutonium have been previously removed. The

* 99.5% of the uranium and plutonium in the spent fuel was removed at the reprocessing operation. After the 99% removal here only 0.005% of the spent fuel uranium and plutonium remains in the waste.

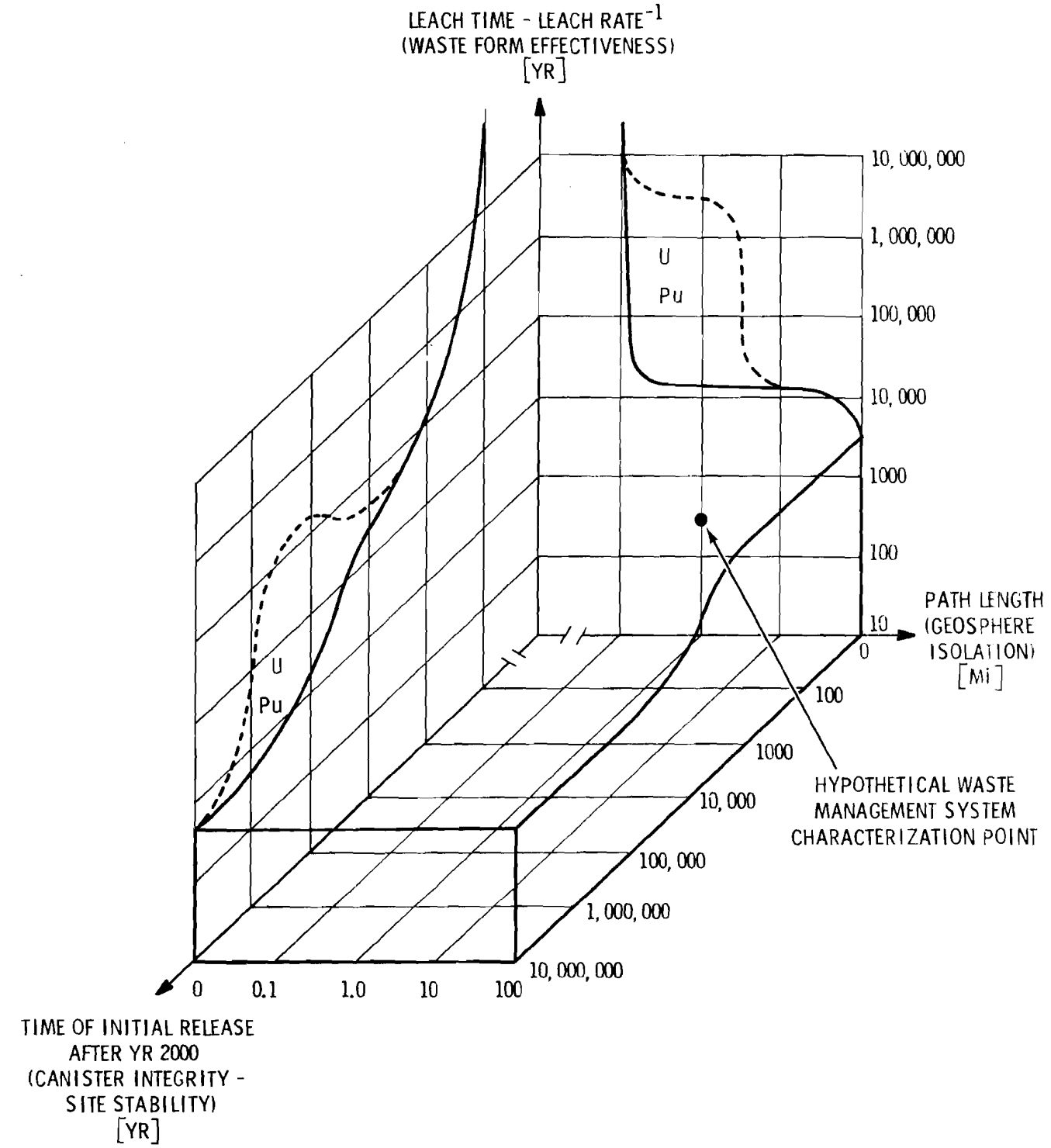

FIGURE 10. Waste Management Control Surface for Incremental Background Dose with 99% Elimination of Uranium and Plutonium

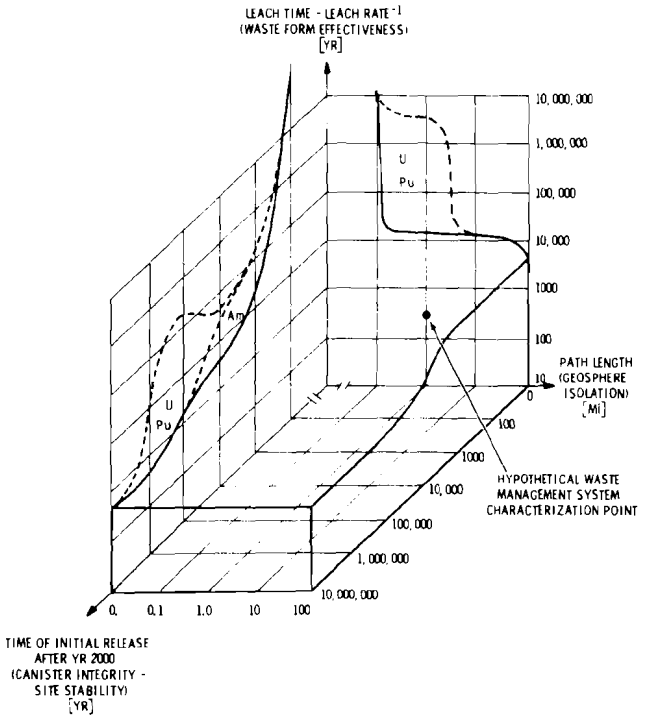

FIGURE 11. Waste Management Control Surface for Incremental Background Dose with 99% Elimination of Uranium, Plutonium, and Americium

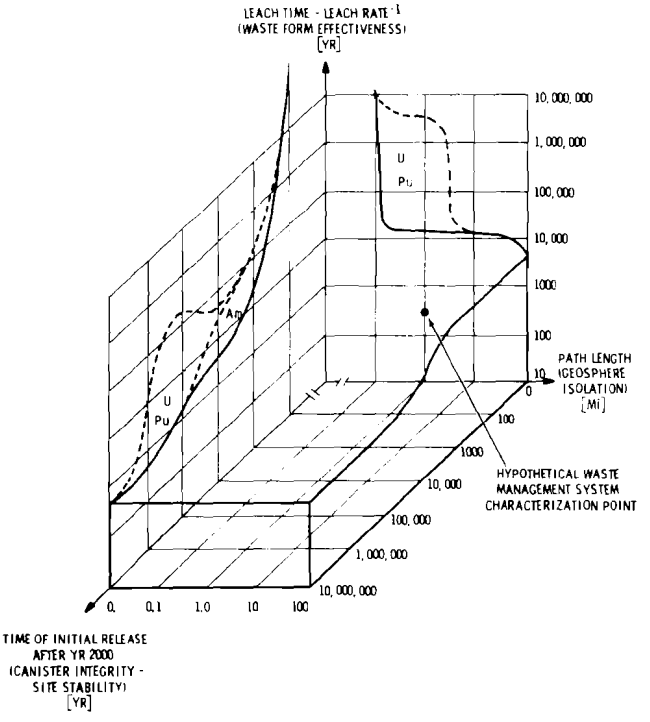

FIGURE 12. Waste Management Control Surface for Incremental Background Dose with 99% Elimination of Uranium, Plutonium, Americium and the Remaining Actinides

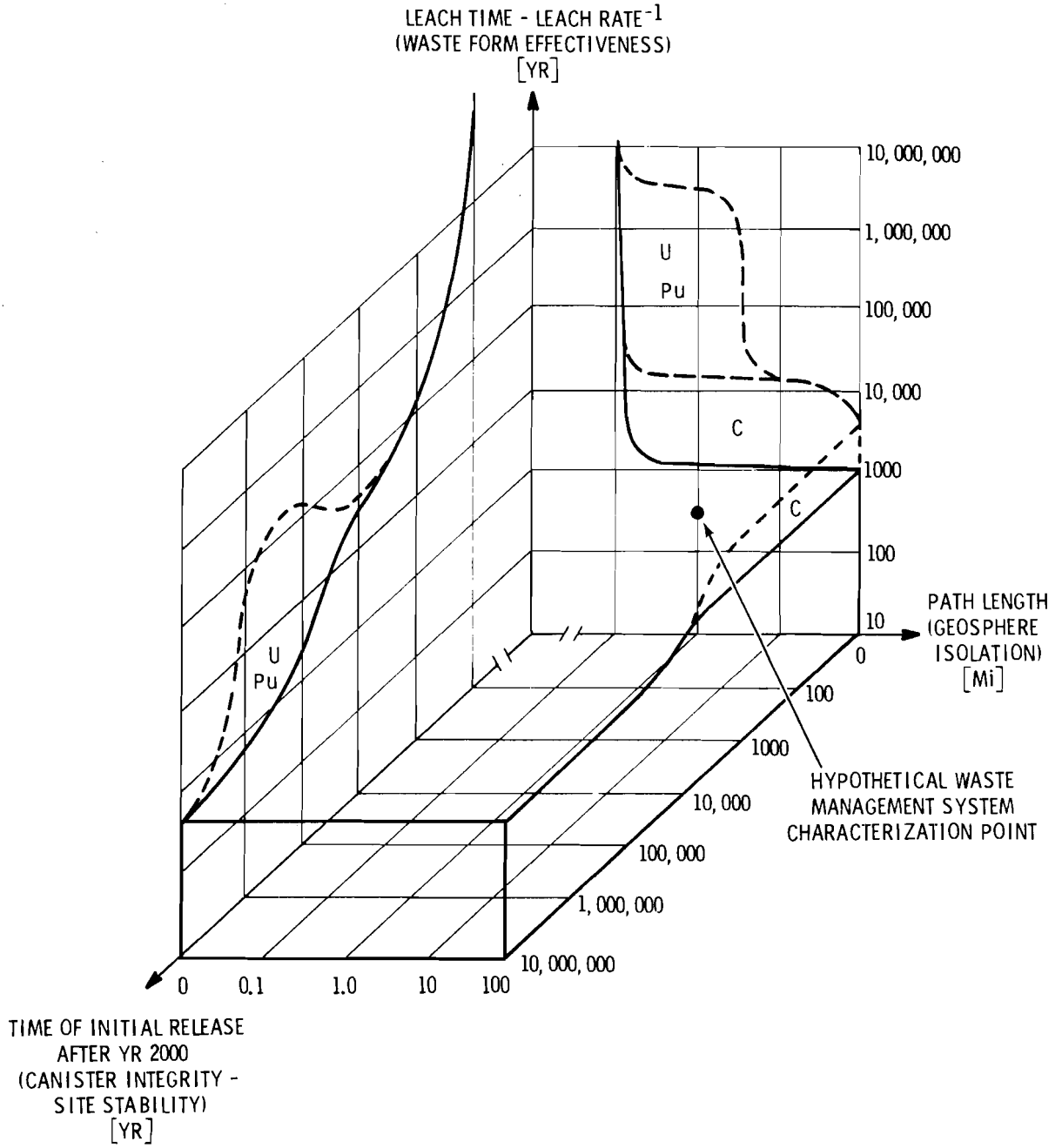

FIGURE 13. Waste Management Control Surface for Incremental Background Dose with 99% Elimination of Uranium, Plutonium and Carbon

height of the control surface above the characterization point is significantly reduced, and hence partitioning incentives exist for carbon. With current reprocessing schemes the ^{14}C would likely leave the reprocessing plant as gaseous carbon dioxide and hence not be included in high-level waste by current definitions, but the significant doses shown here for ^{14}C suggest that carbon is a candidate for isolation from reprocessor off-gas streams.

Figures 14, 15, and 16 show the effects of removing and eliminating sequentially 99% of the technetium, (^{99}Tc) iodine, (^{129}I) and neptunium, (^{237}Np) after prior removal of 99% of uranium, plutonium, and carbon. Technetium removal moves the surface downward slightly on the leach time axis for path lengths 0.3 mile and larger and initial release times 10,000 years and smaller. Iodine (like carbon, a reprocessor off-gas product not currently included in high-level waste) removal changes the surface at all path lengths up to 100 miles for initial release times greater than 1,000,000 years and greater. The prior elimination of technetium and iodine make possible the neptunium elimination effect, greatly decreasing the total volume under the waste management control curve. After having eliminated uranium, plutonium, carbon, technetium, iodine, and neptunium, the characterization point is above the control surface for the assumed publicly acceptable incremental dose, and incentives for additional partitioning do not exist for this hypothetical situation. Now, ^{126}Sn controls the incremental dose for path lengths greater than 0.1 and initial release times up to 100,000 years.

Figure 17 is the equivalent of Figure 16 except that the NCRP radiation limit is assumed to be the publicly acceptable consequences instead of background. The waste management control surface in Figure 17 looks much like that in Figure 16 but closer to the origin at all points, reflecting the dose differences between the two criteria (6000 mrem for background and 75,000 mrem for the NCRP radiation limit for organs). Similar figures can be drawn for other values of the publicly acceptable release consequences.

The previous discussion considered the partitioning incentives for a hypothetical waste management system deliberately chosen to maximize those

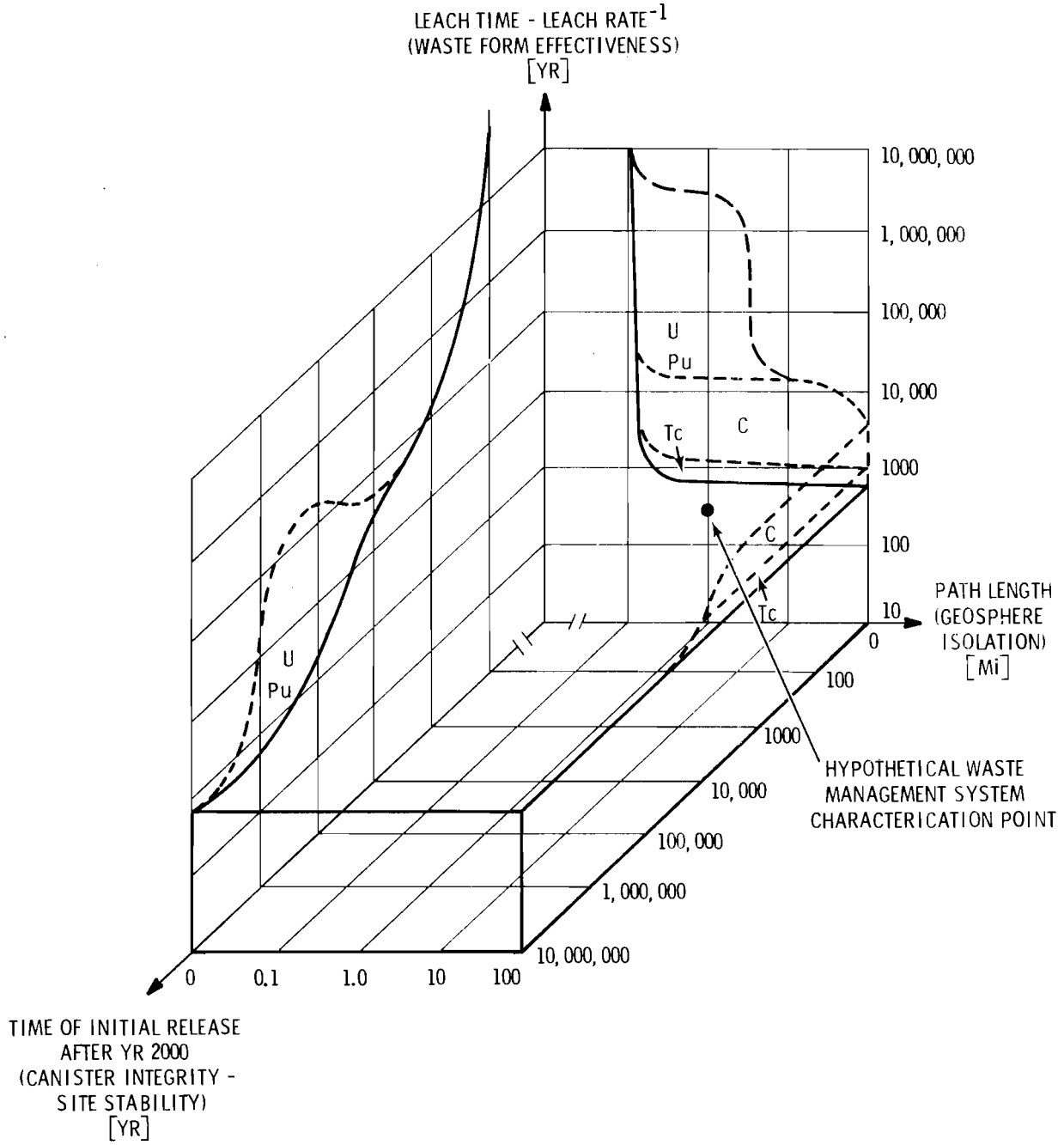

FIGURE 14. Waste Management Control Surface for Incremental Background Dose with 99% Elimination of Uranium, Plutonium, Carbon and Technetium

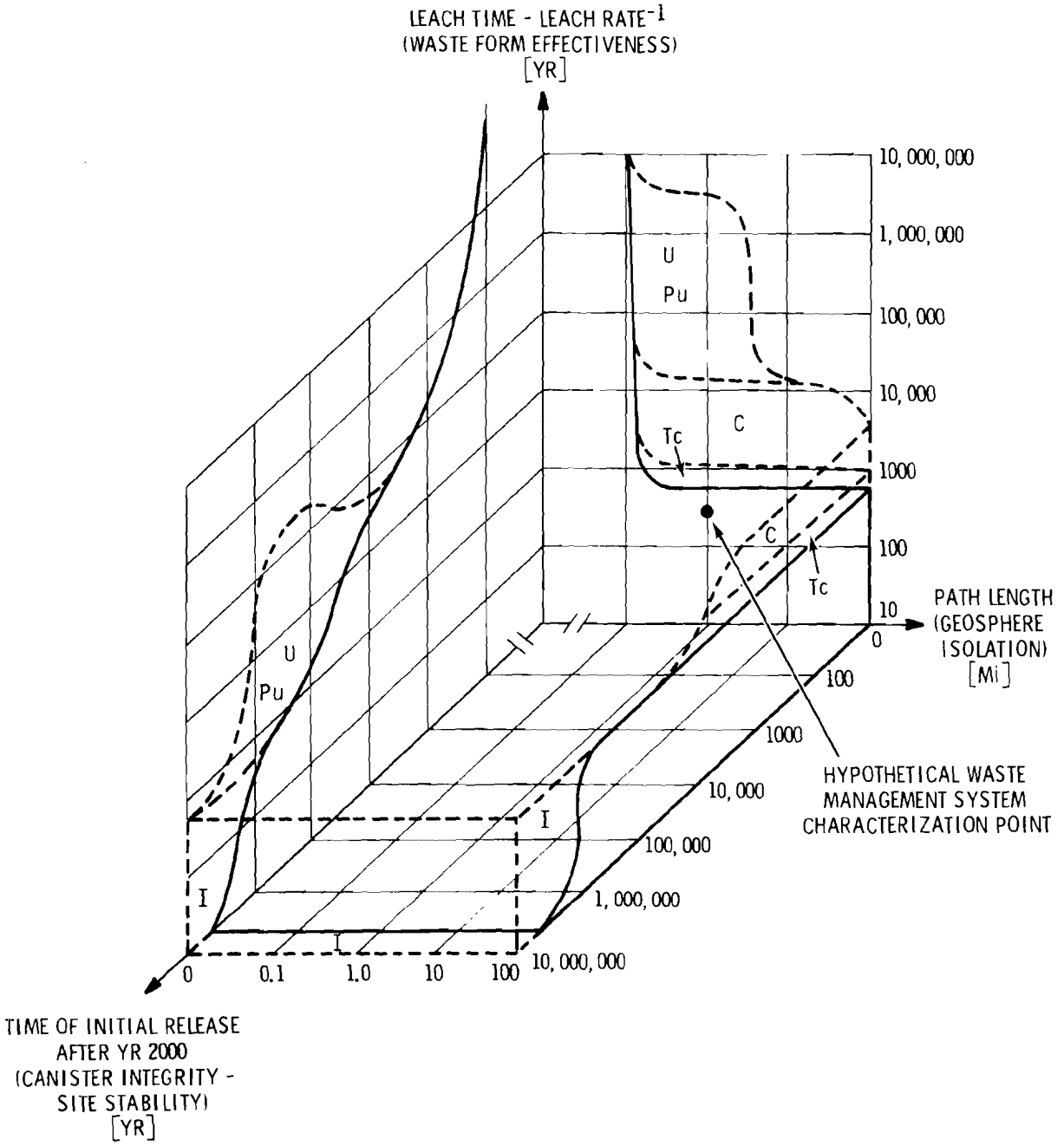

FIGURE 15. Waste Management Control Surface for Incremental Background Dose with 99% Elimination of Uranium, Plutonium, Carbon, Technetium and Iodine

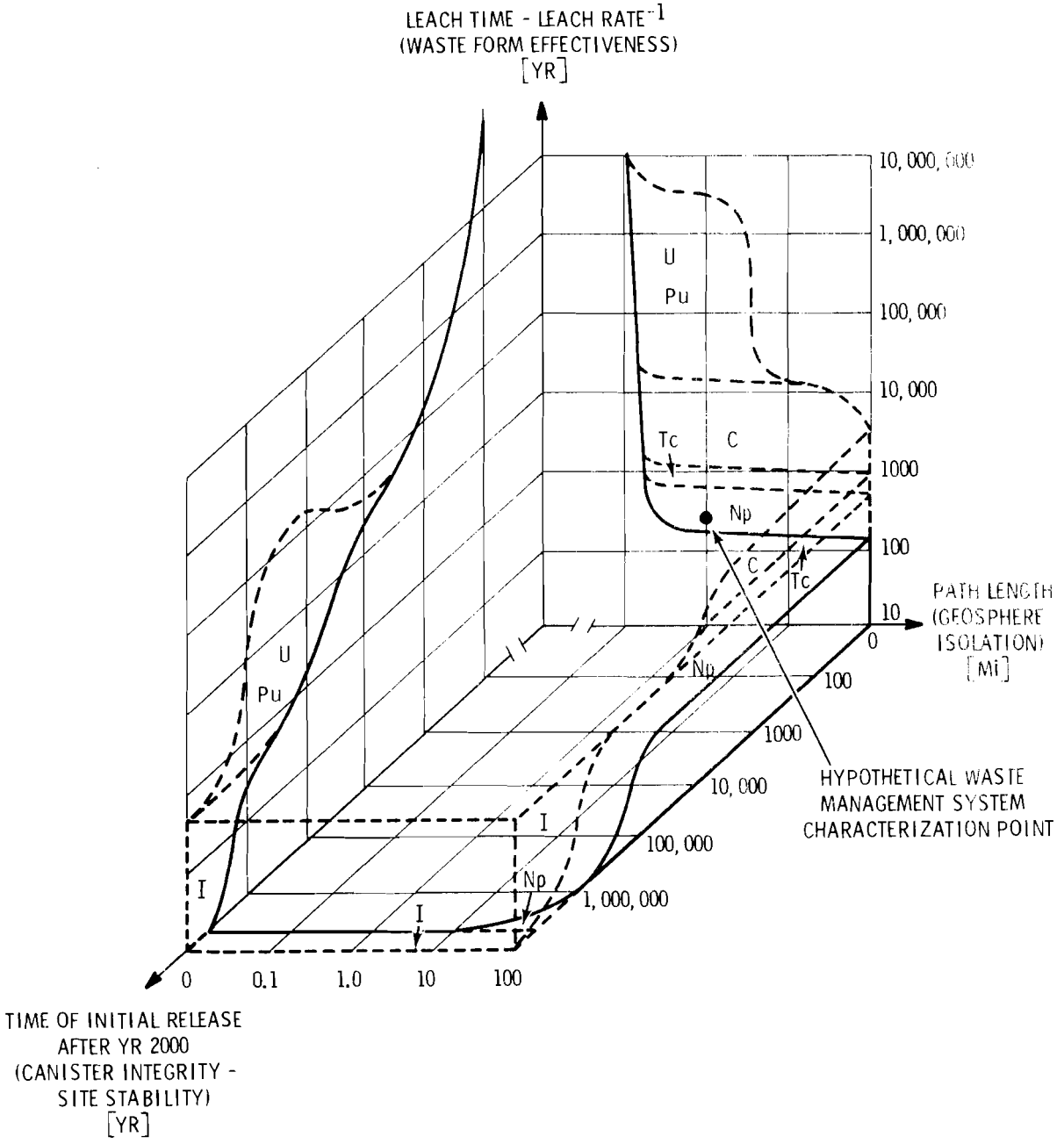

FIGURE 16. Waste Management Control Surface for Incremental Background Dose with 99% Elimination of Uranium, Plutonium, Carbon, Technetium, Iodine and Neptunium

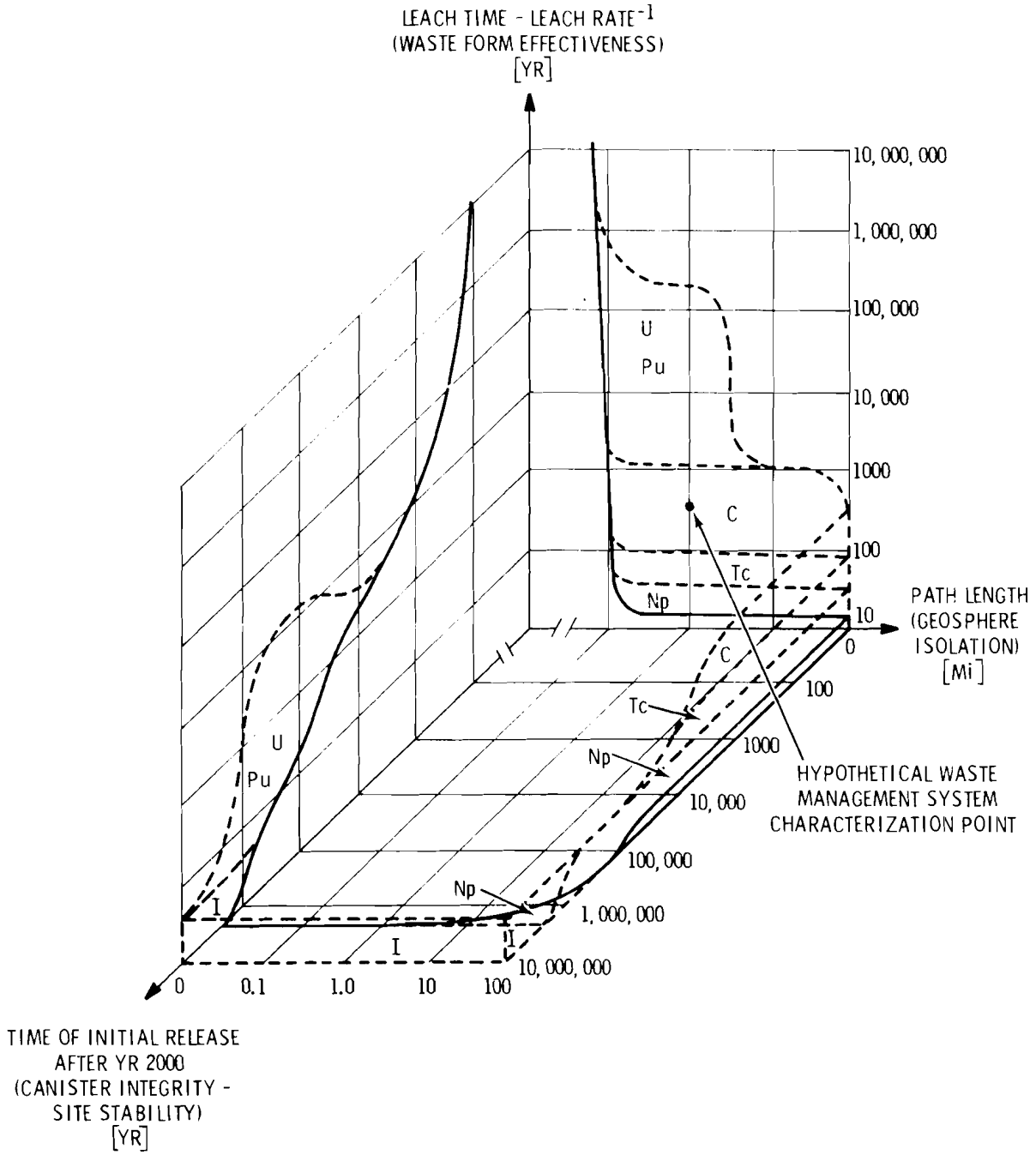

FIGURE 17. Waste Management Control Surface for NCRP Radiation Limit with 99% Elimination of Uranium, Plutonium, Carbon, Technetium, Iodine and Neptunium

incentives. Consideration now is given to waste management systems chosen to make the partitioning incentives marginal. If the final storage site is separated from the biosphere by at least 5 miles of western U.S. desert soil or equivalent, the waste form has a leach time of at least 15,000 years (1 ft diam x 10 ft long monolithic borosilicate glass waste form with a surface flux of slightly less than 10^{-5} g/cm^2/day), the waste containment fails at the Year 2000, and the publicly acceptable consequence to an individual is an incremental background dose or more, the system characterization point would be located on Figure 9 about at the intersection of the carbon ledge and the radium ridge. Thus no partitioning incentives would exist for this scenario.

Likewise, if publicly acceptable incremental dose is one-tenth of background (which raises the control surface in Figure 9 by one order of magnitude at the point where the carbon ledge and radium ridge intersect), the migration path consists of at least 5 miles of western U.S. desert subsoil or equivalent, the leach time is at least 150,000 years (surface flux of slightly less than 10^{-6} g/cm^2/day), and no credit is taken for the integrity of the container or the stability of the site from water penetration, then no partitioning incentives exist.

At first glance it is tempting to argue that there are actually no partitioning incentives even if one one-hundredth of background is the publicly acceptable release consequences for the situation described above because the spent fuel carbon (which controls the dose in the region of interest) is not actually present in the waste. However, as inspection of the bone dose column of Table 11 shows, the ^{226}Ra dose at the uranium and protactinium peaks ($\sim$2 x 10^6 years after the Year 2000) would still be above one one-hundredth of background values even if the carbon were not present.

The preceding scenarios seem quite reasonable. It seems very likely that a terminal storage site in a nonsalt formation can be found in the United States where 5 miles or more of western U.S. desert soil or equivalent separate the site from the biosphere. Leach rates as low as 10^{-7} g/cm^2/day have been measured for sample borosilicate glass waste forms, so that the assumed range of 10^{-5} to 10^{-6} g/cm^2/day seems conservative. Much evidence

exists to show that current containers can last 100 years or more and that almost any reasonable site could be expected to be stable from water penetration for 1000 years or more. Thus taking no credit for canister integrity or the water penetration stability of the site seems very conservative. The assumption that the publicly acceptable incremental consequences are one-tenth of background also seems conservative particularly when background varies by more than a factor of two in the United States (i.e., background at some locations is greater than 240 mrem/yr compared with the 120 mrem/yr assumed for this study). Thus, given the accuracy of the assumptions made in developing and applying the method for this study, incentives for partitioning high-level waste do not exist.

The results of this study are applicable to the evaluation of incentives for conversion of high-level calcine into glass. Calcine is very soluble in water and has a large surface to volume ratio, so that the leach time might be less than one year and would probably not be greater than 100 years. Thus calcine waste forms would be below the waste management control surface in Figure 9 for an incremental background dose (and much below a similar surface for a one-tenth of background incremental dose) even if the release does not occur for 10,000,000 years. Thus if the leach incident is the highest risk pathway to man from high-level waste, there is an incentive to convert calcine into glass.

5.0 ASSUMPTIONS AND CONCLUSIONS

Assumptions:

1. The radionuclide source is all of the high-level U.S. nuclear power economy waste through the Year 2000, including all tritium, carbon, and iodine from spent fuel and the activation products from the cladding.
2. The waste has no value as a mineral resource.
3. The release pathways with the greatest risk to man originate from the waste after ultimate disposal.
4. A nonsalt particulate geologic medium characterizes the terminal storage site.
5. The geologic medium is western U.S. desert subsoil.
6. The highest risk pathway from the site to the biosphere is the leach incident pathway.
7. All partitioning schemes are feasible.
8. The high risk fractions from all partitioning schemes are eliminated with negligible risk.
9. All nuclides are soluble in groundwater and the dissolved nuclides do not change speciation during migration.
10. The migrating nuclides are in sorption equilibrium at all points.
11. Estimates of the sorption equilibrium constants are used.
12. Transverse convection and dispersion are neglected.
13. The nuclides are dissolved in the groundwater in trace concentrations.
14. The water velocity and the axial dispersion coefficient are constant.
15. The waste form maintains its original shape as nuclides are leached out.
16. Doses are calculated for a "maximum" individual.

17. For all dose calculations the discharging nuclides accumulate in the biosphere for 50 years, the "maximum" individual is exposed to that accumulation for another 50 years, and the nuclides are dispersed into the biosphere with no dose after the 100-year accumulation and exposure period.

18. Man's dietary and living habits will remain constant throughout geologic time.

Conclusions:

1. Increasing geosphere isolation (longer path length between the terminal storage site and man's environment) decreases the dose from single nuclides and greatly decreases the dose from nuclides in actinide decay chains.

2. Increasing waste form effectiveness (smaller leach rates) decreases the dose from single nuclides but does not decrease the dose from nuclides created by decay after their precursors have left the site unless the leach rate becomes very small.

3. Increasing canister integrity and site stability does not significantly change the doses for long soil columns unless release from the disposal is delayed for 10,000 years and more. (Of course, any release delay at the repository postpones the radiation exposure to later geologic times.)

4. Elements which could have partitioning incentives under some circumstances are: 1) plutonium (^{238}Pu), 2) uranium (^{234}U), 3) carbon (^{14}C), 4) technetium (^{99}Tc), 5) iodine (^{129}I), and 6) neptunium (^{237}Np).

5. If an incremental background dose (6000 mrem for a 50-year accumulated dose) is the publicly acceptable release consequences, 5 miles or more of western U.S. desert subsoil separate the final storage site from the biosphere, the leach time is 15,000 years or more (monolithic waste form with leach rate of slightly less than 10^{-5} g/cm^2/day), and the initial release occurs in the Year 2000 or later, there is no incentive to partition anything from high-level waste.

6. If one-tenth of background is the publicly acceptable release consequences, the path length is 5 miles or more, the leach time is 150,000 years (monolithic waste form with a leach rate of slightly less than 10^{-6} g/cm^2/day), and the initial release occurs in the Year 2000 or later, there are no partitioning incentives for high-level waste.

7. If the leach incident is the highest risk pathway to man from high-level waste, there is an incentive to convert high-level calcine into glass.

6.0 RECOMMENDATIONS

1. Because the present analysis shows no incentive for partitioning, further work developing specific partitioning processes seems unwarranted at this time.

2. A general evaluation of partitioning incentives should be made which removes or justifies the assumptions made for this study and which includes an evaluation of the waste as a mineral resource. To accomplish this task, the general study must consider:

   a) all wastes from the nuclear fuel cycle

   b) all steps in the waste management scheme for each waste both with and without partitioning

   c) all pathways to man from each step.

3. In support of Recommendation 2, further work should:

   a) complete development of the nuclide migration model for a particulate medium with salt present and extend the present model to describe the faulted monolith type of geologic formation

   b) measure in the laboratory and in situ the sorption equilibrium constants for nuclides in the various geologic media with and without the presence of salt and develop a better fundamental understanding of actinide migration phenomena.

   c) improve the biosphere transport model to include the long-term (>100 years) accumulation and dispersion of nuclides in the biosphere.

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APPENDICES

APPENDICES

APPENDIX A

DATA FILES:

Nuclide Source Inventory

Estimated Sorption Equilibrium Constants for Western U.S. Desert Soil

Estimated Groundwater Composition for Western U.S. Desert

TABLE A.1. Nuclide Source Inventory*

100	TIME	0.00E+00	1.00E+02	1.00E+03	1.00E+04	1.00E+05	1.00E+06
110	H3	7.23E+08	2.29E+06	0.	0.	0.	0.
120	TC99	2.86E+06	2.83E+06	2.82E+06	2.74E+06	2.04E+06	1.08E+05
130	I129	8.04E+03	8.04E+03	8.04E+03	8.04E+03	8.01E+03	7.72E+03
140	C14	1.03E+06	1.02E+06	9.15E+05	3.08E+05	5.77E+00	0.
150	MO93	5.22E+03	5.18E+03	4.84E+03	2.42E+03	2.37E+00	0.
160	CA41	6.85E+02	6.85E+02	6.80E+02	6.29E+02	2.88E+02	1.19E-01
170	SE79	9.72E+04	9.71E+04	9.62E+04	8.74E+04	3.35E+04	2.28E+00
180	SR90	1.29E+10	1.10E+09	2.52E-01	0.	0.	0.
190	BE10	4.04E+02	4.04E+02	4.04E+02	4.03E+02	3.93E+02	3.06E+02
200	CO60	7.70E+07	1.46E+02	0.	0.	0.	0.
210	NI59	2.07E+05	2.06E+05	2.05E+05	1.89E+05	8.69E+04	3.57E+01
220	NI63	6.67E+06	3.14E+06	3.57E+03	0.	0.	0.
230	RB87	4.67E+00	4.67E+00	4.67E+00	4.67E+00	4.67E+00	4.67E+00
240	CS135	8.59E+04	8.59E+04	8.59E+04	8.57E+04	8.40E+04	6.82E+04
250	CS137	1.85E+10	1.84E+09	1.72E+00	0.	0.	0.
260	PD107	2.28E+04	2.28E+04	2.28E+04	2.28E+04	2.26E+04	2.06E+04
270	SN126	1.28E+05	1.28E+05	1.27E+05	1.19E+05	6.39E+04	1.25E+02
280	SM151	3.10E+08	1.40E+08	1.08E+05	0.	0.	0.
290	HO166M	1.00E+02	9.47E+01	5.63E+01	3.11E-01	0.	0.
300	EU152	1.61E+06	5.00E+03	0.	0.	0.	0.
310	EU154	8.32E+08	1.09E+07	1.29E-10	0.	0.	0.
320	ZR93	4.03E+05	4.03E+05	4.02E+05	4.00E+05	3.84E+05	2.53E+05
330	CD113M	4.67E+06	3.31E+04	1.49E-15	0.	0.	0.
340	CM248	5.01E-01	5.01E-01	5.00E-01	4.91E-01	4.11E-01	6.99E-02
350	PU244	5.36E-05	5.40E-05	5.74E-05	9.16E-05	4.02E-04	1.72E-03
360	CM244	4.71E+08	1.02E+07	8.58E-08	1.19E-07	5.23E-07	2.24E-06
370	PU240	1.93E+06	3.13E+06	2.88E+06	1.15E+06	1.13E+02	1.72E-03
380	U236	5.58E+03	5.59E+03	5.67E+03	6.16E+03	6.47E+03	6.30E+03
390	TH232	7.80E+00	7.80E+00	7.80E+00	7.80E+00	7.83E+00	8.11E+00
400	U232	2.50E+04	9.75E+03	1.69E+00	0.	0.	0.
410	CM245	1.38E+05	1.37E+05	1.27E+05	5.97E+04	3.15E+01	0.
420	PU241	2.64E+08	2.58E+06	1.27E+05	5.98E+04	3.16E+01	0.
430	AM241	8.56E+07	8.08E+07	1.93E+07	5.98E+04	3.33E+01	0.
440	NP237	8.07E+04	8.34E+04	9.59E+04	9.98E+04	9.71E+04	7.26E+04
450	U233	1.88E+04	1.88E+04	1.91E+04	2.21E+04	4.65E+04	7.73E+04
460	TH229	1.74E+01	1.95E+02	1.73E+03	1.27E+04	4.72E+04	7.73E+04
470	CM246	2.68E+04	2.64E+04	2.31E+04	6.15E+03	1.09E-02	3.84E-25
480	PU242	9.26E+03	9.46E+03	9.82E+03	9.87E+03	8.44E+03	1.63E+03
490	U238	2.44E+02	2.44E+02	2.44E+02	2.44E+02	2.44E+02	2.45E+02
500	CM242	3.61E+08	3.87E+06	6.40E+04	9.71E-14	0.	0.
510	AM242M	7.45E+06	4.72E+06	7.80E+04	1.18E-13	0.	0.
520	PU238	3.97E+08	1.86E+08	2.32E+05	2.34E-13	0.	0.
530	U234	2.27E+04	1.01E+05	1.70E+05	1.65E+05	1.29E+05	1.05E+04
540	TH230	5.55E+00	6.33E+01	1.38E+03	1.38E+04	8.43E+04	1.55E+04
550	RA226	3.47E-01	1.56E+00	2.47E+02	1.08E+04	8.44E+04	1.55E+04
560	CM247	1.29E-01	1.29E-01	1.29E-01	1.29E-01	1.29E-01	1.24E-01
570	AM243	5.12E+06	5.07E+06	4.67E+06	2.07E+06	5.95E+02	1.24E-01
580	CM243	4.03E+06	4.63E+05	1.59E-03	0.	0.	0.
590	PU239	9.69E+05	9.86E+05	1.08E+06	1.55E+06	1.93E+05	1.24E-01
600	U235	2.26E+01	2.27E+01	2.36E+01	3.57E+01	1.15E+02	1.21E+02
610	PA231	1.57E+04	1.57E+04	1.54E+04	1.27E+04	1.95E+03	1.21E+02
620	CM250	5.59E-08	5.57E-08	5.37E-08	3.75E-08	1.04E-09	2.82E-25
630	CF250	1.31E+01	6.53E-02	5.37E-08	3.75E-08	1.04E-09	2.83E-25
640	CF249	7.86E+00	6.53E+00	1.11E+00	2.24E-08	0.	0.
650	CF251	2.20E-01	2.04E-01	1.02E-01	9.99E-05	0.	0.
660	CF252	3.73E+00	1.58E-11	0.	0.	0.	0.

* Includes all high-level waste from the U.S. nuclear power economy through Year 2000 plus all tritium, carbon, and iodine from spent fuel and activation products from the cladding. The columns show the inventories of each nuclide in curie units at various times after Year 2000. Thus, the first column shows the inventories at the Year 2000, the second column at the Year 2100, the third at the Year 3000, etc.

TABLE A.2. Estimated Sorption Equilibrium Constants for Western U.S. Desert Soil*

Element	K^{-1}**
Tritium	1
Beryllium	3×10^{-3}
Carbon	1×10^{-1}
Sodium	2×10^{-2}
Chlorine	1
Argon	1
Potassium	6×10^{-3}
Calcium	1×10^{-2}
Iron	3×10^{-4}
Cobalt	3×10^{-3}
Nickel	3×10^{-3}
Selenium	1×10^{-2}
Krypton	1
Rubidium	2×10^{-3}
Strontium	1×10^{-2}
Yttrium	1×10^{-4}
Zirconium	1×10^{-4}
Niobium	1×10^{-4}
Molybdenum	1×10^{-2}
Technetium	4×10^{-2}
Palladium	1
Cadmium	9×10^{-4}
Tin	1×10^{-4}
Antimony	9×10^{-4}
Iodine	1×10^{-2}
Cesium	1
Promethium	1×10^{-3}
Samarium	4×10^{-4}
Europium	4×10^{-4}
Holmium	4×10^{-4}
Thallium	4×10^{-4}
Lead	1×10^{-1}
Bismuth	6×10^{-5}
Polonium	2×10^{-2}
Astatine	9×10^{-3}
Radon	1
Francium	1
Radium	1×10^{-3}
Actinium	2×10^{-3}
Thorium	2×10^{-4}
Protactinium	2×10^{-5}
Uranium	6×10^{-5}
Neptunium	7×10^{-5}
Plutonium	1×10^{-2}
Americium	1×10^{-4}
Curium	1×10^{-4}
Berkelium	1×10^{-4}
	3×10^{-4}

* Reference 1, p. 3.54.
** K^{-1} = nuclide velocity/water velocity

TABLE A.3. Estimated Groundwater Composition for Western U.S. Desert*

pH = 6.8-8.2

Ion	Composition (ppm)
Na^{+}	20
K^{+}	5
Ca^{++}	25
Mg^{++}	5
$SO_4^{=}$	15
NO_3^{-}	1
Cl^{-}	8
HCO_3^{-}	125

* Reference 1, p. 3.54

APPENDIX B

CHAIN MIGRATION EQUATIONS

APPENDIX B - CHAIN MIGRATION EQUATIONS

The linear partial differential equations which describe the material balances of the "i"th chain member and all preceding chain members over a differential volume of the soil column are:

$$D \frac{\partial^2 N_1}{\partial Z^2} - V \frac{\partial N_1}{\partial Z} - K_1 \frac{\partial N_1}{\partial t} - K_1 \lambda_1 N_1 = 0 \qquad (1)$$

$$D \frac{\partial^2 N_2}{\partial Z^2} - V \frac{\partial N_2}{\partial Z} - K_2 \frac{\partial N_2}{\partial t} - K_2 \lambda_2 N_2 + K_1 \lambda_1 N_1 = 0 \qquad (2)$$

$$\vdots$$

$$D \frac{\partial^2 N_i}{\partial Z^2} - V \frac{\partial N_i}{\partial Z} - K_i \frac{\partial N_1}{\partial t} - K_i \lambda_i N_i + K_{i-1} \lambda_{i-1} N_{i-1} = 0 \qquad (3)$$

where N is the nuclide migration rate, Z is distance, t is time, D is the dispersion coefficient, V is the water velocity, and λ is the decay constant. K is the sorption equilibrium constant and is defined by $K = 1 + K_d \rho/\varepsilon$ where K_d is the distribution coefficient, ρ is the soil density, and ε is the soil porosity.

The boundary conditions for band release are shown in Table B.1. The analytical solution for band release is obtained by superposing the results for a step increase in nuclide release at the time leaching begins and a step decrease to zero release based on the inventories at the time the repository becomes empty. For a three-member chain, this result is expressed as:

$$N_1^b = N_1^s(\Theta) - N_1^s(\Theta - TV/L) \quad (4)$$

$$N_2^b = N_2^s(\Theta) - N_2^s(\Theta - TV/L) \quad (5)$$

$$N_3^b = N_3^s(\Theta) - N_3^s(\Theta - TV/L) \quad (6)$$

TABLE B.1. Boundary Conditions for Band Release

Initial $t = 0$, all Z	$0 < t < T$, $Z = 0$ Inlet	$t > T$, $Z = 0$	Outlet $t > 0$, $Z = \infty$ *
$N_1 = 0$	$N_1 = \frac{N_1^o}{T} \text{EXP}(-\lambda_1 t)$	$N_1 = 0$	N_1 = finite
$N_2 = 0$	$N_2 = \frac{N_2^o}{T} \text{EXP}(-\lambda_2 t) + \frac{\lambda_1}{\lambda_2 - \lambda_1} \frac{N_1^o}{T} \left(\text{EXP}(-\lambda_1 t) - \text{EXP}(-\lambda_2 t)\right)$	$N_2 = 0$	N_2 = finite
$N_i = 0$	$N_i = \lambda_1\lambda_2 \cdots \lambda_{i-1} \frac{N_1^o}{T} \sum_{j=1}^{i} \frac{\text{EXP}(-\lambda_j t)}{\prod_{k \neq j} (\lambda_k - \lambda_j)} + \lambda_2\lambda_3 \cdots \lambda_{i-1} \frac{N_2^o}{T} \sum_{j=2}^{i} \frac{\text{EXP}(-\lambda_j t)}{\prod_{k \neq j} (\lambda_k - \lambda_j)} + \cdots + \frac{N_i^o}{T} \text{EXP}(-\lambda_i t)$	$N_i = 0$	N_i = finite

where T is the leach time

* This boundary condition implies an infinite soil column with the groundwater leaving the column and entering the surface water at a distance L from the inlet.

The analytical result used in this study simplified the general result for single nuclides, two-member chains, and three-member chains by including the effects of axial dispersion for initial inventory contributions only (i.e., dispersion is applied only to those nuclides which were at the disposal site at the time of the release incident.)[3] The expressions for step release follow:

$$N_1^S = G_1(1) \tag{7}$$

$$N_2^S = G_1(2) + G_2(1,2)\, G_3(1,2)\, G_{12}(1,2)\, G_{13}(2) \tag{8}$$
$$+ G_2(1,2) \left[G_4(1,2)\, G_9(1)\, G_{13}(1) - G_9(2)\, G_{13}(2)\right]$$
$$+ G_2(1,2)\, G_4(1,2)\, G_{11}(1,2,2) \left[G_{13}(2) - G_{13}(1)\right]$$

$$N_3^S = G_1(3) + G_2(2,3)\, G_3(2,3)\, G_{12}(2,3)\, G_{13}(3) \tag{9}$$
$$+ G_2(2,3) \left[G_4(2,3)\, G_9(2)\, G_{13}(2) - G_9(3)\, G_{13}(3)\right]$$
$$+ G_2(2,3)\, G_4(2,3)\, G_{11}(2,3,3) \left[G_{13}(3) - G_{13}(2)\right]$$
$$+ G_{14}(1,2)\, G_{13}(3) \left[\frac{G_{12}(1,3)}{G_7(1,2)\, G_7(1,3)} + \frac{G_{12}(2,3)}{G_7(2,1)\, G_7(2,3)} + \frac{G_9(3)}{G_7(3,1)\, G_7(3,2)}\right]$$
$$+ \frac{G_5(1,2,3)}{G_7(1,2)\, G_8(1,2,3)} \left[G_{12}(1,3)\, G_{13}(3) - G_{12}(1,2)\, G_{13}(2)\right]$$
$$+ \frac{G_5(1,2,3)}{G_7(2,1)\, G_8(2,2,3)} \left[G_{12}(2,3)\, G_{13}(3) - G_9(2)\, G_{13}(2)\right]$$
$$+ \frac{G_5(1,2,3)}{G_8(1,2,3)\, G_8(2,2,3)}\, G_{11}(2,3,3) \left[G_{13}(3) - G_{13}(2)\right]$$

$$+ \frac{G_6(1,2,3,2)}{G_8(1,1,2)\ G_8(1,2,3)} \left[G_{12}(1,3)\ G_{13}(3) - G_{12}(1,2)\ G_{13}(2)\right]$$

$$+ \frac{G_6(1,2,3,2)}{G_8(1,1,2)\ G_{10}(2,3,1,2)} \left[G_{11}(1,2,3)\ G_{13}(3) - G_{11}(1,2,2)\ G_{13}(2)\right]$$

$$+ \frac{G_6(1,2,3,2)}{G_8(1,2,3)\ G_{10}(1,2,2,3)}\ G_{11}(2,3,3) \left[G_{13}(3) - G_{13}(2)\right]$$

$$- \frac{G_6(1,2,3,1)}{G_8(1,1,2)\ G_8(1,1,3)} \left[G_{12}(1,3)\ G_{13}(3) - G_9(1)\ G_{13}(1)\right]$$

$$- \frac{G_6(1,2,3,1)}{G_8(1,1,2)\ G_{10}(1,3,1,2)} \left[G_{11}(1,2,3)\ G_{13}(3) - G_{11}(1,2,1)\ G_{13}(1)\right]$$

$$- \frac{G_6(1,2,3,1)}{G_8(1,1,3)\ G_{10}(1,2,1,3)}\ G_{11}(1,3,3) \left[G_{13}(3) - G_{13}(1)\right]$$

where:

$$G_1(i) = \frac{N_i}{2T} \exp\left(-R_i\Theta + \frac{P\eta}{2}\right) \left[\exp\left(-\frac{P\eta}{2}\right) \operatorname{erfc}\left(\frac{\eta}{2}\sqrt{\frac{K_i P}{\Theta}} - \sqrt{\frac{P\Theta}{4K_i}}\right)\right.$$

$$\left. + \exp\left(\frac{P\eta}{2}\right) \operatorname{erfc}\left(\frac{\eta}{2}\sqrt{\frac{K_i P}{\Theta}} + \sqrt{\frac{P\Theta}{4K_i}}\right)\right]$$

$$G_2(i,j) = \frac{N_i^o}{T} \quad \frac{R_i}{(R_j - R_i)}$$

$$G_3(i,j) = 1 - \frac{K_i}{K_j}$$

$$G_4(i,j) = \frac{K_i}{K_j}$$

$$G_5(i,j,k) = \frac{N_i^o}{T} \quad \frac{K_j R_i R_j}{(K_j - K_k)}$$

$$G_6(i,j,k,\ell) = \frac{N_i^o K_i K_j R_i R_j}{T(K_i - K_j)\ (K_\ell - K_k)}$$

$$G_7(i,j) = R_j - R_i$$

$$G_8(i,j,k) = \frac{R_j K_j - R_k K_k}{K_j - K_k} - R_i$$

$$G_9(i) = \exp\ (\ -\ R_i \Theta)$$

$$G_{10}(i,j,k,\ell) = \frac{R_k K_k - R_\ell K_\ell}{K_k - K_\ell} - \frac{R_i K_i - R_j K_j}{K_i - K_j}$$

$$G_{11}(i,j,k) = \exp\ \left\{ -\frac{R_i K_i - R_j K_j}{K_i - K_j}\ \Theta - \left[R_k K_k - \frac{K_k (R_i K_i - R_j K_j)}{(K_i - K_j)} \right] \eta \right\}$$

$$G_{12}(i,j) = \exp\ \left[-\ R_i \Theta - K_j\ \ (R_j - R_i)\eta \right]$$

$$G_{13}(i) = u(\Theta - K_i \eta)$$

$$G_{14}(i,j) = \frac{N_i}{T} R_i R_j$$

$u(\ )$ = unit step function

N^o = the nuclide inventory at the time the release begins (for the step decrease result used for band release, this symbol represents the nuclide inventory if the total inventories of all the nuclides had remained at the storage site and decayed until the time of the step decrease).

$P=VL/D$ = Peclet Number

$R=\lambda L/V$ = Decay Number

$\eta=Z/L$ = Dimensionless distance

$\Theta=tV/L$ = Dimensionless time

As listed above, N_2^s includes the contributions to the second chain number from the initial inventories of both the first and second members. However, if the $G_1(2)$ term is removed, the remaining terms describe the migration of second member created by decay the first member after the release has begun. Likewise, if the first four terms are removed from N_3^s, the remaining terms describe the migration of third member created by decay of the first member after the release has begun.

APPENDIX C

TREATMENT OF ACTINIDE DECAY CHAINS

APPENDIX C - TREATMENT OF ACTINIDE DECAY CHAINS

The nuclides of interest in geosphere migration studies for high-level waste include four, large, branched, but noninteracting actinide decay system. The migration of these complex chains was approximately modeled using combinations of two- and three-membered chains. The approximation techniques can be understood by considering the chains themselves. The Figures which follow show the chains schematically and include the half-lives and Year 2000 inventories for each nuclide. The very short half-life members of each chain are assumed to travel in secular decay equilibrium with their parents. The Tables which follow treat the nuclides in each chain one at a time, and the sub-chains necessary to describe each nuclide are shown. When a nuclide's initial inventory is used in the calculation, that nuclide is underlined.

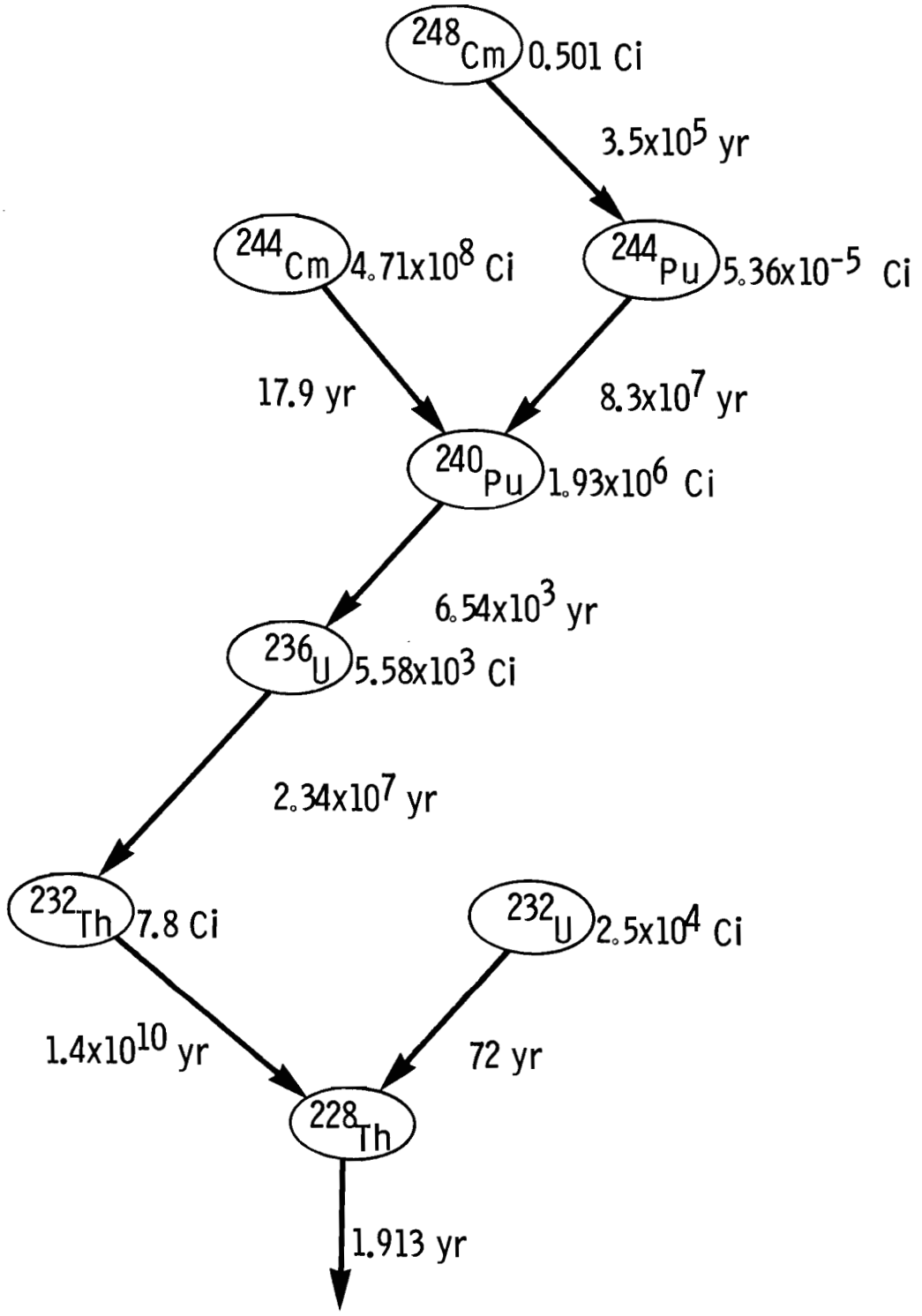

FIGURE C.1. Schematic Diagram of 4N Decay Chain

TABLE C.1. Treatment of the 4N Decay Chain

Nuclide	Treatment	Remarks
^{248}Cm	^{248}Cm	Includes ^{248}Cm from Decay of ^{252}Cf
^{244}Pu	$^{248}Cm \rightarrow {}^{244}Pu$	
^{244}Cm	^{244}Cm	
^{240}Pu	$^{244}Cm \rightarrow {}^{240}Pu$	
	+ $^{248}Cm \rightarrow {}^{244}Pu$	$T_{1/2}\ ^{240}Pu << T_{1/2}\ ^{244}Pu$
^{236}U	$^{244}Cm \rightarrow {}^{240}Pu \rightarrow {}^{236}U$	
	+ $^{244}Pu \rightarrow {}^{236}U$	$T_{1/2}\ ^{240}Pu << T_{1/2}\ ^{244}Pu$
	+ $^{248}Cm \rightarrow {}^{244}Pu \rightarrow {}^{236}U$	$T_{1/2}\ ^{240}Pu << T_{1/2}\ ^{244}Pu$
^{232}U	^{232}U	
^{232}Th	$(^{244}Cm + {}^{240}Pu) \rightarrow {}^{236}U$	^{248}Cm and ^{244}Pu initial inventories are negligible weight ^{240}Pu initial inventory
	$\rightarrow {}^{232}Th$	
^{228}Th	$^{232}U \rightarrow {}^{228}Th$	
	+ $^{240}Pu \rightarrow {}^{236}U \rightarrow {}^{232}Th$	$T_{1/2}\ ^{228}Th << T_{1/2}\ ^{232}Th$

NOTE: ^{244}Ra and its progeny are assumed to be in secular equilibrium with ^{228}Th during migration through the geosphere.

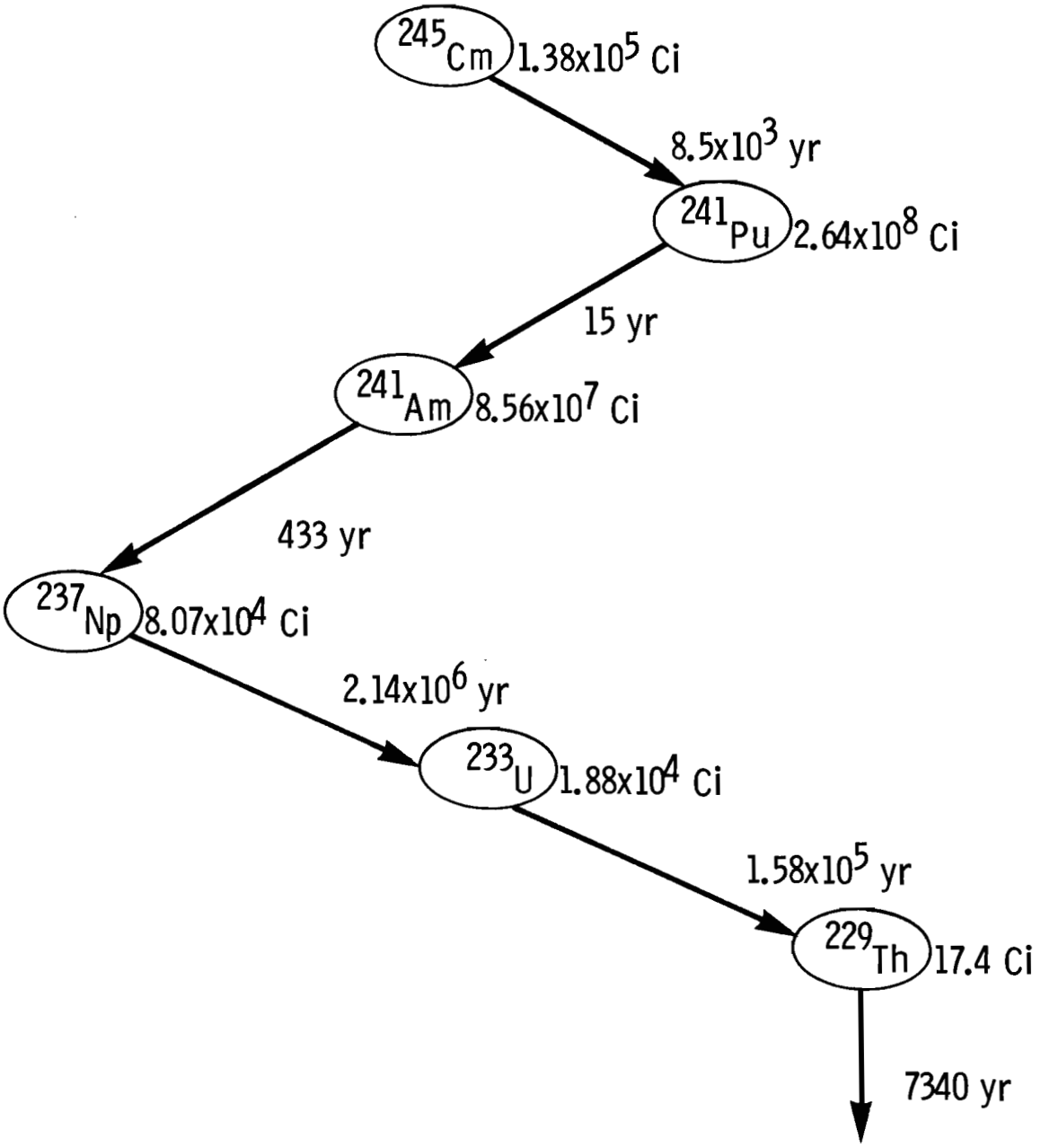

FIGURE C.2. Schematic Diagram of 4N+1 Decay Chain

TABLE C.2. Treatment of 4N+1 Decay Chain

Nuclide	Treatment	Remarks
^{245}Cm	^{245}Cm	Includes ^{245}Cm from Decay of ^{249}Cf
^{241}Pu	^{241}Pu	
	+ ^{245}Cm	$T_{1/2}\ ^{241}Pu \ll T_{1/2}\ ^{245}Cm$
^{241}Am	$^{241}Pu \longrightarrow {}^{241}Am$	
	+ ^{245}Cm	$T_{1/2}\ ^{241}Pu \ll T_{1/2}\ ^{245}Cm$
^{237}Np	$(^{241}Pu + Am^{241}) \longrightarrow {}^{237}Np$	$T_{1/2}\ ^{241}Pu < T_{1/2}\ ^{241}Am$ and $K\ ^{241}Pu = K\ ^{241}Am$
	+ $^{245}Cm \longrightarrow {}^{237}Np$	$T_{1/2}\ ^{241}Pu$ and $T_{1/2}\ ^{241}Am \ll T_{1/2}\ ^{245}Cm$
^{233}U	$^{237}Np \longrightarrow {}^{233}U$	
	+ $(^{241}Pu + {}^{241}Am) \longrightarrow {}^{237}Np \longrightarrow {}^{233}U$	$T_{1/2}\ ^{241}Pu < T_{1/2}\ ^{241}Am$ and $K\ ^{241}Pu = K\ ^{241}Am$
	+ $^{245}Cm \longrightarrow {}^{237}Np \longrightarrow {}^{233}U$	$T_{1/2}\ ^{241}Pu$ and $T_{1/2}\ ^{241}Am \ll T_{1/2}\ ^{245}Cm$
^{229}Th	$^{237}Np \longrightarrow {}^{233}U \longrightarrow {}^{229}Th$	
	+ $(^{241}Pu + {}^{241}Am) \longrightarrow {}^{237}Np \longrightarrow {}^{233}U$	$T_{1/2}\ ^{229}Th \ll T_{1/2}\ ^{233}U$
	+ $^{245}Cm \longrightarrow {}^{237}Np \longrightarrow {}^{233}U$	$T_{1/2}\ ^{229}Th \ll T_{1/2}\ ^{233}U$

Note: ^{225}Ra and its progeny are assumed to be in secular equilibrium with ^{229}Th during migration through the geosphere.

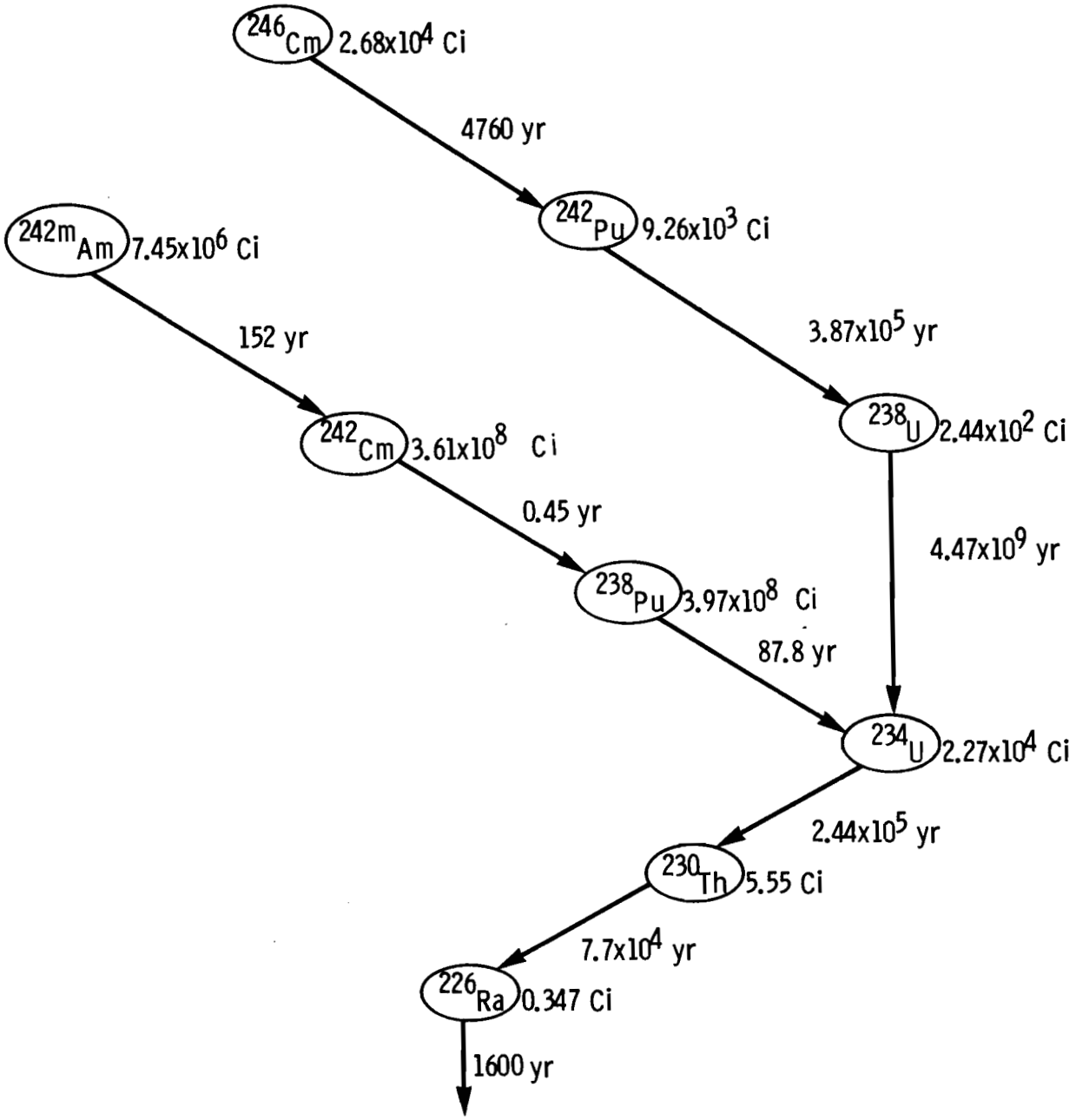

FIGURE C.3. Schematic Diagram of the 4N+2 Chain

TABLE C.3. Treatment of 4N+2 Decay Chain

Nuclide	Treatment	Remarks
^{246}Cm	^{246}Cm	Includes ^{246}Cm from Decay of ^{250}Cm and ^{250}Cf.
^{242}Pu	$^{246}Cm \rightarrow {}^{242}Pu$	
^{238}U	$^{246}Cm \rightarrow {}^{242}Pu \rightarrow {}^{238}U$	
^{242m}Am	^{242m}Am	
^{242}Cm	$^{242m}Am \rightarrow {}^{242}Cm$	
^{238}Pu	$^{242}Cm + {}^{238}Pu$	^{242m}Am initial inventories are negligible with respect to ^{238}Pu
^{234}U	$(^{242}Cm + {}^{238}Pu) \rightarrow {}^{234}U$	$T_{1/2}\ ^{242}Cm << T_{1/2}\ ^{238}Pu$
	$+\ ^{238}U \rightarrow {}^{234}U$	
	$+\ ^{242}Pu \rightarrow {}^{238}U$	$T_{1/2}\ ^{234}U << T_{1/2}\ ^{238}U$
	$+\ ^{246}Cm \rightarrow {}^{242}Pu \rightarrow {}^{238}U$	$T_{1/2}\ ^{234}U << T_{1/2}\ ^{238}U$
	$+\ ^{242m}Am \rightarrow {}^{234}U$	
^{230}Th	$(^{242}Cm + {}^{238}Pu + {}^{234}U) \rightarrow {}^{230}Th$	$T_{1/2}\ ^{242}Cm$ and $T_{1/2}\ ^{238}Pu << T_{1/2}\ ^{234}U$
	$+\ ^{238}U \rightarrow {}^{230}Th$	$K\ ^{238}U = K\ ^{234}U$. Use Bateman equation to convert ^{238}U inventory to pseudo ^{234}U inventory.
	$+\ ^{242}Pu \rightarrow {}^{238}U$	
	$+\ ^{246}Cm \rightarrow {}^{242}Pu \rightarrow {}^{238}U$	$T_{1/2}\ ^{234}U$ and $T_{1/2}\ ^{230}Th << T_{1/2}\ ^{238}U$
	$+\ ^{242m}Am \rightarrow {}^{234}U \rightarrow {}^{230}Th$	

TABLE C.3. (contd)

Nuclide	Treatment	Remarks
^{226}Ra	$(^{238}Pu + ^{234}U) \rightarrow ^{230}Th$	
	$\rightarrow ^{226}Ra$	
	$+ ^{238}U \rightarrow ^{230}Th \rightarrow ^{226}Ra$	$K\ ^{238}U = K\ ^{234}U$. Use Bateman equation to convert ^{238}U inventory to pseudo ^{234}U inventory.
	$+ ^{242}Pu \rightarrow ^{238}U$	
	$+ ^{246}Cm \rightarrow ^{242}Pu \rightarrow ^{238}U$	$T_{1/2}\ ^{234}U$, $T_{1/2}\ ^{230}Th$, and $T_{1/2}\ ^{226}Ra \ll T_{1/2}\ ^{238}U$
	$+ ^{242m}Am \rightarrow ^{234}U \rightarrow ^{230}Th$	$T_{1/2}\ ^{226}Ra \ll T_{1/2}\ ^{230}Th$

NOTE: ^{222}Rn and its progeny are assumed to be in secular equilibrium with ^{226}Ra during migration through the geosphere.

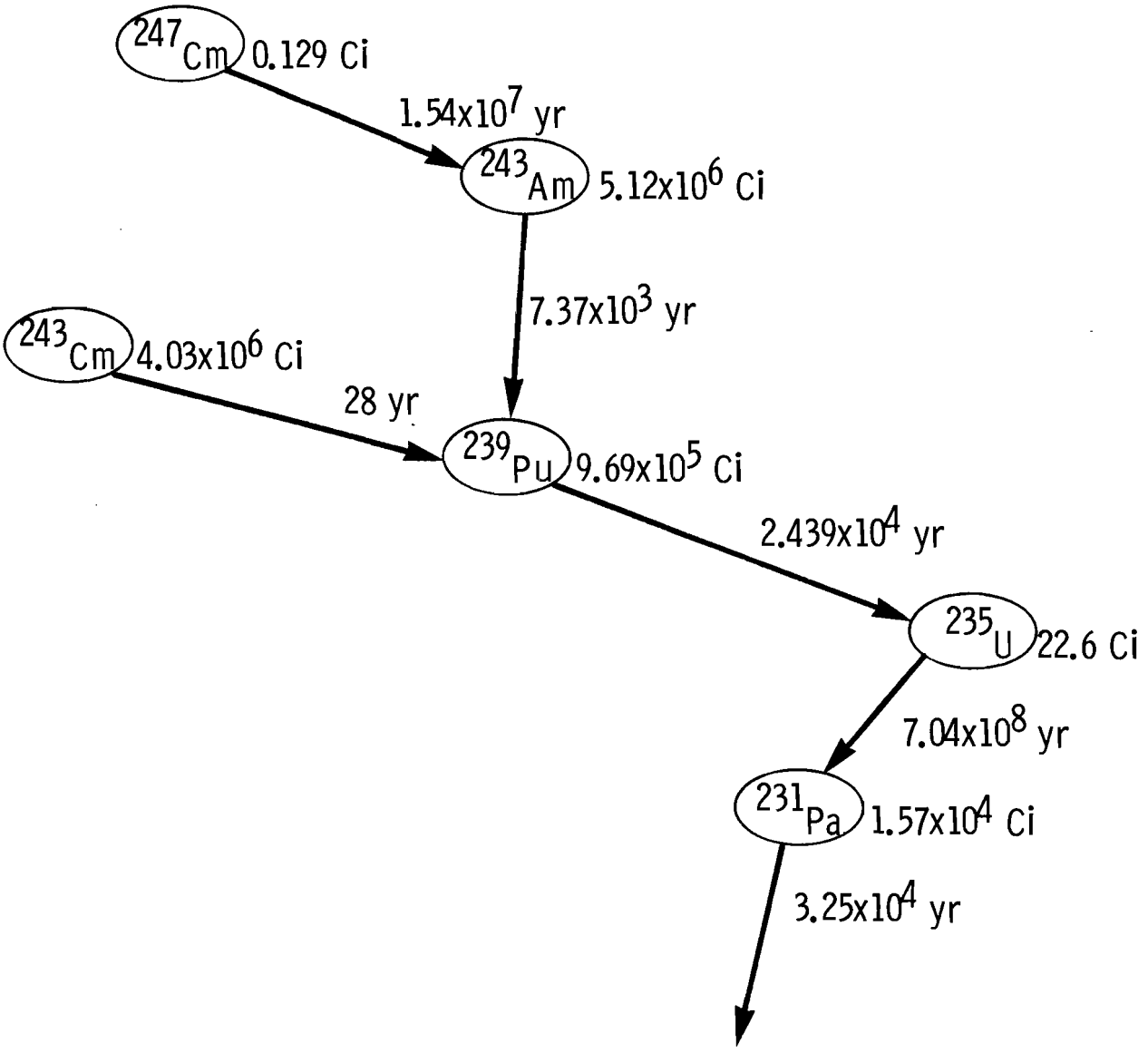

FIGURE C.4. Schematic Diagram of the 4N+3 Chain

TABLE C.4. Treatment of 4N+3 Decay Chain

Nuclide	Treatment	Remarks
^{247}Cm	$\underline{^{247}Cm}$	Includes ^{247}Cm from Decay of ^{257}Cf
^{243}Am	$\underline{^{247}Cm} \longrightarrow \underline{^{243}Am}$	
^{239}Pu	$\underline{^{243}Cm} + \underline{^{239}Pu}$	
	$+ \underline{^{243}Am} \longrightarrow ^{239}Pu$	
	$+ \underline{^{247}Cm} \longrightarrow ^{239}Pu$	$T_{1/2}\ ^{243}Am << ^{247}Cm$
^{235}U	$\left(\underline{^{243}Am} + \underline{^{243}Cm} + \underline{^{239}Pu}\right)$	$T_{1/2}\ ^{243}Am$ and $T_{1/2}\ ^{243}Cm$
	$\longrightarrow \underline{^{235}U}$	$<< T_{1/2}\ ^{239}Pu$
	$+ \underline{^{247}Cm} \longrightarrow ^{235}U$	
^{231}Pa	$\left(\underline{^{243}Am} + \underline{^{243}Cm} + \underline{^{239}Pu}\right)$	
	$\longrightarrow \underline{^{235}U} \longrightarrow \underline{^{231}Pa}$	
	$+ \underline{^{247}Cm} \longrightarrow ^{235}U$	$T_{1/2}\ ^{231}Pa << T_{1/2}\ ^{235}U$

NOTE: ^{227}Ac and its progeny are assumed to be in secular equilibrium with ^{231}Pa during migration through the geosphere.

APPENDIX D

DESCRIPTION OF THE BASIC LANGUAGE COMPUTER PROGRAM GETOUT

APPENDIX D - DESCRIPTION OF THE BASIC LANGUAGE COMPUTER PROGRAM GETOUT

GETOUT is an integration of several independent programs as shown in Figure D.1. AQCAL8 does the migration calculations for single nuclides; CHAIN4 does the migration calculations for two- and three-member chains; and RPEAK2 does the migration calculations for four or more membered chains using combinations of two- and three-membered chains. INVEN5 contains the nuclide inventories at the final storage site. OTHER2 contains peak information from AQCAL8 used by CHAIN4 to reduce the number of time increments needed for the two- and three-member chain calculations. MIG001, MIG002, and MIG003 contain the migration output files for single nuclides, two-member chains and three-member chains, respectively. LST001 contains the migration calculation output in the input format of the biosphere model. KSOMIG is a master key file which oversees the execution of the entire program, while KEAQC4, KCHIN4, and KCHAN4 are key files which oversee the execution of the migration calculations for single nuclides, two-member chains, and three-member chains, respectively.

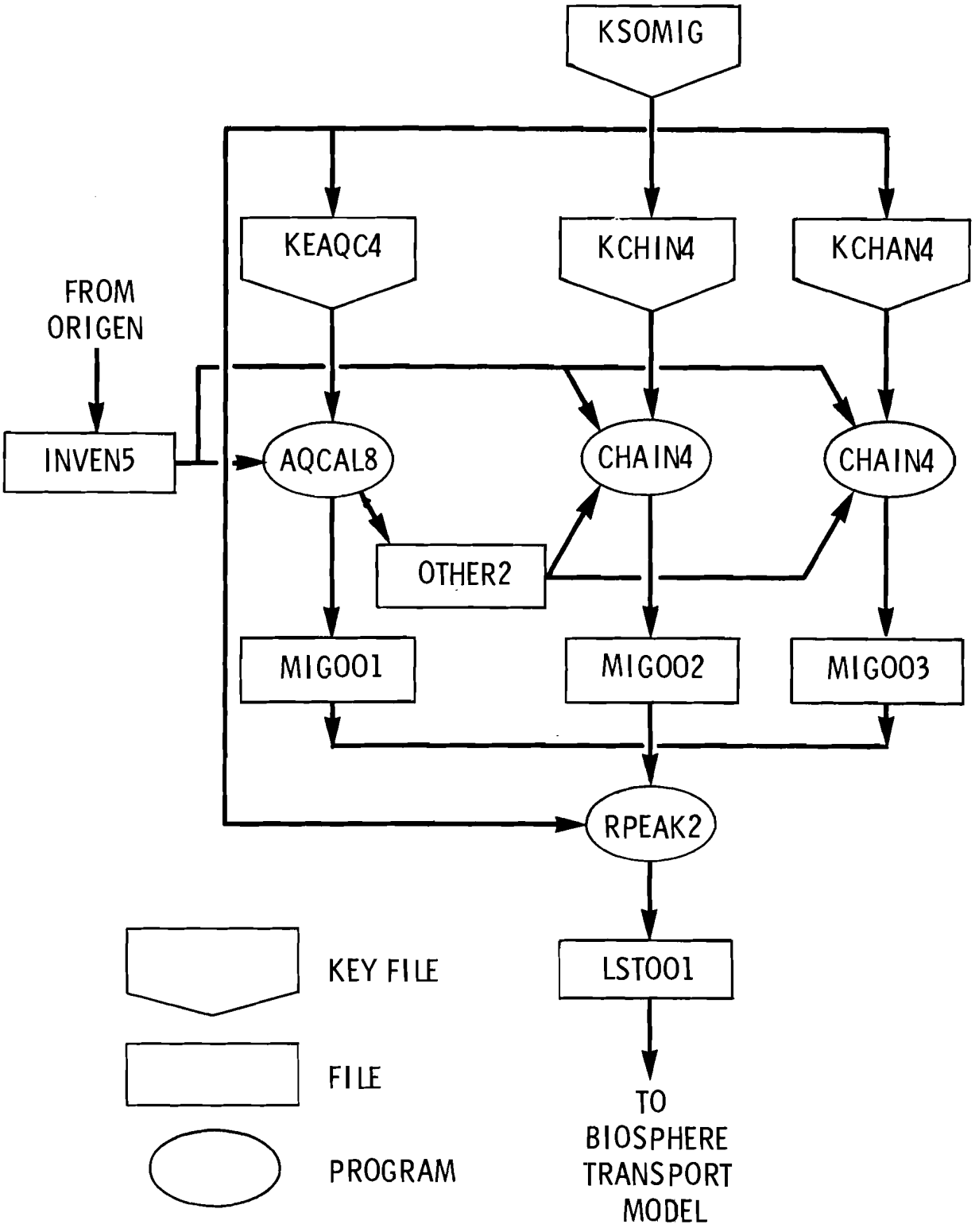

FIGURE D.1. Flow Diagram for BASIC Language Geosphere Transport Code: GETOUT

APPENDIX E

DOSE CALCULATION EQUATIONS

APPENDIX E - DOSE CALCULATION EQUATIONS

The fundamental relation for calculating radiation dose to man from a given biosphere pathway is:[7]

$$R_{ipr} = C_{ip}\, U_p\, D_{ipr} \qquad (1)$$

where R_{ipr} = the dose rate to organ r from nuclide i via pathway p

C_{ip} = the concentration of nuclide i in the media of pathway p

U_p = the exposure rate or intake rate associated with pathway p, the usage rate

D_{ipr} = a number specific to nuclide i, pathway p, and organ r which can be used to calculate the radiation dose rate from the exposure rate to a given concentration of the nuclide or the intake rate of that nuclide, the dose factor.*

The specific relationships used for the drinking water, aquatic foods, shoreline deposition, swimming, and irrigated food products follow.

Drinking Water

The dose from ingestion of water is given by

$$R_{pr} = 1119 \sum_{i=1}^{n} \frac{Q_i\, N_i}{F} M_p \exp\left(-\lambda_i t_p\right) U_p\, D_{ipr} \qquad (2)$$

where R_{pr} = total dose rate to organ r from n nuclides i via pathway p (mrem/yr)

N_i = the reconcentration factor[7] (dimensionless)

Q_i = the release rate of nuclide i (Ci/yr)

F = the flow rate of the liquid effluent (ft^3/sec)

---

* Dose factors are listed in Appendix F.

M_p = the mixing ratio at the point of exposure (or the point of withdrawal of drinking water or point of harvest of aquatic food)

λ_i = radiological decay constant of nuclide i (hr^{-1})

t_p = the transit time required for nuclides to reach the point of exposure. For internal dose, t_p is the total time elapsed between release of the nuclides and ingestion of food or water (hr)

1119 = a constant which converts from (Ci/yr)/(ft^3/sec) to pCi/liter.

The summation process adds the dose contribution from each of the nuclides for which dose factors have been derived to yield the total dose for the pathway-organ combination selected.

The first three terms in Equation 1, $\frac{Q_i N_i}{P}$, define the concentration of nuclide i in the effluent at the point of discharge. The expression $\frac{Q_i N_i}{F} M_p \exp(-\lambda_i t_p)$ yields the concentration at the time that the water is consumed.

Aquatic Foods

Concentrations of radionuclides in aquatic foods (fish, crustaceans and molluscs) are directly related to the concentrations of the nuclides in water. Equilibrium ratios between the two concentrations (bioaccumulation factors) are those for freshwater organisms. Inclusion of the bioaccumulation factor B_{ip} in Equation 1 converts it to Equation 2 below, which is suitable for calculation of internal dose from consumption of aquatic foods.

$$R_{pr} = 1119 \frac{U_p M_p}{F} \sum_{i=1}^{n} Q_i N_i B_{ip} D_{ipr} \exp(-\lambda_i t_p) \qquad (3)$$

where B_{ip} = the bioaccumulation factor for nuclide i via pathway p* (pCi/kg per pCi/liter).

---

* Bioaccumulation factors are listed in Appendix G.

Shoreline Deposits

The equation used for estimating the radiation dose from shoreline sediments is given below.[7]

$$R_{pr} = 111{,}900 \sum_{i=1}^{n} \tau_i \frac{Q_i N_i}{F} M_p e^{-\lambda_i t_p} W (1-e^{-\lambda_i t_s}) U_p D_{ipr} . \quad (4)$$

where: W = shore width factor for correction from infinite plane surface to shoreline; taken to be 0.2 for river shoreline.[7]

Swimming

The equation for calculation of external dose to the skin and total body from swimming (water immersion) is:[7]

$$R_{pr} = 1119 \sum_{i=1}^{n} \frac{Q_i N_i}{FK_p} M_p e^{-\lambda_i t_p} U_p D_{ipr} . \quad (5)$$

where: K_p = a geometry correction factor equal to 1 for swimming and 2 for boating.

Irrigated Food Products

The concentration of radioactive material in vegetation results from deposition onto the plant foliage and from uptake from the soil of prior depositions on the ground.[8] The equation for the model is presented below. The first term in brackets relates to the concentration derived from direct foliar deposition* during the growing season whereas the second term relates to uptake from soil and reflects the deposition throughout the total time of the dose accumulation (50 years). Thus, for a uniform release rate

* This study assumes that water is applied to the crops by sprinkler rather than surface methods such as furrow or drip. Thus contaminated water deposits directly onto foliage as well as onto the ground continuously over the whole year.

$$C_{iv} = d_i \left[\frac{r\, T_v (1 - e^{-\lambda_{Ei} t_e})}{Y_v\, \lambda_{Ei}} + \frac{B_{iv}(1 - e^{-\lambda_i t_b})}{P\, \lambda_i} \right] e^{-\lambda_i t_h} \qquad (6)$$

where C_{iv} = concentration of radionuclide i in edible portion of plant v (pCi/kg)

d_i = deposition rate [pCi/m^2 hr)]

r = fraction of deposition retained on plant (dimensionless), taken to be 0.25

T_v = factor for the translocation of externally deposited radionuclide to edible parts of plants (dimensionless). Assumed to be independent of radionuclide and taken to be 1 for leafy vegetables and fresh forage, and 0.1 for all other produce, including grain

λ_{Ei} = effective removal constant of radionuclide i from plant (hr^{-1})
$\lambda_{Ei} = \lambda_i + \lambda_w$, where λ_w = weathering removal constant = 0.693/14 day^{-1}

t_e = time of aboveground exposure of crop to contamination during growing season (hr)

Y_v = plant yield [kg (wet weight)/m^2]

B_{iv} = concentration factor for plant uptake of nuclide i from soil to the edible part of the plant [pCi/kg (wet weight)/pCi/kg (dry soil)]

t_b = time for buildup of radionuclide in soil (hr), taken to be 50 years

P = soil "surface density" [kg(dry soil)/m^2]. Assuming a uniform mixing of all radionuclides in a plow layer of 15 cm depth, P has a value of about 224 kg/m^2, and

t_h = holdup time (hr), the time between the time from harvest to consumption of the food.

The deposition rate d_i from irrigation water is defined by the relation

$$d_i = C_{iw}\, I \qquad (7)$$

where C_{iw} = Concentration of radionuclide i in water used for irrigation (pCi/ℓ), and

I = irrigation rate [ℓ/(m^2.hr)]. Amount of water sprinkled on unit area of field in 1 hr.

The dose rate in mrem/yr to a particular organ r would then be given by Equation 1 for n radionuclides i via a particular vegetable pathway v:

$$R_{vr} = \sum_{i=1}^{n} C_{iv} U_v D_{ivr} \tag{8}$$

The radionuclide concentration in an animal product such as meat, milk or eggs depends on the amount of contaminated feed or forage eaten by the animal and its uptake of contaminated water. The following equation describes this model for the concentration in animal products

$$C_{ia} = S_{ia} \left[C_{iF} Q_F + C_{iaw} Q_{aw}\right] \tag{9}$$

where C_{ia} = concentration in animal product (pCi/ℓ) or (pCi/kg)

S_{ia} = transfer coefficient of radionuclide i from daily intake of animal to edible portion of animal product [pCi/ℓ (milk) per pCi/day] or [pCi/kg (animal product) per pCi/day]

C_{iF} = concentration of nuclide i in feed or forage (pCi/kg) calculated from Equation 5, previously

Q_F = consumption rate of contaminated feed or forage by animal (kg/day)

C_{iaw} = concentration of nuclide i in water consumed by animals (pCi/ℓ), assumed to be equal to C_{iw}, and

Q_{aw} = consumption rate of contaminated water by animal (ℓ/day).

The dose from the consumption of animal products is given by Equation 7 with C_{ia} substituted for C_{iv}.

For a cow grazing on fresh forage, t_e in Equation 5 is set equal to 720 hr (30 days), the typical time for a cow to return to a particular portion of a grazing site.

Values for the various plant concentration factors and animal product transfer coefficients for the elements considered are given in Appendix G. Table E.1 gives values for the various animal consumption parameters of Equation 9.

TABLE E.1. Animal Consumption Rates[8]

	Q_F Feed of Forage (kg/day)		Q_{AW} Water (ℓ/day)
Milk Cow	55	(Fresh Forage)	60
Beef Cattle	68	(feed)[a]	50
Pig	4.2	(feed)[b]	10
Poultry (chickens)	0.12	(feed)[c]	0.3

a. Assumed to be 50% Barley, 25% Alfalfa, and 25% Silage
b. Assumed to be 100% Barley
c. Assumed to be 50% Wheat and 50% Barley

APPENDIX F

DOSE FACTORS

APPENDIX F - DOSE FACTORS

Equations for calculating internal dose factors, D_{ipr}, were derived from those given by the ICRP for body burden and MPC and have previously been published.[9] Effective decay energies for the radionuclides were calculated from the ICRP model, which assumes all of the radionuclide is in the center of a spherical organ with an appropriate effective radius. These dose factors have units of mrem/yr per pCi/yr ingested and represent the first year's dose from one year's intake.

The dose factors for external exposure to water were derived by assuming that the contaminated medium is large enough to be considered an "infinite volume" relative to the range of the emitted radiations. Under that assumption the energy emitted per gram of media is equivalent to the energy absorbed per gram of media. The MeV per disintegration per gram is then converted to rem, and the differences in energy adsorption between air or water and tissue are corrected as well as for physical geometry of each specific exposure situation.

The dose from water immersion is an external dose either to the skin or to both the skin and total body, depending on the penetrating power of the radiation emitted by the airborne radionuclides. Only beta and gamma radiation, which could penetrate 7 mg/cm^2 of tissue, was considered in calculating skin dose. Gamma radiation dose at a 5-cm depth in tissue was used for calculating external dose to the total body (and for internal organs). These dose factors have units of mrem/hr per pCi/liter water.

Material deposited from the river onto the shoreline represents a fairly large, nearly uniform, thin sheet of contamination. The factors for converting surface contamination in pCi/m^2 to gamma dose at 1 m above a uniformly contaminated plane have been described.[9] Dose factors for exposure river sediment have units of mrem/hr per pCi/m^2 surface.

Table F.1 lists the dose factors for the various organs and pathways considered in this investigation.

The total dose to the individual accumulated from continued ingestion and shoreline exposure throughout 50 years of residing in the same area and retaining the same dietary and recreational habits have been estimated by multiplying the first-year dose factor by the 50-year dose accumulation factor (DAF). The DAF is a function of effective organ half-life (τ) and is given by the equation:

$$DAF_{50} = \sum_{i=1}^{50} 1 + (50 - i)\, e^{-i\lambda} \qquad (1)$$

where λ = effective decay constant = $\frac{0.693}{\tau}$.

The above relation can be shown to be equal to a geometric series

$$\sum_{i=1}^{50} \frac{(1-e^{-i\lambda})}{\lambda} ,$$

which can be written in the closed form:

$$DAF_{50} = \frac{50\ (1-e^{+\lambda}) + 1-e^{-\lambda 50}}{(1-e^{-\lambda})(1-e^{+\lambda})}. \qquad (2)$$

Figure F.1 is a plot of this relation versus τ.

TABLE F.1. Dose Factors

1	ISOTOPE	DECAY	INGESTION DOSE FACTORS							SHORE D.F.		SWIM D.F.	
2		CONSTANT	BODY	GI-LLI	THYROID	BONE	LIVER	LUNG	KIDNEY	SKIN	BODY	SKIN	BODY
101	H-3	6.43E-06	1.27E-07	6.40E-08	1.27E-07	.00E+00	1.27E-07	1.26E-07	1.26E-07	.00E+00	.00E+00	.00E+00	.00E+00
102	BE-10	3.16E-11	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
103	C-14	1.38E-08	5.29E-07	3.20E-07	5.29E-07	2.64E-06	5.29E-07	.00E+00	.00E+00	.00E+00	.00E+00	3.80E-09	.00E+00
104	NA-22	3.04E-05	1.77E-05	3.26E-06	1.77E-05	1.77E-05	1.75E-05	.00E+00	.00E+00	1.80E-08	1.60E-08	4.80E-06	4.00E-06
105	NA-24	4.62E-02	1.71E-06	3.73E-06	1.71E-06	1.71E-06	1.71E-06	1.71E-06	.00E+00	2.90E-08	2.50E-08	9.30E-06	7.80E-06
106	P-32	2.02E-03	7.44E-06	2.15E-05	.00E+00	1.93E-04	1.20E-05	.00E+00	.00E+00	.00E+00	.00E+00	6.80E-07	6.40E-09
107	CA-41	1.00E-09	3.96E-05	3.07E-06	.00E+00	8.40E-05	.00E+00	.00E+00	.00E+00	4.01E-09	3.41E-09	8.52E-07	7.28E-07
108	CR-51	1.04E-03	2.67E-09	6.69E-07	1.59E-09	.00E+00	.00E+00	.00E+00	.00E+00	2.60E-10	2.20E-10	6.40E-08	5.20E-08
109	MN-54	9.53E-05	8.68E-07	1.38E-05	.00E+00	.00E+00	4.62E-06	.00E+00	.00E+00	6.80E-09	5.80E-09	1.80E-06	1.50E-06
110	FE-55	3.04E-05	1.48E-07	8.41E-07	.00E+00	6.78E-07	7.44E-07	.00E+00	.00E+00	.00E+00	.00E+00	3.60E-10	6.40E-11
111	FE-59	6.42E-04	3.68E-06	3.31E-05	.00E+00	4.12E-06	1.01E-05	.00E+00	.00E+00	9.40E-09	8.00E-09	2.60E-06	2.20E-06
112	CO-57	1.07E-04	2.92E-07	4.47E-06	.00E+00	.00E+00	1.76E-07	.00E+00	.00E+00	1.00E-09	9.10E-10	2.70E-07	2.20E-07
113	CO-58	4.05E-04	1.67E-06	1.51E-05	.00E+00	.00E+00	7.66E-07	.00E+00	.00E+00	8.20E-09	7.00E-09	2.30E-06	1.80E-06
114	CO-60	1.50E-05	4.70E-06	3.94E-05	.00E+00	.00E+00	2.11E-06	.00E+00	.00E+00	2.00E-08	1.70E-08	5.40E-06	4.60E-06
115	NI-59	9.96E-10	5.14E-07	6.90E-07	.00E+00	2.65E-06	1.33E-06	.00E+00	.00E+00	.00E+00	.00E+00	3.40E-09	2.30E-09
116	NI-63	8.60E-07	1.20E-06	1.61E-06	.00E+00	3.02E-05	3.10E-06	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
117	ZN-65	1.18E-04	5.08E-06	9.78E-06	.00E+00	3.46E-06	1.48E-05	.00E+00	.00E+00	4.60E-09	4.00E-09	1.20E-06	1.10E-06
118	SE-79	1.26E-09	4.40E-07	5.38E-07	.00E+00	.00E+00	2.63E-06	.00E+00	.00E+00	.00E+00	.00E+00	3.20E-09	3.40E-11
119	BR-82	1.99E-02	2.24E-06	2.53E-06	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	2.20E-08	1.90E-08	6.30E-06	5.30E-06
120	KR-85	7.35E-06	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.80E-07	4.70E-09
121	RB-87	1.60E-15	4.27E-06	5.76E-07	.00E+00	.00E+00	1.21E-05	.00E+00	.00E+00	.00E+00	.00E+00	2.50E-08	1.20E-10
122	SR-89	5.55E-04	9.13E-06	4.98E-05	.00E+00	3.20E-04	.00E+00	.00E+00	.00E+00	6.50E-13	5.60E-13	5.40E-07	4.60E-09
123	SR-90	2.81E-06	8.95E-05	1.23E-04	.00E+00	3.36E-04	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.50E-07	5.40E-10
124	SR-90D	2.81E-06	2.65E-10	1.05E-04	.00E+00	9.86E-09	.00E+00	.00E+00	.00E+00	2.60E-12	2.20E-12	9.60E-07	1.30E-08
125	SR-91	7.17E-02	2.43E-07	2.87E-05	.00E+00	5.81E-06	.00E+00	.00E+00	.00E+00	8.30E-09	7.10E-09	2.90E-06	1.90E-06
126	Y-90	1.08E-02	2.65E-10	1.05E-04	.00E+00	9.86E-09	.00E+00	.00E+00	.00E+00	2.60E-12	2.20E-12	9.60E-07	1.30E-08
127	Y-91M	8.32E-01	3.49E-12	2.93E-10	.00E+00	8.89E-11	.00E+00	.00E+00	.00E+00	4.40E-09	3.80E-09	1.20E-06	1.00E-06
128	Y-91	4.91E-04	3.60E-09	7.50E-05	.00E+00	1.35E-07	.00E+00	.00E+00	.00E+00	2.70E-11	2.40E-11	5.70E-07	6.70E-09
129	ZR-93+D	5.25E-11	4.71E-10	2.43E-06	.00E+00	9.36E-09	1.10E-10	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
130	ZR-95	4.44E-04	6.34E-09	2.93E-05	.00E+00	2.70E-08	7.83E-10	.00E+00	1.38E-08	5.80E-09	5.00E-09	1.80E-06	1.50E-06
131	ZR-95D	4.44E-04	1.81E-09	2.03E-05	.00E+00	5.56E-09	7.83E-10	.00E+00	1.38E-08	6.00E-09	5.10E-09	1.60E-06	1.40E-06
132	NB-93M	5.81E-06	6.66E-10	3.84E-06	.00E+00	6.84E-09	2.51E-09	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
133	NB-95	8.25E-04	1.81E-09	2.03E-05	.00E+00	5.56E-09	3.29E-09	.00E+00	3.42E-09	6.00E-09	5.10E-09	1.60E-06	1.40E-06
134	MO-93	7.90E-09	2.07E-07	1.25E-06	.00E+00	.00E+00	7.65E-06	.00E+00	.00E+00	.00E+00	.00E+00	7.90E-11	4.50E-11
135	MO-99+D	1.03E-02	7.88E-07	9.85E-06	.00E+00	.00E+00	4.30E-06	.00E+00	.00E+00	2.20E-09	1.90E-09	9.10E-07	4.70E-07
136	MO-99D	1.03E-02	2.01E-08	2.01E-06	.00E+00	1.75E-09	2.43E-09	.00E+00	.00E+00	9.50E-10	8.30E-10	2.40E-07	2.10E-07
137	TC-99M	1.16E-01	2.01E-08	2.01E-06	.00E+00	1.75E-09	2.43E-09	.00E+00	.00E+00	1.10E-09	9.60E-10	2.70E-07	2.40E-07
138	TC-99	3.73E-10	4.44E-08	5.38E-06	.00E+00	1.11E-07	1.65E-07	.00E+00	.00E+00	.00E+00	.00E+00	2.60E-10	1.30E-10
139	RU-103+D	7.29E-04	7.87E-08	2.09E-05	.00E+00	1.72E-07	.00E+00	.00E+00	2.88E-07	4.20E-09	3.60E-09	1.10E-06	8.90E-07
140	RU-106+D	7.87E-05	3.56E-07	1.81E-04	.00E+00	2.79E-06	.00E+00	.00E+00	2.21E-06	1.80E-09	1.50E-09	1.90E-06	3.80E-07
141	PD-107	1.11E-11	9.41E-09	9.11E-07	.00E+00	.00E+00	1.47E-07	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
142	AG-110M+	1.14E-04	8.70E-08	5.82E-05	.00E+00	1.46E-07	1.44E-07	.00E+00	.00E+00	2.10E-08	1.80E-08	5.30E-06	4.90E-06
143	CD-113M	5.65E-06	6.69E-08	2.30E-05	.00E+00	.00E+00	2.09E-06	.00E+00	.00E+00	2.20E-12	1.90E-12	1.40E-09	1.10E-09
144	SN-126+D	7.81E-10	2.40E-06	2.43E-05	4.79E-07	7.78E-05	1.63E-06	.00E+00	.00E+00	1.00E-08	9.00E-09	6.00E-08	1.80E-08
145	SB-125	2.93E-05	4.17E-07	1.86E-05	1.72E-09	.00E+00	1.57E-06	.00E+00	.00E+00	3.50E-09	3.10E-09	9.50E-07	7.80E-07

146	SB-126	2.31E-03	4.17E-07	9.40E-05	6.99E-09	1.16E-06	2.36E-08	.00E+00	.00E+00	1.00E-08	8.90E-09	3.30E-06	2.40E-06
147	TE-125M	4.98E-04	3.49E-07	1.05E-05	7.44E-07	2.72E-06	9.47E-07	.00E+00	.00E+00	4.80E-11	3.50E-11	1.50E-08	3.60E-09
148	TE-127M	2.85E-04	7.92E-07	2.10E-05	1.61E-06	6.40E-06	2.25E-06	.00E+00	.00E+00	1.30E-12	1.10E-12	1.80E-09	2.60E-10
149	TE-127	7.37E-02	2.21E-08	8.13E-06	7.53E-08	1.03E-07	3.70E-08	.00E+00	.00E+00	1.10E-11	1.00E-11	1.70E-07	2.80E-09
150	I-129	4.65E-12	6.01E-06	3.07E-07	7.05E-03	2.49E-06	1.76E-06	.00E+00	5.03E-06	7.50E-10	4.50E-10	3.30E-08	1.70E-08
151	I-130	5.59E-02	8.76E-07	1.89E-06	2.80E-04	7.41E-07	2.20E-06	.00E+00	.00E+00	1.70E-08	1.40E-08	4.80E-06	3.90E-06
152	I-131	3.59E-03	3.36E-06	1.53E-04	1.82E-03	3.93E-06	5.67E-06	.00E+00	1.02E-05	3.40E-09	2.80E-09	9.30E-07	7.80E-07
153	I-132	3.01E-01	3.25E-07	1.07E-07	7.33E-05	2.10E-07	5.53E-07	.00E+00	.00E+00	2.00E-08	1.70E-08	5.50E-06	4.40E-06
154	I-133	3.30E-02	7.63E-07	2.25E-06	4.81E-04	1.43E-06	2.48E-06	.00E+00	.00E+00	4.50E-09	3.70E-09	1.50E-06	9.60E-07
155	I-134	8.00E-01	1.02E-07	2.26E-10	3.73E-05	1.07E-07	2.87E-07	.00E+00	.00E+00	1.90E-08	1.60E-08	5.50E-06	4.20E-06
156	I-135	1.03E-01	4.51E-07	1.41E-06	1.76E-04	5.00E-07	1.25E-06	.00E+00	.00E+00	1.40E-08	1.20E-08	4.00E-06	3.30E-06
157	CS-134	3.86E-05	1.00E-04	2.56E-06	.00E+00	5.29E-05	.00E+00	1.39E-05	4.82E-05	1.40E-08	1.20E-08	3.50E-06	2.90E-06
158	CS-135	2.63E-11	5.64E-06	3.71E-07	.00E+00	1.44E-05	1.49E-05	1.00E-05	.00E+00	.00E+00	.00E+00	1.10E-08	6.60E-11
159	CS-136	2.22E-03	1.39E-05	2.86E-06	.00E+00	6.24E-06	2.53E-05	.00E+00	.00E+00	1.70E-08	1.50E-08	4.80E-06	4.10E-06
160	CS-137	2.64E-06	5.60E-05	2.05E-06	.00E+00	6.37E-05	9.96E-05	.00E+00	3.71E-05	4.90E-09	4.20E-09	1.40E-05	1.00E-06
161	CS-138	1.29E+00	5.44E-08	4.75E-13	.00E+00	5.65E-08	1.10E-07	.00E+00	.00E+00	2.40E-08	2.10E-08	5.70E-06	4.00E-06
162	BA-140	2.26E-03	1.33E-06	6.02E-05	.00E+00	2.02E-05	2.54E-08	.00E+00	.00E+00	2.40E-09	2.10E-09	7.60E-07	4.90E-07
163	BA-140D	2.26E-03	3.34E-10	9.32E-05	.00E+00	2.53E-09	1.28E-09	.00E+00	.00E+00	1.70E-08	1.50E-08	5.30E-06	4.10E-06
164	CE-141	8.75E-04	6.92E-10	2.28E-05	.00E+00	8.41E-09	6.13E-09	.00E+00	2.87E-09	5.20E-10	5.50E-10	2.40E-07	1.30E-07
165	CE-144+D	1.02E-04	1.98E-08	1.69E-04	.00E+00	3.27E-07	1.73E-07	.00E+00	9.96E-08	3.70E-10	3.20E-10	1.40E-06	8.60E-08
166	PR-144	2.41E+00	1.59E-12	4.51E-18	.00E+00	3.13E-11	1.30E-11	.00E+00	.00E+00	2.30E-10	2.00E-10	1.30E-06	5.60E-08
167	PM-147	3.02E-05	1.22E-09	7.93E-06	.00E+00	2.36E-08	3.01E-09	.00E+00	6.37E-09	.00E+00	.00E+00	1.30E-08	7.50E-11
168	PM-148	5.35E-03	6.11E-10	9.43E-05	.00E+00	7.29E-09	1.20E-09	.00E+00	.00E+00	5.30E-09	4.60E-09	2.00E-06	1.10E-06
169	SM-151	9.03E-07	9.29E-10	5.25E-06	.00E+00	1.12E-08	8.84E-09	.00E+00	.00E+00	2.10E-10	4.80E-11	1.90E-09	2.60E-10
170	EU-152	6.38E-06	1.42E-08	2.56E-05	.00E+00	3.28E-08	3.87E-07	.00E+00	.00E+00	6.53E-09	7.37E-09	2.10E-06	1.80E-06
171	EU-154	4.90E-06	2.81E-08	8.83E-05	.00E+00	2.34E-07	1.01E-07	.00E+00	.00E+00	9.00E-09	7.80E-09	2.70E-06	2.10E-06
172	EU-155	4.37E-05	2.94E-09	9.80E-06	.00E+00	2.05E-08	9.88E-08	.00E+00	.00E+00	4.73E-10	3.81E-10	1.10E-07	9.00E-08
173	HO-166M	6.56E-08	1.84E-08	2.56E-05	.00E+00	6.05E-08	2.12E-08	.00E+00	.00E+00	1.00E-08	8.90E-09	2.80E-06	2.40E-06
174	PB-210+D	3.75E-06	1.01E-04	5.42E-05	.00E+00	1.47E-03	6.49E-04	.00E+00	.00E+00	1.70E-11	1.30E-11	3.80E-07	3.00E-09
175	AT-210	5.76E-03	3.78E-08	4.75E-05	.00E+00	4.97E-07	3.23E-06	.00E+00	.00E+00	.00E+00	.00E+00	3.90E-07	2.70E-09
176	BI-210	2.[illegible]	9.62E-05	6.36E-05	.00E+00	3.56E-04	7.57E-04	.00E+00	.00E+00	6.20E-10	5.40E-10	1.70E-11	1.50E-11
177	RN-222+D	7.55E-03	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	7.40E-04	6.40E-04	3.10E-06	1.80E-06
178	RA-223+D	2.59E-03	5.15E-04	3.21E-04	.00E+00	4.98E-03	7.66E-06	.00E+00	.00E+00	1.80E-09	1.50E-09	1.30E-06	4.00E-07
179	RA-224+D	7.93E-03	2.04E-04	3.40E-04	.00E+00	1.62E-03	3.90E-06	.00E+00	.00E+00	1.00E-08	8.90E-09	3.50E-06	2.60E-06
180	RA-225+D	1.95E-03	1.31E-03	3.06E-04	.00E+00	6.57E-03	7.79E-06	.00E+00	.00E+00	1.20E-10	8.40E-11	5.30E-08	1.90E-08
181	RA-226+D	4.94E-03	7.69E-03	3.32E-04	.00E+00	1.17E-02	5.75E-06	.00E+00	.00E+00	7.40E-09	6.40E-09	3.10E-06	1.80E-06
182	RA-228+D	1.70E-05	1.12E-02	5.64E-05	.00E+00	1.91E-02	3.12E-06	.00E+00	.00E+00	1.40E-08	1.20E-08	4.80E-05	3.40E-06
183	AC-225	2.49E-03	2.99E-07	4.07E-04	.00E+00	4.41E-06	6.09E-06	.00E+00	.00E+00	1.80E-09	1.60E-09	1.10E-06	4.00E-07
184	AC-227+D	3.65E-06	5.24E-06	7.94E-05	.00E+00	7.88E-05	3.19E-05	.00E+00	.00E+00	2.40E-04	2.00E-04	6.30E-07	4.40E-07
185	TH-227+D	1.59E-03	3.85E-07	5.39E-04	.00E+00	1.33E-05	2.42E-07	.00E+00	.00E+00	6.30E-10	5.10E-10	1.60E-07	1.30E-07
186	TH-228+D	4.14E-04	5.15E-05	5.63E-04	.00E+00	1.52E-04	2.57E-06	.00E+00	.00E+00	1.00E-08	8.90E-09	3.50E-06	2.60E-06
187	TH-229	1.04E-08	4.74E-06	5.12E-04	.00E+00	3.06E-04	4.79E-06	.00E+00	.00E+00	2.70E-09	2.20E-09	1.30E-06	5.80E-07
188	TH-230+D	9.96E-10	1.28E-05	6.02E-05	.00E+00	4.52E-05	2.66E-06	.00E+00	.00E+00	.00E-09	6.50E-09	3.10E-06	1.80E-06
189	TH-232+D	5.66E-15	1.08E-07	1.24E-04	.00E+00	3.92E-05	2.24E-05	.00E+00	.00E+00	4.00E-04	3.30E-04	4.80E-05	3.40E-06
190	TH-234	1.20E-03	[illegible]	3.13E-04	.00E+00	8.03E-08	4.73E-09	.00E+00	.00E+00	1.30E-10	1.10E-10	5.70E-07	2.80E-08
191	PA-231+D	2.43E-04	3.73E-06	6.27E-04	.00E+00	9.01E-05	3.46E-06	.00E+00	.00E+00	2.70E-09	2.20E-09	7.00E-07	5.00E-07
192	PA-233	1.37E-03	7.13E-10	1.54E-05	.00E+00	5.27E-07	1.06E-07	.00E+00	.00E+00	1.50E-09	1.30E-09	4.00E-07	3.30E-07

193	U-232+D	1.10E-06	2.72E-04	6.72E-05	.00E+00	2.38E-03	.00E+00	.00E+00	4.48E-04	2.69E-11	2.59E-12	1.10E-09	4.56E-10
194	U-233	4.88E-10	4.86E-05	6.27E-05	.00E+00	4.97E-04	.00E+00	.00E+00	2.09E-04	2.80E-09	2.30E-09	1.40E-06	5.90E-07
195	U-234	3.20E-10	4.77E-05	6.14E-05	.00E+00	4.77E-04	.00E+00	.00E+00	1.99E-04	2.00E-11	7.40E-13	4.70E-09	1.70E-10
196	U-235+D	1.11E-13	4.48E-05	7.81E-05	.00E+00	4.57E-04	.00E+00	.00E+00	1.87E-04	4.00E-09	3.20E-09	3.30E-07	2.70E-07
197	U-236	3.31E-12	4.57E-05	5.76E-05	.00E+00	4.57E-04	.00E+00	.00E+00	1.91E-04	1.80E-11	2.10E-14	4.30E-09	4.50E-12
198	U-237	4.28E-03	1.47E-08	1.94E-05	.00E+00	5.53E-08	.00E+00	.00E+00	1.36E-07	1.30E-09	1.00E-09	3.40E-07	2.60E-07
199	U-238+D	1.81E-14	4.18E-05	1.66E-04	.00E+00	4.37E-04	.00E+00	.00E+00	1.75E-04	1.50E-10	1.10E-10	8.80E-07	2.80E-08
200	NP-237+D	3.69E-11	1.31E-06	7.94E-05	.00E+00	3.00E-05	2.70E-06	.00E+00	.00E+00	1.60E-09	1.40E-09	4.50E-07	3.60E-07
201	NP-239	1.23E-02	6.46E-11	2.40E-05	.00E+00	1.20E-09	1.18E-10	.00E+00	.00E+00	1.10E-09	9.50E-10	3.70E-07	2.40E-07
202	PU-238	9.20E-07	4.39E-07	7.30E-05	.00E+00	1.76E-05	2.70E-06	.00E+00	2.04E-06	1.80E-11	1.30E-12	4.00E-09	1.50E-10
203	PU-239	3.25E-09	4.12E-07	6.66E-05	.00E+00	1.65E-05	2.54E-06	.00E+00	1.92E-06	7.70E-12	7.90E-13	1.70E-09	1.20E-10
204	PU-240	1.20E-08	4.16E-07	6.78E-05	.00E+00	1.65E-05	2.57E-06	.00E+00	1.92E-06	1.80E-11	1.30E-12	4.00E-09	1.40E-10
205	PU-241	5.99E-06	4.21E-10	6.78E-07	.00E+00	1.44E-08	2.60E-09	.00E+00	4.07E-10	6.80E-12	4.60E-12	9.50E-11	6.10E-11
206	PU-242	2.09E-10	3.92E-07	6.53E-05	.00E+00	1.57E-05	2.42E-06	.00E+00	1.82E-06	1.60E-11	1.10E-12	3.60E-09	1.10E-10
207	PU-244	9.88E-13	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
208	AM-241	1.73E-07	1.46E-06	7.42E-05	.00E+00	1.83E-05	2.04E-05	.00E+00	1.02E-05	2.60E-10	1.80E-10	6.10E-08	3.90E-08
209	AM-242M+	5.20E-07	1.62E-06	9.34E-05	.00E+00	2.01E-05	2.12E-05	.00E+00	.00E+00	1.80E-10	2.60E-11	1.60E-07	5.10E-09
210	AM-243+D	9.96E-09	1.41E-06	9.73E-05	.00E+00	1.77E-05	1.97E-05	.00E+00	.00E+00	1.50E-09	1.30E-09	4.60E-07	3.10E-07
211	CM-242	1.77E-04	8.26E-07	7.92E-05	.00E+00	1.25E-05	1.32E-05	.00E+00	3.84E-06	2.30E-11	5.50E-12	4.70E-09	3.40E-10
212	CM-243	2.50E-06	1.58E-06	7.81E-05	.00E+00	2.38E-05	2.51E-05	.00E+00	.00E+00	2.90E-09	2.30E-09	3.10E-07	2.30E-07
213	CM-244	4.49E-06	1.51E-06	7.55E-05	.00E+00	2.28E-05	2.40E-05	.00E+00	7.06E-06	1.80E-11	2.90E-12	3.90E-09	2.60E-10
214	CM-245+D	8.49E-09	1.49E-06	7.04E-05	.00E+00	2.24E-05	2.36E-05	.00E+00	.00E+00	1.20E-09	9.50E-10	1.30E-07	9.60E-08
215	CM-246	1.44E-08	1.49E-06	6.91E-05	.00E+00	2.23E-05	2.36E-05	.00E+00	.00E+00	1.50E-11	1.00E-12	3.30E-09	1.10E-10
216	CM-247+D	4.90E-12	1.46E-06	9.09E-05	.00E+00	2.16E-05	2.32E-05	.00E+00	.00E+00	2.60E-09	2.20E-09	7.50E-07	4.70E-07
217	CM-248	1.68E-10	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

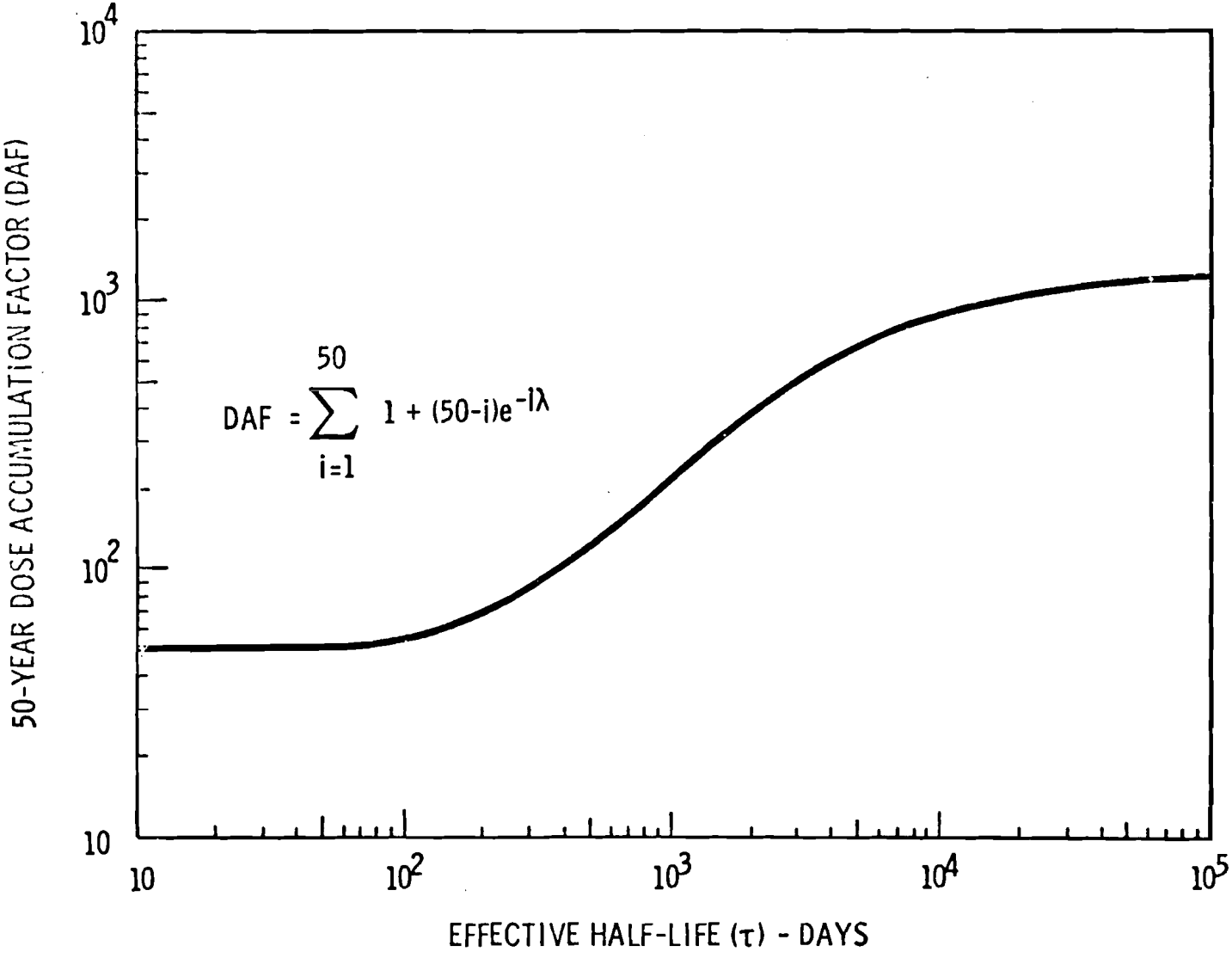

FIGURE F.1. 50 Yr Dose Accumulation Factor as a Function of Effective Half-Life

APPENDIX G

TRANSFER FACTORS

APPENDIX G - TRANSFER FACTORS

Bioaccumulation Factors, B_{ip}

Bioaccumulation (concentration factors) for aquatic organisms in equilibrium with their surroundings and which are postulated to be consumed by the individual are listed in Table G.1.[7] These factors of pCi/kg wet weight of organism per pCi/liter of water.

Produce, B_{iv}, and Animal Product, S_{ia}, Transfer Factors

Transfer factors for produce and animal products are given in Table G.2 in units of pCi/kg (wet weight) per pCi/kg (dry soil) for the plant/soil concentration factor and pCi/kg (animal product) per pCi/day (intake) for the animal product/forage transfer factor except for eggs which is in units of pCi/egg per pCi/day.[7]

TABLE G.1. Bioaccumulation Factors for Freshwater Organisms

	Bip (pCi/kg Organism Per pCi/Liter Water)		
Element	Fish	Crustacea	Molluscs
H	.9	.9	.9
BE	10	10	20
C	4600.0	9100.0	9100.0
NA	100.0	200.0	200.0
P	100000	20000.0	20000.0
CA	40.0	330.0	330.0
CR	20.0	2000.0	2000.0
MN	400.0	90000.0	90000.0
FE	100.0	3200.0	3200.0
CO	50.0	200.0	200.0
NI	100.0	100.0	100.0
ZN	2000.0	10000.0	10000.0
SE	170.0	170.0	170.0
BR	420.0	330.0	330.0
KR	1.0	1.0	1.0
RB	2000.0	1000.0	1000.0
SR	30.0	100.0	100.0
Y	25.0	1000.0	1000.0
ZR	3.3	6.7	6.7
NB	30000.0	100.0	100.0
MO	10.0	10.0	10.0
TC	15.0	5.0	5.0
RU	10.0	300.0	300.0
PD	10.0	300.0	300.0
AG	2.3	770.0	770.0
CD	200.0	2000.0	2000.0
SN	3000.0	1000.0	1000.0
SB	1.0	10.0	10.0
TE	400.0	75.0	75.0
I	15.0	5.0	5.0
CS	2000.0	100.0	100.0
BA	4.0	200.0	200.0
CE	1.0	1000.0	1000.0
PR	25.0	1000.0	1000.0
PM	25.0	1000.0	1000.0
SM	25.0	1000.0	1000.0
EU	25.0	1000.0	1000.0
HO	25.0	1000.0	1000.0
PB	100.0	100.0	100.0
BI	15.0	10.0	10.0
PO	500.0	20000.0	20000.0
RN	57.0	1.0	1.0
RA	50.0	250.0	250.0
AC	25.0	1000.0	1000.0
TH	30.0	500.0	500.0
PA	11.0	110.0	110.0
U	2.0	60.0	60.0
NP	10.0	400.0	400.0
PU	3.5	100.0	100.0
AM	25.0	1000.0	1000.0
CM	25.0	1000.0	1000.0

TABLE G.2. Plant Concentration Factors and Animal Product Transfer Factors

	FILE FOR FOOD PROGRAM:				TRANSFER FACTORS.		
	NUK	PLANT	EGG	MILK	BEEF	PORK	POULTRY
130	BE	4.0E-04	1.0E-03	5.0E-05	8.0E-04	1.0E-02	4.0E-01
140	C-	5.5E+00	1.0E+00	7.5E-03	1.0E+00	1.0E+00	1.0E+00
150	NA	5.0E-02	1.0E-02	2.5E-02	5.0E-02	1.0E-01	1.0E-02
160	P-	1.1E+00	1.0E+00	1.2E-02	3.3E-02	5.4E-01	1.9E-01
170	CA	3.6E-02	1.0E-04	8.0E-03	9.0E-04	9.0E-04	9.0E-04
180	CR	2.5E-04	9.0E-04	1.1E-03	9.0E-04	9.0E-04	9.0E-04
190	MN	2.9E-02	5.0E-03	1.2E-04	5.0E-03	1.0E-02	1.0E-03
200	FE	4.0E-04	5.0E-03	6.0E-04	1.0E-03	5.0E-03	1.0E-03
210	CO	9.4E-03	5.0E-03	5.0E-04	1.0E-03	5.0E-03	1.0E-03
220	NI	1.9E-02	5.0E-03	3.4E-03	1.0E-03	5.0E-03	1.0E-03
230	ZN	4.0E-01	2.0E-04	2.0E-02	2.0E-03	5.0E-03	2.0E-03
240	SE	1.3E+00	1.0E-02	2.3E-02	9.0E-04	9.0E-04	9.0E-04
245	BR	7.6E-1	3.0E-01	2.5E-02	2.0E-02	9.0E-02	4.0E-03
250	KR	.0E+00	.0E+00	1.0E-02	.0E+00	.0E+00	.0E+00
260	RB	1.3E-01	9.0E-04	1.5E-02	9.0E-04	9.0E-04	9.0E-04
270	SR	2.0E-01	7.0E-03	1.0E-03	2.0E-03	8.0E-03	9.0E-04
280	Y	2.5E-03	1.0E-05	1.0E-05	6.0E-03	1.0E-02	4.0E-03
290	ZR	1.7E-04	6.0E-05	2.5E-06	5.0E-04	1.0E-03	1.0E-04
300	NB	9.4E-03	2.0E-05	1.2E-03	5.0E-04	1.0E-03	1.0E-04
310	MO	1.3E-01	7.0E-03	3.8E-03	1.0E-02	2.0E-02	2.0E-03
320	TC	2.5E-01	9.0E-04	1.2E-02	9.0E-04	9.0E-04	9.0E-04
330	RU	1.0E-02	7.0E-05	5.0E-07	1.0E-03	5.0E-03	3.0E-04
340	PD	5.0E+00	9.0E-04	5.0E-03	9.0E-04	9.0E-04	9.0E-04
350	AG	1.5E-01	9.0E-04	2.5E-02	9.0E-04	9.0E-04	9.0E-04
360	CD	3.0E-01	1.0E-03	6.2E-05	9.0E-04	9.0E-04	9.0E-04
370	SN	2.5E-03	1.0E-05	2.5E-03	2.5E-03	5.0E-03	2.0E-03
380	SB	1.1E-02	9.0E-04	7.5E-04	9.0E-04	9.0E-04	9.0E-04
390	TE	1.3E+00	7.0E-03	5.0E-04	5.0E-03	1.0E-02	1.0E-02
400	I-	2.0E-02	3.0E-02	1.0E-02	2.0E-02	9.0E-02	4.0E-03
410	CS	3.0E-03	2.0E-02	7.0E-03	3.0E-02	4.0E-02	4.0E-01
415	BA	5.0E-03	6.0E-03	3.0E-04	5.0E-04	2.0E-03	5.0E-04
420	CE	5.0E-04	5.0E-05	1.0E-05	1.0E-03	5.0E-03	6.0E-04
430	PR	2.5E-03	4.0E-05	2.5E-06	5.0E-03	1.0E-02	4.0E-03
440	PM	2.5E-03	4.0E-05	2.5E-06	5.0E-03	1.0E-02	4.0E-03
450	SM	2.5E-03	4.0E-05	2.5E-06	5.0E-03	1.0E-02	4.0E-03
460	EU	2.5E-03	4.0E-05	2.5E-06	5.0E-03	1.0E-02	4.0E-03
470	HO	2.6E-03	1.0E-05	2.5E-06	9.0E-04	9.0E-04	9.0E-04
480	PB	6.8E-02	1.0E-04	3.1E-04	9.0E-04	9.0E-04	9.0E-04
490	BI	1.5E-01	1.0E-03	2.5E-04	9.0E-04	9.0E-04	9.0E-04
500	PO	1.0E+00	9.0E-04	1.5E-03	9.0E-04	9.0E-04	9.0E-04
510	RN	.0E+00	.0E+00	1.0E-02	.0E+00	.0E+00	.0E+00
520	RA	3.1E-04	1.0E-06	8.0E-03	9.0E-04	9.0E-04	9.0E-04
530	AC	2.5E-03	1.0E-04	5.0E-06	5.0E-03	1.0E-02	4.0E-03
540	TH	4.2E-03	1.0E-04	5.0E-06	5.0E-03	1.0E-02	4.0E-03

550	PA	2.5E-03	1.0E-04	5.0E-06	5.0E-03	1.0E-02	4.0E-03
560	U-	2.5E-03	1.0E-04	5.0E-04	5.0E-03	1.0E-02	4.0E-03
570	NP	2.5E-03	1.0E-04	5.0E-06	5.0E-03	1.0E-02	4.0E-03
580	PU	2.5E-04	1.0E-04	1.5E-06	5.0E-03	1.0E-02	4.0E-03
590	AM	2.5E-04	1.0E-04	5.0E-06	5.0E-03	1.0E-02	4.0E-03
600	CM	2.5E-03	1.0E-04	5.0E-06	5.0E-03	1.0E-02	4.0E-03

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APPENDIX H - DESCRIPTION OF THE BASIC LANGUAGE

COMPUTER PROGRAM FOR DOSE CALCULATIONS

Figure H.1 shows the computing scheme for calculating radiological doses using the LST001 file from the geosphere transport code GETOUT as input. The program ARRGWX calculates doses from the aquatic and drinking water pathways, and the program FOOD2 calculates doses from irrigated foods and food products. SUMDOS integrates the dose results from ARRGWX and FOOD2 and summarizes the accumulated dose. The files FOOEX, ARGEX2, and TAUS7 contain the dose factors, the transfer factors, and the accumulation factors, respectively. The AWMARG and AWMFD files contain the dose results from ARRGWX and FOOD2. The key file KAWML oversees the running of the programs for a given peak from the LST001 file. KEKE is a master key file which oversees the execution of KAWML.

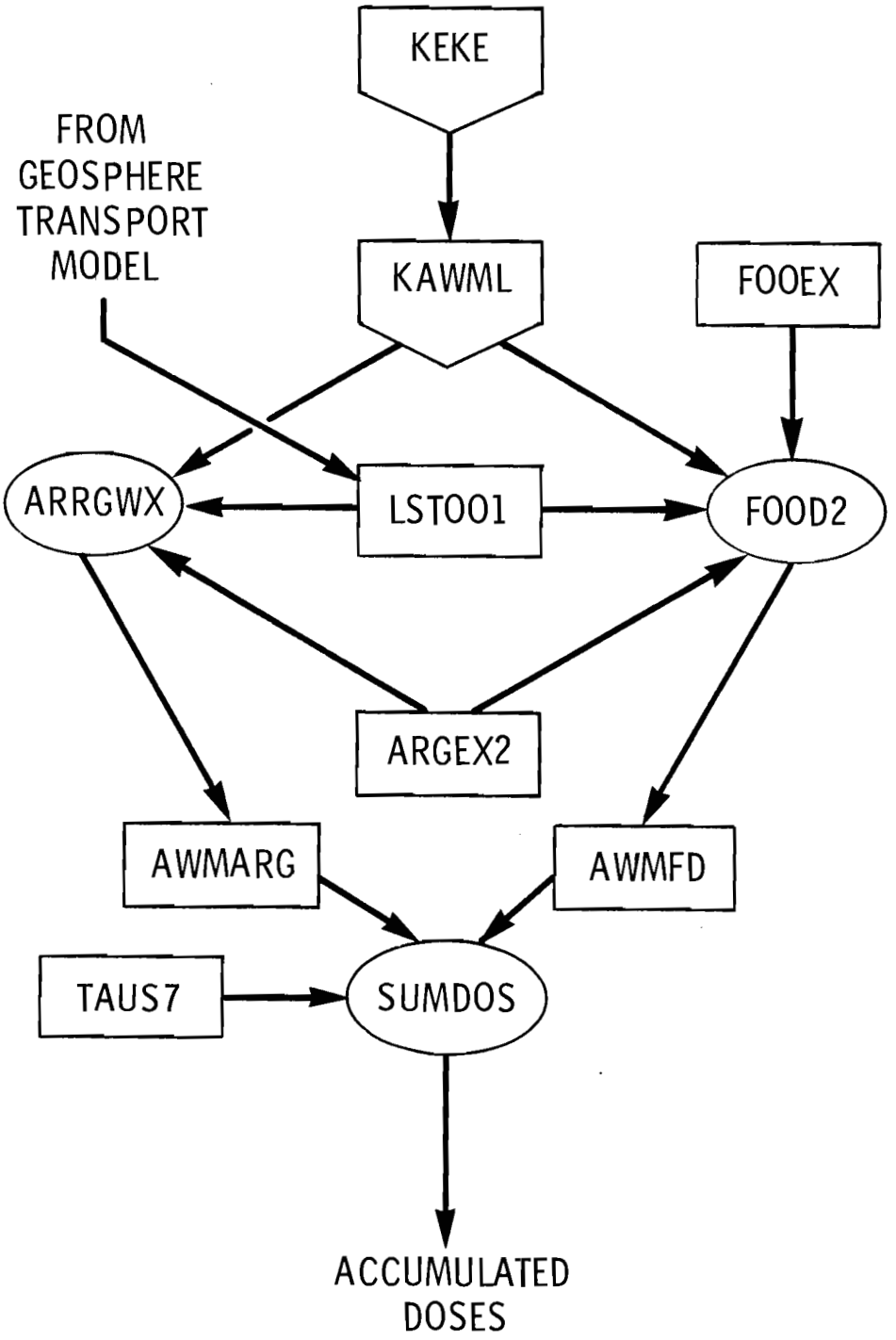

FIGURE H.1. Flow Diagram for BASIC Language Dose Calculation Scheme

APPENDIX I

SAMPLE OUTPUT FROM THE INTEGRATED GEOSPHERE-BIOSPHERE TRANSPORT MODEL

APPENDIX I - SAMPLE OUTPUT FROM THE INTEGRATED GEOSPHERE-BIOSPHERE TRANSPORT MODEL

The single nuclide, two-member chain, and three-member chain migration results, the geosphere transport output file (the biosphere transport input file), and the accumulated dose summary for the base case (10 mile path length, 0.3%/yr leach rate, and 100 yr initial release time after the year 2000) are shown below.

I.1 Single Nuclide Migration Results

I.1 Single Nuclide Migration Results

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: I-129
HALF LIFE: 1.23E+01 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= 1.000000
INVENTORY IN WASTE AT YEAR 2000= 7.23E+08 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=2.29E+06 CURIES
NUCLIDE FLUX RATE INTO AQUIFER =6.87E+03 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 2.02E+00 CURIES PER YEAR AT 245 YEARS
FINAL : 1.47E-08 CURIES PER YEAR AT 578 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 245 YEARS
PEAK DISCHARGE RATE= 1.98E+00 CURIES PER YEAR AT 245 YEARS
BAND WIDTH= 330 YEARS WITH TAIL END AT 575 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =9.81E-01

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
240	.000E+00	.000E+00	.000E+00	.000E+00
245	1.980E+00	1.981E+00	9.997E-01	.000E+00
250	1.496E+00	1.496E+00	1.000E+00	.000E+00
255	1.129E+00	1.129E+00	1.000E+00	.000E+00
260	8.524E-01	8.524E-01	1.000E+00	.000E+00
265	6.435E-01	6.435E-01	1.000E+00	.000E+00
270	4.859E-01	4.859E-01	1.000E+00	.000E+00
275	3.669E-01	3.669E-01	1.000E+00	.000E+00
280	2.769E-01	2.769E-01	1.000E+00	.000E+00
285	2.091E-01	2.091E-01	1.000E+00	.000E+00
290	1.579E-01	1.579E-01	1.000E+00	.000E+00
295	1.192E-01	1.192E-01	1.000E+00	.000E+00
300	9.004E-02	9.004E-02	1.000E+00	.000E+00
305	6.797E-02	6.797E-02	1.000E+00	.000E+00
310	5.132E-02	5.132E-02	1.000E+00	.000E+00
315	3.871E-02	3.871E-02	1.000E+00	.000E+00
320	2.923E-02	2.923E-02	1.000E+00	.000E+00
325	2.207E-02	2.207E-02	1.000E+00	.000E+00
330	1.666E-02	1.666E-02	1.000E+00	.000E+00
335	1.258E-02	1.258E-02	1.000E+00	.000E+00
340	9.495E-03	9.495E-03	1.000E+00	.000E+00
345	7.168E-03	7.168E-03	1.000E+00	.000E+00
350	5.412E-03	5.412E-03	1.000E+00	.000E+00
355	4.086E-03	4.086E-03	1.000E+00	.000E+00
360	3.085E-03	3.085E-03	1.000E+00	.000E+00
365	2.329E-03	2.329E-03	1.000E+00	.000E+00
370	1.758E-03	1.758E-03	1.000E+00	.000E+00
375	1.327E-03	1.327E-03	1.000E+00	.000E+00
380	1.002E-03	1.002E-03	1.000E+00	.000E+00
385	7.566E-04	7.566E-04	1.000E+00	.000E+00
390	5.712E-04	5.712E-04	1.000E+00	.000E+00
395	4.312E-04	4.312E-04	1.000E+00	.000E+00
400	3.256E-04	3.256E-04	1.000E+00	.000E+00
405	2.458E-04	2.458E-04	1.000E+00	.000E+00
410	1.856E-04	1.856E-04	1.000E+00	.000E+00
415	1.401E-04	1.401E-04	1.000E+00	.000E+00
420	1.058E-04	1.058E-04	1.000E+00	.000E+00
425	7.965E-05	7.985E-05	1.000E+00	.000E+00
430	6.028E-05	6.028E-05	1.000E+00	.000E+00
435	4.551E-05	4.551E-05	1.000E+00	.000E+00
440	3.436E-05	3.436E-05	1.000E+00	.000E+00
445	2.594E-05	2.594E-05	1.000E+00	.000E+00
450	1.958E-05	1.958E-05	1.000E+00	.000E+00
455	1.479E-05	1.479E-05	1.000E+00	.000E+00
460	1.116E-05	1.116E-05	1.000E+00	.000E+00
465	8.427E-06	8.427E-06	1.000E+00	.000E+00
470	6.362E-06	6.362E-06	1.000E+00	.000E+00
475	4.803E-06	4.803E-06	1.000E+00	.000E+00
480	3.626E-06	3.626E-06	1.000E+00	.000E+00
485	2.738E-06	2.738E-06	1.000E+00	.000E+00
490	2.067E-06	2.067E-06	1.000E+00	.000E+00
495	1.560E-06	1.560E-06	1.000E+00	.000E+00
500	1.178E-06	1.178E-06	1.000E+00	.000E+00
505	8.894E-07	8.894E-07	1.000E+00	.000E+00
510	6.715E-07	6.715E-07	1.000E+00	.000E+00
515	5.070E-07	5.070E-07	1.000E+00	.000E+00
520	3.827E-07	3.827E-07	1.000E+00	.000E+00
525	2.889E-07	2.889E-07	1.000E+00	.000E+00
530	2.181E-07	2.181E-07	1.000E+00	.000E+00
535	1.647E-07	1.647E-07	1.000E+00	.000E+00
540	1.243E-07	1.243E-07	1.000E+00	.000E+00
545	9.387E-08	9.387E-08	1.000E+00	.000E+00
550	7.087E-08	7.087E-08	1.000E+00	.000E+00
555	5.350E-08	5.350E-08	1.000E+00	.000E+00
560	4.039E-08	4.039E-08	1.000E+00	.000E+00
565	3.050E-08	3.050E-08	1.000E+00	.000E+00
570	2.302E-08	2.302E-08	1.000E+00	.000E+00
575	1.738E-08	1.738E-08	1.000E+00	.000E+00
580	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: BE10
HALF LIFE: 1.60E+06 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .003000
INVENTORY IN WASTE AT YEAR 2000= 4.04E+02 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=4.04E+02 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =1.21E+00 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 1.19E+00 CURIES PER YEAR AT 48319 YEARS
FINAL : 1.19E+00 CURIES PER YEAR AT 48653 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 47897 YEARS
PEAK DISCHARGE RATE= 1.19E+00 CURIES PER YEAR AT 48468 YEARS
BAND WIDTH= 1175 YEARS WITH TAIL END AT 49072 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =1.00E+00

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
47897	1.658E-38	.000E+00	3.924E-38	1.279E+02
47913	2.269E-35	.000E+00	1.860E-35	1.234E+02
47929	8.266E-33	.000E+00	6.963E-33	1.189E+02
47945	2.445E-30	.000E+00	2.059E-30	1.144E+02
47960	5.713E-28	.000E+00	4.813E-28	1.098E+02
47976	1.055E-25	.000E+00	8.890E-26	1.053E+02
47992	1.542E-23	.000E+00	1.299E-23	1.006E+02
48008	1.783E-21	.000E+00	1.502E-21	9.602E+01
48024	1.631E-19	.000E+00	1.374E-19	9.138E+01
48040	1.182E-17	.000E+00	9.959E-18	8.672E+01
48055	6.796E-16	.000E+00	5.720E-16	8.203E+01
48072	3.092E-14	.000E+00	2.605E-14	7.734E+01
48087	1.117E-12	.000E+00	9.411E-13	7.261E+01
48103	3.204E-11	.000E+00	2.699E-11	6.790E+01
48119	7.305E-10	.000E+00	6.154E-10	6.316E+01
48135	1.324E-08	.000E+00	1.116E-08	5.842E+01
48151	1.912E-07	.000E+00	1.611E-07	5.370E+01
48167	2.200E-06	.000E+00	1.854E-06	4.897E+01
48183	2.022E-05	.000E+00	1.703E-05	4.427E+01
48199	1.486E-04	.000E+00	1.252E-04	3.960E+01
48214	8.760E-04	.000E+00	7.380E-04	3.499E+01
48230	4.152E-03	.000E+00	3.498E-03	3.043E+01
48246	1.589E-02	.000E+00	1.338E-02	2.598E+01
48262	4.933E-02	.000E+00	4.156E-02	2.165E+01
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48357	1.040E+00	1.187E+00	8.762E-01	2.356E+00
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48500	1.187E+00	1.187E+00	1.000E+00	1.218E-06
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48532	1.187E+00	1.187E+00	9.999E-01	4.019E-09
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48738	5.523E-03	.000E+00	4.654E-03	1.441E-32
48754	1.224E-03	.000E+00	1.032E-03	1.384E-34
48770	2.191E-04	.000E+00	1.846E-04	.000E+00
48786	3.155E-05	.000E+00	2.658E-05	.000E+00
48802	3.650E-06	.000E+00	3.076E-06	.000E+00
48818	3.387E-07	.000E+00	2.854E-07	.000E+00
48834	2.518E-08	.000E+00	2.122E-08	.000E+00
48849	1.499E-09	.000E+00	1.263E-09	.000E+00
48865	7.140E-11	.000E+00	6.017E-11	.000E+00
48881	2.719E-12	.000E+00	2.292E-12	.000E+00
48897	8.274E-14	.000E+00	6.976E-14	.000E+00
48913	2.014E-15	.000E+00	1.697E-15	.000E+00
48929	3.914E-17	.000E+00	3.299E-17	.000E+00
48945	6.078E-19	.000E+00	5.122E-19	.000E+00
48961	7.538E-21	.000E+00	6.352E-21	.000E+00
48977	7.468E-23	.000E+00	6.294E-23	.000E+00

48992	5.935E-25	.000E+00	4.980E-25	.000E+00
49008	3.734E-27	.000E+00	3.147E-27	.000E+00
49024	1.885E-29	.000E+00	1.588E-29	.000E+00
49040	7.601E-32	.000E+00	6.406E-32	.000E+00
49056	2.445E-34	.000E+00	2.064E-34	.000E+00
49072	6.301E-37	.000E+00	5.310E-37	.000E+00
49088	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: C14
HALF LIFE: 5.73E+03 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .100000
INVENTORY IN WASTE AT YEAR 2000= 1.03E+06 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=1.02E+06 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =3.06E+03 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 2.57E+03 CURIES PER YEAR AT 1547 YEARS
FINAL : 2.47E+03 CURIES PER YEAR AT 1880 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM2/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 1535 YEARS
PEAK DISCHARGE RATE= 2.57E+03 CURIES PER YEAR AT 1554 YEARS
BAND WIDTH= 355 YEARS WITH TAIL END AT 1891 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =9.99E-01

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
1530	.000E+00	.000E+00	.000E+00	.000E+00
1535	1.071E-29	.000E+00	4.164E-33	3.976E+03
1540	1.535E-09	.000E+00	5.971E-13	2.441E+03
1544	2.770E-01	.000E+00	1.078E-02	8.914E+02
1549	2.552E+02	2.568E+03	9.937E-01	6.001E+00
1554	2.567E+03	2.567E+03	1.000E+00	4.366E-10
1559	2.565E+03	2.565E+03	1.000E+00	4.716E-30
1563	2.564E+03	2.564E+03	1.000E+00	.000E+00
1568	2.562E+03	2.562E+03	1.000E+00	.000E+00
1573	2.561E+03	2.561E+03	1.000E+00	.000E+00
1578	2.559E+03	2.559E+03	1.000E+00	.000E+00
1582	2.558E+03	2.558E+03	1.000E+00	.000E+00
1587	2.556E+03	2.556E+03	1.000E+00	.000E+00
1592	2.555E+03	2.555E+03	1.000E+00	.000E+00
1596	2.553E+03	2.553E+03	1.000E+00	.000E+00
1601	2.552E+03	2.552E+03	1.000E+00	.000E+00
1606	2.550E+03	2.550E+03	1.000E+00	.000E+00
1611	2.549E+03	2.549E+03	1.000E+00	.000E+00
1615	2.547E+03	2.547E+03	1.000E+00	.000E+00
1620	2.546E+03	2.546E+03	1.000E+00	.000E+00
1625	2.545E+03	2.545E+03	1.000E+00	.000E+00
1630	2.543E+03	2.543E+03	1.000E+00	.000E+00
1634	2.542E+03	2.542E+03	1.000E+00	.000E+00
1639	2.540E+03	2.540E+03	1.000E+00	.000E+00
1644	2.539E+03	2.539E+03	1.000E+00	.000E+00
1649	2.537E+03	2.537E+03	1.000E+00	.000E+00
1653	2.536E+03	2.536E+03	1.000E+00	.000E+00
1658	2.534E+03	2.534E+03	1.000E+00	.000E+00
1663	2.533E+03	2.533E+03	1.000E+00	.000E+00
1668	2.531E+03	2.531E+03	1.000E+00	.000E+00
1672	2.530E+03	2.530E+03	1.000E+00	.000E+00
1677	2.529E+03	2.529E+03	1.000E+00	.000E+00
1682	2.527E+03	2.527E+03	1.000E+00	.000E+00
1687	2.526E+03	2.526E+03	1.000E+00	.000E+00
1691	2.524E+03	2.524E+03	1.000E+00	.000E+00
1696	2.523E+03	2.523E+03	1.000E+00	.000E+00
1701	2.521E+03	2.521E+03	1.000E+00	.000E+00
1706	2.520E+03	2.520E+03	1.000E+00	.000E+00
1710	2.518E+03	2.518E+03	1.000E+00	.000E+00
1715	2.517E+03	2.517E+03	1.000E+00	.000E+00
1720	2.516E+03	2.516E+03	1.000E+00	.000E+00
1725	2.514E+03	2.514E+03	1.000E+00	.000E+00
1729	2.513E+03	2.513E+03	1.000E+00	.000E+00
1734	2.511E+03	2.511E+03	1.000E+00	.000E+00
1739	2.510E+03	2.510E+03	1.000E+00	.000E+00
1744	2.508E+03	2.508E+03	1.000E+00	.000E+00
1748	2.507E+03	2.507E+03	1.000E+00	.000E+00
1753	2.505E+03	2.505E+03	1.000E+00	.000E+00
1758	2.504E+03	2.504E+03	1.000E+00	.000E+00
1762	2.503E+03	2.503E+03	1.000E+00	.000E+00
1767	2.501E+03	2.501E+03	1.000E+00	.000E+00
1772	2.500E+03	2.500E+03	1.000E+00	.000E+00
1777	2.498E+03	2.498E+03	1.000E+00	.000E+00
1781	2.497E+03	2.497E+03	1.000E+00	.000E+00
1786	2.495E+03	2.495E+03	1.000E+00	.000E+00
1791	2.494E+03	2.494E+03	1.000E+00	.000E+00
1796	2.493E+03	2.493E+03	1.000E+00	.000E+00
1800	2.491E+03	2.491E+03	1.000E+00	.000E+00
1805	2.490E+03	2.490E+03	1.000E+00	.000E+00
1810	2.488E+03	2.488E+03	1.000E+00	.000E+00
1815	2.487E+03	2.487E+03	1.000E+00	.000E+00
1819	2.485E+03	2.485E+03	1.000E+00	.000E+00

1824	2.484E+03	2.484E+03	1.000E+00	.000E+00
1829	2.483E+03	2.483E+03	1.000E+00	.000E+00
1834	2.481E+03	2.481E+03	1.000E+00	.000E+00
1838	2.480E+03	2.480E+03	1.000E+00	.000E+00
1843	2.478E+03	2.478E+03	1.000E+00	.000E+00
1848	2.477E+03	2.477E+03	1.000E+00	.000E+00
1853	2.475E+03	2.475E+03	1.000E+00	.000E+00
1857	2.474E+03	2.474E+03	1.000E+00	.000E+00
1862	2.473E+03	2.473E+03	1.000E+00	.000E+00
1867	2.471E+03	2.471E+03	1.000E+00	.000E+00
1872	2.470E+03	2.470E+03	1.000E+00	.000E+00
1876	2.468E+03	2.468E+03	9.999E-01	.000E+00
1881	3.065E+02	.000E+00	1.242E-01	.000E+00
1886	5.606E-06	.000E+00	1.463E-09	.000E+00
1891	1.248E-23	.000E+00	5.064E-27	.000E+00
1895	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: CM41
HALF LIFE: 1.30E+05 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .010000
INVENTORY IN WASTE AT YEAR 2000= 6.85E+02 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=6.85E+02 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =2.06E+00 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 1.90E+00 CURIES PER YEAR AT 14566 YEARS
FINAL : 1.90E+00 CURIES PER YEAR AT 14899 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 14443 YEARS
PEAK DISCHARGE RATE= 1.50E+00 CURIES PER YEAR AT 14615 YEARS
BAND WIDTH= 576 YEARS WITH TAIL END AT 15019 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =1.00E+00

TIME,YR DISCHARGE RATE,CI/YR DISP/NO-DISP PULSE/SQUARE

DISPERSION NO DISP.

100	.000E+00	.000E+00	.000E+00	.000E+00
14423	.000E+00	.000E+00	.000E+00	.000E+00
14443	6.598E-36	.000E+00	3.466E-36	4.154E+02
14462	4.931E-26	.000E+00	2.538E-26	3.545E+02
14481	7.787E-18	.000E+00	4.091E-18	2.924E+02
14500	2.655E-11	.000E+00	1.500E-11	2.292E+02
14519	2.493E-06	.000E+00	1.310E-06	1.655E+02
14539	5.620E-03	.000E+00	2.954E-03	1.032E+02
14558	3.978E-01	.000E+00	2.091E-01	4.636E+01
14577	1.657E+00	1.902E+00	8.710E-01	8.128E+00
14596	1.900E+00	1.902E+00	9.989E-01	1.207E-01
14615	1.902E+00	1.902E+00	1.000E+00	4.859E-05
14635	1.902E+00	1.902E+00	1.000E+00	4.704E-10
14654	1.902E+00	1.902E+00	1.000E+00	1.110E-16
14673	1.901E+00	1.901E+00	1.000E+00	6.460E-25
14692	1.901E+00	1.901E+00	1.000E+00	9.496E-35
14711	1.901E+00	1.901E+00	1.000E+00	.000E+00
14731	1.901E+00	1.901E+00	1.000E+00	.000E+00
14750	1.901E+00	1.901E+00	1.000E+00	.000E+00
14769	1.900E+00	1.900E+00	1.000E+00	.000E+00
14788	1.900E+00	1.900E+00	1.000E+00	.000E+00
14807	1.900E+00	1.900E+00	1.000E+00	.000E+00
14827	1.900E+00	1.900E+00	1.000E+00	.000E+00
14846	1.900E+00	1.900E+00	1.000E+00	.000E+00
14865	1.899E+00	1.899E+00	9.997E-01	.000E+00
14884	1.773E+00	1.899E+00	9.335E-01	.000E+00
14903	6.269E-01	.000E+00	3.301E-01	.000E+00
14923	1.650E-02	.000E+00	8.688E-03	.000E+00
14942	1.515E-05	.000E+00	7.980E-06	.000E+00
14961	3.934E-10	.000E+00	2.072E-10	.000E+00
14980	2.711E-16	.000E+00	1.428E-16	.000E+00
14999	4.858E-24	.000E+00	2.559E-24	.000E+00
15019	2.255E-33	.000E+00	1.188E-33	.000E+00
15038	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: CO60
HALF LIFE: 5.27E+00 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .003000
INVENTORY IN WASTE AT YEAR 2000= 7.70E+07 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=1.46E+02 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =4.38E-01 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: .00E+00 CURIES PER YEAR AT 48319 YEARS
FINAL : .00E+00 CURIES PER YEAR AT 48653 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= .00E+00 CURIES PER YEAR AT 48486 YEARS
BAND WIDTH= 0 YEARS WITH TAIL END AT 0 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISCHARGE RATE,CI/YR	DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.	
100	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: NI59
HALF LIFE: 8.00E+04 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .003000
INVENTORY IN WASTE AT YEAR 2000= 2.07E+05 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=2.06E+05 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =6.18E+02 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 4.07E+02 CURIES PER YEAR AT 48319 YEARS
FINAL : 4.06E+02 CURIES PER YEAR AT 48653 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 47897 YEARS
PEAK DISCHARGE RATE= 4.06E+02 CURIES PER YEAR AT 48453 YEARS
BAND WIDTH= 1175 YEARS WITH TAIL END AT 49072 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =9.99E-01

TIME,YR	DISCHARGE RATE,CI/YR	DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.	
100	.000E+00	.000E+00	.000E+00	.000E+00
47897	1.603E-35	.000E+00	3.924E-38	1.279E+02
47913	7.597E-33	.000E+00	1.860E-35	1.234E+02
47929	2.843E-30	.000E+00	6.963E-33	1.189E+02
47945	8.408E-28	.000E+00	2.059E-30	1.144E+02
47960	1.965E-25	.000E+00	4.813E-28	1.098E+02
47976	3.629E-23	.000E+00	8.890E-26	1.053E+02
47992	5.301E-21	.000E+00	1.299E-23	1.006E+02
48008	6.128E-19	.000E+00	1.502E-21	9.602E+01
48024	5.607E-17	.000E+00	1.374E-19	9.138E+01
48040	4.063E-15	.000E+00	9.959E-18	8.672E+01
48056	2.333E-13	.000E+00	5.720E-16	8.203E+01
48072	1.062E-11	.000E+00	2.605E-14	7.734E+01
48087	3.838E-10	.000E+00	9.411E-13	7.261E+01
48103	1.101E-08	.000E+00	2.699E-11	6.790E+01
48119	2.509E-07	.000E+00	6.154E-10	6.316E+01
48135	4.548E-06	.000E+00	1.116E-08	5.842E+01
48151	6.564E-05	.000E+00	1.611E-07	5.370E+01
48167	7.553E-04	.000E+00	1.854E-06	4.897E+01
48183	6.940E-03	.000E+00	1.703E-05	4.427E+01
48199	5.101E-02	.000E+00	1.252E-04	3.960E+01
48214	3.006E-01	.000E+00	7.380E-04	3.499E+01
48230	1.425E+00	.000E+00	3.498E-03	3.043E+01
48246	5.450E+00	.000E+00	1.338E-02	2.598E+01
48262	1.692E+01	.000E+00	4.156E-02	2.165E+01
48278	4.294E+01	.000E+00	1.055E-01	1.750E+01
48294	8.990E+01	.000E+00	2.209E-01	1.359E+01
48310	1.574E+02	.000E+00	3.868E-01	1.000E+01
48326	2.347E+02	4.069E+02	5.768E-01	6.859E+00
48341	3.052E+02	4.069E+02	7.501E-01	4.277E+00
48357	3.564E+02	4.068E+02	8.762E-01	2.356E+00
48373	3.861E+02	4.068E+02	9.492E-01	1.111E+00
48389	3.998E+02	4.067E+02	9.829E-01	4.348E-01
48405	4.047E+02	4.067E+02	9.953E-01	1.382E-01
48421	4.062E+02	4.066E+02	9.990E-01	3.519E-02
48437	4.065E+02	4.065E+02	9.998E-01	7.137E-03
48453	4.065E+02	4.065E+02	1.000E+00	1.151E-03
48468	4.064E+02	4.064E+02	1.000E+00	1.475E-04
48484	4.064E+02	4.064E+02	1.000E+00	1.503E-05
48500	4.063E+02	4.063E+02	1.000E+00	1.218E-06
48516	4.063E+02	4.063E+02	1.000E+00	7.844E-08
48532	4.062E+02	4.062E+02	9.999E-01	4.019E-09
48548	4.058E+02	4.061E+02	9.993E-01	1.640E-10
48564	4.047E+02	4.061E+02	9.965E-01	5.333E-12
48580	4.006E+02	4.060E+02	9.865E-01	1.391E-13
48595	3.890E+02	4.060E+02	9.582E-01	2.943E-15
48611	3.629E+02	4.059E+02	8.941E-01	5.163E-17
48627	3.166E+02	4.059E+02	7.785E-01	7.731E-19
48643	2.485E+02	4.058E+02	6.123E-01	1.021E-20
48659	1.714E+02	.000E+00	4.223E-01	1.225E-22
48675	1.011E+02	.000E+00	2.491E-01	1.369E-24

48691	5.005E+01	.000E+00	1.234E-01	1.454E-26
48707	2.052E+01	.000E+00	5.059E-02	1.487E-28
48722	6.897E+00	.000E+00	1.701E-02	1.478E-30
48738	1.867E+00	.000E+00	4.654E-03	1.441E-32
48754	4.183E-01	.000E+00	1.032E-03	1.384E-34
48770	7.483E-02	.000E+00	1.846E-04	.000E+00
48786	1.077E-02	.000E+00	2.658E-05	.000E+00
48802	1.246E-03	.000E+00	3.076E-06	.000E+00
48818	1.157E-04	.000E+00	2.854E-07	.000E+00
48834	8.594E-06	.000E+00	2.122E-08	.000E+00
48849	5.117E-07	.000E+00	1.263E-09	.000E+00
48865	2.437E-08	.000E+00	6.017E-11	.000E+00
48881	9.280E-10	.000E+00	2.292E-12	.000E+00
48897	2.825E-11	.000E+00	6.976E-14	.000E+00
48913	6.872E-13	.000E+00	1.697E-15	.000E+00
48929	1.335E-14	.000E+00	3.299E-17	.000E+00
48945	2.073E-16	.000E+00	5.122E-19	.000E+00
48961	2.571E-18	.000E+00	6.352E-21	.000E+00
48977	2.547E-20	.000E+00	6.294E-23	.000E+00
48992	2.015E-22	.000E+00	4.980E-25	.000E+00
49008	1.273E-24	.000E+00	3.147E-27	.000E+00
49024	6.425E-27	.000E+00	1.588E-29	.000E+00
49040	2.591E-29	.000E+00	6.406E-32	.000E+00
49056	8.344E-32	.000E+00	2.064E-34	.000E+00
49072	2.147E-34	.000E+00	5.310E-37	.000E+00
49088	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: NI63
HALF LIFE: 1.00E+02 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .003000
INVENTORY IN WASTE AT YEAR 2000= 6.67E+06 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=3.14E+06 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =9.42E+03 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: .00E+00 CURIES PER YEAR AT 48319 YEARS
FINAL : .00E+00 CURIES PER YEAR AT 48653 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= .00E+00 CURIES PER YEAR AT 48486 YEARS
BAND WIDTH= 0 YEARS WITH TAIL END AT 0 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: SE79
HALF LIFE: 6.50E+04 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .010000
INVENTORY IN WASTE AT YEAR 2000= 9.72E+04 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=9.71E+04 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =2.91E+02 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 2.50E+02 CURIES PER YEAR AT 14566 YEARS
FINAL : 2.49E+02 CURIES PER YEAR AT 14899 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 14443 YEARS
PEAK DISCHARGE RATE= 2.50E+02 CURIES PER YEAR AT 14615 YEARS
BAND WIDTH= 576 YEARS WITH TAIL END AT 15019 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =9.99E-01

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
14423	.000E+00	.000E+00	.000E+00	.000E+00
14443	8.665E-34	.000E+00	3.466E-36	4.154E+02
14462	5.343E-24	.000E+00	2.136E-26	3.545E+02
14481	1.022E-15	.000E+00	4.091E-18	2.924E+02

14500	3.748E-09	.000E+00	1.500E-11	2.292E+02
14519	3.272E-04	.000E+00	1.310E-06	1.655E+02
14539	7.376E-01	.000E+00	2.954E-03	1.032E+02
14558	5.221E+01	.000E+00	2.091E-01	4.636E+01
14577	2.174E+02	2.496E+02	8.710E-01	8.128E+00
14596	2.493E+02	2.494E+02	9.989E-01	1.207E-01
14615	2.495E+02	2.495E+02	1.000E+00	4.859E-05
14635	2.495E+02	2.495E+02	1.000E+00	4.704E-10
14654	2.494E+02	2.494E+02	1.000E+00	1.110E-16
14673	2.494E+02	2.494E+02	1.000E+00	6.480E-25
14692	2.493E+02	2.493E+02	1.000E+00	9.496E-35
14711	2.493E+02	2.493E+02	1.000E+00	.000E+00
14731	2.492E+02	2.492E+02	1.000E+00	.000E+00
14750	2.492E+02	2.492E+02	1.000E+00	.000E+00
14769	2.491E+02	2.491E+02	1.000E+00	.000E+00
14789	2.491E+02	2.491E+02	1.000E+00	.000E+00
14807	2.490E+02	2.490E+02	1.000E+00	.000E+00
14827	2.490E+02	2.490E+02	1.000E+00	.000E+00
14846	2.489E+02	2.489E+02	1.000E+00	.000E+00
14865	2.488E+02	2.489E+02	9.997E-01	.000E+00
14884	2.323E+02	2.488E+02	9.335E-01	.000E+00
14903	8.213E+01	.000E+00	3.301E-01	.000E+00
14923	2.161E+00	.000E+00	8.688E-03	.000E+00
14942	1.984E-03	.000E+00	7.980E-06	.000E+00
14961	5.152E-08	.000E+00	2.072E-10	.000E+00
14980	3.549E-14	.000E+00	1.428E-16	.000E+00
14999	5.360E-22	.000E+00	2.559E-24	.000E+00
15019	2.952E-31	.000E+00	1.188E-33	.000E+00
15038	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: SR87
HALF LIFE: 4.70E+10 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .002000
INVENTORY IN WASTE AT YEAR 2000= 4.67E+00 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=4.67E+00 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =1.40E-02 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 1.40E-02 CURIES PER YEAR AT 72429 YEARS
FINAL : 1.40E-02 CURIES PER YEAR AT 72762 YEARS

LEACH RATE= .003600 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY

WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 71808 YEARS
PEAK DISCHARGE RATE= 1.40E-02 CURIES PER YEAR AT 72593 YEARS
BAND WIDTH= 1570 YEARS WITH TAIL END AT 73378 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =9.99E-01

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
71784	.000E+00	.000E+00	2.128E-39	6.663E+01
71808	1.565E-38	.000E+00	1.117E-36	8.363E+01
71832	6.489E-36	.000E+00	4.632E-34	8.064E+01
71856	2.126E-33	.000E+00	1.518E-31	7.765E+01
71880	5.506E-31	.000E+00	3.930E-29	7.462E+01
71903	1.128E-28	.000E+00	8.050E-27	7.158E+01
71927	1.828E-26	.000E+00	1.304E-24	6.853E+01
71951	2.344E-24	.000E+00	1.673E-22	6.545E+01
71975	2.380E-22	.000E+00	1.699E-20	6.238E+01
71998	1.915E-20	.000E+00	1.367E-18	5.927E+01
72022	1.221E-18	.000E+00	8.717E-17	5.616E+01
72046	6.177E-17	.000E+00	4.409E-15	5.304E+01
72070	2.460E-15	.000E+00	1.770E-13	4.990E+01
72094	7.903E-14	.000E+00	5.641E-12	4.676E+01
72117	2.002E-12	.000E+00	1.429E-10	4.361E+01
72141	4.034E-11	.000E+00	2.879E-09	4.046E+01
72165	6.472E-10	.000E+00	4.619E-08	3.730E+01
72189	8.277E-09	.000E+00	5.908E-07	3.415E+01
72213	8.448E-08	.000E+00	6.030E-06	3.101E+01
72236	6.897E-07	.000E+00	4.923E-05	2.789E+01
72260	4.511E-06	.000E+00	3.220E-04	2.480E+01
72284	2.370E-05	.000E+00	1.692E-03	2.175E+01
72308	1.004E-04	.000E+00	7.165E-03	1.875E+01
72332	3.443E-04	.000E+00	2.457E-02	1.583E+01
72355	9.618E-04	.000E+00	6.865E-02	1.300E+01
72379	2.207E-03	.000E+00	1.575E-01	1.031E+01
72403	4.207E-03	.000E+00	3.003E-01	7.809E+00
72427	6.766E-03	.000E+00	4.830E-01	5.561E+00
72450	9.377E-03	1.401E-02	6.693E-01	3.647E+00
72474	1.150E-02	1.401E-02	8.209E-01	2.145E+00
72498	1.288E-02	1.401E-02	9.191E-01	1.097E+00
72522	1.359E-02	1.401E-02	9.699E-01	4.730E-01
72545	1.388E-02	1.401E-02	9.908E-01	1.673E-01
72569	1.398E-02	1.401E-02	9.977E-01	4.769E-02
72593	1.400E-02	1.401E-02	9.992E-01	1.086E-02
72617	1.399E-02	1.401E-02	9.983E-01	1.971E-03
72641	1.391E-02	1.401E-02	9.929E-01	2.856E-04
72665	1.367E-02	1.401E-02	9.756E-01	3.331E-05
72688	1.306E-02	1.401E-02	9.322E-01	3.178E-06
72712	1.182E-02	1.401E-02	8.440E-01	2.546E-07

72736	9.834E-03	1.401E-02	7.019E-01	1.767E-08
72760	7.278E-03	1.401E-02	5.195E-01	1.096E-09
72783	4.664E-03	.000E+00	3.329E-01	6.256E-11
72807	2.533E-03	.000E+00	1.808E-01	3.354E-12
72831	1.146E-03	.000E+00	8.183E-02	1.719E-13
72855	4.274E-04	.000E+00	3.052E-02	8.510E-15
72879	1.304E-04	.000E+00	9.304E-03	4.109E-16
72902	3.228E-05	.000E+00	2.304E-03	1.947E-17
72926	6.465E-06	.000E+00	4.615E-04	9.089E-19
72950	1.044E-06	.000E+00	7.453E-05	4.197E-20
72974	1.357E-07	.000E+00	9.683E-06	1.921E-21
72998	1.415E-08	.000E+00	1.011E-06	8.728E-23
73021	1.185E-09	.000E+00	8.458E-08	3.947E-24
73045	7.949E-11	.000E+00	5.674E-09	1.777E-25
73069	4.268E-12	.000E+00	3.047E-10	7.979E-27
73093	1.834E-13	.000E+00	1.309E-11	.000E+00
73116	6.307E-15	.000E+00	4.502E-13	.000E+00
73140	1.734E-16	.000E+00	1.238E-14	.000E+00
73164	3.811E-18	.000E+00	2.720E-16	.000E+00
73188	6.694E-20	.000E+00	4.778E-18	.000E+00
73212	9.398E-22	.000E+00	6.708E-20	.000E+00
73235	1.055E-23	.000E+00	7.527E-22	.000E+00
73259	9.455E-26	.000E+00	6.749E-24	.000E+00
73283	6.775E-28	.000E+00	4.836E-26	.000E+00
73307	3.880E-30	.000E+00	2.769E-28	.000E+00
73331	1.775E-32	.000E+00	1.267E-30	.000E+00
73354	6.494E-35	.000E+00	4.635E-33	.000E+00
73378	1.898E-37	.000E+00	1.355E-35	.000E+00
73402	.000E+00	.000E+00	3.167E-38	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: SR90
HALF LIFE: 2.90E+01 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .010000
INVENTORY IN WASTE AT YEAR 2000= 1.29E+10 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=1.10E+09 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =3.30E+06 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: .00E+00 CURIES PER YEAR AT 14566 YEARS
FINAL : .00E+00 CURIES PER YEAR AT 14899 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= .00E+00 CURIES PER YEAR AT 14732 YEARS
BAND WIDTH= 0 YEARS WITH TAIL END AT 0 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISCHARGE RATE,CI/YR	DISP/NO-DISP	PULSE/SQUARE
	DISPERSION NO DISP.		
100	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: ZR93
HALF LIFE: 9.50E+05 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000100
INVENTORY IN WASTE AT YEAR 2000= 4.03E+05 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=4.03E+05 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =1.21E+03 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 4.21E+02 CURIES PER YEAR AT 1446675 YEARS
FINAL : 4.21E+02 CURIES PER YEAR AT 1447009 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 1433980 YEARS
PEAK DISCHARGE RATE= 5.62E+01 CURIES PER YEAR AT 1446797 YEARS
BAND WIDTH= 25634 YEARS WITH TAIL END AT 1459614 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =1.34E-01

TIME,YR	DISCHARGE RATE,CI/YR	DISP/NO-DISP	PULSE/SQUARE
	DISPERSION NO DISP.		
100	.000E+00	.000E+00	.000E+00
1433595	.000E+00	.000E+00	.000E+00

1433980	1.161E-35	.000E+00	2.733E-38	4.272E+00	1459614	1.534E-34	.000E+00	3.680E-37	5.682E-02
1434454	5.390E-33	.000E+00	1.270E-35	4.180E+00	1460089	.000E+00	.000E+00	.000E+00	.000E+00
1434929	2.002E-30	.000E+00	4.718E-33	4.038E+00					
1435404	5.881E-28	.000E+00	1.386E-30	3.897E+00					
1435879	1.367E-25	.000E+00	3.222E-28	3.755E+00					
1436353	2.513E-23	.000E+00	5.927E-26	3.615E+00					
1436828	3.456E-21	.000E+00	8.627E-24	3.474E+00					
1437303	4.213E-19	.000E+00	9.943E-22	3.335E+00					
1437777	3.843E-17	.000E+00	9.075E-20	3.196E+00					
1438252	2.778E-15	.000E+00	6.563E-18	3.059E+00					
1438727	1.592E-13	.000E+00	3.761E-16	2.922E+00					
1439201	7.227E-12	.000E+00	1.708E-14	2.787E+00					
1439676	2.602E-10	.000E+00	6.153E-13	2.654E+00					
1440151	7.432E-09	.000E+00	1.758E-11	2.522E+00					
1440626	1.684E-07	.000E+00	3.984E-10	2.392E+00					
1441100	3.028E-06	.000E+00	7.167E-09	2.264E+00					
1441575	4.323E-05	.000E+00	1.023E-07	2.140E+00					
1442050	4.900E-04	.000E+00	1.161E-06	2.017E+00					
1442524	4.412E-03	.000E+00	1.045E-05	1.898E+00					
1442999	3.156E-02	.000E+00	7.481E-05	1.782E+00					
1443474	1.794E-01	.000E+00	4.254E-04	1.669E+00					
1443949	8.107E-01	.000E+00	1.923E-03	1.561E+00					
1444423	2.912E+00	.000E+00	6.909E-03	1.456E+00					
1444898	8.318E+00	.000E+00	1.974E-02	1.356E+00					
1445373	1.890E+01	.000E+00	4.487E-02	1.260E+00					
1445847	3.415E+01	.000E+00	8.112E-02	1.168E+00					
1446322	4.912E+01	.000E+00	1.167E-01	1.081E+00					
1446797	5.422E+01	4.207E+02	1.336E-01	9.981E-01					
1447272	5.123E+01	.000E+00	1.218E-01	9.197E-01					
1447746	3.715E+01	.000E+00	8.842E-02	8.457E-01					
1448221	2.148E+01	.000E+00	5.112E-02	7.760E-01					
1448695	9.891E+00	.000E+00	2.354E-02	7.106E-01					
1449170	3.628E+00	.000E+00	8.638E-03	6.494E-01					
1449645	1.060E+00	.000E+00	2.526E-03	5.923E-01					
1450120	2.471E-01	.000E+00	5.887E-04	5.392E-01					
1450595	4.590E-02	.000E+00	1.094E-04	4.898E-01					
1451069	6.801E-03	.000E+00	1.621E-05	4.440E-01					
1451544	8.036E-04	.000E+00	1.917E-06	4.017E-01					
1452019	7.577E-05	.000E+00	1.809E-07	3.628E-01					
1452493	5.700E-06	.000E+00	1.360E-08	3.270E-01					
1452968	3.422E-07	.000E+00	8.171E-10	2.941E-01					
1453443	1.640E-08	.000E+00	3.917E-11	2.640E-01					
1453917	6.276E-10	.000E+00	1.499E-12	2.366E-01					
1454392	1.917E-11	.000E+00	4.582E-14	2.118E-01					
1454867	4.677E-13	.000E+00	1.118E-15	1.892E-01					
1455342	9.116E-15	.000E+00	2.180E-17	1.687E-01					
1455816	1.419E-16	.000E+00	3.395E-19	1.503E-01					
1456291	1.765E-18	.000E+00	4.224E-21	1.336E-01					
1456765	1.754E-20	.000E+00	4.199E-23	1.187E-01					
1457240	1.393E-22	.000E+00	3.336E-25	1.052E-01					
1457715	8.843E-25	.000E+00	2.119E-27	9.324E-02					
1458190	4.488E-27	.000E+00	1.075E-29	8.252E-02					
1458665	1.821E-29	.000E+00	4.366E-32	7.294E-02					
1459139	5.909E-32	.000E+00	1.417E-34	6.441E-02					

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: MO93
HALF LIFE: 3.00E+03 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .040000
INVENTORY IN WASTE AT YEAR 2000= 5.22E+03 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=5.18E+03 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =1.55E+01 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 6.74E+00 CURIES PER YEAR AT 3716 YEARS
FINAL : 6.24E+00 CURIES PER YEAR AT 4050 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 3689 YEARS
PEAK DISCHARGE RATE= 6.72E+00 CURIES PER YEAR AT 3727 YEARS
BAND WIDTH= 389 YEARS WITH TAIL END AT 4076 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =9.98E-01

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
3682	.000E+00	.000E+00	.000E+00	.000E+00
3689	2.981E-29	.000E+00	4.396E-30	1.517E+03
3695	7.296E-18	.000E+00	1.077E-18	1.189E+03
3701	2.349E-09	.000E+00	3.474E-10	8.540E+02
3708	1.117E-03	.000E+00	1.654E-04	5.188E+02
3714	1.043E+00	.000E+00	1.547E-01	2.075E+02
3720	6.327E+00	6.733E+00	9.397E-01	1.712E+01
3727	6.723E+00	6.723E+00	1.000E+00	1.119E-02
3733	6.713E+00	6.713E+00	1.000E+00	1.117E-08
3739	6.703E+00	6.703E+00	1.000E+00	1.656E-17
3746	6.693E+00	6.693E+00	1.000E+00	3.777E-29
3752	6.683E+00	6.683E+00	1.000E+00	.000E+00
3758	6.673E+00	6.673E+00	1.000E+00	.000E+00

3765	6.664E+00	6.664E+00	1.000E+00	.000E+00
3771	6.654E+00	6.654E+00	1.000E+00	.000E+00
3777	6.644E+00	6.644E+00	1.000E+00	.000E+00
3784	6.634E+00	6.634E+00	1.000E+00	.000E+00
3790	6.625E+00	6.625E+00	1.000E+00	.000E+00
3797	6.615E+00	6.615E+00	1.000E+00	.000E+00
3803	6.605E+00	6.605E+00	1.000E+00	.000E+00
3809	6.596E+00	6.596E+00	1.000E+00	.000E+00
3816	6.586E+00	6.586E+00	1.000E+00	.000E+00
3822	6.576E+00	6.576E+00	1.000E+00	.000E+00
3828	6.567E+00	6.567E+00	1.000E+00	.000E+00
3835	6.557E+00	6.557E+00	1.000E+00	.000E+00
3841	6.547E+00	6.547E+00	1.000E+00	.000E+00
3847	6.538E+00	6.538E+00	1.000E+00	.000E+00
3854	6.528E+00	6.528E+00	1.000E+00	.000E+00
3860	6.519E+00	6.519E+00	1.000E+00	.000E+00
3866	6.509E+00	6.509E+00	1.000E+00	.000E+00
3873	6.499E+00	6.499E+00	1.000E+00	.000E+00
3879	6.490E+00	6.490E+00	1.000E+00	.000E+00
3886	6.480E+00	6.480E+00	1.000E+00	.000E+00
3892	6.471E+00	6.471E+00	1.000E+00	.000E+00
3898	6.461E+00	6.461E+00	1.000E+00	.000E+00
3905	6.452E+00	6.452E+00	1.000E+00	.000E+00
3911	6.442E+00	6.442E+00	1.000E+00	.000E+00
3917	6.433E+00	6.433E+00	1.000E+00	.000E+00
3924	6.424E+00	6.424E+00	1.000E+00	.000E+00
3930	6.414E+00	6.414E+00	1.000E+00	.000E+00
3936	6.405E+00	6.405E+00	1.000E+00	.000E+00
3943	6.395E+00	6.395E+00	1.000E+00	.000E+00
3949	6.386E+00	6.386E+00	1.000E+00	.000E+00
3955	6.377E+00	6.377E+00	1.000E+00	.000E+00
3962	6.367E+00	6.367E+00	1.000E+00	.000E+00
3968	6.358E+00	6.358E+00	1.000E+00	.000E+00
3975	6.348E+00	6.348E+00	1.000E+00	.000E+00
3981	6.339E+00	6.339E+00	1.000E+00	.000E+00
3987	6.330E+00	6.330E+00	1.000E+00	.000E+00
3994	6.321E+00	6.321E+00	1.000E+00	.000E+00
4000	6.311E+00	6.311E+00	1.000E+00	.000E+00
4006	6.302E+00	6.302E+00	1.000E+00	.000E+00
4013	6.293E+00	6.293E+00	1.000E+00	.000E+00
4019	6.284E+00	6.284E+00	1.000E+00	.000E+00
4025	6.274E+00	6.274E+00	1.000E+00	.000E+00
4032	6.265E+00	6.265E+00	1.000E+00	.000E+00
4038	6.256E+00	6.256E+00	1.000E+00	.000E+00
4044	6.152E+00	6.247E+00	9.849E-01	.000E+00
4051	2.139E+00	.000E+00	3.430E-01	.000E+00
4057	9.251E-03	.000E+00	1.485E-03	.000E+00
4063	9.832E-08	.000E+00	1.581E-08	.000E+00
4070	1.871E-15	.000E+00	3.013E-16	.000E+00
4076	5.963E-26	.000E+00	9.617E-27	.000E+00
4083	.000E+00	.000E+00	.000E+00	.000E+00

A RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER

A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: TC99
HALF LIFE: 2.13E+05 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= 1.000000
INVENTORY IN WASTE AT YEAR 2000= 2.86E+06 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=2.83E+06 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =8.49E+03 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 8.49E+03 CURIES PER YEAR AT 245 YEARS
FINAL : 8.48E+03 CURIES PER YEAR AT 578 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 245 YEARS
PEAK DISCHARGE RATE= 8.49E+03 CURIES PER YEAR AT 250 YEARS
BAND WIDTH= 330 YEARS WITH TAIL END AT 575 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =1.00E+00

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
240	.000E+00	.000E+00	.000E+00	.000E+00
245	8.484E+03	8.486E+03	9.997E-01	.000E+00
250	8.486E+03	8.486E+03	1.000E+00	.000E+00
255	8.486E+03	8.486E+03	1.000E+00	.000E+00
260	8.486E+03	8.486E+03	1.000E+00	.000E+00
265	8.485E+03	8.485E+03	1.000E+00	.000E+00
270	8.485E+03	8.485E+03	1.000E+00	.000E+00
275	8.485E+03	8.485E+03	1.000E+00	.000E+00
280	8.485E+03	8.485E+03	1.000E+00	.000E+00
285	8.485E+03	8.485E+03	1.000E+00	.000E+00
290	8.485E+03	8.485E+03	1.000E+00	.000E+00
295	8.485E+03	8.485E+03	1.000E+00	.000E+00
300	8.484E+03	8.484E+03	1.000E+00	.000E+00
305	8.484E+03	8.484E+03	1.000E+00	.000E+00
310	8.484E+03	8.484E+03	1.000E+00	.000E+00
315	8.484E+03	8.484E+03	1.000E+00	.000E+00
320	8.484E+03	8.484E+03	1.000E+00	.000E+00
325	8.484E+03	8.484E+03	1.000E+00	.000E+00

330	8.484E+03	8.484E+03	1.000E+00	.000E+00
335	8.484E+03	8.484E+03	1.000E+00	.000E+00
340	8.483E+03	8.483E+03	1.000E+00	.000E+00
345	8.483E+03	8.483E+03	1.000E+00	.000E+00
350	8.483E+03	8.483E+03	1.000E+00	.000E+00
355	8.483E+03	8.483E+03	1.000E+00	.000E+00
360	8.483E+03	8.483E+03	1.000E+00	.000E+00
365	8.483E+03	8.483E+03	1.000E+00	.000E+00
370	8.483E+03	8.483E+03	1.000E+00	.000E+00
375	8.482E+03	8.482E+03	1.000E+00	.000E+00
380	8.482E+03	8.482E+03	1.000E+00	.000E+00
385	8.482E+03	8.482E+03	1.000E+00	.000E+00
390	8.482E+03	8.482E+03	1.000E+00	.000E+00
395	8.482E+03	8.482E+03	1.000E+00	.000E+00
400	8.482E+03	8.482E+03	1.000E+00	.000E+00
405	8.482E+03	8.482E+03	1.000E+00	.000E+00
410	8.481E+03	8.481E+03	1.000E+00	.000E+00
415	8.481E+03	8.481E+03	1.000E+00	.000E+00
420	8.481E+03	8.481E+03	1.000E+00	.000E+00
425	8.481E+03	8.481E+03	1.000E+00	.000E+00
430	8.481E+03	8.481E+03	1.000E+00	.000E+00
435	8.481E+03	8.481E+03	1.000E+00	.000E+00
440	8.481E+03	8.481E+03	1.000E+00	.000E+00
445	8.480E+03	8.480E+03	1.000E+00	.000E+00
450	8.480E+03	8.480E+03	1.000E+00	.000E+00
455	8.480E+03	8.480E+03	1.000E+00	.000E+00
460	8.480E+03	8.480E+03	1.000E+00	.000E+00
465	8.480E+03	8.480E+03	1.000E+00	.000E+00
470	8.480E+03	8.480E+03	1.000E+00	.000E+00
475	8.480E+03	8.480E+03	1.000E+00	.000E+00
480	8.480E+03	8.480E+03	1.000E+00	.000E+00
485	8.479E+03	8.479E+03	1.000E+00	.000E+00
490	8.479E+03	8.479E+03	1.000E+00	.000E+00
495	8.479E+03	8.479E+03	1.000E+00	.000E+00
500	8.479E+03	8.479E+03	1.000E+00	.000E+00
505	8.479E+03	8.479E+03	1.000E+00	.000E+00
510	8.479E+03	8.479E+03	1.000E+00	.000E+00
515	8.479E+03	8.479E+03	1.000E+00	.000E+00
520	8.478E+03	8.478E+03	1.000E+00	.000E+00
525	8.478E+03	8.478E+03	1.000E+00	.000E+00
530	8.478E+03	8.478E+03	1.000E+00	.000E+00
535	8.478E+03	8.478E+03	1.000E+00	.000E+00
540	8.478E+03	8.478E+03	1.000E+00	.000E+00
545	8.478E+03	8.478E+03	1.000E+00	.000E+00
550	8.478E+03	8.478E+03	1.000E+00	.000E+00
555	8.477E+03	8.477E+03	1.000E+00	.000E+00
560	8.477E+03	8.477E+03	1.000E+00	.000E+00
565	8.477E+03	8.477E+03	1.000E+00	.000E+00
570	8.477E+03	8.477E+03	1.000E+00	.000E+00
575	8.477E+03	8.477E+03	1.000E+00	.000E+00
580	.000E+00	.000E+00	.000E+00	.000E+00

RATE:NUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: PU107
HALF LIFE: 6.50E+06 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000900
INVENTORY IN WASTE AT YEAR 2000= 2.28E+04 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=2.28E+04 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =6.84E+01 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 6.72E+01 CURIES PER YEAR AT 160831 YEARS
FINAL : 6.72E+01 CURIES PER YEAR AT 161164 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 159408 YEARS
PEAK DISCHARGE RATE= 5.85E+01 CURIES PER YEAR AT 160992 YEARS
BAND WIDTH= 3168 YEARS WITH TAIL END AT 162576 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =8.70E-01

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
159356	.000E+00	.000E+00	.000E+00	.000E+00
159408	4.627E-37	.000E+00	6.881E-39	3.873E+01
159461	2.308E-34	.000E+00	3.432E-36	3.738E+01
159514	9.094E-32	.000E+00	1.352E-33	3.605E+01
159567	2.834E-29	.000E+00	4.215E-31	3.469E+01
159620	6.988E-27	.000E+00	1.039E-28	3.333E+01
159672	1.364E-24	.000E+00	2.028E-26	3.197E+01
159725	2.106E-22	.000E+00	3.132E-24	3.060E+01
159778	2.576E-20	.000E+00	3.831E-22	2.922E+01
159831	2.497E-18	.000E+00	3.714E-20	2.783E+01
159884	1.919E-16	.000E+00	2.854E-18	2.643E+01
159936	1.170E-14	.000E+00	1.740E-16	2.503E+01
159989	5.658E-13	.000E+00	8.414E-15	2.363E+01
160042	2.174E-11	.000E+00	3.232E-13	2.222E+01
160095	6.636E-10	.000E+00	9.869E-12	2.080E+01
160148	1.611E-08	.000E+00	2.396E-10	1.939E+01
160200	3.114E-07	.000E+00	4.631E-09	1.797E+01
160253	4.795E-06	.000E+00	7.131E-08	1.655E+01

160305	5.891E-05	.000E+00	8.761E-07	1.514E+01
160359	5.782E-04	.000E+00	8.598E-06	1.373E+01
160411	4.541E-03	.000E+00	6.754E-05	1.233E+01
160464	2.861E-02	.000E+00	4.255E-04	1.094E+01
160517	1.449E-01	.000E+00	2.155E-03	9.574E+00
160570	5.925E-01	.000E+00	8.812E-03	8.230E+00
160623	1.964E+00	.000E+00	2.921E-02	6.922E+00
160675	5.313E+00	.000E+00	7.901E-02	5.660E+00
160728	1.182E+01	.000E+00	1.759E-01	4.463E+00
160781	2.191E+01	.000E+00	3.259E-01	3.355E+00
160834	3.432E+01	6.724E+01	5.105E-01	2.368E+00
160887	4.633E+01	6.724E+01	6.891E-01	1.541E+00
160939	5.502E+01	6.724E+01	8.183E-01	9.048E-01
160992	5.850E+01	6.724E+01	8.701E-01	4.715E-01
161045	5.612E+01	6.724E+01	8.347E-01	2.164E-01
161098	4.832E+01	6.724E+01	7.186E-01	8.795E-02
161151	3.674E+01	6.724E+01	5.464E-01	3.218E-02
161203	2.417E+01	.000E+00	3.594E-01	1.082E-02
161256	1.349E+01	.000E+00	2.007E-01	3.409E-03
161309	6.292E+00	.000E+00	9.359E-02	1.023E-03
161362	2.423E+00	.000E+00	3.604E-02	2.958E-04
161415	7.636E-01	.000E+00	1.136E-02	8.317E-05
161467	1.958E-01	.000E+00	2.912E-03	2.289E-05
161520	4.064E-02	.000E+00	6.045E-04	6.192E-06
161573	6.809E-03	.000E+00	1.013E-04	1.653E-06
161626	9.187E-04	.000E+00	1.366E-05	4.365E-07
161679	9.962E-05	.000E+00	1.482E-06	1.143E-07
161731	8.672E-06	.000E+00	1.290E-07	2.970E-08
161784	6.053E-07	.000E+00	9.004E-09	7.673E-09
161837	3.385E-08	.000E+00	5.036E-10	1.973E-09
161890	1.516E-09	.000E+00	2.255E-11	5.051E-10
161943	5.435E-11	.000E+00	8.084E-13	1.288E-10
161995	1.559E-12	.000E+00	2.319E-14	3.279E-11
162048	3.577E-14	.000E+00	5.321E-16	8.317E-12
162101	6.565E-16	.000E+00	9.765E-18	2.106E-12
162154	9.633E-18	.000E+00	1.433E-19	5.325E-13
162207	1.130E-19	.000E+00	1.681E-21	1.345E-13
162259	1.061E-21	.000E+00	1.578E-23	3.391E-14
162312	7.957E-24	.000E+00	1.184E-25	.000E+00
162365	4.773E-26	.000E+00	7.100E-28	.000E+00
162418	2.289E-28	.000E+00	3.405E-30	.000E+00
162470	8.782E-31	.000E+00	1.306E-32	.000E+00
162523	2.694E-33	.000E+00	4.008E-35	.000E+00
162576	6.610E-36	.000E+00	9.833E-38	.000E+00
162629	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: CD113M
HALF LIFE: 1.46E+01 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000100
INVENTORY IN WASTE AT YEAR 2000= 4.67E+06 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=3.31E+04 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =9.93E+01 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: .00E+00 CURIES PER YEAR AT 1446675 YEARS
FINAL : .00E+00 CURIES PER YEAR AT 1447009 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= .00E+00 CURIES PER YEAR AT 1446842 YEARS
BAND WIDTH= 0 YEARS WITH TAIL END AT 0 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: SN126
HALF LIFE: 1.00E+05 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000900
INVENTORY IN WASTE AT YEAR 2000= 1.28E+05 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=1.28E+05 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =3.84E+02 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 1.25E+02 CURIES PER YEAR AT 160831 YEARS
FINAL : 1.25E+02 CURIES PER YEAR AT 161164 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 159408 YEARS
PEAK DISCHARGE RATE= 1.10E+02 CURIES PER YEAR AT 160992 YEARS
BAND WIDTH= 3168 YEARS WITH TAIL END AT 162576 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =8.69E-01

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
159356	.000E+00	.000E+00	.000E+00	.000E+00
159408	5.758E-37	.000E+00	6.681E-39	3.873E+01
159461	4.366E-34	.000E+00	3.432E-36	3.738E+01
159514	1.720E-31	.000E+00	1.352E-33	3.605E+01
159567	3.358E-29	.000E+00	4.215E-31	3.469E+01
159620	3.321E-26	.000E+00	1.039E-28	3.333E+01
159672	2.576E-24	.000E+00	2.028E-26	3.197E+01
159725	3.977E-22	.000E+00	3.132E-24	3.060E+01
159778	4.863E-20	.000E+00	3.831E-22	2.922E+01
159831	4.713E-18	.000E+00	3.714E-20	2.783E+01
159884	3.621E-16	.000E+00	2.854E-18	2.643E+01
159936	2.206E-14	.000E+00	1.740E-16	2.503E+01
159989	1.067E-12	.000E+00	8.414E-15	2.363E+01
160042	4.096E-11	.000E+00	3.232E-13	2.222E+01
160095	1.250E-09	.000E+00	9.869E-12	2.080E+01
160148	3.034E-08	.000E+00	2.396E-10	1.939E+01
160200	5.862E-07	.000E+00	4.631E-09	1.797E+01
160253	9.023E-06	.000E+00	7.131E-08	1.655E+01
160306	1.108E-04	.000E+00	8.761E-07	1.514E+01
160359	1.087E-03	.000E+00	8.598E-06	1.373E+01
160411	8.537E-03	.000E+00	6.754E-05	1.233E+01
160464	5.376E-02	.000E+00	4.255E-04	1.094E+01
160517	2.723E-01	.000E+00	2.155E-03	9.574E+00
160570	1.113E+00	.000E+00	8.812E-03	8.230E+00
160623	3.687E+00	.000E+00	2.921E-02	6.922E+00
160675	9.969E+00	.000E+00	7.901E-02	5.660E+00
160728	2.218E+01	.000E+00	1.759E-01	4.463E+00
160781	4.104E+01	.000E+00	3.259E-01	3.355E+00
160834	6.434E+01	1.260E+02	5.105E-01	2.368E+00
160887	8.681E+01	1.260E+02	6.891E-01	1.541E+00
160939	1.031E+02	1.259E+02	8.183E-01	9.048E-01
160992	1.095E+02	1.259E+02	8.701E-01	4.715E-01
161045	1.050E+02	1.258E+02	8.347E-01	2.164E-01
161098	9.041E+01	1.258E+02	7.186E-01	8.795E-02
161151	6.871E+01	1.258E+02	5.464E-01	3.218E-02
161203	4.516E+01	.000E+00	3.594E-01	1.082E-02
161256	2.521E+01	.000E+00	2.007E-01	3.409E-03
161309	1.176E+01	.000E+00	9.359E-02	1.023E-03
161362	4.525E+00	.000E+00	3.604E-02	2.958E-04
161415	1.426E+00	.000E+00	1.136E-02	8.317E-05
161467	3.653E-01	.000E+00	2.912E-03	2.289E-05
161520	7.582E-02	.000E+00	6.045E-04	6.192E-06
161573	1.270E-02	.000E+00	1.013E-04	1.653E-06
161626	1.713E-03	.000E+00	1.366E-05	4.365E-07
161679	1.857E-04	.000E+00	1.482E-06	1.143E-07
161731	1.616E-05	.000E+00	1.290E-07	2.970E-08
161784	1.127E-06	.000E+00	9.004E-09	7.673E-09
161837	6.302E-08	.000E+00	5.036E-10	1.973E-09
161890	2.822E-09	.000E+00	2.255E-11	5.051E-10
161943	1.011E-10	.000E+00	8.084E-13	1.288E-10
161995	2.899E-12	.000E+00	2.319E-14	3.279E-11
162048	6.649E-14	.000E+00	5.321E-16	8.317E-12
162101	1.220E-15	.000E+00	9.765E-18	2.106E-12
162154	1.789E-17	.000E+00	1.433E-19	5.325E-13
162207	2.099E-19	.000E+00	1.681E-21	1.345E-13
162259	1.969E-21	.000E+00	1.578E-23	3.391E-14
162312	1.477E-23	.000E+00	1.184E-25	.000E+00
162365	8.853E-26	.000E+00	7.100E-28	.000E+00
162418	4.245E-28	.000E+00	3.405E-30	.000E+00
162470	1.628E-30	.000E+00	1.306E-32	.000E+00
162523	4.993E-33	.000E+00	4.008E-35	.000E+00
162576	1.224E-35	.000E+00	9.833E-38	.000E+00
162629	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: I129
HALF LIFE: 1.59E+07 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= 1.000000
INVENTORY IN WASTE AT YEAR 2000= 8.04E+03 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=8.04E+03 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =2.41E+01 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 2.41E+01 CURIES PER YEAR AT 245 YEARS
FINAL : 2.41E+01 CURIES PER YEAR AT 578 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 245 YEARS

PEAK DISCHARGE RATE= 2.41E+01 CURIES PER YEAR AT 250 YEARS
BAND WIDTH= 330 YEARS WITH TAIL END AT 575 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =1.00E+00

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
240	.000E+00	.000E+00	.000E+00	.000E+00
245	2.411E+01	2.412E+01	9.997E-01	.000E+00
250	2.412E+01	2.412E+01	1.000E+00	.000E+00
255	2.412E+01	2.412E+01	1.000E+00	.000E+00
260	2.412E+01	2.412E+01	1.000E+00	.000E+00
265	2.412E+01	2.412E+01	1.000E+00	.000E+00
270	2.412E+01	2.412E+01	1.000E+00	.000E+00
275	2.412E+01	2.412E+01	1.000E+00	.000E+00
280	2.412E+01	2.412E+01	1.000E+00	.000E+00
285	2.412E+01	2.412E+01	1.000E+00	.000E+00
290	2.412E+01	2.412E+01	1.000E+00	.000E+00
295	2.412E+01	2.412E+01	1.000E+00	.000E+00
300	2.412E+01	2.412E+01	1.000E+00	.000E+00
305	2.412E+01	2.412E+01	1.000E+00	.000E+00
310	2.412E+01	2.412E+01	1.000E+00	.000E+00
315	2.412E+01	2.412E+01	1.000E+00	.000E+00
320	2.412E+01	2.412E+01	1.000E+00	.000E+00
325	2.412E+01	2.412E+01	1.000E+00	.000E+00
330	2.412E+01	2.412E+01	1.000E+00	.000E+00
335	2.412E+01	2.412E+01	1.000E+00	.000E+00
340	2.412E+01	2.412E+01	1.000E+00	.000E+00
345	2.412E+01	2.412E+01	1.000E+00	.000E+00
350	2.412E+01	2.412E+01	1.000E+00	.000E+00
355	2.412E+01	2.412E+01	1.000E+00	.000E+00
360	2.412E+01	2.412E+01	1.000E+00	.000E+00
365	2.412E+01	2.412E+01	1.000E+00	.000E+00
370	2.412E+01	2.412E+01	1.000E+00	.000E+00
375	2.412E+01	2.412E+01	1.000E+00	.000E+00
380	2.412E+01	2.412E+01	1.000E+00	.000E+00
385	2.412E+01	2.412E+01	1.000E+00	.000E+00
390	2.412E+01	2.412E+01	1.000E+00	.000E+00
395	2.412E+01	2.412E+01	1.000E+00	.000E+00
400	2.412E+01	2.412E+01	1.000E+00	.000E+00
405	2.412E+01	2.412E+01	1.000E+00	.000E+00
410	2.412E+01	2.412E+01	1.000E+00	.000E+00
415	2.412E+01	2.412E+01	1.000E+00	.000E+00
420	2.412E+01	2.412E+01	1.000E+00	.000E+00
425	2.412E+01	2.412E+01	1.000E+00	.000E+00
430	2.412E+01	2.412E+01	1.000E+00	.000E+00
435	2.412E+01	2.412E+01	1.000E+00	.000E+00
440	2.412E+01	2.412E+01	1.000E+00	.000E+00
445	2.412E+01	2.412E+01	1.000E+00	.000E+00
450	2.412E+01	2.412E+01	1.000E+00	.000E+00
455	2.412E+01	2.412E+01	1.000E+00	.000E+00
460	2.412E+01	2.412E+01	1.000E+00	.000E+00
465	2.412E+01	2.412E+01	1.000E+00	.000E+00
470	2.412E+01	2.412E+01	1.000E+00	.000E+00
475	2.412E+01	2.412E+01	1.000E+00	.000E+00
480	2.412E+01	2.412E+01	1.000E+00	.000E+00
485	2.412E+01	2.412E+01	1.000E+00	.000E+00
490	2.412E+01	2.412E+01	1.000E+00	.000E+00
495	2.412E+01	2.412E+01	1.000E+00	.000E+00
500	2.412E+01	2.412E+01	1.000E+00	.000E+00
505	2.412E+01	2.412E+01	1.000E+00	.000E+00
510	2.412E+01	2.412E+01	1.000E+00	.000E+00
515	2.412E+01	2.412E+01	1.000E+00	.000E+00
520	2.412E+01	2.412E+01	1.000E+00	.000E+00
525	2.412E+01	2.412E+01	1.000E+00	.000E+00
530	2.412E+01	2.412E+01	1.000E+00	.000E+00
535	2.412E+01	2.412E+01	1.000E+00	.000E+00
540	2.412E+01	2.412E+01	1.000E+00	.000E+00
545	2.412E+01	2.412E+01	1.000E+00	.000E+00
550	2.412E+01	2.412E+01	1.000E+00	.000E+00
555	2.412E+01	2.412E+01	1.000E+00	.000E+00
560	2.412E+01	2.412E+01	1.000E+00	.000E+00
565	2.412E+01	2.412E+01	1.000E+00	.000E+00
570	2.412E+01	2.412E+01	1.000E+00	.000E+00
575	2.412E+01	2.412E+01	1.000E+00	.000E+00
580	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: CS135
HALF LIFE: 2.30E+06 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .001000
INVENTORY IN WASTE AT YEAR 2000= 8.59E+04 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=8.59E+04 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =2.58E+02 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 2.47E+02 CURIES PER YEAR AT 144758 YEARS
FINAL : 2.47E+02 CURIES PER YEAR AT 145091 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 143494 YEARS

PEAK DISCHARGE RATE= 2.24E+02 CURIES PER YEAR AT 144920 YEARS
BAND WIDTH= 2899 YEARS WITH TAIL END AT 146393 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =9.08E-01

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
143447	.000E+00	.000E+00	.000E+00	.000E+00
143494	1.509E-35	.000E+00	6.112E-38	4.252E+01
143542	6.936E-33	.000E+00	2.810E-35	4.103E+01
143589	2.522E-30	.000E+00	1.022E-32	3.953E+01
143637	7.248E-28	.000E+00	2.937E-30	3.801E+01
143684	1.648E-25	.000E+00	6.680E-28	3.651E+01
143732	2.967E-23	.000E+00	1.202E-25	3.498E+01
143779	4.228E-21	.000E+00	1.713E-23	3.346E+01
143827	4.771E-19	.000E+00	1.933E-21	3.192E+01
143874	4.267E-17	.000E+00	1.729E-19	3.038E+01
143922	3.026E-15	.000E+00	1.226E-17	2.883E+01
143969	1.702E-13	.000E+00	6.899E-16	2.727E+01
144017	7.603E-12	.000E+00	3.081E-14	2.571E+01
144064	2.696E-10	.000E+00	1.093E-12	2.414E+01
144112	7.603E-09	.000E+00	3.081E-11	2.257E+01
144159	1.705E-07	.000E+00	6.910E-10	2.099E+01
144207	3.045E-06	.000E+00	1.234E-08	1.942E+01
144254	4.334E-05	.000E+00	1.756E-07	1.784E+01
144302	4.923E-04	.000E+00	1.995E-06	1.627E+01
144349	4.471E-03	.000E+00	1.812E-05	1.471E+01
144397	3.251E-02	.000E+00	1.317E-04	1.316E+01
144444	1.897E-01	.000E+00	7.690E-04	1.162E+01
144492	8.915E-01	.000E+00	3.613E-03	1.011E+01
144540	3.386E+00	.000E+00	1.372E-02	8.631E+00
144587	1.044E+01	.000E+00	4.233E-02	7.193E+00
144635	2.636E+01	.000E+00	1.068E-01	5.814E+00
144682	5.495E+01	.000E+00	2.227E-01	4.514E+00
144730	9.589E+01	.000E+00	3.887E-01	3.324E+00
144777	1.425E+02	2.467E+02	5.777E-01	2.281E+00
144825	1.844E+02	2.467E+02	7.476E-01	1.428E+00
144872	2.129E+02	2.467E+02	8.631E-01	7.956E-01
144920	2.239E+02	2.467E+02	9.076E-01	3.867E-01
144967	2.164E+02	2.467E+02	8.773E-01	1.625E-01
145015	1.911E+02	2.467E+02	7.746E-01	5.939E-02
145062	1.512E+02	2.467E+02	6.128E-01	1.927E-02
145110	1.046E+02	.000E+00	4.241E-01	5.680E-03
145157	6.194E+01	.000E+00	2.511E-01	1.557E-03
145205	3.080E+01	.000E+00	1.249E-01	4.042E-04
145252	1.270E+01	.000E+00	5.147E-02	1.008E-04
145300	4.295E+00	.000E+00	1.741E-02	2.435E-05
145347	1.184E+00	.000E+00	4.800E-03	5.750E-06
145395	3.647E-01	.000E+00	1.073E-03	1.333E-06
145442	4.760E-02	.000E+00	1.938E-04	3.046E-07
145490	6.956E-03	.000E+00	2.820E-05	6.881E-08
145537	8.141E-04	.000E+00	3.301E-06	1.540E-08
145585	7.651E-05	.000E+00	3.102E-07	3.422E-09
145632	5.767E-06	.000E+00	2.338E-08	7.555E-10
145680	3.484E-07	.000E+00	1.413E-09	1.659E-10
145728	1.686E-08	.000E+00	6.834E-11	3.629E-11
145775	6.528E-10	.000E+00	2.647E-12	7.908E-12
145823	2.023E-11	.000E+00	8.202E-14	1.718E-12
145870	5.015E-13	.000E+00	2.034E-15	3.725E-13
145918	9.943E-15	.000E+00	4.032E-17	8.059E-14
145965	1.577E-16	.000E+00	6.394E-19	1.740E-14
146013	1.999E-18	.000E+00	8.107E-21	3.753E-15
146060	2.026E-20	.000E+00	8.217E-23	8.085E-16
146108	1.643E-22	.000E+00	6.660E-25	.000E+00
146155	1.064E-24	.000E+00	4.316E-27	.000E+00
146203	5.515E-27	.000E+00	2.236E-29	.000E+00
146250	2.285E-29	.000E+00	9.264E-32	.000E+00
146298	7.570E-32	.000E+00	3.070E-34	.000E+00
146345	2.006E-34	.000E+00	8.133E-37	.000E+00
146393	4.251E-37	.000E+00	1.724E-39	.000E+00
146440	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: CS137
HALF LIFE: 3.01E+01 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .001000
INVENTORY IN WASTE AT YEAR 2000= 1.85E+10 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=1.84E+09 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =5.52E+06 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: .00E+00 CURIES PER YEAR AT 144758 YEARS
FINAL : .00E+00 CURIES PER YEAR AT 145091 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= .00E+00 CURIES PER YEAR AT 144924 YEARS
BAND WIDTH= 0 YEARS WITH TAIL END AT 0 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISCHARGE RATE,CI/YR	DISP/NO-DISP	PULSE/SQUARE

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          DISPERSION NO DISP.

     100    .000E+00    .000E+00    .000E+00    .000E+00


      RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
        A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
      CONTAINING YEAR 2000  NUCLEAR POWER ECONOMY WASTE


TIME OF LEACH INCIDENT:      100 YEARS

NUCLIDE: SM151
HALF LIFE: 9.30E+01 YEARS
NUCLIDE VELOCITY/WATER VELOCITY=  .000400
INVENTORY IN WASTE AT YEAR 2000= 3.10E+08 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=1.40E+08 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =4.20E+05 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
     INITIAL:  .00E+00 CURIES PER YEAR AT   361744 YEARS
     FINAL  :  .00E+00 CURIES PER YEAR AT   362077 YEARS

LEACH RATE=  .003000 FRACTION PER YEAR
LEACH DURATION=      333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME=   145 YEARS
AXIAL DISPERSION COEFFICIENT=  .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
     INITIAL BREAKTHROUGH AT         0 YEARS
     PEAK DISCHARGE RATE=  .00E+00 CURIES PER YEAR AT   361911 YEARS
     BAND WIDTH=          0 YEARS WITH TAIL END AT         0 YEARS
     DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR   DISCHARGE RATE,CI/YR   DISP/NO-DISP  PULSE/SQUARE

          DISPERSION NO DISP.

     100    .000E+00    .000E+00    .000E+00    .000E+00


      RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
        A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
      CONTAINING YEAR 2000  NUCLEAR POWER ECONOMY WASTE


TIME OF LEACH INCIDENT:      100 YEARS

NUCLIDE: HO166M
HALF LIFE: 1.20E+03 YEARS
NUCLIDE VELOCITY/WATER VELOCITY=  .000400
INVENTORY IN WASTE AT YEAR 2000= 1.00E+02 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=9.47E+01 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =2.84E-01 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
     INITIAL:  .00E+00 CURIES PER YEAR AT   361744 YEARS
     FINAL  :  .00E+00 CURIES PER YEAR AT   362077 YEARS

LEACH RATE=  .003000 FRACTION PER YEAR
LEACH DURATION=      333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME=   145 YEARS
AXIAL DISPERSION COEFFICIENT=  .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
     INITIAL BREAKTHROUGH AT         0 YEARS
     PEAK DISCHARGE RATE=  .00E+00 CURIES PER YEAR AT   361911 YEARS
     BAND WIDTH=          0 YEARS WITH TAIL END AT         0 YEARS
     DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR   DISCHARGE RATE,CI/YR   DISP/NO-DISP  PULSE/SQUARE

          DISPEPSION NO DISP.

     100    .000E+00    .000E+00    .000E+00    .000E+00


      RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
        A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
      CONTAINING YEAR 2000  NUCLEAR POWER ECONOMY WASTE


TIME OF LEACH INCIDENT:      100 YEARS

NUCLIDE: EU152
HALF LIFE: 1.30E+01 YEARS
NUCLIDE VELOCITY/WATER VELOCITY=  .000400
INVENTORY IN WASTE AT YEAR 2000= 1.61E+06 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=5.00E+03 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =1.50E+01 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
     INITIAL:  .00E+00 CURIES PER YEAR AT   361744 YEARS
     FINAL  :  .00E+00 CURIES PER YEAR AT   362077 YEARS

LEACH RATE=  .003000 FRACTION PER YEAR
LEACH DURATION=      333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME=   145 YEARS
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AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= .00E+00 CURIES PER YEAR AT 361911 YEARS
BAND WIDTH= 0 YEARS WITH TAIL END AT 0 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISCHARGE RATE,CI/YR	DISP/NO-DISP	PULSE/SQUARE
	DISPERSION NO DISP.		
100	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: EU154
HALF LIFE: 8.60E+00 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000400
INVENTORY IN WASTE AT YEAR 2000= 8.32E+08 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=1.09E+07 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =3.27E+04 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: .00E+00 CURIES PER YEAR AT 361744 YEARS
FINAL : .00E+00 CURIES PER YEAR AT 362077 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= .00E+00 CURIES PER YEAR AT 361911 YEARS
BAND WIDTH= 0 YEARS WITH TAIL END AT 0 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISCHARGE RATE,CI/YR	DISP/NO-DISP	PULSE/SQUARE
	DISPERSION NO DISP.		
100	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: CM248
HALF LIFE: 3.50E+05 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000300
INVENTORY IN WASTE AT YEAR 2000= 5.01E-01 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=5.01E-01 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =1.50E-03 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 5.78E-04 CURIES PER YEAR AT 482292 YEARS
FINAL : 5.78E-04 CURIES PER YEAR AT 482625 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 478328 YEARS
PEAK DISCHARGE RATE= 2.23E-04 CURIES PER YEAR AT 482443 YEARS
BAND WIDTH= 8369 YEARS WITH TAIL END AT 486717 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =3.86E-01

TIME,YR	DISCHARGE RATE,CI/YR	DISP/NO-DISP	PULSE/SQUARE
	DISPERSION NO DISP.		
100	.000E+00	.000E+00	.000E+00
478170	.000E+00	.000E+00	2.031E-36
478329	4.743E-37	.000E+00	8.135E-34
478487	1.502E-34	.000E+00	2.577E-31
478645	3.764E-32	.000E+00	6.461E-29
478803	7.469E-30	.000E+00	1.282E-26
478961	1.173E-27	.000E+00	2.015E-24
479120	1.460E-25	.000E+00	2.509E-22
479278	1.440E-23	.000E+00	2.475E-20
479436	1.127E-21	.000E+00	1.937E-18
479594	6.994E-20	.000E+00	1.203E-16
479753	3.446E-18	.000E+00	5.927E-15
479911	1.348E-16	.000E+00	2.320E-13
480069	4.193E-15	.000E+00	7.218E-12
480228	1.037E-13	.000E+00	1.786E-10
480386	2.043E-12	.000E+00	3.518E-09
480544	3.205E-11	.000E+00	5.522E-08
480702	4.010E-10	.000E+00	6.911E-07
			5.111E+00

480861	4.006E-09	.000E+00	6.906E-06	4.650E+00
481019	3.198E-08	.000E+00	5.516E-05	4.196E+00
481177	2.044E-07	.000E+00	3.526E-04	3.750E+00
481335	1.047E-06	.000E+00	1.806E-03	3.317E+00
481494	4.303E-06	.000E+00	7.427E-03	2.899E+00
481652	1.422E-05	.000E+00	2.455E-02	2.501E+00
481810	3.783E-05	.000E+00	6.535E-02	2.126E+00
481969	8.118E-05	.000E+00	1.403E-01	1.779E+00
482127	1.407E-04	.000E+00	2.431E-01	1.464E+00
482285	1.971E-04	.000E+00	3.407E-01	1.183E+00
482443	2.234E-04	5.782E-04	3.863E-01	9.387E-01
482602	2.049E-04	5.781E-04	3.546E-01	7.309E-01
482760	1.522E-04	.000E+00	2.634E-01	5.587E-01
482918	9.147E-05	.000E+00	1.583E-01	4.196E-01
483076	4.445E-05	.000E+00	7.696E-02	3.098E-01
483235	1.744E-05	.000E+00	3.022E-02	2.252E-01
483393	5.525E-06	.000E+00	9.573E-03	1.613E-01
483551	1.410E-06	.000E+00	2.444E-03	1.141E-01
483710	2.898E-07	.000E+00	5.024E-04	7.976E-02
483868	4.788E-08	.000E+00	8.304E-05	5.518E-02
484026	6.356E-09	.000E+00	1.103E-05	3.783E-02
484184	6.773E-10	.000E+00	1.175E-06	2.573E-02
484343	5.789E-11	.000E+00	1.005E-07	1.738E-02
484501	3.966E-12	.000E+00	6.887E-09	1.166E-02
484659	2.177E-13	.000E+00	3.781E-10	7.785E-03
484817	9.567E-15	.000E+00	1.662E-11	5.173E-03
484976	3.366E-16	.000E+00	5.851E-13	3.422E-03
485134	9.479E-18	.000E+00	1.648E-14	2.255E-03
485292	2.135E-19	.000E+00	3.714E-16	1.482E-03
485451	3.848E-21	.000E+00	6.695E-18	9.707E-04
485609	5.548E-23	.000E+00	9.655E-20	6.344E-04
485767	6.398E-25	.000E+00	1.114E-21	4.135E-04
485925	5.901E-27	.000E+00	1.028E-23	2.690E-04
486084	4.353E-29	.000E+00	7.582E-26	1.747E-04
486242	2.568E-31	.000E+00	4.475E-28	1.133E-04
486400	1.212E-33	.000E+00	2.113E-30	7.335E-05
486558	4.577E-36	.000E+00	7.981E-33	4.743E-05
486717	1.382E-38	.000E+00	2.411E-35	.000E+00
486875	.000E+00	.000E+00	5.826E-38	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: PU244
HALF LIFE: 8.30E+07 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000100
INVENTORY IN WASTE AT YEAR 2000= 5.36E-05 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=5.40E-05 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =1.62E-07 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 1.60E-07 CURIES PER YEAR AT 1446675 YEARS
FINAL : 1.60E-07 CURIES PER YEAR AT 1447009 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CMI2/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 1435404 YEARS
PEAK DISCHARGE RATE= 2.14E-08 CURIES PER YEAR AT 1446797 YEARS
BAND WIDTH= 23261 YEARS WITH TAIL END AT 1458665 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =1.34E-01

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
1434929	.000E+00	.000E+00	4.718E-33	4.038E+00
1435404	2.219E-37	.000E+00	1.386E-30	3.897E+00
1435878	5.158E-35	.000E+00	3.222E-28	3.755E+00
1436353	9.487E-33	.000E+00	5.927E-26	3.615E+00
1436828	1.381E-30	.000E+00	8.627E-24	3.474E+00
1437303	1.592E-28	.000E+00	9.943E-22	3.335E+00
1437777	1.453E-26	.000E+00	9.075E-20	3.196E+00
1438252	1.050E-24	.000E+00	6.563E-18	3.059E+00
1438727	6.020E-23	.000E+00	3.761E-16	2.922E+00
1439201	2.734E-21	.000E+00	1.708E-14	2.787E+00
1439676	9.849E-20	.000E+00	6.153E-13	2.654E+00
1440151	2.814E-18	.000E+00	1.758E-11	2.522E+00
1440626	6.377E-17	.000E+00	3.984E-10	2.392E+00
1441100	1.147E-15	.000E+00	7.167E-09	2.264E+00
1441575	1.638E-14	.000E+00	1.023E-07	2.140E+00
1442050	1.858E-13	.000E+00	1.161E-06	2.017E+00
1442524	1.673E-12	.000E+00	1.045E-05	1.898E+00
1442999	1.197E-11	.000E+00	7.481E-05	1.782E+00
1443474	6.809E-11	.000E+00	4.254E-04	1.669E+00
1443949	3.078E-10	.000E+00	1.923E-03	1.561E+00
1444423	1.106E-09	.000E+00	6.909E-03	1.456E+00
1444898	3.160E-09	.000E+00	1.974E-02	1.356E+00
1445373	7.181E-09	.000E+00	4.487E-02	1.260E+00
1445847	1.298E-08	.000E+00	8.112E-02	1.168E+00
1446322	1.868E-08	.000E+00	1.167E-01	1.081E+00
1446797	2.139E-08	1.601E-07	1.336E-01	9.981E-01
1447272	1.950E-08	.000E+00	1.218E-01	9.197E-01
1447746	1.415E-08	.000E+00	8.842E-02	8.457E-01
1448221	8.181E-09	.000E+00	5.112E-02	7.760E-01
1448696	3.768E-09	.000E+00	2.354E-02	7.106E-01

1449170	1.382E-09	.000E+00	8.638E-03	6.494E-01
1449645	6.043E-10	.000E+00	2.526E-03	5.923E-01
1450120	9.423E-11	.000E+00	5.887E-04	5.392E-01
1450595	1.751E-11	.000E+00	1.094E-04	4.898E-01
1451069	3.595E-12	.000E+00	1.621E-05	4.440E-01
1451544	3.068E-13	.000E+00	1.917E-06	4.017E-01
1452019	2.893E-14	.000E+00	1.808E-07	3.628E-01
1452493	2.177E-15	.000E+00	1.360E-08	3.270E-01
1452968	1.305E-16	.000E+00	8.171E-10	2.941E-01
1453443	6.259E-18	.000E+00	3.917E-11	2.640E-01
1453917	2.400E-19	.000E+00	1.499E-12	2.366E-01
1454392	7.334E-21	.000E+00	4.582E-14	2.118E-01
1454867	1.790E-22	.000E+00	1.118E-15	1.892E-01
1455342	3.489E-24	.000E+00	2.180E-17	1.687E-01
1455816	5.433E-26	.000E+00	3.395E-19	1.503E-01
1456291	6.760E-28	.000E+00	4.224E-21	1.336E-01
1456766	6.720E-30	.000E+00	4.199E-23	1.187E-01
1457240	5.340E-32	.000E+00	3.336E-25	1.052E-01
1457715	3.391E-34	.000E+00	2.119E-27	9.324E-02
1458190	1.721E-36	.000E+00	1.075E-29	8.252E-02
1458665	6.988E-39	.000E+00	4.366E-32	7.294E-02
1459139	.000E+00	.000E+00	1.417E-34	6.441E-02

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: CM244
HALF LIFE: 1.79E+01 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000300
INVENTORY IN WASTE AT YEAR 2000= 4.71E+08 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=1.02E+07 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =3.06E+04 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: .00E+00 CURIES PER YEAR AT 482292 YEARS
FINAL : .00E+00 CURIES PER YEAR AT 482625 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= .00E+00 CURIES PER YEAR AT 482458 YEARS
BAND WIDTH= 0 YEARS WITH TAIL END AT 0 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: PU240
HALF LIFE: 6.54E+03 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000100
INVENTORY IN WASTE AT YEAR 2000= 1.93E+06 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=3.13E+06 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =9.39E+03 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: .00E+00 CURIES PER YEAR AT 1446675 YEARS
FINAL : .00E+00 CURIES PER YEAR AT 1447009 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= .00E+00 CURIES PER YEAR AT 1446842 YEARS
BAND WIDTH= 0 YEARS WITH TAIL END AT 0 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: U235
HALF LIFE: 2.34E+07 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000070
INVENTORY IN WASTE AT YEAR 2000= 5.58E+03 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=5.59E+03 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =1.68E+01 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 1.58E+01 CURIES PER YEAR AT 2066836 YEARS
FINAL : 1.59E+01 CURIES PER YEAR AT 2066970 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 2048429 YEARS
PEAK DISCHARGE RATE= 1.48E+00 CURIES PER YEAR AT 2066738 YEARS
BAND WIDTH= 36619 YEARS WITH TAIL END AT 2085048 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =9.38E-02

TIME,YR	DISCHARGE RATE,CI/YR DISPERSION	NO DISP.	DISP/NO-DISP	PULSE/SQUARE
100	.000E+00	.000E+00	.000E+00	.000E+00
2047750	.000E+00	.000E+00	.000E+00	.000E+00
2048429	2.239E-37	.000E+00	1.418E-38	3.000E+00
2049107	1.027E-34	.000E+00	6.507E-36	3.047E+00
2049785	3.894E-32	.000E+00	2.467E-33	2.956E+00
2050463	1.167E-29	.000E+00	7.397E-31	2.865E+00
2051141	2.767E-27	.000E+00	1.753E-28	2.775E+00
2051819	5.168E-25	.000E+00	3.287E-26	2.684E+00
2052497	7.692E-23	.000E+00	4.874E-24	2.596E+00
2053176	9.028E-21	.000E+00	5.721E-22	2.507E+00
2053854	8.387E-19	.000E+00	5.314E-20	2.419E+00
2054532	5.168E-17	.000E+00	3.909E-18	2.333E+00
2055210	3.592E-15	.000E+00	2.276E-16	2.246E+00
2055888	1.658E-13	.000E+00	1.050E-14	2.161E+00
2056565	6.060E-12	.000E+00	3.841E-13	2.077E+00
2057244	1.756E-10	.000E+00	1.113E-11	1.994E+00
2057923	4.034E-09	.000E+00	2.557E-10	1.912E+00
2058601	7.349E-08	.000E+00	4.657E-09	1.832E+00
2059279	1.092E-06	.000E+00	6.730E-08	1.752E+00
2059957	1.217E-05	.000E+00	7.716E-07	1.675E+00
2060635	1.107E-04	.000E+00	7.019E-06	1.598E+00
2061313	7.996E-04	.000E+00	5.068E-05	1.524E+00
2061991	4.584E-03	.000E+00	2.905E-04	1.451E+00
2062669	2.066E-02	.000E+00	1.322E-03	1.380E+00
2063348	7.542E-02	.000E+00	4.781E-03	1.312E+00
2064026	2.166E-01	.000E+00	1.373E-02	1.245E+00
2064704	4.941E-01	.000E+00	3.132E-02	1.181E+00
2065382	8.958E-01	.000E+00	5.679E-02	1.118E+00
2066060	1.291E+00	.000E+00	8.184E-02	1.058E+00
2066738	1.479E+00	1.578E+01	9.377E-02	1.001E+00
2067416	1.348E+00	.000E+00	8.544E-02	9.451E-01
2068095	3.768E-01	.000E+00	6.192E-02	8.917E-01
2068773	5.632E-01	.000E+00	3.570E-02	8.405E-01
2069451	2.584E-01	.000E+00	1.638E-02	7.914E-01
2070129	9.437E-02	.000E+00	5.983E-03	7.445E-01
2070807	2.744E-02	.000E+00	1.740E-03	6.997E-01
2071485	6.352E-03	.000E+00	4.027E-04	6.569E-01
2072163	1.171E-03	.000E+00	7.427E-05	6.161E-01
2072842	1.721E-04	.000E+00	1.091E-05	5.771E-01
2073520	2.015E-05	.000E+00	1.278E-06	5.400E-01
2074198	1.881E-06	.000E+00	1.193E-07	5.048E-01
2074876	1.400E-07	.000E+00	8.875E-09	4.713E-01
2075554	8.305E-09	.000E+00	5.266E-10	4.396E-01
2076232	3.931E-10	.000E+00	2.492E-11	4.095E-01
2076910	1.484E-11	.000E+00	9.412E-13	3.812E-01
2077588	4.472E-13	.000E+00	2.836E-14	3.544E-01
2078267	1.075E-14	.000E+00	6.819E-16	3.291E-01
2078945	2.064E-16	.000E+00	1.309E-17	3.054E-01
2079623	3.163E-18	.000E+00	2.006E-19	2.832E-01
2080301	3.870E-20	.000E+00	2.454E-21	2.623E-01
2080979	3.782E-22	.000E+00	2.398E-23	2.427E-01
2081657	2.952E-24	.000E+00	1.872E-25	2.244E-01
2082335	1.842E-26	.000E+00	1.168E-27	2.074E-01
2083014	9.178E-29	.000E+00	5.821E-30	1.915E-01
2083692	3.656E-31	.000E+00	2.319E-32	1.767E-01
2084370	1.164E-33	.000E+00	7.384E-35	1.629E-01
2085048	2.965E-36	.000E+00	1.881E-37	1.501E-01
2085726	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: TH232
HALF LIFE: 1.40E+10 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000020
INVENTORY IN WASTE AT YEAR 2000= 7.80E+00 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=7.80E+00 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =2.34E-02 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 2.34E-02 CURIES PER YEAR AT 7232977 YEARS
FINAL : 2.34E-02 CURIES PER YEAR AT 7233310 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 7171210 YEARS
PEAK DISCHARGE RATE= 6.28E-04 CURIES PER YEAR AT 7232917 YEARS
BAND WIDTH= 123414 YEARS WITH TAIL END AT 7294624 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =2.68E-02

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
7168837	.000E+00	.000E+00	2.790E-39	1.461E+00
7171210	3.203E-38	.000E+00	1.369E-36	1.444E+00
7173584	1.241E-35	.000E+00	5.307E-34	1.428E+00
7175957	3.802E-33	.000E+00	1.625E-31	1.411E+00
7178331	9.199E-31	.000E+00	3.932E-29	1.394E+00
7180704	1.759E-28	.000E+00	7.519E-27	1.378E+00
7183077	2.659E-26	.000E+00	1.137E-24	1.361E+00
7185451	3.178E-24	.000E+00	1.359E-22	1.344E+00
7187824	3.005E-22	.000E+00	1.285E-20	1.328E+00
7190197	2.247E-20	.000E+00	9.607E-19	1.311E+00
7192571	1.330E-18	.000E+00	5.686E-17	1.294E+00
7194944	6.231E-17	.000E+00	2.664E-15	1.277E+00
7197317	2.311E-15	.000E+00	9.880E-14	1.260E+00
7199691	6.789E-14	.000E+00	2.902E-12	1.243E+00
7202064	1.579E-12	.000E+00	6.751E-11	1.225E+00
7204437	2.911E-11	.000E+00	1.244E-09	1.208E+00
7206811	4.252E-10	.000E+00	1.818E-08	1.191E+00
7209184	4.923E-09	.000E+00	2.105E-07	1.173E+00
7211557	4.520E-08	.000E+00	1.932E-06	1.156E+00
7213931	3.290E-07	.000E+00	1.407E-05	1.138E+00
7216304	1.900E-06	.000E+00	8.122E-05	1.120E+00
7218677	8.702E-06	.000E+00	3.720E-04	1.103E+00
7221051	3.162E-05	.000E+00	1.352E-03	1.085E+00
7223424	9.121E-05	.000E+00	3.899E-03	1.068E+00
7225797	2.068E-04	.000E+00	8.927E-03	1.051E+00
7228171	3.795E-04	.000E+00	1.622E-02	1.034E+00
7230544	5.478E-04	.000E+00	2.342E-02	1.018E+00
7232917	6.280E-04	.000E+00	2.685E-02	1.001E+00
7235291	5.720E-04	.000E+00	2.445E-02	9.849E-01
7237664	4.140E-04	.000E+00	1.770E-02	9.688E-01
7240037	2.382E-04	.000E+00	1.018E-02	9.530E-01
7242411	1.089E-04	.000E+00	4.657E-03	9.373E-01
7244784	3.962E-05	.000E+00	1.694E-03	9.219E-01
7247157	1.146E-05	.000E+00	4.900E-04	9.066E-01
7249531	2.658E-06	.000E+00	1.128E-04	8.915E-01
7251904	4.831E-07	.000E+00	2.065E-05	8.765E-01
7254277	7.043E-08	.000E+00	3.011E-06	8.615E-01
7256651	8.175E-09	.000E+00	3.495E-07	8.466E-01
7259024	7.558E-10	.000E+00	3.231E-08	8.317E-01
7261397	5.567E-11	.000E+00	2.380E-09	8.168E-01
7263771	3.267E-12	.000E+00	1.397E-10	8.021E-01
7266144	1.528E-13	.000E+00	6.532E-12	7.873E-01
7268517	5.695E-15	.000E+00	2.435E-13	7.726E-01
7270891	1.693E-16	.000E+00	7.237E-15	7.579E-01
7273264	4.013E-18	.000E+00	1.716E-16	7.434E-01
7275637	7.586E-20	.000E+00	3.244E-18	7.289E-01
7278011	1.144E-21	.000E+00	4.892E-20	7.149E-01
7280384	1.377E-23	.000E+00	5.889E-22	7.007E-01
7282758	1.323E-25	.000E+00	5.656E-24	6.867E-01
7285131	1.015E-27	.000E+00	4.338E-26	6.728E-01
7287504	6.213E-30	.000E+00	2.656E-28	6.592E-01
7289878	3.038E-32	.000E+00	1.299E-30	6.458E-01
7292251	1.187E-34	.000E+00	5.074E-33	6.326E-01
7294624	3.703E-37	.000E+00	1.583E-35	6.197E-01
7296998	.000E+00	.000E+00	3.948E-38	6.068E-01

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: U232
HALF LIFE: 7.20E+01 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000070
INVENTORY IN WASTE AT YEAR 2000= 2.50E+04 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=9.75E+03 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =2.93E+01 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: .00E+00 CURIES PER YEAR AT 2066636 YEARS
FINAL : .00E+00 CURIES PER YEAR AT 2066970 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= .00E+00 CURIES PER YEAR AT 2066803 YEARS
BAND WIDTH= 0 YEARS WITH TAIL END AT 0 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR DISCHARGE RATE,CI/YR DISP/NO-DISP PULSE/SQUARE

DISPERSION NO DISP.

100	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: CM245
HALF LIFE: 8.50E+03 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000300
INVENTORY IN WASTE AT YEAR 2000= 1.38E+05 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=1.37E+05 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =4.11E+02 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 3.44E-15 CURIES PER YEAR AT 482292 YEARS
FINAL : 3.35E-15 CURIES PER YEAR AT 482625 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 478961 YEARS
PEAK DISCHARGE RATE= 1.31E-15 CURIES PER YEAR AT 482443 YEARS
BAND WIDTH= 6964 YEARS WITH TAIL END AT 485925 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =3.82E-01

TIME,YR DISCHARGE RATE,CI/YR DISP/NO-DISP PULSE/SQUARE

DISPERSION NO DISP.

100	.000E+00	.000E+00	.000E+00	.000E+00
478803	.000E+00	.000E+00	1.282E-26	1.069E+01
478961	9.102E-39	.000E+00	2.015E-24	1.024E+01
479120	1.119E-36	.000E+00	2.509E-22	9.780E+00
479278	1.090E-34	.000E+00	2.475E-20	9.319E+00
479436	8.418E-33	.000E+00	1.937E-18	8.854E+00
479594	5.159E-31	.000E+00	1.203E-16	8.388E+00
479753	2.510E-29	.000E+00	5.927E-15	7.921E+00
479911	9.698E-28	.000E+00	2.320E-13	7.451E+00
480069	2.978E-26	.000E+00	7.218E-12	6.983E+00
480228	7.276E-25	.000E+00	1.786E-10	6.513E+00
480386	1.415E-23	.000E+00	3.518E-09	6.044E+00
480544	2.192E-22	.000E+00	5.522E-08	5.576E+00
480702	2.708E-21	.000E+00	6.911E-07	5.111E+00
480861	2.672E-20	.000E+00	6.906E-06	4.650E+00
481019	2.106E-19	.000E+00	5.516E-05	4.196E+00
481177	1.329E-18	.000E+00	3.526E-04	3.750E+00
481335	6.722E-18	.000E+00	1.806E-03	3.317E+00
481494	2.729E-17	.000E+00	7.427E-03	2.899E+00
481652	8.905E-17	.000E+00	2.455E-02	2.501E+00
481810	2.340E-16	.000E+00	6.535E-02	2.126E+00
481969	4.958E-16	.000E+00	1.403E-01	1.779E+00
482127	8.483E-16	.000E+00	2.431E-01	1.464E+00
482285	1.174E-15	.000E+00	3.407E-01	1.183E+00
482443	1.314E-15	3.400E-15	3.863E-01	9.387E-01
482602	1.190E-15	3.357E-15	3.546E-01	7.309E-01
482760	8.728E-16	.000E+00	2.634E-01	5.587E-01
482918	5.179E-16	.000E+00	1.583E-01	4.196E-01
483076	2.485E-16	.000E+00	7.696E-02	3.098E-01
483235	9.632E-17	.000E+00	3.022E-02	2.252E-01
483393	3.012E-17	.000E+00	9.573E-03	1.613E-01
483551	7.593E-18	.000E+00	2.444E-03	1.141E-01
483710	1.541E-18	.000E+00	5.024E-04	7.976E-02
483868	2.514E-19	.000E+00	8.304E-05	5.518E-02
484026	3.295E-20	.000E+00	1.103E-05	3.783E-02
484184	3.468E-21	.000E+00	1.175E-06	2.573E-02
484343	2.927E-22	.000E+00	1.005E-07	1.738E-02
484501	1.980E-23	.000E+00	6.887E-09	1.166E-02
484659	1.073E-24	.000E+00	3.781E-10	7.785E-03
484817	4.657E-26	.000E+00	1.662E-11	5.173E-03
484976	1.618E-27	.000E+00	5.851E-13	3.422E-03
485134	4.500E-29	.000E+00	1.648E-14	2.255E-03
485292	1.001E-30	.000E+00	3.714E-16	1.482E-03
485451	1.781E-32	.000E+00	6.695E-18	9.707E-04
485609	2.536E-34	.000E+00	9.655E-20	6.344E-04
485767	2.888E-36	.000E+00	1.114E-21	4.135E-04
485925	2.630E-38	.000E+00	1.028E-23	2.690E-04
486084	.000E+00	.000E+00	7.582E-26	1.747E-04

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: PU241
HALF LIFE: 1.50E+01 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000100
INVENTORY IN WASTE AT YEAR 2000= 2.64E+08 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=2.58E+06 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =7.74E+03 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION

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     INITIAL:  .00E+00 CURIES PER YEAR AT  1446675 YEARS
     FINAL  :  .00E+00 CURIES PER YEAR AT  1447009 YEARS

LEACH RATE=  .003000 FRACTION PER YEAR
LEACH DURATION=       333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME=   145 YEARS
AXIAL DISPERSION COEFFICIENT=  .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
     INITIAL BREAKTHROUGH AT         0 YEARS
     PEAK DISCHARGE RATE=  .00E+00 CURIES PER YEAR AT  1446842 YEARS
     BAND WIDTH=          0 YEARS WITH TAIL END AT          0 YEARS
     DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR   DISCHARGE RATE,CI/YR   DISP/NO-DISP  PULSE/SQUARE

           DISPERSION NO DISP,

     100    .000E+00    .000E+00    .000E+00    .000E+00


      RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
        A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
      CONTAINING YEAR 2000  NUCLEAR POWER ECONOMY WASTE


TIME OF LEACH INCIDENT:       100 YEARS

NUCLIDE: AM241
HALF LIFE: 4.33E+02 YEARS
NUCLIDE VELOCITY/WATER VELOCITY=  .030100
INVENTORY IN WASTE AT YEAR 2000= 8.56E+07 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=8.08E+07 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =2.42E+05 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
     INITIAL:  .00E+00 CURIES PER YEAR AT  1446675 YEARS
     FINAL  :  .00E+00 CURIES PER YEAR AT  1447009 YEARS

LEACH RATE=  .003000 FRACTION PER YEAR
LEACH DURATION=       333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME=   145 YEARS
AXIAL DISPERSION COEFFICIENT=  .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
     INITIAL BREAKTHROUGH AT         0 YEARS
     PEAK DISCHARGE RATE=  .00E+00 CURIES PER YEAR AT  1446842 YEARS
     BAND WIDTH=          0 YEARS WITH TAIL END AT          0 YEARS
     DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR   DISCHARGE RATE,CI/YR   DISP/NO-DISP  PULSE/SQUARE

           DISPERSION NO DISP,

     100    .000E+00    .000E+00    .000E+00    .000E+00


      RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
        A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
      CONTAINING YEAR 2000  NUCLEAR POWER ECONOMY WASTE


TIME OF LEACH INCIDENT:       100 YEARS

NUCLIDE: NP237
HALF LIFE: 2.14E+06 YEARS
NUCLIDE VELOCITY/WATER VELOCITY=  .010000
INVENTORY IN WASTE AT YEAR 2000= 8.07E+04 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=8.34E+04 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =2.50E+02 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
     INITIAL: 2.49E+02 CURIES PER YEAR AT    14566 YEARS
     FINAL  : 2.49E+02 CURIES PER YEAR AT    14899 YEARS

LEACH RATE=  .003000 FRACTION PER YEAR
LEACH DURATION=       333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME=   145 YEARS
AXIAL DISPERSION COEFFICIENT=  .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
     INITIAL BREAKTHROUGH AT    14443 YEARS
     PEAK DISCHARGE RATE= 2.49E+02 CURIES PER YEAR AT    14615 YEARS
     BAND WIDTH=        576 YEARS WITH TAIL END AT     15019 YEARS
     DISPERSION PEAK/NO-DISPERSION PEAK =1.00E+00

TIME,YR   DISCHARGE RATE,CI/YR   DISP/NO-DISP  PULSE/SQUARE

           DISPERSION NO DISP,

     100    .000E+00    .000E+00    .000E+00    .000E+00
   14423    .000E+00    .000E+00    .000E+00    .000E+00
   14443   8.632E-34    .000E+00   3.460E-36   4.154E+02
   14462   6.320E-24    .000E+00   2.538E-26   3.545E+02
   14481   1.019E-15    .000E+00   4.091E-18   2.924E+02
   14500   3.736E-09    .000E+00   1.500E-11   2.292E+02
   14519   3.262E-04    .000E+00   1.310E-06   1.655E+02
   14539   7.356E-01    .000E+00   2.954E-03   1.032E+02
   14558   9.207E+01    .000E+00   2.091E-01   4.636E+01
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14577	2.169E+02	2.490E+02	8.710E-01	8.128E+00
14596	2.488E+02	2.490E+02	9.989E-01	1.207E-01
14615	2.490E+02	2.490E+02	1.000E+00	4.859E-05
14635	2.490E+02	2.490E+02	1.000E+00	4.704E-10
14654	2.490E+02	2.490E+02	1.000E+00	1.110E-16
14673	2.490E+02	2.490E+02	1.000E+00	6.480E-25
14692	2.490E+02	2.490E+02	1.000E+00	9.496E-35
14711	2.490E+02	2.490E+02	1.000E+00	.000E+00
14731	2.490E+02	2.490E+02	1.000E+00	.000E+00
14750	2.490E+02	2.490E+02	1.000E+00	.000E+00
14769	2.490E+02	2.490E+02	1.000E+00	.000E+00
14788	2.490E+02	2.490E+02	1.000E+00	.000E+00
14807	2.490E+02	2.490E+02	1.000E+00	.000E+00
14827	2.490E+02	2.490E+02	1.000E+00	.000E+00
14846	2.490E+02	2.490E+02	1.000E+00	.000E+00
14865	2.489E+02	2.490E+02	9.997E-01	.000E+00
14884	2.324E+02	2.490E+02	9.335E-01	.000E+00
14903	8.221E+01	.000E+00	3.301E-01	.000E+00
14923	2.163E+00	.000E+00	8.688E-03	.000E+00
14942	1.987E-03	.000E+00	7.980E-06	.000E+00
14961	5.160E-08	.000E+00	2.072E-10	.000E+00
14980	3.556E-14	.000E+00	1.428E-16	.000E+00
14999	6.373E-22	.000E+00	2.559E-24	.000E+00
15019	2.958E-31	.000E+00	1.188E-33	.000E+00
15038	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: U233
HALF LIFE: 1.58E+05 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .00007D
INVENTORY IN WASTE AT YEAR 2000= 1.88E+04 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=1.88E+04 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =5.64E+01 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 6.52E-03 CURIES PER YEAR AT 2066636 YEARS
FINAL : 6.51E-03 CURIES PER YEAR AT 2068970 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION

INITIAL BREAKTHROUGH AT 2049107 YEARS
PEAK DISCHARGE RATE= 6.11E-04 CURIES PER YEAR AT 2066738 YEARS
BAND WIDTH= 35263 YEARS WITH TAIL END AT 2084370 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =9.37E-02

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
2048429	.000E+00	.000E+00	1.418E-38	3.000E+00
2049107	4.579E-38	.000E+00	6.507E-36	3.047E+00
2049785	1.731E-35	.000E+00	2.467E-33	2.956E+00
2050463	5.174E-33	.000E+00	7.397E-31	2.865E+00
2051141	1.223E-30	.000E+00	1.753E-28	2.775E+00
2051819	2.286E-28	.000E+00	3.287E-26	2.684E+00
2052497	3.379E-26	.000E+00	4.874E-24	2.596E+00
2053176	3.954E-24	.000E+00	5.721E-22	2.507E+00
2053854	3.663E-22	.000E+00	5.314E-20	2.419E+00
2054532	2.686E-20	.000E+00	3.909E-18	2.333E+00
2055210	1.560E-18	.000E+00	2.276E-16	2.246E+00
2055888	7.175E-17	.000E+00	1.050E-14	2.161E+00
2056566	2.616E-15	.000E+00	3.841E-13	2.077E+00
2057244	7.557E-14	.000E+00	1.113E-11	1.994E+00
2057923	1.731E-12	.000E+00	2.557E-10	1.912E+00
2058601	3.144E-11	.000E+00	4.657E-09	1.832E+00
2059279	4.529E-10	.000E+00	6.730E-08	1.752E+00
2059957	5.177E-09	.000E+00	7.716E-07	1.675E+00
2060635	4.696E-08	.000E+00	7.019E-06	1.598E+00
2061313	3.381E-07	.000E+00	5.068E-05	1.524E+00
2061991	1.932E-06	.000E+00	2.905E-04	1.451E+00
2062669	8.769E-06	.000E+00	1.322E-03	1.380E+00
2063348	3.160E-05	.000E+00	4.781E-03	1.312E+00
2064026	9.049E-05	.000E+00	1.373E-02	1.245E+00
2064704	2.058E-04	.000E+00	3.132E-02	1.181E+00
2065382	3.721E-04	.000E+00	5.679E-02	1.118E+00
2066060	5.346E-04	.000E+00	8.184E-02	1.058E+00
2066738	6.107E-04	6.513E-03	9.377E-02	1.001E+00
2067416	5.548E-04	.000E+00	8.544E-02	9.451E-01
2068095	4.009E-04	.000E+00	6.192E-02	8.917E-01
2068773	2.365E-04	.000E+00	3.670E-02	8.405E-01
2069451	1.054E-04	.000E+00	1.638E-02	7.914E-01
2070129	3.839E-05	.000E+00	5.983E-03	7.445E-01
2070807	1.113E-05	.000E+00	1.740E-03	6.997E-01
2071485	2.569E-06	.000E+00	4.027E-04	6.569E-01
2072163	4.724E-07	.000E+00	7.427E-05	6.161E-01
2072842	6.920E-08	.000E+00	1.091E-05	5.771E-01
2073520	8.078E-09	.000E+00	1.278E-06	5.400E-01
2074198	7.517E-10	.000E+00	1.193E-07	5.048E-01
2074876	5.578E-11	.000E+00	8.875E-09	4.713E-01
2075554	3.300E-12	.000E+00	5.266E-10	4.396E-01
2076232	1.557E-13	.000E+00	2.492E-11	4.095E-01
2076910	5.863E-15	.000E+00	9.412E-13	3.812E-01
2077588	1.761E-16	.000E+00	2.836E-14	3.544E-01

2078267	4.222E-18	.000E+00	6.819E-16	3.291E-01
2078945	6.080E-20	.000E+00	1.309E-17	3.054E-01
2079623	1.235E-21	.000E+00	2.006E-19	2.832E-01
2080301	1.506E-23	.000E+00	2.454E-21	2.623E-01
2080979	1.468E-25	.000E+00	2.398E-23	2.427E-01
2081657	1.142E-27	.000E+00	1.672E-25	2.244E-01
2082335	7.104E-30	.000E+00	1.168E-27	2.074E-01
2083014	3.530E-32	.000E+00	5.821E-30	1.915E-01
2083692	1.402E-34	.000E+00	2.319E-32	1.767E-01
2084370	4.452E-37	.000E+00	7.384E-35	1.629E-01
2085048	.000E+00	.000E+00	1.881E-37	1.501E-01

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: TH229
HALF LIFE: 7.34E+03 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000020
INVENTORY IN WASTE AT YEAR 2000= 1.74E+01 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=1.95E+02 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =5.85E-01 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: .00E+00 CURIES PER YEAR AT 7232977 YEARS
FINAL : .00E+00 CURIES PER YEAR AT 7233310 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= .00E+00 CURIES PER YEAR AT 7233143 YEARS
BAND WIDTH= 0 YEARS WITH TAIL END AT 0 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: AM241 FROM PU241
HALF LIFE OF AM241 : 4.33E+02 YR HALF LIFE OF PU241 :1.50E+01 YR
NUCLIDE VELOCITY/WATER VELOCITY= .000100
INVENTORY OF PU241 IN WASTE AT YEAR 2000= 2.64E+08 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=2.58E+06 CURIES
PU241 FLOW RATE INTO AQUIFER =7.74E+03 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: .00E+00 CURIES PER YEAR AT 1446675 YEARS
FINAL : .00E+00 CURIES PER YEAR AT 1447009 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= .00E+00 CURIES PER YEAR AT 1446842 YEARS
BAND WIDTH= 0 YEARS WITH TAIL END AT 0 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: CM246
HALF LIFE: 4.76E+03 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000300
INVENTORY IN WASTE AT YEAR 2000= 2.68E+04 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=2.64E+04 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =7.92E+01 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 2.54E-29 CURIES PER YEAR AT 482292 YEARS
FINAL : 2.42E-29 CURIES PER YEAR AT 482625 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 480228 YEARS
PEAK DISCHARGE RATE= 5.58E-30 CURIES PER YEAR AT 482443 YEARS
BAND WIDTH= 4432 YEARS WITH TAIL END AT 484659 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =3.78E-01

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
480069	.000E+00	.000E+00	7.218E-12	6.983E+00
480228	6.118E-39	.000E+00	1.786E-10	6.513E+00
480386	1.178E-37	.000E+00	3.518E-09	6.044E+00
480544	1.306E-36	.000E+00	5.522E-08	5.576E+00
480702	2.209E-35	.000E+00	6.911E-07	5.111E+00
480861	2.157E-34	.000E+00	6.906E-06	4.650E+00
481019	1.684E-33	.000E+00	5.516E-05	4.196E+00
481177	1.052E-32	.000E+00	3.526E-04	3.750E+00
481335	5.265E-32	.000E+00	1.806E-03	3.317E+00
481494	2.116E-31	.000E+00	7.427E-03	2.899E+00
481652	7.834E-31	.000E+00	2.455E-02	2.501E+00
481810	1.778E-30	.000E+00	6.535E-02	2.126E+00
481969	3.729E-30	.000E+00	1.403E-01	1.779E+00
482127	6.316E-30	.000E+00	2.431E-01	1.464E+00
482285	8.649E-30	.000E+00	3.407E-01	1.183E+00
482443	9.583E-30	2.451E-29	3.863E-01	9.387E-01
482602	8.595E-30	2.424E-29	3.546E-01	7.309E-01
482760	6.240E-30	.000E+00	2.634E-01	5.587E-01
482918	3.665E-30	.000E+00	1.583E-01	4.196E-01
483076	1.741E-30	.000E+00	7.696E-02	3.098E-01
483235	6.680E-31	.000E+00	3.022E-02	2.252E-01
483393	2.069E-31	.000E+00	9.573E-03	1.613E-01
483551	5.160E-32	.000E+00	2.444E-03	1.141E-01
483710	1.036E-32	.000E+00	5.024E-04	7.976E-02
483868	1.674E-33	.000E+00	8.304E-05	5.518E-02
484026	2.172E-34	.000E+00	1.103E-05	3.783E-02
484184	2.263E-35	.000E+00	1.175E-06	2.573E-02
484343	1.991E-36	.000E+00	1.005E-07	1.738E-02
484501	1.266E-37	.000E+00	6.887E-09	1.166E-02
484659	6.792E-39	.000E+00	3.781E-10	7.785E-03
484817	.000E+00	.000E+00	1.662E-11	5.173E-03

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: AM242M
HALF LIFE: 1.52E+02 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000100
INVENTORY IN WASTE AT YEAR 2000= 7.45E+06 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=4.72E+06 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =1.42E+04 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL : .00E+00 CURIES PER YEAR AT 1446675 YEARS
FINAL : .00E+00 CURIES PER YEAR AT 1447009 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= .00E+00 CURIES PER YEAR AT 1446842 YEARS
BAND WIDTH= 0 YEARS WITH TAIL END AT 0 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: CM242
HALF LIFE: 4.47E-01 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000300
INVENTORY IN WASTE AT YEAR 2000= 3.61E+08 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=3.87E+06 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =1.16E+04 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: .00E+00 CURIES PER YEAR AT 482292 YEARS

FINAL : .00E+00 CURIES PER YEAR AT 482625 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM2/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= .00E+00 CURIES PER YEAR AT 482458 YEARS
BAND WIDTH= 0 YEARS WITH TAIL END AT 0 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: PU242
HALF LIFE: 3.87E+05 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000100
INVENTORY IN WASTE AT YEAR 2000= 9.26E+03 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=9.46E+03 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =2.84E+01 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 2.13E+00 CURIES PER YEAR AT 1446675 YEARS
FINAL : 2.13E+00 CURIES PER YEAR AT 1447009 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM2/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 1433980 YEARS
PEAK DISCHARGE RATE= 2.84E-01 CURIES PER YEAR AT 1446797 YEARS
BAND WIDTH= 25634 YEARS WITH TAIL END AT 1459614 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =1.34E-01

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
1433505	.000E+00	.000E+00	.000E+00	.000E+00
1433980	5.948E-38	.000E+00	2.733E-38	4.272E+00
1434454	2.761E-35	.000E+00	1.270E-35	4.180E+00
1434929	1.025E-32	.000E+00	4.718E-33	4.038E+00
1435404	3.009E-30	.000E+00	1.386E-30	3.897E+00
1435878	6.988E-28	.000E+00	3.222E-28	3.755E+00
1436353	1.284E-25	.000E+00	5.927E-26	3.615E+00
1436828	1.868E-23	.000E+00	8.627E-24	3.474E+00
1437303	2.151E-21	.000E+00	9.943E-22	3.335E+00
1437777	1.961E-19	.000E+00	9.075E-20	3.196E+00
1438252	1.417E-17	.000E+00	6.563E-18	3.059E+00
1438727	8.115E-16	.000E+00	3.761E-16	2.922E+00
1439201	3.683E-14	.000E+00	1.708E-14	2.787E+00
1439676	1.325E-12	.000E+00	6.153E-13	2.654E+00
1440151	3.783E-11	.000E+00	1.758E-11	2.522E+00
1440626	8.567E-10	.000E+00	3.984E-10	2.392E+00
1441100	1.540E-08	.000E+00	7.167E-09	2.264E+00
1441575	2.197E-07	.000E+00	1.023E-07	2.140E+00
1442050	2.489E-06	.000E+00	1.161E-06	2.017E+00
1442524	2.240E-05	.000E+00	1.045E-05	1.898E+00
1442999	1.602E-04	.000E+00	7.481E-05	1.782E+00
1443474	9.101E-04	.000E+00	4.254E-04	1.669E+00
1443949	4.116E-03	.000E+00	1.923E-03	1.561E+00
1444423	1.476E-02	.000E+00	6.909E-03	1.456E+00
1444898	4.213E-02	.000E+00	1.974E-02	1.356E+00
1445373	9.566E-02	.000E+00	4.487E-02	1.260E+00
1445847	1.728E-01	.000E+00	8.112E-02	1.168E+00
1446322	2.484E-01	.000E+00	1.167E-01	1.081E+00
1446797	2.842E-01	2.127E+00	1.336E-01	9.981E-01
1447272	2.568E-01	.000E+00	1.218E-01	9.197E-01
1447746	1.877E-01	.000E+00	8.842E-02	8.457E-01
1448221	1.084E-01	.000E+00	5.112E-02	7.760E-01
1448695	4.989E-02	.000E+00	2.354E-02	7.106E-01
1449170	1.829E-02	.000E+00	8.638E-03	6.494E-01
1449645	5.344E-03	.000E+00	2.526E-03	5.923E-01
1450120	1.245E-03	.000E+00	5.887E-04	5.392E-01
1450595	2.311E-04	.000E+00	1.094E-04	4.898E-01
1451069	3.422E-05	.000E+00	1.621E-05	4.440E-01
1451544	4.042E-06	.000E+00	1.917E-06	4.017E-01
1452019	3.809E-07	.000E+00	1.808E-07	3.628E-01
1452493	2.864E-08	.000E+00	1.360E-08	3.270E-01
1452968	1.719E-09	.000E+00	8.171E-10	2.941E-01
1453443	8.232E-11	.000E+00	3.917E-11	2.640E-01
1453917	3.148E-12	.000E+00	1.499E-12	2.366E-01
1454392	9.613E-14	.000E+00	4.582E-14	2.118E-01
1454867	2.344E-15	.000E+00	1.118E-15	1.892E-01
1455342	4.566E-17	.000E+00	2.180E-17	1.687E-01
1455816	7.104E-19	.000E+00	3.395E-19	1.503E-01

1456291	6.831E-21	.000E+00	4.224E-21	1.336E-01
1456765	8.771E-23	.000E+00	4.199E-23	1.187E-01
1457240	6.964E-25	.000E+00	3.336E-25	1.052E-01
1457715	4.418E-27	.000E+00	2.119E-27	9.324E-02
1458190	2.241E-29	.000E+00	1.075E-29	8.252E-02
1458665	9.090E-32	.000E+00	4.366E-32	7.294E-02
1459139	2.948E-34	.000E+00	1.417E-34	6.441E-02
1459614	7.649E-37	.000E+00	3.680E-37	5.682E-02
1460089	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: PU238
HALF LIFE: 8.78E+01 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000100
INVENTORY IN WASTE AT YEAR 2000= 3.97E+08 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=1.46E+08 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =5.58E+05 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: .00E+00 CURIES PER YEAR AT 1446675 YEARS
FINAL : .00E+00 CURIES PER YEAR AT 1447009 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= .00E+00 CURIES PER YEAR AT 1446842 YEARS
BAND WIDTH= 0 YEARS WITH TAIL END AT 0 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISCHARGE RATE,CI/YR	DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.	
100	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: U238
HALF LIFE: 4.47E+09 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000070
INVENTORY IN WASTE AT YEAR 2000= 2.44E+02 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=2.44E+02 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =7.32E-01 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 7.32E-01 CURIES PER YEAR AT 2066636 YEARS
FINAL : 7.32E-01 CURIES PER YEAR AT 2066970 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 2048429 YEARS
PEAK DISCHARGE RATE= 5.66E-02 CURIES PER YEAR AT 2066736 YEARS
BAND WIDTH= 36619 YEARS WITH TAIL END AT 2085048 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =9.38E-02

TIME,YR	DISCHARGE RATE,CI/YR	DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.	
100	.000E+00	.000E+00	.000E+00	.000E+00
2047750	.000E+00	.000E+00	.000E+00	.000E+00
2048429	1.038E-38	.000E+00	1.418E-38	3.000E+00
2049107	4.762E-36	.000E+00	6.507E-36	3.047E+00
2049785	1.805E-33	.000E+00	2.467E-33	2.956E+00
2050463	5.413E-31	.000E+00	7.397E-31	2.865E+00
2051141	1.263E-28	.000E+00	1.753E-28	2.775E+00
2051819	2.405E-26	.000E+00	3.287E-26	2.684E+00
2052497	3.567E-24	.000E+00	4.874E-24	2.596E+00
2053175	4.186E-22	.000E+00	5.721E-22	2.507E+00
2053854	3.889E-20	.000E+00	5.314E-20	2.419E+00
2054532	2.860E-18	.000E+00	3.909E-18	2.333E+00
2055210	1.656E-16	.000E+00	2.276E-16	2.246E+00
2055888	7.687E-15	.000E+00	1.050E-14	2.161E+00
2056566	2.810E-13	.000E+00	3.841E-13	2.077E+00
2057244	8.194E-12	.000E+00	1.113E-11	1.994E+00
2057923	1.871E-10	.000E+00	2.557E-10	1.912E+00
2058601	3.408E-09	.000E+00	4.657E-09	1.832E+00
2059279	4.925E-08	.000E+00	6.730E-08	1.752E+00
2059957	5.646E-07	.000E+00	7.716E-07	1.675E+00
2060635	5.136E-06	.000E+00	7.019E-06	1.598E+00
2061313	3.709E-05	.000E+00	5.068E-05	1.524E+00

2061991	2.126E-04	.000E+00	2.905E-04	1.451E+00
2062669	9.677E-04	.000E+00	1.322E-03	1.380E+00
2063348	3.498E-03	.000E+00	4.781E-03	1.312E+00
2064026	1.005E-02	.000E+00	1.373E-02	1.245E+00
2064704	2.292E-02	.000E+00	3.132E-02	1.181E+00
2065382	4.159E-02	.000E+00	5.679E-02	1.118E+00
2066060	5.988E-02	.000E+00	8.184E-02	1.058E+00
2066738	6.862E-02	7.318E-01	9.377E-02	1.001E+00
2067416	6.252E-02	.000E+00	8.544E-02	9.451E-01
2068095	4.531E-02	.000E+00	6.192E-02	8.917E-01
2068773	2.613E-02	.000E+00	3.570E-02	8.405E-01
2069451	1.139E-02	.000E+00	1.638E-02	7.914E-01
2070129	4.378E-03	.000E+00	5.983E-03	7.445E-01
2070807	1.273E-03	.000E+00	1.740E-03	6.997E-01
2071485	2.947E-04	.000E+00	4.027E-04	6.569E-01
2072163	5.435E-05	.000E+00	7.427E-05	6.161E-01
2072842	7.985E-06	.000E+00	1.091E-05	5.771E-01
2073520	9.350E-07	.000E+00	1.278E-06	5.400E-01
2074198	8.726E-08	.000E+00	1.193E-07	5.048E-01
2074876	6.494E-09	.000E+00	8.875E-09	4.713E-01
2075554	3.854E-10	.000E+00	5.266E-10	4.396E-01
2076232	1.824E-11	.000E+00	2.492E-11	4.095E-01
2076910	6.888E-13	.000E+00	9.412E-13	3.812E-01
2077589	2.075E-14	.000E+00	2.836E-14	3.544E-01
2078267	4.990E-16	.000E+00	6.819E-16	3.291E-01
2078945	9.577E-18	.000E+00	1.309E-17	3.054E-01
2079623	1.468E-19	.000E+00	2.006E-19	2.832E-01
2080301	1.796E-21	.000E+00	2.454E-21	2.623E-01
2080979	1.755E-23	.000E+00	2.398E-23	2.427E-01
2081657	1.370E-25	.000E+00	1.872E-25	2.244E-01
2082335	8.546E-28	.000E+00	1.168E-27	2.074E-01
2083014	4.260E-30	.000E+00	5.821E-30	1.915E-01
2083692	1.697E-32	.000E+00	2.319E-32	1.767E-01
2084370	5.403E-35	.000E+00	7.384E-35	1.629E-01
2085048	1.376E-37	.000E+00	1.881E-37	1.501E-01
2085726	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE : U234
HALF LIFE: 2.44E+05 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000070
INVENTORY IN WASTE AT YEAR 2000= 2.27E+04 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=1.01E+05 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =3.03E+02 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 8.55E-01 CURIES PER YEAR AT 2066636 YEARS
FINAL : 8.54E-01 CURIES PER YEAR AT 2066970 YEARS

LEACH RATE= .00300 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 2048429 YEARS
PEAK DISCHARGE RATE= 8.01E-02 CURIES PER YEAR AT 2066738 YEARS
BAND WIDTH= 38619 YEARS WITH TAIL END AT 2085048 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =9.37E-02

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
2047750	.000E+00	.000E+00	.000E+00	.000E+00
2048429	1.277E-38	.000E+00	1.418E-38	3.000E+00
2049107	5.847E-36	.000E+00	6.507E-36	3.047E+00
2049785	2.213E-33	.000E+00	2.467E-33	2.956E+00
2050463	6.620E-31	.000E+00	7.397E-31	2.865E+00
2051141	1.566E-28	.000E+00	1.753E-28	2.775E+00
2051819	2.931E-26	.000E+00	3.287E-26	2.684E+00
2052497	4.337E-24	.000E+00	4.874E-24	2.596E+00
2053176	5.081E-22	.000E+00	5.721E-22	2.507E+00
2053854	4.711E-20	.000E+00	5.314E-20	2.419E+00
2054532	3.458E-18	.000E+00	3.909E-18	2.333E+00
2055210	2.010E-16	.000E+00	2.276E-16	2.246E+00
2055888	9.258E-15	.000E+00	1.050E-14	2.161E+00
2056565	3.378E-13	.000E+00	3.841E-13	2.077E+00
2057244	9.771E-12	.000E+00	1.113E-11	1.994E+00
2057923	2.240E-10	.000E+00	2.557E-10	1.912E+00
2058601	4.073E-09	.000E+00	4.657E-09	1.832E+00
2059279	5.875E-08	.000E+00	6.730E-08	1.752E+00
2059957	6.722E-07	.000E+00	7.716E-07	1.675E+00
2060635	6.103E-06	.000E+00	7.019E-06	1.598E+00
2061313	4.399E-05	.000E+00	5.068E-05	1.524E+00
2061991	2.517E-04	.000E+00	2.905E-04	1.451E+00
2062669	1.143E-03	.000E+00	1.322E-03	1.380E+00
2063348	4.125E-03	.000E+00	4.781E-03	1.312E+00
2064026	1.182E-02	.000E+00	1.373E-02	1.245E+00
2064704	2.692E-02	.000E+00	3.132E-02	1.181E+00
2065382	4.872E-02	.000E+00	5.679E-02	1.118E+00
2066060	7.007E-02	.000E+00	8.184E-02	1.058E+00
2066738	8.013E-02	8.546E-01	9.377E-02	1.001E+00
2067416	7.288E-02	.000E+00	8.544E-02	9.451E-01
2068095	5.272E-02	.000E+00	6.192E-02	8.917E-01
2068773	3.034E-02	.000E+00	3.570E-02	8.405E-01
2069451	1.389E-02	.000E+00	1.638E-02	7.914E-01

2070129	5.064E-03	.000E+00	5.983E-03	7.445E-01
2070807	1.470E-03	.000E+00	1.740E-03	6.997E-01
2071485	3.396E-04	.000E+00	4.027E-04	6.569E-01
2072163	6.250E-05	.000E+00	7.427E-05	6.161E-01
2072842	9.166E-06	.000E+00	1.091E-05	5.771E-01
2073520	1.071E-06	.000E+00	1.278E-06	5.400E-01
2074198	9.978E-08	.000E+00	1.193E-07	5.048E-01
2074876	7.411E-09	.000E+00	8.875E-09	4.713E-01
2075554	4.389E-10	.000E+00	5.266E-10	4.396E-01
2076232	2.073E-11	.000E+00	2.492E-11	4.095E-01
2076910	7.815E-13	.000E+00	9.412E-13	3.812E-01
2077588	2.350E-14	.000E+00	2.836E-14	3.544E-01
2078267	5.640E-16	.000E+00	6.819E-16	3.291E-01
2078945	1.080E-17	.000E+00	1.309E-17	3.054E-01
2079623	1.653E-19	.000E+00	2.006E-19	2.832E-01
2080301	2.015E-21	.000E+00	2.454E-21	2.623E-01
2080979	1.968E-23	.000E+00	2.398E-23	2.427E-01
2081657	1.534E-25	.000E+00	1.872E-25	2.244E-01
2082335	9.549E-28	.000E+00	1.168E-27	2.074E-01
2083014	4.750E-30	.000E+00	5.821E-30	1.915E-01
2083692	1.889E-32	.000E+00	2.319E-32	1.767E-01
2084370	6.002E-35	.000E+00	7.384E-35	1.629E-01
2085048	1.526E-37	.000E+00	1.881E-37	1.501E-01
2085726	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: TH230
HALF LIFE: 7.70E+04 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000020
INVENTORY IN WASTE AT YEAR 2000= 5.55E+00 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=6.33E+01 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =1.90E-01 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 1.00E-29 CURIES PER YEAR AT 7232977 YEARS
FINAL : 1.00E-29 CURIES PER YEAR AT 7233310 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 7204437 YEARS
PEAK DISCHARGE RATE= 2.70E-31 CURIES PER YEAR AT 7232917 YEARS
BAND WIDTH= 56960 YEARS WITH TAIL END AT 7261397 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =2.69E-02

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
7202064	.000E+00	.000E+00	6.751E-11	1.225E+00
7204437	1.615E-38	.000E+00	1.244E-09	1.208E+00
7206811	2.310E-37	.000E+00	1.818E-08	1.191E+00
7209184	2.618E-36	.000E+00	2.105E-07	1.173E+00
7211557	2.352E-35	.000E+00	1.932E-06	1.156E+00
7213931	1.676E-34	.000E+00	1.407E-05	1.138E+00
7216304	9.475E-34	.000E+00	8.122E-05	1.120E+00
7218677	4.294E-33	.000E+00	3.720E-04	1.103E+00
7221051	1.511E-32	.000E+00	1.352E-03	1.085E+00
7223424	4.266E-32	.000E+00	3.899E-03	1.068E+00
7225797	9.561E-32	.000E+00	8.927E-03	1.051E+00
7228171	1.701E-31	.000E+00	1.622E-02	1.034E+00
7230544	2.403E-31	.000E+00	2.342E-02	1.018E+00
7232917	2.697E-31	.000E+00	2.685E-02	1.001E+00
7235291	2.405E-31	.000E+00	2.445E-02	9.849E-01
7237664	1.704E-31	.000E+00	1.770E-02	9.688E-01
7240037	9.593E-32	.000E+00	1.018E-02	9.530E-01
7242411	4.295E-32	.000E+00	4.657E-03	9.373E-01
7244784	1.529E-32	.000E+00	1.694E-03	9.219E-01
7247157	4.330E-33	.000E+00	4.900E-04	9.066E-01
7249531	9.754E-34	.000E+00	1.128E-04	8.915E-01
7251904	1.749E-34	.000E+00	2.065E-05	8.765E-01
7254277	2.495E-35	.000E+00	3.011E-06	8.615E-01
7256651	2.835E-36	.000E+00	3.455E-07	8.466E-01
7259024	2.566E-37	.000E+00	3.231E-08	8.317E-01
7261397	1.850E-38	.000E+00	2.360E-09	8.168E-01
7263771	.000E+00	.000E+00	1.397E-10	8.021E-01

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: RA226
HALF LIFE: 1.60E+03 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000200
INVENTORY IN WASTE AT YEAR 2000= 3.47E-01 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=1.56E+00 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =4.68E-03 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL : 1.15E-29 CURIES PER YEAR AT 7242424 YEARS

FINAL : 9.99E-17 CURIES PER YEAR AT 72762 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 71951 YEARS
PEAK DISCHARGE RATE= 1.09E-16 CURIES PER YEAR AT 72546 YEARS
BAND WIDTH= 1285 YEARS WITH TAIL END AT 73235 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =9.42E-01

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
71927	.000E+00	.000E+00	1.304E-24	6.853E+01
71951	2.374E-38	.000E+00	1.673E-22	6.545E+01
71975	2.386E-36	.000E+00	1.699E-20	6.238E+01
71998	1.900E-34	.000E+00	1.367E-18	5.927E+01
72022	1.199E-32	.000E+00	8.717E-17	5.616E+01
72046	6.003E-31	.000E+00	4.409E-15	5.304E+01
72070	2.385E-29	.000E+00	1.770E-13	4.990E+01
72094	7.524E-28	.000E+00	5.641E-12	4.676E+01
72117	1.887E-26	.000E+00	1.429E-10	4.361E+01
72141	3.762E-25	.000E+00	2.879E-09	4.046E+01
72165	5.974E-24	.000E+00	4.619E-08	3.730E+01
72189	7.561E-23	.000E+00	5.908E-07	3.415E+01
72213	7.639E-22	.000E+00	6.030E-06	3.101E+01
72236	6.172E-21	.000E+00	4.923E-05	2.789E+01
72260	3.995E-20	.000E+00	3.220E-04	2.480E+01
72284	2.078E-19	.000E+00	1.692E-03	2.175E+01
72308	5.711E-19	.000E+00	7.145E-03	1.875E+01
72332	2.957E-18	.000E+00	2.457E-02	1.583E+01
72355	8.175E-18	.000E+00	6.865E-02	1.300E+01
72379	1.857E-17	.000E+00	1.575E-01	1.031E+01
72403	3.503E-17	.000E+00	3.003E-01	7.809E+00
72427	5.576E-17	.000E+00	4.830E-01	5.561E+00
72450	7.649E-17	1.143E-16	6.693E-01	3.647E+00
72474	9.284E-17	1.131E-16	8.209E-01	2.145E+00
72498	1.029E-16	1.119E-16	9.191E-01	1.097E+00
72522	1.075E-16	1.108E-16	9.699E-01	4.730E-01
72546	1.087E-16	1.097E-16	9.904E-01	1.673E-01
72569	1.083E-16	1.085E-16	9.977E-01	4.769E-02
72593	1.073E-16	1.074E-16	9.992E-01	1.086E-02
72617	1.061E-16	1.063E-16	9.983E-01	1.971E-03
72641	1.045E-16	1.052E-16	9.929E-01	2.856E-04
72665	1.016E-16	1.042E-16	9.758E-01	3.331E-05
72688	9.610E-17	1.031E-16	9.322E-01	3.178E-06
72712	8.611E-17	1.020E-16	8.440E-01	2.546E-07
72736	7.088E-17	1.010E-16	7.019E-01	1.767E-08
72760	5.193E-17	9.995E-17	5.195E-01	1.096E-09
72783	3.294E-17	.000E+00	3.329E-01	6.256E-11
72807	1.770E-17	.000E+00	1.808E-01	3.354E-12
72831	7.930E-18	.000E+00	8.183E-02	1.719E-13
72855	2.928E-18	.000E+00	3.052E-02	8.510E-15
72879	8.833E-19	.000E+00	9.304E-03	4.109E-16
72902	2.165E-19	.000E+00	2.304E-03	1.947E-17
72926	4.291E-20	.000E+00	4.615E-04	9.089E-19
72950	6.860E-21	.000E+00	7.453E-05	4.197E-20
72974	8.821E-22	.000E+00	9.683E-06	1.921E-21
72998	9.112E-23	.000E+00	1.011E-06	8.728E-23
73021	7.548E-24	.000E+00	8.458E-08	3.947E-24
73045	5.011E-25	.000E+00	5.674E-09	1.777E-25
73069	2.663E-26	.000E+00	3.047E-10	7.979E-27
73093	1.133E-27	.000E+00	1.309E-11	.000E+00
73116	3.855E-29	.000E+00	4.502E-13	.000E+00
73140	1.049E-30	.000E+00	1.232E-14	.000E+00
73164	2.262E-32	.000E+00	2.720E-16	.000E+00
73188	3.967E-34	.000E+00	4.774E-18	.000E+00
73212	5.513E-36	.000E+00	6.703E-20	.000E+00
73235	6.122E-38	.000E+00	7.527E-22	.000E+00
73259	.000E+00	.000E+00	6.749E-24	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: PU238 FROM AM242M
HALF LIFE OF PU238 : 8.78E+01 YR HALF LIFE OF AM242 :1.52E+02 YR
NUCLIDE VELOCITY/WATER VELOCITY= .000100
INVENTORY OF AM242 IN WASTE AT YEAR 2000= 7.45E+00 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=4.72E+06 CURIES
AM242 FLOW RATE INTO AQUIFER =1.42E+04 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: .00E+00 CURIES PER YEAR AT 144609 YEARS
FINAL : .00E+00 CURIES PER YEAR AT 144709 YEARS

LEACH RATE= .00300 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS

PEAK DISCHARGE RATE= .00E+00 CURIES PER YEAR AT 1446842 YEARS
BAND WIDTH= 0 YEARS WITH TAIL END AT 0 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISCHARGE RATE,CI/YR	DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.	
100	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: U234 FROM U238
HALF LIFE OF U234 : 2.44E+05 YR HALF LIFE OF U238 :4.47E+09 YR
NUCLIDE VELOCITY/WATER VELOCITY= .000070
INVENTORY OF U238 IN WASTE AT YEAR 2000= 2.44E+02 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=2.44E+02 CURIES
U238 FLOW RATE INTO AQUIFER =7.32E-01 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 7.30E-01 CURIES PER YEAR AT 2066636 YEARS
FINAL : 7.30E-01 CURIES PER YEAR AT 2066970 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 2048429 YEARS
PEAK DISCHARGE RATE= 6.84E-02 CURIES PER YEAR AT 2066738 YEARS
BAND WIDTH= 36619 YEARS WITH TAIL END AT 2085048 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =9.38E-02

TIME,YR	DISCHARGE RATE,CI/YR	DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.	
100	.000E+00	.000E+00	.000E+00	.000E+00
2047750	.000E+00	.000E+00	.000E+00	.000E+00
2048429	1.035E-38	.000E+00	1.418E-38	3.000E+00
2049107	4.748E-36	.000E+00	6.507E-36	3.047E+00
2049785	1.800E-33	.000E+00	2.467E-33	2.956E+00
2050463	5.397E-31	.000E+00	7.397E-31	2.865E+00
2051141	1.279E-28	.000E+00	1.753E-28	2.775E+00
2051819	2.398E-26	.000E+00	3.287E-26	2.684E+00
2052497	3.556E-24	.000E+00	4.874E-24	2.596E+00
2053176	4.174E-22	.000E+00	5.721E-22	2.507E+00
2053854	3.878E-20	.000E+00	5.314E-20	2.419E+00
2054532	2.852E-18	.000E+00	3.909E-18	2.333E+00
2055210	1.661E-16	.000E+00	2.276E-16	2.246E+00
2055888	7.665E-15	.000E+00	1.050E-14	2.161E+00
2056566	2.802E-13	.000E+00	3.841E-13	2.077E+00
2057244	8.121E-12	.000E+00	1.113E-11	1.994E+00
2057923	1.865E-10	.000E+00	2.557E-10	1.912E+00
2058601	3.399E-09	.000E+00	4.657E-09	1.832E+00
2059279	4.911E-08	.000E+00	6.730E-08	1.752E+00
2059957	5.630E-07	.000E+00	7.716E-07	1.675E+00
2060635	5.122E-06	.000E+00	7.019E-06	1.598E+00
2061313	3.698E-05	.000E+00	5.068E-05	1.524E+00
2061991	2.120E-04	.000E+00	2.905E-04	1.451E+00
2062669	9.650E-04	.000E+00	1.322E-03	1.380E+00
2063348	3.489E-03	.000E+00	4.781E-03	1.312E+00
2064026	1.002E-02	.000E+00	1.373E-02	1.245E+00
2064704	2.286E-02	.000E+00	3.132E-02	1.181E+00
2065382	4.144E-02	.000E+00	5.679E-02	1.118E+00
2066060	5.972E-02	.000E+00	8.184E-02	1.058E+00
2066738	6.843E-02	1.297E-01	9.377E-02	1.001E+00
2067416	6.235E-02	.000E+00	8.544E-02	9.451E-01
2068095	4.519E-02	.000E+00	6.192E-02	8.917E-01
2068773	2.606E-02	.000E+00	3.570E-02	8.405E-01
2069451	1.196E-02	.000E+00	1.638E-02	7.914E-01
2070129	4.366E-03	.000E+00	5.983E-03	7.445E-01
2070807	1.269E-03	.000E+00	1.740E-03	6.997E-01
2071485	2.939E-04	.000E+00	4.027E-04	6.569E-01
2072163	5.420E-05	.000E+00	7.427E-05	6.161E-01
2072842	7.964E-06	.000E+00	1.091E-05	5.771E-01
2073520	9.324E-07	.000E+00	1.278E-06	5.400E-01
2074198	8.703E-08	.000E+00	1.193E-07	5.048E-01
2074875	6.477E-09	.000E+00	8.875E-09	4.713E-01
2075554	3.843E-10	.000E+00	5.266E-10	4.396E-01
2076232	1.819E-11	.000E+00	2.492E-11	4.095E-01
2076910	6.869E-13	.000E+00	9.412E-13	3.812E-01
2077588	2.070E-14	.000E+00	2.836E-14	3.544E-01
2078267	4.976E-16	.000E+00	6.819E-16	3.291E-01
2078945	9.551E-18	.000E+00	1.309E-17	3.054E-01
2079623	1.464E-19	.000E+00	2.006E-19	2.832E-01
2080301	1.791E-21	.000E+00	2.454E-21	2.623E-01
2080979	1.750E-23	.000E+00	2.398E-23	2.427E-01
2081657	1.366E-25	.000E+00	1.872E-25	2.244E-01
2082335	8.524E-28	.000E+00	1.168E-27	2.074E-01
2083014	4.248E-30	.000E+00	5.821E-30	1.915E-01
2083692	1.692E-32	.000E+00	2.319E-32	1.767E-01
2084370	5.359E-35	.000E+00	7.344E-35	1.629E-01
2085048	1.373E-37	.000E+00	1.881E-37	1.501E-01
2085726	.000E+00	.000E+00	.000E+00	.000E+00

A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: CM247
HALF LIFE: 1.54E+07 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000300
INVENTORY IN WASTE AT YEAR 2000= 1.29E-01 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=1.29E-01 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =3.87E-04 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 3.79E-04 CURIES PER YEAR AT 482292 YEARS
FINAL : 3.79E-04 CURIES PER YEAR AT 482625 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 478328 YEARS
PEAK DISCHARGE RATE= 1.46E-04 CURIES PER YEAR AT 482443 YEARS
HAND WIDTH= 8389 YEARS WITH TAIL END AT 486717 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =3.86E-01

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
478170	.000E+00	.000E+00	2.031E-36	1.250E+01
478328	3.081E-37	.000E+00	8.135E-34	1.205E+01
478487	9.762E-35	.000E+00	2.577E-31	1.160E+01
478645	2.447E-32	.000E+00	6.461E-29	1.115E+01
478803	4.857E-30	.000E+00	1.282E-26	1.069E+01
478961	7.632E-28	.000E+00	2.015E-24	1.024E+01
479120	9.502E-26	.000E+00	2.509E-22	9.780E+00
479278	9.376E-24	.000E+00	2.475E-20	9.319E+00
479436	7.337E-22	.000E+00	1.937E-18	8.854E+00
479594	4.555E-20	.000E+00	1.203E-16	8.388E+00
479753	2.245E-18	.000E+00	5.927E-15	7.921E+00
479911	8.786E-17	.000E+00	2.320E-13	7.451E+00
480069	2.733E-15	.000E+00	7.218E-12	6.983E+00
480228	6.765E-14	.000E+00	1.786E-10	6.513E+00
480386	1.333E-12	.000E+00	3.518E-09	6.044E+00
480544	2.091E-11	.000E+00	5.522E-08	5.576E+00
480702	2.617E-10	.000E+00	6.911E-07	5.111E+00
480861	2.615E-09	.000E+00	6.906E-06	4.650E+00
481019	2.089E-08	.000E+00	5.516E-05	4.196E+00
481177	1.335E-07	.000E+00	3.526E-04	3.750E+00
481335	6.840E-07	.000E+00	1.806E-03	3.317E+00
481494	2.813E-06	.000E+00	7.427E-03	2.899E+00
481652	9.298E-06	.000E+00	2.455E-02	2.501E+00
481810	2.475E-05	.000E+00	6.535E-02	2.126E+00
481969	5.312E-05	.000E+00	1.403E-01	1.779E+00
482127	9.207E-05	.000E+00	2.431E-01	1.464E+00
482285	1.290E-04	.000E+00	3.407E-01	1.183E+00
482443	1.463E-04	3.787E-04	3.863E-01	9.387E-01
482602	1.343E-04	3.787E-04	3.546E-01	7.309E-01
482760	9.975E-05	.000E+00	2.634E-01	5.587E-01
482919	5.996E-05	.000E+00	1.583E-01	4.196E-01
483076	2.914E-05	.000E+00	7.696E-02	3.098E-01
483235	1.144E-05	.000E+00	3.022E-02	2.252E-01
483393	3.625E-06	.000E+00	9.573E-03	1.613E-01
483551	9.256E-07	.000E+00	2.444E-03	1.141E-01
483710	1.902E-07	.000E+00	5.024E-04	7.976E-02
483868	3.144E-08	.000E+00	8.304E-05	5.518E-02
484026	4.175E-09	.000E+00	1.103E-05	3.783E-02
484184	4.451E-10	.000E+00	1.175E-06	2.573E-02
484343	3.805E-11	.000E+00	1.005E-07	1.738E-02
484501	2.608E-12	.000E+00	6.887E-09	1.166E-02
484659	1.432E-13	.000E+00	3.781E-10	7.785E-03
484817	6.294E-15	.000E+00	1.662E-11	5.173E-03
484976	2.215E-16	.000E+00	5.851E-13	3.422E-03
485134	6.240E-18	.000E+00	1.648E-14	2.255E-03
485292	1.406E-19	.000E+00	3.714E-16	1.482E-03
485451	2.535E-21	.000E+00	6.695E-18	9.707E-04
485609	3.656E-23	.000E+00	9.655E-20	6.344E-04
485767	4.217E-25	.000E+00	1.114E-21	4.135E-04
485925	3.891E-27	.000E+00	1.028E-23	2.690E-04
486084	2.871E-29	.000E+00	7.582E-26	1.747E-04
486242	1.694E-31	.000E+00	4.475E-28	1.133E-04
486400	8.000E-34	.000E+00	2.113E-30	7.335E-05
486559	3.022E-36	.000E+00	7.981E-33	4.743E-05
486717	9.127E-39	.000E+00	2.411E-35	.000E+00
486875	.000E+00	.000E+00	5.826E-38	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: AM243
HALF LIFE: 7.37E+03 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000100
INVENTORY IN WASTE AT YEAR 2000= 5.12E+05 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=5.37E+05 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =1.52E+04 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: .00E+00 CURIES PER YEAR AT 1446675 YEARS
FINAL : .00E+00 CURIES PER YEAR AT 1447009 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= .00E+00 CURIES PER YEAR AT 1446842 YEARS
BAND WIDTH= 0 YEARS WITH TAIL END AT 0 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: PU239
HALF LIFE: 2.44E+04 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000100
INVENTORY IN WASTE AT YEAR 2000= 9.69E+05 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=9.86E+05 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =2.96E+03 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 4.10E-15 CURIES PER YEAR AT 1446675 YEARS
FINAL : 4.10E-15 CURIES PER YEAR AT 1447009 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 1436828 YEARS
PEAK DISCHARGE RATE= 5.51E-16 CURIES PER YEAR AT 1446797 YEARS
BAND WIDTH= 1993.8 YEARS WITH TAIL END AT 1456766 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =1.33E-01

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
1436353	.000E+00	.000E+00	5.927E-26	3.615E+00
1436828	4.723E-38	.000E+00	8.627E-24	3.474E+00
1437303	5.371E-36	.000E+00	9.943E-22	3.335E+00
1437777	4.837E-34	.000E+00	9.075E-20	3.196E+00
1438252	3.451E-32	.000E+00	6.563E-18	3.059E+00
1438727	1.951E-30	.000E+00	3.761E-16	2.922E+00
1439201	8.743E-29	.000E+00	1.708E-14	2.787E+00
1439676	3.107E-27	.000E+00	6.153E-13	2.654E+00
1440151	8.758E-26	.000E+00	1.758E-11	2.522E+00
1440626	1.958E-24	.000E+00	3.984E-10	2.392E+00
1441100	3.476E-23	.000E+00	7.167E-09	2.264E+00
1441575	4.847E-22	.000E+00	1.023E-07	2.140E+00
1442050	5.479E-21	.000E+00	1.161E-06	2.017E+00
1442524	4.868E-20	.000E+00	1.045E-05	1.898E+00
1442999	3.437E-19	.000E+00	7.481E-05	1.782E+00
1443474	1.928E-18	.000E+00	4.254E-04	1.669E+00
1443949	8.595E-18	.000E+00	1.923E-03	1.561E+00
1444423	3.049E-17	.000E+00	6.909E-03	1.456E+00
1444898	8.594E-17	.000E+00	1.974E-02	1.356E+00
1445373	1.927E-16	.000E+00	4.487E-02	1.260E+00
1445847	3.437E-15	.000E+00	8.112E-02	1.168E+00
1446322	4.879E-16	.000E+00	1.167E-01	1.081E+00
1446797	5.511E-16	4.12E-15	1.334E-01	9.981E-01
1447272	4.957E-16	.000E+00	1.218E-01	9.197E-01
1447746	3.550E-16	.000E+00	8.842E-02	8.457E-01
1448221	2.025E-16	.000E+00	5.112E-02	7.760E-01
1448695	9.199E-17	.000E+00	2.354E-02	7.105E-01
1449170	3.36[illegible]E-17	.000E+00	8.638E-03	6.494E-01
1449645	9.607E-18	.000E+00	2.526E-03	5.923E-01
1450120	2.209E-18	.000E+00	5.867E-04	5.392E-01
1450595	4.051E-19	.000E+00	1.094E-04	4.898E-01
1451069	5.923E-20	.000E+00	1.621E-05	4.440E-01
1451544	6.907E-21	.000E+00	1.917E-06	4.017E-01
1452019	6.428E-22	.000E+00	1.808E-07	3.628E-01
1452493	4.772E-23	.000E+00	1.36[illegible]E-08	3.270E-01
1452968	2.828E-24	.000E+00	8.171E-10	2.941E-01
1453443	1.338E-25	.000E+00	3.917E-11	2.640E-01
1453917	5.05[illegible]E-27	.000E+00	1.499E-12	2.366E-01
1454392	1.523E-28	.000E+00	4.582E-14	2.118E-01
1454867	3.667E-30	.000E+00	1.118E-15	1.892E-01
1455342	7.153E-32	.000E+00	2.180E-17	1.687E-01
1455816	1.084E-33	.000E+00	3.395E-19	1.503E-01
1456291	1.330E-35	.000E+00	4.224E-21	1.336E-01
145[illegible]	1.[illegible]E-37	.000E+00	4.[illegible]E-23	1.187E-01
1457240	.000E+00	.000E+00	3.336E-25	1.052E-01

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: U235
HALF LIFE: 7.04E+08 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000070
INVENTORY IN WASTE AT YEAR 2000= 2.26E+01 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=2.27E+01 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =6.81E-02 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 6.80E-02 CURIES PER YEAR AT 2066636 YEARS
FINAL : 6.80E-02 CURIES PER YEAR AT 2066970 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 2049107 YEARS
PEAK DISCHARGE RATE= 6.37E-03 CURIES PER YEAR AT 2066736 YEARS
BAND WIDTH= 35941 YEARS WITH TAIL END AT 2085048 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =9.38E-02

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
2048429	.000E+00	.000E+00	1.418E-38	3.000E+00
2049107	4.422E-37	.000E+00	6.507E-36	3.047E+00
2049785	1.677E-34	.000E+00	2.467E-33	2.956E+00
2050463	5.027E-32	.000E+00	7.397E-31	2.865E+00
2051141	1.192E-29	.000E+00	1.753E-28	2.775E+00
2051819	2.234E-27	.000E+00	3.287E-26	2.684E+00
2052497	3.313E-25	.000E+00	4.874E-24	2.596E+00
2053176	3.888E-23	.000E+00	5.721E-22	2.507E+00
2053854	3.612E-21	.000E+00	5.314E-20	2.419E+00
2054532	2.556E-19	.000E+00	3.909E-18	2.333E+00
2055210	1.547E-17	.000E+00	2.276E-16	2.246E+00
2055888	7.139E-16	.000E+00	1.050E-14	2.161E+00
2056566	2.610E-14	.000E+00	3.841E-13	2.077E+00
2057244	7.564E-13	.000E+00	1.113E-11	1.994E+00
2057923	1.737E-11	.000E+00	2.557E-10	1.912E+00
2058601	3.165E-10	.000E+00	4.657E-09	1.832E+00
2059279	4.574E-09	.000E+00	6.730E-08	1.752E+00
2059957	5.244E-08	.000E+00	7.716E-07	1.675E+00
2060635	4.770E-07	.000E+00	7.019E-06	1.599E+00
2061313	3.444E-06	.000E+00	5.068E-05	1.524E+00
2061991	1.975E-05	.000E+00	2.905E-04	1.451E+00
2062669	8.988E-05	.000E+00	1.322E-03	1.380E+00
2063348	3.249E-04	.000E+00	4.781E-03	1.312E+00
2064026	9.330E-04	.000E+00	1.373E-02	1.245E+00
2064704	2.129E-03	.000E+00	3.132E-02	1.181E+00
2065382	3.859E-03	.000E+00	5.679E-02	1.118E+00
2066060	5.562E-03	.000E+00	8.184E-02	1.058E+00
2066738	6.373E-03	6.796E-02	9.377E-02	1.001E+00
2067416	5.806E-03	.000E+00	8.544E-02	9.451E-01
2068095	4.208E-03	.000E+00	6.192E-02	8.917E-01
2068773	2.427E-03	.000E+00	3.570E-02	8.405E-01
2069451	1.113E-03	.000E+00	1.638E-02	7.914E-01
2070129	4.066E-04	.000E+00	5.983E-03	7.445E-01
2070807	1.182E-04	.000E+00	1.740E-03	6.997E-01
2071485	2.737E-05	.000E+00	4.027E-04	6.569E-01
2072163	5.047E-06	.000E+00	7.427E-05	6.161E-01
2072842	7.416E-07	.000E+00	1.091E-05	5.771E-01
2073520	8.683E-08	.000E+00	1.278E-06	5.400E-01
2074198	8.104E-09	.000E+00	1.193E-07	5.048E-01
2074876	6.031E-10	.000E+00	8.875E-09	4.713E-01
2075554	3.579E-11	.000E+00	5.266E-10	4.396E-01
2076232	1.694E-12	.000E+00	2.492E-11	4.095E-01
2076910	6.397E-14	.000E+00	9.412E-13	3.812E-01
2077588	1.927E-15	.000E+00	2.836E-14	3.544E-01
2078267	4.634E-17	.000E+00	6.819E-16	3.291E-01
2078945	8.894E-19	.000E+00	1.309E-17	3.054E-01
2079623	1.363E-20	.000E+00	2.006E-19	2.832E-01
2080301	1.668E-22	.000E+00	2.454E-21	2.623E-01
2080979	1.630E-24	.000E+00	2.398E-23	2.427E-01
2081657	1.272E-26	.000E+00	1.872E-25	2.246E-01
2082335	7.937E-29	.000E+00	1.168E-27	2.074E-01
2083014	3.956E-31	.000E+00	5.821E-30	1.915E-01
2083692	1.576E-33	.000E+00	2.319E-32	1.767E-01
2084370	5.018E-36	.000E+00	7.384E-35	1.629E-01
2085048	1.278E-38	.000E+00	1.881E-37	1.501E-01
2085726	.000E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: Pa231
HALF LIFE: 3.25E+04 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000060
INVENTORY IN WASTE AT YEAR 2000= 1.57E+04 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=1.57E+04 CURIES

NUCLIDE FLOW RATE INTO AQUIFER =4.71E+01 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 2.20E-21 CURIES PER YEAR AT 2411059 YEARS
FINAL : 2.18E-21 CURIES PER YEAR AT 2411392 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 2396910 YEARS
PEAK DISCHARGE RATE= 1.76E-22 CURIES PER YEAR AT 2411150 YEARS
BAND WIDTH= 28481 YEARS WITH TAIL END AT 2425391 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =8.03E-02

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
2396119	.000E+00	.000E+00	4.343E-20	2.178E+00
2396910	9.531E-39	.000E+00	3.210E-18	2.107E+00
2397701	5.483E-37	.000E+00	1.878E-16	2.036E+00
2398492	2.498E-35	.000E+00	8.701E-15	1.967E+00
2399283	9.017E-34	.000E+00	3.194E-13	1.898E+00
2400074	2.579E-32	.000E+00	9.291E-12	1.830E+00
2400865	5.847E-31	.000E+00	2.142E-10	1.763E+00
2401655	1.051E-29	.000E+00	3.916E-09	1.696E+00
2402448	1.497E-28	.000E+00	5.675E-08	1.631E+00
2403239	1.693E-27	.000E+00	6.525E-07	1.567E+00
2404030	1.548E-26	.000E+00	5.951E-06	1.504E+00
2404821	1.080E-25	.000E+00	4.308E-05	1.442E+00
2405612	6.103E-25	.000E+00	2.475E-04	1.381E+00
2406403	2.736E-24	.000E+00	1.128E-03	1.322E+00
2407194	9.742E-24	.000E+00	4.085E-03	1.265E+00
2407986	2.754E-23	.000E+00	1.175E-02	1.209E+00
2408777	6.184E-23	.000E+00	2.683E-02	1.154E+00
2409568	1.103E-22	.000E+00	4.867E-02	1.102E+00
2410359	1.564E-22	.000E+00	7.018E-02	1.051E+00
2411150	1.762E-22	2.192E-21	8.042E-02	1.001E+00
2411941	1.579E-22	.000E+00	7.327E-02	9.533E-01
2412733	1.125E-22	.000E+00	5.308E-02	9.071E-01
2413524	6.373E-23	.000E+00	3.059E-02	8.625E-01
2414315	2.872E-23	.000E+00	1.402E-02	8.195E-01
2415106	1.030E-23	.000E+00	5.115E-03	7.781E-01
2415897	2.941E-24	.000E+00	1.485E-03	7.383E-01
2416688	6.683E-25	.000E+00	3.432E-04	6.999E-01
2417479	1.209E-25	.000E+00	6.316E-05	6.629E-01
2418271	1.743E-26	.000E+00	9.259E-06	6.275E-01
2419062	2.002E-27	.000E+00	1.082E-06	5.935E-01
2419853	1.833E-28	.000E+00	1.007E-07	5.607E-01
2420644	1.337E-29	.000E+00	7.469E-09	5.294E-01
2421435	7.776E-31	.000E+00	4.418E-10	4.993E-01
2422226	3.606E-32	.000E+00	2.084E-11	4.706E-01
2423017	1.334E-33	.000E+00	7.840E-13	4.430E-01
2423809	3.938E-35	.000E+00	2.354E-14	4.168E-01
2424600	9.272E-37	.000E+00	5.636E-16	3.919E-01
2425391	1.743E-38	.000E+00	1.077E-17	3.681E-01
2426182	.000E+00	.000E+00	1.644E-19	3.455E-01

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: PU239 FROM AM243
HALF LIFE OF PU239 : 2.44E+04 YR HALF LIFE OF AM243 :7.37E+03 YR
NUCLIDE VELOCITY/WATER VELOCITY= .000100
INVENTORY OF AM243 IN WASTE AT YEAR 2000= 5.12E+06 CURIES
INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=5.07E+06 CURIES
AM243 FLOW RATE INTO AQUIFER =1.52E+04 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: 9.21E-15 CURIES PER YEAR AT 1446675 YEARS
FINAL : 9.13E-15 CURIES PER YEAR AT 1447009 YEARS

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00800 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 1436803 YEARS
PEAK DISCHARGE RATE= 1.23E-15 CURIES PER YEAR AT 1446797 YEARS
BAND WIDTH= 20413 YEARS WITH TAIL END AT 1457240 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK =1.33E-01

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.000E+00	.000E+00	.000E+00	.000E+00
1436353	.000E+00	.000E+00	5.927E-26	3.615E+00
1436629	1.057E-37	.000E+00	8.627E-24	3.474E+00
1437303	1.1[illegible]	.000E+00	9.943E-22	[illegible]
1437777	1.077E-33	.000E+00	9.879E-20	[illegible]
1438252	7.683E-32	.000E+00	[illegible]	[illegible]

1438727	4.344E-30	.000E+00	3.761E-16	2.922E+00
1439201	1.947E-28	.000E+00	1.708E-14	2.787E+00
1439676	6.918E-27	.000E+00	6.153E-13	2.654E+00
1440151	1.950E-25	.000E+00	1.758E-11	2.522E+00
1440626	4.360E-24	.000E+00	3.984E-10	2.392E+00
1441100	7.739E-23	.000E+00	7.167E-09	2.264E+00
1441575	1.090E-21	.000E+00	1.023E-07	2.140E+00
1442050	1.220E-20	.000E+00	1.161E-06	2.017E+00
1442524	1.084E-19	.000E+00	1.045E-05	1.898E+00
1442999	7.653E-19	.000E+00	7.461E-05	1.782E+00
1443474	4.294E-18	.000E+00	4.254E-04	1.669E+00
1443949	1.915E-17	.000E+00	1.923E-03	1.561E+00
1444423	6.788E-17	.000E+00	6.909E-03	1.456E+00
1444898	1.914E-16	.000E+00	1.974E-02	1.356E+00
1445373	4.290E-16	.000E+00	4.487E-02	1.260E+00
1445847	7.653E-16	.000E+00	8.112E-02	1.168E+00
1446322	1.086E-15	.000E+00	1.167E-01	1.081E+00
1446797	1.227E-15	9.183E-15	1.336E-01	9.981E-01
1447272	1.104E-15	.000E+00	1.218E-01	9.197E-01
1447746	7.904E-16	.000E+00	8.842E-02	8.457E-01
1448221	4.508E-16	.000E+00	5.112E-02	7.760E-01
1448696	2.048E-16	.000E+00	2.354E-02	7.106E-01
1449170	7.415E-17	.000E+00	8.638E-03	6.494E-01
1449645	2.139E-17	.000E+00	2.526E-03	5.923E-01
1450120	4.919E-18	.000E+00	5.887E-04	5.392E-01
1450595	9.019E-19	.000E+00	1.094E-04	4.898E-01
1451069	1.319E-19	.000E+00	1.621E-05	4.440E-01
1451544	1.538E-20	.000E+00	1.917E-06	4.017E-01
1452019	1.431E-21	.000E+00	1.808E-07	3.628E-01
1452493	1.063E-22	.000E+00	1.360E-08	3.270E-01
1452968	6.297E-24	.000E+00	8.171E-10	2.941E-01
1453443	2.976E-25	.000E+00	3.917E-11	2.640E-01
1453917	1.125E-26	.000E+00	1.499E-12	2.366E-01
1454392	3.391E-28	.000E+00	4.582E-14	2.118E-01
1454867	8.165E-30	.000E+00	1.114E-15	1.892E-01
1455342	1.570E-31	.000E+00	2.180E-17	1.687E-01
1455816	2.413E-33	.000E+00	3.395E-19	1.503E-01
1456291	2.962E-35	.000E+00	4.224E-21	1.336E-01
1456766	2.905E-37	.000E+00	4.199E-23	1.187E-01
1457240	2.277E-39	.000E+00	3.336E-25	1.052E-01
1457715	.000E+00	.000E+00	2.119E-27	9.324E-02

INVENTORY IN WASTE AT BEGINNING OF LEACH INCIDENT=4.63E+05 CURIES
NUCLIDE FLOW RATE INTO AQUIFER =1.39E+03 CURIES/YR

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH NO DISPERSION
INITIAL: .00E+00 CURIES PER YEAR AT 482292 YEARS
FINAL : .00E+00 CURIES PER YEAR AT 482625 YEARS

LEACH RATE= .00300 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
LENGTH OF AQUIFER= 10.00 MILES

WATER VELOCITY= 1.000 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .00000 CM12/MIN

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= .00E+00 CURIES PER YEAR AT 482458 YEARS
BAND WIDTH= 0 YEARS WITH TAIL END AT 0 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISCHARGE RATE,CI/YR		DISP/NO-DISP	PULSE/SQUARE
	DISPERSION	NO DISP.		
100	.00E+00	.000E+00	.000E+00	.000E+00

RADIONUCLIDE DISCHARGE RATE FROM AN AQUIFER AFTER
A LEACH INCIDENT IN AN UNDERGROUND REPOSITORY
CONTAINING YEAR 2000 NUCLEAR POWER ECONOMY WASTE

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: CM243
HALF LIFE: 2.80E+01 YEARS
NUCLIDE VELOCITY/WATER VELOCITY= .000300
INVENTORY IN WASTE AT YEAR 2000= 4.03E+06 CURIES

I.2 Two-Member Chain Migration Results

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: PU244 FROM CM248

NUCLIDE	CM248	PU244	
HALF LIFE, YR	3.50E+05	8.30E+07	.00E+00
DECAY NUMBER	2.86E-04	1.21E-06	.00E+00
DISTRIB COEF	3.33E+03	1.00E+04	.00E+00
YR 2000 CURIES	5.01E-01	.00E+00	.00E+00
PULSE G-ATOMS	4.90E-01	.00E+00	.00E+00
NUCL VEL, MI/YR	2.07E-05	6.91E-06	.00E+00
DISCH TIME, YR	4.82E+05	1.45E+06	.00E+00
DIM DISC TIME	3.33E+03	1.00E+04	.00E+00

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 482443 YEARS
PEAK DISCHARGE RATE= 2.62E-09 CURIES PER YEAR AT 1446797 YEARS
BAND WIDTH= 964354 YEARS WITH TAIL END AT 1446797 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME, YR	DISC RATE, CI/YR	PULSE RATE	BAND RATE	DIM TIME
478534	.000E+00	.000E+00	.000E+00	3307
478739	.000E+00	1.619E-36	.000E+00	3309
478945	.000E+00	1.212E-33	.000E+00	3310
479151	.000E+00	6.165E-31	.000E+00	3312
479357	.000E+00	2.122E-28	.000E+00	3313
479563	.000E+00	4.943E-25	.000E+00	3314
479768	.000E+00	7.806E-24	.000E+00	3316
479974	.000E+00	8.377E-22	.000E+00	3317
480180	.000E+00	6.102E-20	.000E+00	3319
480386	.000E+00	3.030E-18	.000E+00	3320
480591	.000E+00	1.027E-16	.000E+00	3322
480797	.000E+00	2.381E-15	.000E+00	3323
481003	.000E+00	3.791E-14	.000E+00	3324
481208	.000E+00	4.163E-13	.000E+00	3326
481414	.000E+00	3.172E-12	.000E+00	3327
481620	.000E+00	1.690E-11	.000E+00	3329
481826	.000E+00	6.379E-11	.000E+00	3331
482031	3.652E-10	1.736E-10	3.652E-10	3332
482237	3.652E-10	3.500E-10	3.652E-10	3333
482443	3.652E-10	5.448E-10	3.552E-10	3334
482657	8.049E-10	6.969E-10	8.049E-10	3335
482870	8.051E-10	7.735E-10	8.051E-10	3337
483084	8.053E-10	7.940E-10	8.053E-10	3339
483298	8.055E-10	8.049E-10	8.055E-10	3340
483511	8.056E-10	8.059E-10	8.056E-10	3342
483725	8.058E-10	8.062E-10	8.058E-10	3343
483939	8.060E-10	8.064E-10	8.060E-10	3345
484153	8.061E-10	8.065E-10	8.061E-10	3346
484366	8.063E-10	8.067E-10	8.063E-10	3348
484580	8.065E-10	8.069E-10	8.065E-10	3349
484794	8.066E-10	8.070E-10	8.066E-10	3351
485007	8.068E-10	8.072E-10	8.068E-10	3352
485221	8.070E-10	8.074E-10	8.070E-10	3354
485435	8.071E-10	8.075E-10	8.071E-10	3355
485649	8.073E-10	8.077E-10	8.073E-10	3357
485862	8.075E-10	8.079E-10	8.075E-10	3358
486076	8.076E-10	8.080E-10	8.076E-10	3359
486290	8.078E-10	8.082E-10	8.078E-10	3361
486503	8.080E-10	8.084E-10	8.080E-10	3362
486717	8.082E-10	8.086E-10	8.082E-10	3364
534151	8.465E-10	8.464E-10	8.465E-10	3692
581585	8.867E-10	8.871E-10	8.867E-10	4020
629020	9.288E-10	9.292E-10	9.288E-10	4348
676454	9.729E-10	9.734E-10	9.729E-10	4675
723889	1.019E-09	1.020E-09	1.019E-09	5003
771323	1.067E-09	1.068E-09	1.067E-09	5331
818757	1.118E-09	1.119E-09	1.118E-09	5659
866192	1.171E-09	1.172E-09	1.171E-09	5987
913626	1.227E-09	1.227E-09	1.227E-09	6315
961060	1.285E-09	1.286E-09	1.285E-09	6643
1008495	1.346E-09	1.347E-09	1.346E-09	6971
1055929	1.410E-09	1.411E-09	1.410E-09	7299
1103363	1.477E-09	1.478E-09	1.477E-09	7627
1150798	1.547E-09	1.548E-09	1.547E-09	7955
1198232	1.621E-09	1.621E-09	1.62[illegible]E-09	8283
1245666	1.697E-09	1.698E-09	1.697E-09	[illegible]
1293101	1.778E-09	1.779E-09	1.778E-09	[illegible]
1340535	1.862E-09	1.863E-09	1.862E-09	[illegible]
1387970	1.951E-09	1.952E-09	1.951E-09	9594
1435404	2.043E-09	2.044E-09	2.043E-09	[illegible]
1435973	2.044E-09	[illegible]	[illegible]	[illegible]
1436543	2.045E-09	2.046E-09	2.045E-09	[illegible]
1437113	2.047E-09	2.048E-09	[illegible]	[illegible]
1437682	2.048E-09	2.049E-09	[illegible]	[illegible]
1438252	[illegible]	[illegible]	[illegible]	[illegible]
1438822	2.050E-09	[illegible]	[illegible]	[illegible]
1439391	2.051E-09	2.052E-09	[illegible]	[illegible]
1439961	[illegible]	[illegible]	[illegible]	[illegible]
1440531	[illegible]	2.054E-09	[illegible]	[illegible]
1441100	[illegible]	[illegible]	[illegible]	[illegible]

1441670	2.056E-09	2.057E-09	2.056E-09	9965
1442240	2.057E-09	2.058E-09	2.057E-09	9969
1442809	2.058E-09	2.059E-09	2.058E-09	9973
1443379	2.059E-09	2.059E-09	2.059E-09	9977
1443948	2.060E-09	2.055E-09	2.060E-09	9981
1444518	2.061E-09	2.032E-09	2.061E-09	9985
1445088	2.063E-09	1.951E-09	2.063E-09	9989
1445657	2.064E-09	1.750E-09	2.064E-09	9993
1446227	2.065E-09	1.393E-09	2.065E-09	9997
1446797	2.818E-09	9.321E-10	2.818E-09	10001
1447390	.000E+00	4.865E-10	.000E+00	10005
1447983	.000E+00	1.934E-10	.000E+00	10009
1448577	.000E+00	5.710E-11	.000E+00	10013
1449170	.000E+00	1.232E-11	.000E+00	10017
1449764	.000E+00	1.922E-12	.000E+00	10021
1450357	.000E+00	2.152E-13	.000E+00	10025
1450950	.000E+00	1.720E-14	.000E+00	10030
1451544	.000E+00	9.796E-16	.000E+00	10034
1452137	.000E+00	3.961E-17	.000E+00	10038
1452731	.000E+00	1.135E-18	.000E+00	10042
1453324	.000E+00	2.303E-20	.000E+00	10046
1453917	.000E+00	3.309E-22	.000E+00	10050
1454511	.000E+00	3.361E-24	.000E+00	10054
1455104	.000E+00	2.412E-26	.000E+00	10058
1455698	.000E+00	1.223E-28	.000E+00	10062
1456291	.000E+00	4.383E-31	.000E+00	10066
1456884	.000E+00	1.110E-33	.000E+00	10071
1457478	.000E+00	1.986E-36	.000E+00	10075
1458071	.000E+00	2.510E-39	.000E+00	10079
1458664	.000E+00	.000E+00	.000E+00	10083

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: U236 FROM PU240

NUCLIDE	PU240	U236 F	
HALF LIFE, YR	6.54E+03	2.34E+07	.00E+00
DECAY NUMBER	1.53E-02	4.28E-05	.00E+00
DISTRIB COEF	1.00E+04	1.43E+04	.00E+00
YR 2000 CURIES	1.93E+06	.00E+00	.00E+00
PULSE G-ATOMS	5.72E+04	.00E+00	.00E+00
NUCL VEL,MI/YR	6.91E-06	4.84E-06	.00E+00
DISCH TIME,YR	1.45E+06	2.07E+06	.00E+00
DIM DISC TIME	1.00E+04	1.43E+04	.00E+00

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00

WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 SQ MI2/MIN
PECLET NUMBER= 4.26E+00
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 1717556 YEARS
PEAK DISCHARGE RATE= 1.61E-01 CURIES PER YEAR AT 2066738 YEARS
BAND WIDTH= 349182 YEARS WITH TAIL END AT 2066738 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
1687477	.000E+00	.000E+00	.000E+00	11665
1717556	5.401E-39	7.214E-39	6.401E-39	11873
1747635	1.085E-35	1.223E-35	1.085E-35	12081
1777715	1.840E-32	2.074E-32	1.840E-32	12288
1807794	3.119E-29	3.515E-29	3.119E-29	12496
1837873	5.288E-26	5.960E-26	5.288E-26	12704
1867953	8.965E-23	1.010E-22	8.965E-23	12912
1898032	1.520E-19	1.713E-19	1.520E-19	13120
1928111	2.577E-16	2.904E-16	2.577E-16	13328
1958191	4.369E-13	4.924E-13	4.369E-13	13536
1988270	7.407E-10	8.348E-10	7.407E-10	13744
2018350	1.256E-06	1.415E-06	1.256E-06	13952
2048429	2.129E-03	2.399E-03	2.129E-03	14160
2049344	2.670E-03	3.009E-03	2.670E-03	14185
2050260	3.348E-03	3.773E-03	3.348E-03	14173
2051175	4.198E-03	4.731E-03	4.198E-03	14179
2052091	5.264E-03	5.932E-03	5.264E-03	14185
2053006	6.600E-03	7.434E-03	6.600E-03	14191
2053922	8.276E-03	9.325E-03	8.276E-03	14198
2054837	1.038E-02	1.170E-02	1.038E-02	14204
2055752	1.301E-02	1.467E-02	1.301E-02	14210
2056668	1.632E-02	1.839E-02	1.632E-02	14217
2057583	2.046E-02	2.306E-02	2.046E-02	14223
2058499	2.566E-02	2.892E-02	2.566E-02	14229
2059414	3.218E-02	3.626E-02	3.218E-02	14235
2060330	4.035E-02	4.547E-02	4.035E-02	14242
2061245	5.059E-02	5.700E-02	5.059E-02	14248
2062160	6.344E-02	7.150E-02	6.344E-02	14255
2063076	7.955E-02	8.830E-02	7.955E-02	14261
2063991	9.975E-02	1.052E-01	9.975E-02	14267
2064907	1.251E-01	1.190E-01	1.251E-01	14274
2065822	1.569E-01	1.041E-01	1.569E-01	14280
2066738	1.607E-01	7.462E-02	1.607E-01	14286
2067653	.000E+00	3.964E-02	.000E+00	14293
2068569	.000E+00	1.508E-02	.000E+00	14299
2069484	.000E+00	3.997E-03	.000E+00	14305
2070400	.000E+00	7.273E-04	.000E+00	14312
2071315	.000E+00	9.[illegible]E-05	.000E+00	14318
2072231	.000E+00	7.[illegible]E-06	.000E+00	14324
2073146	.000E+00	4.[illegible]E-07	.000E+00	14331

2074062	.000E+00	1.595E-08	.000E+00	14337
2074977	.000E+00	4.024E-10	.000E+00	14343
2075893	.000E+00	6.790E-12	.000E+00	14350
2076808	.000E+00	7.643E-14	.000E+00	14356
2077724	.000E+00	5.743E-16	.000E+00	14362
2078639	.000E+00	2.875E-18	.000E+00	14369
2079555	.000E+00	9.602E-21	.000E+00	14375
2080470	.000E+00	2.139E-23	.000E+00	14381
2081386	.000E+00	3.173E-26	.000E+00	14388
2082301	.000E+00	3.140E-29	.000E+00	14394
2083217	.000E+00	2.071E-32	.000E+00	14400
2084132	.000E+00	9.110E-36	.000E+00	14407
2085048	.000E+00	.000E+00	.000E+00	14413

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: TH232 FROM U236

NUCLIDE	U236	TH232	
HALF LIFE, YR	2.34E+07	1.40E+10	.00E+00
DECAY NUMBER	4.28E-06	7.16E-09	.00E+00
DISTRIB COEF	1.43E+04	5.00E+04	.00E+00
YR 2000 CURIES	5.58E+03	.00E+00	.00E+00
PULSE G-ATOMS	3.66E+05	.00E+00	.00E+00
NUCL VEL,MI/YR	4.84E-06	1.38E-06	.00E+00
DISCH TIME,YR	2.07E+06	7.23E+06	.00E+00
DIM DISC TIME	1.43E+04	5.00E+04	.00E+00

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM2/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 2066738 YEARS
PEAK DISCHARGE RATE= 1.04E-07 CURIES PER YEAR AT 2067653 YEARS
BAND WIDTH= 5166178 YEARS WITH TAIL END AT 7232916 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
2049344	.000E+00	.000E+00	.000E+00	14166
2050260	.000E+00	1.989E-38	.000E+00	14173
2051175	.000E+00	3.264E-35	.000E+00	14179
2052091	.000E+00	3.594E-32	.000E+00	14185
2053006	.000E+00	2.466E-29	.000E+00	14191
2053922	.000E+00	1.138E-26	.000E+00	14198
2054837	.000E+00	3.430E-24	.000E+00	14204
2055753	.000E+00	6.876E-22	.000E+00	14210
2056668	.000E+00	9.027E-20	.000E+00	14217
2057583	.000E+00	7.815E-18	.000E+00	14223
2058499	.000E+00	4.476E-16	.000E+00	14229
2059414	.000E+00	1.597E-14	.000E+00	14236
2060330	.000E+00	4.278E-13	.000E+00	14242
2061245	.000E+00	7.195E-12	.000E+00	14248
2062161	.000E+00	8.116E-11	.000E+00	14255
2063076	.000E+00	6.181E-10	.000E+00	14261
2063991	.000E+00	3.212E-09	.000E+00	14267
2064907	3.169E-08	1.155E-08	3.169E-08	14274
2065822	3.169E-08	2.944E-08	3.169E-08	14280
2066738	3.169E-08	5.505E-08	3.169E-08	14286
2067653	1.043E-07	7.952E-08	1.043E-07	14293
2068569	1.042E-07	9.515E-08	1.042E-07	14299
2069484	1.043E-07	1.018E-07	1.043E-07	14305
2070400	1.042E-07	1.037E-07	1.042E-07	14312
2071315	1.043E-07	1.041E-07	1.043E-07	14318
2072231	1.043E-07	1.041E-07	1.043E-07	14324
2073146	1.043E-07	1.041E-07	1.043E-07	14331
2074062	1.043E-07	1.041E-07	1.043E-07	14337
2074977	1.042E-07	1.041E-07	1.042E-07	14343
2075893	1.043E-07	1.041E-07	1.043E-07	14350
2076808	1.042E-07	1.041E-07	1.042E-07	14356
2077724	1.042E-07	1.042E-07	1.042E-07	14362
2078639	1.043E-07	1.042E-07	1.043E-07	14369
2079555	1.042E-07	1.042E-07	1.042E-07	14375
2080470	1.043E-07	1.042E-07	1.043E-07	14381
2081386	1.043E-07	1.042E-07	1.043E-07	14388
2082301	1.043E-07	1.042E-07	1.043E-07	14394
2083217	1.043E-07	1.042E-07	1.043E-07	14400
2084132	1.043E-07	1.042E-07	1.043E-07	14407
2085048	1.043E-07	1.042E-07	1.043E-07	14413
2339356	1.047E-07	1.045E-07	1.047E-07	16171
2593664	1.049E-07	1.048E-07	1.049E-07	17929
2847972	1.053E-07	1.051E-07	1.053E-07	19687
3102280	1.056E-07	1.054E-07	1.056E-07	21445
3356588	1.058E-07	1.057E-07	1.058E-07	23203
3610896	1.062E-07	1.060E-07	1.062E-07	24961
3865204	1.065E-07	1.064E-07	1.065E-07	26719
4119512	1.067E-07	1.067E-07	1.067E-07	28477
4373821	1.070E-07	1.070E-07	1.070E-07	30235
4628129	1.073E-07	1.073E-07	1.073E-07	31993
4882437	1.077E-07	1.076E-07	1.077E-07	33751
5136745	1.080E-07	1.080E-07	1.080E-07	35509
5391053	1.084E-07	1.083E-07	1.084E-07	37267
5645361	1.087E-07	1.086E-07	1.087E-07	39025
5899669	1.090E-07	1.089E-07	1.090E-07	40783
6153977	1.093E-07	1.093E-07	1.093E-07	42541
6408285	1.097E-07	1.096E-07	1.097E-07	44299

6662593	1.100E-07	1.094E-07	1.100E-07	46057
6916901	1.104E-07	1.103E-07	1.104E-07	47815
7171209	1.107E-07	1.106E-07	1.107E-07	49573
7174295	1.107E-07	1.106E-07	1.107E-07	49594
7177380	1.107E-07	1.106E-07	1.107E-07	49616
7180465	1.107E-07	1.106E-07	1.107E-07	49637
7183550	1.107E-07	1.106E-07	1.107E-07	49658
7186636	1.108E-07	1.106E-07	1.108E-07	49680
7189721	1.107E-07	1.106E-07	1.107E-07	49701
7192806	1.107E-07	1.106E-07	1.107E-07	49722
7195892	1.107E-07	1.106E-07	1.107E-07	49744
7198977	1.107E-07	1.106E-07	1.107E-07	49765
7202062	1.107E-07	1.106E-07	1.107E-07	49786
7205148	1.107E-07	1.106E-07	1.107E-07	49808
7208233	1.107E-07	1.106E-07	1.107E-07	49829
7211318	1.108E-07	1.106E-07	1.108E-07	49850
7214404	1.108E-07	1.106E-07	1.108E-07	49872
7217489	1.107E-07	1.105E-07	1.107E-07	49893
7220574	1.108E-07	1.100E-07	1.108E-07	49914
7223660	1.107E-07	1.073E-07	1.107E-07	49936
7226745	1.108E-07	9.912E-08	1.108E-07	49957
7229830	1.108E-07	8.159E-08	1.108E-07	49978
7232915	1.108E-07	5.587E-08	1.108E-07	50000
7236001	.000E+00	2.999E-08	.000E+00	50021
7239086	.000E+00	1.206E-08	.000E+00	50042
7242171	.000E+00	3.529E-09	.000E+00	50064
7245257	.000E+00	7.368E-10	.000E+00	50085
7248342	.000E+00	1.084E-10	.000E+00	50106
7251427	.000E+00	1.114E-11	.000E+00	50128
7254513	.000E+00	7.958E-13	.000E+00	50149
7257598	.000E+00	3.936E-14	.000E+00	50170
7260683	.000E+00	1.345E-15	.000E+00	50192
7263769	.000E+00	3.165E-17	.000E+00	50213
7266854	.000E+00	5.133E-19	.000E+00	50234
7269939	.000E+00	5.721E-21	.000E+00	50256
7273025	.000E+00	4.379E-23	.000E+00	50277
7276110	.000E+00	2.307E-25	.000E+00	50298
7279195	.000E+00	8.339E-28	.000E+00	50320
7282280	.000E+00	2.071E-30	.000E+00	50341
7285366	.000E+00	3.533E-33	.000E+00	50362
7288451	.000E+00	4.138E-36	.000E+00	50383
7291536	.000E+00	3.332E-39	.000E+00	50405
7294622	.000E+00	.000E+00	.000E+00	50426

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: PU240 FROM CM244

NUCLIDE	CM244	PU240	
HALF LIFE, YR	1.79E+01	6.54E+03	.00E+00
DECAY NUMBER	5.60E+00	1.53E-02	.00E+00
DISTRIB COEF	3.33E+03	1.00E+04	.00E+00
YR 2000 CURIES	4.71E+08	.00E+00	.00E+00
PULSE G-ATOMS	5.10E+02	.00E+00	.00E+00
NUCL VEL,MI/YR	2.07E-05	6.91E-06	.00E+00
DISCH TIME,YR	4.82E+05	1.45E+06	.00E+00
DIM DISC TIME	3.33E+03	1.00E+04	.00E+00

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM2/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= .00E+00 CURIES PER YEAR AT 0 YEARS
BAND WIDTH= 0 YEARS WITH TAIL END AT 0 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: U236 FROM PU244

NUCLIDE	PU244	U236 F	
HALF LIFE, YR	8.30E+07	2.34E+07	.00E+00
DECAY NUMBER	1.21E-06	4.28E-06	.00E+00
DISTRIB COEF	1.00E+04	1.43E+04	.00E+00
YR 2000 CURIES	5.36E-05	.00E+00	.00E+00
PULSE G-ATOMS	1.25E-02	.00E+00	.00E+00
NUCL VEL,MI/YR	6.91E-06	4.84E-06	.00E+00
DISCH TIME,YR	1.45E+06	2.07E+06	.00E+00
DIM DISC TIME	1.00E+04	1.43E+04	.00E+00

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM2/MIN

PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 1446797 YEARS
PEAK DISCHARGE RATE= 3.68E-12 CURIES PER YEAR AT 1447390 YEARS
BAND WIDTH= 619940 YEARS WITH TAIL END AT 2066737 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
1435404	.000E+00	.000E+00	.000E+00	9922
1435974	.000E+00	4.452E-39	.000E+00	9926
1436543	.000E+00	2.094E-36	.000E+00	9930
1437113	.000E+00	7.056E-34	.000E+00	9934
1437683	.000E+00	1.703E-31	.000E+00	9938
1438252	.000E+00	2.950E-29	.000E+00	9942
1438822	.000E+00	3.667E-27	.000E+00	9946
1439391	.000E+00	3.273E-25	.000E+00	9950
1439961	.000E+00	2.104E-23	.000E+00	9954
1440531	.000E+00	9.734E-22	.000E+00	9958
1441100	.000E+00	3.250E-20	.000E+00	9961
1441670	.000E+00	7.838E-19	.000E+00	9965
1442240	.000E+00	1.370E-17	.000E+00	9969
1442809	.000E+00	1.738E-16	.000E+00	9973
1443379	.000E+00	1.607E-15	.000E+00	9977
1443949	.000E+00	1.088E-14	.000E+00	9981
1444518	.000E+00	5.425E-14	.000E+00	9985
1445088	.000E+00	2.010E-13	.000E+00	9989
1445658	1.344E-12	5.608E-13	1.344E-12	9993
1446227	1.344E-12	1.199E-12	1.344E-12	9997
1446797	1.344E-12	2.022E-12	1.344E-12	10001
1447390	3.683E-12	2.816E-12	3.683E-12	10005
1447984	3.682E-12	3.339E-12	3.682E-12	10009
1448577	3.682E-12	3.582E-12	3.682E-12	10013
1449170	3.682E-12	3.662E-12	3.682E-12	10017
1449764	3.682E-12	3.680E-12	3.682E-12	10021
1450357	3.682E-12	3.683E-12	3.682E-12	10025
1450951	3.682E-12	3.683E-12	3.682E-12	10030
1451544	3.682E-12	3.683E-12	3.682E-12	10034
1452137	3.682E-12	3.683E-12	3.682E-12	10038
1452731	3.682E-12	3.683E-12	3.682E-12	10042
1453324	3.680E-12	3.682E-12	3.680E-12	10046
1453919	3.680E-12	3.682E-12	3.680E-12	10050
1454511	3.680E-12	3.682E-12	3.680E-12	10054
1455104	3.680E-12	3.682E-12	3.680E-12	10058
1455698	3.680E-12	3.682E-12	3.680E-12	10062
1456291	3.680E-12	3.682E-12	3.680E-12	10066
1456884	3.680E-12	3.681E-12	3.680E-12	10071
1457478	3.680E-12	3.681E-12	3.680E-12	10075
1458071	3.680E-12	3.681E-12	3.680E-12	10079
1458665	3.680E-12	3.681E-12	3.680E-12	10083
1488153	3.671E-12	3.672E-12	3.671E-12	10287
1517641	3.662E-12	3.664E-12	3.662E-12	10491
1547129	3.653E-12	3.655E-12	3.653E-12	10696
1576617	3.645E-12	3.647E-12	3.645E-12	10898
1606106	3.638E-12	3.638E-12	3.638E-12	11102
1635594	3.629E-12	3.630E-12	3.629E-12	11306
1665082	3.620E-12	3.621E-12	3.620E-12	11510
1694570	3.611E-12	3.613E-12	3.611E-12	11714
1724059	3.604E-12	3.604E-12	3.604E-12	11918
1753547	3.595E-12	3.596E-12	3.595E-12	12121
1783035	3.585E-12	3.586E-12	3.585E-12	12325
1812523	3.578E-12	3.579E-12	3.578E-12	12529
1842011	3.571E-12	3.571E-12	3.571E-12	12733
1871499	3.562E-12	3.563E-12	3.562E-12	12937
1900987	3.553E-12	3.554E-12	3.553E-12	13141
1930475	3.544E-12	3.546E-12	3.544E-12	13344
1959964	3.537E-12	3.538E-12	3.537E-12	13548
1989452	3.528E-12	3.529E-12	3.528E-12	13752
2018940	3.519E-12	3.521E-12	3.519E-12	13956
2048428	3.512E-12	3.513E-12	3.512E-12	14160
2049340	3.511E-12	3.513E-12	3.511E-12	14166
2050259	3.511E-12	3.512E-12	3.511E-12	14173
2051175	3.511E-12	3.512E-12	3.511E-12	14179
2052090	3.511E-12	3.512E-12	3.511E-12	14185
2053006	3.511E-12	3.512E-12	3.511E-12	14191
2053921	3.511E-12	3.511E-12	3.511E-12	14198
2054836	3.511E-12	3.511E-12	3.511E-12	14204
2055752	3.509E-12	3.511E-12	3.509E-12	14210
2056667	3.511E-12	3.511E-12	3.511E-12	14217
2057583	3.509E-12	3.510E-12	3.509E-12	14223
2058498	3.509E-12	3.510E-12	3.509E-12	14229
2059414	3.509E-12	3.510E-12	3.509E-12	14236
2060329	3.509E-12	3.510E-12	3.509E-12	14242
2061244	3.509E-12	3.509E-12	3.509E-12	14248
2062160	3.507E-12	3.508E-12	3.507E-12	14255
2063075	3.507E-12	3.488E-12	3.507E-12	14261
2063991	3.507E-12	3.481E-12	3.507E-12	14267
2064906	3.507E-12	3.120E-12	3.507E-12	14274
2065822	3.505E-12	2.517E-12	3.505E-12	14280
2066737	2.698E-12	1.654E-12	2.698E-12	142
2067653	.000E+00	5.298E-13	.000E+00	14293
2068568	.000E+00	3.030E-13	.000E+00	14299
2069484	.000E+00	7.810E-14	.000E+00	14305
2070399	.000E+00	1.393E-14	.000E+00	14312
2071315	.000E+00	1.699E-15	.000E+00	14318
2072230	.000E+00	1.464E-16	.000E+00	14324
2073146	.000E+00	7.823E-18	.000E+00	14331
2074061	.000E+00	2.925E-19	.000E+00	14337
2074977	.000E+00	7.350E-21	.000E+00	14343
2075892	.000E+00	1.233E-22	.000E+00	14350
2076808	.000E+00	1.383E-24	.000E+00	14356
2077723	.000E+00	1.035E-26	.000E+00	14362
2078639	.000E+00	5.169E-29	.000E+00	14369
2079554	.000E+00	1.722E-31	.000E+00	14375
2080470	.000E+00	3.827E-34	.000E+00	14381
2081385	.000E+00	5.566E-37	.000E+00	14388

2082301	.000E+00	.000E+00	.000E+00	14394

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: NP237 FROM AM241

NUCLIDE	AM241	NP237	
HALF LIFE, YR	4.33E+02	2.14E+06	.00E+00
DECAY NUMBER	2.32E-01	4.69E-05	.00E+00
DISTRIB COEF	1.00E+04	1.00E+02	.00E+00
YR 2000 CURIES	8.56E+07	.00E+00	.00E+00
PULSE G-ATOMS	9.78E+04	.00E+00	.00E+00
NUCL VEL,MI/YR	6.91E-06	6.91E-04	.00E+00
DISCH TIME,YR	1.45E+06	1.45E+04	.00E+00
DIM DISC TIME	1.00E+04	1.00E+02	.00E+00

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM2/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= 1.52E+01 CURIES PER YEAR AT 14906 YEARS
BAND WIDTH= 43655 YEARS WITH TAIL END AT 43655 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
14443	.000E+00	2.301E-34	.000E+00	99
14445	.000E+00	1.725E-32	.000E+00	99
14450	.000E+00	1.142E-30	.000E+00	99
14453	.000E+00	6.691E-29	.000E+00	99
14457	.000E+00	3.471E-27	.000E+00	99
14460	.000E+00	1.591E-25	.000E+00	99
14464	.000E+00	6.467E-24	.000E+00	99
14467	.000E+00	2.324E-22	.000E+00	99
14471	.000E+00	7.404E-21	.000E+00	99
14474	.000E+00	2.088E-19	.000E+00	99
14477	.000E+00	5.217E-18	.000E+00	99
14481	.000E+00	1.155E-16	.000E+00	99
14484	.000E+00	2.262E-15	.000E+00	99
14488	.000E+00	3.932E-14	.000E+00	99
14491	.000E+00	6.053E-13	.000E+00	99
14495	.000E+00	8.268E-12	.000E+00	100
14498	.000E+00	1.002E-10	.000E+00	100
14501	.000E+00	1.076E-09	.000E+00	100
14505	.000E+00	1.026E-08	.000E+00	100
14508	.000E+00	8.642E-08	.000E+00	100
14512	.000E+00	6.512E-07	.000E+00	100
14515	.000E+00	4.364E-06	.000E+00	100
14519	.000E+00	2.594E-05	.000E+00	100
14522	.000E+00	1.369E-04	.000E+00	100
14526	.000E+00	6.435E-04	.000E+00	100
14529	.000E+00	2.695E-03	.000E+00	100
14532	.000E+00	1.005E-02	.000E+00	100
14536	.000E+00	3.349E-02	.000E+00	100
14539	.000E+00	9.962E-02	.000E+00	100
14543	.000E+00	2.652E-01	.000E+00	100
14546	.000E+00	6.325E-01	.000E+00	100
14550	.000E+00	1.357E+00	.000E+00	100
14553	.000E+00	2.622E+00	.000E+00	100
14557	.000E+00	4.584E+00	.000E+00	100
14560	.000E+00	7.278E+00	.000E+00	100
14563	.000E+00	1.056E+01	.000E+00	100
14906	1.522E+01	1.518E+01	1.522E+01	102
14914	1.502E+01	1.499E+01	1.502E+01	102
14922	1.483E+01	1.479E+01	1.483E+01	102
14930	1.464E+01	1.460E+01	1.464E+01	103
14938	1.445E+01	1.441E+01	1.445E+01	103
14946	1.426E+01	1.422E+01	1.426E+01	103
14954	1.407E+01	1.404E+01	1.407E+01	103
14962	1.389E+01	1.386E+01	1.389E+01	103
14971	1.371E+01	1.368E+01	1.371E+01	103
14979	1.353E+01	1.350E+01	1.353E+01	103
14987	1.336E+01	1.332E+01	1.336E+01	103
14995	1.319E+01	1.315E+01	1.319E+01	103
15003	1.301E+01	1.298E+01	1.301E+01	103
[illegible]	1.284E+01	[illegible]	[illegible]	[illegible]
15019	1.268E+01	1.264E+01	1.268E+01	104
43655	9.846E-20	9.823E-20	9.846E-20	301
72292	.000E+00	.000E+00	.000E+00	499

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: U233 FROM NP237

NUCLIDE	NP237	U233	
HALF LIFE, YR	2.14E+06	1.59E+05	.00E+00
DECAY NUMBER	4.69E-05	6.35E-04	.00E+00
DISTRIB COEF	1.00E+02	1.43E+04	.00E+00
YR 2000 CURIES	9.07E+04	.00E+00	.00E+00

PULSE G-ATOMS 4.99E+05 .00E+00 .00E+00
NUCL VEL,MI/YR 6.91E-04 4.84E-06 .00E+00
DISCH TIME,YR 1.45E+04 2.07E+06 .00E+00
DIM DISC TIME 1.00E+02 1.43E+04 .00E+00
LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 14572 YEARS
PEAK DISCHARGE RATE= 2.56E-03 CURIES PER YEAR AT 14918 YEARS
BAND WIDTH= 2051284 YEARS WITH TAIL END AT 2065856 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
14443	.000E+00	2.249E-38	.000E+00	99
14452	.000E+00	8.666E-34	.000E+00	99
14460	.000E+00	1.556E-29	.000E+00	99
14469	.000E+00	1.302E-25	.000E+00	99
14477	.000E+00	5.099E-22	.000E+00	99
14486	.000E+00	9.359E-19	.000E+00	99
14495	.000E+00	8.084E-16	.000E+00	100
14503	.000E+00	3.300E-13	.000E+00	100
14512	.000E+00	6.397E-11	.000E+00	100
14520	.000E+00	5.920E-09	.000E+00	100
14529	.000E+00	2.640E-07	.000E+00	100
14538	.000E+00	5.744E-06	.000E+00	100
14546	.000E+00	6.215E-05	.000E+00	100
14555	4.809E-05	3.453E-04	4.809E-05	100
14563	4.809E-05	1.043E-03	4.809E-05	100
14572	4.809E-05	1.888E-03	4.809E-05	100
14581	1.143E-04	2.394E-03	1.143E-04	100
14589	1.805E-04	2.544E-03	1.805E-04	100
14598	2.468E-04	2.565E-03	2.468E-04	100
14606	3.130E-04	2.567E-03	3.130E-04	100
14615	3.792E-04	2.567E-03	3.792E-04	100
14635	5.347E-04	2.566E-03	5.347E-04	100
14655	6.903E-04	2.566E-03	6.903E-04	101
14676	8.457E-04	2.566E-03	8.457E-04	101
14696	1.001E-03	2.566E-03	1.001E-03	101
14716	1.157E-03	2.565E-03	1.157E-03	101
14736	1.312E-03	2.565E-03	1.312E-03	101
14756	1.468E-03	2.565E-03	1.468E-03	101
14777	1.623E-03	2.565E-03	1.623E-03	101
14797	1.778E-03	2.565E-03	1.778E-03	102
14817	1.934E-03	2.564E-03	1.934E-03	102
14837	2.089E-03	2.564E-03	2.089E-03	102
14857	2.245E-03	2.564E-03	2.245E-03	102
14878	2.400E-03	2.564E-03	2.400E-03	102
14898	2.555E-03	2.563E-03	2.555E-03	102
14918	2.565E-03	2.563E-03	2.565E-03	102
14938	2.565E-03	2.563E-03	2.565E-03	103
14958	2.564E-03	2.563E-03	2.564E-03	103
14979	2.564E-03	2.562E-03	2.564E-03	103
14999	2.564E-03	2.562E-03	2.564E-03	103
15019	2.564E-03	2.562E-03	2.564E-03	103
116723	1.636E-03	1.635E-03	1.636E-03	806
218428	1.044E-03	1.044E-03	1.044E-03	1509
320132	6.664E-04	6.660E-04	6.664E-04	2212
421837	4.253E-04	4.250E-04	4.253E-04	2915
523541	2.714E-04	2.713E-04	2.714E-04	3618
625245	1.732E-04	1.731E-04	1.732E-04	4322
726950	1.106E-04	1.105E-04	1.106E-04	5025
828654	7.056E-05	7.051E-05	7.056E-05	5728
930359	4.503E-05	4.500E-05	4.503E-05	6431
1032063	2.874E-05	2.872E-05	2.874E-05	7134
1133767	1.834E-05	1.833E-05	1.834E-05	7837
1235472	1.171E-05	1.170E-05	1.171E-05	8540
1337176	7.471E-06	7.466E-06	7.471E-06	9243
1438881	4.768E-06	4.765E-06	4.768E-06	9946
1540585	3.043E-06	3.041E-06	3.043E-06	10649
1642289	1.942E-06	1.941E-06	1.942E-06	11352
1743994	1.239E-06	1.239E-06	1.239E-06	12055
1845698	7.910E-07	7.905E-07	7.910E-07	12758
1947403	5.048E-07	5.045E-07	5.048E-07	13461
2049107	3.222E-07	3.220E-07	3.222E-07	14165
2049988	3.209E-07	3.207E-07	3.209E-07	14171
2050870	3.197E-07	3.195E-07	3.197E-07	14177
2051752	3.184E-07	3.182E-07	3.184E-07	14183
2052633	3.172E-07	3.170E-07	3.172E-07	14189
2053515	3.160E-07	3.158E-07	3.160E-07	14195
2054396	3.147E-07	3.145E-07	3.147E-07	14201
2055278	3.135E-07	3.133E-07	3.135E-07	14207
2056159	3.123E-07	3.121E-07	3.123E-07	14213
2057041	3.111E-07	3.109E-07	3.111E-07	14219
2057922	3.099E-07	3.097E-07	3.099E-07	14225
2058804	3.087E-07	3.085E-07	3.087E-07	14232
2059685	3.075E-07	3.073E-07	3.075E-07	14238
2060567	3.063E-07	3.061E-07	3.063E-07	14244
2061449	3.051E-07	3.049E-07	3.051E-07	14250
2062330	3.039E-07	3.034E-07	3.039E-07	14256
2063212	3.027E-07	3.002E-07	3.027E-07	14262
2064093	3.016E-07	2.905E-07	3.016E-07	14268
2064975	3.004E-07	2.641E-07	3.004E-07	14274
2065856	2.992E-07	2.120E-07	2.992E-07	14280
2066738	.000E+00	1.404E-07	.000E+00	14286
2067619	.000E+00	7.235E-08	.000E+00	14293
2068501	.000E+00	2.781E-08	.000E+00	14299
2069383	.000E+00	7.750E-09	.000E+00	14305
2070264	.000E+00	1.538E-09	.000E+00	14311
2071145	.000E+00	2.147E-10	.000E+00	14317

2072027	.000E+00	2.093E-11	.000E+00	14323
2072909	.000E+00	1.417E-12	.000E+00	14329
2073791	.000E+00	6.637E-14	.000E+00	14335
2074672	.000E+00	2.146E-15	.000E+00	14341
2075554	.000E+00	4.783E-17	.000E+00	14347
2076435	.000E+00	7.336E-19	.000E+00	14353
2077317	.000E+00	7.739E-21	.000E+00	14360
2078199	.000E+00	5.613E-23	.000E+00	14366
2079080	.000E+00	2.795E-25	.000E+00	14372
2079962	.000E+00	9.554E-28	.000E+00	14378
2080843	.000E+00	2.244E-30	.000E+00	14384
2081725	.000E+00	3.622E-33	.000E+00	14390
2082607	.000E+00	4.013E-36	.000E+00	14396
2083488	.000E+00	3.054E-39	.000E+00	14402
2084370	.000E+00	.000E+00	.000E+00	14408

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: TH229 FROM U233

NUCLIDE	U233	TH229	
HALF LIFE, YR	1.58E+05	7.34E+03	.00E+00
DECAY NUMBER	6.35E-04	1.37E-02	.00E+00
DISTRIB COEF	1.43E+04	5.00E+04	.00E+00
YR 2000 CURIES	1.88E+04	.00E+00	.00E+00
PULSE G-ATOMS	8.30E+03	.00E+00	.00E+00
NUCL VEL,MI/YR	4.84E-06	1.38E-06	.00E+00
DISCH TIME,YR	2.07E+06	7.23E+06	.00E+00
DIM DISC TIME	1.43E+04	5.00E+04	.00E+00

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.06E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 2066738 YEARS
PEAK DISCHARGE RATE= 7.37E-05 CURIES PER YEAR AT 2067620 YEARS
BAND WIDTH= 532509 YEARS WITH TAIL END AT 2599247 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
2049107	.000E+00	.000E+00	.000E+00	14165
2049989	.000E+00	1.708E-36	.000E+00	14171
2050870	.000E+00	2.413E-33	.000E+00	14177
2051752	.000E+00	2.299E-30	.000E+00	14183
2052633	.000E+00	1.477E-27	.000E+00	14189
2053515	.000E+00	6.427E-25	.000E+00	14195
2054396	.000E+00	1.892E-22	.000E+00	14201
2055278	.000E+00	3.774E-20	.000E+00	14207
2056159	.000E+00	5.103E-18	.000E+00	14213
2057041	.000E+00	4.684E-16	.000E+00	14219
2057922	.000E+00	2.928E-14	.000E+00	14225
2058804	.000E+00	1.245E-12	.000E+00	14232
2059686	.000E+00	3.622E-11	.000E+00	14238
2060567	.000E+00	7.209E-10	.000E+00	14244
2061449	.000E+00	9.862E-09	.000E+00	14250
2062330	.000E+00	9.308E-08	.000E+00	14256
2063212	.000E+00	6.103E-07	.000E+00	14262
2064093	.000E+00	2.803E-06	.000E+00	14268
2064975	2.488E-05	9.130E-06	2.488E-05	14274
2065856	2.488E-05	2.150E-05	2.488E-05	14280
2066738	2.488E-05	3.764E-05	2.488E-05	14286
2067620	7.371E-05	5.110E-05	7.371E-05	14293
2068501	6.570E-05	5.702E-05	6.570E-05	14299
2069383	5.856E-05	5.597E-05	5.856E-05	14305
2070264	5.220E-05	5.148E-05	5.220E-05	14311
2071146	4.653E-05	4.623E-05	4.653E-05	14317
2072027	4.147E-05	4.126E-05	4.147E-05	14323
2072909	3.697E-05	3.678E-05	3.697E-05	14329
2073791	3.295E-05	3.278E-05	3.295E-05	14335
2074672	2.937E-05	2.922E-05	2.937E-05	14341
2075554	2.618E-05	2.605E-05	2.618E-05	14347
2076435	2.333E-05	2.322E-05	2.333E-05	14353
2077317	2.080E-05	2.070E-05	2.080E-05	14360
2078199	1.854E-05	1.845E-05	1.854E-05	14366
2079080	1.653E-05	1.644E-05	1.653E-05	14372
2079962	1.473E-05	1.466E-05	1.473E-05	14378
2080843	1.313E-05	1.306E-05	1.313E-05	14384
2081725	1.170E-05	1.164E-05	1.170E-05	14390
2082607	1.043E-05	1.038E-05	1.043E-05	14396
2083488	9.300E-06	9.252E-06	9.300E-06	14402
2084370	8.289E-06	8.247E-06	8.289E-06	14408
2341308	2.154E-20	2.143E-20	2.154E-20	16188
2599247	5.599E-35	5.570E-35	5.599E-35	17968
2856686	.000E+00	.000E+00	.000E+00	19747

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: NP237 FROM CM245

NUCLIDE	CM245	NP237	
HALF LIFE, YR	8.50E+03	2.14E+06	.00E+00
DECAY NUMBER	1.1ME-02	4.69E-05	.00E+00
DISTRIB COEF	3.33E+03	1.00E+02	.00E+00
YR 2000 CURIES	1.38E+05	.00E+00	.00E+00
PULSE G-ATOMS	3.25E+03	.00E+00	.00E+00
NUCL VEL,MI/YR	2.07E-05	6.91E-04	.00E+00
DISCH TIME,YR	4.82E+05	1.45E+04	.00E+00
DIM DISC TIME	3.33E+03	1.00E+02	.00E+00

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 0 YEARS
PEAK DISCHARGE RATE= 4.43E-02 CURIES PER YEAR AT 14906 YEARS
BAND WIDTH= 482234 YEARS WITH TAIL END AT 482234 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
14443	.000E+00	3.989E-37	.000E+00	99
14446	.000E+00	2.985E-35	.000E+00	99
14450	.000E+00	1.979E-33	.000E+00	99
14453	.000E+00	1.159E-31	.000E+00	99
14457	.000E+00	6.011E-30	.000E+00	99
14460	.000E+00	2.758E-28	.000E+00	99
14464	.000E+00	1.121E-26	.000E+00	99
14467	.000E+00	4.029E-25	.000E+00	99
14471	.000E+00	1.283E-23	.000E+00	99
14474	.000E+00	3.520E-22	.000E+00	99
14477	.000E+00	9.037E-21	.000E+00	99
14481	.000E+00	2.000E-19	.000E+00	99
14484	.000E+00	3.920E-18	.000E+00	99
14488	.000E+00	6.813E-17	.000E+00	99
14491	.000E+00	1.050E-15	.000E+00	99
14495	.000E+00	1.434E-14	.000E+00	100
14498	.000E+00	1.737E-13	.000E+00	100
14501	.000E+00	1.866E-12	.000E+00	100
14505	.000E+00	1.781E-11	.000E+00	100
14508	.000E+00	1.507E-10	.000E+00	100
14512	.000E+00	1.133E-09	.000E+00	100
14515	.000E+00	7.573E-09	.000E+00	100
14519	.000E+00	4.500E-08	.000E+00	100
14522	.000E+00	2.377E-07	.000E+00	100
14526	.000E+00	1.118E-06	.000E+00	100
14529	.000E+00	4.680E-06	.000E+00	100
14532	.000E+00	1.747E-05	.000E+00	100
14536	.000E+00	5.820E-05	.000E+00	100
14539	.000E+00	1.732E-04	.000E+00	100
14543	.000E+00	4.614E-04	.000E+00	100
14546	.000E+00	1.102E-03	.000E+00	100
14550	.000E+00	2.364E-03	.000E+00	100
14553	.000E+00	4.571E-03	.000E+00	100
14557	.000E+00	7.997E-03	.000E+00	100
14560	.000E+00	1.271E-02	.000E+00	100
14563	.000E+00	1.848E-02	.000E+00	100
14906	4.427E-02	4.425E-02	4.427E-02	102
14914	4.424E-02	4.422E-02	4.424E-02	102
14922	4.421E-02	4.419E-02	4.421E-02	102
14930	4.418E-02	4.416E-02	4.418E-02	103
14938	4.415E-02	4.413E-02	4.415E-02	103
14946	4.412E-02	4.410E-02	4.412E-02	103
14954	4.409E-02	4.407E-02	4.409E-02	103
14962	4.406E-02	4.404E-02	4.406E-02	103
14971	4.403E-02	4.401E-02	4.403E-02	103
14979	4.400E-02	4.398E-02	4.400E-02	103
14987	4.397E-02	4.395E-02	4.397E-02	103
14995	4.394E-02	4.392E-02	4.394E-02	103
15003	4.391E-02	4.389E-02	4.391E-02	103
15011	4.388E-02	4.386E-02	4.388E-02	103
15019	4.385E-02	4.383E-02	4.385E-02	103
24298	2.010E-02	2.009E-02	2.010E-02	167
33577	9.214E-03	9.211E-03	9.214E-03	231
42856	4.224E-03	4.223E-03	4.224E-03	296
52134	1.936E-03	1.936E-03	1.936E-03	360
61413	8.877E-04	8.874E-04	8.877E-04	424
70692	4.069E-04	4.068E-04	4.069E-04	488
79971	1.866E-04	1.865E-04	1.866E-04	552
89250	8.552E-05	8.549E-05	8.552E-05	616
98529	3.920E-05	3.919E-05	3.920E-05	680
107807	1.797E-05	1.796E-05	1.797E-05	745
117086	8.238E-06	8.235E-06	8.238E-06	809
126365	3.777E-06	3.775E-06	3.777E-06	873
135644	1.731E-06	1.731E-06	1.731E-06	937
144923	7.936E-07	7.934E-07	7.936E-07	1001
154202	3.638E-07	3.637E-07	3.638E-07	1065
163480	1.668E-07	1.667E-07	1.668E-07	1129
172759	7.646E-08	7.643E-08	7.646E-08	1194
182038	3.505E-08	3.504E-08	3.505E-08	1258
191317	1.607E-08	1.606E-08	1.607E-08	1322
200596	7.367E-09	7.363E-09	7.367E-09	1386
209875	3.376E-09	3.375E-09	3.376E-09	1450
219153	1.548E-09	1.547E-09	1.548E-09	1514
228432	7.097E-10	7.093E-10	7.097E-10	1578
237711	3.252E-10	3.252E-10	3.252E-10	1643
246990	1.491E-10	1.491E-10	1.491E-10	1707
256269	6.837E-11	6.834E-11	6.837E-11	1771
265548	3.133E-11	3.133E-11	3.133E-11	1835
274827	1.437E-11	1.436E-11	1.437E-11	1899
284105	6.585E-12	6.583E-12	6.585E-12	1963
293384	3.019E-12	3.018E-12	3.019E-12	2027

302663	1.384E-12	1.383E-12	1.384E-12	2092	481398	4.134E-19	4.117E-19	4.134E-19	3327
311942	6.343E-13	6.342E-13	6.343E-13	2156	481468	4.107E-19	4.081E-19	4.107E-19	3328
321221	2.909E-13	2.907E-13	2.909E-13	2220	481538	4.086E-19	4.037E-19	4.086E-19	3328
330500	1.333E-13	1.333E-13	1.333E-13	2284	481607	4.060E-19	3.981E-19	4.060E-19	3329
339778	6.111E-14	6.110E-14	6.111E-14	2348	481677	4.036E-19	3.909E-19	4.036E-19	3329
349057	2.802E-14	2.801E-14	2.802E-14	2412	481746	4.012E-19	3.814E-19	4.012E-19	3330
358336	1.285E-14	1.284E-14	1.285E-14	2476	481816	3.989E-19	3.690E-19	3.989E-19	3330
367615	5.887E-15	5.886E-15	5.887E-15	2541	481886	3.966E-19	3.531E-19	3.966E-19	3331
376894	2.700E-15	2.698E-15	2.700E-15	2605	481955	3.945E-19	3.334E-19	3.945E-19	3331
386173	1.237E-15	1.237E-15	1.237E-15	2669	482025	3.919E-19	3.098E-19	3.919E-19	3331
395451	5.672E-16	5.670E-16	5.672E-16	2733	482095	3.897E-19	2.824E-19	3.897E-19	3332
404730	2.601E-16	2.599E-16	2.601E-16	2797	482164	3.874E-19	2.520E-19	3.874E-19	3332
414009	1.193E-16	1.192E-16	1.193E-16	2861	482234	3.851E-19	2.194E-19	3.851E-19	3333
423288	5.464E-17	5.463E-17	5.464E-17	2925	482304	.000E+00	1.861E-19	.000E+00	3333
432567	2.505E-17	2.504E-17	2.505E-17	2990	482373	.000E+00	1.534E-19	.000E+00	3334
441846	1.148E-17	1.148E-17	1.148E-17	3054	482443	.000E+00	1.226E-19	.000E+00	3334
451124	5.264E-18	5.263E-18	5.264E-18	3118	482512	.000E+00	9.496E-20	.000E+00	3335
460403	2.414E-18	2.412E-18	2.414E-18	3182	482582	.000E+00	7.110E-20	.000E+00	3335
469682	1.107E-18	1.106E-18	1.107E-18	3246	482652	.000E+00	5.142E-20	.000E+00	3336
478961	5.071E-19	5.070E-19	5.071E-19	3310	482721	.000E+00	3.587E-20	.000E+00	3336
479031	5.044E-19	5.040E-19	5.044E-19	3311	482791	.000E+00	2.412E-20	.000E+00	3337
479100	5.012E-19	5.011E-19	5.012E-19	3311	482861	.000E+00	1.562E-20	.000E+00	3337
479170	4.983E-19	4.982E-19	4.983E-19	3312	482930	.000E+00	9.735E-21	.000E+00	3338
479240	4.956E-19	4.952E-19	4.956E-19	3312	483000	.000E+00	5.834E-21	.000E+00	3338
479309	4.925E-19	4.924E-19	4.925E-19	3313	483070	.000E+00	3.362E-21	.000E+00	3339
479379	4.899E-19	4.895E-19	4.899E-19	3313	483139	.000E+00	1.861E-21	.000E+00	3339
479448	4.867E-19	4.866E-19	4.867E-19	3314	483209	.000E+00	9.898E-22	.000E+00	3340
479518	4.839E-19	4.838E-19	4.839E-19	3314	483278	.000E+00	5.054E-22	.000E+00	3340
479588	4.813E-19	4.810E-19	4.813E-19	3315	483348	.000E+00	2.477E-22	.000E+00	3341
479657	4.783E-19	4.782E-19	4.783E-19	3315	483418	.000E+00	1.164E-22	.000E+00	3341
479727	4.755E-19	4.754E-19	4.755E-19	3316	483487	.000E+00	5.254E-23	.000E+00	3342
479797	4.730E-19	4.726E-19	4.730E-19	3316	483557	.000E+00	2.275E-23	.000E+00	3342
479866	4.699E-19	4.698E-19	4.699E-19	3317	483627	.000E+00	9.440E-24	.000E+00	3343
479936	4.675E-19	4.671E-19	4.675E-19	3317	483696	.000E+00	3.757E-24	.000E+00	3343
480005	4.645E-19	4.644E-19	4.645E-19	3318	483766	.000E+00	1.434E-24	.000E+00	3344
480075	4.617E-19	4.617E-19	4.617E-19	3318	483836	.000E+00	5.245E-25	.000E+00	3344
480145	4.591E-19	4.590E-19	4.591E-19	3318	483905	.000E+00	1.839E-25	.000E+00	3344
480214	4.566E-19	4.563E-19	4.566E-19	3319	483975	.000E+00	6.185E-26	.000E+00	3345
480284	4.537E-19	4.536E-19	4.537E-19	3319	484044	.000E+00	1.992E-26	.000E+00	3345
480354	4.511E-19	4.510E-19	4.511E-19	3320	484114	.000E+00	6.148E-27	.000E+00	3346
480423	4.484E-19	4.483E-19	4.484E-19	3320	484184	.000E+00	1.819E-27	.000E+00	3346
480493	4.458E-19	4.457E-19	4.458E-19	3321	484253	.000E+00	5.156E-28	.000E+00	3347
480563	4.432E-19	4.431E-19	4.432E-19	3321	484323	.000E+00	1.401E-28	.000E+00	3347
480632	4.409E-19	4.405E-19	4.409E-19	3322	484393	.000E+00	3.644E-29	.000E+00	3348
480702	4.380E-19	4.380E-19	4.380E-19	3322	484462	.000E+00	9.088E-30	.000E+00	3348
480772	4.355E-19	4.354E-19	4.355E-19	3323	484532	.000E+00	2.169E-30	.000E+00	3349
480841	4.330E-19	4.329E-19	4.330E-19	3323	484602	.000E+00	4.966E-31	.000E+00	3349
480911	4.304E-19	4.303E-19	4.304E-19	3324	484671	.000E+00	1.089E-31	.000E+00	3350
480980	4.282E-19	4.276E-19	4.282E-19	3324	484741	.000E+00	2.286E-32	.000E+00	3350
481050	4.254E-19	4.253E-19	4.254E-19	3325	484810	.000E+00	4.597E-33	.000E+00	3351
481120	4.229E-19	4.229E-19	4.229E-19	3325	484880	.000E+00	8.859E-34	.000E+00	3351
481189	4.207E-19	4.202E-19	4.207E-19	3326	484950	.000E+00	1.636E-34	.000E+00	3352
481259	4.180E-19	4.176E-19	4.180E-19	3326	485019	.000E+00	2.892E-35	.000E+00	3352
481329	4.156E-19	4.144E-19	4.156E-19	3327	485089	.000E+00	4.499E-36	.000E+00	3353

485159	.000E+00	7.948E-37	.000E+00	3353
485228	.000E+00	1.235E-37	.000E+00	3354
485298	.000E+00	1.839E-38	.000E+00	3354
485368	.000E+00	2.621E-39	.000E+00	3355
485437	.000E+00	.000E+00	.000E+00	3355

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: PU242 FROM CM246

NUCLIDE	CM246	PU242	
HALF LIFE, YR	4.76E+03	3.87E+05	.00E+00
DECAY NUMBER	2.11E-02	2.59E-04	.00E+00
DISTRIB COEF	3.33E+03	1.00E+04	.00E+00
YR 2000 CURIES	2.68E+04	.00E+00	.00E+00
PULSE G-ATOMS	3.51E+02	.00E+00	.00E+00
NUCL VEL,MI/YR	2.07E-05	6.91E-06	.00E+00
DISCH TIME,YR	4.82E+05	1.45E+06	.00E+00
DIM DISC TIME	3.33E+03	1.00E+04	.00E+00

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 482332 YEARS
PEAK DISCHARGE RATE= 1.65E-03 CURIES PER YEAR AT 1446156 YEARS
BAND WIDTH= 963824 YEARS WITH TAIL END AT 1446156 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
480560	.000E+00	.000E+00	.000E+00	3321
480671	.000E+00	4.369E-39	.000E+00	3322
480782	.000E+00	2.264E-38	.000E+00	3323
480892	.000E+00	1.052E-37	.000E+00	3324
481003	.000E+00	4.386E-37	.000E+00	3324
481114	.000E+00	1.643E-36	.000E+00	3325
481225	.000E+00	5.532E-36	.000E+00	3326
481335	.000E+00	1.676E-35	.000E+00	3327
481446	.000E+00	4.573E-35	.000E+00	3327
481557	.000E+00	1.126E-34	.000E+00	3328
481668	.000E+00	2.507E-34	.000E+00	3329
481778	.000E+00	5.056E-34	.000E+00	3330
481889	.000E+00	9.269E-34	.000E+00	3331
482000	.000E+00	1.550E-33	.000E+00	3331
482111	9.176E-34	2.374E-33	9.176E-34	3332
482221	9.176E-34	3.351E-33	9.176E-34	3333
482332	9.176E-34	4.390E-33	9.176E-34	3334
482443	3.415E-33	5.381E-33	3.415E-33	3334
482554	5.893E-33	6.232E-33	5.893E-33	3335
482665	7.498E-33	6.893E-33	7.498E-33	3336
482775	7.556E-33	7.361E-33	7.556E-33	3337
482886	7.615E-33	7.669E-33	7.615E-33	3337
482997	7.675E-33	7.864E-33	7.675E-33	3338
483108	7.735E-33	7.992E-33	7.735E-33	3339
483219	7.795E-33	8.083E-33	7.795E-33	3340
483329	7.856E-33	8.157E-33	7.856E-33	3341
483440	7.917E-33	8.224E-33	7.917E-33	3341
483551	7.979E-33	8.290E-33	7.979E-33	3342
483662	8.041E-33	8.355E-33	8.041E-33	3343
483773	8.104E-33	8.420E-33	8.104E-33	3344
483883	8.167E-33	8.486E-33	8.167E-33	3344
483994	8.231E-33	8.552E-33	8.231E-33	3345
484105	8.295E-33	8.619E-33	8.295E-33	3346
484216	8.360E-33	8.686E-33	8.360E-33	3347
484327	8.425E-33	8.753E-33	8.425E-33	3347
484437	8.490E-33	8.822E-33	8.490E-33	3348
484548	8.557E-33	8.891E-33	8.557E-33	3349
484659	8.623E-33	8.960E-33	8.623E-33	3350
532125	2.405E-31	2.499E-31	2.405E-31	3678
579591	6.710E-30	6.972E-30	6.710E-30	4006
627057	1.872E-28	1.945E-28	1.872E-28	4334
674523	5.222E-27	5.425E-27	5.222E-27	4662
721989	1.457E-25	1.513E-25	1.457E-25	4990
769455	4.063E-24	4.222E-24	4.063E-24	5318
816921	1.133E-22	1.178E-22	1.133E-22	5647
864387	3.162E-21	3.285E-21	3.162E-21	5975
911853	8.820E-20	9.164E-20	8.820E-20	6303
959319	2.460E-18	2.556E-18	2.460E-18	6631
1006785	6.863E-17	7.131E-17	6.863E-17	6959
1054251	1.914E-15	1.989E-15	1.914E-15	7287
1101718	5.341E-14	5.549E-14	5.341E-14	7615
1149184	1.490E-12	1.548E-12	1.490E-12	7943
1196650	4.156E-11	4.318E-11	4.156E-11	8272
1244116	1.159E-09	1.205E-09	1.159E-09	8600
1291582	3.234E-08	3.360E-08	3.234E-08	8928
1339048	9.021E-07	9.373E-07	9.021E-07	9256
1386514	2.516E-05	2.615E-05	2.516E-05	9584
1433980	7.020E-04	7.294E-04	7.020E-04	9912
1434621	7.342E-04	7.629E-04	7.342E-04	9917
1435262	7.680E-04	7.979E-04	7.680E-04	9921
1435902	8.033E-04	8.346E-04	8.033E-04	9926
1436543	8.402E-04	8.730E-04	8.402E-04	9930
1437184	8.788E-04	9.131E-04	8.788E-04	9934
1437825	9.192E-04	9.551E-04	9.192E-04	9939
1438466	9.614E-04	9.990E-04	9.614E-04	9943

1439107	1.006E-03	1.045E-03	1.006E-03	9948
1439747	1.052E-03	1.093E-03	1.052E-03	9952
1440388	1.100E-03	1.143E-03	1.100E-03	9957
1441029	1.151E-03	1.196E-03	1.151E-03	9961
1441670	1.204E-03	1.251E-03	1.204E-03	9965
1442311	1.259E-03	1.308E-03	1.259E-03	9970
1442952	1.317E-03	1.368E-03	1.317E-03	9974
1443593	1.377E-03	1.429E-03	1.377E-03	9979
1444233	1.441E-03	1.484E-03	1.441E-03	9983
1444874	1.507E-03	1.503E-03	1.507E-03	9988
1445515	1.576E-03	1.415E-03	1.576E-03	9992
1446156	1.649E-03	1.156E-03	1.649E-03	9996
1446797	.000E+00	7.582E-04	.000E+00	10001
1447438	.000E+00	3.757E-04	.000E+00	10005
1448078	.000E+00	1.346E-04	.000E+00	10010
1448719	.000E+00	3.388E-05	.000E+00	10014
1449360	.000E+00	5.886E-06	.000E+00	10019
1450001	.000E+00	6.973E-07	.000E+00	10023
1450642	.000E+00	5.595E-08	.000E+00	10027
1451283	.000E+00	3.024E-09	.000E+00	10032
1451923	.000E+00	1.098E-10	.000E+00	10036
1452564	.000E+00	2.669E-12	.000E+00	10041
1453205	.000E+00	4.335E-14	.000E+00	10045
1453845	.000E+00	4.711E-16	.000E+00	10050
1454487	.000E+00	3.413E-18	.000E+00	10054
1455128	.000E+00	1.650E-20	.000E+00	10058
1455769	.000E+00	5.318E-23	.000E+00	10063
1456409	.000E+00	1.144E-25	.000E+00	10067
1457050	.000E+00	1.640E-28	.000E+00	10072
1457691	.000E+00	1.568E-31	.000E+00	10076
1458332	.000E+00	9.991E-35	.000E+00	10081
1458973	.000E+00	4.249E-38	.000E+00	10085
1459614	.000E+00	.000E+00	.000E+00	10089

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: U238 FROM PU242

NUCLIDE	PU242	U238 F	
HALF LIFE, YR	3.87E+05	4.47E+09	.00E+00
DECAY NUMBER	2.59E-04	2.24E-08	.00E+00
DISTRIB COEF	1.00E+04	1.43E+04	.00E+00
YR 2000 CURIES	9.28E+03	.00E+00	.00E+00
PULSE G-ATOMS	1.02E+04	.00E+00	.00E+00
NUCL VEL,MI/YR	6.91E-06	4.84E-06	.00E+00
DISCH TIME,YR	1.45E+06	2.07E+06	.00E+00
DIM DISC TIME	1.00E+04	1.43E+04	.00E+00

LEACH RATE= .003000 FRACTION PER YEAR

LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 1446797 YEARS
PEAK DISCHARGE RATE= 3.41E-06 CURIES PER YEAR AT 2065822 YEARS
BAND WIDTH= 619941 YEARS WITH TAIL END AT 2066738 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
1434621	.000E+00	.000E+00	.000E+00	9917
1435262	.000E+00	9.020E-38	.000E+00	9921
1435903	.000E+00	1.431E-34	.000E+00	9926
1436543	.000E+00	1.487E-31	.000E+00	9930
1437184	.000E+00	1.011E-28	.000E+00	9934
1437825	.000E+00	4.516E-26	.000E+00	9939
1438466	.000E+00	1.323E-23	.000E+00	9943
1439107	.000E+00	2.552E-21	.000E+00	9948
1439748	.000E+00	3.240E-19	.000E+00	9952
1440388	.000E+00	2.713E-17	.000E+00	9957
1441029	.000E+00	1.503E-15	.000E+00	9961
1441670	.000E+00	5.518E-14	.000E+00	9965
1442311	.000E+00	1.346E-12	.000E+00	9970
1442952	.000E+00	2.192E-11	.000E+00	9974
1443593	.000E+00	2.395E-10	.000E+00	9979
1444233	.000E+00	1.768E-09	.000E+00	9983
1444874	.000E+00	8.915E-09	.000E+00	9988
1445515	9.353E-08	3.116E-08	9.353E-08	9992
1446156	9.353E-08	7.737E-08	9.353E-08	9996
1446797	9.353E-08	1.415E-07	9.353E-08	10001
1447438	2.571E-07	2.009E-07	2.571E-07	10005
1448079	2.578E-07	2.380E-07	2.578E-07	10010
1448719	2.585E-07	2.537E-07	2.585E-07	10014
1449360	2.592E-07	2.586E-07	2.592E-07	10019
1450001	2.599E-07	2.600E-07	2.599E-07	10023
1450642	2.606E-07	2.608E-07	2.606E-07	10027
1451283	2.613E-07	2.615E-07	2.613E-07	10032
1451924	2.619E-07	2.622E-07	2.619E-07	10036
1452564	2.627E-07	2.629E-07	2.627E-07	10041
1453205	2.634E-07	2.636E-07	2.634E-07	10045
1453846	2.641E-07	2.644E-07	2.641E-07	10050
1454487	2.648E-07	2.651E-07	2.648E-07	10054
1455128	2.655E-07	2.658E-07	2.655E-07	10058
1455769	2.662E-07	2.665E-07	2.662E-07	10063
1456410	2.669E-07	2.672E-07	2.669E-07	10067
1457050	2.676E-07	2.679E-07	2.676E-07	10072
1457691	2.684E-07	2.686E-07	2.684E-07	10076

1458332	2.691E-07	2.694E-07	2.691E-07	10081	2077723	.000E+00	1.007E-20	.000E+00	14362
1458973	2.698E-07	2.701E-07	2.698E-07	10085	2078639	.000E+00	5.032E-23	.000E+00	14369
1459614	2.705E-07	2.708E-07	2.705E-07	10089	2079554	.000E+00	1.676E-25	.000E+00	14375
1489055	3.059E-07	3.062E-07	3.059E-07	10293	2080470	.000E+00	3.720E-28	.000E+00	14381
1518495	3.460E-07	3.463E-07	3.460E-07	10496	2081385	.000E+00	5.511E-31	.000E+00	14388
1547936	3.913E-07	3.917E-07	3.913E-07	10700	2082301	.000E+00	5.438E-34	.000E+00	14394
1577377	4.425E-07	4.430E-07	4.425E-07	10904	2083216	.000E+00	3.586E-37	.000E+00	14400
1606817	5.004E-07	5.009E-07	5.004E-07	11107	2084132	.000E+00	.000E+00	.000E+00	14407
1636258	5.659E-07	5.665E-07	5.659E-07	11311					
1665699	6.400E-07	6.407E-07	6.400E-07	11514					
1695140	7.238E-07	7.246E-07	7.238E-07	11718	MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM				
1724580	8.186E-07	8.194E-07	8.186E-07	11921	FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR				
1754021	9.257E-07	9.267E-07	9.257E-07	12125	POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY				
1783462	1.047E-06	1.048E-06	1.047E-06	12328					
1812903	1.184E-06	1.185E-06	1.184E-06	12532					
1842343	1.339E-06	1.340E-06	1.339E-06	12735	TIME OF LEACH INCIDENT: 100 YEARS				
1871784	1.514E-06	1.516E-06	1.514E-06	12939					
1901225	1.712E-06	1.714E-06	1.712E-06	13142	NUCLIDE: U234 FROM PU238				
1930666	1.937E-06	1.939E-06	1.937E-06	13346					
1960106	2.190E-06	2.192E-06	2.190E-06	13549	NUCLIDE	PU238	U234 F		
1989547	2.477E-06	2.479E-06	2.477E-06	13753	HALF LIFE, YR	8.78E+01	2.44E+05	.00E+00	
2018988	2.801E-06	2.804E-06	2.801E-06	13956	DECAY NUMBER	1.14E+00	4.11E-04	.00E+00	
2048429	3.168E-06	3.171E-06	3.168E-06	14160	DISTRIB COEF	1.00E+04	1.43E+04	.00E+00	
2049344	3.180E-06	3.183E-06	3.180E-06	14166	YR 2000 CURIES	3.97E+08	.00E+00	.00E+00	
2050260	3.192E-06	3.195E-06	3.192E-06	14173	PULSE G-ATOMS	4.56E+04	.00E+00	.00E+00	
2051175	3.204E-06	3.208E-06	3.204E-06	14179	NUCL VEL,MI/YR	6.91E-06	4.84E-06	.00E+00	
2052091	3.217E-06	3.220E-06	3.217E-06	14185	DISCH TIME,YR	1.45E+06	2.07E+06	.00E+00	
2053006	3.229E-06	3.232E-06	3.229E-06	14191	DIM DISC TIME	1.00E+04	1.43E+04	.00E+00	
2053921	3.241E-06	3.245E-06	3.241E-06	14198	LEACH RATE= .003000 FRACTION PER YEAR				
2054837	3.254E-06	3.257E-06	3.254E-06	14204	LEACH DURATION= 333 YEARS				
2055752	3.266E-06	3.270E-06	3.266E-06	14210	PATH LENGTH= 10.00 MILES				
2056668	3.279E-06	3.282E-06	3.279E-06	14217	DIMENSIONLESS DISTANCE= 1.00				
2057583	3.291E-06	3.295E-06	3.291E-06	14223	WATER VELOCITY= 1.00 FT/DAY				
2058499	3.304E-06	3.307E-06	3.304E-06	14229	WATER TRAVEL TIME= 145 YEARS				
2059414	3.317E-06	3.320E-06	3.317E-06	14236	AXIAL DISPERSION COEFFICIENT= .0080 CMI2/MIN				
2060329	3.329E-06	3.333E-06	3.329E-06	14242	PECLET NUMBER= 4.26E+06				
2061245	3.342E-06	3.345E-06	3.342E-06	14248	NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION				
2062160	3.355E-06	3.356E-06	3.355E-06	14255	INITIAL BREAKTHROUGH AT 2063076 YEARS				
2063076	3.368E-06	3.351E-06	3.368E-06	14261	PEAK DISCHARGE RATE= 4.90E-01 CURIES PER YEAR AT 2066738 YEARS				
2063991	3.381E-06	3.278E-06	3.381E-06	14267	BAND WIDTH= 3662 YEARS WITH TAIL END AT 2066738 YEARS				
2064907	3.394E-06	3.017E-06	3.394E-06	14274	DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00				
2065822	3.407E-06	2.440E-06	3.407E-06	14280					
2066738	2.825E-06	1.606E-06	2.825E-06	14286	TIME,YR DISC RATE,CI/YR PULSE RATE BAND RATE DIM TIME				
2067653	.000E+00	8.064E-07	.000E+00	14293					
2068569	.000E+00	2.946E-07	.000E+00	14299					
2069484	.000E+00	7.596E-08	.000E+00	14305					
2070400	.000E+00	1.356E-08	.000E+00	14312	1446842	.000E+00	.000E+00	.000E+00	10001
2071315	.000E+00	1.653E-09	.000E+00	14318	1476921	.000E+00	.000E+00	.000E+00	10209
2072231	.000E+00	1.366E-10	.000E+00	14324	1507001	.000E+00	.000E+00	.000E+00	10417
2073146	.000E+00	7.616E-12	.000E+00	14331	1537080	.000E+00	.000E+00	.000E+00	10625
2074062	.000E+00	2.851E-13	.000E+00	14337	1567159	.000E+00	.000E+00	.000E+00	10833
2074977	.000E+00	7.153E-15	.000E+00	14343	1597239	.000E+00	.000E+00	.000E+00	11041
2075893	.000E+00	1.200E-16	.000E+00	14350	1627318	.000E+00	.000E+00	.000E+00	11249
2076808	.000E+00	1.345E-18	.000E+00	14356	1657397	.000E+00	.000E+00	.000E+00	11457

1687477	.000E+00	.000E+00	.000E+00
1717556	.000E+00	.000E+00	.000E+00
1747635	.000E+00	.000E+00	.000E+00
1777715	.000E+00	.000E+00	.000E+00
1807794	.000E+00	.000E+00	.000E+00
1837873	.000E+00	.000E+00	.000E+00
1867953	.000E+00	.000E+00	.000E+00
1898032	.000E+00	.000E+00	.000E+00
1928111	.000E+00	.000E+00	.000E+00
1958191	.000E+00	.000E+00	.000E+00
1988270	.000E+00	.000E+00	.000E+00
2018350	.000E+00	.000E+00	.000E+00
2048429	.000E+00	7.592E-38	.000E+00
2049344	.000E+00	.000E+00	.000E+00
2050260	.000E+00	.000E+00	.000E+00
2051175	.000E+00	.000E+00	.000E+00
2052091	.000E+00	.000E+00	.000E+00
2053006	.000E+00	.000E+00	.000E+00
2053922	.000E+00	.000E+00	.000E+00
2054837	.000E+00	.000E+00	.000E+00
2055753	.000E+00	.000E+00	.000E+00
2056668	.000E+00	.000E+00	.000E+00
2057583	.000E+00	.000E+00	.000E+00
2058499	.000E+00	.000E+00	.000E+00
2059414	.000E+00	.000E+00	.000E+00
2060330	.000E+00	.000E+00	.000E+00
2061245	.000E+00	.000E+00	.000E+00
2062160	.000E+00	.000E+00	.000E+00
2063076	1.348E-29	.000E+00	1.348E-29
2063991	2.816E-22	.000E+00	2.816E-22
2064907	5.881E-15	.000E+00	5.881E-15
2065822	1.228E-07	.000E+00	1.228E-07
2066738	4.898E-01	.000E+00	4.898E-01
2067653	.000E+00	.000E+00	.000E+00
2068569	.000E+00	.000E+00	.000E+00
2069484	.000E+00	.000E+00	.000E+00
2070400	.000E+00	.000E+00	.000E+00
2071315	.000E+00	.000E+00	.000E+00
2072231	.000E+00	.000E+00	.000E+00
2073145	.000E+00	.000E+00	.000E+00
2074062	.000E+00	.000E+00	.000E+00
2074977	.000E+00	.000E+00	.000E+00
2075893	.000E+00	.000E+00	.000E+00
2076808	.000E+00	.000E+00	.000E+00
2077724	.000E+00	.000E+00	.000E+00
2078639	.000E+00	.000E+00	.000E+00
2079555	.000E+00	.000E+00	.000E+00
2080470	.000E+00	.000E+00	.000E+00
2081385	.000E+00	.000E+00	.000E+00
2082301	.000E+00	.000E+00	.000E+00
2083217	.000E+00	.000E+00	.000E+00
2084132	.000E+00	.000E+00	.000E+00
2085048	.000E+00	.000E+00	.000E+00

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: TH230 FROM U234

NUCLIDE	U234	TH230	
HALF LIFE, YR	2.44E+05	7.70E+04	.00E+00
DECAY NUMBER	4.11E-04	1.30E-03	.00E+00
DISTRIB COEF	1.43E+04	5.00E+04	.00E+00
YR 2000 CURIES	2.27E+04	.00E+00	.00E+00
PULSE G-ATOMS	6.89E+04	.00E+00	.00E+00
NUCL VEL,MI/YR	4.84E-06	1.38E-06	.00E+00
DISCH TIME,YR	2.07E+06	7.23E+06	.00E+00
DIM DISC TIME	1.43E+04	5.00E+04	.00E+00

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 2066738 YEARS
PEAK DISCHARGE RATE= 1.02E-03 CURIES PER YEAR AT 2067653 YEARS
BAND WIDTH= 5166179 YEARS WITH TAIL END AT 7232917 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
2048429	.000E+00	.000E+00	.000E+00	14160
2049344	.000E+00	8.191E-38	.000E+00	14166
2050260	.000E+00	2.050E-34	.000E+00	14173
2051175	.000E+00	3.356E-31	.000E+00	14179
2052091	.000E+00	3.593E-28	.000E+00	14185
2053006	.000E+00	2.522E-25	.000E+00	14191
2053922	.000E+00	1.161E-22	.000E+00	14198
2054837	.000E+00	3.509E-20	.000E+00	14204
2055753	.000E+00	6.975E-18	.000E+00	14210
2056668	.000E+00	9.133E-16	.000E+00	14217
2057583	.000E+00	7.885E-14	.000E+00	14223
2058499	.000E+00	4.503E-12	.000E+00	14229
2059414	.000E+00	1.703E-10	.000E+00	14236
2060330	.000E+00	4.280E-09	.000E+00	14242
2061245	.000E+00	7.177E-08	.000E+00	14248
2062161	.000E+00	8.071E-07	.000E+00	14255
2063076	.000E+00	6.127E-06	.000E+00	14261

2063991	.000E+00	3.173E-05	.000E+00	14267	7220100	2.232E-29	2.219E-29	2.232E-29	49911
2064907	3.124E-04	1.137E-04	3.124E-04	14274	7221525	2.196E-29	2.171E-29	2.196E-29	49921
2065822	3.124E-04	2.885E-04	3.124E-04	14280	7222949	2.160E-29	2.112E-29	2.160E-29	49931
2066738	3.124E-04	5.368E-04	3.124E-04	14286	7224372	2.125E-29	2.037E-29	2.125E-29	49941
2067653	1.016E-03	7.706E-04	1.016E-03	14293	7225796	2.090E-29	1.938E-29	2.090E-29	49950
2068569	1.005E-03	9.151E-04	1.005E-03	14299	7227221	2.056E-29	1.807E-29	2.056E-29	49960
2069484	9.945E-04	9.704E-04	9.945E-04	14305	7228645	2.023E-29	1.642E-29	2.023E-29	49970
2070400	9.841E-04	9.787E-04	9.841E-04	14312	7230068	1.991E-29	1.442E-29	1.991E-29	49980
2071315	9.738E-04	9.720E-04	9.738E-04	14318	7231492	1.959E-29	1.217E-29	1.959E-29	49990
2072231	9.637E-04	9.623E-04	9.637E-04	14324	7232917	1.927E-29	9.808E-30	1.927E-29	50000
2073146	9.535E-04	9.523E-04	9.535E-04	14331	7234340	.000E+00	7.503E-30	.000E+00	50009
2074062	9.436E-04	9.424E-04	9.436E-04	14337	7235764	.000E+00	5.423E-30	.000E+00	50019
2074977	9.338E-04	9.325E-04	9.338E-04	14343	7237189	.000E+00	3.687E-30	.000E+00	50029
2075893	9.240E-04	9.228E-04	9.240E-04	14350	7238613	.000E+00	2.352E-30	.000E+00	50039
2076808	9.143E-04	9.132E-04	9.143E-04	14356	7240036	.000E+00	1.402E-30	.000E+00	50049
2077724	9.048E-04	9.036E-04	9.048E-04	14362	7241460	.000E+00	7.805E-31	.000E+00	50059
2078639	8.953E-04	8.942E-04	8.953E-04	14369	7242885	.000E+00	4.045E-31	.000E+00	50068
2079555	8.860E-04	8.849E-04	8.860E-04	14375	7244309	.000E+00	1.949E-31	.000E+00	50078
2080470	8.767E-04	8.756E-04	8.767E-04	14381	7245732	.000E+00	8.726E-32	.000E+00	50088
2081386	8.676E-04	8.665E-04	8.676E-04	14388	7247156	.000E+00	3.624E-32	.000E+00	50098
2082301	8.585E-04	8.574E-04	8.585E-04	14394	7248581	.000E+00	1.395E-32	.000E+00	50108
2083217	8.496E-04	8.485E-04	8.496E-04	14400	7250005	.000E+00	4.976E-33	.000E+00	50118
2084132	8.407E-04	8.396E-04	8.407E-04	14407	7251428	.000E+00	1.643E-33	.000E+00	50128
2085048	8.320E-04	8.308E-04	8.320E-04	14413	7252852	.000E+00	5.022E-34	.000E+00	50137
2341017	4.420E-05	4.414E-05	4.420E-05	16162	7254277	.000E+00	1.419E-34	.000E+00	50147
2596987	2.348E-06	2.345E-06	2.348E-06	17952	7255701	.000E+00	3.710E-35	.000E+00	50157
2852956	1.248E-07	1.246E-07	1.248E-07	19721	7257124	.000E+00	8.966E-36	.000E+00	50167
3108926	6.628E-09	6.620E-09	6.628E-09	21491	7258548	.000E+00	2.002E-36	.000E+00	50177
3364895	3.521E-10	3.517E-10	3.521E-10	23260	7259973	.000E+00	4.130E-37	.000E+00	50187
3620864	1.871E-11	1.868E-11	1.871E-11	25030	7261397	.000E+00	7.875E-38	.000E+00	50196
3876834	9.941E-13	9.927E-13	9.941E-13	26799					
4132803	5.282E-14	5.274E-14	5.282E-14	28569					
4388773	2.806E-15	2.802E-15	2.806E-15	30338					
4644742	1.491E-16	1.489E-16	1.491E-16	32108					
4900712	7.920E-18	7.909E-18	7.920E-18	33877					
5156681	4.208E-19	4.202E-19	4.208E-19	35647					
5412650	2.235E-20	2.232E-20	2.235E-20	37416					
5668620	1.187E-21	1.186E-21	1.187E-21	39186					
5924589	6.308E-23	6.301E-23	6.308E-23	40955					
6180559	3.353E-24	3.348E-24	3.353E-24	42725					
6436528	1.781E-25	1.779E-25	1.781E-25	44494					
6692498	9.463E-27	9.450E-27	9.463E-27	46264					
6948467	5.026E-28	5.021E-28	5.026E-28	48033					
7204437	2.670E-29	2.667E-29	2.670E-29	49803					
7205861	2.627E-29	2.624E-29	2.627E-29	49813					
7207284	2.585E-29	2.582E-29	2.585E-29	49822					
7208708	2.543E-29	2.540E-29	2.543E-29	49832					
7210133	2.502E-29	2.499E-29	2.502E-29	49842					
7211557	2.462E-29	2.458E-29	2.462E-29	49852					
7212980	2.422E-29	2.418E-29	2.422E-29	49862					
7214404	2.383E-29	2.379E-29	2.383E-29	49872					
7215829	2.343E-29	2.340E-29	2.343E-29	49881					
7217253	2.305E-29	2.301E-29	2.305E-29	49891					
7218676	2.269E-29	2.261E-29	2.269E-29	49901					

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND RAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: RA226 FROM TH230

NUCLIDE	TH230	RA226	
HALF LIFE, YR	7.70E+04	1.60E+03	.00E+00
DECAY NUMBER	1.30E-05	5.27E-02	.00E+00
DISTRIB COEF	5.00E+03	5.00E+02	.00E+00
YR 2000 CURIES	5.55E+00	.00E+00	.00E+00
PULSE G-ATOMS	1.36E+01	.00E+00	.00E+00
NUCL VEL, M/YR	1.38E-06	1.38E-04	.00E+00
DISCH TIME, YR	7.23E+05	7.23E+04	.00E+00
DIM DISC TIME	5.00E+04	5.00E+03	.00E+00

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00

WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 72457 YEARS
PEAK DISCHARGE RATE= 1.27E-15 CURIES PER YEAR AT 72753 YEARS
BAND WIDTH= 7160460 YEARS WITH TAIL END AT 7232917 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
71951	.000E+00	1.729E-37	.000E+00	497
71981	.000E+00	5.198E-35	.000E+00	497
72010	.000E+00	1.087E-32	.000E+00	497
72040	.000E+00	1.585E-30	.000E+00	497
72070	.000E+00	1.611E-28	.000E+00	498
72100	.000E+00	1.143E-26	.000E+00	498
72130	.000E+00	5.677E-25	.000E+00	498
72159	.000E+00	1.975E-23	.000E+00	498
72189	.000E+00	4.822E-22	.000E+00	498
72219	.000E+00	8.291E-21	.000E+00	499
72248	.000E+00	1.007E-19	.000E+00	499
72278	.000E+00	8.683E-19	.000E+00	499
72308	.000E+00	5.345E-18	.000E+00	499
72338	.000E+00	2.369E-17	.000E+00	499
72367	.000E+00	7.660E-17	.000E+00	500
72397	1.138E-16	1.840E-16	1.138E-16	500
72427	1.138E-16	3.375E-16	1.138E-16	500
72457	1.138E-16	4.923E-16	1.138E-16	500
72487	2.341E-16	6.022E-16	2.341E-16	500
72516	3.533E-16	6.573E-16	3.533E-16	501
72546	4.717E-16	6.767E-16	4.717E-16	501
72580	6.081E-16	6.817E-16	6.081E-16	501
72615	7.433E-16	6.823E-16	7.433E-16	501
72649	8.775E-16	6.822E-16	8.775E-16	502
72684	1.011E-15	6.821E-16	1.011E-15	502
72718	1.143E-15	6.820E-16	1.143E-15	502
72753	1.274E-15	6.819E-16	1.274E-15	502
72787	6.812E-16	6.818E-16	6.812E-16	502
72822	6.810E-16	6.817E-16	6.810E-16	503
72856	6.810E-16	6.815E-16	6.810E-16	503
72890	6.808E-16	6.814E-16	6.808E-16	503
72925	6.807E-16	6.813E-16	6.807E-16	503
72959	6.805E-16	6.812E-16	6.805E-16	504
72994	6.804E-16	6.811E-16	6.804E-16	504
73028	6.803E-16	6.810E-16	6.803E-16	504
73063	6.802E-16	6.809E-16	6.802E-16	504
73097	6.802E-16	6.808E-16	6.802E-16	505
73132	6.800E-16	6.807E-16	6.800E-16	505
73166	6.800E-16	6.805E-16	6.800E-16	505
73201	6.798E-16	6.804E-16	6.798E-16	505
73235	6.796E-16	6.803E-16	6.796E-16	506
429795	1.265E-16	1.266E-16	1.265E-16	2970
786355	2.352E-17	2.354E-17	2.352E-17	5435
1142915	4.376E-18	4.380E-18	4.376E-18	7900
1499475	8.141E-19	8.147E-19	8.141E-19	10365
1856035	1.514E-19	1.516E-19	1.514E-19	12830
2212596	2.817E-20	2.820E-20	2.817E-20	15295
2569156	5.241E-21	5.245E-21	5.241E-21	17760
2925716	9.749E-22	9.757E-22	9.749E-22	20224
3282276	1.813E-22	1.815E-22	1.813E-22	22689
3638836	3.373E-23	3.377E-23	3.373E-23	25154
3995396	6.276E-24	6.281E-24	6.276E-24	27619
4351956	1.167E-24	1.169E-24	1.167E-24	30084
4708516	2.172E-25	2.174E-25	2.172E-25	32549
5065076	4.040E-26	4.044E-26	4.040E-26	35014
5421636	7.516E-27	7.523E-27	7.516E-27	37478
5778196	1.398E-27	1.399E-27	1.398E-27	39943
6134756	2.601E-28	2.603E-28	2.601E-28	42408
6491316	4.839E-29	4.843E-29	4.839E-29	44873
6847877	9.002E-30	9.009E-30	9.002E-30	47338
7204437	1.675E-30	1.676E-30	1.675E-30	49803
7205861	1.664E-30	1.665E-30	1.664E-30	49813
7207285	1.652E-30	1.654E-30	1.652E-30	49822
7208709	1.641E-30	1.642E-30	1.641E-30	49832
7210133	1.630E-30	1.631E-30	1.630E-30	49842
7211557	1.619E-30	1.621E-30	1.619E-30	49852
7212981	1.608E-30	1.610E-30	1.608E-30	49862
7214405	1.597E-30	1.599E-30	1.597E-30	49872
7215829	1.587E-30	1.588E-30	1.587E-30	49881
7217253	1.577E-30	1.576E-30	1.577E-30	49891
7218677	1.565E-30	1.564E-30	1.565E-30	49901
7220101	1.555E-30	1.549E-30	1.555E-30	49911
7221525	1.545E-30	1.529E-30	1.545E-30	49921
7222949	1.535E-30	1.501E-30	1.535E-30	49931
7224373	1.525E-30	1.460E-30	1.525E-30	49941
7225797	1.515E-30	1.399E-30	1.515E-30	49950
7227221	1.503E-30	1.314E-30	1.503E-30	49960
7228645	1.493E-30	1.201E-30	1.493E-30	49970
7230069	1.483E-30	1.061E-30	1.483E-30	49980
7231493	1.473E-30	8.992E-31	1.473E-30	49990
7232917	1.465E-30	7.273E-31	1.465E-30	50000
7234341	.000E+00	5.582E-31	.000E+00	50009
7235765	.000E+00	4.045E-31	.000E+00	50019
7237189	.000E+00	2.757E-31	.000E+00	50029
7238613	.000E+00	1.761E-31	.000E+00	50039
7240037	.000E+00	1.052E-31	.000E+00	50049
7241461	.000E+00	5.864E-32	.000E+00	50059
7242885	.000E+00	3.043E-32	.000E+00	50068
7244309	.000E+00	1.468E-32	.000E+00	50078
7245733	.000E+00	6.576E-33	.000E+00	50088
7247157	.000E+00	2.733E-33	.000E+00	50098
7248581	.000E+00	1.053E-33	.000E+00	50108
7250005	.000E+00	3.757E-34	.000E+00	50118
7251429	.000E+00	1.241E-34	.000E+00	50128

7252853	.000E+00	3.796E-35	.000E+00	50137
7254277	.000E+00	1.073E-35	.000E+00	50147
7255701	.000E+00	2.806E-36	.000E+00	50157
7257125	.000E+00	6.785E-37	.000E+00	50167
7258549	.000E+00	1.515E-37	.000E+00	50177
7259973	.000E+00	3.129E-38	.000E+00	50187
7261397	.000E+00	5.965E-39	.000E+00	50196

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: TH230 VIA PSEUDO U234 FROM U238

NUCLIDE	U238	TH230	
HALF LIFE, YR	4.47E+09	7.70E+04	.00E+00
DECAY NUMBER	2.24E-08	1.30E-03	.00E+00
DISTRIB COEF	1.43E+04	5.00E+04	.00E+00
YR 2000 CURIES	2.44E+02	.00E+00	.00E+00
PULSE G-ATOMS	3.05E+06	.00E+00	.00E+00
NUCL VEL,MI/YR	4.84E-06	1.38E-06	.00E+00
DISCH TIME,YR	2.07E+06	7.23E+06	.00E+00
DIM DISC TIME	1.43E+04	5.00E+04	.00E+00

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM2/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 2066738 YEARS
PEAK DISCHARGE RATE= 8.69E-04 CURIES PER YEAR AT 2067653 YEARS
BAND WIDTH= 5164179 YEARS WITH TAIL END AT 7232917 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
2048429	.000E+00	.000E+00	.000E+00	14160
2049344	.000E+00	6.67ME-38	.000E+00	14166
2050260	.000E+00	1.674E-34	.000E+00	14173
2051175	.000E+00	2.747E-31	.000E+00	14179
2052091	.000E+00	2.950E-28	.000E+00	14185
2053006	.000E+00	2.077E-25	.000E+00	14191
2053922	.000E+00	9.567E-23	.000E+00	14198
2054837	.000E+00	2.905E-20	.000E+00	14204
2055753	.000E+00	5.785E-18	.000E+00	14210
2056668	.000E+00	7.592E-16	.000E+00	14217
2057583	.000E+00	6.573E-14	.000E+00	14223
2058499	.000E+00	3.763E-12	.000E+00	14229
2059414	.000E+00	1.427E-10	.000E+00	14236
2060330	.000E+00	3.596E-09	.000E+00	14242
2061245	.000E+00	6.042E-08	.000E+00	14248
2062161	.000E+00	6.811E-07	.000E+00	14255
2063076	.000E+00	5.184E-06	.000E+00	14261
2063991	.000E+00	2.690E-05	.000E+00	14267
2064907	2.673E-04	9.661E-05	2.673E-04	14274
2065822	2.673E-04	2.456E-04	2.673E-04	14280
2066738	2.673E-04	4.575E-04	2.673E-04	14286
2067653	8.690E-04	6.575E-04	8.690E-04	14293
2068569	8.590E-04	7.809E-04	8.590E-04	14299
2069484	8.491E-04	8.279E-04	8.491E-04	14305
2070400	8.394E-04	8.343E-04	8.394E-04	14312
2071315	8.298E-04	8.278E-04	8.298E-04	14318
2072231	8.202E-04	8.187E-04	8.202E-04	14324
2073146	8.108E-04	8.093E-04	8.108E-04	14331
2074062	8.015E-04	8.000E-04	8.015E-04	14337
2074977	7.923E-04	7.908E-04	7.923E-04	14343
2075893	7.832E-04	7.818E-04	7.832E-04	14350
2076808	7.743E-04	7.728E-04	7.743E-04	14356
2077724	7.654E-04	7.639E-04	7.654E-04	14362
2078639	7.566E-04	7.552E-04	7.566E-04	14369
2079555	7.479E-04	7.465E-04	7.479E-04	14375
2080470	7.393E-04	7.379E-04	7.393E-04	14381
2081386	7.309E-04	7.295E-04	7.309E-04	14388
2082301	7.225E-04	7.211E-04	7.225E-04	14394
2083217	7.142E-04	7.128E-04	7.142E-04	14400
2084132	7.060E-04	7.047E-04	7.060E-04	14407
2085048	6.979E-04	6.966E-04	6.979E-04	14413
2341017	2.772E-05	2.767E-05	2.772E-05	16182
2596987	1.101E-06	1.099E-06	1.101E-06	17952
2852956	4.373E-08	4.365E-08	4.373E-08	19721
3108926	1.737E-09	1.734E-09	1.737E-09	21491
3364895	6.900E-11	6.887E-11	6.900E-11	23260
3620864	2.741E-12	2.736E-12	2.741E-12	25030
3876834	1.089E-13	1.087E-13	1.089E-13	26799
4132803	4.324E-15	4.316E-15	4.324E-15	28569
4388773	1.718E-16	1.714E-16	1.718E-16	30338
4644742	6.822E-18	6.810E-18	6.822E-18	32108
4900712	2.710E-19	2.705E-19	2.710E-19	33877
5156681	1.077E-20	1.074E-20	1.077E-20	35647
5412650	4.275E-22	4.268E-22	4.275E-22	37416
5668620	1.698E-23	1.695E-23	1.698E-23	39186
5924589	6.746E-25	6.733E-25	6.746E-25	40955
6180559	2.680E-26	2.674E-26	2.680E-26	42725
6436528	1.064E-27	1.062E-27	1.064E-27	44494
6692498	4.228E-29	4.220E-29	4.228E-29	46264
6948467	1.679E-30	1.676E-30	1.679E-30	48033
7204437	6.670E-32	6.657E-32	6.670E-32	49803
7205861	6.552E-32	6.539E-32	6.552E-32	49813
7207284	6.435E-32	6.423E-32	6.435E-32	49822

7208708	6.321E-32	6.308E-32	6.321E-32	49832
7210133	6.208E-32	6.196E-32	6.208E-32	49842
7211557	6.096E-32	6.086E-32	6.096E-32	49852
7212980	5.989E-32	5.978E-32	5.989E-32	49862
7214404	5.883E-32	5.871E-32	5.883E-32	49872
7215829	5.778E-32	5.765E-32	5.778E-32	49881
7217253	5.674E-32	5.660E-32	5.674E-32	49891
7218676	5.575E-32	5.553E-32	5.575E-32	49901
7220100	5.474E-32	5.440E-32	5.474E-32	49911
7221525	5.378E-32	5.314E-32	5.378E-32	49921
7222949	5.281E-32	5.164E-32	5.281E-32	49931
7224372	5.188E-32	4.973E-32	5.188E-32	49941
7225796	5.095E-32	4.724E-32	5.095E-32	49950
7227221	5.005E-32	4.401E-32	5.005E-32	49960
7228645	4.915E-32	3.993E-32	4.915E-32	49970
7230068	4.829E-32	3.505E-32	4.829E-32	49980
7231492	4.742E-32	2.956E-32	4.742E-32	49990
7232917	4.659E-32	2.380E-32	4.659E-32	50000
7234340	.000E+00	1.820E-32	.000E+00	50009
7235764	.000E+00	1.315E-32	.000E+00	50019
7237189	.000E+00	8.937E-33	.000E+00	50029
7238613	.000E+00	5.697E-33	.000E+00	50039
7240036	.000E+00	3.397E-33	.000E+00	50049
7241460	.000E+00	1.890E-33	.000E+00	50059
7242885	.000E+00	9.792E-34	.000E+00	50068
7244309	.000E+00	4.719E-34	.000E+00	50078
7245732	.000E+00	2.111E-34	.000E+00	50088
7247156	.000E+00	8.770E-35	.000E+00	50098
7248581	.000E+00	3.377E-35	.000E+00	50108
7250005	.000E+00	1.204E-35	.000E+00	50118
7251428	.000E+00	3.974E-36	.000E+00	50128
7252852	.000E+00	1.214E-36	.000E+00	50137
7254277	.000E+00	3.432E-37	.000E+00	50147
7255701	.000E+00	8.974E-38	.000E+00	50157
7257124	.000E+00	2.169E-38	.000E+00	50167
7258548	.000E+00	4.842E-39	.000E+00	50177
7259973	.000E+00	.000E+00	.000E+00	50187

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: TH230 VIA -PSEUDO U234 FROM U238

NUCLIDE	U238	Th230	
HALF LIFE, YR	2.44E+05	7.70E+04	.00E+00
DECAY NUMBER	4.11E-04	1.30E-03	.00E+00
DISTRIB COEF	1.43E+04	5.00E+04	.00E+00
YR 2000 CURIES	2.44E+02	.00E+00	.00E+00
PULSE G-ATOMS	1.66E+02	.00E+00	.00E+00

NUCL VEL,MI/YR 4.84E-06 1.38E-06 .00E+00
DISCH TIME,YR 2.07E+06 7.23E+06 .00E+00
DIM DISC TIME 1.43E+04 5.00E+04 .00E+00
LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 2066738 YEARS
PEAK DISCHARGE RATE= 2.45E-06 CURIES PER YEAR AT 2067653 YEARS
BAND WIDTH= 5166179 YEARS WITH TAIL END AT 7232917 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
2049344	.000E+00	.000E+00	.000E+00	14166
2050260	.000E+00	4.952E-37	.000E+00	14173
2051175	.000E+00	8.107E-34	.000E+00	14179
2052091	.000E+00	8.682E-31	.000E+00	14185
2053006	.000E+00	6.093E-28	.000E+00	14191
2053922	.000E+00	2.805E-25	.000E+00	14198
2054837	.000E+00	8.477E-23	.000E+00	14204
2055753	.000E+00	1.685E-20	.000E+00	14210
2056668	.000E+00	2.206E-18	.000E+00	14217
2057583	.000E+00	1.905E-16	.000E+00	14223
2058499	.000E+00	1.088E-14	.000E+00	14229
2059414	.000E+00	4.114E-13	.000E+00	14236
2060330	.000E+00	1.034E-11	.000E+00	14242
2061245	.000E+00	1.734E-10	.000E+00	14248
2062161	.000E+00	1.950E-09	.000E+00	14255
2063076	.000E+00	1.480E-08	.000E+00	14261
2063991	.000E+00	7.666E-08	.000E+00	14267
2064907	7.547E-07	2.747E-07	7.547E-07	14274
2065822	7.547E-07	6.971E-07	7.547E-07	14280
2066738	7.547E-07	1.297E-06	7.547E-07	14286
2067653	2.454E-06	1.862E-06	2.454E-06	14293
2068569	2.428E-06	2.211E-06	2.428E-06	14299
2069484	2.403E-06	2.345E-06	2.403E-06	14305
2070400	2.378E-06	2.365E-06	2.378E-06	14312
2071315	2.353E-06	2.348E-06	2.353E-06	14318
2072231	2.328E-06	2.325E-06	2.328E-06	14324
2073146	2.304E-06	2.301E-06	2.304E-06	14331
2074062	2.280E-06	2.277E-06	2.280E-06	14337
2074977	2.256E-06	2.253E-06	2.256E-06	14343
2075893	2.232E-06	2.229E-06	2.232E-06	14350
2076808	2.209E-06	2.206E-06	2.209E-06	14356
2077724	2.186E-06	2.183E-06	2.186E-06	14362
2078639	2.163E-06	2.160E-06	2.163E-06	14369

2079555	2.141E-06	2.138E-06	2.141E-06	14375	7244309	.000E+00	4.709E-34	.000E+00	50078
2080470	2.118E-06	2.115E-06	2.118E-06	14381	7245732	.000E+00	2.108E-34	.000E+00	50088
2081386	2.096E-06	2.093E-06	2.096E-06	14388	7247156	.000E+00	8.755E-35	.000E+00	50098
2082301	2.074E-06	2.072E-06	2.074E-06	14394	7248581	.000E+00	3.371E-35	.000E+00	50108
2083217	2.053E-06	2.050E-06	2.053E-06	14400	7250005	.000E+00	1.202E-35	.000E+00	50118
2084132	2.031E-06	2.028E-06	2.031E-06	14407	7251428	.000E+00	3.969E-36	.000E+00	50128
2085048	2.010E-06	2.007E-06	2.010E-06	14413	7252852	.000E+00	1.213E-36	.000E+00	50137
2341017	1.068E-07	1.066E-07	1.068E-07	16182	7254277	.000E+00	3.429E-37	.000E+00	50147
2596987	5.673E-09	5.666E-09	5.673E-09	17952	7255701	.000E+00	8.962E-38	.000E+00	50157
2852956	3.014E-10	3.010E-10	3.014E-10	19721	7257124	.000E+00	2.166E-38	.000E+00	50167
3108926	1.601E-11	1.599E-11	1.601E-11	21491	7258548	.000E+00	4.837E-39	.000E+00	50177
3364895	8.507E-13	8.497E-13	8.507E-13	23260	7259973	.000E+00	.000E+00	.000E+00	50187
3620864	4.520E-14	4.514E-14	4.520E-14	25030					
3876834	2.402E-15	2.398E-15	2.402E-15	26799					
4132803	1.276E-16	1.274E-16	1.276E-16	28569	MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM				
4388773	6.778E-18	6.770E-18	6.778E-18	30338	FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR				
4644742	3.601E-19	3.597E-19	3.601E-19	32108	POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY				
4900712	1.914E-20	1.911E-20	1.914E-20	33877					
5156681	1.017E-21	1.015E-21	1.017E-21	35647					
5412650	5.400E-23	5.394E-23	5.400E-23	37416	TIME OF LEACH INCIDENT: 100 YEARS				
5668620	2.869E-24	2.866E-24	2.869E-24	39186					
5924589	1.524E-25	1.522E-25	1.524E-25	40955	NUCLIDE: U234 FROM AM242M				
6180559	8.100E-27	8.088E-27	8.100E-27	42725					
6436528	4.303E-28	4.297E-28	4.303E-28	44494	NUCLIDE	AM242M	U234 F		
6692498	2.286E-29	2.283E-29	2.286E-29	46264	HALF LIFE, YR	1.52E+02	2.44E+05	.00E+00	
6948467	1.214E-30	1.213E-30	1.214E-30	48033	DECAY NUMBER	6.60E-01	4.11E-04	.00E+00	
7204437	6.451E-32	6.444E-32	6.451E-32	49803	DISTRIB COEF	1.00E+04	1.43E+04	.00E+00	
7205861	6.347E-32	6.340E-32	6.347E-32	49813	YR 2000 CURIES	7.45E+06	.00E+00	.00E+00	
7207284	6.246E-32	6.237E-32	6.246E-32	49822	PULSE G-ATOMS	2.01E+03	.00E+00	.00E+00	
7208708	6.145E-32	6.136E-32	6.145E-32	49832	NUCL VEL,MI/YR	6.91E-06	4.84E-06	.00E+00	
7210133	6.045E-32	6.037E-32	6.045E-32	49842	DISCH TIME,YR	1.45E+06	2.07E+06	.00E+00	
7211557	5.948E-32	5.939E-32	5.948E-32	49852	DIM DISC TIME	1.00E+04	1.43E+04	.00E+00	
7212980	5.851E-32	5.843E-32	5.851E-32	49862	LEACH RATE= .003000 FRACTION PER YEAR				
7214404	5.756E-32	5.748E-32	5.756E-32	49872	LEACH DURATION= 333 YEARS				
7215829	5.661E-32	5.654E-32	5.661E-32	49881	PATH LENGTH= 10.00 MILES				
7217253	5.570E-32	5.560E-32	5.570E-32	49891	DIMENSIONLESS DISTANCE= 1.00				
7218676	5.481E-32	5.463E-32	5.481E-32	49901	WATER VELOCITY= 1.00 FT/DAY				
7220100	5.393E-32	5.361E-32	5.393E-32	49911	WATER TRAVEL TIME= 145 YEARS				
7221525	5.305E-32	5.244E-32	5.305E-32	49921	AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN				
7222949	5.219E-32	5.103E-32	5.219E-32	49931	PECLET NUMBER= 4.26E+06				
7224372	5.133E-32	4.922E-32	5.133E-32	49941	NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION				
7225796	5.050E-32	4.681E-32	5.050E-32	49950	INITIAL BREAKTHROUGH AT 2059414 YEARS				
7227221	4.968E-32	4.366E-32	4.968E-32	49960	PEAK DISCHARGE RATE= 1.99E-02 CURIES PER YEAR AT 2066738 YEARS				
7228645	4.888E-32	3.966E-32	4.888E-32	49970	BAND WIDTH= 7324 YEARS WITH TAIL END AT 2066738 YEARS				
7230068	4.810E-32	3.484E-32	4.810E-32	49980	DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00				
7231492	4.732E-32	2.941E-32	4.732E-32	49990					
7232917	4.656E-32	2.370E-32	4.656E-32	50000	TIME,YR DISC RATE,CI/YR PULSE RATE BAND RATE DIM TIME				
7234340	.000E+00	1.813E-32	.000E+00	50009					
7235764	.000E+00	1.310E-32	.000E+00	50019					
7237189	.000E+00	8.909E-33	.000E+00	50029					
7238613	.000E+00	5.681E-33	.000E+00	50039	1446842	.000E+00	.000E+00	.000E+00	10001
7240036	.000E+00	3.388E-33	.000E+00	50049	1476921	.000E+00	.000E+00	.000E+00	10209
7241460	.000E+00	1.886E-33	.000E+00	50059	1507001	.000E+00	.000E+00	.000E+00	10417
7242885	.000E+00	9.773E-34	.000E+00	50068	1537080	.000E+00	.000E+00	.000E+00	10625

1567159	.000E+00	.000E+00	.000E+00	10833	2083217	.000E+00	.000E+00	.000E+00	14400
1597239	.000E+00	.000E+00	.000E+00	11041	2084132	.000E+00	.000E+00	.000E+00	14407
1627318	.000E+00	.000E+00	.000E+00	11249	2085048	.000E+00	.000E+00	.000E+00	14413
1657397	.000E+00	.000E+00	.000E+00	11457					
1687477	.000E+00	.000E+00	.000E+00	11665					
1717556	.000E+00	.000E+00	.000E+00	11873	MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM				
1747635	.000E+00	.000E+00	.000E+00	12081	FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR				
1777715	.000E+00	.000E+00	.000E+00	12288	POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY				
1807794	.000E+00	.000E+00	.000E+00	12496					
1837873	.000E+00	.000E+00	.000E+00	12704					
1867953	.000E+00	.000E+00	.000E+00	12912	TIME OF LEACH INCIDENT: 100 YEARS				
1898032	.000E+00	.000E+00	.000E+00	13120					
1928111	.000E+00	.000E+00	.000E+00	13328	NUCLIDE: PU239 FROM CM247				
1958191	.000E+00	.000E+00	.000E+00	13536					
1988270	.000E+00	.000E+00	.000E+00	13744	NUCLIDE	CM247	PU239		
2018350	.000E+00	.000E+00	.000E+00	13952	HALF LIFE, YR	1.54E+07	2.44E+04	.00E+00	
2048429	.000E+00	1.011E-38	.000E+00	14160	DECAY NUMBER	6.51E-06	4.11E-03	.00E+00	
2049344	.000E+00	2.958E-35	.000E+00	14166	DISTRIB COEF	3.33E+03	1.00E+04	.00E+00	
2050260	.000E+00	5.845E-32	.000E+00	14173	YR 2000 CURIES	1.29E-01	.00E+00	.00E+00	
2051175	.000E+00	7.735E-29	.000E+00	14179	PULSE G-ATOMS	5.55E+00	.00E+00	.00E+00	
2052091	.000E+00	6.816E-26	.000E+00	14185	NUCL VEL,MI/YR	2.07E-05	6.91E-06	.00E+00	
2053006	.000E+00	3.983E-23	.000E+00	14191	DISCH TIME,YR	4.82E+05	1.45E+06	.00E+00	
2053922	.000E+00	1.541E-20	.000E+00	14198	DIM DISC TIME	3.33E+03	1.00E+04	.00E+00	
2054837	.000E+00	3.939E-18	.000E+00	14204	LEACH RATE= .003000 FRACTION PER YEAR				
2055752	.000E+00	6.640E-16	.000E+00	14210	LEACH DURATION= 333 YEARS				
2056668	.000E+00	7.381E-14	.000E+00	14217	PATH LENGTH= 10.00 MILES				
2057583	7.839E-36	5.406E-12	7.839E-36	14223	DIMENSIONLESS DISTANCE= 1.00				
2058499	7.839E-36	2.607E-10	7.839E-36	14229	WATER VELOCITY= 1.00 FT/DAY				
2059414	7.839E-36	8.278E-09	7.839E-36	14236	WATER TRAVEL TIME= 145 YEARS				
2060330	1.321E-31	1.731E-07	1.321E-31	14242	AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN				
2061245	2.225E-27	2.383E-06	2.225E-27	14248	PECLET NUMBER= 4.26E+06				
2062160	3.749E-23	2.162E-05	3.749E-23	14255	NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION				
2063076	6.316E-19	1.291E-04	6.316E-19	14261	INITIAL BREAKTHROUGH AT 482443 YEARS				
2063991	1.064E-14	5.081E-04	1.064E-14	14267	PEAK DISCHARGE RATE= 1.78E-06 CURIES PER YEAR AT 482657 YEARS				
2064907	1.793E-10	.000E+00	1.793E-10	14274	BAND WIDTH= 963855 YEARS WITH TAIL END AT 1446298 YEARS				
2065822	3.021E-06	.000E+00	3.021E-06	14280	DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00				
2066738	1.987E-02	.000E+00	1.987E-02	14286					
2067653	.000E+00	.000E+00	.000E+00	14293	TIME,YR DISC RATE,CI/YR PULSE RATE BAND RATE DIM TIME				
2068569	.000E+00	.000E+00	.000E+00	14299					
2069484	.000E+00	.000E+00	.000E+00	14305					
2070400	.000E+00	.000E+00	.000E+00	14312					
2071315	.000E+00	.000E+00	.000E+00	14318	478328	.000E+00	1.927E-39	.000E+00	3306
2072231	.000E+00	.000E+00	.000E+00	14324	478534	.000E+00	3.185E-36	.000E+00	3307
2073146	.000E+00	.000E+00	.000E+00	14331	478739	.000E+00	3.557E-33	.000E+00	3309
2074062	.000E+00	.000E+00	.000E+00	14337	478945	.000E+00	2.678E-30	.000E+00	3310
2074977	.000E+00	.000E+00	.000E+00	14343	479151	.000E+00	1.363E-27	.000E+00	3312
2075893	.000E+00	.000E+00	.000E+00	14350	479357	.000E+00	4.692E-25	.000E+00	3313
2076808	.000E+00	.000E+00	.000E+00	14356	479563	.000E+00	1.094E-22	.000E+00	3314
2077724	.000E+00	.000E+00	.000E+00	14362	479768	.000E+00	1.729E-20	.000E+00	3316
2078639	.000E+00	.000E+00	.000E+00	14369	479974	.000E+00	1.854E-18	.000E+00	3317
2079555	.000E+00	.000E+00	.000E+00	14375	480180	.000E+00	1.351E-16	.000E+00	3319
2080470	.000E+00	.000E+00	.000E+00	14381	480386	.000E+00	6.709E-15	.000E+00	3320
2081386	.000E+00	.000E+00	.000E+00	14388	480591	.000E+00	2.274E-13	.000E+00	3322
2082301	.000E+00	.000E+00	.000E+00	14394	480797	.000E+00	5.272E-12	.000E+00	3323

481003	.000E+00	8.398E-11	.000E+00
481208	.000E+00	9.219E-10	.000E+00
481414	.000E+00	7.023E-09	.000E+00
481620	.000E+00	3.741E-08	.000E+00
481826	.000E+00	1.410E-07	.000E+00
482031	8.111E-07	3.833E-07	8.111E-07
482237	8.111E-07	7.712E-07	8.111E-07
482443	8.111E-07	1.196E-06	8.111E-07
482657	1.779E-06	1.523E-06	1.779E-06
482870	1.762E-06	1.678E-06	1.762E-06
483084	1.747E-06	1.719E-06	1.747E-06
483298	1.731E-06	1.716E-06	1.731E-06
483511	1.715E-06	1.703E-06	1.715E-06
483725	1.699E-06	1.686E-06	1.699E-06
483939	1.684E-06	1.672E-06	1.684E-06
484153	1.669E-06	1.657E-06	1.669E-06
484365	1.654E-06	1.642E-06	1.654E-06
484580	1.639E-06	1.627E-06	1.639E-06
484794	1.624E-06	1.612E-06	1.624E-06
485007	1.609E-06	1.598E-06	1.609E-06
485221	1.595E-06	1.583E-06	1.595E-06
485435	1.580E-06	1.569E-06	1.580E-06
485648	1.566E-06	1.555E-06	1.566E-06
485862	1.552E-06	1.541E-06	1.552E-06
486076	1.537E-06	1.527E-06	1.537E-06
486290	1.524E-06	1.513E-06	1.524E-06
486503	1.510E-06	1.499E-06	1.510E-06
486717	1.496E-06	1.486E-06	1.496E-06
534223	1.977E-07	1.963E-07	1.977E-07
581728	2.611E-08	2.593E-08	2.611E-08
629234	3.450E-09	3.426E-09	3.450E-09
676739	4.558E-10	4.527E-10	4.558E-10
724245	6.023E-11	5.981E-11	6.023E-11
771750	7.957E-12	7.902E-12	7.957E-12
819256	1.051E-12	1.044E-12	1.051E-12
866761	1.389E-13	1.379E-13	1.389E-13
914267	1.835E-14	1.822E-14	1.835E-14
961772	2.425E-15	2.408E-15	2.425E-15
1009278	3.203E-16	3.181E-16	3.203E-16
1056784	4.232E-17	4.203E-17	4.232E-17
1104289	5.592E-18	5.553E-18	5.592E-18
1151795	7.388E-19	7.336E-19	7.388E-19
1199300	9.760E-20	9.693E-20	9.760E-20
1246806	1.290E-20	1.281E-20	1.290E-20
1294311	1.704E-21	1.692E-21	1.704E-21
1341817	2.251E-22	2.235E-22	2.251E-22
1389322	2.974E-23	2.953E-23	2.974E-23
1436828	3.929E-24	3.902E-24	3.929E-24
1437325	3.847E-24	3.820E-24	3.847E-24
1437825	3.766E-24	3.740E-24	3.766E-24
1438323	3.687E-24	3.661E-24	3.687E-24
1438822	3.609E-24	3.584E-24	3.609E-24
1439320	3.533E-24	3.509E-24	3.533E-24
1439819	3.459E-24	3.435E-24	3.459E-24

3324	1440317	3.386E-24	3.363E-24	3.386E-24	9956
3326	1440815	3.315E-24	3.292E-24	3.315E-24	9959
3327	1441314	3.246E-24	3.223E-24	3.246E-24	9963
3329	1441812	3.177E-24	3.155E-24	3.177E-24	9966
3330	1442311	3.111E-24	3.089E-24	3.111E-24	9970
3332	1442809	3.045E-24	3.024E-24	3.045E-24	9973
3333	1443308	2.981E-24	2.960E-24	2.981E-24	9977
3334	1443806	2.919E-24	2.893E-24	2.919E-24	9980
3336	1444304	2.857E-24	2.815E-24	2.857E-24	9984
3337	1444803	2.797E-24	2.699E-24	2.797E-24	9987
3339	1445301	2.739E-24	2.500E-24	2.739E-24	9991
3340	1445800	2.681E-24	2.171E-24	2.681E-24	9994
3342	1446298	2.625E-24	1.703E-24	2.625E-24	9997
3343	1446797	.000E+00	1.166E-24	.000E+00	10001
3345	1447295	.000E+00	6.760E-25	.000E+00	10004
3346	1447794	.000E+00	3.247E-25	.000E+00	10008
3348	1448292	.000E+00	1.271E-25	.000E+00	10011
3349	1448790	.000E+00	4.007E-26	.000E+00	10015
3351	1449289	.000E+00	1.010E-26	.000E+00	10018
3352	1449787	.000E+00	2.022E-27	.000E+00	10022
3354	1450286	.000E+00	3.202E-28	.000E+00	10025
3355	1450784	.000E+00	4.003E-29	.000E+00	10028
3357	1451283	.000E+00	3.938E-30	.000E+00	10032
3358	1451781	.000E+00	3.046E-31	.000E+00	10035
3359	1452279	.000E+00	1.849E-32	.000E+00	10039
3361	1452778	.000E+00	8.811E-34	.000E+00	10042
3362	1453276	.000E+00	3.289E-35	.000E+00	10046
3364	1453775	.000E+00	9.622E-37	.000E+00	10049
3692	1454273	.000E+00	2.204E-38	.000E+00	10053
4021	1454772	.000E+00	.000E+00	.000E+00	10056
4349					
4678					

5006 MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
5334 FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
5663 POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY
5991
6320
6648 TIME OF LEACH INCIDENT: 100 YEARS
6976
7305 NUCLIDE: AM243 FROM CM247
7633

7962 NUCLIDE	CM247	AM243	
8290 HALF LIFE, YR	1.54E+07	7.37E+03	.00E+00
8618 DECAY NUMBER	6.51E-06	1.36E-02	.00E+00
8947 DISTRIB COEF	3.33E+03	1.00E+04	.00E+00
9275 YR 2000 CURIES	1.29E-01	.00E+00	.00E+00
9604 PULSE G-ATOMS	5.55E+00	.00E+00	.00E+00
9932 NUCL VEL,MI/YR	2.07E-05	6.91E-06	.00E+00
9935 DISCH TIME,YR	4.82E+05	1.45E+06	.00E+00
9939 DIM DISC TIME	3.33E+03	1.00E+04	.00E+00

9942 LEACH RATE= .003000 FRACTION PER YEAR
9946 LEACH DURATION= 333 YEARS
9949 PATH LENGTH= 10.00 MILES
9953 DIMENSIONLESS DISTANCE= 1.00

WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 482443 YEARS
PEAK DISCHARGE RATE= 5.77E-06 CURIES PER YEAR AT 482657 YEARS
BAND WIDTH= 532343 YEARS WITH TAIL END AT 1014786 YEARS
DISPERSION PEAK/ND-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
476328	.000E+00	6.360E-39	.000E+00	3306
478534	.000E+00	1.052E-35	.000E+00	3307
478739	.000E+00	1.174E-32	.000E+00	3309
478945	.000E+00	8.839E-30	.000E+00	3310
479151	.000E+00	4.498E-27	.000E+00	3312
479357	.000E+00	1.548E-24	.000E+00	3313
479563	.000E+00	3.606E-22	.000E+00	3314
479768	.000E+00	5.695E-20	.000E+00	3316
479974	.000E+00	6.110E-18	.000E+00	3317
480180	.000E+00	4.450E-16	.000E+00	3319
480386	.000E+00	2.209E-14	.000E+00	3320
480591	.000E+00	7.482E-13	.000E+00	3322
480797	.000E+00	1.734E-11	.000E+00	3323
481003	.000E+00	2.759E-10	.000E+00	3324
481208	.000E+00	3.025E-09	.000E+00	3326
481414	.000E+00	2.301E-08	.000E+00	3327
481620	.000E+00	1.223E-07	.000E+00	3329
481826	.000E+00	4.600E-07	.000E+00	3330
482031	2.664E-06	1.245E-06	2.664E-06	3332
482237	2.664E-06	2.492E-06	2.664E-06	3333
482443	2.664E-06	3.836E-06	2.664E-06	3334
482657	5.773E-06	4.825E-06	5.773E-06	3336
482870	5.601E-06	5.234E-06	5.601E-06	3337
483084	5.435E-06	5.264E-06	5.435E-06	3339
483298	5.274E-06	5.149E-06	5.274E-06	3340
483511	5.117E-06	5.002E-06	5.117E-06	3342
483725	4.965E-06	4.855E-06	4.965E-06	3343
483939	4.818E-06	4.710E-06	4.818E-06	3345
484153	4.675E-06	4.571E-06	4.675E-06	3346
484366	4.536E-06	4.435E-06	4.536E-06	3348
484580	4.401E-06	4.303E-06	4.401E-06	3349
484794	4.270E-06	4.175E-06	4.270E-06	3351
485007	4.144E-06	4.051E-06	4.144E-06	3352
485221	4.021E-06	3.931E-06	4.021E-06	3354
485435	3.901E-06	3.814E-06	3.901E-06	3355
485649	3.785E-06	3.701E-06	3.785E-06	3357
485862	3.673E-06	3.591E-06	3.673E-06	3358
486076	3.564E-06	3.485E-06	3.564E-06	3359
486290	3.458E-06	3.381E-06	3.458E-06	3361
486503	3.355E-06	3.281E-06	3.355E-06	3362
486717	3.256E-06	3.183E-06	3.256E-06	3364
534723	3.732E-09	3.648E-09	3.732E-09	3696
582729	4.277E-12	4.181E-12	4.277E-12	4028
630736	4.901E-15	4.792E-15	4.901E-15	4360
678742	5.618E-18	5.493E-18	5.618E-18	4691
726748	6.438E-21	6.295E-21	6.438E-21	5023
774754	7.379E-24	7.215E-24	7.379E-24	5355
822761	8.457E-27	8.269E-27	8.457E-27	5687
870767	9.692E-30	9.477E-30	9.692E-30	6019
918773	1.111E-32	1.086E-32	1.111E-32	6351
966779	1.273E-35	1.245E-35	1.273E-35	6683
1014786	1.459E-38	1.427E-38	1.459E-38	7014
1062792	.000E+00	.000E+00	.000E+00	7346

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: U235 FROM PU239

NUCLIDE	PU239	U235 F	
HALF LIFE, YR	2.44E+04	7.04E+08	.00E+00
DECAY NUMBER	4.11E-03	1.42E-07	.00E+00
DISTRIB COEF	1.00E+04	1.43E+04	.00E+00
YR 2000 CURIES	9.69E+05	.00E+00	.00E+00
PULSE G-ATOMS	6.72E+04	.00E+00	.00E+00
NUCL VEL,MI/YR	6.91E-06	4.84E-06	.00E+00
DISCH TIME,YR	1.45E+06	2.07E+06	.00E+00
DIM DISC TIME	1.00E+04	1.43E+04	.00E+00

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 1446797 YEARS
PEAK DISCHARGE RATE= 2.11E-03 CURIES PER YEAR AT 2065856 YEARS
BAND WIDTH= 619941 YEARS WITH TAIL END AT 2066737 YEARS
DISPERSION PEAK/ND-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
1437825	.000E+00	.000E+00	.000E+00	9939
1438323	.000E+00	6.044E-38	.000E+00	9942
1438822	.000E+00	3.982E-36	.000E+00	9946

1439320	.000E+00	2.039E-34	.000E+00	9949	2019489	9.764E-05	9.964E-05	9.764E-05	13960
1439819	.000E+00	8.106E-33	.000E+00	9953	2049106	6.959E-04	7.101E-04	6.959E-04	14165
1440317	.000E+00	2.507E-31	.000E+00	9956	2049988	7.378E-04	7.529E-04	7.378E-04	14171
1440816	.000E+00	6.039E-30	.000E+00	9959	2050870	7.822E-04	7.982E-04	7.822E-04	14177
1441314	.000E+00	1.133E-28	.000E+00	9963	2051751	8.293E-04	8.462E-04	8.293E-04	14183
1441812	.000E+00	1.660E-27	.000E+00	9966	2052633	8.792E-04	8.972E-04	8.792E-04	14189
1442311	.000E+00	1.901E-26	.000E+00	9970	2053514	9.322E-04	9.512E-04	9.322E-04	14195
1442809	.000E+00	1.705E-25	.000E+00	9973	2054396	9.883E-04	1.008E-03	9.883E-04	14201
1443308	.000E+00	1.200E-24	.000E+00	9977	2055277	1.048E-03	1.069E-03	1.048E-03	14207
1443806	.000E+00	6.659E-24	.000E+00	9980	2056159	1.111E-03	1.133E-03	1.111E-03	14213
1444305	.000E+00	2.921E-23	.000E+00	9984	2057040	1.178E-03	1.202E-03	1.178E-03	14219
1444803	.000E+00	1.019E-22	.000E+00	9987	2057922	1.249E-03	1.274E-03	1.249E-03	14225
1445301	.000E+00	2.850E-22	.000E+00	9991	2058803	1.324E-03	1.351E-03	1.324E-03	14232
1445800	1.157E-21	6.455E-22	1.157E-21	9994	2059685	1.403E-03	1.432E-03	1.403E-03	14238
1446298	1.157E-21	1.202E-21	1.157E-21	9997	2060567	1.488E-03	1.518E-03	1.488E-03	14244
1446797	1.157E-21	1.879E-21	1.157E-21	10001	2061448	1.577E-03	1.609E-03	1.577E-03	14250
1447295	3.250E-21	2.534E-21	3.250E-21	10004	2062330	1.672E-03	1.704E-03	1.672E-03	14256
1447794	3.360E-21	3.048E-21	3.360E-21	10008	2063211	1.773E-03	1.791E-03	1.773E-03	14262
1448292	3.473E-21	3.393E-21	3.473E-21	10011	2064093	1.880E-03	1.833E-03	1.880E-03	14268
1448791	3.589E-21	3.615E-21	3.589E-21	10015	2064974	1.993E-03	1.749E-03	1.993E-03	14274
1449289	3.710E-21	3.774E-21	3.710E-21	10018	2065856	2.113E-03	1.458E-03	2.113E-03	14280
1449787	3.835E-21	3.910E-21	3.835E-21	10022	2066737	1.847E-03	9.929E-04	1.847E-03	14286
1450286	3.964E-21	4.044E-21	3.964E-21	10025	2067653	.000E+00	5.064E-04	.000E+00	14293
1450784	4.097E-21	4.180E-21	4.097E-21	10028	2068568	.000E+00	1.871E-04	.000E+00	14299
1451283	4.234E-21	4.321E-21	4.234E-21	10032	2069484	.000E+00	4.861E-05	.000E+00	14305
1451781	4.377E-21	4.466E-21	4.377E-21	10035	2070399	.000E+00	8.721E-06	.000E+00	14312
1452280	4.524E-21	4.616E-21	4.524E-21	10039	2071315	.000E+00	1.068E-06	.000E+00	14318
1452778	4.676E-21	4.771E-21	4.676E-21	10042	2072230	.000E+00	8.854E-08	.000E+00	14324
1453276	4.833E-21	4.931E-21	4.833E-21	10046	2073146	.000E+00	4.946E-09	.000E+00	14331
1453775	4.995E-21	5.097E-21	4.995E-21	10049	2074061	.000E+00	1.856E-10	.000E+00	14337
1454273	5.163E-21	5.268E-21	5.163E-21	10053	2074977	.000E+00	4.662E-12	.000E+00	14343
1454772	5.337E-21	5.445E-21	5.337E-21	10056	2075892	.000E+00	7.833E-14	.000E+00	14350
1455270	5.516E-21	5.628E-21	5.516E-21	10059	2076808	.000E+00	8.793E-16	.000E+00	14356
1455769	5.701E-21	5.818E-21	5.701E-21	10063	2077723	.000E+00	6.589E-18	.000E+00	14362
1456267	5.893E-21	6.013E-21	5.893E-21	10066	2078639	.000E+00	3.292E-20	.000E+00	14369
1456765	6.091E-21	6.215E-21	6.091E-21	10070	2079554	.000E+00	1.097E-22	.000E+00	14375
1486383	4.341E-20	4.429E-20	4.341E-20	10274	2080470	.000E+00	2.440E-25	.000E+00	14381
1516000	3.094E-19	3.157E-19	3.094E-19	10479	2081385	.000E+00	3.614E-28	.000E+00	14388
1545617	2.205E-18	2.250E-18	2.205E-18	10684	2082301	.000E+00	3.572E-31	.000E+00	14394
1575234	1.571E-17	1.603E-17	1.571E-17	10889	2083216	.000E+00	2.357E-34	.000E+00	14400
1604851	1.120E-16	1.143E-16	1.120E-16	11093	2084132	.000E+00	1.035E-37	.000E+00	14407
1634468	7.981E-16	8.144E-16	7.981E-16	11298	2085047	.000E+00	.000E+00	.000E+00	14413
1664085	5.688E-15	5.804E-15	5.688E-15	11503					
1693702	4.054E-14	4.136E-14	4.054E-14	11708					
1723319	2.889E-13	2.948E-13	2.889E-13	11912	MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM				
1752936	2.059E-12	2.101E-12	2.059E-12	12117	FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR				
1782553	1.467E-11	1.497E-11	1.467E-11	12322	POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY				
1812170	1.046E-10	1.067E-10	1.046E-10	12527					
1841787	7.452E-10	7.604E-10	7.452E-10	12731					
1871404	5.311E-09	5.420E-09	5.311E-09	12936	TIME OF LEACH INCIDENT: 100 YEARS				
1901021	3.785E-08	3.862E-08	3.785E-08	13141					
1930639	2.698E-07	2.753E-07	2.698E-07	13346	NUCLIDE: PA231 FROM U235				
1960255	1.923E-06	1.962E-06	1.923E-06	13550					
1989872	1.370E-05	1.398E-05	1.370E-05	13755	NUCLIDE U235 PA231				

HALF LIFE, YR	7.04E+08	3.25E+04	.00E+00
DECAY NUMBER	1.42E-07	3.09E-03	.00E+00
DISTRIB COEF	1.43E+04	1.67E+04	.00E+00
YR 2000 CURIES	2.26E+01	.00E+00	.00E+00
PULSE G-ATOMS	4.47E+04	.00E+00	.00E+00
NUCL VEL,MI/YR	4.84E-06	4.15E-06	.00E+00
DISCH TIME,YR	2.07E+06	2.41E+06	.00E+00
DIM DISC TIME	1.43E+04	1.67E+04	.00E+00

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CMI2/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 2066738 YEARS
PEAK DISCHARGE RATE= 2.55E-03 CURIES PER YEAR AT 2067653 YEARS
BAND WIDTH= 344412 YEARS WITH TAIL END AT 2411150 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
2049107	.000E+00	2.660E-38	.000E+00	14165
2049989	.000E+00	5.596E-35	.000E+00	14171
2050870	.000E+00	7.928E-32	.000E+00	14177
2051752	.000E+00	7.589E-29	.000E+00	14183
2052633	.000E+00	4.895E-26	.000E+00	14189
2053515	.000E+00	2.137E-23	.000E+00	14195
2054396	.000E+00	6.317E-21	.000E+00	14201
2055278	.000E+00	1.264E-18	.000E+00	14207
2056159	.000E+00	1.715E-16	.000E+00	14213
2057041	.000E+00	1.580E-14	.000E+00	14219
2057922	.000E+00	9.905E-13	.000E+00	14225
2058804	.000E+00	4.228E-11	.000E+00	14232
2059686	.000E+00	1.234E-09	.000E+00	14238
2060567	.000E+00	2.464E-08	.000E+00	14244
2061449	.000E+00	3.379E-07	.000E+00	14250
2062330	.000E+00	3.199E-06	.000E+00	14256
2063212	.000E+00	2.102E-05	.000E+00	14262
2064093	.000E+00	9.675E-05	.000E+00	14268
2064975	8.779E-04	3.155E-04	8.779E-04	14274
2065856	8.779E-04	7.427E-04	8.779E-04	14280
2066738	8.779E-04	1.298E-03	8.779E-04	14286
2067653	2.554E-03	1.767E-03	2.554E-03	14293
2068569	2.227E-03	1.945E-03	2.227E-03	14299
2069484	1.943E-03	1.868E-03	1.943E-03	14305
2070400	1.694E-03	1.678E-03	1.694E-03	14312
2071315	1.478E-03	1.473E-03	1.478E-03	14318
2072231	1.289E-03	1.286E-03	1.289E-03	14324
2073146	1.125E-03	1.122E-03	1.125E-03	14331
2074062	9.809E-04	9.784E-04	9.809E-04	14337
2074977	8.556E-04	8.534E-04	8.556E-04	14343
2075893	7.463E-04	7.444E-04	7.463E-04	14350
2076808	6.509E-04	6.493E-04	6.509E-04	14356
2077724	5.678E-04	5.663E-04	5.678E-04	14362
2078639	4.953E-04	4.940E-04	4.953E-04	14369
2079555	4.320E-04	4.309E-04	4.320E-04	14375
2080470	3.768E-04	3.758E-04	3.768E-04	14381
2081386	3.287E-04	3.278E-04	3.287E-04	14388
2082301	2.867E-04	2.860E-04	2.867E-04	14394
2083217	2.501E-04	2.494E-04	2.501E-04	14400
2084132	2.181E-04	2.176E-04	2.181E-04	14407
2085048	1.903E-04	1.898E-04	1.903E-04	14413
2100641	1.855E-05	1.850E-05	1.855E-05	14521
2116234	1.809E-06	1.804E-06	1.809E-06	14629
2131827	1.764E-07	1.759E-07	1.764E-07	14736
2147420	1.720E-08	1.715E-08	1.720E-08	14844
2163013	1.677E-09	1.672E-09	1.677E-09	14952
2178607	1.635E-10	1.631E-10	1.635E-10	15060
2194200	1.594E-11	1.590E-11	1.594E-11	15168
2209793	1.554E-12	1.550E-12	1.554E-12	15275
2225386	1.516E-13	1.512E-13	1.516E-13	15383
2240979	1.478E-14	1.474E-14	1.478E-14	15491
2256572	1.441E-15	1.437E-15	1.441E-15	15599
2272165	1.405E-16	1.401E-16	1.405E-16	15707
2287758	1.370E-17	1.366E-17	1.370E-17	15814
2303351	1.336E-18	1.332E-18	1.336E-18	15922
2318944	1.302E-19	1.299E-19	1.302E-19	16030
2334537	1.270E-20	1.267E-20	1.270E-20	16138
2350131	1.238E-21	1.235E-21	1.238E-21	16245
2365724	1.207E-22	1.204E-22	1.207E-22	16353
2381317	1.177E-23	1.174E-23	1.177E-23	16461
2396910	1.148E-24	1.145E-24	1.148E-24	16569
2397622	1.032E-24	1.029E-24	1.032E-24	16574
2398334	9.280E-25	9.256E-25	9.280E-25	16579
2399046	8.345E-25	8.323E-25	8.345E-25	16584
2399758	7.503E-25	7.484E-25	7.503E-25	16589
2400470	6.747E-25	6.729E-25	6.747E-25	16593
2401182	6.067E-25	6.050E-25	6.067E-25	16598
2401894	5.454E-25	5.440E-25	5.454E-25	16603
2402606	4.905E-25	4.892E-25	4.905E-25	16608
2403318	4.410E-25	4.399E-25	4.410E-25	16613
2404030	3.965E-25	3.955E-25	3.965E-25	16618
2404742	3.565E-25	3.556E-25	3.565E-25	16623
2405454	3.206E-25	3.197E-25	3.206E-25	16628
2406166	2.883E-25	2.873E-25	2.883E-25	16633
2406878	2.592E-25	2.577E-25	2.592E-25	16638
2407590	2.331E-25	2.300E-25	2.331E-25	16643
2410438	1.523E-25	1.096E-25	1.523E-25	16662
2411150	3.275E-24	7.680E-26	3.275E-24	16667
2411862	.000E+00	4.814E-26	.000E+00	16672
2412574	.000E+00	2.655E-26	.000E+00	16677
2413286	.000E+00	1.272E-26	.000E+00	16682
2413998	.000E+00	5.239E-27	.000E+00	16687

2414710	.000E+00	1.843E-27	.000E+00	16692
2415422	.000E+00	5.503E-28	.000E+00	16697
2416134	.000E+00	1.390E-28	.000E+00	16702
2416846	.000E+00	2.961E-29	.000E+00	16707
2417558	.000E+00	5.306E-30	.000E+00	16712
2418270	.000E+00	7.988E-31	.000E+00	16717
2418982	.000E+00	1.009E-31	.000E+00	16721
2419694	.000E+00	1.068E-32	.000E+00	16726
2420406	.000E+00	9.464E-34	.000E+00	16731
2421118	.000E+00	7.018E-35	.000E+00	16736
2421830	.000E+00	4.353E-36	.000E+00	16741
2422542	.000E+00	2.257E-37	.000E+00	16746
2423254	.000E+00	9.792E-39	.000E+00	16751
2423966	.000E+00	.000E+00	.000E+00	16756

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: U235 FROM CM247

NUCLIDE	CM247	U235 F	
HALF LIFE, YR	1.54E+07	7.04E+08	.00E+00
DECAY NUMBER	6.51E-06	1.42E-07	.00E+00
DISTRIB COEF	3.33E+03	1.43E+04	.00E+00
YR 2000 CURIES	1.29E-01	.00E+00	.00E+00
PULSE G-ATOMS	5.55E+00	.00E+00	.00E+00
NUCL VEL,MI/YR	2.07E-05	4.84E-06	.00E+00
DISCH TIME,YR	4.82E+05	2.07E+06	.00E+00
DIM DISC TIME	3.33E+03	1.43E+04	.00E+00

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 482443 YEARS
PEAK DISCHARGE RATE= 3.78E-11 CURIES PER YEAR AT 482657 YEARS
BAND WIDTH= 1583413 YEARS WITH TAIL END AT 2065856 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
478534	.000E+00	.000E+00	.000E+00	3307
478739	.000E+00	7.511E-38	.000E+00	3309
478945	.000E+00	5.656E-35	.000E+00	3310
479151	.000E+00	2.879E-32	.000E+00	3312
479357	.000E+00	9.910E-30	.000E+00	3313
479563	.000E+00	2.310E-27	.000E+00	3314
479768	.000E+00	3.650E-25	.000E+00	3316
479974	.000E+00	3.918E-23	.000E+00	3317
480180	.000E+00	2.855E-21	.000E+00	3319
480386	.000E+00	1.418E-19	.000E+00	3320
480591	.000E+00	4.808E-18	.000E+00	3322
480797	.000E+00	1.115E-16	.000E+00	3323
481003	.000E+00	1.777E-15	.000E+00	3324
481208	.000E+00	1.951E-14	.000E+00	3326
481414	.000E+00	1.487E-13	.000E+00	3327
481620	.000E+00	7.930E-13	.000E+00	3329
481826	.000E+00	2.993E-12	.000E+00	3330
482031	1.714E-11	8.148E-12	1.714E-11	3332
482237	1.714E-11	1.643E-11	1.714E-11	3333
482443	1.714E-11	2.558E-11	1.714E-11	3334
482657	3.783E-11	3.273E-11	3.783E-11	3336
482870	3.780E-11	3.631E-11	3.780E-11	3337
483084	3.783E-11	3.751E-11	3.783E-11	3339
483298	3.781E-11	3.778E-11	3.781E-11	3340
483511	3.781E-11	3.782E-11	3.781E-11	3342
483725	3.781E-11	3.783E-11	3.781E-11	3343
483939	3.781E-11	3.783E-11	3.781E-11	3345
484153	3.781E-11	3.783E-11	3.781E-11	3346
484366	3.781E-11	3.783E-11	3.781E-11	3348
484580	3.781E-11	3.783E-11	3.781E-11	3349
484794	3.783E-11	3.783E-11	3.783E-11	3351
485007	3.781E-11	3.783E-11	3.781E-11	3352
485221	3.783E-11	3.783E-11	3.783E-11	3354
485435	3.781E-11	3.783E-11	3.781E-11	3355
485648	3.783E-11	3.783E-11	3.783E-11	3357
485862	3.781E-11	3.783E-11	3.781E-11	3358
486076	3.781E-11	3.783E-11	3.781E-11	3359
486290	3.781E-11	3.783E-11	3.781E-11	3361
486503	3.781E-11	3.783E-11	3.781E-11	3362
486717	3.783E-11	3.783E-11	3.783E-11	3364
564836	3.784E-11	3.786E-11	3.784E-11	3904
642956	3.790E-11	3.790E-11	3.790E-11	4444
721076	3.793E-11	3.794E-11	3.793E-11	4984
799195	3.798E-11	3.797E-11	3.798E-11	5524
877314	3.799E-11	3.801E-11	3.799E-11	6064
955434	3.804E-11	3.805E-11	3.804E-11	6604
1033553	3.807E-11	3.809E-11	3.807E-11	7144
1111673	3.811E-11	3.812E-11	3.811E-11	7684
1189792	3.814E-11	3.816E-11	3.814E-11	8224
1267912	3.817E-11	3.820E-11	3.817E-11	8764
1346031	3.823E-11	3.823E-11	3.823E-11	9304
1424151	3.825E-11	3.827E-11	3.825E-11	9844
1502270	3.830E-11	3.831E-11	3.830E-11	10384
1580390	3.834E-11	3.834E-11	3.834E-11	10924
1658509	3.839E-11	3.838E-11	3.839E-11	11464
1736629	3.840E-11	3.842E-11	3.840E-11	12004

1814748	3.845E-11	3.846E-11	3.845E-11	12544
1892868	3.848E-11	3.849E-11	3.848E-11	13084
1970987	3.852E-11	3.853E-11	3.852E-11	13625
2049107	3.855E-11	3.857E-11	3.855E-11	14165
2049989	3.855E-11	3.857E-11	3.855E-11	14171
2050870	3.857E-11	3.857E-11	3.857E-11	14177
2051752	3.857E-11	3.857E-11	3.857E-11	14183
2052633	3.855E-11	3.857E-11	3.855E-11	14189
2053515	3.855E-11	3.857E-11	3.855E-11	14195
2054396	3.857E-11	3.857E-11	3.857E-11	14201
2055278	3.857E-11	3.857E-11	3.857E-11	14207
2057041	3.855E-11	3.857E-11	3.855E-11	14219
2057922	3.855E-11	3.857E-11	3.855E-11	14225
2058804	3.856E-11	3.857E-11	3.858E-11	14232
2060567	3.855E-11	3.857E-11	3.855E-11	14244
2061449	3.855E-11	3.857E-11	3.855E-11	14250
2062330	3.857E-11	3.853E-11	3.857E-11	14256
2063212	3.858E-11	3.828E-11	3.858E-11	14262
2064093	3.857E-11	3.718E-11	3.857E-11	14268
2064975	3.855E-11	3.394E-11	3.855E-11	14274
2065856	3.855E-11	2.735E-11	3.855E-11	14280
2066738	.000E+00	1.818E-11	.000E+00	14286
2067653	.000E+00	9.119E-12	.000E+00	14293
2068569	.000E+00	3.329E-12	.000E+00	14299
2069464	.000E+00	8.576E-13	.000E+00	14305
2070400	.000E+00	1.530E-13	.000E+00	14312
2071315	.000E+00	1.865E-14	.000E+00	14318
2072231	.000E+00	1.540E-15	.000E+00	14324
2073146	.000E+00	8.583E-17	.000E+00	14331
2074062	.000E+00	3.211E-18	.000E+00	14337
2074977	.000E+00	8.055E-20	.000E+00	14343
2075893	.000E+00	1.351E-21	.000E+00	14350
2076808	.000E+00	1.515E-23	.000E+00	14356
2077724	.000E+00	1.134E-25	.000E+00	14362
2078639	.000E+00	5.661E-28	.000E+00	14369
2079555	.000E+00	1.885E-30	.000E+00	14375
2080470	.000E+00	4.186E-33	.000E+00	14381
2081386	.000E+00	6.200E-36	.000E+00	14388
2082301	.000E+00	6.123E-39	.000E+00	14394
2083217	.000E+00	.000E+00	.000E+00	14400

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: PU239 FROM CM243

NUCLIDE	CM243	PU239	
HALF LIFE, YR	2.80E+01	2.44E+04	.00E+00
DECAY NUMBER	3.58E+00	4.11E-03	.00E+00

DISTRIB COEF	3.33E+03	1.00E+04	.00E+00
YR 2000 CURIES	4.03E+06	.00E+00	.00E+00
PULSE G-ATOMS	3.62E+01	.00E+00	.00E+00
NUCL VEL,MI/YR	2.07E-05	6.91E-06	.00E+00
DISCH TIME,YR	4.82E+05	1.45E+06	.00E+00
DIM DISC TIME	3.33E+03	1.00E+04	.00E+00

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 1443308 YEARS
PEAK DISCHARGE RATE= 2.15E-18 CURIES PER YEAR AT 1446797 YEARS
BAND WIDTH= 3489 YEARS WITH TAIL END AT 1446797 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
482458	.000E+00	.000E+00	.000E+00	3334
530177	.000E+00	.000E+00	.000E+00	3664
577895	.000E+00	.000E+00	.000E+00	3994
625613	.000E+00	.000E+00	.000E+00	4324
673332	.000E+00	.000E+00	.000E+00	4654
721051	.000E+00	.000E+00	.000E+00	4984
768769	.000E+00	.000E+00	.000E+00	5314
816488	.000E+00	.000E+00	.000E+00	5644
864206	.000E+00	.000E+00	.000E+00	5973
911924	.000E+00	.000E+00	.000E+00	6303
959643	.000E+00	.000E+00	.000E+00	6633
1007361	.000E+00	.000E+00	.000E+00	6963
1055080	.000E+00	.000E+00	.000E+00	7293
1102798	.000E+00	.000E+00	.000E+00	7623
1150517	.000E+00	.000E+00	.000E+00	7953
1198235	.000E+00	.000E+00	.000E+00	8283
1245954	.000E+00	.000E+00	.000E+00	8612
1293672	.000E+00	.000E+00	.000E+00	8942
1341391	.000E+00	.000E+00	.000E+00	9272
1389109	.000E+00	.000E+00	.000E+00	9602
1436828	.000E+00	.000E+00	.000E+00	9932
1437326	.000E+00	6.197E-38	.000E+00	9935
1437825	.000E+00	5.572E-36	.000E+00	9939
1438323	.000E+00	3.938E-34	.000E+00	9942
1438822	.000E+00	2.183E-32	.000E+00	9946
1439320	.000E+00	9.462E-31	.000E+00	9949
1439819	.000E+00	3.202E-29	.000E+00	9953
1440317	.000E+00	8.463E-28	.000E+00	9956
1440816	.000E+00	1.742E-26	.000E+00	9959
1441314	.000E+00	2.791E-25	.000E+00	9963

1441812	.000E+00	3.487E-24	.000E+00	9966
1442311	6.781E-37	3.386E-23	6.781E-37	9970
1442809	6.781E-37	2.558E-22	6.781E-37	9973
1443308	6.781E-37	1.505E-21	6.781E-37	9977
1443806	3.174E-34	6.880E-21	3.174E-34	9980
1444305	1.484E-31	2.445E-20	1.484E-31	9984
1444803	6.947E-29	6.771E-20	6.947E-29	9987
1445301	3.250E-26	1.456E-19	3.250E-26	9991
1445800	1.521E-23	2.437E-19	1.521E-23	9994
1446298	7.115E-21	3.172E-19	7.115E-21	9997
1446797	2.152E-18	3.209E-19	2.152E-18	10001
1447295	.000E+00	2.528E-19	.000E+00	10004
1447794	.000E+00	.000E+00	.000E+00	10008
1448292	.000E+00	.000E+00	.000E+00	10011
1448791	.000E+00	.000E+00	.000E+00	10015
1449289	.000E+00	.000E+00	.000E+00	10018
1449787	.000E+00	.000E+00	.000E+00	10022
1450286	.000E+00	.000E+00	.000E+00	10025
1450784	.000E+00	.000E+00	.000E+00	10028
1451283	.000E+00	.000E+00	.000E+00	10032
1451781	.000E+00	.000E+00	.000E+00	10035
1452280	.000E+00	.000E+00	.000E+00	10039
1452778	.000E+00	.000E+00	.000E+00	10042
1453276	.000E+00	.000E+00	.000E+00	10046
1453775	.000E+00	.000E+00	.000E+00	10049
1454273	.000E+00	.000E+00	.000E+00	10053
1454772	.000E+00	.000E+00	.000E+00	10056
1455270	.000E+00	.000E+00	.000E+00	10059
1455769	.000E+00	.000E+00	.000E+00	10063
1456267	.000E+00	.000E+00	.000E+00	10066
1456765	.000E+00	.000E+00	.000E+00	10070

I.3 Three-Member Chain Migration Results

I.3 Three-Member Chain Migration Results

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: U236 VIA PU240 FROM CM244

NUCLIDE	CM244	PU240	U236 V
HALF LIFE, YR	1.79E+01	6.54E+03	2.34E+07
DECAY NUMBER	5.60E+00	1.53E-02	4.28E-06
DISTRIB COEF	3.33E+03	1.00E+04	1.43E+04
YR 2000 CURIES	4.71E+08	.00E+00	.00E+00
PULSE G-ATOMS	5.10E+02	.00E+00	.00E+00
NUCL VEL,MI/YR	2.07E-05	6.91E-06	4.84E-06
DISCH TIME,YR	4.82E+05	1.45E+06	2.07E+06
DIM DISC TIME	3.33E+03	1.00E+04	1.43E+04

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHRU OF AT 1747635 YEARS
PEAK DISCHARGE RATE= 1.17E-04 CURIES PER YEAR AT 2065822 YEARS
BAND WIDTH= 318187 YEARS WITH TAIL END AT 2065822 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
1717556	.000E+00	.000E+00	.000E+00	11873
1747635	8.067E-39	1.114E-37	8.067E-39	12080
1777715	1.368E-35	1.889E-34	1.368E-35	12288
1807794	2.319E-32	3.203E-31	2.319E-32	12496
1837873	3.931E-29	5.430E-28	3.931E-29	12704
1867953	6.665E-26	9.205E-25	6.665E-26	12912
1898032	1.130E-22	1.561E-21	1.130E-22	13120
1928111	1.916E-19	2.646E-18	1.916E-19	13328
1958191	3.248E-16	4.486E-15	3.248E-16	13536
1988270	5.506E-13	7.605E-12	5.506E-13	13744
2018349	9.335E-10	1.289E-08	9.335E-10	13952
2053065	4.907E-06	6.777E-05	4.907E-06	14191
2053921	6.153E-06	8.498E-05	6.153E-06	14198
2054837	7.715E-06	1.066E-04	7.715E-06	14204
2055752	9.675E-06	1.336E-04	9.675E-06	14210
2056668	1.213E-05	1.676E-04	1.213E-05	14217
2057583	1.521E-05	2.101E-04	1.521E-05	14223
2058499	1.908E-05	2.635E-04	1.908E-05	14229
2059414	2.392E-05	3.304E-04	2.392E-05	14236
2060329	2.999E-05	4.142E-04	2.999E-05	14242
2061245	3.761E-05	5.193E-04	3.761E-05	14248
2062160	4.716E-05	6.498E-04	4.716E-05	14255
2063076	5.914E-05	8.044E-04	5.914E-05	14261
2063991	7.416E-05	9.583E-04	7.416E-05	14267
2064907	9.299E-05	1.038E-03	9.299E-05	14274
2065822	1.166E-04	9.486E-04	1.166E-04	14280
2068568	.000E+00	1.374E-04	.000E+00	14299
2069484	.000E+00	3.641E-05	.000E+00	14305
2070399	.000E+00	6.629E-06	.000E+00	14312
2071315	.000E+00	8.201E-07	.000E+00	14318
2072230	.000E+00	6.857E-08	.000E+00	14324
2073146	.000E+00	3.857E-09	.000E+00	14331
2074061	.000E+00	1.454E-10	.000E+00	14337
2074977	.000E+00	3.670E-12	.000E+00	14343
2075892	.000E+00	6.186E-14	.000E+00	14350
2076808	.000E+00	6.964E-16	.000E+00	14356
2077723	.000E+00	5.235E-18	.000E+00	14362
2078639	.000E+00	2.623E-20	.000E+00	14369
2079554	.000E+00	8.762E-23	.000E+00	14375
2080470	.000E+00	1.951E-25	.000E+00	14381
2081385	.000E+00	2.896E-28	.000E+00	14388
2082301	.000E+00	2.863E-31	.000E+00	14394
2083216	.000E+00	1.889E-34	.000E+00	14400
2084132	.000E+00	8.309E-38	.000E+00	14407
2085047	.000E+00	.000E+00	.000E+00	14413

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: TH232 VIA U236 FROM PU240

NUCLIDE	PU240	U236 F	TH232
HALF LIFE, YR	6.54E+03	2.34E+07	1.40E+10
DECAY NUMBER	1.53E-02	4.28E-06	7.16E-09
DISTRIB COEF	1.00E+04	1.43E+04	5.00E+04
YR 2000 CURIES	1.93E+06	.00E+00	.00E+00
PULSE G-ATOMS	5.72E+04	.00E+00	.00E+00
NUCL VEL,MI/YR	6.91E-06	4.84E-06	1.38E-06
DISCH TIME,YR	1.45E+06	2.07E+06	7.23E+06
DIM DISC TIME	1.00E+04	1.43E+04	5.00E+04

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY

WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CMI2/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 1777715 YEARS
PEAK DISCHARGE RATE= 2.33E-08 CURIES PER YEAR AT 2085048 YEARS
BAND WIDTH= 5455201 YEARS WITH TAIL END AT 7232915 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
1747635	.000E+00	.000E+00	.000E+00	12081
1777715	1.474E-39	1.661E-39	1.474E-39	12288
1807794	2.499E-36	2.816E-36	2.499E-36	12496
1837873	4.237E-33	4.775E-33	4.237E-33	12704
1867953	7.183E-30	8.095E-30	7.183E-30	12912
1898032	1.218E-26	1.372E-26	1.218E-26	13120
1928111	2.065E-23	2.327E-23	2.065E-23	13328
1958191	3.500E-20	3.945E-20	3.500E-20	13536
1988270	5.934E-17	6.688E-17	5.934E-17	13744
2018350	1.006E-13	1.134E-13	1.006E-13	13952
2048429	1.706E-10	1.922E-10	1.706E-10	14160
2049344	2.139E-10	2.411E-10	2.139E-10	14166
2050260	2.682E-10	3.023E-10	2.682E-10	14173
2051175	3.363E-10	3.790E-10	3.363E-10	14179
2052091	4.217E-10	4.753E-10	4.217E-10	14185
2053006	5.288E-10	5.960E-10	5.288E-10	14191
2053922	6.631E-10	7.473E-10	6.631E-10	14198
2054837	8.315E-10	9.371E-10	8.315E-10	14204
2055752	1.043E-09	1.175E-09	1.043E-09	14210
2056668	1.307E-09	1.474E-09	1.307E-09	14217
2057583	1.639E-09	1.848E-09	1.639E-09	14223
2058499	2.056E-09	2.317E-09	2.056E-09	14229
2059414	2.578E-09	2.905E-09	2.578E-09	14236
2060330	3.232E-09	3.643E-09	3.232E-09	14242
2061245	4.053E-09	4.568E-09	4.053E-09	14248
2062160	5.083E-09	5.727E-09	5.083E-09	14255
2063076	6.373E-09	7.181E-09	6.373E-09	14261
2063991	7.991E-09	8.925E-09	7.991E-09	14267
2064907	1.002E-08	1.094E-08	1.002E-08	14274
2065822	1.257E-08	1.295E-08	1.257E-08	14280
2066738	1.601E-08	1.459E-08	1.601E-08	14286
2067653	1.601E-08	1.562E-08	1.601E-08	14293
2068569	1.601E-08	1.609E-08	1.601E-08	14299
2069484	1.601E-08	1.625E-08	1.601E-08	14305
2070400	1.601E-08	1.628E-08	1.601E-08	14312
2071315	1.601E-08	1.629E-08	1.601E-08	14318
2072231	1.602E-08	1.629E-08	1.602E-08	14324
2073146	1.603E-08	1.629E-08	1.603E-08	14331
2074062	1.604E-08	1.629E-08	1.604E-08	14337
2074977	1.606E-08	1.629E-08	1.606E-08	14343
2075893	1.609E-08	1.629E-08	1.609E-08	14350
2076808	1.613E-08	1.629E-08	1.613E-08	14356
2077724	1.621E-08	1.629E-08	1.621E-08	14362
2078639	1.631E-08	1.629E-08	1.631E-08	14369
2079555	1.649E-08	1.629E-08	1.649E-08	14375
2080470	1.677E-08	1.629E-08	1.677E-08	14381
2081386	1.722E-08	1.629E-08	1.722E-08	14388
2082301	1.794E-08	1.629E-08	1.794E-08	14394
2083217	1.898E-08	1.629E-08	1.898E-08	14400
2084132	2.061E-08	1.629E-08	2.061E-08	14407
2085048	2.329E-08	1.629E-08	2.329E-08	14413
2593664	1.611E-08	1.639E-08	1.611E-08	17929
2847972	1.615E-08	1.644E-08	1.615E-08	19687
3102280	1.620E-08	1.649E-08	1.620E-08	21445
3356588	1.625E-08	1.654E-08	1.625E-08	23203
3610896	1.630E-08	1.659E-08	1.630E-08	24961
3865204	1.635E-08	1.664E-08	1.635E-08	26719
4119512	1.640E-08	1.669E-08	1.640E-08	28477
4373820	1.645E-08	1.674E-08	1.645E-08	30235
4628128	1.650E-08	1.679E-08	1.650E-08	31993
4882437	1.655E-08	1.684E-08	1.655E-08	33751
5136745	1.659E-08	1.689E-08	1.659E-08	35509
5391053	1.664E-08	1.694E-08	1.664E-08	37267
5645361	1.669E-08	1.699E-08	1.669E-08	39025
5899669	1.674E-08	1.704E-08	1.674E-08	40783
6153977	1.679E-08	1.709E-08	1.679E-08	42541
6408285	1.684E-08	1.714E-08	1.684E-08	44299
6662593	1.690E-08	1.720E-08	1.690E-08	46057
6916901	1.694E-08	1.724E-08	1.694E-08	47815
7171209	1.370E-08	1.390E-08	1.370E-08	49573
7174294	1.342E-08	1.361E-08	1.342E-08	49594
7177380	1.312E-08	1.330E-08	1.312E-08	49616
7180465	1.279E-08	1.296E-08	1.279E-08	49637
7183550	1.243E-08	1.259E-08	1.243E-08	49658
7186636	1.204E-08	1.219E-08	1.204E-08	49680
7189721	1.162E-08	1.175E-08	1.162E-08	49701
7192806	1.116E-08	1.128E-08	1.116E-08	49722
7195892	1.066E-08	1.077E-08	1.066E-08	49744
7198977	1.012E-08	1.021E-08	1.012E-08	49765
7202062	9.538E-09	9.608E-09	9.538E-09	49786
7205148	8.902E-09	8.953E-09	8.902E-09	49808
7208233	8.213E-09	8.242E-09	8.213E-09	49829
7211318	7.465E-09	7.470E-09	7.465E-09	49850
7214403	6.653E-09	6.633E-09	6.653E-09	49872
7217489	5.772E-09	5.725E-09	5.772E-09	49893
7220574	4.815E-09	4.743E-09	4.815E-09	49914
7223659	3.777E-09	3.696E-09	3.777E-09	49936
7226745	2.651E-09	2.626E-09	2.651E-09	49957
7229830	1.429E-09	1.634E-09	1.429E-09	49978
7232915	1.024E-10	8.493E-10	1.024E-10	50000
7236001	.000E+00	3.532E-10	.000E+00	50021
7239086	.000E+00	1.133E-10	.000E+00	50042
7242171	.000E+00	2.702E-11	.000E+00	50064
7245257	.000E+00	4.718E-12	.000E+00	50085
7248342	.000E+00	5.796E-13	.000E+00	50106

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITIORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: U236 VIA PU244 FROM CM248

NUCLIDE	CM248	PU244	U236 V
HALF LIFE, YR	3.50E+05	8.30E+07	2.34E+07
DECAY NUMBER	2.86E-04	1.21E-06	4.28E-06
DISTRIB COEF	3.33E+03	1.00E+04	1.43E+04
YR 2000 CURIES	5.01E-01	.00E+00	.00E+00
PULSE G-ATOMS	4.90E-01	.00E+00	.00E+00
NUCL VEL,MI/YR	2.07E-05	6.91E-06	4.84E-06
DISCH TIME,YR	4.82E+05	1.45E+06	2.07E+06
DIM DISC TIME	3.33E+03	1.00E+04	1.43E+04

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM2/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 482443 YEARS
PEAK DISCHARGE RATE= 4.44E-11 CURIES PER YEAR AT 1446627 YEARS
BAND WIDTH= 583379 YEARS WITH TAIL END AT 2065822 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
482031	1.200E-14	1.438E-15	1.200E-14	3332
482237	1.200E-14	1.274E-15	1.200E-14	3333
482443	1.200E-14	3.862E-15	1.200E-14	3334
482870	8.100E-14	1.249E-14	8.100E-14	3337
483084	7.394E-14	1.732E-14	7.394E-14	3339
483298	6.953E-14	2.190E-14	6.953E-14	3340
483511	6.248E-14	2.657E-14	6.248E-14	3342
483725	5.542E-14	3.122E-14	5.542E-14	3343
484153	4.396E-14	4.055E-14	4.396E-14	3346
484366	3.602E-14	4.521E-14	3.602E-14	3348
484580	3.072E-14	4.987E-14	3.072E-14	3349
484794	2.465E-14	5.454E-14	2.465E-14	3351
485007	1.749E-14	5.921E-14	1.749E-14	3352
485221	1.220E-14	6.388E-14	1.220E-14	3354
485435	6.028E-15	6.855E-14	6.028E-15	3355
485717	2.629E-13	9.661E-14	2.629E-13	3364
534151	1.202E-12	1.174E-12	1.202E-12	3692
581586	2.397E-12	2.332E-12	2.397E-12	4020
629020	3.553E-12	3.575E-12	3.553E-12	4348
676454	4.963E-12	4.907E-12	4.963E-12	4676
723889	6.331E-12	6.335E-12	6.331E-12	5003
771323	7.952E-12	7.862E-12	7.952E-12	5331
818757	9.232E-12	9.495E-12	9.232E-12	5659
866192	1.136E-11	1.124E-11	1.136E-11	5987
913626	1.314E-11	1.310E-11	1.314E-11	6315
961060	1.517E-11	1.509E-11	1.517E-11	6643
1008495	1.714E-11	1.721E-11	1.714E-11	6971
1055929	1.937E-11	1.947E-11	1.937E-11	7299
1103363	2.184E-11	2.187E-11	2.184E-11	7627
1150798	2.425E-11	2.443E-11	2.425E-11	7955
1198232	2.721E-11	2.715E-11	2.721E-11	8283
1245666	3.010E-11	3.004E-11	3.010E-11	8610
1293101	3.324E-11	3.311E-11	3.324E-11	8938
1340535	3.661E-11	3.637E-11	3.661E-11	9266
1387970	3.992E-11	3.984E-11	3.992E-11	9594
1435404	4.346E-11	4.351E-11	4.346E-11	9922
1437113	4.366E-11	4.365E-11	4.366E-11	9934
1437682	4.393E-11	4.369E-11	4.393E-11	9938
1438252	4.361E-11	4.374E-11	4.361E-11	9942
1439961	4.382E-11	4.388E-11	4.382E-11	9954
1441670	4.373E-11	4.401E-11	4.373E-11	9965
1442240	4.400E-11	4.406E-11	4.400E-11	9969
1443948	4.391E-11	4.420E-11	4.391E-11	9981
1445657	4.412E-11	4.432E-11	4.412E-11	9993
1446227	4.438E-11	4.435E-11	4.438E-11	9997
1446797	4.437E-11	4.436E-11	4.437E-11	10001
1447390	4.437E-11	4.435E-11	4.437E-11	10005
1447983	4.433E-11	4.433E-11	4.433E-11	10009
1448577	4.430E-11	4.430E-11	4.430E-11	10013
1449170	4.426E-11	4.426E-11	4.426E-11	10017
1449764	4.422E-11	4.423E-11	4.422E-11	10021
1450357	4.419E-11	4.419E-11	4.419E-11	10025
1450950	4.415E-11	4.415E-11	4.415E-11	10030
1451544	4.411E-11	4.412E-11	4.411E-11	10034
1452137	4.408E-11	4.408E-11	4.408E-11	10038
1452731	4.404E-11	4.404E-11	4.404E-11	10042
1453324	4.400E-11	4.401E-11	4.400E-11	10046
1453917	4.397E-11	4.397E-11	4.397E-11	10050
1454511	4.393E-11	4.393E-11	4.393E-11	10054
1455104	4.389E-11	4.390E-11	4.389E-11	10058
1455698	4.385E-11	4.386E-11	4.385E-11	10062
1456291	4.382E-11	4.382E-11	4.382E-11	10066
1456884	4.378E-11	4.379E-11	4.378E-11	10071
1457478	4.375E-11	4.375E-11	4.375E-11	10075
1458071	4.371E-11	4.371E-11	4.371E-11	10079
1458664	4.367E-11	4.367E-11	4.367E-11	10083
1489153	4.182E-11	4.183E-11	4.182E-11	10287
1517641	3.996E-11	3.996E-11	3.996E-11	10491
1547129	3.806E-11	3.806E-11	3.806E-11	10694
1576617	3.614E-11	3.614E-11	3.614E-11	10898

1606105	3.419E-11	3.419E-11	3.419E-11	11102
1635594	3.222E-11	3.222E-11	3.222E-11	11306
1665082	3.022E-11	3.022E-11	3.022E-11	11510
1694576	2.819E-11	2.819E-11	2.819E-11	11714
1724059	2.613E-11	2.613E-11	2.613E-11	11918
1753546	2.405E-11	2.405E-11	2.405E-11	12121
1783035	2.194E-11	2.193E-11	2.194E-11	12325
1812523	1.979E-11	1.979E-11	1.979E-11	12529
1842011	1.762E-11	1.761E-11	1.762E-11	12733
1871499	1.541E-11	1.541E-11	1.541E-11	12937
1900987	1.318E-11	1.317E-11	1.318E-11	13141
1930475	1.091E-11	1.090E-11	1.091E-11	13344
1959964	8.612E-12	8.600E-12	8.612E-12	13548
1989452	6.278E-12	6.267E-12	6.278E-12	13752
2018940	3.913E-12	3.900E-12	3.913E-12	13956
2048428	1.512E-12	1.499E-12	1.512E-12	14160
2049344	1.439E-12	1.424E-12	1.439E-12	14166
2050259	1.364E-12	1.349E-12	1.364E-12	14173
2051175	1.291E-12	1.274E-12	1.291E-12	14179
2052090	1.214E-12	1.199E-12	1.214E-12	14185
2053005	1.138E-12	1.124E-12	1.138E-12	14191
2053921	1.062E-12	1.049E-12	1.062E-12	14198
2054836	9.879E-13	9.732E-13	9.879E-13	14204
2055752	9.103E-13	8.979E-13	9.103E-13	14210
2056667	8.362E-13	8.226E-13	8.362E-13	14217
2057583	7.621E-13	7.472E-13	7.621E-13	14223
2058498	6.880E-13	6.718E-13	6.880E-13	14229
2059413	6.086E-13	5.964E-13	6.086E-13	14236
2060329	5.363E-13	5.209E-13	5.363E-13	14242
2061244	4.604E-13	4.454E-13	4.604E-13	14248
2062160	3.846E-13	3.699E-13	3.846E-13	14255
2063075	3.087E-13	2.944E-13	3.087E-13	14261
2063991	2.346E-13	2.204E-13	2.346E-13	14267
2064906	1.570E-13	1.502E-13	1.570E-13	14274
2065822	8.291E-14	8.582E-14	8.291E-14	14280
2067652	.000E+00	1.775E-14	.000E+00	14293
2068568	.000E+00	4.106E-15	.000E+00	14299
2069483	.000E+00	7.760E-16	.000E+00	14305

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: U233 VIA NP237 FROM PM245

NUCLIDE	PM245	[illegible]	U233 +
HALF LIFE, YR	8.50E+03	2.14E+06	1.59E+05
DECAY NUMBER	1.18E-02	3.23E-05	4.35E-04
DISTRIB COEF	5.33E+03	1.51E+02	1.24E+04
YR 2000 CURIES	1.39E+05	.00E+00	.00E+00

PULSE G-ATOMS 3.25E+03 .00E+00 .00E+00
NUCL VEL,MI/YR 2.07E-05 6.91E-04 4.84E-06
DISCH TIME,YR 4.82E+05 1.45E+04 2.07E+06
DIM DISC TIME 3.33E+03 1.00E+02 1.43E+04
LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 14572 YEARS
PEAK DISCHARGE RATE= 1.39E-05 CURIES PER YEAR AT 61413 YEARS
BAND WIDTH= 2051284 YEARS WITH TAIL END AT 2065856 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
14495	.000E+00	1.321E-22	.000E+00	100
14503	.000E+00	1.030E-19	.000E+00	100
14512	.000E+00	3.127E-17	.000E+00	100
14520	.000E+00	4.181E-15	.000E+00	100
14529	.000E+00	2.585E-13	.000E+00	100
14538	.000E+00	7.695E-12	.000E+00	100
14546	.000E+00	1.147E-10	.000E+00	100
14555	8.67EE-10	8.991E-10	8.676E-10	100
14563	8.676E-10	4.126E-09	8.676E-10	100
14572	8.676E-10	1.095E-08	8.676E-10	100
14581	1.953E-09	2.126E-08	1.953E-09	100
14589	3.032E-08	3.301E-08	3.032E-08	100
14598	4.108E-08	4.505E-08	4.108E-08	100
14606	5.146E-08	5.712E-08	5.146E-08	100
14615	6.635E-08	6.918E-08	6.635E-08	100
14655	9.934E-08	1.257E-07	9.934E-08	101
14696	1.125E-07	1.821E-07	1.125E-07	101
14714	1.935E-07	2.102E-07	1.935E-07	101
14736	2.200E-07	2.382E-07	2.200E-07	101
14797	3.263E-07	3.220E-07	3.263E-07	102
14817	3.512E-07	3.499E-07	3.512E-07	102
14837	3.792E-07	3.777E-07	3.792E-07	102
14857	4.111E-07	4.054E-07	4.111E-07	102
14878	4.291E-07	4.331E-07	4.291E-07	102
14898	4.379E-07	4.607E-07	4.379E-07	102
14918	4.382E-07	4.883E-07	4.382E-07	102
14938	5.076E-07	5.159E-07	5.076E-07	103
14958	5.769E-07	5.434E-07	5.769E-07	103
14978	6.905E-07	5.708E-07	6.906E-07	103
14998	7.600E-07	5.982E-07	7.600E-07	103
15018	8.732E-07	6.256E-07	8.732E-07	103
38216	1.530E-05	1.351E-05	1.530E-05	263

61413	1.385E-05	1.403E-05	1.385E-05	424	485228	2.184E-06	2.213E-06	2.184E-06	3354
84610	1.270E-05	1.293E-05	1.276E-05	584	485403	2.183E-06	2.211E-06	2.183E-06	3355
107807	1.156E-05	1.171E-05	1.156E-05	745	485577	2.181E-06	2.209E-06	2.181E-06	3356
131004	1.044E-05	1.057E-05	1.044E-05	905	485751	2.179E-06	2.208E-06	2.179E-06	3357
154202	9.422E-06	9.544E-06	9.422E-06	1065	485925	2.178E-06	2.206E-06	2.178E-06	3358
177399	8.506E-06	8.614E-06	8.505E-06	1226	564084	1.542E-06	1.562E-06	1.542E-06	3899
200596	7.677E-06	7.776E-06	7.677E-06	1386	642243	1.092E-06	1.106E-06	1.092E-06	4439
223793	6.929E-06	7.019E-06	6.929E-06	1545	720402	7.733E-07	7.833E-07	7.733E-07	4979
246990	6.255E-06	6.335E-06	6.255E-06	1707	798561	5.476E-07	5.547E-07	5.476E-07	5520
270187	5.646E-06	5.719E-06	5.646E-06	1867	876720	3.878E-07	3.928E-07	3.878E-07	6060
293384	5.096E-06	5.162E-06	5.096E-06	2027	954879	2.746E-07	2.781E-07	2.746E-07	6600
316581	4.600E-06	4.659E-06	4.600E-06	2188	1033039	1.944E-07	1.970E-07	1.944E-07	7141
339778	4.152E-06	4.206E-06	4.152E-06	2348	1111198	1.377E-07	1.395E-07	1.377E-07	7681
362975	3.748E-06	3.796E-06	3.748E-06	2509	1189357	9.751E-08	9.877E-08	9.751E-08	8221
386173	3.383E-06	3.427E-06	3.383E-06	2669	1267516	6.905E-08	6.994E-08	6.905E-08	8761
409370	3.054E-06	3.093E-06	3.054E-06	2829	1345675	4.890E-08	4.953E-08	4.890E-08	9302
432567	2.756E-06	2.792E-06	2.756E-06	2990	1423834	3.462E-08	3.507E-08	3.462E-08	9842
455764	2.488E-06	2.520E-06	2.488E-06	3150	1501993	2.452E-08	2.484E-08	2.452E-08	10382
478961	2.246E-06	2.275E-06	2.246E-06	3310	1580152	1.736E-08	1.759E-08	1.736E-08	10923
479135	2.244E-06	2.273E-06	2.244E-06	3312	1658311	1.229E-08	1.245E-08	1.229E-08	11463
479309	2.242E-06	2.271E-06	2.242E-06	3313	1736470	8.703E-09	8.815E-09	8.703E-09	12003
479483	2.241E-06	2.269E-06	2.241E-06	3314	1814629	6.149E-09	6.228E-09	6.149E-09	12544
479657	2.239E-06	2.268E-06	2.239E-06	3315	1892789	4.293E-09	4.348E-09	4.293E-09	13084
479831	2.237E-06	2.266E-06	2.237E-06	3316	1970948	2.767E-09	2.801E-09	2.767E-09	13624
480006	2.235E-06	2.264E-06	2.235E-06	3318	2049107	7.452E-10	7.482E-10	7.452E-10	14165
480180	2.234E-06	2.263E-06	2.234E-06	3319	2049988	7.121E-10	7.147E-10	7.121E-10	14171
480354	2.232E-06	2.261E-06	2.232E-06	3320	2050870	6.787E-10	6.807E-10	6.787E-10	14177
480528	2.230E-06	2.259E-06	2.230E-06	3321	2051751	6.449E-10	6.464E-10	6.449E-10	14183
480702	2.229E-06	2.257E-06	2.229E-06	3322	2052633	6.107E-10	6.116E-10	6.107E-10	14189
480875	2.227E-06	2.256E-06	2.227E-06	3324	2053514	5.761E-10	5.764E-10	5.761E-10	14195
481050	2.225E-06	2.254E-06	2.225E-06	3325	2054396	5.411E-10	5.409E-10	5.411E-10	14201
481224	2.223E-06	2.252E-06	2.223E-06	3326	2055278	5.057E-10	5.049E-10	5.057E-10	14207
481398	2.222E-06	2.250E-06	2.222E-06	3327	2056159	4.698E-10	4.684E-10	4.698E-10	14213
481572	2.220E-06	2.249E-06	2.220E-06	3328	2057041	4.335E-10	4.315E-10	4.335E-10	14219
481747	2.218E-06	2.247E-06	2.218E-06	3330	2057922	3.968E-10	3.942E-10	3.968E-10	14225
481921	2.217E-06	2.245E-06	2.217E-06	3331	2058804	3.596E-10	3.564E-10	3.596E-10	14232
482095	2.215E-06	2.243E-06	2.215E-06	3332	2059685	3.219E-10	3.181E-10	3.219E-10	14238
482269	2.213E-06	2.242E-06	2.213E-06	3333	2060567	2.838E-10	2.793E-10	2.838E-10	14244
482443	2.211E-06	2.240E-06	2.211E-06	3334	2061448	2.452E-10	2.401E-10	2.452E-10	14250
482617	2.210E-06	2.238E-06	2.210E-06	3336	2062330	2.061E-10	2.004E-10	2.061E-10	14256
482791	2.208E-06	2.237E-06	2.208E-06	3337	2063212	1.666E-10	1.603E-10	1.666E-10	14262
482965	2.206E-06	2.235E-06	2.206E-06	3338	2064093	1.265E-10	1.204E-10	1.265E-10	14268
483139	2.205E-06	2.233E-06	2.205E-06	3339	2064975	8.630E-11	8.225E-11	8.585E-11	14274
483313	2.203E-06	2.231E-06	2.203E-06	3340	2065856	4.474E-11	4.905E-11	4.474E-11	14280
483488	2.201E-06	2.230E-06	2.201E-06	3342	2067619	.000E+00	9.672E-12	.000E+00	14293
483662	2.200E-06	2.228E-06	2.200E-06	3343	2068501	.000E+00	2.945E-12	.000E+00	14299
483836	2.198E-06	2.226E-06	2.198E-06	3344	2069382	.000E+00	6.713E-13	.000E+00	14305
484010	2.196E-06	2.225E-06	2.196E-06	3345	2070264	.000E+00	1.113E-13	.000E+00	14311
484184	2.195E-06	2.223E-06	2.195E-06	3346	2071145	.000E+00	1.278E-14	.000E+00	14317
484359	2.193E-06	2.221E-06	2.193E-06	3348	2072027	.000E+00	1.050E-15	.000E+00	14323
484533	2.191E-06	2.219E-06	2.191E-06	3349					
484706	2.189E-06	2.218E-06	2.189E-06	3350					
484880	2.188E-06	2.216E-06	2.188E-06	3351	MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM				
485054	2.186E-06	2.214E-06	2.186E-06	3352	FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR				

POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: TH229 VIA U233 FROM NP237

NUCLIDE	NP237	U233 F	TH229
HALF LIFE, YR	2.14E+06	1.58E+05	7.34E+03
DECAY NUMBER	4.69E-05	6.35E-04	1.37E-02
DISTRIB COEF	1.00E+02	1.43E+04	5.00E+04
YR 2000 CURIES	8.07E+04	.00E+00	.00E+00
PULSE G-ATOMS	4.99E+05	.00E+00	.00E+00
NUCL VEL,MI/YR	6.91E-04	4.84E-06	1.38E-06
DISCH TIME,YR	1.45E+04	2.07E+06	7.23E+06
DIM DISC TIME	1.00E+02	1.43E+04	5.00E+04

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 14635 YEARS
PEAK DISCHARGE RATE= 4.91E-04 CURIES PER YEAR AT 116723 YEARS
BAND WIDTH= 2599247 YEARS WITH TAIL END AT 2599247 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
14520	.000E+00	9.203E-14	.000E+00	100
14529	.000E+00	8.757E-12	.000E+00	100
14538	.000E+00	3.161E-10	.000E+00	100
14546	.000E+00	5.214E-09	.000E+00	100
14555	.000E+00	4.316E-08	.000E+00	100
14563	.000E+00	2.024E-07	.000E+00	100
14615	8.646E-08	3.421E-06	8.646E-08	100
14635	8.646E-08	4.815E-06	8.646E-08	100
14655	1.729E-07	6.206E-06	1.729E-07	101
14676	1.285E-06	7.594E-06	1.285E-06	101
14696	1.556E-06	8.979E-06	1.556E-06	101
14716	1.902E-06	1.036E-05	1.902E-06	101
14736	2.352E-06	1.174E-05	2.352E-06	101
14756	3.821E-06	1.312E-05	3.821E-06	101
14777	4.427E-06	1.449E-05	4.427E-06	101
14797	5.141E-06	1.586E-05	5.141E-06	102
14817	5.931E-06	1.723E-05	5.931E-06	102
14837	6.807E-06	1.860E-05	6.807E-06	102
14857	8.721E-06	1.996E-05	8.721E-06	102
14878	9.775E-06	2.132E-05	9.775E-06	102
14898	1.092E-05	2.268E-05	1.092E-05	102
14918	1.273E-05	2.404E-05	1.273E-05	102
14938	1.323E-05	2.539E-05	1.323E-05	103
14958	1.562E-05	2.674E-05	1.562E-05	103
14979	1.705E-05	2.809E-05	1.705E-05	103
14999	1.849E-05	2.943E-05	1.849E-05	103
15019	1.898E-05	3.077E-05	1.898E-05	103
116723	4.910E-04	4.900E-04	4.910E-04	806
218428	3.135E-04	3.127E-04	3.135E-04	1509
320132	1.993E-04	1.996E-04	1.993E-04	2212
421837	1.275E-04	1.274E-04	1.275E-04	2915
523541	8.140E-05	8.130E-05	8.140E-05	3618
625245	5.194E-05	5.189E-05	5.194E-05	4322
726950	3.315E-05	3.311E-05	3.315E-05	5025
828654	2.115E-05	2.113E-05	2.115E-05	5728
930359	1.350E-05	1.349E-05	1.350E-05	6431
1032063	8.622E-06	8.608E-06	8.622E-06	7134
1133767	5.496E-06	5.494E-06	5.496E-06	7837
1235472	3.504E-06	3.506E-06	3.504E-06	8540
1337176	2.238E-06	2.238E-06	2.238E-06	9243
1438881	1.435E-06	1.428E-06	1.435E-06	9946
1540585	9.113E-07	9.114E-07	9.113E-07	10649
1642289	5.817E-07	5.817E-07	5.817E-07	11352
1743994	3.711E-07	3.712E-07	3.711E-07	12055
1845698	2.380E-07	2.369E-07	2.380E-07	12758
1947403	1.511E-07	1.512E-07	1.511E-07	13461
2049107	9.651E-08	9.650E-08	9.651E-08	14165
2049988	9.623E-08	9.612E-08	9.623E-08	14171
2050870	9.576E-08	9.575E-08	9.576E-08	14177
2051752	9.538E-08	9.538E-08	9.538E-08	14183
2052633	9.510E-08	9.501E-08	9.510E-08	14189
2053515	9.472E-08	9.464E-08	9.472E-08	14195
2054396	9.434E-08	9.427E-08	9.434E-08	14201
2055278	9.396E-08	9.390E-08	9.396E-08	14207
2056159	9.358E-08	9.354E-08	9.358E-08	14213
2057041	9.330E-08	9.318E-08	9.330E-08	14219
2057922	9.283E-08	9.281E-08	9.283E-08	14225
2058804	9.255E-08	9.245E-08	9.255E-08	14232
2059685	9.217E-08	9.209E-08	9.217E-08	14238
2060567	9.179E-08	9.174E-08	9.179E-08	14244
2061449	9.141E-08	9.138E-08	9.141E-08	14250
2062330	9.103E-08	9.102E-08	9.103E-08	14256
2065856	8.971E-08	8.695E-08	8.971E-08	14280
2066739	8.573E-08	8.305E-08	8.573E-08	14286
2067619	8.029E-08	7.731E-08	8.029E-08	14293
2068501	7.156E-08	7.040E-08	7.156E-08	14299
2069383	6.379E-08	6.325E-08	6.379E-08	14305
2070264	5.686E-08	5.650E-08	5.686E-08	14311
2071146	5.068E-08	5.038E-08	5.068E-08	14317
2072027	4.518E-08	4.491E-08	4.518E-08	14323
2072909	4.026E-08	4.003E-08	4.026E-08	14329
2073791	3.589E-08	3.569E-08	3.589E-08	14335
2074672	3.199E-08	3.181E-08	3.199E-08	14341
2075554	2.852E-08	2.835E-08	2.852E-08	14347

2076435	2.542E-08	2.527E-08	2.542E-08	14353
2077317	2.266E-08	2.253E-08	2.266E-08	14360
2078199	2.019E-08	2.008E-08	2.019E-08	14366
2079080	1.800E-08	1.790E-08	1.800E-08	14372
2079962	1.605E-08	1.595E-08	1.605E-08	14378
2080843	1.430E-08	1.422E-08	1.430E-08	14384
2081725	1.275E-08	1.266E-08	1.275E-08	14390
2082607	1.136E-08	1.130E-08	1.136E-08	14396
2083488	1.013E-08	1.007E-08	1.013E-08	14402
2084370	9.028E-09	8.977E-09	9.028E-09	14408
2341808	2.346E-23	6.184E-15	2.346E-23	16188
2599247	6.099E-38	2.061E-15	6.099E-38	17968
2856686	6.099E-38	6.442E-16	6.099E-38	19747
3114124	6.099E-38	2.147E-16	6.099E-38	21527
3371563	6.099E-38	6.442E-17	6.099E-38	23307
3629001	6.099E-38	2.147E-17	6.099E-38	25086
3886440	6.099E-38	7.045E-18	6.099E-38	26866
4143879	6.099E-38	2.181E-18	6.099E-38	28645
4401317	6.099E-38	7.549E-19	6.099E-38	30425
4658756	6.099E-38	2.307E-19	6.099E-38	32205
4916195	6.099E-38	7.339E-20	6.099E-38	33984
5173633	6.099E-38	2.490E-20	6.099E-38	35764
5431072	6.099E-38	7.536E-21	6.099E-38	37544
5688510	6.099E-38	2.457E-21	6.099E-38	39323
5945949	6.099E-38	7.372E-22	6.099E-38	41103
6203388	6.099E-38	2.457E-22	6.099E-38	42883
6460826	6.099E-38	7.935E-23	6.099E-38	44662
6718265	6.099E-38	2.432E-23	6.099E-38	46442
6975704	6.099E-38	7.999E-24	6.099E-38	48222
7233142	.000E+00	2.560E-24	.000E+00	50001

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDES: U233 VIA NP237 FROM AM241

NUCLIDE	AM241	NP237	U233 V
HALF LIFE, YR	4.33E+02	2.14E+06	1.58E+05
DECAY NUMBER	2.32E-01	4.69E-05	6.35E-04
DISTRIB COEF	1.00E+04	1.00E+02	1.43E+04
YR 2000 CURIES	8.56E+07	.00E+00	.00E+00
PULSE G-ATOMS	7.78E+02	.00E+00	.00E+00
NUCL VEL,MI/YR	6.91E-05	6.91E-04	4.84E-06
DISCH TIME,YR	1.45E+05	1.45E+04	2.07E+06
DIM DISC TIME	1.00E+04	1.00E+02	1.43E+04

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00

WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 14572 YEARS
PEAK DISCHARGE RATE= 3.35E-04 CURIES PER YEAR AT 15019 YEARS
BAND WIDTH= 2051284 YEARS WITH TAIL END AT 2065856 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
14443	.000E+00	.000E+00	.000E+00	99
14452	.000E+00	2.619E-37	.000E+00	99
14460	.000E+00	4.821E-33	.000E+00	99
14469	.000E+00	2.020E-29	.000E+00	99
14477	.000E+00	1.748E-25	.000E+00	99
14486	.000E+00	3.467E-22	.000E+00	99
14495	.000E+00	3.297E-19	.000E+00	100
14503	.000E+00	1.237E-16	.000E+00	100
14512	.000E+00	3.498E-14	.000E+00	100
14520	.000E+00	3.741E-12	.000E+00	100
14529	.000E+00	2.024E-10	.000E+00	100
14538	.000E+00	5.048E-09	.000E+00	100
14546	.000E+00	7.344E-08	.000E+00	100
14555	3.004E-07	5.448E-07	3.004E-07	100
14563	3.004E-07	2.317E-06	3.004E-07	100
14572	3.004E-07	6.303E-06	3.004E-07	100
14581	7.481E-07	1.211E-05	7.481E-07	100
14589	1.432E-06	1.868E-05	1.432E-06	100
14598	2.545E-06	2.535E-05	2.545E-06	100
14606	3.905E-06	3.195E-05	3.905E-06	100
14615	5.771E-06	3.845E-05	5.771E-06	100
14623	1.127E-05	5.339E-05	1.127E-05	100
14632	1.821E-05	6.784E-05	1.821E-05	101
14641	2.672E-05	8.182E-05	2.672E-05	101
14649	3.735E-05	9.535E-05	3.735E-05	101
14658	4.872E-05	1.085E-04	4.872E-05	101
14666	6.164E-05	1.211E-04	6.164E-05	101
14675	7.591E-05	1.334E-04	7.591E-05	101
14683	9.169E-05	1.453E-04	9.169E-05	101
14692	1.083E-04	1.567E-04	1.083E-04	102
14701	1.260E-04	1.679E-04	1.260E-04	102
14709	1.450E-04	1.786E-04	1.450E-04	102
14718	1.650E-04	1.890E-04	1.650E-04	102
14726	1.855E-04	1.991E-04	1.855E-04	102
14735	2.075E-04	2.089E-04	2.075E-04	102
14743	2.292E-04	2.183E-04	2.292E-04	102
14752	2.514E-04	2.274E-04	2.514E-04	103
14761	2.723E-04	2.363E-04	2.723E-04	103
14769	2.937E-04	2.448E-04	2.937E-04	103
14778	3.150E-04	2.531E-04	3.150E-04	103

15019	3.355E-04	2.611E-04	3.355E-04	103	2061449	4.648E-08	5.991E-08	4.648E-08	14250
86610	2.847E-04	3.671E-04	2.847E-04	598	2062330	4.630E-08	5.954E-08	4.630E-08	14256
158201	2.075E-04	2.676E-04	2.075E-04	1093	2063212	4.612E-08	5.859E-08	4.612E-08	14262
229792	1.513E-04	1.951E-04	1.513E-04	1588	2064093	4.593E-08	5.578E-08	4.593E-08	14268
301384	1.103E-04	1.422E-04	1.103E-04	2083	2064975	4.570E-08	4.906E-08	4.570E-08	14274
372975	8.039E-05	1.037E-04	8.039E-05	2578	2065856	4.407E-08	3.741E-08	4.407E-08	14280
444566	5.860E-05	7.557E-05	5.860E-05	3073	2067619	.000E+00	1.110E-08	.000E+00	14293
516157	4.272E-05	5.509E-05	4.272E-05	3567	2068501	.000E+00	3.950E-09	.000E+00	14299
587748	3.114E-05	4.016E-05	3.114E-05	4062	2069383	.000E+00	1.019E-09	.000E+00	14305
659339	2.270E-05	2.927E-05	2.270E-05	4557	2070264	.000E+00	1.874E-10	.000E+00	14311
730930	1.655E-05	2.134E-05	1.655E-05	5052	2071146	.000E+00	2.431E-11	.000E+00	14317
802522	1.206E-05	1.556E-05	1.206E-05	5547	2072027	.000E+00	2.205E-12	.000E+00	14323
874113	8.794E-06	1.134E-05	8.794E-06	6042	2072909	.000E+00	1.392E-13	.000E+00	14329
945704	6.410E-06	8.266E-06	6.410E-06	6537	2073791	.000E+00	6.093E-15	.000E+00	14335
1017295	4.673E-06	6.026E-06	4.673E-06	7032	2074672	.000E+00	1.847E-16	.000E+00	14341
1088886	3.406E-06	4.393E-06	3.406E-06	7527	2075554	.000E+00	3.869E-18	.000E+00	14347
1160477	2.483E-06	3.202E-06	2.483E-06	8022	2076435	.000E+00	5.464E-20	.000E+00	14353
1232068	1.810E-06	2.334E-06	1.810E-06	8516	2077317	.000E+00	3.657E-22	.000E+00	14360
1303660	1.320E-06	1.702E-06	1.320E-06	9011	2078199	.000E+00	.000E+00	.000E+00	14366
1375251	9.619E-07	1.240E-06	9.619E-07	9506					
1446842	7.012E-07	9.043E-07	7.012E-07	10001					
1476955	6.139E-07	7.917E-07	6.139E-07	10209	MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM				
1507068	5.375E-07	6.931E-07	5.375E-07	10417	FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR				
1537182	4.706E-07	6.066E-07	4.706E-07	10626	POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY				
1567295	4.120E-07	5.313E-07	4.120E-07	10834					
1597408	3.607E-07	4.651E-07	3.607E-07	11042					
1627521	3.158E-07	4.072E-07	3.158E-07	11250	TIME OF LEACH INCIDENT: 100 YEARS				
1657635	2.765E-07	3.565E-07	2.765E-07	11458					
1687748	2.420E-07	3.121E-07	2.420E-07	11667	NUCLIDE: U238 VIA PU242 FROM CM246				
1717861	2.119E-07	2.732E-07	2.119E-07	11875					
1747974	1.855E-07	2.392E-07	1.855E-07	12083	NUCLIDE	CM246	PU242	U238 V	
1778088	1.624E-07	2.094E-07	1.624E-07	12291	HALF LIFE, YR	4.76E+03	3.87E+05	4.47E+09	
1808201	1.422E-07	1.834E-07	1.422E-07	12499	DECAY NUMBER	2.11E-02	2.59E-04	2.24E-08	
1838314	1.245E-07	1.605E-07	1.245E-07	12707	DISTRIB COEF	3.33E+03	1.00E+04	1.43E+04	
1868427	1.090E-07	1.405E-07	1.090E-07	12916	YR 2000 CURIES	2.68E+04	.00E+00	.00E+00	
1898541	9.542E-08	1.230E-07	9.542E-08	13124	PULSE G-ATOMS	3.51E+02	.00E+00	.00E+00	
1928654	8.354E-08	1.077E-07	8.354E-08	13332	NUCL VEL,MI/YR	2.07E-05	6.91E-06	4.84E-06	
1958767	7.314E-08	9.431E-08	7.314E-08	13540	DISCH TIME,YR	4.82E+05	1.45E+06	2.07E+06	
1988880	6.403E-08	8.257E-08	6.403E-08	13748	DIM DISC TIME	3.33E+03	1.00E+04	1.43E+04	
2018994	5.606E-08	7.229E-08	5.606E-08	13956	LEACH RATE= .003000 FRACTION PER YEAR				
2049107	4.908E-08	6.329E-08	4.908E-08	14165	LEACH DURATION= 333 YEARS				
2049988	4.889E-08	6.304E-08	4.889E-08	14171	PATH LENGTH= 10.00 MILES				
2050870	4.870E-08	6.280E-08	4.870E-08	14177	DIMENSIONLESS DISTANCE= 1.00				
2051752	4.851E-08	6.255E-08	4.851E-08	14183	WATER VELOCITY= 1.00 FT/DAY				
2052633	4.832E-08	6.231E-08	4.832E-08	14189	WATER TRAVEL TIME= 145 YEARS				
2053515	4.813E-08	6.207E-08	4.813E-08	14195	AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN				
2054396	4.795E-08	6.183E-08	4.795E-08	14201	PECLET NUMBER= 4.26E+06				
2055278	4.776E-08	6.159E-08	4.776E-08	14207	NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION				
2056159	4.757E-08	6.135E-08	4.757E-08	14213	INITIAL BREAKTHROUGH AT 483773 YEARS				
2057041	4.739E-08	6.111E-08	4.739E-08	14219	PEAK DISCHARGE RATE= 8.85E-08 CURIES PER YEAR AT 2018988 YEARS				
2057922	4.721E-08	6.087E-08	4.721E-08	14225	BAND WIDTH= 1579133 YEARS WITH TAIL END AT 2064906 YEARS				
2058804	4.702E-08	6.064E-08	4.702E-08	14232	DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00				
2059685	4.684E-08	6.040E-08	4.684E-08	14238					
2060567	4.666E-08	6.016E-08	4.666E-08	14244	TIME,YR DISC RATE,CI/YR PULSE RATE BAND RATE DIM TIME				

483440	.000E+00	.000E+00	.000E+00
483551	1.485E-39	1.479E-39	1.485E-39
483662	1.485E-39	1.617E-39	1.485E-39
483773	1.485E-39	1.757E-39	1.485E-39
483883	1.621E-39	1.899E-39	1.621E-39
483994	1.757E-39	2.042E-39	1.757E-39
484105	1.896E-39	2.187E-39	1.896E-39
484216	2.036E-39	2.334E-39	2.036E-39
484327	2.177E-39	2.483E-39	2.177E-39
484437	2.321E-39	2.633E-39	2.321E-39
484548	2.466E-39	2.785E-39	2.466E-39
484659	2.613E-39	2.939E-39	2.613E-39
532125	9.534E-37	9.925E-37	9.534E-37
579591	3.382E-35	3.515E-35	3.382E-35
627057	1.002E-33	1.042E-33	1.002E-33
674523	2.845E-32	2.956E-32	2.845E-32
721989	7.975E-31	8.287E-31	7.975E-31
769455	2.228E-29	2.315E-29	2.228E-29
816921	6.218E-28	6.461E-28	6.218E-28
864387	1.735E-26	1.802E-26	1.735E-26
911853	4.839E-25	5.028E-25	4.839E-25
959319	1.350E-23	1.403E-23	1.350E-23
1006785	3.766E-22	3.913E-22	3.766E-22
1054251	1.050E-20	1.091E-20	1.050E-20
1101718	2.930E-19	3.045E-19	2.930E-19
1149184	8.174E-18	8.493E-18	8.174E-18
1196650	2.280E-16	2.369E-16	2.280E-16
1244116	6.361E-15	6.609E-15	6.361E-15
1291582	1.774E-13	1.844E-13	1.774E-13
1339048	4.949E-12	5.143E-12	4.949E-12
1386514	1.381E-10	1.435E-10	1.381E-10
1433980	3.852E-09	4.002E-09	3.852E-09
1434621	4.028E-09	4.186E-09	4.028E-09
1435262	4.214E-09	4.378E-09	4.214E-09
1435902	4.407E-09	4.579E-09	4.407E-09
1436543	4.610E-09	4.790E-09	4.610E-09
1437184	4.822E-09	5.010E-09	4.822E-09
1437825	5.043E-09	5.240E-09	5.043E-09
1438466	5.275E-09	5.481E-09	5.275E-09
1439107	5.518E-09	5.733E-09	5.518E-09
1439747	5.772E-09	5.997E-09	5.772E-09
1440388	6.036E-09	6.272E-09	6.036E-09
1441029	6.314E-09	6.560E-09	6.314E-09
1441670	6.604E-09	6.862E-09	6.604E-09
1442311	6.908E-09	7.177E-09	6.908E-09
1442952	7.225E-09	7.507E-09	7.225E-09
1443593	7.557E-09	7.852E-09	7.557E-09
1444233	7.904E-09	8.212E-09	7.904E-09
1444874	8.268E-09	8.592E-09	8.268E-09
1445515	8.648E-09	8.986E-09	8.648E-09
1446155	9.045E-09	9.272E-09	9.045E-09

3341	1446797	9.371E-09	9.521E-09	9.371E-09	10001
3342	1447438	9.514E-09	9.676E-09	9.514E-09	10005
3343	1448078	9.540E-09	9.758E-09	9.540E-09	10010
3344	1448719	9.565E-09	9.802E-09	9.565E-09	10014
3344	1449360	9.591E-09	9.832E-09	9.591E-09	10019
3345	1450001	9.616E-09	9.859E-09	9.616E-09	10023
3346	1450642	9.642E-09	9.885E-09	9.642E-09	10027
3347	1451283	9.670E-09	9.912E-09	9.670E-09	10032
3347	1451923	9.694E-09	9.936E-09	9.694E-09	10036
3348	1452564	9.720E-09	9.965E-09	9.720E-09	10041
3349	1453205	9.746E-09	9.992E-09	9.746E-09	10045
3350	1453846	9.774E-09	1.002E-08	9.774E-09	10050
3678	1454487	9.800E-09	1.005E-08	9.800E-09	10054
4006	1455128	9.825E-09	1.007E-08	9.825E-09	10058
4334	1455769	9.851E-09	1.010E-08	9.851E-09	10063
4662	1456409	9.877E-09	1.013E-08	9.877E-09	10067
4990	1457050	9.904E-09	1.015E-08	9.904E-09	10072
5318	1457691	9.931E-09	1.018E-08	9.931E-09	10076
5647	1458332	9.953E-09	1.021E-08	9.953E-09	10081
5975	1458973	9.979E-09	1.024E-08	9.979E-09	10085
6303	1459614	1.000E-08	1.026E-08	1.000E-08	10089
6631	1489054	1.093E-08	1.161E-08	1.093E-08	10293
6959	1518495	1.247E-08	1.312E-08	1.247E-08	10496
7287	1547936	1.409E-08	1.483E-08	1.409E-08	10700
7615	1577377	1.586E-08	1.670E-08	1.586E-08	10904
7943	1606817	1.736E-08	1.827E-08	1.736E-08	11107
8272	1636258	2.094E-08	1.582E-08	2.094E-08	11311
8600	1665699	2.368E-08	2.487E-08	2.368E-08	11514
8928	1695140	2.678E-08	2.812E-08	2.678E-08	11718
9256	1724580	3.029E-08	3.181E-08	3.029E-08	11921
9584	1754021	3.426E-08	3.597E-08	3.426E-08	12125
9912	1783462	3.874E-08	4.068E-08	3.874E-08	12328
9917	1812903	4.381E-08	4.600E-08	4.381E-08	12532
9921	1842343	4.954E-08	5.202E-08	4.954E-08	12735
9926	1871784	5.601E-08	5.881E-08	5.601E-08	12939
9930	1901225	6.329E-08	6.645E-08	6.329E-08	13142
9934	1930666	7.136E-08	7.493E-08	7.136E-08	13346
9939	1960106	7.993E-08	8.393E-08	7.993E-08	13549
9943	1989547	8.753E-08	9.191E-08	8.753E-08	13753
9948	2018988	8.845E-08	9.287E-08	8.845E-08	13956
9952	2048429	6.116E-08	6.421E-08	6.116E-08	14160
9957	2049344	5.928E-08	6.225E-08	5.928E-08	14166
9961	2050260	5.732E-08	6.016E-08	5.732E-08	14173
9965	2051175	5.525E-08	5.801E-08	5.525E-08	14179
9970	2052090	5.308E-08	5.574E-08	5.308E-08	14185
9974	2053005	5.081E-08	5.335E-08	5.081E-08	14191
9979	2053921	4.842E-08	5.084E-08	4.842E-08	14198
9983	2054837	4.592E-08	4.822E-08	4.592E-08	14204
9988	2055752	4.330E-08	4.546E-08	4.330E-08	14210
9992	2056668	4.055E-08	4.258E-08	4.055E-08	14217
9996	2057583	3.767E-08	3.955E-08	3.767E-08	14223
	2058498	3.465E-08	3.639E-08	3.465E-08	14229
	2059414	3.150E-08	3.307E-08	3.150E-08	14236
	2060329	2.819E-08	2.960E-08	2.819E-08	14242

2061245	2.473E-08	2.596E-08	2.473E-08	14248
2062160	2.110E-08	2.216E-08	2.110E-08	14255
2063076	1.731E-08	1.818E-08	1.731E-08	14261
2063991	1.335E-08	1.401E-08	1.335E-08	14267
2064906	9.198E-09	9.658E-09	9.198E-09	14274
2065093	.000E+00	.000E+00	.000E+00	14280

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: RA226 VIA TH230 FROM U234

NUCLIDE	U234	TH230	RA226
HALF LIFE, YR	2.44E+05	7.70E+04	1.60E+03
DECAY NUMBER	4.11E-04	1.30E-03	6.27E-02
DISTRIB COEF	1.43E+04	5.00E+04	5.00E+02
YR 2000 CURIES	2.27E+04	.00E+00	.00E+00
PULSE G-ATOMS	1.16E+05	.00E+00	.00E+00
NUCL VEL,MI/YR	4.84E-06	1.38E-06	1.38E-04
DISCH TIME,YR	2.07E+06	7.23E+06	7.23E+04
DIM DISC TIME	1.43E+04	5.00E+04	5.00E+02

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 72248 YEARS
PEAK DISCHARGE RATE= 1.11E-01 CURIES PER YEAR AT 2065822 YEARS
BAND WIDTH= 7187724 YEARS WITH TAIL END AT 7259972 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
72010	.000E+00	1.351E-33	.000E+00	497
72040	.000E+00	2.127E-31	.000E+00	497
72070	.000E+00	2.340E-29	.000E+00	498
72219	3.617E-19	3.218E-21	3.617E-19	499
72249	3.617E-19	4.113E-20	3.617E-19	499
72279	3.617E-19	3.307E-19	3.617E-19	499
72308	2.452E-18	2.581E-18	2.452E-18	499
72338	1.082E-17	1.139E-17	1.082E-17	499
72367	3.175E-17	3.343E-17	3.175E-17	500
72397	1.316E-16	1.385E-16	1.316E-16	500
72427	3.144E-16	3.309E-16	3.144E-16	500
72457	3.478E-16	6.423E-16	3.478E-16	500
72516	2.832E-16	1.528E-15	2.832E-16	501
72580	7.942E-16	2.615E-15	7.942E-16	501
72615	2.025E-15	3.205E-15	2.025E-15	501
72649	2.212E-15	3.795E-15	2.212E-15	502
72718	3.526E-15	4.977E-15	3.526E-15	502
72787	5.444E-15	6.158E-15	5.444E-15	502
72822	7.660E-15	6.750E-15	7.660E-15	503
72856	8.128E-15	7.341E-15	8.128E-15	503
72890	1.033E-14	7.932E-15	1.033E-14	503
72925	1.110E-14	8.524E-15	1.110E-14	503
72959	1.275E-14	9.116E-15	1.275E-14	504
72994	1.389E-14	9.708E-15	1.389E-14	504
73028	1.457E-14	1.030E-14	1.457E-14	504
73063	1.578E-14	1.089E-14	1.578E-14	504
73097	1.620E-14	1.148E-14	1.620E-14	505
73132	1.807E-14	1.208E-14	1.807E-14	505
73166	1.813E-14	1.267E-14	1.813E-14	505
73201	2.083E-14	1.326E-14	2.083E-14	505
73235	2.151E-14	1.386E-14	2.151E-14	506
171995	2.867E-12	2.877E-12	2.867E-12	1188
270754	1.189E-11	1.193E-11	1.189E-11	1871
369514	4.309E-11	4.321E-11	4.309E-11	2554
468274	1.528E-10	1.532E-10	1.528E-10	3236
567033	5.395E-10	5.411E-10	5.395E-10	3919
665793	1.904E-09	1.910E-09	1.904E-09	4602
764553	6.721E-09	6.740E-09	6.721E-09	5285
863313	2.372E-08	2.379E-08	2.372E-08	5967
962072	8.369E-08	8.394E-08	8.369E-08	6650
1060832	2.954E-07	2.962E-07	2.954E-07	7333
1159592	1.042E-06	1.045E-06	1.042E-06	8015
1258351	3.679E-06	3.689E-06	3.679E-06	8698
1357111	1.298E-05	1.302E-05	1.298E-05	9381
1455871	4.582E-05	4.595E-05	4.582E-05	10064
1554630	1.617E-04	1.622E-04	1.617E-04	10746
1653390	5.706E-04	5.723E-04	5.706E-04	11429
1752150	2.014E-03	2.020E-03	2.014E-03	12112
1850909	7.107E-03	7.127E-03	7.107E-03	12794
1949669	2.508E-02	2.515E-02	2.508E-02	13477
2048429	8.851E-02	8.876E-02	8.851E-02	14160
2049344	8.955E-02	8.981E-02	8.955E-02	14166
2050260	9.061E-02	9.086E-02	9.061E-02	14173
2051175	9.167E-02	9.193E-02	9.167E-02	14179
2052091	9.275E-02	9.301E-02	9.275E-02	14185
2053006	9.384E-02	9.411E-02	9.384E-02	14191
2053921	9.494E-02	9.521E-02	9.494E-02	14198
2054837	9.606E-02	9.633E-02	9.606E-02	14204
2055752	9.719E-02	9.747E-02	9.719E-02	14210
2056668	9.833E-02	9.861E-02	9.833E-02	14217
2057583	9.949E-02	9.977E-02	9.949E-02	14223
2058499	1.006E-01	1.009E-01	1.006E-01	14229
2059414	1.018E-01	1.021E-01	1.018E-01	14236
2060330	1.030E-01	1.033E-01	1.030E-01	14242

2061245	1.043E-01	1.045E-01	1.043E-01	14248	7215825	2.649E-28	2.788E-28	2.649E-28	49881
2062160	1.055E-01	1.058E-01	1.055E-01	14255	7217252	2.401E-28	2.527E-28	2.401E-28	49891
2063076	1.067E-01	1.070E-01	1.067E-01	14261	7218676	2.158E-28	2.272E-28	2.158E-28	49901
2063991	1.080E-01	1.082E-01	1.080E-01	14267	7220100	1.921E-28	2.022E-28	1.921E-28	49911
2064907	1.092E-01	1.093E-01	1.092E-01	14274	7221524	1.690E-28	1.779E-28	1.690E-28	49921
2065822	1.105E-01	1.102E-01	1.105E-01	14280	7222948	1.466E-28	1.544E-28	1.466E-28	49931
2066738	1.049E-01	1.105E-01	1.049E-01	14286	7224372	1.250E-28	1.316E-28	1.250E-28	49941
2067653	1.046E-01	1.101E-01	1.046E-01	14293	7225796	1.044E-28	1.099E-28	1.044E-28	49950
2068569	1.039E-01	1.094E-01	1.039E-01	14299	7227220	8.509E-29	8.957E-29	8.509E-29	49960
2069484	1.029E-01	1.083E-01	1.029E-01	14305	7228644	6.742E-29	7.097E-29	6.742E-29	49970
2070400	1.019E-01	1.072E-01	1.019E-01	14312	7230068	5.156E-29	5.428E-29	5.156E-29	49980
2071315	1.008E-01	1.061E-01	1.008E-01	14318	7231492	3.799E-29	3.999E-29	3.799E-29	49990
2072231	9.977E-02	1.050E-01	9.977E-02	14324	7232916	2.691E-29	2.832E-29	2.691E-29	50000
2073145	9.873E-02	1.039E-01	9.873E-02	14331	7234340	1.813E-29	1.906E-29	1.813E-29	50009
2074062	9.770E-02	1.028E-01	9.770E-02	14337	7235764	1.163E-29	1.224E-29	1.163E-29	50019
2074977	9.668E-02	1.018E-01	9.668E-02	14343	7237188	7.010E-30	7.379E-30	7.010E-30	50029
2075893	9.567E-02	1.007E-01	9.567E-02	14350	7238612	4.041E-30	4.254E-30	4.041E-30	50039
2076808	9.467E-02	9.965E-02	9.467E-02	14356	7240036	2.178E-30	2.293E-30	2.178E-30	50049
2077724	9.368E-02	9.861E-02	9.368E-02	14362	7241460	1.103E-30	1.161E-30	1.103E-30	50059
2078639	9.270E-02	9.758E-02	9.270E-02	14369	7242884	5.232E-31	5.507E-31	5.232E-31	50068
2079555	9.173E-02	9.656E-02	9.173E-02	14375	7244308	2.337E-31	2.460E-31	2.337E-31	50078
2080470	9.077E-02	9.555E-02	9.077E-02	14381	7245732	9.756E-32	1.027E-31	9.756E-32	50088
2081386	8.983E-02	9.455E-02	8.983E-02	14388	7247156	3.758E-32	3.956E-32	3.758E-32	50098
2082301	8.889E-02	9.357E-02	8.889E-02	14394	7248580	1.485E-32	1.563E-32	1.485E-32	50108
2083217	8.796E-02	9.259E-02	8.796E-02	14400	7250004	5.844E-33	6.151E-33	5.844E-33	50118
2084132	8.704E-02	9.162E-02	8.704E-02	14407	7251428	2.942E-33	3.097E-33	2.942E-33	50128
2085048	8.613E-02	9.067E-02	8.613E-02	14413	7252852	1.948E-33	2.050E-33	1.948E-33	50137
2341017	4.576E-03	4.817E-03	4.576E-03	16182	7254276	1.623E-33	1.709E-33	1.623E-33	50147
2596986	2.431E-04	2.559E-04	2.431E-04	17952	7255700	1.522E-33	1.602E-33	1.522E-33	50157
2852955	1.292E-05	1.360E-05	1.292E-05	19721	7257124	1.461E-33	1.538E-33	1.461E-33	50167
3108925	6.863E-07	7.224E-07	6.863E-07	21491	7258548	.000E+00	1.517E-33	.000E+00	50177
3364895	3.646E-08	3.838E-08	3.646E-08	23260	7259972	.000E+00	1.495E-33	.000E+00	50187
3620864	1.937E-09	2.039E-09	1.937E-09	25030	7261396	.000E+00	.000E+00	.000E+00	50196
3876834	1.029E-10	1.083E-10	1.029E-10	26799					
4132803	5.468E-12	5.755E-12	5.468E-12	28569					
4388773	2.905E-13	3.058E-13	2.905E-13	30338	MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM				
4644742	1.543E-14	1.625E-14	1.543E-14	32109	FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR				
4900711	8.199E-16	8.631E-16	8.199E-16	33877	POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY				
5156681	4.356E-17	4.585E-17	4.356E-17	35647					
5412650	2.314E-18	2.436E-18	2.314E-18	37416					
5668620	1.230E-19	1.294E-19	1.230E-19	39186	TIME OF LEACH INCIDENT: 100 YEARS				
5924589	6.532E-21	6.876E-21	6.532E-21	40955					
6180559	3.468E-22	3.650E-22	3.468E-22	42725	NUCLIDE: RA226 VIA TH230 AND PSEUDO U234 FROM				
6436528	1.835E-23	1.932E-23	1.835E-23	44494					
6692497	9.542E-25	1.004E-24	9.542E-25	46264	NUCLIDE	U238 T	TH230	RA226	
6948467	4.442E-26	4.676E-26	4.442E-26	48033	HALF LIFE, YR	4.47E+09	7.70E+04	1.60E+03	
7204435	4.842E-28	5.096E-28	4.842E-28	49803	DECAY NUMBER	2.24E-08	1.30E-03	6.27E-02	
7205867	4.547E-28	4.786E-28	4.547E-28	49813	DISTRIB COEF	1.43E+04	5.00E+04	5.00E+02	
7207284	4.258E-28	4.482E-28	4.258E-28	49822	YR 2000 CURIES	2.44E+02	.00E+00	.00E+00	
7208708	3.975E-28	4.184E-28	3.975E-28	49832	PULSE G-ATOMS	3.05E+06	.00E+00	.00E+00	
7210132	3.698E-28	3.893E-28	3.698E-28	49842	NUCL VEL.M1/YR	4.84E-06	1.38E-06	1.38E-04	
7211556	3.427E-28	3.608E-28	3.427E-28	49852	DISCH TIME.YR	2.07E+06	7.23E+06	7.23E+04	
7212980	3.162E-28	3.329E-28	3.162E-28	49862	DIM DISC TIME	1.43E+04	5.00E+04	5.00E+02	
7214404	2.903E-28	3.056E-28	2.903E-28	49872	LEACH RATE= .003000 FRACTION PER YEAR				

LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 72457 YEARS
PEAK DISCHARGE RATE= 4.94E-02 CURIES PER YEAR AT 2069484 YEARS
BAND WIDTH= 7188940 YEARS WITH TAIL END AT 7261396 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
71951	.000E+00	.000E+00	.000E+00	497
71981	.000E+00	4.962E-38	.000E+00	497
72010	.000E+00	6.417E-36	.000E+00	497
72040	.000E+00	9.112E-34	.000E+00	497
72070	.000E+00	9.075E-32	.000E+00	498
72219	.000E+00	6.159E-24	.000E+00	499
72248	.000E+00	7.526E-23	.000E+00	499
72278	.000E+00	6.664E-22	.000E+00	499
72308	.000E+00	4.321E-21	.000E+00	499
72338	.000E+00	1.887E-20	.000E+00	499
72367	.000E+00	5.678E-20	.000E+00	500
72397	5.110E-19	2.096E-19	5.110E-19	500
72427	5.110E-19	4.982E-19	5.110E-19	500
72516	6.253E-19	2.196E-18	6.253E-19	501
72546	1.461E-18	2.909E-18	1.461E-18	501
72580	1.701E-18	3.755E-18	1.701E-18	501
72615	2.696E-18	4.602E-18	2.696E-18	501
72649	3.631E-18	5.450E-18	3.631E-18	502
72684	4.993E-18	6.298E-18	4.993E-18	502
72718	5.862E-18	7.147E-18	5.862E-18	502
72753	7.936E-18	7.995E-18	7.936E-18	502
72787	8.486E-18	8.844E-18	8.486E-18	502
72822	1.093E-17	9.695E-18	1.093E-17	503
72856	1.237E-17	1.054E-17	1.237E-17	503
72890	1.472E-17	1.139E-17	1.472E-17	503
72925	1.593E-17	1.224E-17	1.593E-17	503
72959	1.800E-17	1.310E-17	1.800E-17	504
72994	1.956E-17	1.395E-17	1.950E-17	504
73028	2.080E-17	1.480E-17	2.080E-17	504
73063	2.257E-17	1.565E-17	2.257E-17	504
73097	2.404E-17	1.650E-17	2.404E-17	505
73132	2.585E-17	1.735E-17	2.585E-17	505
73166	2.689E-17	1.821E-17	2.689E-17	505
73201	2.965E-17	1.906E-17	2.965E-17	505
73235	3.076E-17	1.991E-17	3.076E-17	506
171995	4.978E-15	4.994E-15	4.978E-15	1188
270754	2.657E-14	2.665E-14	2.657E-14	1871
369514	1.273E-13	1.277E-13	1.273E-13	2554
468274	6.021E-13	6.039E-13	6.021E-13	3236
567033	2.843E-12	2.851E-12	2.843E-12	3919
665793	1.342E-11	1.346E-11	1.342E-11	4602
764553	6.333E-11	6.351E-11	6.333E-11	5285
863313	2.989E-10	2.998E-10	2.989E-10	5967
962072	1.411E-09	1.415E-09	1.411E-09	6650
1060832	6.658E-09	6.677E-09	6.658E-09	7333
1159592	3.142E-08	3.152E-08	3.142E-08	8015
1258351	1.483E-07	1.487E-07	1.483E-07	8698
1357111	7.000E-07	7.020E-07	7.000E-07	9381
1455871	3.304E-06	3.313E-06	3.304E-06	10064
1554630	1.559E-05	1.564E-05	1.559E-05	10746
1653390	7.359E-05	7.381E-05	7.359E-05	11429
1752150	3.473E-04	3.483E-04	3.473E-04	12112
1850909	1.639E-03	1.644E-03	1.639E-03	12794
1949669	7.737E-03	7.760E-03	7.737E-03	13477
2048429	3.652E-02	3.662E-02	3.652E-02	14160
2049344	3.705E-02	3.715E-02	3.705E-02	14166
2050260	3.758E-02	3.769E-02	3.758E-02	14173
2051175	3.813E-02	3.824E-02	3.813E-02	14179
2052091	3.868E-02	3.879E-02	3.868E-02	14185
2053006	3.924E-02	3.935E-02	3.924E-02	14191
2053921	3.981E-02	3.992E-02	3.981E-02	14198
2054837	4.038E-02	4.050E-02	4.038E-02	14204
2055752	4.097E-02	4.109E-02	4.097E-02	14210
2056668	4.156E-02	4.169E-02	4.156E-02	14217
2057583	4.217E-02	4.229E-02	4.217E-02	14223
2058499	4.278E-02	4.290E-02	4.278E-02	14229
2059414	4.340E-02	4.352E-02	4.340E-02	14236
2060330	4.403E-02	4.415E-02	4.403E-02	14242
2061245	4.466E-02	4.479E-02	4.466E-02	14248
2062160	4.531E-02	4.544E-02	4.531E-02	14255
2063076	4.597E-02	4.610E-02	4.597E-02	14261
2063991	4.663E-02	4.675E-02	4.663E-02	14267
2064907	4.731E-02	4.734E-02	4.731E-02	14274
2067653	4.562E-02	4.786E-02	4.562E-02	14293
2068569	4.752E-02	4.750E-02	4.752E-02	14299
2069484	4.939E-02	4.701E-02	4.939E-02	14305
2070400	4.822E-02	4.649E-02	4.822E-02	14312
2071315	4.718E-02	4.596E-02	4.718E-02	14318
2072231	4.609E-02	4.543E-02	4.609E-02	14324
2073146	4.501E-02	4.491E-02	4.501E-02	14331
2074062	4.401E-02	4.439E-02	4.401E-02	14337
2075893	4.202E-02	4.338E-02	4.202E-02	14350
2076808	4.345E-02	4.288E-02	4.345E-02	14356
2077724	4.246E-02	4.239E-02	4.246E-02	14362
2078639	4.146E-02	4.191E-02	4.146E-02	14369
2080470	3.964E-02	4.095E-02	3.964E-02	14381
2081386	4.090E-02	4.048E-02	4.090E-02	14388
2082301	3.994E-02	4.002E-02	3.994E-02	14394
2083217	3.903E-02	3.956E-02	3.903E-02	14400
2084132	3.812E-02	3.910E-02	3.812E-02	14407
2085048	3.730E-02	3.865E-02	3.730E-02	14413

2341017	1.539E-03	1.535E-03	1.539E-03	16182	7258548	1.671E-30	3.609E-36	1.871E-30	50177
2596986	6.108E-05	6.099E-05	6.108E-05	17952	7259972	.000E+00	3.546E-36	.000E+00	50187
2852956	2.426E-06	2.422E-06	2.426E-06	19721	7261396	.000E+00	.000E+00	.000E+00	50196
3108925	9.643E-08	9.622E-08	9.643E-08	21491					
3364895	3.830E-09	3.822E-09	3.830E-09	23260					
3620864	1.521E-10	1.518E-10	1.521E-10	25030	MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM				
3876834	6.043E-12	6.030E-12	6.043E-12	26799	FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR				
4132803	2.400E-13	2.395E-13	2.400E-13	28569	POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY				
4388773	9.531E-15	9.514E-15	9.531E-15	30338					
4644742	3.786E-16	3.779E-16	3.786E-16	32108					
4900711	1.504E-17	1.501E-17	1.504E-17	33877	TIME OF LEACH INCIDENT: 100 YEARS				
5156681	5.974E-19	5.962E-19	5.974E-19	35647					
5412650	2.374E-20	2.368E-20	2.374E-20	37416	NUCLIDE: RA226 VIA TH230 AND -PSEUDO U234 FRO				
5668620	9.422E-22	9.406E-22	9.422E-22	39186					
5924589	3.743E-23	3.736E-23	3.743E-23	40955	NUCLIDE U238 T TH230 RA226				
6180559	1.487E-24	1.484E-24	1.487E-24	42725	HALF LIFE, YR 2.44E+05 7.70E+04 1.60E+03				
6436528	5.898E-26	5.884E-26	5.898E-26	44494	DECAY NUMBER 4.11E-04 1.30E-03 6.27E-02				
6692497	2.311E-27	2.308E-27	2.311E-27	46264	DISTRIB COEF 1.43E+04 5.00E+04 5.00E+02				
6948467	8.331E-29	8.314E-29	8.331E-29	48033	YR 2000 CURIES 2.44E+02 .00E+00 .00E+00				
7204436	7.476E-31	7.443E-31	7.476E-31	49803	PULSE G-ATOMS 1.66E+02 .00E+00 .00E+00				
7205860	7.023E-31	6.984E-31	7.023E-31	49813	NUCL VEL,MI/YR 4.84E-06 1.38E-06 1.38E-04				
7207284	6.570E-31	6.534E-31	6.570E-31	49822	DISCH TIME,YR 2.07E+06 7.23E+06 7.23E+04				
7208709	6.158E-31	6.095E-31	6.158E-31	49832	DIM DISC TIME 1.43E+04 5.00E+04 5.00E+02				
7210132	5.702E-31	5.656E-31	5.702E-31	49842	LEACH RATE= .003000 FRACTION PER YEAR				
7211556	5.306E-31	5.247E-31	5.306E-31	49852	LEACH DURATION= 333 YEARS				
7212980	4.890E-31	4.837E-31	4.890E-31	49862	PATH LENGTH= 10.00 MILES				
7214404	4.499E-31	4.437E-31	4.499E-31	49872	DIMENSIONLESS DISTANCE= 1.00				
7215828	4.082E-31	4.046E-31	4.082E-31	49881	WATER VELOCITY= 1.00 FT/DAY				
7217252	3.706E-31	3.664E-31	3.706E-31	49891	WATER TRAVEL TIME= 145 YEARS				
7218676	3.328E-31	3.291E-31	3.328E-31	49901	AXIAL DISPERSION COEFFICIENT= .0060 CM12/MIN				
7220100	2.967E-31	2.928E-31	2.967E-31	49911	PECLET NUMBER= 4.26E+06				
7221524	2.630E-31	2.574E-31	2.630E-31	49921	NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION				
7222948	2.292E-31	2.231E-31	2.292E-31	49931	INITIAL BREAKTHROUGH AT 72457 YEARS				
7224372	1.910E-31	1.902E-31	1.910E-31	49941	PEAK DISCHARGE RATE= 1.59E-04 CURIES PER YEAR AT 2067653 YEARS				
7225796	1.597E-31	1.587E-31	1.597E-31	49950	BAND WIDTH= 7188940 YEARS WITH TAIL END AT 7261396 YEARS				
7227220	1.256E-31	1.293E-31	1.256E-31	49960	DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00				
7232915	9.411E-34	4.073E-32	9.411E-34	50000					
7234340	2.539E-30	2.750E-32	2.539E-30	50009	TIME,YR DISC RATE,CI/YR PULSE RATE BAND RATE DIM TIME				
7235764	2.495E-30	1.763E-32	2.495E-30	50019					
7237188	2.448E-30	1.064E-32	2.448E-30	50029					
7238612	2.409E-30	6.131E-33	2.409E-30	50039					
7240036	2.361E-30	3.307E-33	2.361E-30	50049	71951 .000E+00 .000E+00 .000E+00 497				
7241460	2.322E-30	1.680E-33	2.322E-30	50059	71981 .000E+00 2.970E-38 .000E+00 497				
7242884	2.279E-30	7.876E-34	2.279E-30	50068	72010 .000E+00 1.940E-36 .000E+00 497				
7244308	2.240E-30	3.504E-34	2.240E-30	50078	72040 .000E+00 3.052E-34 .000E+00 497				
7245732	2.201E-30	1.498E-34	2.201E-30	50088	72070 .000E+00 3.359E-32 .000E+00 498				
7247156	2.162E-30	5.895E-35	2.162E-30	50098	72219 .000E+00 4.619E-24 .000E+00 499				
7248580	2.123E-30	2.434E-35	2.123E-30	50108	72248 .000E+00 5.903E-23 .000E+00 499				
7250004	2.084E-30	1.051E-35	2.084E-30	50118	72278 .000E+00 5.465E-22 .000E+00 499				
7251428	2.045E-30	6.007E-36	2.045E-30	50128	72308 .000E+00 3.705E-21 .000E+00 499				
7252852	2.010E-30	4.464E-36	2.010E-30	50137	72338 .000E+00 1.634E-20 .000E+00 499				
7254276	1.975E-30	3.984E-36	1.975E-30	50147	72367 .000E+00 4.798E-20 .000E+00 500				
7255700	1.936E-30	3.796E-36	1.936E-30	50157	72397 4.389E-19 1.988E-19 4.389E-19 500				
7257124	1.902E-30	3.692E-36	1.902E-30	50167	72427 4.389E-19 4.750E-19 4.389E-19 500				

72516	5.391E-19	2.193E-18	5.391E-19	501	2063076	1.532E-04	1.536E-04	1.532E-04	14261
72546	1.229E-18	2.911E-18	1.229E-18	501	2063991	1.550E-04	1.554E-04	1.550E-04	14267
72580	1.248E-18	3.754E-18	1.248E-18	501	2064907	1.568E-04	1.569E-04	1.568E-04	14274
72615	2.922E-18	4.600E-18	2.922E-18	501	2067653	1.590E-04	1.581E-04	1.590E-04	14293
72649	3.141E-18	5.445E-18	3.141E-18	502	2068569	1.573E-04	1.570E-04	1.573E-04	14299
72718	5.035E-18	7.143E-18	5.035E-18	502	2069484	1.560E-04	1.555E-04	1.560E-04	14305
72787	7.963E-18	8.840E-18	7.963E-18	502	2070400	1.542E-04	1.539E-04	1.542E-04	14312
72822	1.120E-17	9.688E-18	1.120E-17	503	2071315	1.525E-04	1.523E-04	1.525E-04	14318
72856	1.180E-17	1.054E-17	1.180E-17	503	2072231	1.509E-04	1.507E-04	1.508E-04	14324
72890	1.506E-17	1.139E-17	1.506E-17	503	2073146	1.495E-04	1.492E-04	1.495E-04	14331
72925	1.609E-17	1.224E-17	1.609E-17	503	2074062	1.482E-04	1.476E-04	1.482E-04	14337
72959	1.849E-17	1.308E-17	1.849E-17	504	2074977	1.464E-04	1.461E-04	1.464E-04	14343
72994	2.003E-17	1.393E-17	2.003E-17	504	2075893	1.451E-04	1.445E-04	1.451E-04	14350
73028	2.112E-17	1.478E-17	2.112E-17	504	2076808	1.430E-04	1.430E-04	1.430E-04	14356
73063	2.283E-17	1.564E-17	2.283E-17	504	2077724	1.417E-04	1.415E-04	1.417E-04	14362
73097	2.347E-17	1.649E-17	2.347E-17	505	2078639	1.404E-04	1.401E-04	1.404E-04	14369
73166	2.618E-17	1.819E-17	2.618E-17	505	2079555	1.386E-04	1.386E-04	1.386E-04	14375
73201	3.010E-17	1.904E-17	3.010E-17	505	2080470	1.373E-04	1.372E-04	1.373E-04	14381
73235	3.096E-17	1.989E-17	3.096E-17	506	2081386	1.360E-04	1.357E-04	1.360E-04	14388
171995	4.115E-15	4.130E-15	4.115E-15	1188	2082301	1.343E-04	1.343E-04	1.343E-04	14394
270754	1.707E-14	1.712E-14	1.707E-14	1871	2083217	1.330E-04	1.329E-04	1.330E-04	14400
369514	6.185E-14	6.202E-14	6.185E-14	2554	2084132	1.317E-04	1.315E-04	1.317E-04	14407
468274	2.193E-13	2.199E-13	2.193E-13	3236	2085048	1.304E-04	1.301E-04	1.304E-04	14413
567033	7.744E-13	7.766E-13	7.744E-13	3919	2341017	6.927E-06	6.914E-06	6.927E-06	16182
665793	2.733E-12	2.741E-12	2.733E-12	4602	2596986	3.678E-07	3.673E-07	3.678E-07	17952
764553	9.647E-12	9.674E-12	9.647E-12	5285	2852956	1.954E-08	1.952E-08	1.954E-08	19721
863313	3.404E-11	3.414E-11	3.404E-11	5967	3108925	1.038E-09	1.037E-09	1.038E-09	21491
962072	1.201E-10	1.205E-10	1.201E-10	6650	3364895	5.515E-11	5.509E-11	5.515E-11	23260
1060832	4.240E-10	4.252E-10	4.240E-10	7333	3620864	2.929E-12	2.927E-12	2.929E-12	25030
1159592	1.496E-09	1.501E-09	1.496E-09	8015	3876834	1.555E-13	1.555E-13	1.555E-13	26799
1258351	5.280E-09	5.296E-09	5.280E-09	8698	4132803	8.270E-15	8.261E-15	8.270E-15	28569
1357111	1.864E-08	1.869E-08	1.864E-08	9381	4388773	4.397E-16	4.389E-16	4.397E-16	30338
1455871	6.577E-08	6.595E-08	6.577E-08	10064	4644742	2.335E-17	2.332E-17	2.335E-17	32108
1554630	2.321E-07	2.328E-07	2.321E-07	10746	4900711	1.240E-18	1.239E-18	1.240E-18	33877
1653390	8.190E-07	8.214E-07	8.190E-07	11429	5156681	6.594E-20	6.582E-20	6.594E-20	35647
1752150	2.890E-06	2.899E-06	2.890E-06	12112	5412650	3.500E-21	3.497E-21	3.500E-21	37416
1850909	1.020E-05	1.023E-05	1.020E-05	12794	5668620	1.863E-22	1.858E-22	1.863E-22	39186
1949669	3.600E-05	3.610E-05	3.600E-05	13477	5924589	9.880E-24	9.869E-24	9.880E-24	40955
2048429	1.270E-04	1.274E-04	1.270E-04	14160	6180559	5.246E-25	5.240E-25	5.246E-25	42725
2049344	1.285E-04	1.289E-04	1.285E-04	14166	6436528	2.777E-26	2.773E-26	2.777E-26	44494
2050260	1.301E-04	1.304E-04	1.301E-04	14173	6692497	1.443E-27	1.442E-27	1.443E-27	46264
2051175	1.316E-04	1.320E-04	1.316E-04	14179	6948467	6.723E-29	6.711E-29	6.723E-29	48033
2052091	1.331E-04	1.335E-04	1.331E-04	14185	7204436	7.364E-31	7.315E-31	7.364E-31	49803
2053006	1.347E-04	1.351E-04	1.347E-04	14191	7205860	6.902E-31	6.869E-31	6.902E-31	49813
2053921	1.363E-04	1.367E-04	1.363E-04	14198	7207284	6.482E-31	6.433E-31	6.482E-31	49822
2054837	1.379E-04	1.383E-04	1.379E-04	14204	7208708	6.016E-31	6.006E-31	6.016E-31	49832
2055752	1.395E-04	1.399E-04	1.395E-04	14210	7210132	5.593E-31	5.587E-31	5.593E-31	49842
2056668	1.411E-04	1.415E-04	1.411E-04	14217	7211556	5.262E-31	5.178E-31	5.262E-31	49852
2057583	1.428E-04	1.432E-04	1.428E-04	14223	7212980	4.824E-31	4.778E-31	4.824E-31	49862
2058499	1.445E-04	1.449E-04	1.445E-04	14229	7214404	4.442E-31	4.386E-31	4.442E-31	49872
2059414	1.462E-04	1.466E-04	1.462E-04	14236	7215828	4.014E-31	4.002E-31	4.014E-31	49881
2060330	1.479E-04	1.483E-04	1.479E-04	14242	7217252	3.668E-31	3.627E-31	3.668E-31	49891
2061245	1.496E-04	1.501E-04	1.496E-04	14248	7218676	3.230E-31	3.261E-31	3.280E-31	49901
2062160	1.514E-04	1.518E-04	1.514E-04	14255	7220100	2.981E-31	2.963E-31	2.981E-31	49911

7221524	2.632E-31	2.554E-31	2.632E-31	49921
7222948	2.281E-31	2.215E-31	2.281E-31	49931
7224372	1.929E-31	1.889E-31	1.929E-31	49941
7225796	1.572E-31	1.578E-31	1.572E-31	49950
7227220	1.218E-31	1.286E-31	1.218E-31	49960
7232916	4.537E-33	4.065E-32	4.537E-33	50000
7234340	2.972E-30	2.739E-32	2.972E-30	50009
7235764	2.920E-30	1.757E-32	2.920E-30	50019
7237188	2.877E-30	1.059E-32	2.877E-30	50029
7238612	2.829E-30	6.106E-33	2.829E-30	50039
7240036	2.781E-30	3.291E-33	2.781E-30	50049
7241460	2.738E-30	1.666E-33	2.738E-30	50059
7242884	2.695E-30	7.905E-34	2.695E-30	50068
7244308	2.647E-30	3.531E-34	2.647E-30	50078
7245732	2.608E-30	1.475E-34	2.608E-30	50088
7247156	2.565E-30	5.680E-35	2.565E-30	50098
7248580	2.521E-30	2.249E-35	2.521E-30	50108
7250004	2.482E-30	8.865E-36	2.482E-30	50118
7251428	2.439E-30	4.464E-36	2.439E-30	50128
7252852	2.400E-30	2.962E-36	2.400E-30	50137
7254276	2.361E-30	2.461E-36	2.361E-30	50147
7255700	2.326E-30	2.336E-36	2.326E-30	50157
7257124	2.283E-30	2.253E-36	2.283E-30	50167
7258548	2.248E-30	2.211E-36	2.248E-30	50177
7259972	.000E+00	2.169E-36	.000E+00	50187
7261396	.000E+00	.000E+00	.000E+00	50196

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDES: TH230 VIA U234 FROM AM242M

NUCLIDE	AM242M	U234 F	TH230
HALF LIFE, YR	1.52E+02	2.44E+05	7.70E+04
DECAY NUMBER	4.60E-01	4.11E-04	1.30E-03
DISTRIB COEF	1.00E+04	1.43E+04	5.00E+04
YR 2000 CURIES	7.45E+06	.00E+00	.00E+00
PULSE G-ATOMS	2.01E+01	.00E+00	.00E+00
NUCL VEL,MI/YR	6.91E-06	4.84E-06	1.38E-06
DISCH TIME,YR	1.45E+06	2.07E+06	7.23E+06
DIM DISC TIME	1.00E+04	1.43E+04	5.00E+04

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 FILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 10^ YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06

NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 2061245 YEARS
PEAK DISCHARGE RATE= 2.33E-05 CURIES PER YEAR AT 2066738 YEARS
BAND WIDTH= 5171671 YEARS WITH TAIL END AT 7232916 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
2049344	.000E+00	.000E+00	.000E+00	14166
2050260	.000E+00	2.573E-35	.000E+00	14173
2051175	.000E+00	3.592E-32	.000E+00	14179
2052091	.000E+00	3.345E-29	.000E+00	14185
2064907	6.067E-14	3.310E-06	6.067E-14	14274
2065822	1.022E-09	8.398E-06	1.022E-09	14280
2066738	2.329E-05	1.562E-05	2.329E-05	14286
2067653	1.519E-05	2.243E-05	1.519E-05	14293
2068569	1.504E-05	2.663E-05	1.504E-05	14299
2069484	1.488E-05	2.825E-05	1.488E-05	14305
2070400	1.472E-05	2.849E-05	1.472E-05	14312
2071315	1.457E-05	2.829E-05	1.457E-05	14318
2072231	1.442E-05	2.801E-05	1.442E-05	14324
2073146	1.427E-05	2.772E-05	1.427E-05	14331
2074062	1.412E-05	2.743E-05	1.412E-05	14337
2074977	1.397E-05	2.714E-05	1.397E-05	14343
2075893	1.382E-05	2.686E-05	1.382E-05	14350
2076808	1.368E-05	2.658E-05	1.368E-05	14356
2077724	1.354E-05	2.630E-05	1.354E-05	14362
2078639	1.340E-05	2.603E-05	1.340E-05	14369
2079555	1.326E-05	2.576E-05	1.326E-05	14375
2080470	1.312E-05	2.549E-05	1.312E-05	14381
2081386	1.298E-05	2.522E-05	1.298E-05	14388
2082301	1.285E-05	2.496E-05	1.285E-05	14394
2083217	1.271E-05	2.470E-05	1.271E-05	14400
2084132	1.258E-05	2.444E-05	1.258E-05	14407
2085048	1.245E-05	2.418E-05	1.245E-05	14413
2341017	6.613E-07	1.285E-06	6.613E-07	16182
2596987	3.513E-08	6.826E-08	3.513E-08	17952
2852956	1.867E-09	3.627E-09	1.867E-09	19721
3108925	9.917E-11	1.927E-10	9.917E-11	21491
3364895	5.269E-12	1.024E-11	5.269E-12	23260
3620864	2.799E-13	5.439E-13	2.799E-13	25030
3876834	1.487E-14	2.889E-14	1.487E-14	26799
4132803	7.901E-16	1.535E-15	7.901E-16	28569
4388773	4.198E-17	8.156E-17	4.198E-17	30338
4644742	2.230E-18	4.333E-18	2.230E-18	32108
4900711	1.185E-19	2.302E-19	1.185E-19	33877
5156681	6.295E-21	1.223E-20	6.295E-21	35647
5412650	3.345E-22	6.498E-22	3.345E-22	37416
5668620	1.777E-23	3.452E-23	1.777E-23	39186
5924589	9.440E-25	1.834E-24	9.440E-25	40955
6180559	5.016E-26	9.745E-26	5.016E-26	42725
6436528	2.665E-27	5.177E-27	2.665E-27	44494

6692498	1.416E-28	2.751E-28	1.416E-28	46264
6948467	7.521E-30	1.461E-29	7.521E-30	48033
7204436	3.996E-31	7.764E-31	3.996E-31	49803
7205860	3.931E-31	7.638E-31	3.931E-31	49813
7207284	3.868E-31	7.514E-31	3.868E-31	49822
7208708	3.805E-31	7.393E-31	3.805E-31	49832
7210132	3.743E-31	7.273E-31	3.743E-31	49842
7211556	3.683E-31	7.155E-31	3.683E-31	49852
7212980	3.623E-31	7.039E-31	3.623E-31	49862
7214404	3.564E-31	6.924E-31	3.564E-31	49872
7215828	3.507E-31	6.809E-31	3.507E-31	49881
7217252	3.450E-31	6.692E-31	3.450E-31	49891
7218676	3.394E-31	6.569E-31	3.394E-31	49901
7220100	3.339E-31	6.432E-31	3.339E-31	49911
7221524	3.285E-31	6.269E-31	3.285E-31	49921
7222948	3.232E-31	6.064E-31	3.232E-31	49931
7224372	3.179E-31	5.796E-31	3.179E-31	49941
7225796	3.127E-31	5.445E-31	3.127E-31	49950
7227220	3.074E-31	4.997E-31	3.074E-31	49960
7228644	3.009E-31	4.450E-31	3.009E-31	49970
7230068	2.884E-31	3.819E-31	2.884E-31	49980
7231492	2.461E-31	3.139E-31	2.461E-31	49990
7232915	5.401E-32	2.458E-31	5.401E-32	50000
7234340	.000E+00	1.824E-31	.000E+00	50009
7235764	.000E+00	1.277E-31	.000E+00	50019
7237188	.000E+00	8.403E-32	.000E+00	50029
7238612	.000E+00	5.184E-32	.000E+00	50039
7240036	.000E+00	2.991E-32	.000E+00	50049
7241460	.000E+00	1.609E-32	.000E+00	50059
7242884	.000E+00	8.070E-33	.000E+00	50068
7244308	.000E+00	3.764E-33	.000E+00	50078
7245732	.000E+00	1.630E-33	.000E+00	50088
7247156	.000E+00	6.553E-34	.000E+00	50098
7248580	.000E+00	2.444E-34	.000E+00	50108
7250004	.000E+00	8.445E-35	.000E+00	50118
7251428	.000E+00	2.705E-35	.000E+00	50128
7252852	.000E+00	8.018E-36	.000E+00	50137
7254276	.000E+00	2.199E-36	.000E+00	50147
7255700	.000E+00	5.576E-37	.000E+00	50157
7257124	.000E+00	.000E+00	.000E+00	50167

MIGRATION OF RADIONUCLIDE CHAINS THROUGH AN ADSORBING MEDIUM
FOR IMPULSE AND BAND RELEASE OF ALL OF THE YR 2000 NUCLEAR
POWER ECONOMY WASTE FROM AN UNDERGROUND REPOSITORY

TIME OF LEACH INCIDENT: 100 YEARS

NUCLIDE: PA231 VIA U235 FROM PU239

NUCLIDE	PU239	U235	PA231
HALF LIFE, YR	2.44E+04	7.04E+08	3.25E+04
DECAY NUMBER	4.11E-03	1.42E-07	3.09E-03

DISTRIB COEF	1.00E+04	1.43E+04	1.67E+04
YR 2000 CURIES	9.69E+05	.00E+00	.00E+00
PULSE G-ATOMS	6.72E+04	.00E+00	.00E+00
NUCL VEL,MI/YR	6.91E-06	4.84E-06	4.15E-06
DISCH TIME,YR	1.45E+06	2.07E+06	2.41E+06
DIM DISC TIME	1.00E+04	1.43E+04	1.67E+04

LEACH RATE= .003000 FRACTION PER YEAR
LEACH DURATION= 333 YEARS
PATH LENGTH= 10.00 MILES
DIMENSIONLESS DISTANCE= 1.00
WATER VELOCITY= 1.00 FT/DAY
WATER TRAVEL TIME= 145 YEARS
AXIAL DISPERSION COEFFICIENT= .0080 CM12/MIN
PECLET NUMBER= 4.26E+06
NUCLIDE DISCHARGE RATE FROM AQUIFER WITH AXIAL DISPERSION
INITIAL BREAKTHROUGH AT 1446797 YEARS
PEAK DISCHARGE RATE= 1.25E-03 CURIES PER YEAR AT 2065856 YEARS
BAND WIDTH= 964352 YEARS WITH TAIL END AT 2411149 YEARS
DISPERSION PEAK/NO-DISPERSION PEAK = .00E+00

TIME,YR	DISC RATE,CI/YR	PULSE RATE	BAND RATE	DIM TIME
1438323	.000E+00	.000E+00	.000E+00	9942
1438822	.000E+00	2.020E-38	.000E+00	9946
1439320	.000E+00	1.199E-36	.000E+00	9949
1439819	.000E+00	4.837E-35	.000E+00	9953
1440317	.000E+00	1.606E-33	.000E+00	9956
1440816	.000E+00	4.410E-32	.000E+00	9959
1441314	.000E+00	8.689E-31	.000E+00	9963
1441812	.000E+00	1.379E-29	.000E+00	9966
1442311	.000E+00	1.796E-28	.000E+00	9970
1442809	.000E+00	1.753E-27	.000E+00	9973
1443308	.000E+00	1.382E-26	.000E+00	9977
1443806	.000E+00	8.812E-26	.000E+00	9980
1444305	.000E+00	4.386E-25	.000E+00	9984
1444803	.000E+00	1.781E-24	.000E+00	9987
1445301	.000E+00	5.908E-24	.000E+00	9991
1445800	3.356E-24	1.603E-23	3.356E-24	9994
1446298	3.356E-24	3.661E-23	3.356E-24	9997
1446797	3.356E-24	7.141E-23	3.356E-24	10001
1447295	6.592E-23	1.213E-22	6.592E-23	10004
1447794	1.407E-22	1.844E-22	1.407E-22	10008
1448292	2.179E-22	2.569E-22	2.179E-22	10011
1448791	2.968E-22	3.353E-22	2.968E-22	10015
1449289	3.781E-22	4.176E-22	3.781E-22	10018
1449787	4.619E-22	5.027E-22	4.619E-22	10022
1450286	5.481E-22	5.903E-22	5.481E-22	10025
1450784	6.366E-22	6.806E-22	6.366E-22	10028
1451283	7.279E-22	7.736E-22	7.279E-22	10032
1451781	8.218E-22	8.693E-22	8.218E-22	10035
1452280	9.187E-22	9.678E-22	9.187E-22	10039
1452778	1.018E-21	1.069E-21	1.018E-21	10042

1453276	1.121E-21	1.174E-21	1.121E-21	10046	2073146	5.162E-04	5.192E-04	5.162E-04	14331
1453775	1.226E-21	1.281E-21	1.226E-21	10049	2074061	4.497E-04	4.529E-04	4.497E-04	14337
1454273	1.335E-21	1.392E-21	1.335E-21	10053	2074977	3.918E-04	3.950E-04	3.918E-04	14343
1454772	1.447E-21	1.507E-21	1.447E-21	10056	2075892	3.412E-04	3.446E-04	3.412E-04	14350
1455270	1.563E-21	1.624E-21	1.563E-21	10059	2076808	2.969E-04	3.005E-04	2.969E-04	14356
1455769	1.682E-21	1.746E-21	1.682E-21	10063	2077723	2.582E-04	2.621E-04	2.582E-04	14362
1456267	1.805E-21	1.871E-21	1.805E-21	10066	2078639	2.241E-04	2.287E-04	2.241E-04	14369
1456765	1.931E-21	2.000E-21	1.931E-21	10070	2079554	1.945E-04	1.994E-04	1.945E-04	14375
1486383	2.454E-20	2.506E-20	2.454E-20	10274	2080470	1.687E-04	1.740E-04	1.687E-04	14381
1516000	1.827E-19	1.865E-19	1.827E-19	10479	2081385	1.459E-04	1.517E-04	1.459E-04	14388
1545617	1.308E-18	1.335E-18	1.308E-18	10684	2082301	1.259E-04	1.324E-04	1.259E-04	14394
1575234	9.326E-18	9.516E-18	9.326E-18	10889	2083216	1.082E-04	1.154E-04	1.082E-04	14400
1604851	6.647E-17	6.782E-17	6.647E-17	11093	2084132	1.005E-04	1.007E-04	1.005E-04	14407
1634469	4.737E-16	4.834E-16	4.737E-16	11298	2085047	8.765E-05	8.783E-05	8.765E-05	14413
1664085	3.376E-15	3.445E-15	3.376E-15	11503	2100640	8.546E-06	8.540E-06	8.546E-06	14521
1693702	2.406E-14	2.455E-14	2.406E-14	11708	2116234	8.334E-07	7.654E-07	8.334E-07	14629
1723319	1.715E-13	1.750E-13	1.715E-13	11912	2131827	8.126E-08	8.532E-08	8.126E-08	14736
1752936	1.222E-12	1.247E-12	1.222E-12	12117	2147420	7.922E-09	8.318E-09	7.922E-09	14844
1782553	8.708E-12	8.887E-12	8.708E-12	12322	2163013	7.725E-10	8.111E-10	7.725E-10	14952
1812170	6.207E-11	6.333E-11	6.207E-11	12527	2178606	7.532E-11	7.908E-11	7.532E-11	15060
1841787	4.423E-10	4.514E-10	4.423E-10	12731	2194199	7.344E-12	7.711E-12	7.344E-12	15168
1871404	3.152E-09	3.217E-09	3.152E-09	12936	2209792	7.161E-13	7.519E-13	7.161E-13	15275
1901021	2.247E-08	2.293E-08	2.247E-08	13141	2225385	6.982E-14	7.331E-14	6.982E-14	15383
1930638	1.601E-07	1.634E-07	1.601E-07	13346	2240978	6.808E-15	7.149E-15	6.808E-15	15491
1960255	1.141E-06	1.164E-06	1.141E-06	13550	2256571	6.639E-16	6.970E-16	6.639E-16	15599
1989872	8.132E-06	8.298E-06	8.132E-06	13755	2272165	6.472E-17	6.796E-17	6.472E-17	15707
2019489	5.796E-05	5.914E-05	5.796E-05	13960	2287758	6.311E-18	6.626E-18	6.311E-18	15814
2049106	4.131E-04	4.215E-04	4.131E-04	14165	2303351	6.153E-19	6.461E-19	6.153E-19	15922
2049988	4.379E-04	4.469E-04	4.379E-04	14171	2318944	6.000E-20	6.300E-20	6.000E-20	16030
2050870	4.643E-04	4.738E-04	4.643E-04	14177	2334537	5.851E-21	6.143E-21	5.851E-21	16138
2051751	4.922E-04	5.023E-04	4.922E-04	14183	2350130	5.703E-22	5.988E-22	5.703E-22	16245
2052633	5.218E-04	5.329E-04	5.218E-04	14189	2365723	5.559E-23	5.839E-23	5.552E-23	16353
2053514	5.534E-04	5.648E-04	5.534E-04	14195	2381316	5.338E-24	5.605E-24	5.338E-24	16461
2054396	5.865E-04	5.985E-04	5.865E-04	14201	2396909	4.561E-25	4.789E-25	4.561E-25	16569
2055277	6.220E-04	6.345E-04	6.220E-04	14207	2397521	4.033E-25	4.235E-25	4.033E-25	16574
2056159	6.593E-04	6.728E-04	6.593E-04	14213	2398333	3.559E-25	3.737E-25	3.559E-25	16579
2057040	6.993E-04	7.133E-04	6.993E-04	14219	2399045	3.133E-25	3.290E-25	3.133E-25	16584
2057922	7.411E-04	7.562E-04	7.411E-04	14225	2399757	2.751E-25	2.889E-25	2.751E-25	16589
2058803	7.859E-04	8.017E-04	7.859E-04	14232	2400469	2.406E-25	2.529E-25	2.408E-25	16593
2059685	8.331E-04	8.500E-04	8.331E-04	14238	2401181	2.100E-25	2.205E-25	2.100E-25	16598
2060567	8.832E-04	9.012E-04	8.832E-04	14244	2401893	1.824E-25	1.915E-25	1.824E-25	16603
2061448	9.363E-04	9.554E-04	9.363E-04	14250	2402605	1.575E-25	1.654E-25	1.575E-25	16608
2062330	9.926E-04	1.013E-03	9.926E-04	14256	2403317	1.353E-25	1.420E-25	1.353E-25	16613
2063211	1.053E-03	1.073E-03	1.053E-03	14262	2404029	1.153E-25	1.210E-25	1.153E-25	16618
2064093	1.116E-03	1.138E-03	1.116E-03	14268	2404741	9.736E-26	1.022E-25	9.736E-26	16623
2064974	1.183E-03	1.206E-03	1.183E-03	14274	2405453	8.134E-26	8.541E-26	8.134E-26	16628
2065856	1.254E-03	1.279E-03	1.254E-03	14280	2406165	6.694E-26	7.028E-26	6.694E-26	16633
2066737	1.330E-03	1.356E-03	1.330E-03	14286	2406877	5.404E-26	5.674E-26	5.404E-26	16638
2067619	1.410E-03	1.438E-03	1.410E-03	14293	2407589	4.250E-26	4.463E-26	4.250E-26	16643
2068500	1.495E-03	1.525E-03	1.495E-03	14299	2410437	7.258E-27	7.620E-27	7.258E-27	16662
2069382	1.585E-03	1.616E-03	1.585E-03	14305	2411149	3.533E-24	3.709E-24	3.533E-24	16667
2070263	1.680E-03	1.713E-03	1.680E-03	14312	2411861	.000E+00	.000E+00	.000E+00	16672
2071145	1.780E-03	1.816E-03	1.780E-03	14318					
2072026	1.886E-03	1.924E-03	1.886E-03	14324					

I.4 Geosphere Transport Output File

The geosphere transport output file which follows contains all nuclide inventories exiting the soil column at the peak discharge times for 26 important single nuclides. Table I.1 shows the nuclide inventory locations for the entries in output file.

TABLE I.1. Nuclide Inventory Locations for Geosphere Transport Output File

^{3}H	^{10}Be	^{14}C	^{22}Na	^{24}Na	^{32}P	^{41}Ca
^{51}Cr	^{54}Mn	^{55}Fe	^{59}Fe	^{57}Co	^{58}Co	^{60}Co
^{59}Ni	^{63}Ni	^{65}Zn	^{79}Se	^{82}Br	^{85}Kr	^{87}Rb
^{89}Sr	^{90}Sr	^{90D}Sr	^{91}Sr	^{90}Y	^{91M}Y	^{91}Y
^{93+D}Zr	^{95}Zr	^{95D}Zr	^{93M}Nb	^{95}Nb	^{93}Mo	^{99+D}Mo
^{99D}Mo	^{99M}Tc	^{99}Tc	$^{103+D}Ru$	$^{106+D}Ru$	^{107}Pd	$^{110M+D}Ag$
^{113M}Cd	$^{126+D}Sn$	^{125}Sb	^{126}Sb	^{125M}Te	^{127M}Te	^{127}Te
^{129}I	^{130}I	^{131}I	^{132}I	^{133}I	^{134}I	^{135}I
^{134}Cs	^{135}Cs	^{136}Cs	^{137}Cs	^{138}Cs	^{140}Ba	^{140D}Ba
^{141}Ce	$^{144+D}Ce$	^{144}Pr	^{147}Pm	^{148}Pm	^{151}Sm	^{152}Eu
^{154}Eu	^{155}Eu	^{166M}Ho	$^{210+D}Pb$	$^{210+D}Bi$	^{210}Po	$^{222+D}Rn$
$^{223+D}Ra$	$^{224+D}Ra$	$^{225+D}Ra$	$^{226+D}Ra$	$^{228+D}Ra$	^{225}Ac	$^{227+D}Ac$
$^{227+D}Th$	$^{228+D}Th$	^{229}Th	$^{230+D}Th$	$^{232+D}Th$	^{234}Th	$^{231+D}Pa$
^{233}Pa	^{232}U	^{233}U	^{234}U	^{235D}U	^{236}U	^{237}U
$^{238+D}U$	$^{237+D}Np$	^{239}Np	^{238}Pu	^{239}Pu	^{240}Pu	^{241}Pu
^{242}Pu	^{244}Pu	^{241}Am	$^{242M+D}Am$	$^{243+D}Am$	^{242}Cm	^{243}Cm
^{244}Cm	$^{245+D}Cm$	^{246}Cm	$^{247+D}Cm$	^{248}Cm		

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H3     08/06/75 117 NUKS FOR AWM 1.98E+00 CI/YR AT       245 YR
FRESH
1.98E+00 4.66E-38  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
1.60E-35  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00 8.48E+03  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
2.41E+01  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00

TC99   08/06/75 117 NUKS FOR AWM 8.49E+03 CI/YR AT       250 YR
FRESH
1.50E+00 4.66E-38  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
1.60E-35  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00 8.49E+03  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
2.41E+01  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00

I129   08/06/75 117 NUKS FOR AWM 2.41E+01 CI/YR AT       250 YR
FRESH
1.50E+00 4.66E-38  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
1.60E-35  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00 8.49E+03  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
2.41E+01  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
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 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00

C14    08/06/75 117 NUKS FOR AWM 2.57E+03 CI/YR AT      1554 YR
FRESH
 .00E+00 4.66E-38 2.57E+03  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
1.60E-35  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00

M093   08/06/75 117 NUKS FOR AWM 6.72E+00 CI/YR AT      3727 YR
FRESH
 .00E+00 4.66E-38  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
1.60E-35  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00 6.72E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
 .00E+00  .00E+00  .00E+00  .00E+00  .00E+00

CA41   08/06/75 117 NUKS FOR AWM 1.90E+00 CI/YR AT     14615 YR
FRESH
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.00E+00	4.66E-38	.00E+00	.00E+00	.00E+00	.00E+00	1.90E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
1.60E-35	.00E+00	.00E+00	2.50E+02	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	5.92E-06	.00E+00	.00E+00	5.92E-06	.00E+00
.00E+00	.00E+00	5.92E-06	.00E+00	.00E+00	.00E+00	.00E+00
2.64E+02	.00E+00	3.85E-04	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	2.64E+02	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

SE79 08/06/75 117 NUKS FOR AWM 2.50E+02 CI/YR AT 14615 YR

FRESH

.00E+00	4.66E-38	.00E+00	.00E+00	.00E+00	.00E+00	1.90E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
1.60E-35	.00E+00	.00E+00	2.50E+02	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	5.92E-06	.00E+00	.00E+00	5.92E-06	.00E+00
.00E+00	.00E+00	5.92E-06	.00E+00	.00E+00	.00E+00	.00E+00
2.64E+02	.00E+00	3.85E-04	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	2.64E+02	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

SR90 08/06/75 117 NUKS FOR AWM .00E+00 CI/YR AT 14732 YR

FRESH

.00E+00	4.66E-38	.00E+00	.00E+00	.00E+00	.00E+00	1.90E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
1.60E-35	.00E+00	.00E+00	2.49E+02	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	6.15E-05	.00E+00	.00E+00	6.15E-05	.00E+00
.00E+00	.00E+00	6.15E-05	.00E+00	.00E+00	.00E+00	.00E+00
2.64E+02	.00E+00	1.34E-03	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	2.64E+02	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

BE10 08/06/75 117 NUKS FOR AWM 1.19E+00 CI/YR AT 48468 YR

FRESH

.00E+00	1.19E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
4.06E+02	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	5.00E-04	.00E+00	.00E+00	5.00E-04	.00E+00
.00E+00	.00E+00	5.00E-04	.00E+00	.00E+00	.00E+00	.00E+00
2.84E-03	.00E+00	2.58E-03	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	2.84E-03	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

CO60 08/06/75 117 NUKS FOR AWM .00E+00 CI/YR AT 48486 YR

FRESH

.00E+00	1.19E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
4.06E+02	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	5.00E-04	.00E+00	.00E+00	5.00E-04	.00E+00
.00E+00	.00E+00	5.00E-04	.00E+00	.00E+00	.00E+00	.00E+00
2.84E-03	.00E+00	2.58E-03	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	2.84E-03	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

NI59 08/06/75 117 NUKS FOR AWM 4.07E+02 CI/YR AT 48453 YR

FRESH

.00E+00	1.19E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
4.07E+02	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	4.99E-04	.00E+00	.00E+00	4.99E-04	.00E+00
.00E+00	.00E+00	4.99E-04	.00E+00	.00E+00	.00E+00	.00E+00
2.84E-03	.00E+00	2.58E-03	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	2.84E-03	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

PB87 08/06/75 117 NUKS FOR AWM 1.40E-02 CI/YR AT 72593 YR
FRESH

.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.40E-02
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	2.02E-15	2.02E-15	2.02E-15	2.02E-15
.00E+00	.00E+00	5.94E-04	2.02E-15	.00E+00	5.94E-04	.00E+00
.00E+00	.00E+00	5.94E-04	.00E+00	.00E+00	.00E+00	.00E+00
3.62E-04	.00E+00	2.35E-03	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	3.62E-04	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

CS135 08/06/75 117 NUKS FOR AWM 2.24E+02 CI/YR AT 144920 YR
FRESH

.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	2.24E+02	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	2.09E-12	2.09E-12	2.09E-12	2.09E-12
.00E+00	.00E+00	6.73E-04	2.09E-12	.00E+00	6.73E-04	.00E+00
.00E+00	.00E+00	6.73E-04	.00E+00	.00E+00	.00E+00	.00E+00
7.94E-07	.00E+00	[illegible]	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	7.94E-07	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

PD107 08/06/75 117 NUKS FOR AWM 5.85E+01 CI/YR AT 160992 YR
FRESH

.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	5.85E+01	.00E+00
.00E+00	1.09E+02	.00E+00	1.09E+02	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	2.55E-12	2.55E-12	2.55E-12	2.55E-12
.00E+00	.00E+00	6.28E-04	2.55E-12	.00E+00	6.28E-04	.00E+00
.00E+00	.00E+00	6.28E-04	.00E+00	.00E+00	.00E+00	.00E+00
2.20E-07	.00E+00	1.59E-03	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	2.20E-07	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

SN126 08/06/75 117 NUKS FOR AWM 1.10E+02 CI/YR AT 160992 YR
FRESH

.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	5.85E+01	.00E+00
.00E+00	1.09E+02	.00E+00	1.09E+02	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	2.55E-12	2.55E-12	2.55E-12	2.55E-12
.00E+00	.00E+00	6.28E-04	2.55E-12	.00E+00	6.28E-04	.00E+00
.00E+00	.00E+00	6.28E-04	.00E+00	.00E+00	.00E+00	.00E+00
2.20E-07	.00E+00	1.59E-03	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	2.20E-07	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

H0166M 08/06/75 117 NUKS FOR AWM .00E+00 CI/YR AT 361911 YR
FRESH

.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	4.07E-11	4.07E-11	4.07E-11	4.07E-11
.00E+00	.00E+00	2.59E-04	4.07E-11	.00E+00	2.59E-04	.00E+00
.00E+00	.00E+00	2.59E-04	.00E+00	.00E+00	.00E+00	.00E+00
1.02E-14	.00E+00	6.56E-04	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	1.02E-14	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

ZR93 08/06/75 117 NUKS FOR AWM 5.62E+01 CI/YR AT 1446797 YR
FRESH

.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
5.62E+01	.00E+00	.00E+00	5.62E+01	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	4.59E-05	4.59E-05	4.59E-05	4.59E-05
3.83E-11	.00E+00	2.13E-06	4.59E-05	.00E+00	2.13E-06	3.83E-11
3.78E-11	.00E+00	2.13E-06	1.03E-07	.00E+00	1.03E-07	3.83E-11
.00E+00	.00E+00	5.37E-06	1.03E-07	3.83E-11	4.57E-11	.00E+00
1.03E-07	.00E+00	.00E+00	.00E+00	1.78E-15	2.42E-08	.00E+00
2.84E-01	2.42E-08	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

CD113M 08/06/75 117 NUKS FOR AWM .00E+00 CI/YR AT 1446842 YR
FRESH

.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
5.57E+01	.00E+00	.00E+00	5.57E+01	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	4.59E-05	4.59E-05	4.59E-05	4.59E-05
3.83E-11	.00E+00	2.13E-06	4.59E-05	.00E+00	2.13E-06	3.83E-11
3.78E-11	.00E+00	2.13E-06	1.14E-07	.00E+00	1.14E-07	3.83E-11
.00E+00	.00E+00	5.37E-06	1.14E-07	3.83E-11	4.59E-11	.00E+00
1.14E-07	.00E+00	.00E+00	.00E+00	1.76E-15	2.38E-08	.00E+00
2.82E-01	2.38E-08	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

NP237 08/06/75 117 NUKS FOR AWM 2.49E+02 CI/YR AT 14615 YR
FRESH

.00E+00	4.66E-38	.00E+00	.00E+00	.00E+00	.00E+00	1.90E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
1.60E-35	.00E+00	.00E+00	2.50E+02	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	5.92E-06	.00E+00	.00E+00	5.92E-06	.00E+00
.00E+00	.00E+00	5.92E-06	.00E+00	.00E+00	.00E+00	.00E+00
2.64E+02	.00E+00	3.85E-04	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	2.64E+02	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

RA226 08/06/75 117 NUKS FOR AWM 1.09E-16 CI/YR AT 72546 YR
FRESH

.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	1.39E-02
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	1.10E-15	1.10E-15	1.10E-15	1.10E-15
.00E+00	.00E+00	5.94E-04	1.10E-15	.00E+00	5.94E-04	.00E+00
.00E+00	.00E+00	5.94E-04	.00E+00	.00E+00	.00E+00	.00E+00
3.63E-04	.00E+00	2.35E-03	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	3.63E-04	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

CM247 08/06/75 117 NUKS FOR AWM 1.46E-04 CI/YR AT 482443 YR
FRESH

.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	2.09E-10	2.09E-10	2.09E-10	2.09E-10
1.71E-11	.00E+00	1.52E-04	2.09E-10	.00E+00	1.52E-04	1.71E-11
1.69E-11	.00E+00	1.52E-04	.00E+00	.00E+00	.00E+00	1.71E-11
.00E+00	.00E+00	3.86E-04	.00E+00	1.71E-11	1.20E-14	3.28E-20
.00E+00	.00E+00	2.66E-06	.00E+00	8.11E-07	3.65E-10	1.31E-15
3.41E-33	3.65E-10	1.31E-15	.00E+00	2.66E-06	.00E+00	.00E+00
.00E+00	1.31E-15	9.58E-30	1.46E-04	2.23E-04		

AM243 08/06/75 117 NUKS FOR AWM .00E+00 CI/YR AT 1446842 YR
FRESH

.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
5.57E+01	.00E+00	.00E+00	5.57E+01	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	4.59E-05	4.59E-05	4.59E-05	4.59E-05
3.83E-11	.00E+00	2.13E-06	4.59E-05	.00E+00	2.13E-06	3.83E-11
3.78E-11	.00E+00	2.13E-06	1.14E-07	.00E+00	1.14E-07	3.83E-11
.00E+00	.00E+00	5.37E-06	1.14E-07	3.83E-11	4.59E-11	.00E+00
1.14E-07	.00E+00	.00E+00	.00E+00	1.76E-15	2.38E-08	.00E+00
2.82E-01	2.38E-08	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

PU244 08/06/75 117 NUKS FOR AWM 2.14E-08 CI/YR AT 1446797 YR
FRESH

.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
5.62E+01	.00E+00	.00E+00	5.62E+01	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	4.59E-05	4.59E-05	4.59E-05	4.59E-05
3.83E-11	.00E+00	2.13E-06	4.59E-05	.00E+00	2.13E-06	3.83E-11
3.78E-11	.00E+00	2.13E-06	1.03E-07	.00E+00	1.03E-07	3.83E-11
.00E+00	.00E+00	5.37E-06	1.03E-07	3.83E-11	4.57E-11	.00E+00
1.03E-07	.00E+00	.00E+00	.00E+00	1.78E-15	2.42E-08	.00E+00
2.84E-01	2.42E-08	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

U238 08/06/75 117 NUKS FOR AWM 6.86E-02 CI/YR AT 2066738 YR
FRESH

.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	1.51E-01	1.51E-01	1.51E-01	1.51E-01
2.01E-03	4.77E-08	9.08E-03	1.51E-01	.00E+00	9.08E-03	2.01E-03
1.98E-03	4.77E-08	9.08E-03	6.05E-04	4.77E-08	6.86E-02	2.01E-03
.00E+00	.00E+00	6.11E-04	6.58E-01	8.22E-03	1.64E+00	.00E+00
6.86E-02	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

PA231 08/06/75 117 NUKS FOR AWM 1.76E-22 CI/YR AT 2411150 YR
FRESH

.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	4.52E-03	4.52E-03	4.52E-03	4.52E-03
1.83E-22	1.23E-07	1.58E-20	4.52E-03	.00E+00	1.58E-20	1.83E-22
1.81E-22	1.23E-07	1.58E-20	5.36E-05	1.23E-07	.00E+00	1.83E-22
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

TH232 08/06/75 117 NUKS FOR AWM 6.28E-04 CI/YR AT 7232917 YR
FRESH

.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	2.84E-29	2.84E-29	2.84E-29	2.84E-29
.00E+00	6.28E-04	.00E+00	2.84E-29	.00E+00	.00E+00	.00E+00

.00E+00	6.28E-04	.00E+00	1.96E-29	6.28E-04	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
.00E+00	.00E+00	.00E+00	.00E+00	.00E+00		

I.5 Accumulated Dose Summary

I.5 Accumulated Dose Summary

* * * * DOSES BY PATH, ORGAN, AND NUCLIDE AFTER 50 YEARS UPTAKE AND 50 YEARS EXPOSURE * * * *

TC99 MAX. INDIVIDUAL * * * LST008 SOURCE FILE * * * * * * 50 YR BUILDUP * * * 12:21:01 08/26/75

ISOTOPE	FISH	CRUSTACEA	MOLLUSCS	DRINKING-	SHORELINE	SWIMMING	PRODUCE	EGGS	MILK	MEAT	TOTAL	PERCENT
SKIN * * *												
TC-99	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-03	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-03	.0
I-129	.0E+00	.0E+00	.0E+00	.0E+00	1.3E+01	6.5E-04	.0E+00	.0E+00	.0E+00	.0E+00	1.3E+01	100.0
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	1.3E+01	2.5E-03	.0E+00	.0E+00	.0E+00	.0E+00	1.3E+01	
PERCENT	.0	.0	.0	.0	100.0	.0	.0	.0	.0	.0		100.0
BODY * * *												
H-3	1.7E-05	8.5E-06	8.5E-06	8.0E-04	.0E+00	.0E+00	3.7E-04	2.3E-04	2.6E-04	4.2E-03	5.8E-03	.0
1235 <NUMERIC UNDERFLOW>												
TC-99	5.5E-01	9.5E-02	9.5E-02	1.5E+00	.0E+00	9.5E-04	1.5E+02	1.4E-02	5.9E+01	5.3E-01	2.1E+02	91.5
I-129	2.4E-01	4.0E-02	4.0E-02	6.5E-01	7.5E+00	3.5E-04	6.2E+00	2.6E-02	4.2E+00	6.9E-01	2.0E+01	8.5
TOTAL	7.9E-01	1.3E-01	1.3E-01	2.2E+00	7.5E+00	1.3E-03	1.6E+02	4.0E-02	6.3E+01	1.2E+00	2.3E+02	
PERCENT	.3	.1	.1	1.0	3.2	.0	67.4	.0	27.4	.5		100.0
GI-LLI * * *												
1235 <NUMERIC UNDERFLOW>												
TC-99	7.0E+01	1.1E+01	1.1E+01	1.8E+02	.0E+00	9.5E-04	1.8E+04	1.8E+00	7.1E+03	6.4E+01	2.6E+04	100.0
I-129	1.1E-02	1.8E-03	1.8E-03	3.0E-02	7.5E+00	3.5E-04	2.9E-01	1.2E-03	2.0E-01	3.3E-02	8.1E+00	.0
TOTAL	7.0E+01	1.2E+01	1.2E+01	1.9E+02	7.5E+00	1.3E-03	1.8E+04	1.8E+00	7.2E+03	6.5E+01	2.6E+04	
PERCENT	.3	.0	.0	.7	.0	.0	70.7	.0	27.9	.3		100.0
THYROID * * *												
I-129	2.8E+02	4.7E+01	4.7E+01	7.6E+02	7.5E+00	3.5E-04	7.3E+03	3.0E+01	4.9E+03	8.1E+02	1.4E+04	100.0
TOTAL	2.8E+02	4.7E+01	4.7E+01	7.6E+02	7.5E+00	1.3E-03	7.3E+03	3.0E+01	4.9E+03	8.1E+02	1.4E+04	
PERCENT	1.9	.3	.3	5.3	.1	.0	51.5	.2	34.5	5.7		100.0
BONE * * *												
TC-99	1.4E+00	2.4E-01	2.4E-01	3.9E+00	.0E+00	9.5E-04	3.7E+02	3.6E-02	1.5E+02	1.3E+00	5.3E+02	97.8
I-129	9.0E-02	1.5E-02	1.5E-02	2.4E-01	7.5E+00	3.5E-04	2.4E+00	9.7E-03	1.6E+00	2.6E-01	1.2E+01	2.2
TOTAL	1.5E+00	2.5E-01	2.5E-01	4.1E+00	7.5E+00	1.3E-03	3.8E+02	4.6E-02	1.5E+02	1.6E+00	5.4E+02	
PERCENT	.3	.0	.0	.8	1.4	.0	69.6	.0	27.6	.3		100.0

LIVER * * *

TC-99	2.1E+00	3.6E-01	3.6E-01	5.5E+00	.0E+00	9.5E-04	5.6E+02	5.4E-02	2.2E+02	2.0E+00	7.9E+02	98.6
I-129	6.5E-02	1.0E-02	1.0E-02	1.7E-01	7.5E+00	3.5E-04	1.7E+00	6.9E-03	1.1E+00	1.9E-01	1.1E+01	1.4
TOTAL	2.2E+00	3.7E-01	3.7E-01	5.7E+00	7.5E+00	1.3E-03	5.6E+02	6.1E-02	2.2E+02	2.2E+00	8.0E+02	
PERCENT	.3	.0	.0	.7	.9	.0	70.0	.0	27.7	.3		100.0

LUNG * * *

H-3	1.7E-05	8.5E-06	8.5E-06	7.5E-04	.0E+00	.0E+00	3.7E-04	2.3E-04	2.6E-04	4.1E-03	5.8E-03	.1
TC-99	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	9.5E-04	.0E+00	.0E+00	.0E+00	.0E+00	9.5E-04	.0
I-129	.0E+00	.0E+00	.0E+00	.0E+00	7.5E+00	3.5E-04	.0E+00	.0E+00	.0E+00	.0E+00	7.5E+00	99.9
TOTAL	1.7E-05	8.5E-06	8.5E-06	7.5E-04	7.5E+00	1.3E-03	3.7E-04	2.3E-04	2.6E-04	4.1E-03	7.5E+00	
PERCENT	.0	.0	.0	.0	99.9	.0	.0	.0	.0	.1		100.0

KIDNEY * * *

H-3	1.7E-05	8.5E-06	8.5E-06	7.5E-04	.0E+00	.0E+00	3.7E-04	2.3E-04	2.6E-04	4.1E-03	5.8E-03	.0
TC-99	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	9.5E-04	.0E+00	.0E+00	.0E+00	.0E+00	9.5E-04	.0
I-129	1.8E-01	3.0E-02	3.0E-02	4.9E-01	7.5E+00	3.5E-04	4.8E+00	2.0E-02	3.2E+00	5.3E-01	1.7E+01	100.0
TOTAL	1.9E-01	3.1E-02	3.1E-02	5.0E-01	7.5E+00	1.3E-03	4.8E+00	2.0E-02	3.2E+00	5.4E-01	1.7E+01	
PERCENT	1.1	.2	.2	2.9	44.6	.0	28.5	.1	19.2	3.2		100.0

* * * * DOSES BY PATH, ORGAN, AND NUCLIDE AFTER 50 YEARS UPTAKE AND 50 YEARS EXPOSURE * * * *

C14 MAX. INDIVIDUAL * * * LST008 SOURCE FILE * * * * * * 50 YR BUILDUP * * * 12:30:55 08/26/75

ISOTOPE	FISH	CRUSTACEA	MOLLUSCS	DRINKING-	SHORELINE	SWIMMING	PRODUCE	EGGS	MILK	MEAT	TOTAL	PERCENT
SKIN * * *												
C-14	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-03	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-03	100.0
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-03	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-03	
PERCENT	.0	.0	.0	.0	.0	100.0	.0	.0	.0	.0		100.0
BODY * * *												
C-14	6.5E+02	6.0E+02	6.0E+02	5.5E+00	.0E+00	.0E+00	1.2E+04	1.2E+03	2.5E+03	4.5E+04	6.3E+04	100.0
1235 <NUMERIC UNDERFLOW>												
TOTAL	6.5E+02	6.0E+02	6.0E+02	5.5E+00	.0E+00	.0E+00	1.2E+04	1.2E+03	2.5E+03	4.5E+04	6.3E+04	
PERCENT	1.0	1.0	1.0	.0	.0	.0	18.5	1.9	4.1	72.5		100.0
GI-LLI * * *												
C-14	3.8E+02	3.7E+02	3.7E+02	3.3E+00	.0E+00	.0E+00	7.0E+03	7.3E+02	1.5E+03	2.7E+04	3.8E+04	100.0
1235 <NUMERIC UNDERFLOW>												
TOTAL	3.8E+02	3.7E+02	3.7E+02	3.3E+00	.0E+00	.0E+00	7.0E+03	7.3E+02	1.5E+03	2.7E+04	3.8E+04	
PERCENT	1.0	1.0	1.0	.0	.0	.0	18.5	1.9	4.1	72.5		100.0
THYROID * * *												
C-14	6.5E+02	6.0E+02	6.0E+02	5.5E+00	.0E+00	.0E+00	1.2E+04	1.2E+03	2.5E+03	4.5E+04	6.2E+04	100.0
TOTAL	6.5E+02	6.0E+02	6.0E+02	5.5E+00	.0E+00	.0E+00	1.2E+04	1.2E+03	2.5E+03	4.5E+04	6.2E+04	
PERCENT	1.0	1.0	1.0	.0	.0	.0	18.5	1.9	4.1	72.5		100.0
BONE * * *												
C-14	3.1E+03	3.1E+03	3.1E+03	2.7E+01	.0E+00	.0E+00	5.7E+04	6.0E+03	1.3E+04	2.3E+05	3.1E+05	100.0
1235 <NUMERIC UNDERFLOW>												
TOTAL	3.1E+03	3.1E+03	3.1E+03	2.7E+01	.0E+00	.0E+00	5.7E+04	6.0E+03	1.3E+04	2.3E+05	3.1E+05	
PERCENT	1.0	1.0	1.0	.0	.0	.0	18.5	1.9	4.1	72.5		100.0
LIVER * * *												
C-14	6.5E+02	6.0E+02	6.0E+02	5.5E+00	.0E+00	.0E+00	1.2E+04	1.2E+03	2.5E+03	4.5E+04	6.2E+04	100.0
1235 <NUMERIC UNDERFLOW>												

TOTAL	6.5E+02	6.0E+02	6.0E+02	5.5E+00	.0E+00	.0E+00	1.2E+04	1.2E+03	2.5E+03	4.5E+04	6.2E+04	
PERCENT	1.0	1.0	1.0	.0	.0	.0	18.5	1.9	4.1	72.5		100.0
LUNG * * *												
C-14	6.5E+02	6.0E+02	6.0E+02	5.5E+00	.0E+00	.0E+00	1.2E+04	1.2E+03	2.5E+03	4.5E+04	6.2E+04	100.0
TOTAL	6.5E+02	6.0E+02	6.0E+02	5.5E+00	.0E+00	.0E+00	1.2E+04	1.2E+03	2.5E+03	4.5E+04	6.2E+04	
PERCENT	1.0	1.0	1.0	.0	.0	.0	18.5	1.9	4.1	72.5		100.0
KIDNEY * * *												
C-14	6.5E+02	6.0E+02	6.0E+02	5.5E+00	.0E+00	.0E+00	1.2E+04	1.2E+03	2.5E+03	4.5E+04	6.2E+04	100.0
TOTAL	6.5E+02	6.0E+02	6.0E+02	5.5E+00	.0E+00	.0E+00	1.2E+04	1.2E+03	2.5E+03	4.5E+04	6.2E+04	
PERCENT	1.0	1.0	1.0	.0	.0	.0	18.5	1.9	4.1	72.5		100.0

* * * * DOSES BY PATH, ORGAN, AND NUCLIDE AFTER 50 YEARS UPTAKE AND 50 YEARS EXPOSURE * * * *

M093 MAX. INDIVIDUAL * * * LST008 SOURCE FILE * * * * * * 50 YR BUILDUP * * * 08:31:25 04/21/75

ISOTOPE	FISH	CRUSTACEA	MOLLUSCS	DRINKING-	SHORELINE	SWIMMING	PRODUCE	EGGS	MILK	MEAT	TOTAL	PERCENT
SKIN * * *												
MO-93	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	4.4E-07	.0E+00	.0E+00	.0E+00	.0E+00	4.4E-07	100.0
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	4.4E-07	.0E+00	.0E+00	.0E+00	.0E+00	4.4E-07	
PERCENT	.0	.0	.0	.0	.0	100.0	.0	.0	.0	.0		100.0
BODY * * *												
MO-93	1.4E-03	7.0E-04	7.0E-04	5.5E-03	.0E+00	2.5E-07	2.9E-01	2.3E-04	4.0E-02	1.2E-02	3.5E-01	100.0
TOTAL	1.4E-03	7.0E-04	7.0E-04	5.5E-03	.0E+00	2.5E-07	2.9E-01	2.3E-04	4.0E-02	1.2E-02	3.5E-01	
PERCENT	.4	.2	.2	1.6	.0	.0	82.6	.1	11.4	3.5		100.0
GI-LLI * * *												
MO-93	8.5E-03	4.2E-03	4.2E-03	3.4E-02	.0E+00	2.5E-07	1.8E+00	1.4E-03	2.4E-01	7.5E-02	2.1E+00	100.0
TOTAL	8.5E-03	4.2E-03	4.2E-03	3.4E-02	.0E+00	2.5E-07	1.8E+00	1.4E-03	2.4E-01	7.5E-02	2.1E+00	
PERCENT	.4	.2	.2	1.6	.0	.0	82.6	.1	11.4	3.5		100.0
THYROID * * *												
MO-93	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-07	100.0
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-07	
PERCENT	.0	.0	.0	.0	.0	100.0	.0	.0	.0	.0		100.0
BONE * * *												
MO-93	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-07	100.0
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-07	
PERCENT	.0	.0	.0	.0	.0	100.0	.0	.0	.0	.0		100.0
LIVER * * *												
MO-93	5.0E-02	2.6E-02	2.6E-02	2.1E-01	.0E+00	2.5E-07	1.1E+01	8.4E-03	1.5E+00	4.6E-01	1.3E+01	100.0
TOTAL	5.0E-02	2.6E-02	2.6E-02	2.1E-01	.0E+00	2.5E-07	1.1E+01	8.4E-03	1.5E+00	4.6E-01	1.3E+01	
PERCENT	.4	.2	.2	1.6	.0	.0	82.6	.1	11.4	3.5		100.0

LUNG * * *												
MO-93	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-07	100.0
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-07	
PERCENT	.0	.0	.0	.0	.0	100.0	.0	.0	.0	.0		100.0
KIDNEY * * *												
MO-93	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-07	100.0
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-07	
PERCENT	.0	.0	.0	.0	.0	100.0	.0	.0	.0	.0		100.0

* * * * DOSES BY PATH, ORGAN, AND NUCLIDE AFTER 50 YEARS UPTAKE AND 50 YEARS EXPOSURE * * * *

SR90 MAX. INDIVIDUAL * * * LST008 SOURCE FILE * * * * * * 50 YR BUILDUP * * * 12:25:20 08/26/75

ISOTOPE	FISH	CRUSTACEA	MOLLUSCS	DRINKING-	SHORELINE	SWIMMING	PRODUCE	EGGS	MILK	MEAT	TOTAL	PERCENT
SKIN * * *												
CA-41	.0E+00	.0E+00	.0E+00	.0E+00	5.5E+00	1.3E-03	.0E+00	.0E+00	.0E+00	.0E+00	5.5E+00	1.8
PA-233	.0E+00	.0E+00	.0E+00	.0E+00	6.0E-01	9.0E-02	.0E+00	.0E+00	.0E+00	.0E+00	6.9E-01	.2
NP-237+D	.0E+00	.0E+00	.0E+00	.0E+00	3.0E+02	1.0E-01	.0E+00	.0E+00	.0E+00	.0E+00	3.0E+02	98.0
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	3.1E+02	1.9E-01	.0E+00	.0E+00	.0E+00	.0E+00	3.1E+02	
PERCENT	.0	.0	.0	.0	99.9	.1	.0	.0	.0	.0		100.0
BODY * * *												
CA-41	6.1E+00	2.5E+01	2.5E+01	6.1E+00	4.6E+00	1.1E-03	9.8E+01	1.2E-03	4.1E+01	3.8E-01	2.1E+02	15.7
1235 <NUMERIC UNDERFLOW>												
SE-79	1.9E+00	9.5E-01	9.5E-01	4.5E-01	.0E+00	7.0E-06	2.2E+02	2.3E-01	1.5E+02	7.9E-01	3.8E+02	28.9
PA-233	2.6E-04	1.3E-03	1.3E-03	9.5E-04	5.0E-01	7.5E-02	1.2E-03	4.2E-08	1.6E-06	3.8E-05	5.8E-01	.0
NP-237+D	8.1E+00	1.6E+02	1.6E+02	3.2E+01	2.6E+02	8.0E-02	9.9E+01	2.1E-03	7.4E-02	3.1E+00	7.2E+02	55.3
TOTAL	1.6E+01	1.9E+02	1.9E+02	3.9E+01	2.7E+02	1.6E-01	4.2E+02	2.4E-01	1.9E+02	4.3E+00	1.3E+03	
PERCENT	1.2	14.3	14.3	3.0	20.2	.0	31.9	.0	14.8	.3		100.0
GI-LLI * * *												
CA-41	2.3E-02	9.5E-02	9.5E-02	2.4E-02	4.6E+00	1.1E-03	3.8E-01	4.7E-06	1.6E-01	1.4E-03	5.4E+00	.3
1235 <NUMERIC UNDERFLOW>												
SE-79	2.3E+00	1.1E+00	1.1E+00	5.5E-01	.0E+00	7.0E-06	2.7E+02	2.8E-01	1.9E+02	9.5E-01	4.6E+02	22.8
PA-233	4.7E+00	2.3E+01	2.3E+01	1.7E+01	5.0E-01	7.5E-02	2.2E+01	7.5E-04	2.9E-02	6.9E-01	9.2E+01	4.5
NP-237+D	2.1E+01	4.2E+02	4.2E+02	8.5E+01	2.6E+02	8.0E-02	2.6E+02	5.4E-03	2.0E-01	8.2E+00	1.5E+03	72.5
TOTAL	2.8E+01	4.4E+02	4.4E+02	1.0E+02	2.7E+02	1.6E-01	5.5E+02	2.9E-01	1.9E+02	9.9E+00	2.0E+03	
PERCENT	1.4	21.8	21.8	5.0	13.0	.0	27.2	.0	9.2	.5		100.0
THYROID * * *												
CA-41	.0E+00	.0E+00	.0E+00	.0E+00	4.6E+00	1.1E-03	.0E+00	.0E+00	.0E+00	.0E+00	4.6E+00	1.7
PA-233	.0E+00	.0E+00	.0E+00	.0E+00	5.0E-01	7.5E-02	.0E+00	.0E+00	.0E+00	.0E+00	5.7E-01	.2
NP-237+D	.0E+00	.0E+00	.0E+00	.0E+00	2.6E+02	8.0E-02	.0E+00	.0E+00	.0E+00	.0E+00	2.6E+02	98.0
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	2.7E+02	1.6E-01	.0E+00	.0E+00	.0E+00	.0E+00	2.7E+02	
PERCENT	.0	.0	.0	.0	99.9	.1	.0	.0	.0	.0		100.0
BONE * * *												
CA-41	1.3E+01	5.4E+01	5.4E+01	1.3E+01	4.6E+00	1.1E-03	2.1E+02	2.6E-03	8.9E+01	8.1E-01	4.4E+02	3.7

1235 <NUMERIC UNDERFLOW>												
PA-233	1.5E-03	7.5E-03	7.5E-03	5.5E-03	5.0E-01	7.5E-02	7.0E-03	2.4E-07	9.3E-06	2.2E-04	6.0E-01	.0
NP-237+D	1.9E+02	3.9E+03	3.9E+03	7.8E+02	2.6E+02	8.0E-02	2.4E+03	4.9E-02	1.8E+00	7.5E+01	1.1E+04	96.3
TOTAL	2.1E+02	3.9E+03	3.9E+03	8.0E+02	2.7E+02	1.6E-01	2.6E+03	5.2E-02	9.1E+01	7.6E+01	1.2E+04	
PERCENT	1.7	33.0	33.0	6.7	2.2	.0	21.9	.0	.8	.6		100.0
LIVER * * *												
CA-41	.0E+00	.0E+00	.0E+00	.0E+00	4.6E+00	1.1E-03	.0E+00	.0E+00	.0E+00	.0E+00	4.6E+00	.1
1235 <NUMERIC UNDERFLOW>												
SE-79	1.1E+01	5.5E+00	5.5E+00	2.7E+00	.0E+00	7.0E-06	1.3E+03	1.4E+00	9.1E+02	4.7E+00	2.3E+03	64.4
PA-233	3.0E-04	1.5E-03	1.5E-03	1.1E-03	5.0E-01	7.5E-02	1.4E-03	4.9E-08	1.9E-06	4.5E-05	5.8E-01	.0
NP-237+D	1.7E+01	3.4E+02	3.4E+02	6.9E+01	2.6E+02	8.0E-02	2.1E+02	4.4E-03	1.6E-01	6.6E+00	1.2E+03	35.5
TOTAL	2.8E+01	3.5E+02	3.5E+02	7.1E+01	2.7E+02	1.6E-01	1.5E+03	1.4E+00	9.1E+02	1.1E+01	3.5E+03	
PERCENT	.8	9.9	9.9	2.0	7.5	.0	43.6	.0	25.9	.3		100.0
LUNG * * *												
CA-41	.0E+00	.0E+00	.0E+00	.0E+00	4.6E+00	1.1E-03	.0E+00	.0E+00	.0E+00	.0E+00	4.6E+00	1.7
PA-233	.0E+00	.0E+00	.0E+00	.0E+00	5.0E-01	7.5E-02	.0E+00	.0E+00	.0E+00	.0E+00	5.7E-01	.2
NP-237+D	.0E+00	.0E+00	.0E+00	.0E+00	2.6E+02	8.0E-02	.0E+00	.0E+00	.0E+00	.0E+00	2.6E+02	98.0
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	2.7E+02	1.6E-01	.0E+00	.0E+00	.0E+00	.0E+00	2.7E+02	
PERCENT	.0	.0	.0	.0	99.9	.1	.0	.0	.0	.0		100.0
KIDNEY * * *												
CA-41	.0E+00	.0E+00	.0E+00	.0E+00	4.6E+00	1.1E-03	.0E+00	.0E+00	.0E+00	.0E+00	4.6E+00	1.7
PA-233	.0E+00	.0E+00	.0E+00	.0E+00	5.0E-01	7.5E-02	.0E+00	.0E+00	.0E+00	.0E+00	5.7E-01	.2
U-233	5.5E-05	8.5E-04	8.5E-04	1.2E-03	2.2E-03	6.5E-07	3.5E-03	7.3E-08	2.6E-04	1.1E-04	9.0E-03	.0
NP-237+D	.0E+00	.0E+00	.0E+00	.0E+00	2.6E+02	8.0E-02	.0E+00	.0E+00	.0E+00	.0E+00	2.6E+02	98.0
TOTAL	5.5E-05	8.5E-04	8.5E-04	1.2E-03	2.7E+02	1.6E-01	3.5E-03	7.3E-08	2.6E-04	1.1E-04	2.7E+02	
PERCENT	.0	.0	.0	.0	99.9	.1	.0	.0	.0	.0		100.0

* * * * DOSES BY PATH, ORGAN, AND NUCLIDE AFTER 50 YEARS UPTAKE AND 50 YEARS EXPOSURE * * * *

NI59 MAX. INDIVIDUAL * * * LST008 SOURCE FILE * * * * * * 50 YR BUILDUP * * * 12:40:33 08/26/75

ISOTOPE	FISH	CRUSTACEA	MOLLUSCS	DRINKING-	SHORELINE	SWIMMING	PRODUCE	EGGS	MILK	MEAT	TOTAL	PERCENT
SKIN * * *												
NI-59	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-03	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-03	11.2
AC-225	.0E+00	.0E+00	.0E+00	.0E+00	5.0E-07	4.6E-07	.0E+00	.0E+00	.0E+00	.0E+00	9.6E-07	.0
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	9.5E-04	5.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	9.5E-04	9.2
PA-233	.0E+00	.0E+00	.0E+00	.0E+00	6.5E-06	9.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	7.4E-06	.1
U-233	.0E+00	.0E+00	.0E+00	.0E+00	5.0E-03	3.0E-06	.0E+00	.0E+00	.0E+00	.0E+00	5.0E-03	48.5
NP-237+D	.0E+00	.0E+00	.0E+00	.0E+00	3.2E-03	1.0E-06	.0E+00	.0E+00	.0E+00	.0E+00	3.2E-03	31.0
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	9.2E-03	1.2E-03	.0E+00	.0E+00	.0E+00	.0E+00	1.0E-02	
PERCENT	.0	.0	.0	.0	88.8	11.2	.0	.0	.0	.0		100.0
BODY * * *												
NI-59	6.4E+00	3.2E+00	3.2E+00	2.6E+00	.0E+00	8.0E-04	2.4E+01	1.7E-02	5.6E+00	1.4E-01	4.5E+01	99.9
RA-225+D	3.2E-03	8.0E-03	8.0E-03	2.6E-03	3.4E-08	8.0E-09	2.3E-03	1.0E-09	5.7E-03	1.1E-05	3.0E-02	.1
TH-229	3.1E-04	2.6E-03	2.6E-03	4.3E-04	8.0E-04	2.4E-07	1.6E-03	3.0E-08	1.0E-06	4.6E-05	8.4E-03	.0
U-233	2.8E-05	4.1E-04	4.1E-04	5.4E-04	4.2E-03	1.3E-06	1.7E-03	3.5E-08	1.3E-04	5.3E-05	7.5E-03	.0
NP-237+D	8.6E-05	1.7E-03	1.7E-03	3.5E-04	2.8E-03	8.5E-07	1.1E-03	2.2E-08	8.0E-07	3.4E-05	7.8E-03	.0
TOTAL	6.4E+00	3.2E+00	3.2E+00	2.6E+00	7.8E-03	8.0E-04	2.4E+01	1.7E-02	5.6E+00	1.4E-01	4.5E+01	
PERCENT	14.1	7.1	7.1	5.7	.0	.0	53.3	.0	12.5	.3		100.0
GI-LLI * * *												
NI-59	2.8E+00	1.4E+00	1.4E+00	1.1E+00	.0E+00	8.0E-04	1.1E+01	7.4E-03	2.5E+00	6.1E-02	2.0E+01	99.6
RA-225+D	7.5E-04	1.8E-03	1.8E-03	6.0E-04	3.4E-08	8.0E-09	5.4E-04	2.4E-10	1.3E-03	2.5E-06	6.9E-03	.0
AC-225	4.7E-04	9.5E-03	9.5E-03	7.5E-04	4.4E-07	1.6E-07	5.3E-04	2.8E-08	9.1E-07	1.3E-05	2.1E-02	.1
TH-229	7.5E-04	6.5E-03	6.5E-03	1.0E-03	8.0E-04	2.4E-07	3.9E-03	7.3E-08	2.5E-06	1.1E-04	2.0E-02	.1
PA-233	5.0E-05	2.5E-04	2.5E-04	1.8E-04	5.5E-06	8.0E-07	2.3E-04	8.1E-09	3.1E-07	7.4E-06	9.8E-04	.0
U-233	3.2E-05	4.9E-04	4.9E-04	6.5E-04	4.2E-03	1.3E-06	2.0E-03	4.2E-08	1.5E-04	6.3E-05	8.1E-03	.0
NP-237+D	2.2E-04	4.5E-03	4.5E-03	9.0E-04	2.8E-03	8.5E-07	2.8E-03	5.8E-08	2.1E-06	8.8E-05	1.6E-02	.1
TOTAL	2.9E+00	1.4E+00	1.4E+00	1.2E+00	7.8E-03	8.0E-04	1.1E+01	7.4E-03	2.5E+00	6.2E-02	2.0E+01	
PERCENT	14.2	7.1	7.1	5.7	.0	.0	53.2	.0	12.4	.3		100.0
THYROID * * *												
NI-59	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-04	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-04	9.3
AC-225	.0E+00	.0E+00	.0E+00	.0E+00	4.4E-07	1.6E-07	.0E+00	.0E+00	.0E+00	.0E+00	6.1E-07	.0
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-04	2.4E-07	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-04	9.3
PA-233	.0E+00	.0E+00	.0E+00	.0E+00	5.5E-06	8.0E-07	.0E+00	.0E+00	.0E+00	.0E+00	6.3E-06	.1
U-233	.0E+00	.0E+00	.0E+00	.0E+00	4.2E-03	1.3E-06	.0E+00	.0E+00	.0E+00	.0E+00	4.2E-03	48.8
NP-237+D	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-03	8.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-03	32.5

TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	7.8E-03	8.0E-04	.0E+00	.0E+00	.0E+00	.0E+00	8.6E-03	
PERCENT	.0	.0	.0	.0	90.7	9.3	.0	.0	.0	.0		100.0

BONE * * *

NI-59	3.8E+01	1.9E+01	1.9E+01	1.5E+01	.0E+00	8.0E-04	1.4E+02	9.9E-02	3.4E+01	8.2E-01	2.7E+02	99.8
RA-225+D	1.6E-02	4.0E-02	4.0E-02	1.3E-02	3.4E-08	8.0E-09	1.2E-02	5.1E-09	2.8E-02	5.4E-05	1.5E-01	.1
TH-229	1.1E-02	9.3E-02	9.3E-02	1.4E-02	8.0E-04	2.4E-07	5.6E-02	1.1E-06	3.6E-05	1.6E-03	2.7E-01	.1
U-233	4.5E-04	6.7E-03	6.7E-03	8.6E-03	4.2E-03	1.3E-06	2.8E-02	5.7E-07	2.1E-03	8.7E-04	5.7E-02	.0
NP-237+D	2.1E-03	4.1E-02	4.1E-02	8.4E-03	2.8E-03	8.5E-07	2.6E-02	5.3E-07	1.9E-05	8.1E-04	1.2E-01	.0
TOTAL	3.8E+01	1.9E+01	1.9E+01	1.5E+01	7.8E-03	8.0E-04	1.4E+02	9.9E-02	3.4E+01	8.3E-01	2.7E+02	
PERCENT	14.2	7.2	7.2	5.7	.0	.0	53.0	.0	12.4	.3		100.0

LIVER * * *

NI-59	1.3E+01	6.7E+00	6.7E+00	5.4E+00	.0E+00	8.0E-04	5.0E+01	3.5E-02	1.2E+01	2.9E-01	9.5E+01	100.0
TH-229	3.2E-04	2.6E-03	2.6E-03	4.3E-04	8.0E-04	2.4E-07	1.6E-03	3.0E-08	1.0E-06	4.6E-05	8.4E-03	.0
U-233	.0E+00	.0E+00	.0E+00	.0E+00	4.2E-03	1.3E-06	.0E+00	.0E+00	.0E+00	.0E+00	4.2E-03	.0
NP-237+D	1.8E-04	3.7E-03	3.7E-03	7.5E-04	2.8E-03	8.5E-07	2.3E-03	4.7E-08	1.7E-06	7.1E-05	1.3E-02	.0
TOTAL	1.3E+01	6.7E+00	6.7E+00	5.4E+00	7.8E-03	8.0E-04	5.0E+01	3.5E-02	1.2E+01	2.9E-01	9.5E+01	
PERCENT	14.2	7.1	7.1	5.7	.0	.0	53.2	.0	12.4	.3		100.0

LUNG * * *

NI-59	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-04	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-04	9.3
AC-225	.0E+00	.0E+00	.0E+00	.0E+00	4.4E-07	1.6E-07	.0E+00	.0E+00	.0E+00	.0E+00	6.1E-07	.0
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-04	2.4E-07	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-04	9.3
PA-233	.0E+00	.0E+00	.0E+00	.0E+00	5.5E-06	8.0E-07	.0E+00	.0E+00	.0E+00	.0E+00	6.3E-06	.1
U-233	.0E+00	.0E+00	.0E+00	.0E+00	4.2E-03	1.3E-06	.0E+00	.0E+00	.0E+00	.0E+00	4.2E-03	48.8
NP-237+D	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-03	8.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-03	32.5
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	7.8E-03	8.0E-04	.0E+00	.0E+00	.0E+00	.0E+00	8.6E-03	
PERCENT	.0	.0	.0	.0	90.7	9.3	.0	.0	.0	.0		100.0

KIDNEY * * *

NI-59	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-04	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-04	3.7
AC-225	.0E+00	.0E+00	.0E+00	.0E+00	4.4E-07	1.6E-07	.0E+00	.0E+00	.0E+00	.0E+00	6.1E-07	.0
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-04	2.4E-07	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-04	3.7
PA-233	.0E+00	.0E+00	.0E+00	.0E+00	5.5E-06	8.0E-07	.0E+00	.0E+00	.0E+00	.0E+00	6.3E-06	.0
U-233	1.1E-04	1.7E-03	1.7E-03	2.2E-03	4.2E-03	1.3E-06	6.8E-03	1.4E-07	5.1E-04	2.1E-04	1.7E-02	79.7
NP-237+D	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-03	8.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-03	12.9
TOTAL	1.1E-04	1.7E-03	1.7E-03	2.2E-03	7.8E-03	8.0E-04	6.8E-03	1.4E-07	5.1E-04	2.1E-04	2.2E-02	
PERCENT	.5	7.6	7.6	10.1	36.0	3.7	31.1	.0	2.3	1.0		100.0

* * * * DOSES BY PATH, ORGAN, AND NUCLIDE AFTER 50 YEARS UPTAKE AND 50 YEARS EXPOSURE * * * *

RB87 MAX. INDIVIDUAL * * * LST008 SOURCE FILE * * * * * * 50 YR BUILDUP * * * 12:53:12 08/26/75

ISOTOPE	FISH	CRUSTACEA	MOLLUSCS	DRINKING-	SHORELINE	SWIMMING	PRODUCE	EGGS	MILK	MEAT	TOTAL	PERCENT
SKIN * * *												
RB-87	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	2.9E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.9E-07	.0
RA-225+D	.0E+00	.0E+00	.0E+00	.0E+00	6.0E-08	3.1E-08	.0E+00	.0E+00	.0E+00	.0E+00	9.1E-08	.0
AC-225	.0E+00	.0E+00	.0E+00	.0E+00	6.0E-07	5.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-06	.0
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-03	6.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.2E-03	18.5
PA-233	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-07	1.2E-07	.0E+00	.0E+00	.0E+00	.0E+00	9.2E-07	.0
U-233	.0E+00	.0E+00	.0E+00	.0E+00	4.6E-03	2.7E-06	.0E+00	.0E+00	.0E+00	.0E+00	4.7E-03	74.9
NP-237+D	.0E+00	.0E+00	.0E+00	.0E+00	4.1E-04	1.3E-07	.0E+00	.0E+00	.0E+00	.0E+00	4.1E-04	6.6
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	6.2E-03	4.5E-06	.0E+00	.0E+00	.0E+00	.0E+00	6.2E-03	
PERCENT	.0	.0	.0	.0	99.9	.1	.0	.0	.0	.0		100.0
BODY * * *												
RB-87	1.2E-02	3.0E-03	3.0E-03	2.5E-04	.0E+00	1.4E-09	1.3E-02	1.3E-06	6.9E-03	4.6E-05	3.8E-02	41.6
RA-225+D	3.8E-03	9.5E-03	9.5E-03	3.1E-03	4.1E-08	9.5E-09	2.8E-03	1.2E-09	6.8E-03	1.3E-05	3.5E-02	38.9
AC-225	4.1E-07	8.5E-06	8.5E-06	6.5E-07	5.5E-07	2.0E-07	4.6E-07	2.5E-11	7.9E-10	1.1E-08	1.9E-05	.0
TH-229	3.7E-04	3.1E-03	3.1E-03	5.0E-04	9.0E-04	2.9E-07	1.9E-03	3.5E-08	1.2E-06	5.5E-05	9.8E-03	10.8
U-233	2.5E-05	3.7E-04	3.7E-04	5.0E-04	3.8E-03	1.1E-06	1.5E-03	3.2E-08	1.2E-04	4.9E-05	6.8E-03	7.5
NP-237+D	1.1E-05	2.2E-04	2.2E-04	4.5E-05	3.6E-04	1.1E-07	1.4E-04	2.8E-09	1.0E-07	4.3E-06	9.9E-04	1.1
TOTAL	1.6E-02	1.6E-02	1.6E-02	4.3E-03	5.1E-03	1.9E-06	1.9E-02	1.3E-06	1.4E-02	1.7E-04	9.1E-02	
PERCENT	17.8	17.8	17.8	4.8	5.6	.0	20.8	.0	15.1	.2		100.0
GI-LLI * * *												
RB-87	1.6E-03	4.0E-04	4.0E-04	3.3E-05	.0E+00	1.4E-09	1.7E-03	1.7E-07	9.2E-04	6.1E-06	5.1E-03	7.2
RA-225+D	8.5E-04	2.2E-03	2.2E-03	7.0E-04	4.1E-08	9.5E-09	6.5E-04	2.8E-10	1.6E-03	3.0E-06	8.2E-03	11.6
AC-225	5.5E-04	1.1E-02	1.1E-02	9.0E-04	5.5E-07	2.0E-07	6.4E-04	3.4E-08	1.1E-06	1.5E-05	2.5E-02	35.5
TH-229	9.0E-04	7.5E-03	7.5E-03	1.2E-03	9.0E-04	2.9E-07	4.6E-03	8.7E-08	3.0E-06	1.4E-04	2.3E-02	32.2
PA-233	6.5E-06	3.2E-05	3.2E-05	2.3E-05	7.0E-07	1.0E-07	3.0E-05	1.0E-09	3.9E-08	9.4E-07	1.3E-04	.2
U-233	2.9E-05	4.4E-04	4.4E-04	6.0E-04	3.8E-03	1.1E-06	1.8E-03	3.8E-08	1.4E-04	5.8E-05	7.4E-03	10.5
NP-237+D	2.9E-05	6.0E-04	6.0E-04	1.1E-04	3.6E-04	1.1E-07	3.6E-04	7.4E-09	2.7E-07	1.1E-05	2.1E-03	2.9
TOTAL	4.0E-03	2.3E-02	2.3E-02	3.6E-03	5.1E-03	1.9E-06	9.8E-03	3.4E-07	2.6E-03	2.3E-04	7.1E-02	
PERCENT	5.6	32.1	32.1	5.1	7.2	.0	13.9	.0	3.7	.3		100.0
THYROID * * *												
AC-225	.0E+00	.0E+00	.0E+00	.0E+00	5.5E-07	2.0E-07	.0E+00	.0E+00	.0E+00	.0E+00	7.5E-07	.0
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	9.0E-04	2.9E-07	.0E+00	.0E+00	.0E+00	.0E+00	9.0E-04	17.6
PA-233	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-07	1.0E-07	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-07	.0
U-233	.0E+00	.0E+00	.0E+00	.0E+00	3.8E-03	1.1E-06	.0E+00	.0E+00	.0E+00	.0E+00	3.9E-03	75.3

NP-237+D	.0E+00	.0E+00	.0E+00	.0E+00	3.6E-04	1.1E-07	.0E+00	.0E+00	.0E+00	.0E+00	3.6E-04	7.0
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	5.1E-03	1.9E-06	.0E+00	.0E+00	.0E+00	.0E+00	5.1E-03	
PERCENT	.0	.0	.0	.0	100.0	.0	.0	.0	.0	.0		100.0

BONE * * *

RA-225+D	1.9E-02	4.7E-02	4.7E-02	1.5E-02	4.1E-08	9.5E-09	1.4E-02	6.1E-09	3.4E-02	6.4E-05	1.8E-01	31.1
AC-225	6.0E-06	1.2E-04	1.2E-04	1.0E-05	5.5E-07	2.0E-07	6.9E-06	3.7E-10	1.2E-08	1.6E-07	2.7E-04	.0
TH-229	1.3E-02	1.1E-01	1.1E-01	1.8E-02	9.0E-04	2.9E-07	6.6E-02	1.3E-06	4.3E-05	2.0E-03	3.2E-01	56.8
U-233	4.1E-04	6.1E-03	6.1E-03	8.2E-03	3.8E-03	1.1E-06	2.5E-02	5.2E-07	1.9E-03	7.9E-04	5.3E-02	9.3
NP-237+D	2.7E-04	5.3E-03	5.3E-03	1.1E-03	3.6E-04	1.1E-07	3.3E-03	6.8E-08	2.4E-06	1.0E-04	1.6E-02	2.8
TOTAL	3.3E-02	1.7E-01	1.7E-01	4.2E-02	5.1E-03	1.9E-06	1.1E-01	1.8E-06	3.6E-02	2.9E-03	5.7E-01	
PERCENT	5.8	29.9	29.9	7.5	.9	.0	19.2	.0	6.3	.5		100.0

LIVER * * *

RB-87	3.5E-02	8.7E-03	8.7E-03	7.1E-04	.0E+00	1.4E-09	3.6E-02	3.6E-06	2.0E-02	1.3E-04	1.1E-01	87.2
RA-225+D	2.2E-05	5.5E-05	5.5E-05	1.8E-05	4.1E-08	9.5E-09	1.7E-05	7.1E-12	4.0E-05	7.5E-08	2.1E-04	.2
AC-225	8.5E-06	1.7E-04	1.7E-04	1.4E-05	5.5E-07	2.0E-07	9.5E-06	5.1E-10	1.6E-08	2.3E-07	3.7E-04	.3
TH-229	3.8E-04	3.1E-03	3.1E-03	5.1E-04	9.0E-04	2.9E-07	1.9E-03	3.5E-08	1.2E-06	5.5E-05	9.9E-03	7.9
U-233	.0E+00	.0E+00	.0E+00	.0E+00	3.8E-03	1.1E-06	.0E+00	.0E+00	.0E+00	.0E+00	3.9E-03	3.1
NP-237+D	2.4E-05	4.6E-04	4.6E-04	9.5E-05	3.6E-04	1.1E-07	2.9E-04	6.0E-09	2.2E-07	9.1E-06	1.7E-03	1.4
TOTAL	3.5E-02	1.2E-02	1.2E-02	1.3E-03	5.1E-03	1.9E-06	3.8E-02	3.6E-06	2.0E-02	2.0E-04	1.2E-01	
PERCENT	28.1	10.0	10.0	1.1	4.1	.0	30.8	.0	15.9	.2		100.0

LUNG * * *

AC-225	.0E+00	.0E+00	.0E+00	.0E+00	5.5E-07	2.0E-07	.0E+00	.0E+00	.0E+00	.0E+00	7.5E-07	.0
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	9.0E-04	2.9E-07	.0E+00	.0E+00	.0E+00	.0E+00	9.0E-04	17.6
PA-233	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-07	1.0E-07	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-07	.0
U-233	.0E+00	.0E+00	.0E+00	.0E+00	3.8E-03	1.1E-06	.0E+00	.0E+00	.0E+00	.0E+00	3.9E-03	75.3
NP-237+D	.0E+00	.0E+00	.0E+00	.0E+00	3.6E-04	1.1E-07	.0E+00	.0E+00	.0E+00	.0E+00	3.6E-04	7.0
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	5.1E-03	1.9E-06	.0E+00	.0E+00	.0E+00	.0E+00	5.1E-03	
PERCENT	.0	.0	.0	.0	100.0	.0	.0	.0	.0	.0		100.0

KIDNEY * * *

AC-225	.0E+00	.0E+00	.0E+00	.0E+00	5.5E-07	2.0E-07	.0E+00	.0E+00	.0E+00	.0E+00	7.5E-07	.0
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	9.0E-04	2.9E-07	.0E+00	.0E+00	.0E+00	.0E+00	9.0E-04	5.3
PA-233	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-07	1.0E-07	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-07	.0
U-233	1.0E-04	1.5E-03	1.5E-03	2.0E-03	3.8E-03	1.1E-06	6.2E-03	1.3E-07	4.6E-04	1.9E-04	1.6E-02	92.6
NP-237+D	.0E+00	.0E+00	.0E+00	.0E+00	3.6E-04	1.1E-07	.0E+00	.0E+00	.0E+00	.0E+00	3.6E-04	2.1
TOTAL	1.0E-04	1.5E-03	1.5E-03	2.0E-03	5.1E-03	1.9E-06	6.2E-03	1.3E-07	4.6E-04	1.9E-04	1.7E-02	
PERCENT	.6	8.8	8.8	11.8	30.0	.0	36.1	.0	2.7	1.1		100.0

* * * * DOSES BY PATH, ORGAN, AND NUCLIDE AFTER 50 YEARS UPTAKE AND 50 YEARS EXPOSURE * * * *

CS135 MAX. INDIVIDUAL * * * LST008 SOURCE FILE * * * * * * 50 YR BUILDUP * * * 13:00:30 08/26/75

ISOTOPE	FISH	CRUSTACEA	MOLLUSCS	DRINKING-	SHORELINE	SWIMMING	PRODUCE	EGGS	MILK	MEAT	TOTAL	PERCENT
SKIN * * *												
CS-135	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	2.0E-03	.0E+00	.0E+00	.0E+00	.0E+00	2.0E-03	30.6
RA-225+D	.0E+00	.0E+00	.0E+00	.0E+00	6.5E-08	3.5E-08	.0E+00	.0E+00	.0E+00	.0E+00	1.0E-07	.0
AC-225	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-07	6.0E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-06	.0
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-03	7.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-03	19.4
U-233	.0E+00	.0E+00	.0E+00	.0E+00	3.3E-03	2.0E-06	.0E+00	.0E+00	.0E+00	.0E+00	3.4E-03	50.0
NP-237+D	.0E+00	.0E+00	.0E+00	.0E+00	9.0E-07	3.0E-10	.0E+00	.0E+00	.0E+00	.0E+00	9.0E-07	.0
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	4.7E-03	2.1E-03	.0E+00	.0E+00	.0E+00	.0E+00	6.7E-03	
PERCENT	.0	.0	.0	.0	69.4	30.6	.0	.0	.0	.0		100.0
BODY * * *												
CS-135	2.9E+02	7.3E+00	7.3E+00	5.6E+00	.0E+00	1.2E-05	1.9E+01	7.6E-02	1.9E+01	3.3E+00	3.5E+02	100.0
RA-225+D	4.3E-03	1.1E-02	1.1E-02	3.5E-03	4.7E-08	1.0E-08	3.2E-03	1.4E-09	7.7E-03	1.4E-05	4.0E-02	.0
TH-229	4.3E-04	3.6E-03	3.6E-03	5.7E-04	1.0E-03	3.3E-07	2.1E-03	4.0E-08	1.4E-06	6.2E-05	1.1E-02	.0
U-233	1.8E-05	2.7E-04	2.7E-04	3.6E-04	2.7E-03	8.5E-07	1.1E-03	2.3E-08	8.4E-05	3.5E-05	4.9E-03	.0
TOTAL	2.9E+02	7.3E+00	7.3E+00	5.6E+00	3.8E-03	1.4E-05	1.9E+01	7.6E-02	1.9E+01	3.3E+00	3.5E+02	
PERCENT	82.4	2.1	2.1	1.6	.0	.0	5.4	.0	5.4	1.0		100.0
GI-LLI * * *												
CS-135	1.6E+01	4.2E-01	4.2E-01	3.4E-01	.0E+00	1.2E-05	1.1E+00	4.4E-03	1.1E+00	2.0E-01	2.0E+01	99.7
RA-225+D	1.0E-03	2.4E-03	2.4E-03	8.0E-04	4.7E-08	1.0E-08	7.3E-04	3.2E-10	1.8E-03	3.3E-06	9.2E-03	.0
AC-225	6.5E-04	1.3E-02	1.3E-02	1.0E-03	6.0E-07	2.2E-07	7.2E-04	3.8E-08	1.2E-06	1.7E-05	2.8E-02	.1
TH-229	1.0E-03	8.5E-03	8.5E-03	1.4E-03	1.0E-03	3.3E-07	5.2E-03	9.8E-08	3.4E-06	1.5E-04	2.6E-02	.1
U-233	2.1E-05	3.2E-04	3.2E-04	4.3E-04	2.7E-03	8.5E-07	1.3E-03	2.8E-08	9.9E-05	4.2E-05	5.3E-03	.0
TOTAL	1.7E+01	4.4E-01	4.4E-01	3.4E-01	3.8E-03	1.4E-05	1.1E+00	4.4E-03	1.1E+00	2.0E-01	2.0E+01	
PERCENT	81.9	2.2	2.2	1.7	.0	.0	5.5	.0	5.5	1.0		100.0
THYROID * * *												
CS-135	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.2E-05	.0E+00	.0E+00	.0E+00	.0E+00	1.2E-05	.3
RA-225+D	.0E+00	.0E+00	.0E+00	.0E+00	4.7E-08	1.0E-08	.0E+00	.0E+00	.0E+00	.0E+00	5.7E-08	.0
AC-225	.0E+00	.0E+00	.0E+00	.0E+00	6.0E-07	2.2E-07	.0E+00	.0E+00	.0E+00	.0E+00	8.2E-07	.0
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	1.0E-03	3.3E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-03	27.5
U-233	.0E+00	.0E+00	.0E+00	.0E+00	2.7E-03	8.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-03	72.1
NP-237+D	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-07	2.4E-10	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-07	.0
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	3.8E-03	1.4E-05	.0E+00	.0E+00	.0E+00	.0E+00	3.8E-03	
PERCENT	.0	.0	.0	.0	99.6	.4	.0	.0	.0	.0		100.0

BONE * * *

CS-135	7.7E+02	1.9E+01	1.9E+01	1.5E+01	.0E+00	1.2E-05	5.1E+01	2.1E-01	5.1E+01	9.1E+00	9.4E+02	99.9
RA-225+D	2.1E-02	5.5E-02	5.5E-02	1.7E-02	4.7E-08	1.0E-08	1.6E-02	6.9E-09	3.8E-02	7.2E-05	2.0E-01	.0
TH-229	1.4E-02	1.2E-01	1.2E-01	2.0E-02	1.0E-03	3.3E-07	7.5E-02	1.4E-06	4.8E-05	2.2E-03	3.5E-01	.0
U-233	2.9E-04	4.4E-03	4.4E-03	6.0E-03	2.7E-03	8.5E-07	1.8E-02	3.8E-07	1.4E-03	5.7E-04	3.8E-02	.0
TOTAL	7.7E+02	1.9E+01	1.9E+01	1.6E+01	3.8E-03	1.4E-05	5.1E+01	2.1E-01	5.1E+01	9.1E+00	9.4E+02	
PERCENT	82.4	2.0	2.0	1.7	.0	.0	5.4	.0	5.4	1.0		100.0

LIVER * * *

CS-135	6.9E+02	1.8E+01	1.8E+01	1.4E+01	.0E+00	1.2E-05	4.7E+01	1.9E-01	4.7E+01	8.4E+00	8.4E+02	100.0
TH-229	4.3E-04	3.6E-03	3.6E-03	5.7E-04	1.0E-03	3.3E-07	2.1E-03	4.0E-08	1.4E-06	6.3E-05	1.1E-02	.0
TOTAL	6.9E+02	1.8E+01	1.8E+01	1.4E+01	3.8E-03	1.4E-05	4.7E+01	1.9E-01	4.7E+01	8.4E+00	8.4E+02	
PERCENT	81.9	2.1	2.1	1.7	.0	.0	5.6	.0	5.6	1.0		100.0

LUNG * * *

CS-135	5.4E+02	1.4E+01	1.4E+01	1.1E+01	.0E+00	1.2E-05	3.5E+01	1.4E-01	3.5E+01	6.3E+00	6.5E+02	100.0
TOTAL	5.4E+02	1.4E+01	1.4E+01	1.1E+01	3.8E-03	1.4E-05	3.5E+01	1.4E-01	3.5E+01	6.3E+00	6.5E+02	
PERCENT	82.3	2.1	2.1	1.6	.0	.0	5.4	.0	5.4	1.0		100.0

KIDNEY * * *

CS-135	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.2E-05	.0E+00	.0E+00	.0E+00	.0E+00	1.2E-05	.1
AC-225	.0E+00	.0E+00	.0E+00	.0E+00	6.0E-07	2.2E-07	.0E+00	.0E+00	.0E+00	.0E+00	8.2E-07	.0
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	1.0E-03	3.3E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-03	8.5
U-233	7.0E-05	1.1E-03	1.1E-03	1.5E-03	2.7E-03	8.5E-07	4.4E-03	9.2E-08	3.3E-04	1.4E-04	1.1E-02	91.4
NP-237+D	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-07	2.4E-10	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-07	.0
TOTAL	7.0E-05	1.1E-03	1.1E-03	1.5E-03	3.8E-03	1.4E-05	4.4E-03	9.2E-08	3.3E-04	1.4E-04	1.2E-02	
PERCENT	.6	8.5	8.5	11.8	30.8	.1	35.9	.0	2.7	1.1		100.0

* * * * DOSES BY PATH, ORGAN, AND NUCLIDE AFTER 50 YEARS UPTAKE AND 50 YEARS EXPOSURE * * * *

SN126 MAX. INDIVIDUAL * * * LST008 SOURCE FILE * * * * * * 50 YR BUILDUP * * * 13:06:06 08/26/75

ISOTOPE	FISH	CRUSTACEA	MOLLUSCS	DRINKING-	SHORELINE	SWIMMING	PRODUCE	EGGS	MILK	MEAT	TOTAL	PERCENT
SKIN * * *												
SN-126+D	.0E+00	.0E+00	.0E+00	.0E+00	7.5E+02	5.5E-03	.0E+00	.0E+00	.0E+00	.0E+00	7.5E+02	99.9
SB-126	.0E+00	.0E+00	.0E+00	.0E+00	7.5E-01	3.0E-01	.0E+00	.0E+00	.0E+00	.0E+00	1.0E+00	.1
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	7.5E+02	3.1E-01	.0E+00	.0E+00	.0E+00	.0E+00	7.5E+02	
PERCENT	.0	.0	.0	.0	100.0	.0	.0	.0	.0	.0		100.0
BODY * * *												
PD-107	5.5E-04	8.5E-03	8.5E-03	2.2E-03	.0E+00	.0E+00	4.3E+00	4.0E-04	6.2E-01	1.5E-02	4.9E+00	.6
SN-126+D	8.0E+01	1.3E+01	1.3E+01	1.1E+00	7.0E+02	1.6E-03	3.3E+00	6.8E-06	1.2E+00	5.2E-02	8.1E+02	99.2
SB-126	4.3E-03	2.1E-02	2.1E-02	1.7E-01	7.0E-01	2.2E-01	1.4E-01	6.1E-05	3.4E-02	6.1E-04	1.3E+00	.2
RA-225+D	4.0E-03	1.0E-02	1.0E-02	3.2E-03	4.4E-08	1.0E-08	2.9E-03	1.3E-09	7.2E-03	1.3E-05	3.7E-02	.0
TH-229	3.9E-04	3.3E-03	3.3E-03	5.3E-04	1.0E-03	3.0E-07	2.0E-03	3.7E-08	1.3E-06	5.8E-05	1.1E-02	.0
TOTAL	8.0E+01	1.3E+01	1.3E+01	1.2E+00	7.0E+02	2.2E-01	7.7E+00	4.7E-04	1.9E+00	6.7E-02	8.2E+02	
PERCENT	9.8	1.6	1.6	.2	85.7	.0	.9	.0	.2	.0		100.0
GI-LLI * * *												
PD-107	5.5E-02	8.0E-01	8.0E-01	2.2E-01	.0E+00	.0E+00	4.1E+02	3.9E-02	6.0E+01	1.5E+00	4.8E+02	19.9
SN-126+D	8.0E+02	1.3E+02	1.3E+02	1.1E+01	7.0E+02	1.6E-03	3.3E+01	6.8E-05	1.2E+01	5.2E-01	1.8E+03	76.2
SB-126	1.0E+00	4.9E+00	4.9E+00	3.9E+01	7.0E-01	2.2E-01	3.3E+01	1.4E-02	7.7E+00	1.4E-01	9.2E+01	3.8
AC-225	6.0E-04	1.2E-02	1.2E-02	9.5E-04	5.5E-07	2.1E-07	6.7E-04	3.6E-08	1.1E-06	1.6E-05	2.6E-02	.0
TH-229	9.5E-04	8.0E-03	8.0E-03	1.3E-03	1.0E-03	3.0E-07	4.9E-03	9.2E-08	3.1E-06	1.4E-04	2.4E-02	.0
TOTAL	8.0E+02	1.4E+02	1.4E+02	5.1E+01	7.0E+02	2.2E-01	4.8E+02	5.3E-02	8.1E+01	2.1E+00	2.4E+03	
PERCENT	33.4	5.9	5.9	2.1	29.2	.0	20.0	.0	3.4	.1		100.0
THYROID * * *												
SN-126+D	1.6E+01	2.7E+00	2.7E+00	2.2E-01	7.0E+02	1.6E-03	6.7E-01	1.4E-06	2.5E-01	1.1E-02	7.2E+02	99.9
SB-126	7.5E-05	3.6E-04	3.6E-04	2.9E-03	7.0E-01	2.2E-01	2.4E-03	1.0E-06	5.7E-04	1.0E-05	9.3E-01	.1
TOTAL	1.6E+01	2.7E+00	2.7E+00	2.2E-01	7.0E+02	2.2E-01	6.7E-01	2.4E-06	2.5E-01	1.1E-02	7.2E+02	
PERCENT	2.3	.4	.4	.0	96.8	.0	.1	.0	.0	.0		100.0
BONE * * *												
SN-126+D	2.8E+03	4.6E+02	4.6E+02	3.7E+01	7.0E+02	1.6E-03	1.1E+02	2.4E-04	4.3E+01	1.8E+00	4.6E+03	99.9
SB-126	1.2E-02	6.0E-02	6.0E-02	4.9E-01	7.0E-01	2.2E-01	4.0E-01	1.7E-04	9.5E-02	1.7E-03	2.0E+00	.0
RA-225+D	2.0E-02	5.0E-02	5.0E-02	1.6E-02	4.4E-08	1.0E-08	1.5E-02	6.4E-09	3.6E-02	6.7E-05	1.9E-01	.0

TH-229	1.4E-02	1.2E-01	1.2E-01	1.9E-02	1.0E-03	3.0E-07	7.0E-02	1.3E-06	4.5E-05	2.1E-03	3.4E-01	.0
TOTAL	2.8E+03	4.6E+02	4.6E+02	3.8E+01	7.0E+02	2.2E-01	1.2E+02	4.1E-04	4.3E+01	1.8E+00	4.6E+03	
PERCENT	60.3	10.1	10.1	.8	15.3	.0	2.5	.0	.9	.0		100.0
LIVER * * *												
PD-107	8.5E-03	1.3E-01	1.3E-01	3.5E-02	.0E+00	.0E+00	6.7E+01	6.3E-03	9.8E+00	2.4E-01	7.7E+01	9.0
SN-126+D	5.6E+01	9.2E+00	9.2E+00	7.7E-01	7.0E+02	1.6E-03	2.3E+00	4.7E-06	8.5E-01	3.6E-02	7.8E+02	90.9
SB-126	2.4E-04	1.2E-03	1.2E-03	1.0E-02	7.0E-01	2.2E-01	8.1E-03	3.4E-06	1.9E-03	3.5E-05	9.4E-01	.1
TH-229	3.9E-04	3.3E-03	3.3E-03	5.3E-04	1.0E-03	3.0E-07	2.0E-03	3.7E-08	1.3E-06	5.8E-05	1.1E-02	.0
TOTAL	5.7E+01	9.4E+00	9.4E+00	8.2E-01	7.0E+02	2.2E-01	6.9E+01	6.3E-03	1.1E+01	2.7E-01	8.6E+02	
PERCENT	6.6	1.1	1.1	.1	81.8	.0	8.0	.0	1.2	.0		100.0
LUNG * * *												
SN-126+D	.0E+00	.0E+00	.0E+00	.0E+00	7.0E+02	1.6E-03	.0E+00	.0E+00	.0E+00	.0E+00	7.0E+02	99.9
SB-126	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-01	2.2E-01	.0E+00	.0E+00	.0E+00	.0E+00	9.2E-01	.1
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	7.0E+02	2.2E-01	.0E+00	.0E+00	.0E+00	.0E+00	7.0E+02	
PERCENT	.0	.0	.0	.0	100.0	.0	.0	.0	.0	.0		100.0
KIDNEY * * *												
SN-126+D	.0E+00	.0E+00	.0E+00	.0E+00	7.0E+02	1.6E-03	.0E+00	.0E+00	.0E+00	.0E+00	7.0E+02	99.9
SB-126	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-01	2.2E-01	.0E+00	.0E+00	.0E+00	.0E+00	9.2E-01	.1
U-233	6.5E-05	1.0E-03	1.0E-03	1.4E-03	2.6E-03	8.0E-07	4.1E-03	8.6E-08	3.1E-04	1.3E-04	1.1E-02	.0
TOTAL	6.5E-05	1.0E-03	1.0E-03	1.4E-03	7.0E+02	2.2E-01	4.1E-03	8.6E-08	3.1E-04	1.3E-04	7.0E+02	
PERCENT	.0	.0	.0	.0	100.0	.0	.0	.0	.0	.0		100.0

* * * * DOSES BY PATH, ORGAN, AND NUCLIDE AFTER 50 YEARS UPTAKE AND 50 YEARS EXPOSURE * * * *

H0166M MAX. INDIVIDUAL * * * LST008 SOURCE FILE * * * * * * 50 YR BUILDUP * * * 13:12:05 08/26/75

ISOTOPE	FISH	CRUSTACEA	MOLLUSCS	DRINKING-	SHORELINE	SWIMMING	PRODUCE	EGGS	MILK	MEAT	TOTAL	PERCENT
SKIN * * *												
RA-225+D	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-08	1.4E-08	.0E+00	.0E+00	.0E+00	.0E+00	3.9E-08	.0
AC-225	.0E+00	.0E+00	.0E+00	.0E+00	2.6E-07	2.4E-07	.0E+00	.0E+00	.0E+00	.0E+00	5.0E-07	.0
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	5.0E-04	2.8E-07	.0E+00	.0E+00	.0E+00	.0E+00	5.0E-04	27.6
U-233	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-03	7.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-03	72.4
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-03	1.3E-06	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-03	
PERCENT	.0	.0	.0	.0	99.9	.1	.0	.0	.0	.0		100.0
BODY * * *												
RA-225+D	1.7E-03	4.1E-03	4.1E-03	1.3E-03	1.8E-08	4.1E-09	1.2E-03	5.3E-10	2.9E-03	5.5E-06	1.5E-02	71.5
RA-226+D	2.6E-08	6.4E-08	6.4E-08	2.1E-08	1.8E-10	6.0E-14	4.6E-08	1.1E-14	7.2E-08	2.7E-10	2.9E-07	.0
AC-225	1.8E-07	3.6E-06	3.6E-06	2.9E-07	2.3E-07	8.5E-08	2.0E-07	1.1E-11	3.4E-10	4.8E-09	8.2E-06	.0
TH-229	1.7E-04	1.3E-03	1.3E-03	2.1E-04	4.0E-04	1.2E-07	8.1E-04	1.5E-08	5.2E-07	2.4E-05	4.2E-03	19.7
U-233	7.1E-06	1.0E-04	1.0E-04	1.4E-04	1.0E-03	3.2E-07	4.3E-04	8.9E-09	3.2E-05	1.4E-05	1.9E-03	8.8
TOTAL	1.8E-03	5.5E-03	5.5E-03	1.7E-03	1.5E-03	5.4E-07	2.5E-03	2.5E-08	3.0E-03	4.3E-05	2.1E-02	
PERCENT	8.5	25.7	25.7	7.7	6.8	.0	11.5	.0	13.9	.2		100.0
GI-LLI * * *												
RA-225+D	3.8E-04	9.5E-04	9.5E-04	3.1E-04	1.8E-08	4.1E-09	2.8E-04	1.2E-10	6.9E-04	1.3E-06	3.6E-03	13.4
AC-225	2.5E-04	4.9E-03	4.9E-03	4.0E-04	2.3E-07	8.5E-08	2.8E-04	1.5E-08	4.7E-07	6.6E-06	1.1E-02	40.8
TH-229	4.0E-04	3.3E-03	3.3E-03	5.5E-04	4.0E-04	1.2E-07	2.0E-03	3.8E-08	1.3E-06	5.9E-05	1.0E-02	38.1
U-233	8.5E-06	1.2E-04	1.2E-04	1.7E-04	1.0E-03	3.2E-07	5.1E-04	1.1E-08	3.8E-05	1.6E-05	2.0E-03	7.7
TOTAL	1.0E-03	9.4E-03	9.4E-03	1.4E-03	1.5E-03	5.4E-07	3.1E-03	6.4E-08	7.3E-04	8.3E-05	2.7E-02	
PERCENT	3.9	35.3	35.3	5.4	5.5	.0	11.6	.0	2.7	.3		100.0
THYROID * * *												
RA-225+D	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-08	4.1E-09	.0E+00	.0E+00	.0E+00	.0E+00	2.2E-08	.0
AC-225	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-07	8.5E-08	.0E+00	.0E+00	.0E+00	.0E+00	3.1E-07	.0
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	4.0E-04	1.2E-07	.0E+00	.0E+00	.0E+00	.0E+00	4.1E-04	27.8
U-233	.0E+00	.0E+00	.0E+00	.0E+00	1.0E-03	3.2E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-03	72.1
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	1.5E-03	5.4E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.5E-03	
PERCENT	.0	.0	.0	.0	100.0	.0	.0	.0	.0	.0		100.0
BONE * * *												

RA-225+D	8.0E-03	2.1E-02	2.1E-02	6.5E-03	1.8E-08	4.1E-09	6.1E-03	2.6E-09	1.5E-02	2.8E-05	7.6E-02	33.0
AC-225	2.7E-06	5.5E-05	5.5E-05	4.3E-06	2.3E-07	8.5E-08	3.0E-06	1.6E-10	5.1E-09	7.1E-08	1.2E-04	.1
TH-229	5.8E-03	4.8E-02	4.8E-02	7.8E-03	4.0E-04	1.2E-07	2.9E-02	5.5E-07	1.9E-05	8.5E-04	1.4E-01	60.5
U-233	1.1E-04	1.7E-03	1.7E-03	2.3E-03	1.0E-03	3.2E-07	7.0E-03	1.5E-07	5.3E-04	2.2E-04	1.5E-02	6.4
TOTAL	1.4E-02	7.0E-02	7.0E-02	1.7E-02	1.5E-03	5.4E-07	4.2E-02	7.0E-07	1.5E-02	1.1E-03	2.3E-01	
PERCENT	6.0	30.5	30.5	7.2	.6	.0	18.1	.0	6.6	.5		100.0

LIVER * * *

PO-210	1.6E-09	3.1E-08	3.1E-08	1.3E-10	1.7E-17	5.0E-19	7.4E-10	1.1E-13	1.0E-10	3.1E-12	6.5E-08	.0
RA-225+D	9.5E-06	2.4E-05	2.4E-05	8.0E-06	1.8E-08	4.1E-09	7.2E-06	3.1E-12	1.7E-05	3.3E-08	9.0E-05	1.6
AC-225	3.7E-06	7.5E-05	7.5E-05	6.0E-06	2.3E-07	8.5E-08	4.2E-06	2.2E-10	7.1E-09	9.9E-08	1.6E-04	3.0
TH-229	1.7E-04	1.3E-03	1.3E-03	2.3E-04	4.0E-04	1.2E-07	8.1E-04	1.5E-08	5.3E-07	2.4E-05	4.2E-03	76.5
U-233	.0E+00	.0E+00	.0E+00	.0E+00	1.0E-03	3.2E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-03	18.9
TOTAL	1.8E-04	1.4E-03	1.4E-03	2.4E-04	1.5E-03	5.4E-07	8.3E-04	1.6E-08	1.8E-05	2.4E-05	5.5E-03	
PERCENT	3.2	25.3	25.3	4.3	26.2	.0	14.9	.0	.3	.4		100.0

LUNG * * *

RA-225+D	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-08	4.1E-09	.0E+00	.0E+00	.0E+00	.0E+00	2.2E-08	.0
AC-225	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-07	8.5E-08	.0E+00	.0E+00	.0E+00	.0E+00	3.1E-07	.0
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	4.0E-04	1.2E-07	.0E+00	.0E+00	.0E+00	.0E+00	4.1E-04	27.8
U-233	.0E+00	.0E+00	.0E+00	.0E+00	1.0E-03	3.2E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-03	72.1
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	1.5E-03	5.4E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.5E-03	
PERCENT	.0	.0	.0	.0	100.0	.0	.0	.0	.0	.0		100.0

KIDNEY * * *

AC-225	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-07	8.5E-08	.0E+00	.0E+00	.0E+00	.0E+00	3.1E-07	.0
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	4.0E-04	1.2E-07	.0E+00	.0E+00	.0E+00	.0E+00	4.1E-04	8.5
U-233	2.8E-05	4.2E-04	4.2E-04	5.5E-04	1.0E-03	3.2E-07	1.7E-03	3.6E-08	1.3E-04	5.4E-05	4.3E-03	91.5
TOTAL	2.8E-05	4.2E-04	4.2E-04	5.5E-04	1.5E-03	5.4E-07	1.7E-03	3.6E-08	1.3E-04	5.4E-05	4.8E-03	
PERCENT	.6	8.7	8.7	11.6	30.6	.0	36.0	.0	2.7	1.1		100.0

* * * * DOSES BY PATH, ORGAN, AND NUCLIDE AFTER 50 YEARS UPTAKE AND 50 YEARS EXPOSURE * * * *

CM247 MAX. INDIVIDUAL * * * LST008 SOURCE FILE * * * * * * 50 YR BUILDUP * * * 11:59:27 08/26/75

ISOTOPE	FISH	CRUSTACEA	MOLLUSCS	DRINKING-	SHORELINE	SWIMMING	PRODUCE	EGGS	MILK	MEAT	TOTAL	PERCENT
SKIN * * *												
RA-225+D	.0E+00	.0E+00	.0E+00	.0E+00	1.5E-08	8.0E-09	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-08	.0
AC-225	.0E+00	.0E+00	.0E+00	.0E+00	1.5E-07	1.4E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.9E-07	.0
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	2.9E-04	1.6E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.9E-04	22.1
U-233	.0E+00	.0E+00	.0E+00	.0E+00	7.5E-04	4.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	7.5E-04	57.1
AM-243+D	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-06	1.0E-09	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-06	.2
CM-247+D	.0E+00	.0E+00	.0E+00	.0E+00	2.7E-04	9.0E-08	.0E+00	.0E+00	.0E+00	.0E+00	2.7E-04	20.6
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-03	8.6E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-03	
PERCENT	.0	.0	.0	.0	99.9	.1	.0	.0	.0	.0		100.0
BODY * * *												
RA-225+D	9.5E-04	2.4E-03	2.4E-03	8.0E-04	1.0E-08	2.4E-09	7.1E-04	3.1E-10	1.7E-03	3.2E-06	9.0E-03	66.8
RA-226+D	1.3E-07	3.2E-07	3.2E-07	1.1E-07	9.5E-10	3.1E-13	2.4E-07	5.8E-14	3.7E-07	1.4E-09	1.5E-06	.0
AC-225	1.0E-07	2.1E-06	2.1E-06	1.7E-07	1.3E-07	5.0E-08	1.2E-07	6.3E-12	2.0E-10	2.8E-09	4.8E-06	.0
TH-229	9.5E-05	7.9E-04	7.9E-04	1.3E-04	2.3E-04	7.5E-08	4.8E-04	9.0E-09	3.1E-07	1.4E-05	2.5E-03	18.9
U-233	4.1E-06	6.0E-05	6.0E-05	8.1E-05	6.5E-04	1.9E-07	2.5E-04	5.3E-09	1.9E-05	8.0E-06	1.1E-03	8.4
PU-239	2.9E-09	4.1E-08	4.1E-08	3.2E-08	4.5E-10	8.0E-14	7.2E-08	1.8E-12	2.1E-11	2.6E-09	1.9E-07	.0
AM-243+D	2.0E-07	4.0E-06	4.0E-06	3.2E-07	2.4E-06	7.0E-10	7.1E-07	1.7E-11	6.9E-10	2.5E-08	1.2E-05	.1
CM-247+D	1.2E-05	2.3E-04	2.3E-04	1.8E-05	2.3E-04	6.0E-08	5.8E-05	1.2E-09	4.3E-08	1.8E-06	7.7E-04	5.8
TOTAL	1.1E-03	3.5E-03	3.5E-03	1.0E-03	1.1E-03	3.8E-07	1.5E-03	1.6E-08	1.7E-03	2.7E-05	1.3E-02	
PERCENT	7.9	25.9	25.9	7.7	8.3	.0	11.1	.0	13.0	.2		100.0
GI-LLI * * *												
RA-225+D	2.2E-04	5.5E-04	5.5E-04	1.8E-04	1.0E-08	2.4E-09	1.7E-04	7.2E-11	4.0E-04	7.5E-07	2.1E-03	11.9
AC-225	1.4E-04	2.9E-03	2.9E-03	2.3E-04	1.3E-07	5.0E-08	1.6E-04	8.7E-09	2.8E-07	3.9E-06	6.3E-03	36.5
TH-229	2.3E-04	1.9E-03	1.9E-03	3.2E-04	2.3E-04	7.5E-08	1.2E-03	2.2E-08	7.5E-07	3.5E-05	5.9E-03	33.9
U-233	4.9E-06	7.5E-05	7.5E-05	1.0E-04	6.5E-04	1.9E-07	3.0E-04	6.2E-09	2.3E-05	9.5E-06	1.2E-03	7.1
NP-239	4.8E-08	9.5E-07	9.5E-07	1.9E-07	3.3E-10	5.5E-10	3.3E-08	5.6E-12	9.5E-11	9.2E-11	2.2E-06	.0
PU-239	1.9E-08	2.7E-07	2.7E-07	2.2E-07	4.5E-10	8.0E-14	4.9E-07	1.2E-11	1.4E-10	1.7E-08	1.3E-06	.0
AM-243+D	6.5E-07	1.3E-05	1.3E-05	1.0E-06	2.4E-06	7.0E-10	2.3E-06	5.7E-11	2.3E-09	8.3E-08	3.3E-05	.2
CM-247+D	3.3E-05	6.5E-04	6.5E-04	5.5E-05	2.3E-04	6.0E-08	1.7E-04	3.4E-09	1.2E-07	5.2E-06	1.8E-03	10.3
TOTAL	6.4E-04	6.1E-03	6.1E-03	8.9E-04	1.1E-03	3.8E-07	2.0E-03	4.1E-08	4.3E-04	5.4E-05	1.7E-02	
PERCENT	3.7	35.3	35.3	5.1	6.4	.0	11.4	.0	2.5	.3		100.0
THYROID * * *												
RA-225+D	.0E+00	.0E+00	.0E+00	.0E+00	1.0E-08	2.4E-09	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-08	.0
AC-225	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-07	5.0E-08	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-07	.0

TH-229	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-04	7.5E-08	.0E+00	.0E+00	.0E+00	.0E+00	2.4E-04	21.0
U-233	.0E+00	.0E+00	.0E+00	.0E+00	6.5E-04	1.9E-07	.0E+00	.0E+00	.0E+00	.0E+00	6.5E-04	58.2
AM-243+D	.0E+00	.0E+00	.0E+00	.0E+00	2.4E-06	7.0E-10	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-06	.2
CM-247+D	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-04	6.0E-08	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-04	20.6
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-03	3.8E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-03	
PERCENT	.0	.0	.0	.0	100.0	.0	.0	.0	.0	.0		100.0

BONE * * *

RA-225+D	4.8E-03	1.2E-02	1.2E-02	3.9E-03	1.0E-08	2.4E-09	3.6E-03	1.5E-09	8.7E-03	1.6E-05	4.5E-02	31.1
RA-226+D	2.5E-07	6.2E-07	6.2E-07	2.0E-07	9.5E-10	3.1E-13	4.4E-07	1.1E-13	6.9E-07	2.6E-09	2.8E-06	.0
AC-225	1.5E-06	3.1E-05	3.1E-05	2.5E-06	1.3E-07	5.0E-08	1.8E-06	9.4E-11	3.0E-09	4.2E-08	6.9E-05	.0
TH-229	3.4E-03	2.8E-02	2.8E-02	4.6E-03	2.3E-04	7.5E-08	1.7E-02	3.2E-07	1.1E-05	5.0E-04	8.1E-02	56.1
U-233	6.7E-05	1.0E-03	1.0E-03	1.4E-03	6.5E-04	1.9E-07	4.1E-03	8.6E-08	3.1E-04	1.3E-04	8.8E-03	6.1
PU-239	1.1E-07	1.6E-06	1.6E-06	1.3E-06	4.5E-10	8.0E-14	2.9E-06	7.2E-11	8.6E-10	1.0E-07	7.6E-06	.0
AM-243+D	2.9E-06	5.7E-05	5.7E-05	4.6E-06	2.4E-06	7.0E-10	1.0E-05	2.5E-10	1.0E-08	3.6E-07	1.3E-04	.1
CM-247+D	1.9E-04	3.9E-03	3.9E-03	3.1E-04	2.3E-04	6.0E-08	9.5E-04	2.0E-08	7.1E-07	3.0E-05	9.4E-03	6.5
TOTAL	8.4E-03	4.5E-02	4.5E-02	1.0E-02	1.1E-03	3.8E-07	2.6E-02	4.3E-07	9.0E-03	6.8E-04	1.4E-01	
PERCENT	5.8	31.0	31.0	7.1	.8	.0	17.7	.0	6.2	.5		100.0

LIVER * * *

PO-210	8.0E-09	1.6E-07	1.6E-07	6.5E-10	8.5E-17	2.6E-18	3.8E-09	5.5E-13	5.1E-10	1.6E-11	3.3E-07	.0
RA-225+D	5.5E-06	1.4E-05	1.4E-05	4.6E-06	1.0E-08	2.4E-09	4.2E-06	1.8E-12	1.0E-05	1.9E-08	5.3E-05	.7
AC-225	2.1E-06	4.3E-05	4.3E-05	3.5E-06	1.3E-07	5.0E-08	2.4E-06	1.3E-10	4.2E-09	5.8E-08	9.5E-05	1.3
TH-229	9.6E-05	7.9E-04	7.9E-04	1.3E-04	2.3E-04	7.5E-08	4.8E-04	9.1E-09	3.1E-07	1.4E-05	2.5E-03	33.7
U-233	.0E+00	.0E+00	.0E+00	.0E+00	6.5E-04	1.9E-07	.0E+00	.0E+00	.0E+00	.0E+00	6.5E-04	8.6
PU-239	1.7E-08	2.3E-07	2.3E-07	1.9E-07	4.5E-10	8.0E-14	4.1E-07	1.0E-11	1.2E-10	1.5E-08	1.1E-06	.0
AM-243+D	1.4E-06	2.8E-05	2.8E-05	2.3E-06	2.4E-06	7.0E-10	5.0E-06	1.2E-10	4.9E-09	1.8E-07	6.7E-05	.9
CM-247+D	8.2E-05	1.6E-03	1.6E-03	1.3E-04	2.3E-04	6.0E-08	4.1E-04	8.4E-09	3.0E-07	1.3E-05	4.1E-03	54.8
TOTAL	1.9E-04	2.5E-03	2.5E-03	2.8E-04	1.1E-03	3.8E-07	9.0E-04	1.8E-08	1.1E-05	2.7E-05	7.5E-03	
PERCENT	2.5	33.3	33.3	3.7	14.8	.0	11.9	.0	.1	.4		100.0

LUNG * * *

RA-225+D	.0E+00	.0E+00	.0E+00	.0E+00	1.0E-08	2.4E-09	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-08	.0
AC-225	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-07	5.0E-08	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-07	.0
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-04	7.5E-08	.0E+00	.0E+00	.0E+00	.0E+00	2.4E-04	21.0
U-233	.0E+00	.0E+00	.0E+00	.0E+00	6.5E-04	1.9E-07	.0E+00	.0E+00	.0E+00	.0E+00	6.5E-04	58.2
AM-243+D	.0E+00	.0E+00	.0E+00	.0E+00	2.4E-06	7.0E-10	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-06	.2
CM-247+D	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-04	6.0E-08	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-04	20.6
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-03	3.8E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-03	
PERCENT	.0	.0	.0	.0	100.0	.0	.0	.0	.0	.0		100.0

KIDNEY * * *

AC-225	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-07	5.0E-08	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-07	.0
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-04	7.5E-08	.0E+00	.0E+00	.0E+00	.0E+00	2.4E-04	7.7
U-233	1.7E-05	2.5E-04	2.5E-04	3.3E-04	6.5E-04	1.9E-07	1.0E-03	2.1E-08	7.6E-05	3.2E-05	2.6E-03	84.7
PU-239	1.2E-08	1.8E-07	1.8E-07	1.5E-07	4.5E-10	8.0E-14	3.2E-07	7.8E-12	9.3E-11	1.1E-08	8.5E-07	.0
AM-243+D	.0E+00	.0E+00	.0E+00	.0E+00	2.4E-06	7.0E-10	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-06	.1
CM-247+D	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-04	6.0E-08	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-04	7.5
TOTAL	1.7E-05	2.5E-04	2.5E-04	3.3E-04	1.1E-03	3.8E-07	1.0E-03	2.1E-08	7.6E-05	3.2E-05	3.1E-03	
PERCENT	.5	8.0	8.0	10.8	36.4	.0	32.8	.0	2.5	1.0		100.0

* * * * DOSES BY PATH, ORGAN, AND NUCLIDE AFTER 50 YEARS UPTAKE AND 50 YEARS EXPOSURE * * * *

7R93 MAX. INDIVIDUAL * * * LST008 SOURCE FILE * * * * * * 50 YR BUILDUP * * * 12:02:37 08/26/75

ISOTOPE	FISH	CRUSTACEA	MOLLUSCS	DRINKING-	SHORELINE	SWIMMING	PRODUCE	EGGS	MILK	MEAT	TOTAL	PERCENT
SKIN * * *												
PB-210+D	.0E+00	.0E+00	.0E+00	.0E+00	2.7E-07	1.4E-08	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-07	.0
RN-222+D	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-08	1.2E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.9E-07	.0
RA-226+D	.0E+00	.0E+00	.0E+00	.0E+00	2.4E-04	1.2E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.4E-04	6.9
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	4.0E-06	2.3E-09	.0E+00	.0E+00	.0E+00	.0E+00	4.1E-06	.1
TH-230+D	.0E+00	.0E+00	.0E+00	.0E+00	5.5E-07	2.7E-10	.0E+00	.0E+00	.0E+00	.0E+00	5.5E-07	.0
U-233	.0E+00	.0E+00	.0E+00	.0E+00	1.0E-05	6.5E-09	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-05	.3
PU-242	.0E+00	.0E+00	.0E+00	.0E+00	3.2E-03	8.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	3.2E-03	92.6
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	3.5E-03	1.1E-06	.0E+00	.0E+00	.0E+00	.0E+00	3.5E-03	
PERCENT	.0	.0	.0	.0	100.0	.0	.0	.0	.0	.0		100.0
BODY * * *												
ZR-93+D	2.0E-05	2.0E-05	2.0E-05	2.5E-04	.0E+00	.0E+00	5.3E-04	8.0E-09	2.6E-07	1.9E-06	8.4E-04	.1
NB-93M	3.5E-01	5.7E-04	5.7E-04	4.7E-04	.0E+00	.0E+00	1.6E-03	6.1E-09	2.6E-04	4.7E-06	3.5E-01	46.2
PB-210+D	2.3E-04	1.2E-04	1.2E-04	9.3E-05	2.0E-07	1.1E-10	1.4E-03	1.7E-08	2.3E-05	5.3E-06	2.0E-03	.3
PO-210	2.0E-04	4.0E-03	4.0E-03	1.6E-05	1.9E-11	6.0E-13	9.5E-05	1.4E-08	1.3E-05	4.0E-07	8.2E-03	1.1
RA-225+D	1.4E-05	3.4E-05	3.4E-05	1.1E-05	1.5E-10	3.4E-11	1.0E-05	4.3E-12	2.4E-05	4.5E-08	1.3E-04	.0
RA-226+D	2.9E-02	7.2E-02	7.2E-02	2.4E-02	2.1E-04	7.0E-08	5.2E-02	1.3E-08	8.1E-02	3.1E-04	3.3E-01	43.9
TH-229	1.3E-06	1.1E-05	1.1E-05	1.8E-06	3.3E-06	1.0E-09	6.7E-06	1.3E-10	4.3E-09	2.0E-07	3.6E-05	.0
U-233	6.0E-08	8.7E-07	8.7E-07	1.1E-06	8.5E-06	2.6E-09	3.5E-06	7.3E-11	2.6E-07	1.1E-07	1.5E-05	.0
PU-242	9.3E-04	1.3E-02	1.3E-02	1.1E-02	2.2E-04	2.6E-08	2.4E-02	5.9E-07	7.1E-06	8.5E-04	6.3E-02	8.4
TOTAL	3.8E-01	9.0E-02	9.0E-02	3.5E-02	4.4E-04	1.7E-07	8.0E-02	6.5E-07	8.1E-02	1.2E-03	7.5E-01	
PERCENT	49.9	12.0	12.0	4.7	.1	.0	10.6	.0	10.8	.2		100.0
GI-LLI * * *												
ZR-93+D	4.5E-02	4.6E-02	4.6E-02	5.5E-01	.0E+00	.0E+00	1.2E+00	1.8E-05	6.0E-04	4.3E-03	1.9E+00	.3
NB-93M	6.5E+02	1.1E+00	1.1E+00	9.0E-01	.0E+00	.0E+00	3.0E+00	1.2E-05	4.9E-01	9.0E-03	6.6E+02	99.6
PU-242	6.5E-03	9.5E-02	9.5E-02	7.5E-02	2.2E-04	2.6E-08	1.7E-01	4.1E-06	4.9E-05	5.9E-03	4.4E-01	.1
TOTAL	6.5E+02	1.2E+00	1.2E+00	1.5E+00	4.4E-04	1.7E-07	4.4E+00	3.4E-05	4.9E-01	1.9E-02	6.6E+02	
PERCENT	98.7	.2	.2	.2	.0	.0	.7	.0	.1	.0		100.0
THYROID * * *												
PB-210+D	.0E+00	.0E+00	.0E+00	.0E+00	2.0E-07	1.1E-10	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-07	.0
RN-222+D	.0E+00	.0E+00	.0E+00	.0E+00	6.0E-08	7.0E-08	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-07	.0
RA-226+D	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-04	7.0E-08	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-04	46.9
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	3.3E-06	1.0E-09	.0E+00	.0E+00	.0E+00	.0E+00	3.3E-06	.8
TH-230+D	.0E+00	.0E+00	.0E+00	.0E+00	4.8E-07	1.5E-10	.0E+00	.0E+00	.0E+00	.0E+00	4.8E-07	.1

U-233	.0E+00	.0E+00	.0E+00	.0E+00	8.5E-06	2.6E-09	.0E+00	.0E+00	.0E+00	.0E+00	8.5E-06	1.9
PU-242	.0E+00	.0E+00	.0E+00	.0E+00	2.2E-04	2.6E-08	.0E+00	.0E+00	.0E+00	.0E+00	2.2E-04	50.3
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	4.4E-04	1.7E-07	.0E+00	.0E+00	.0E+00	.0E+00	4.4E-04	
PERCENT	.0	.0	.0	.0	100.0	.0	.0	.0	.0	.0		100.0

BONE * * *

ZR-93+D	7.3E-04	7.3E-04	7.3E-04	9.0E-03	.0E+00	.0E+00	1.9E-02	2.9E-07	9.7E-06	7.0E-05	3.1E-02	.4
NB-93M	4.1E+00	7.0E-03	7.0E-03	5.6E-03	.0E+00	.0E+00	1.9E-02	7.6E-08	3.2E-03	5.8E-05	4.2E+00	55.9
PB-210+D	5.9E-03	2.8E-03	2.8E-03	2.3E-03	2.0E-07	1.1E-10	3.4E-02	4.3E-07	5.7E-04	1.3E-04	4.9E-02	.6
PO-210	8.0E-04	1.7E-02	1.7E-02	6.5E-05	1.9E-11	6.0E-13	3.9E-04	5.7E-08	5.3E-05	1.6E-06	3.4E-02	.5
RA-225+D	6.5E-05	1.7E-04	1.7E-04	5.5E-05	1.5E-10	3.4E-11	5.0E-05	2.2E-11	1.2E-04	2.3E-07	6.3E-04	.0
RA-226+D	5.4E-02	1.4E-01	1.4E-01	4.4E-02	2.1E-04	7.0E-08	9.8E-02	2.4E-08	1.5E-01	5.8E-04	6.3E-01	8.4
TH-229	4.7E-05	4.0E-04	4.0E-04	6.4E-05	3.3E-06	1.0E-09	2.4E-04	4.5E-09	1.5E-07	7.0E-06	1.2E-03	.0
U-233	9.5E-07	1.4E-05	1.4E-05	1.9E-05	8.5E-06	2.6E-09	5.8E-05	1.2E-09	4.3E-06	1.8E-06	1.2E-04	.0
PU-242	3.7E-02	5.4E-01	5.4E-01	4.3E-01	2.2E-04	2.6E-08	9.7E-01	2.4E-05	2.9E-04	3.4E-02	2.6E+00	34.2
TOTAL	4.2E+00	7.1E-01	7.1E-01	5.0E-01	4.4E-04	1.7E-07	1.1E+00	2.5E-05	1.6E-01	3.5E-02	7.5E+00	
PERCENT	56.6	9.5	9.5	6.6	.0	.0	15.2	.0	2.1	.5		100.0

LIVER * * *

ZR-93+D	3.7E-06	3.8E-06	3.8E-06	4.6E-05	.0E+00	.0E+00	9.9E-05	1.5E-09	4.9E-08	3.5E-07	1.6E-04	.0
NB-93M	1.4E+00	2.3E-03	2.3E-03	1.9E-03	.0E+00	.0E+00	6.3E-03	2.5E-08	1.0E-03	1.9E-05	1.4E+00	75.3
PB-210+D	1.8E-03	8.8E-04	8.8E-04	7.1E-04	2.0E-07	1.1E-10	1.1E-02	1.3E-07	1.8E-04	4.1E-05	1.5E-02	.8
PO-210	1.8E-03	3.5E-02	3.5E-02	1.4E-04	1.9E-11	6.0E-13	8.4E-04	1.2E-07	1.1E-04	3.5E-06	7.3E-02	4.0
RA-226+D	1.3E-06	3.3E-06	3.3E-06	1.1E-06	2.1E-04	7.0E-08	2.4E-06	5.9E-13	3.7E-06	1.4E-08	2.2E-04	.0
TH-229	1.3E-06	1.1E-05	1.1E-05	1.8E-06	3.3E-06	1.0E-09	6.7E-06	1.3E-10	4.3E-09	2.0E-07	3.6E-05	.0
PU-242	5.4E-03	7.7E-02	7.7E-02	6.3E-02	2.2E-04	2.6E-08	1.4E-01	3.4E-06	4.1E-05	4.9E-03	3.7E-01	19.9
TOTAL	1.4E+00	1.2E-01	1.2E-01	6.5E-02	4.4E-04	1.7E-07	1.6E-01	3.7E-06	1.4E-03	5.0E-03	1.8E+00	
PERCENT	75.0	6.3	6.3	3.6	.0	.0	8.5	.0	.1	.3		100.0

LUNG * * *

PB-210+D	.0E+00	.0E+00	.0E+00	.0E+00	2.0E-07	1.1E-10	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-07	.0
RN-222+D	.0E+00	.0E+00	.0E+00	.0E+00	6.0E-08	7.0E-08	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-07	.0
RA-226+D	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-04	7.0E-08	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-04	46.9
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	3.3E-06	1.0E-09	.0E+00	.0E+00	.0E+00	.0E+00	3.3E-06	.8
TH-230+D	.0E+00	.0E+00	.0E+00	.0E+00	4.8E-07	1.5E-10	.0E+00	.0E+00	.0E+00	.0E+00	4.8E-07	.1
U-233	.0E+00	.0E+00	.0E+00	.0E+00	8.5E-06	2.6E-09	.0E+00	.0E+00	.0E+00	.0E+00	8.5E-06	1.9
PU-242	.0E+00	.0E+00	.0E+00	.0E+00	2.2E-04	2.6E-08	.0E+00	.0E+00	.0E+00	.0E+00	2.2E-04	50.3
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	4.4E-04	1.7E-07	.0E+00	.0E+00	.0E+00	.0E+00	4.4E-04	
PERCENT	.0	.0	.0	.0	100.0	.0	.0	.0	.0	.0		100.0

KIDNEY * * *

RA-226+D	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-04	7.0E-08	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-04	.1

TH-229	.0E+00	.0E+00	.0E+00	.0E+00	3.3E-06	1.0E-09	.0E+00	.0E+00	.0E+00	.0E+00	3.3E-06	.0
U-233	2.3E-07	3.4E-06	3.4E-06	4.6E-06	8.5E-06	2.6E-09	1.4E-05	2.9E-10	1.1E-06	4.4E-07	3.6E-05	.0
PU-242	4.1E-03	5.9E-02	5.9E-02	4.7E-02	2.2E-04	2.6E-08	1.0E-01	2.6E-06	3.1E-05	3.7E-03	2.8E-01	99.9
TOTAL	4.1E-03	5.9E-02	5.9E-02	4.7E-02	4.4E-04	1.7E-07	1.0E-01	2.6E-06	3.2E-05	3.7E-03	2.8E-01	
PERCENT	1.5	21.1	21.1	17.1	.2	.0	37.7	.0	.0	1.3		100.0

* * * * DOSES BY PATH, ORGAN, AND NUCLIDE AFTER 50 YEARS UPTAKE AND 50 YEARS EXPOSURE * * * *

U238 MAX. INDIVIDUAL * * * LST008 SOURCE FILE * * * * * * 50 YR BUILDUP * * * 12:06:21 08/26/75

ISOTOPE	FISH	CRUSTACEA	MOLLUSCS	DRINKING-	SHORELINE	SWIMMING	PRODUCE	EGGS	MILK	MEAT	TOTAL	PERCENT
SKIN * * *												
PB-210+D	.0E+00	.0E+00	.0E+00	.0E+00	9.0E-04	4.5E-05	.0E+00	.0E+00	.0E+00	.0E+00	9.5E-04	.1
BI-210+D	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	4.4E-05	.0E+00	.0E+00	.0E+00	.0E+00	4.4E-05	.0
RN-222+D	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-04	3.9E-04	.0E+00	.0E+00	.0E+00	.0E+00	6.2E-04	.1
RA-226+D	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-01	3.9E-04	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-01	90.1
AC-225	.0E+00	.0E+00	.0E+00	.0E+00	9.0E-06	8.5E-06	.0E+00	.0E+00	.0E+00	.0E+00	1.7E-05	.0
AC-227+D	.0E+00	.0E+00	.0E+00	.0E+00	1.7E-03	1.0E-06	.0E+00	.0E+00	.0E+00	.0E+00	1.7E-03	.2
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	1.7E-02	1.0E-05	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-02	2.0
TH-230+D	.0E+00	.0E+00	.0E+00	.0E+00	3.2E-03	1.5E-06	.0E+00	.0E+00	.0E+00	.0E+00	3.2E-03	.4
TH-234	.0E+00	.0E+00	.0E+00	.0E+00	1.2E-05	5.0E-05	.0E+00	.0E+00	.0E+00	.0E+00	6.2E-05	.0
PA-231+D	.0E+00	.0E+00	.0E+00	.0E+00	3.8E-03	1.2E-06	.0E+00	.0E+00	.0E+00	.0E+00	3.9E-03	.4
U-233	.0E+00	.0E+00	.0E+00	.0E+00	1.2E-03	7.0E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.2E-03	.1
U-234	.0E+00	.0E+00	.0E+00	.0E+00	9.5E-03	2.6E-06	.0E+00	.0E+00	.0E+00	.0E+00	9.5E-03	1.1
U-235+D	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-02	2.3E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.9E-02	3.2
U-236	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-02	6.0E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-02	2.4
U-238+D	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	5.0E-05	.0E+00	.0E+00	.0E+00	.0E+00	5.0E-05	.0
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	8.9E-01	1.0E-03	.0E+00	.0E+00	.0E+00	.0E+00	8.9E-01	
PERCENT	.0	.0	.0	.0	99.9	.1	.0	.0	.0	.0		100.0
BODY * * *												
PB-210+D	7.6E-01	3.7E-01	3.7E-01	2.9E-01	7.0E-04	3.8E-07	4.5E+00	5.7E-05	7.6E-02	1.7E-02	6.4E+00	.6
PO-210	6.5E-01	1.3E+01	1.3E+01	5.5E-02	6.5E-08	1.9E-09	3.1E-01	4.5E-05	4.2E-02	1.3E-03	2.7E+01	2.4
RA-223+D	4.9E-03	1.2E-02	1.2E-02	4.0E-03	1.9E-06	6.5E-07	3.0E-03	1.5E-09	7.9E-03	1.3E-05	4.5E-02	.0
RA-225+D	5.5E-02	1.5E-01	1.5E-01	4.7E-02	6.5E-07	1.4E-07	4.3E-02	1.8E-08	1.0E-01	1.9E-04	5.4E-01	.0
RA-226+D	9.7E+01	2.4E+02	2.4E+02	7.7E+01	7.0E-01	2.3E-04	1.7E+02	4.2E-05	2.7E+02	1.0E+00	1.1E+03	96.7
AC-227+D	3.8E-04	7.8E-03	7.8E-03	6.1E-04	1.4E-03	7.5E-07	1.6E-03	3.6E-08	1.4E-06	5.3E-05	2.0E-02	.0
TH-229	5.7E-03	4.7E-02	4.7E-02	7.7E-03	1.4E-02	4.4E-06	2.8E-02	5.4E-07	1.8E-05	8.4E-04	1.5E-01	.0
U-234	7.1E-03	1.0E-01	1.0E-01	1.4E-01	3.5E-04	9.5E-08	4.2E-01	8.8E-06	3.2E-02	1.3E-02	8.2E-01	.1
U-235+D	8.1E-05	1.2E-03	1.2E-03	1.6E-03	2.3E-02	1.8E-06	5.0E-03	1.0E-07	3.7E-04	1.6E-04	3.3E-02	.0
U-236	1.6E-02	2.4E-01	2.4E-01	3.3E-01	2.4E-05	6.0E-09	1.0E+00	2.1E-05	7.6E-02	3.2E-02	2.0E+00	.2
U-238+D	6.5E-04	9.2E-03	9.2E-03	1.2E-02	.0E+00	1.6E-06	3.9E-02	8.1E-07	2.9E-03	1.2E-03	7.4E-02	.0
TOTAL	9.9E+01	2.5E+02	2.5E+02	7.8E+01	7.5E-01	4.7E-04	1.8E+02	1.8E-04	2.7E+02	1.1E+00	1.1E+03	
PERCENT	8.8	22.2	22.2	6.9	.1	.0	15.8	.0	23.8	.1		100.0
GI-LLI * * *												
PB-210+D	8.0E-02	4.1E-02	4.1E-02	3.3E-02	7.0E-04	3.8E-07	4.9E-01	6.2E-06	8.3E-03	1.9E-03	7.0E-01	2.4
BI-210+D	9.5E-03	3.1E-03	3.1E-03	2.5E-02	.0E+00	3.4E-07	9.8E-03	8.3E-06	1.0E-03	2.1E-05	5.2E-02	.2
PO-210	4.8E-01	9.5E+00	9.5E+00	3.9E-02	6.5E-08	1.9E-09	2.3E-01	3.3E-05	3.1E-02	9.6E-04	2.0E+01	67.7
RN-222+D	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-04	2.2E-04	.0E+00	.0E+00	.0E+00	.0E+00	4.3E-04	.0
RA-223+D	3.0E-03	7.5E-03	7.5E-03	2.5E-03	1.9E-06	6.5E-07	1.9E-03	9.3E-10	5.0E-03	7.8E-06	2.7E-02	.1

RA-225+D	1.3E-02	3.3E-02	3.3E-02	1.1E-02	6.5E-07	1.4E-07	9.9E-03	4.3E-09	2.4E-02	4.5E-05	1.3E-01	.4
RA-226+D	2.5E-01	6.5E-01	6.5E-01	2.0E-01	7.0E-01	2.3E-04	4.5E-01	1.1E-07	7.1E-01	2.7E-03	3.6E+00	12.4
AC-225	8.5E-03	1.7E-01	1.7E-01	1.4E-02	8.0E-06	3.0E-06	9.7E-03	5.2E-07	1.7E-05	2.3E-04	3.8E-01	1.3
AC-227+D	4.0E-04	8.0E-03	8.0E-03	6.5E-04	1.4E-03	7.5E-07	1.7E-03	3.8E-08	1.4E-06	5.6E-05	2.0E-02	.1
TH-227+D	3.1E-03	2.6E-02	2.6E-02	4.2E-03	1.0E-06	2.2E-07	4.4E-03	1.7E-07	6.2E-06	1.3E-04	6.4E-02	.2
TH-229	1.4E-02	1.1E-01	1.1E-01	1.9E-02	1.4E-02	4.4E-06	7.0E-02	1.3E-06	4.5E-05	2.1E-03	3.5E-01	1.2
TH-230+D	1.1E-04	9.0E-04	9.0E-04	1.5E-04	2.8E-03	9.0E-07	5.5E-04	1.0E-08	3.5E-07	1.6E-05	5.4E-03	.0
TH-234	2.3E-02	1.9E-01	1.9E-01	3.1E-02	1.0E-05	1.6E-06	3.7E-02	1.3E-06	5.0E-05	1.1E-03	4.7E-01	1.6
PA-231+D	1.4E-03	7.0E-03	7.0E-03	5.0E-03	3.2E-03	8.5E-07	1.6E-02	3.3E-07	1.2E-05	4.9E-04	4.0E-02	.1
U-233	7.5E-06	1.1E-04	1.1E-04	1.5E-04	1.0E-03	3.0E-07	4.8E-04	9.9E-09	3.6E-05	1.5E-05	1.9E-03	.0
U-234	8.0E-03	1.2E-01	1.2E-01	1.6E-01	3.5E-04	9.5E-08	5.0E-01	1.0E-05	3.8E-02	1.6E-02	9.7E-01	3.3
U-235+D	1.3E-04	1.9E-03	1.9E-03	2.6E-03	2.3E-02	1.8E-06	8.0E-03	1.7E-07	6.0E-04	2.5E-04	3.8E-02	.1
U-236	1.9E-02	2.8E-01	2.8E-01	3.8E-01	2.4E-05	6.0E-09	1.2E+00	2.4E-05	8.8E-02	3.7E-02	2.3E+00	7.8
U-238+D	2.3E-03	3.4E-02	3.4E-02	4.6E-02	.0E+00	1.6E-06	1.4E-01	2.9E-06	1.1E-02	4.5E-03	2.7E-01	.9
TOTAL	9.2E-01	1.1E+01	1.1E+01	9.9E-01	7.5E-01	4.7E-04	3.2E+00	9.0E-05	9.2E-01	6.7E-02	2.9E+01	
PERCENT	3.1	38.3	38.3	3.4	2.6	.0	10.9	.0	3.1	.2		100.0

THYROID * * *

PB-210+D	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-04	3.8E-07	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-04	.1
RN-222+D	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-04	2.2E-04	.0E+00	.0E+00	.0E+00	.0E+00	4.3E-04	.1
RA-226+D	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-01	2.3E-04	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-01	93.7
AC-225	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-06	3.0E-06	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-05	.0
AC-227+D	.0E+00	.0E+00	.0E+00	.0E+00	1.4E-03	7.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.4E-03	.2
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	1.4E-02	4.4E-06	.0E+00	.0E+00	.0E+00	.0E+00	1.4E-02	1.9
TH-230+D	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-03	9.0E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-03	.4
TH-234	.0E+00	.0E+00	.0E+00	.0E+00	1.0E-05	1.6E-06	.0E+00	.0E+00	.0E+00	.0E+00	1.2E-05	.0
PA-231+D	.0E+00	.0E+00	.0E+00	.0E+00	3.2E-03	8.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	3.2E-03	.4
U-233	.0E+00	.0E+00	.0E+00	.0E+00	1.0E-03	3.0E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.0E-03	.1
U-234	.0E+00	.0E+00	.0E+00	.0E+00	3.5E-04	9.5E-08	.0E+00	.0E+00	.0E+00	.0E+00	3.5E-04	.0
U-235+D	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-02	1.8E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-02	3.1
U-236	.0E+00	.0E+00	.0E+00	.0E+00	2.4E-05	6.0E-09	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-05	.0
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	7.5E-01	4.7E-04	.0E+00	.0E+00	.0E+00	.0E+00	7.5E-01	
PERCENT	.0	.0	.0	.0	99.9	.1	.0	.0	.0	.0		100.0

BONE * * *

PB-210+D	1.9E+01	9.2E+00	9.2E+00	7.5E+00	7.0E-04	3.8E-07	1.1E+02	1.4E-03	1.9E+00	4.4E-01	1.6E+02	6.8
PO-210	2.7E+00	5.5E+01	5.5E+01	2.2E-01	6.5E-08	1.9E-09	1.3E+00	1.9E-04	1.7E-01	5.4E-03	1.1E+02	4.9
RA-223+D	4.7E-02	1.2E-01	1.2E-01	3.8E-02	1.9E-06	6.5E-07	2.9E-02	1.5E-08	7.7E-02	1.2E-04	4.3E-01	.0
RA-225+D	2.9E-01	7.0E-01	7.0E-01	2.4E-01	6.5E-07	1.4E-07	2.1E-01	9.3E-08	5.2E-01	9.7E-04	2.7E+00	.1
RA-226+D	1.8E+02	4.4E+02	4.4E+02	1.4E+02	7.0E-01	2.3E-04	3.2E+02	7.9E-05	5.0E+02	1.9E+00	2.0E+03	86.1
AC-227+D	6.2E-03	1.2E-01	1.2E-01	1.0E-02	1.4E-03	7.5E-07	2.6E-02	5.9E-07	2.2E-05	8.6E-04	2.9E-01	.0
TH-229	2.0E-01	1.7E+00	1.7E+00	2.8E-01	1.4E-02	4.4E-06	1.0E+00	1.9E-05	6.5E-04	3.0E-02	4.9E+00	.2
TH-230+D	2.0E-03	1.7E-02	1.7E-02	2.7E-03	2.8E-03	9.0E-07	1.0E-02	1.9E-07	6.4E-06	2.9E-04	5.2E-02	.0
PA-231+D	4.8E-03	2.4E-02	2.4E-02	1.8E-02	3.2E-03	8.5E-07	5.4E-02	1.1E-06	4.1E-05	1.7E-03	1.3E-01	.0
U-234	1.1E-01	1.6E+00	1.6E+00	2.2E+00	3.5E-04	9.5E-08	6.8E+00	1.4E-04	5.1E-01	2.1E-01	1.3E+01	.6
U-235+D	1.3E-03	2.0E-02	2.0E-02	2.7E-02	2.3E-02	1.8E-06	8.1E-02	1.7E-06	6.1E-03	2.5E-03	1.8E-01	.0
U-236	2.6E-01	3.9E+00	3.9E+00	5.3E+00	2.4E-05	6.0E-09	1.6E+01	3.4E-04	1.2E+00	5.1E-01	3.1E+01	1.3
U-238+D	1.0E-02	1.6E-01	1.6E-01	2.1E-01	.0E+00	1.6E-06	6.5E-01	1.3E-05	4.8E-02	2.0E-02	1.2E+00	.1

TOTAL	2.0E+02	5.1E+02	5.1E+02	1.6E+02	7.5E-01	4.7E-04	4.6E+02	2.2E-03	5.1E+02	3.1E+00	2.4E+03	
PERCENT	8.6	21.8	21.8	6.6	.0	.0	19.5	.0	21.5	.1		100.0
LIVER * * *												
PB-210+D	5.9E+00	2.9E+00	2.9E+00	2.4E+00	7.0E-04	3.8E-07	3.5E+01	4.4E-04	5.8E-01	1.3E-01	5.0E+01	17.1
BI-210+D	6.5E-04	2.1E-04	2.1E-04	1.7E-03	.0E+00	3.4E-07	6.6E-04	5.6E-07	7.0E-05	1.4E-06	3.6E-03	.0
PO-210	5.5E+00	1.2E+02	1.2E+02	4.7E-01	6.5E-08	1.9E-09	2.7E+00	3.9E-04	3.7E-01	1.1E-02	2.4E+02	82.5
RA-225+D	3.4E-04	8.5E-04	8.5E-04	2.7E-04	6.5E-07	1.4E-07	2.5E-04	1.1E-10	6.1E-04	1.1E-06	3.2E-03	.0
RA-226+D	4.3E-03	1.1E-02	1.1E-02	3.5E-03	7.0E-01	2.3E-04	7.9E-03	1.9E-09	1.2E-02	4.6E-05	7.5E-01	.3
AC-225	1.3E-04	2.6E-03	2.6E-03	2.1E-04	8.0E-06	3.0E-06	1.5E-04	7.7E-09	2.5E-07	3.5E-06	5.7E-03	.0
AC-227+D	1.1E-03	2.2E-02	2.2E-02	1.7E-03	1.4E-03	7.5E-07	4.5E-03	1.0E-07	3.9E-06	1.5E-04	5.3E-02	.0
TH-229	5.7E-03	4.7E-02	4.7E-02	7.7E-03	1.4E-02	4.4E-06	2.9E-02	5.4E-07	1.8E-05	8.5E-04	1.5E-01	.1
TH-230+D	1.2E-04	9.6E-04	9.6E-04	1.5E-04	2.8E-03	9.0E-07	5.8E-04	1.1E-08	3.7E-07	1.7E-05	5.6E-03	.0
PA-231+D	1.8E-04	9.2E-04	9.2E-04	6.8E-04	3.2E-03	8.5E-07	2.1E-03	4.3E-08	1.5E-06	6.5E-05	8.0E-03	.0
U-235+D	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-02	1.8E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-02	.0
TOTAL	1.1E+01	1.2E+02	1.2E+02	2.8E+00	7.5E-01	4.7E-04	3.8E+01	8.3E-04	9.7E-01	1.5E-01	2.9E+02	
PERCENT	3.9	40.7	40.7	1.0	.3	.0	13.0	.0	.3	.1		100.0
LUNG * * *												
PB-210+D	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-04	3.8E-07	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-04	.1
RN-222+D	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-04	2.2E-04	.0E+00	.0E+00	.0E+00	.0E+00	4.3E-04	.1
RA-226+D	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-01	2.3E-04	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-01	93.7
AC-225	.0E+00	.0E+00	.0E+00	.0E+00	8.0E-06	3.0E-06	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-05	.0
AC-227+D	.0E+00	.0E+00	.0E+00	.0E+00	1.4E-03	7.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.4E-03	.2
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	1.4E-02	4.4E-06	.0E+00	.0E+00	.0E+00	.0E+00	1.4E-02	1.9
TH-230+D	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-03	9.0E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-03	.4
TH-234	.0E+00	.0E+00	.0E+00	.0E+00	1.0E-05	1.6E-06	.0E+00	.0E+00	.0E+00	.0E+00	1.2E-05	.0
PA-231+D	.0E+00	.0E+00	.0E+00	.0E+00	3.2E-03	8.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	3.2E-03	.4
U-233	.0E+00	.0E+00	.0E+00	.0E+00	1.0E-03	3.0E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.0E-03	.1
U-234	.0E+00	.0E+00	.0E+00	.0E+00	3.5E-04	9.5E-08	.0E+00	.0E+00	.0E+00	.0E+00	3.5E-04	.0
U-235+D	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-02	1.8E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-02	3.1
U-236	.0E+00	.0E+00	.0E+00	.0E+00	2.4E-05	6.0E-09	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-05	.0
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	7.5E-01	4.7E-04	.0E+00	.0E+00	.0E+00	.0E+00	7.5E-01	
PERCENT	.0	.0	.0	.0	99.9	.1	.0	.0	.0	.0		100.0
KIDNEY * * *												
PB-210+D	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-04	3.8E-07	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-04	.0
RN-222+D	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-04	2.2E-04	.0E+00	.0E+00	.0E+00	.0E+00	4.3E-04	.0
RA-226+D	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-01	2.3E-04	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-01	5.9
AC-227+D	.0E+00	.0E+00	.0E+00	.0E+00	1.4E-03	7.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	1.4E-03	.0
TH-229	.0E+00	.0E+00	.0E+00	.0E+00	1.4E-02	4.4E-06	.0E+00	.0E+00	.0E+00	.0E+00	1.4E-02	.1
TH-230+D	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-03	9.0E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-03	.0
PA-231+D	.0E+00	.0E+00	.0E+00	.0E+00	3.2E-03	8.5E-07	.0E+00	.0E+00	.0E+00	.0E+00	3.2E-03	.0
U-233	2.6E-05	3.9E-04	3.9E-04	5.0E-04	1.0E-03	3.0E-07	1.6E-03	3.3E-08	1.2E-04	5.0E-05	4.1E-03	.0
U-234	2.7E-02	4.0E-01	4.0E-01	5.5E-01	3.5E-04	9.5E-08	1.6E+00	3.4E-05	1.2E-01	5.2E-02	3.2E+00	26.8

U-235+D	3.1E-04	4.7E-03	4.7E-03	6.5E-03	2.3E-02	1.8E-06	1.9E-02	4.0E-07	1.4E-03	6.1E-04	6.0E-02	.5
U-236	6.5E-02	9.5E-01	9.5E-01	1.3E+00	2.4E-05	6.0E-09	3.9E+00	8.1E-05	2.9E-01	1.2E-01	7.6E+00	64.1
U-238+D	2.4E-03	3.7E-02	3.7E-02	4.9E-02	.0E+00	1.6E-06	1.5E-01	3.1E-06	1.1E-02	4.7E-03	2.9E-01	2.5
TOTAL	9.4E-02	1.4E+00	1.4E+00	1.9E+00	7.5E-01	4.7E-04	5.7E+00	1.2E-04	4.3E-01	1.8E-01	1.2E+01	
PERCENT	.8	11.7	11.7	16.1	6.3	.0	48.2	.0	3.6	1.5		100.0

* * * * DOSES BY PATH, ORGAN, AND NUCLIDE AFTER 50 YEARS UPTAKE AND 50 YEARS EXPOSURE * * * *

PA231 MAX. INDIVIDUAL * * * LST008 SOURCE FILE * * * * * * 50 YR BUILDUP * * * 12:08:48 08/26/75

ISOTOPE	FISH	CRUSTACEA	MOLLUSCS	DRINKING-	SHORELINE	SWIMMING	PRODUCE	EGGS	MILK	MEAT	TOTAL	PERCENT
SKIN * * *												
PB-210+D	.0E+00	.0E+00	.0E+00	.0E+00	2.6E-05	1.3E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-05	.1
BI-210+D	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-06	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-06	.0
RN-222+D	.0E+00	.0E+00	.0E+00	.0E+00	7.0E-06	1.1E-05	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-05	.1
RA-226+D	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-02	1.2E-05	.0E+00	.0E+00	.0E+00	.0E+00	2.4E-02	98.6
TH-230+D	.0E+00	.0E+00	.0E+00	.0E+00	2.8E-04	1.4E-07	.0E+00	.0E+00	.0E+00	.0E+00	2.9E-04	1.2
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	2.4E-02	2.6E-05	.0E+00	.0E+00	.0E+00	.0E+00	2.4E-02	
PERCENT	.0	.0	.0	.0	99.9	.1	.0	.0	.0	.0		100.0
BODY * * *												
PB-210+D	2.3E-02	1.1E-02	1.1E-02	9.1E-03	2.0E-05	1.1E-08	1.3E-01	1.7E-06	2.3E-03	5.2E-04	1.9E-01	.6
PO-210	2.0E-02	3.9E-01	3.9E-01	1.6E-03	1.9E-09	5.5E-11	9.4E-03	1.3E-06	1.3E-03	3.9E-05	8.1E-01	2.4
RA-226+D	2.8E+00	7.1E+00	7.1E+00	2.3E+00	2.0E-02	7.0E-06	5.1E+00	1.3E-06	8.0E+00	3.0E-02	3.3E+01	97.0
TH-230+D	4.9E-06	4.2E-05	4.2E-05	6.6E-06	2.4E-04	8.0E-08	2.5E-05	4.7E-10	1.6E-08	7.3E-07	3.7E-04	.0
TOTAL	2.9E+00	7.5E+00	7.5E+00	2.3E+00	2.1E-02	1.4E-05	5.3E+00	4.3E-06	8.0E+00	3.1E-02	3.4E+01	
PERCENT	8.6	22.5	22.5	6.8	.1	.0	15.7	.0	23.8	.1		100.0
GI-LLI * * *												
PB-210+D	2.4E-03	1.2E-03	1.2E-03	1.0E-03	2.0E-05	1.1E-08	1.5E-02	1.9E-07	2.5E-04	5.7E-05	2.1E-02	2.9
BI-210+D	2.8E-04	9.5E-05	9.5E-05	7.5E-04	.0E+00	1.0E-08	2.9E-04	2.5E-07	3.1E-05	6.3E-07	1.5E-03	.2
PO-210	1.4E-02	2.9E-01	2.9E-01	1.1E-03	1.9E-09	5.5E-11	6.9E-03	9.9E-07	9.2E-04	2.9E-05	6.0E-01	82.3
RN-222+D	.0E+00	.0E+00	.0E+00	.0E+00	6.0E-06	7.0E-06	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-05	.0
RA-226+D	7.5E-03	1.9E-02	1.9E-02	6.0E-03	2.0E-02	7.0E-06	1.4E-02	3.4E-09	2.1E-02	8.0E-05	1.1E-01	14.6
TH-230+D	9.5E-06	8.0E-05	8.0E-05	1.3E-05	2.4E-04	8.0E-08	4.9E-05	9.2E-10	3.1E-08	1.4E-06	4.8E-04	.1
TOTAL	2.5E-02	3.1E-01	3.1E-01	8.9E-03	2.1E-02	1.4E-05	3.6E-02	1.4E-06	2.2E-02	1.7E-04	7.3E-01	
PERCENT	3.4	42.3	42.3	1.2	2.8	.0	4.9	.0	3.1	.0		100.0
THYROID * * *												
PB-210+D	.0E+00	.0E+00	.0E+00	.0E+00	2.0E-05	1.1E-08	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-05	.1
RN-222+D	.0E+00	.0E+00	.0E+00	.0E+00	6.0E-06	7.0E-06	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-05	.1
RA-226+D	.0E+00	.0E+00	.0E+00	.0E+00	2.0E-02	7.0E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-02	98.7
TH-230+D	.0E+00	.0E+00	.0E+00	.0E+00	2.4E-04	8.0E-08	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-04	1.2
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-02	1.4E-05	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-02	
PERCENT	.0	.0	.0	.0	99.9	.1	.0	.0	.0	.0		100.0

BONE * * *

PB-210+D	5.4E-01	2.8E-01	2.8E-01	2.3E-01	2.0E-05	1.1E-08	3.4E+00	4.2E-05	5.6E-02	1.3E-02	4.8E+00	6.9
PO-210	8.0E-02	1.6E+00	1.6E+00	6.5E-03	1.9E-09	5.5E-11	3.9E-02	5.6E-06	5.2E-03	1.6E-04	3.3E+00	4.9
RA-226+D	5.3E+00	1.3E+01	1.3E+01	4.3E+00	2.0E-02	7.0E-06	9.6E+00	2.4E-06	1.5E+01	5.7E-02	6.0E+01	88.2
TH-230+D	1.8E-04	1.4E-03	1.4E-03	2.4E-04	2.4E-04	8.0E-08	8.8E-04	1.7E-08	5.7E-07	2.6E-05	4.5E-03	.0
TOTAL	5.9E+00	1.5E+01	1.5E+01	4.5E+00	2.1E-02	1.4E-05	1.3E+01	5.0E-05	1.5E+01	7.0E-02	6.8E+01	
PERCENT	8.7	21.8	21.8	6.6	.0	.0	19.0	.0	22.0	.1		100.0

LIVER * * *

PB-210+D	1.7E-01	8.8E-02	8.8E-02	7.1E-02	2.0E-05	1.1E-08	1.0E+00	1.3E-05	1.7E-02	4.0E-03	1.5E+00	17.1
BI-210+D	1.9E-05	6.5E-06	6.5E-06	5.0E-05	.0E+00	1.0E-08	2.0E-05	1.7E-08	2.1E-06	4.3E-08	1.0E-04	.0
PO-210	1.7E-01	3.5E+00	3.5E+00	1.4E-02	1.9E-09	5.5E-11	8.2E-02	1.2E-05	1.1E-02	3.4E-04	7.2E+00	82.6
RA-226+D	1.3E-04	3.2E-04	3.2E-04	1.0E-04	2.0E-02	7.0E-06	2.4E-04	5.8E-11	3.7E-04	1.4E-06	2.2E-02	.3
TH-230+D	1.0E-05	8.5E-05	8.5E-05	1.4E-05	2.4E-04	8.0E-08	5.1E-05	9.7E-10	3.3E-08	1.5E-06	4.9E-04	.0
TOTAL	3.4E-01	3.5E+00	3.5E+00	8.5E-02	2.1E-02	1.4E-05	1.1E+00	2.5E-05	2.9E-02	4.4E-03	8.7E+00	
PERCENT	4.0	40.7	40.7	1.0	.2	.0	13.0	.0	.3	.1		100.0

LUNG * * *

PB-210+D	.0E+00	.0E+00	.0E+00	.0E+00	2.0E-05	1.1E-08	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-05	.1
RN-222+D	.0E+00	.0E+00	.0E+00	.0E+00	6.0E-06	7.0E-06	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-05	.1
RA-226+D	.0E+00	.0E+00	.0E+00	.0E+00	2.0E-02	7.0E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-02	98.7
TH-230+D	.0E+00	.0E+00	.0E+00	.0E+00	2.4E-04	8.0E-08	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-04	1.2
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-02	1.4E-05	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-02	
PERCENT	.0	.0	.0	.0	99.9	.1	.0	.0	.0	.0		100.0

KIDNEY * * *

PB-210+D	.0E+00	.0E+00	.0E+00	.0E+00	2.0E-05	1.1E-08	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-05	.1
RN-222+D	.0E+00	.0E+00	.0E+00	.0E+00	6.0E-06	7.0E-06	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-05	.1
RA-226+D	.0E+00	.0E+00	.0E+00	.0E+00	2.0E-02	7.0E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-02	98.7
TH-230+D	.0E+00	.0E+00	.0E+00	.0E+00	2.4E-04	8.0E-08	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-04	1.2
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-02	1.4E-05	.0E+00	.0E+00	.0E+00	.0E+00	2.1E-02	
PERCENT	.0	.0	.0	.0	99.9	.1	.0	.0	.0	.0		100.0

* * * * DOSES BY PATH, ORGAN, AND NUCLIDE AFTER 50 YEARS UPTAKE AND 50 YEARS EXPOSURE * * * *

TH232 MAX. INDIVIDUAL * * * LST008 SOURCE FILE * * * * * * 50 YR BUILDUP * * * 12:11:22 08/26/75

ISOTOPE	FISH	CRUSTACEA	MOLLUSCS	DRINKING-	SHORELINE	SWIMMING	PRODUCE	EGGS	MILK	MEAT	TOTAL	PERCENT
SKIN * * *												
RA-224+D	.0E+00	.0E+00	.0E+00	.0E+00	1.2E-06	1.8E-06	.0E+00	.0E+00	.0E+00	.0E+00	3.1E-06	1.2
TH-228+D	.0E+00	.0E+00	.0E+00	.0E+00	2.4E-04	1.8E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-04	97.8
TH-232+D	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-06	1.0
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-04	6.2E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-04	
PERCENT	.0	.0	.0	.0	97.5	2.5	.0	.0	.0	.0		100.0
BODY * * *												
RA-224+D	5.5E-04	1.3E-03	1.3E-03	4.3E-04	1.1E-06	1.3E-06	1.2E-04	1.3E-10	4.5E-04	1.5E-07	4.3E-03	67.4
TH-228+D	3.1E-05	2.5E-04	2.5E-04	4.0E-05	2.2E-04	1.3E-06	8.8E-05	2.2E-09	8.8E-08	3.1E-06	8.8E-04	13.9
TH-232+D	4.9E-05	4.0E-04	4.0E-04	6.6E-05	.0E+00	1.8E-06	2.5E-04	4.7E-09	1.6E-07	7.3E-06	1.2E-03	18.6
TOTAL	6.3E-04	2.0E-03	2.0E-03	5.4E-04	2.2E-04	4.5E-06	4.5E-04	7.0E-09	4.5E-04	1.1E-05	6.3E-03	
PERCENT	10.0	31.7	31.7	8.6	3.5	.1	7.1	.0	7.2	.2		100.0
GI-LLI * * *												
RA-224+D	9.0E-04	2.2E-03	2.2E-03	7.0E-04	1.1E-06	1.3E-06	1.9E-04	2.2E-10	7.5E-04	2.6E-07	7.0E-03	18.9
TH-228+D	1.0E-03	9.0E-03	9.0E-03	1.4E-03	2.2E-04	1.3E-06	3.1E-03	7.8E-08	3.1E-06	1.1E-04	2.4E-02	65.2
TH-232+D	2.4E-04	2.0E-03	2.0E-03	3.3E-04	.0E+00	1.8E-06	1.2E-03	2.3E-08	7.8E-07	3.6E-05	5.8E-03	15.9
TOTAL	2.2E-03	1.3E-02	1.3E-02	2.5E-03	2.2E-04	4.5E-06	4.5E-03	1.0E-07	7.6E-04	1.5E-04	3.7E-02	
PERCENT	6.0	36.0	36.0	6.8	.6	.0	12.3	.0	2.1	.4		100.0
THYROID * * *												
RA-224+D	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-06	1.3E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-06	1.1
TH-228+D	.0E+00	.0E+00	.0E+00	.0E+00	2.2E-04	1.3E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.2E-04	98.1
TH-232+D	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-06	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-06	.8
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	2.2E-04	4.5E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-04	
PERCENT	.0	.0	.0	.0	98.0	2.0	.0	.0	.0	.0		100.0
BONE * * *												
RA-224+D	4.2E-03	1.0E-02	1.0E-02	3.4E-03	1.1E-06	1.3E-06	9.2E-04	1.1E-09	3.6E-03	1.2E-06	3.3E-02	34.8
TH-228+D	9.0E-04	7.5E-03	7.5E-03	1.2E-03	2.2E-04	1.3E-06	2.6E-03	6.5E-08	2.6E-06	9.2E-05	2.0E-02	20.9
TH-232+D	1.8E-03	1.4E-02	1.4E-02	2.4E-03	.0E+00	1.8E-06	9.0E-03	1.7E-07	5.8E-06	2.7E-04	4.2E-02	44.3
TOTAL	7.0E-03	3.2E-02	3.2E-02	7.1E-03	2.2E-04	4.5E-06	1.2E-02	2.4E-07	3.6E-03	3.6E-04	9.6E-02	

PERCENT	7.3	33.9	33.9	7.4	.2	.0	13.1	.0	3.8	.4		100.0
LIVER * * *												
RA-224+D	1.0E-05	2.5E-05	2.5E-05	8.5E-06	1.1E-06	1.3E-06	2.2E-06	2.5E-12	8.7E-06	2.9E-09	8.3E-05	2.7
TH-228+D	1.5E-05	1.3E-04	1.3E-04	2.0E-05	2.2E-04	1.3E-06	4.4E-05	1.1E-09	4.4E-08	1.6E-06	5.5E-04	17.9
TH-232+D	1.0E-04	8.4E-04	8.4E-04	1.4E-04	.0E+00	1.8E-06	5.1E-04	9.7E-09	3.3E-07	1.5E-05	2.5E-03	79.4
TOTAL	1.3E-04	9.9E-04	9.9E-04	1.7E-04	2.2E-04	4.5E-06	5.6E-04	1.1E-08	9.1E-06	1.7E-05	3.1E-03	
PERCENT	4.1	32.1	32.1	5.5	7.1	.1	18.0	.0	.3	.5		100.0
LUNG * * *												
RA-224+D	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-06	1.3E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-06	1.1
TH-228+D	.0E+00	.0E+00	.0E+00	.0E+00	2.2E-04	1.3E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.2E-04	98.1
TH-232+D	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-06	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-06	.8
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	2.2E-04	4.5E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-04	
PERCENT	.0	.0	.0	.0	98.0	2.0	.0	.0	.0	.0		100.0
KIDNEY * * *												
RA-224+D	.0E+00	.0E+00	.0E+00	.0E+00	1.1E-06	1.3E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.5E-06	1.1
TH-228+D	.0E+00	.0E+00	.0E+00	.0E+00	2.2E-04	1.3E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.2E-04	98.1
TH-232+D	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-06	.0E+00	.0E+00	.0E+00	.0E+00	1.8E-06	.8
TOTAL	.0E+00	.0E+00	.0E+00	.0E+00	2.2E-04	4.5E-06	.0E+00	.0E+00	.0E+00	.0E+00	2.3E-04	
PERCENT	.0	.0	.0	.0	98.0	2.0	.0	.0	.0	.0		100.0