



CONNECTICUT YANKEE ATOMIC POWER COMPANY

HADDAM NECK PLANT

362 INJUN HOLLOW ROAD • EAST HAMPTON, CT 06424-3099

SEP 16 2004

CY-04-168

Docket No. 50-213

RE: 10 CFR 20.2002

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D C 20555

Haddam Neck Plant
Request for Approval of Proposed Procedures
in accordance with 10 CFR 20.2002

Connecticut Yankee Atomic Power Company (CYAPCO) proposes to transfer certain of its solid waste from decommissioning of the Haddam Neck Plant (HNP) facilities (e.g., structures and buildings) to a disposal facility. Specifically, CYAPCO proposes to dispose of demolition debris from decommissioning of the HNP facilities to the US Ecology Idaho Facility, located in Grand View, Idaho. The purpose of this letter is to request NRC approval of proposed procedures for disposal of certain demolition debris in accordance with the provisions of 10 CFR 20.2002.

A description of the waste material for disposal that potentially contains licensed material is provided in Attachment 1. This description includes the physical and chemical properties important to risk evaluation and the proposed manner and conditions of waste disposal. In addition, CYAPCO has performed a conservative radiological assessment of the demolition debris material and determined that the potential dose to workers involved in the transportation and placement of the waste at the site and to members of the public after closure of the facility as a consequence of the proposed waste disposal will be no more than a few millirem per year Total Effective Dose Equivalent (TEDE) and a small fraction of NRC limits for exposure to members of the public of 25 millirem/yr TEDE.

CYAPCO hereby requests expedited review and approval of this request by December 24, 2004 to support our decommissioning activities at the HNP.

There are no regulatory commitments contained in this letter.

Abdi

If you should have any questions regarding this submittal, please contact Mr. G. P. van Noordennen at (860)-267-3938.

Sincerely,


G. H. Bonchard
Director Nuclear Safety/Regulatory Affairs

9-16-04
Date

Attachments:

- Attachment 1 Haddam Neck Plant, Evaluation in Support of Alternate Waste Disposal Procedures in Accordance with 10 CFR 20.2002
- Attachment 2 Microshield Calculations
- Attachment 3 Resident/Farmer Dose Assessment

cc: S. J. Collins, NRC Region 1 Administrator
T. B. Smith, NRC Project Manager, Haddam Neck Plant
R. R. Bellamy, Chief, Decommissioning and Laboratory Branch, NRC Region1
E. L. Wilds, Jr., Director, CT DEP Monitoring and Radiation Division

Docket No. 50-213
CY-04-168

Attachment 1
Haddam Neck Plant
Evaluation in Support of Alternate Waste Disposal Procedures
In Accordance with 10 CFR 20.2002

September 2004

**Haddam Neck Plant
Evaluation in Support of Alternate Waste Disposal Procedures
In accordance with 10 CFR 20.2002**

1. INTRODUCTION

Approval of the proposed disposal procedures in accordance with the provisions of 10 CFR 20.2002 would allow Connecticut Yankee Atomic Power Company (CYAPCO) to dispose of demolition debris from the Haddam Neck Plant (HNP) decommissioning activities at the US Ecology Idaho Facility in Grand View, Idaho. This attachment provides a conservative assessment of the radiological impacts of the proposed disposal. The following Sections describe disposal site characteristics, the waste material, the radiological assessment and conclusions. The main conclusion is that the potential dose to workers involved in the transportation and placement of the waste at the site and to members of the public after closure of the facility as a consequence of the proposed waste disposal will be no more than a few millirem per year Total Effective Dose Equivalent (TEDE) and a small fraction of NRC limits for exposure to members of the public of 25 millirem/yr TEDE.

2. DISPOSAL SITE CHARACTERISTICS

This section describes the features of the disposal facility of importance in radiological assessment. It describes in turn the geographical and physical environment of the facility, the engineered features, the permits under which the site operates, radioactive material disposal limits, site operations, radiation monitoring, and post-closure plans. A complete description of the site is provided in documents submitted to the State of Idaho in support of permit applications (Envirosafe 1998, Ref. 6.1; EnviroSAFE, 2000, Ref 6.2; CH2M Hill, 1993, Ref 6.3). A description of the key features in detail sufficient to support radiological analysis is provided herein.

2.1 ENVIRONMENT AND FACILITY DESIGN

The US Ecology Idaho site is located near Grand View, Idaho in the Owyhee Desert. Grand View is approximately 40 miles south-southeast of Boise, Idaho. The disposal site is located at 10.5 miles NW on Highway 78, Lemley Road, Grand View, Idaho, 83624.

The most significant natural site features that appear to limit the transport of radioactive material are the low precipitation rate and the long vertical distance to groundwater. The precipitation rate in this arid location is 0.184 meters per year (Envirosafe, 2000, Ref 6.2). The depth to groundwater accommodates a 3.6-meter thick cover, a 33.6-meter thick disposal zone, and a 61-meter thick unsaturated zone between the base of the disposal cell and groundwater (Envirosafe, 2000, Ref 6.2; CH2M Hill, 1993, Ref 6.3).

A number of engineered features designed to enhance confinement performance have been incorporated in the facility. The most important from the standpoint of radioactive material confinement is the 3.6-meter thick, low permeability, erosion resistant cover to be constructed at cell closure. This final cover is to be constructed of compacted soil in conjunction with a 40-mil HDPE liner. The HDPE cover liner is to be integrated with a similar liner along the sides and bottom of the cell. The confinement effectiveness of the HDPE liner is ignored in this analysis to assure that projections of potential radiation dose are conservatively maximal.

Together, the low precipitation rate, the thick, low-permeability cover, and the thick unsaturated zone minimize the potential for long term infiltration, dissolution, and transport of constituents to groundwater. The thick cover also minimizes the potential for exposure of waste material radionuclides by erosion or intrusion and minimizes release of radon gas to the atmosphere (although the dose due to the release of radon is shown to be insignificant in these analyses).

Other facility design features and operating procedures provide shorter term confinement of radioactive materials and limit the potential for radiation exposure during receipt of material and emplacement of materials in the cell. These include a closed facility with filtered ventilation exhaust for transfer of incoming waste material from the shipping conveyance to US Ecology Idaho waste transfer vehicles, mechanized equipment for disposition of waste material in the cell, and the application of an asphaltic spray (to control resuspension of the material into the air) over newly deposited material at the end of each day's operations.

The total capacity of the cell which would receive the HNP waste is approximately two million cubic yards (1.5 million cubic meters). The surface area of the cell is approximately 88,000 square meters. The material that CYAPCO proposes for disposal if occupying the full depth of this cell would have a surface area of approximately 900 square meters. This means that the HNP material would occupy approximately 1 % of the total volume of this disposal cell.

2.2 PERMITS

The US Ecology Idaho site is a Subtitle C RCRA hazardous waste disposal facility permitted under the authority of the Idaho Hazardous Waste Management Act, Chapter 44, Title 39, of the Idaho Code. The site operates under permit IDD073 114654. A Class I Permit Modification was approved in 1999, and a Class II Permit Modification was approved in 2001. The latter permit modification also accommodates recent changes to Idaho law and regulations regarding the disposal of radioactive material, as described below. In accordance with its regulations and permit conditions, the site has been receiving certain radioactive materials exempt from Nuclear Regulatory Commission licensing requirements, including U.S. Army Corps of Engineers formerly Utilized Sites Remedial Action Program materials, for a number of years.

Disposal of radioactive materials at the US Ecology Idaho site is regulated under the Rules of the Department of Environmental Quality, IDAPA 58.01.10, "Rules Regulating the Disposal of Radioactive Materials Not Regulated Under the Atomic Energy Act of 1954, As Amended." These regulations establish radiation protection standards and permit conditions for disposal of these materials at a permitted disposal facility under the authority of the Idaho Hazardous Waste Management Act, Chapter 44, Title 39, Idaho Code.

Under the Idaho Department of Environmental Quality general protection standards, all owners and operators disposing of radioactive materials are required to conduct operations in a manner consistent with radiation protection standards contained in 10 CFR Part 20. In addition, no owner or operator may operate in a manner such that any member of the public would receive an annual TEDE in excess of 100 millirem per year. In addition, no person may release radioactive material for unrestricted use in such a manner that the reasonable maximally exposed individual would receive an annual TEDE greater than 15 millirem per year, excluding natural background.

The facility owner or operator is also required to comply with each of the following permit conditions:

- Department-approved waste acceptance criteria for radioactive material;
- A Department-approved closure program that provides reasonable assurance that the radon emanation rate from the

closed disposal unit will not exceed twenty (20) picocuries per square meter per second averaged across the entire area of the closed disposal unit and meets the general radiation protection standard for the public (TEDE of 15 millirem per year); and

- A Department-approved environmental monitoring program that monitors air, ground water, surface water and soil for radionuclides and ambient radiation levels in the environs of the facility, and which demonstrates that no member of the general public is likely to exceed a radiation dose of 100 millirem per year from operations conducted at the site.

As previously mentioned, the analysis to follow will show that the HNP material proposed for disposal at the US Ecology facility will result in doses that are a small fraction of the applicable limits.

2.3 OPERATIONS

US Ecology Idaho accepts only wastes that conform to waste acceptance criteria approved by the Idaho Department of Environmental Quality, as required in IDAPA 58.01.10. This is implemented in the form of a two-step pre-acceptance protocol. In the first step, the generator prepares a chemical and physical characterization of the waste stream on a US Ecology Idaho standard form. The second step is an evaluation performed by US Ecology Idaho to determine the acceptability of the waste. No waste is shipped until the waste is determined to be acceptable by US Ecology Idaho.

Waste acceptance criteria applicable to the material intended for disposal are as follows:

1. Acceptable Dose Rate at receipt to insure that the yearly dose criteria stated in the following paragraph are maintained.
2. The sum of the concentrations of all radionuclides present in the waste does not exceed 2000 pCi/g.

US Ecology Idaho is required by condition of its Department of Environmental Quality permit to operate in a way that assures that the highest potential dose to a worker handling radioactive material is 400 millirem TEDE per year, and that assures that the highest potential dose to a member of the public is 100 millirem TEDE per year from operations or 15 millirem TEDE per year from release of radioactive materials for unrestricted use.

To meet these requirements, US Ecology Idaho conducts its operations in accordance with its Radioactive Material Health and Safety Manual and other operating procedures. These procedures include measures for minimizing release of material in receipt and handling. Transfers of as-received materials from shipping conveyances to US Ecology Idaho vehicles are performed in a closed structure with bag-filtered ventilation exhaust. Workers use mechanized equipment to transfer and deposit material in the disposal cell. Materials placed in the cell are covered each day with asphaltic spray to minimize the potential for release of radioactive materials to the atmosphere.

To assist in demonstrating compliance with these requirements, US Ecology Idaho also operates a radiation monitoring program approved by the Idaho Department of Environmental Quality, as required in IDAPA 58.01.10. The program includes:

- Periodic collection of grab air samples with analysis for radon progeny,
- Periodic deployment and collection and analysis of passive track-etch detectors with analysis for radon concentration, and
- Periodic deployment and collection of passive dosimeters at locations around the perimeter of the cell with analysis for direct radiation exposure

The following samples are analyzed for Isotopic uranium and thorium, Ra-226 and Gross Alpha and Gross Beta radioactivity (The US Ecology Idaho site will soon be receiving materials from NRC Part 50 licensees. Prior to allowing shipment of any of this additional material, analyses of the following samples for gamma radionuclides will also be instituted):

- Periodic collection of grab air samples during material transfer operations,
- Periodic collection of continuous air samples from the admin/lab area,
- Periodic collection of soil samples from locations downwind of the disposal area, and
- Periodic collection of groundwater samples from two monitoring wells with analysis for gross activity.

2.4 POST-CLOSURE PLAN

As required by the Idaho Department of Environmental Quality in IDAPA 58.01.10, US Ecology Idaho maintains an approved closure plan, submitted as part of its permit application (Envirosafe, 1998,

Ref 6.1). The plan conforms to all standard closure and post-closure requirements applicable to RCRA disposal facilities, including post-closure monitoring and financial assurance.

The plan provides reasonable assurance that the radon emanation rate from the closed disposal unit will not exceed twenty (20) picocuries per square meter per second averaged across the entire area of the closed disposal unit and reasonable assurance that the general radiation protection standard for the public (TEDE of 15 millirem per year) will not be exceeded. It should be noted that this standard for post closure exposure to a member of the public is set below the NRC standard for unconditional release of an NRC licensed facility which is 25 millirem per year TEDE.

3. DESCRIPTION OF WASTE

3.1 Physical Properties

The waste material (the demolition debris) intended for disposal includes flooring materials, concrete, rebar, roofing materials, structural steel, soils associated with digging up foundations, and concrete and/or pavement or other similar solid materials. Soils remediated for the purpose of meeting the final status survey requirements of the HNP License Termination Plan (LTP) (i.e., exceed the Derived Concentration Guideline Levels (DCGL) in the LTP) will not be disposed of at the US Ecology facility as the concentrations of the key gamma radionuclides at the DCGL levels are approximately an order of magnitude over the averages determined later in this evaluation. Large quantities of material at the DCGLs would therefore increase the dose to site workers.

The demolition debris proposed for disposal at the US Ecology Idaho facility will originate from the demolition and removal of structures and paved surfaces at the HNP plant site, after the structure/surface has been decontaminated to remove areas that are highly contaminated.

The physical form of this demolition debris will be that of bulk material of various sizes ranging from the size of sand grains up to occasional monoliths with a volume of several cubic feet. CYAPCO, for the purpose of calculations, assumed the material to be a homogeneous mixture with a specific density of 1 gram per cubic centimeter during shipment and 1.5 grams per cubic centimeter after compaction in the disposal cell at US Ecology. The material will be dry solid waste containing no absorbents or chelating agents.

3.2 Estimated Waste Volume

It is estimated that the mass of demolition debris originating from the decommissioning of the HNP will total approximately 100 million pounds. A breakdown of this waste by source is shown in Table 1. With an assumed density of 1.50 grams per cubic centimeter, (after compaction at the disposal site) the estimated volume of material to be disposed of at the US Ecology Idaho facility is approximately 40,000 cubic feet. This represents approximately 9 percent of the annual volume of waste at the US Ecology Idaho facility. It will be conservatively assumed that all the HNP material is received in one year although it is anticipated that waste will be shipped to the US Ecology facility starting in 2005 through 2006.

The material will not be isolated or dedicated to a single burial cell at the US Ecology Idaho facility. Rather, it will be co-mingled with other radioactive and non radioactive waste material. The material will be covered at the end of each workday with an asphaltic spray to lockdown contamination, in accordance with US Ecology Idaho facility requirements.

3.3. Radiological Characterization of Waste

3.3.1 Background:

CYAPCO has been in the process of characterizing the radiologically contaminated buildings on site. Efforts to date have concentrated on the buildings containing the highest contamination; however, some radiological data is available on all buildings in the radiological controlled area. The demolition plans are to scabble off surface concrete where contamination levels are high and to dispose of this material at radioactive waste disposal facilities other than the US Ecology, Idaho facility. Areas of concrete where high neutron flux has caused significant activation of the concrete are also not proposed for disposal at the US Ecology Idaho facility. After dispositioning the surface contaminated material containing the highest levels of radioactivity, the remainder of the building and structures will be demolished and it is proposed that much of the debris be shipped to the US Ecology facility near Grand View, Idaho. For the purpose of determining the radioactivity level of material to be shipped to the US Ecology facility, concrete core sampling is most appropriate as these portions of the applicable buildings will be demolished in total. The demolition process results in mixing the surface and

volumetric contamination with the remainder of the wall and floor material. This makes the average concentration in the total thickness of the wall or floor appropriate in determining the overall radioactivity content of the waste material. Additional sampling will be conducted during building demolition to confirm radionuclide waste concentrations and scaling factors where currently available information is limited. It is also appropriate to use average values as the dose limits are in terms of annual exposures. Any variation of the waste shipments would be incorporated in the average of all shipments made during a year.

Structural material other than concrete are expected to have only low levels of surface contamination and are therefore bounded by the characteristics of the concrete intended for disposal. Any rebar encased in concrete is also expected to be much less than the surface contamination levels as it is located below the depth to which most of the surface contamination is located and therefore can be treated the same as the concrete.

3.3.2 Characterization Results

The portions of site buildings (including structural material after removal of contaminated system piping and components) that CYAPCO proposes to dispose of at the US Ecology Facility are as follows:

- Containment Walls (including the containment liner) above elevation 17.5',
- Containment Floors/Structures that are inside the containment liner,
- Residual Heat Exchanger (RHR) Pit (a Portion of Auxiliary Building) Floors,
- RHR Pit Walls,
- Waste Disposal Building Floors,
- Waste Disposal Building Walls and Ceilings,
- Remainder of Auxiliary Building above the RHR Pit,
- Spent Fuel Pool Walls and Floor,
- Remainder of Fuel Building above elevation 17.5',
- Service Building above elevation 17.5', and
- Other Miscellaneous Radiological Controlled Area (RCA) Structures, Soil and Asphalt.

A breakdown of the estimated quantities of materials from the above sources is included in Table 1. The following discussion

describes the operational history of the buildings that will make up the waste to be disposed at the US Ecology Idaho Facility and characterization results for the waste that will result from their demolition. In this analysis, some conservatism is applied where data gaps exist. As previously mentioned, additional sampling will be conducted as part of ongoing decommissioning activities to fill these data gaps.

Containment Walls above elevation 17.5'

This portion of the Containment Building has not experienced high levels of contamination due to its location and the fact that it did not come in contact with contaminated system leakage. The concrete in this area is outside of a steel liner that covers the entire inside walls of the containment dome above elevation 17.5'. The liner itself is not expected to be highly contaminated. Four (4) Concrete Core Bores have been taken from quadrants of the containment wall at approximately elevation 4'. Twenty-Four (24) wafers cut from these cores were analyzed for gamma radionuclides, tritium and selected wafers for hard to detect radionuclides. Concrete at this elevation will not be shipped as waste but provides conservative characterization results. The containment wall at elevation 4' has been potentially exposed to more contamination than higher elevations of the wall. This elevation is below the water table and therefore subject to the diffusion of contaminated groundwater that has been present outside to the containment. The inside of containment at this elevation was exposed to standing water during the cavity seal failure event in 1984. Therefore, using the wall characterization results from elevation 4' for elevations above 17.5' is conservative. The results of these characterization samples are contained in Table 2. It should be noted that most of the sample results included in Table 2 indicated no detectable activity at the Minimum Detectable Activity (MDA) concentration. For this reason, the scaling factors determined in Table 4 for the RHR Pit Floors will be used to determine waste activities for this building area for all radionuclides except H-3, Co-60, Sr-90 and Cs-137 for which actual sample averages will be used. For C-14, the scaling factor to Co-60 from core sample # 181 taken in this area will be used.

Containment Floors and Internal Structures

As described in Section 3.3.1 "Background" above, the highly contaminated surfaces and significantly activated areas of

buildings will not be included as waste materials for the US Ecology facility. Therefore, the core sample results for the in core sump and the liquid sumps in containment are not applicable to the determination of average waste concentration for this area of the building. These sample results were used to determine scaling factors for radionuclides not analyzed for all of the samples. The lower area of the inside of containment experienced standing water from the cavity seal failure previously mentioned. Six (6) cores were taken from the floor in this area. Twelve wafers from these cores were analyzed for gamma and selected hard to detect radionuclides. As can be seen from Table 3, the contamination is one to two orders of magnitude higher in the first 2.5" core compared to the deeper cores. Three additional cores from the floor and walls of this area were taken in 1999. These cores showed a similar trend. For Co-60 and Cs-137, the concentration of the resulting debris waste, C_{waste} , was determined by averaging the concentration in the first 2^{1/2} inch wafers, C_1 , of the 12 cores and distributing that value over the average thickness of the containment internal floors, $X(in)$, as follows:

$$C_{waste} = C_1 \frac{2.5}{X}$$

These characterization results will also be used for the internal structures of containment that will be disposed of at US Ecology. Using the floor samples for the internal structures is conservative as most of this material was above the cavity seal failure event and any areas of high surface contamination will be remediated and shipped to a facility other than US Ecology. Data from areas where CYAPCO has collected both floor and wall samples show the floor samples to be at least an order of magnitude higher in radioactivity content than the wall samples.

Whereas many of the samples did not show any detectable activity for most radionuclides, the average scaling factor calculated from the surface wafers will be used to calculate the average activity for all radionuclides except H-3, C-60 and Cs-137. For these radionuclides, the average of the sample results was used to characterize the waste. Only 2 samples from the highly contaminated containment sump were analyzed for tritium. These two sample results were averaged to determine the waste concentration. It is expected that when

more wafers are analyzed for H-3, the average concentration will be reduced.

The characterization samples for this area show measurable levels of C-14. This radionuclide has not been detected in concrete outside of the containment liner in the containment wall or in other buildings on site. It is possible that a gaseous diffusion mechanism has resulted in the shallow permeation of C-14 into containment interior concrete. Therefore, the average sample results for C-14 inside the containment liner will be applied for all concrete inside the containment liner until additional characterization data is obtained.

Residual Heat Exchanger (RHR) Pit of the Auxiliary Building Floors

The RHR Pit is one of the most contaminated areas inside buildings at the HNP site due its design and relative inaccessibility. For this reason, it was targeted for concrete characterization work. Four (4) core bores were taken from the floors in this pit. Seventeen wafers were cut from these bores and analyzed for gamma radionuclides. A subset of the wafers was also analyzed for tritium and all other hard to detect radionuclides. Table 4 details the results of the analysis performed on these core bores. As can be seen in Table 4, contamination (with the exception of Tritium) is highest in the first 2.5" wafer and drops by approximately two orders of magnitude for the second and subsequent wafers. As discussed earlier, areas of high contamination will be remediated. For conservatism, it will be assumed that no scabbling will be performed in the areas where the cores were drilled prior to demolition of the RHR Pit floors. The sumps in this building are known to be highly contaminated and will be remediated prior to demolition of the building. None of the cores were taken from sump areas. The determination of the average concentrations for Co-60 and Cs-137 follows the same method as is used for the containment floors above.

To determine the activity of the other radionuclides except tritium, the scaling factors to Co-60 calculated from Sample # 165 taken in this area are used to determine the average concentration. For Tritium the average concentration in all the samples will be used to characterize the waste. This is due to the fact that tritium acts as water when diffusing into the concrete.

RHR Pit Walls

Five (5) core bores were taken in the walls of the RHR pit. One was taken through an internal wall at approximately elevation -17'. The other four were taken through the exterior wall of the pit at three subsurface elevations at the location adjacent to the outside location of the former Refueling Water Storage Tank. This was determined to be an area of high potential for elevated concrete contamination due to diffusion of contamination from outside of the building resulting from leakage of the Refueling Water Storage Tank (RWST) while the plant was operating. Twenty-Eight (28) wafers from the cores were analyzed for gamma radionuclides, tritium and a subset for all other hard to detect radionuclides. The results of these analyses are shown in Table 5. Surface and volumetric radioactivity levels were generally low with the exception of Tritium which was detected in moderate levels (compared with the Derived Concentration Guidelines Levels published in the HNP LTP). As contamination was seen on both end cores and on certain internal wafers, the average concentration of H-3, Co-60, Sr-90 and Cs-137 from all the cores were used in determining the waste concentration from this building area. This approach is conservative as the highest concentrations are on the outside wafers and samples from only 15 % of the core length were analyzed. By not including results from all interior areas of the cores where lower concentrations are expected, the average concentration is higher and, therefore conservative as the average does not take credit for all the dilution that will occur when the building is demolished.

For the remaining radionuclides there were essentially no detections at the MDA concentration. For this reason and due to the relatively low levels of Co-60 for samples in this area, the scaling factors determined for the RHR Pit Floors were used to determine the waste concentrations for the remaining radionuclides.

Waste Disposal Building Walls, Ceilings and Floors above elevation 15'

The current plan for the waste disposal building is to decontaminate (this waste was sent to a facility other than US Ecology) it to allow for open air demolition, demolish all of the building and dispose of this post decontamination debris as radioactive waste at US Ecology Idaho. Surveys of the building were reviewed to determine the relative contamination

level of this building other than the floor areas. The result of this review is that these portions of this building had low levels of contamination, at least an order of magnitude below the levels on the RHR pit floors and somewhat lower than the levels on the RHR Pit Walls. A very small percentage of the building areas are a contaminated area. The concentrations determined for the RHR Pit Walls will be used for these areas for conservatism.

Waste Disposal Building Floors at Elevation 0'

As mentioned above, the basement floor of the Waste Disposal Building will be removed in its entirety. One concrete core sample was taken from the basement floor in 1999. Three wafers 0.5" thick were cut from the floor side of the core and analyzed for gamma radionuclides. The results for these wafers are shown on Table 6. The results show shallow contamination at levels consistent with the RHR pit floor samples. These results will be used to characterize the waste from this area along with the scaling factors determined from the RHR Pit floor samples. The tritium sample results from the RHR floors samples were used to characterize this area. A review of surveys of the area shows that the contamination levels are generally low and at least a factor of 5 below the levels on the RHR Pit floors. Only a small portion of these floors are contaminated. Using the results of the one core is therefore conservative.

Primary Auxiliary Building (PAB) other than RHR Pit

All of the Primary Auxiliary Building other than the RHR Pit will be decontaminated to allow open air demolition with the scabbled material disposed of in the manner of other higher contaminated materials (not at the U. S. Ecology). The remaining material will be demolished and the debris proposed for shipment to the US Ecology facility. One concrete core was taken from the pipe trench portion of the PAB in 1999. The pipe trench portion of the PAB is the one of the most highly contaminated areas in the PAB. A review of contamination levels of other areas of the PAB shows generally low contamination levels with only a small portion of the building posted as a contaminated area. When the average contamination levels in the PAB as whole are considered, the characterization results for Co-60 and Cs-137 for the containment floors are conservative and will be applied to all areas of the PAB except for the RHR Pit. As with the other

areas outside of the containment liner, the scaling factors to Co-60 from the RHR pit floors will be used to determine the concentrations of radionuclides other than H-3, Co-60 and Cs-137. The average concentration of H-3 for the RHR pit walls will be conservatively used for these upper areas of the Primary Auxiliary Building.

Fuel Pit Walls and Floors below elevation 17.5'

The spent fuel pool in the Fuel Building is lined with stainless steel liner. The demolition plan for this building is to remove the liner after the pool is empty of fuel and all other material. This liner will be disposed at a waste facility other than the US Ecology facility. It is known that at least a small amount of leakage past the liner has occurred. Due to concerns with the integrity of the fuel pool there has been no characterization of this area. The high concentrations measured for the RHR Pit Floors will be used to represent this area.

Remainder of Fuel Building above Elevation 17.5'

The review of surveys of the remainder of the fuel building has shown low contamination levels with only a few small contaminated areas. Although the RHR Pit walls show higher levels of contamination, the concentrations for the RHR Pit walls will be used for the remainder of the Fuel Building for conservatism.

Service Building above Elevation 17.5'

The Service Building has not experienced many contamination events. A review of building surveys shows only a few small contaminated areas in a Decontamination Room and the Chemistry Lab. Contaminated commodities in these areas will be removed and shipped to facilities other than the US Ecology facility. The remaining concrete, will on the average, have very low contamination levels. The expected levels are consistent with those in the Containment walls and therefore, those concentrations will be used for the service building with the exception of C-14. As there have been no detections of C-14 in concrete outside of the containment liner, the scaling factor for Co-60 determined for the RHR Pit floors will be used to determine the C-14 waste concentration in this area.

Miscellaneous Structures, Soil and Asphalt

There are other relatively small structures which are in the Radiological Controlled Area but have very low contamination levels. These include the Cable Vault and the Radwaste Reduction Facility. It is planned that the portions of these buildings above elevation 17.5' be disposed at the US Ecology facility. These buildings have a very low contamination history and either have very small or no contaminated areas. There will also be quantities of slightly contaminated soil that will be displaced to allow access for removal of foundations. Quantities of slightly contaminated asphalt will be removed from the site to meet non-radioactive site closure criteria. As previously discussed, soil with radionuclide concentrations near the LTP DCGLs will not be disposed of at US Ecology, Idaho as these levels would be inconsistent with the concentrations in other type of waste proposed for disposal there. Waste concentrations determined for the containment walls are appropriate for application to this class of waste materials except as amended for C-14 as was done for the Service Building.

3.3.3 Average Concentration of Waste to be shipped to US Ecology

In order to determine the average concentration of waste proposed to be disposed of at US Ecology, a weighted average of the concentrations discussed earlier is determined in Table 8. It can be seen from characterization sample results in Tables 2 thru 7 that the primary radionuclides that affect dose to personnel either transporting the waste or working with its disposal at US Ecology are C-60 and Cs-137. All other gamma emitting radionuclides are present at much lower levels and therefore, need not be included in calculating worker dose. The alpha and beta emitting radionuclides are not a direct dose concern and can only be an inhalation or ingestion hazard during placement in the disposal cell. The controls, discussed earlier, present at the US Ecology facility and the relative low concentrations will preclude any significant dose from these radionuclides to the workers.

The weight of waste from each building is shown based on a recent estimate. The concentration of Co-60 and Cs-137 for each building area is multiplied by the estimated weight of building debris from each building, summed and the sum divided by the total waste weight to determine the weighted average. This value is shown in Table 8. These values are

used later to determine expected yearly dose to transportation and US Ecology site workers involved in disposal of the HNP material.

For the purposes of determining potential dose to a member of the public after the closure of the US Ecology site, the activities of other radionuclides will be determined by the use of scaling factors based on actual HNP characterization sample data. The sample data indicates different scaling factors for inside versus outside of the containment liner. This is primarily due to the detection of C-14 in concrete inside of the containment liner. Therefore, two sets of scaling factors were used to characterize the waste. As shown on Table 8, one set of scaling factors determined from the average of sample results inside the containment liner will be applied to that area. Scaling factors determined from RHR pit floor samples will be used for concrete and other materials from outside of the containment liner. All scaling factors will be based on the ratio of the hard to detect radionuclide to Co-60. As previously discussed, average sample results were used to characterize the proposed waste for tritium. Sr-90 samples show some limited degree of migration of this radionuclide through concrete structures in certain plant areas. As can be seen in Table 8, average sample results for Sr-90 were used when this was the case. A review of the sample data shows that the scaling factors determined are conservative as many are based on sample results that indicate no detectable activity at Minimum Detectable Activity concentration rather than actual detections. Using the above outlined protocol, Table 8 illustrates the values used to determine the average waste concentrations for the material proposed for disposal at the US Ecology facility.

4 RADIOLOGICAL ASSESSMENTS

4.1 Transport Worker Dose Assessment

The Transportation Scenario Maximally Exposed Individual (MEI) dose equivalent will not exceed a few (e.g., five (5)) millirem/yr. This standard of a "few mrem/yr" to a member of the public prior to license termination is defined in NRC Regulatory Issue Summary 2004-08 Reference 6.4). The transportation workers and worker at the US Ecology site are treated as members of the public as the US Ecology site is not licensed by the NRC. Evaluations of both internal and external dose hazards to the transportation worker are discussed below.

Each conveyance will be a strong-tight container and will be verified to be in compliance with Department of Transportation (DOT) external loose surface contamination limits prior to shipment. Therefore, there are no internal dose hazards associated with the Transportation Scenario.

The conservative average activity concentrations discussed in Section 3.3.3 of this Attachment were used to calculate penetrating gamma dose rates external to the conveyance used to transport the material. The geometry modeled bounds any variations in the actual conveyances (e.g., intermodals) that may be used. These calculations are included as Attachment 2. The following dose receptor points were modeled.

- a worst case, on-contact (i.e., one inch (1")) receptor point adjacent to the center of the side of the conveyance;
- a more representative one (1) meter receptor point adjacent to the center of the side of the conveyance; and
- a theoretical "driver" receptor point two (2) meters from the center of the front of the conveyance.

The resultant dose rates to each of these receptor points are $1.025 \text{ E-3 mR/hour}$, $6.454 \text{ E-4 mR/hour}$, and $2.288 \text{ E-4 mR/hour}$, respectively. Therefore, a worker would need to spend in excess of 4,878 hours, 7,747 hours, and 21,853 hours per year, respectively, at these points to exceed a dose equivalent of five (5) millirem per year. It is qualitatively judged to be non-credible that the Transportation Scenario Maximum Exposed Individual (MEI) (e.g., transportation worker, or any other member of public interacting with the transportation activity) would exceed these occupancy times. When a realistic maximum occupancy time of 1000 hours per year (50% of the normal 2000 hours work year actually spent transporting the HNP waste) and worker location in respect to the package is used, the expected dose is less than 1 millirem/yr.

While any given conveyance, or point on the conveyance, may exhibit external dose rates in excess of the levels calculated, the average dose rate to which the MEI is exposed over the course of the year is expected to be below the value calculated. Therefore, Transportation Scenario MEI dose equivalent will not exceed a few (e.g., five (5)) millirem/yr and realistically the expected dose to the MEI is less than 1 millirem/yr.

4.2 Disposal Facility Worker Dose Assessment

The Disposal Site Material Placement Scenario MEI dose equivalent will not exceed a few (e.g., five (5)) millirem/yr. The relevance of this

standard is discussed previously in section 4.1. Evaluations of both internal and external dose hazards to the transportation worker are discussed below.

In support of the operating permit issued by the State of Idaho, US Ecology Idaho maintains a Radiation Protection Program including routine performance of radiation, contamination, and airborne radioactive material surveys. The facility currently conducts disposal activities involving materials similar to those described in Section 3, except that they are contaminated with source material, which has been exempted under 10CFR40. These source material isotopes (i.e., ^{238}U and ^{232}Th) are present in concentrations greater than, and have Derived Air Concentration (DAC) and Annual Limit on Intake (ALI) values several orders of magnitude more restrictive than the primary isotopes of concern described in Section 3.2, herein. Despite this much larger internal dose hazard, the site has had no significant internal dose exposures. Therefore, operating experience indicates that there would be no internal dose hazards associated with the disposal activities described herein, and on-site monitoring will be used to demonstrate and control compliance with all applicable limits.

The conservative average activity concentrations discussed in Section 3.3 of this Attachment were used to calculate penetrating gamma dose rates to the worker in the vicinity of the placed material prior to it being covered. The geometry modeled assumes a dose receptor point centered 18" above a representative slab of material (i.e., after placement) and bounds any after placement scenario. It should also be noted that this calculation conservatively does not take credit for the non-radioactive material that will be co-mingled with the HNP waste. This calculation is included as Attachment 2.

The resultant dose rate to the receptor point is $1.452 \text{ E-3 mR per hour}$. Therefore, a worker would need to spend in excess of 3,444 hours per year at this point to exceed a dose equivalent of five (5) millirem per year. It is qualitatively judged to be non-credible that the Disposal Site Material Placement Scenario MEI (e.g., disposal activity worker, or any other member of public interacting with the disposal activity) would exceed this occupancy time. When a realistic maximum occupancy time above the disposal cell of 1000 hours/yr (50% of the normal work year spent directly on the disposal cell) is used, the dose to the disposal facility worker is 1.45 millirem/yr.

4.3 Resident/Farmer Dose Assessment

The RESRAD computer code was used to calculate the projected effect of the proposed disposal activity on future residents at the disposal site. Each isotope of concern was included at a soil concentration of one (1) pCi/g, such that the resultant calculated dose equivalent to the maximum exposed individual (Resident Farmer) could be evaluated in terms of mrem/year per pCi/g activity concentration. A comprehensive report describing the methodology, input parameter selection, and calculation results is included as Attachment 3.

The average radionuclide concentrations in the waste proposed for disposal was determined in Section 3.3.3. It can be seen in Attachment 3 that many of the assumptions used in the RESRAD code were conservative resulting in an over estimation of post closure dose to a member of the public. The calculation of expected dose to a member of the public after closure of the facility is performed as follows: Table 9 shows the dose to the Resident Farmer for each radionuclide at a concentration of 1 pCi/g. Table 9 shows the post-closure dose to a member of the public when the dose at 1 pCi/yr for each radionuclide is scaled to the average concentrations of the HNP waste determined in Section 3.3.3. It can be seen that the total expected dose to a member of the public post closure is 1.133 millirem/yr.

In addition to other conservatism in the post-closure dose calculation discussed elsewhere in this evaluation, the values shown in Table 9 are very conservative for the following reason. It can be seen that more than 99 % of the post closure dose results from the radionuclides C-14, Nb-94, Tc-99 and Ag-108m. A review of the Attachment 3 report shows that the dose from these radionuclides results from the groundwater pathway. Further review of Attachment 3 shows that the RESRAD default distribution coefficient (K_d) for these radionuclides which was used is value of zero (0). This means that these radionuclides are assumed to have mobility in and below the disposal cell which is equivalent to water. A review of NRC guidance (NUREG/CR-6697, Development of Probabilistic RESRAD 6.0 and RESRAD-BUILD 3.0 Computer Codes, Attachment C, Table 3.9-1) shows positive K_d values for all of these radionuclides. If the NRC guidance values for K_d had been used in lieu of the RESRAD defaults, the mobility of these radionuclides would be significantly retarded and post closure dose reduced to even less significant levels.

The above discussion demonstrates that the disposal of the HNP waste materials at the average isotopic contaminant concentrations

described in Section 3 will result in an insignificant dose (1.15 millirem/yr) post closure to a member of the public. This dose is a small fraction of the 25 millirem/yr NRC post closure criteria for allowable dose to a member of the public (and also the US Ecology site standard of 15 millirem/yr general radiation protection standards for the public) and is of little significance when the high factors of conservatism used in the calculation are considered.

5. Conclusions

Based on the above assessment, it can be concluded that the calculated potential dose to members of the public (i.e., workers involved in the transportation to and placement of the waste and residents after closure of the site) as a consequence of the proposed waste disposal from the decommissioning activities at the HNP at the US Ecology Idaho Facility will be an insignificant fraction of the 25 millirem per year limit. Therefore, CYAPCO concludes that the proposed request for approval in accordance with 10 CFR 20.2002 will not have a significant impact on the workers, public, or the environment and that it is, therefore, acceptable.

6. References

- 6.1 EnviroSAFE, 1998. "Permit for Treatment, Storage, and Disposal of Hazardous Waste, Attachment 9: Closure and Post Closure Plans, p.36, EnviroSAFE Services of Idaho, Inc., 1998.
- 6.2 EnviroSAFE, 2000. "Notification of a Class I Modification, Administrative and Informational Changes to Waste Acceptance Parameters, Appendix A, ResRad Modeling of Post Closure Dose, p.2, EnviroSAFE Services of Idaho, Inc., 2000.
- 6.3 CH2M Hill, 1993. "Hydrogeological Characterization and Ground Water Monitoring Considerations for Proposed Cell 14 Expansion Area at EnviroSAFE Services of Idaho-Site B, pp.35-39, EnviroSAFE Services of Idaho, 1993.
- 6.4 NRC Regulatory Issue Summary 2004-08, Results of the License Termination Rule Analysis, dated May 28, 2004.

Table 1**Estimated Waste Quantities Proposed for Disposal at US Ecology Idaho**

Source of Waste	Estimated Waste Weight (pounds)
Containment Walls	40,000,000
Containment Floor & Internal Structures	20,000,000
Residual Heat Exchanger(RHR) Pit Floors	1,000,000
RHR Pit Walls	2,000,000
Waste Disposal Building Walls	2,500,000
Waste Disposal Building Floors	500,000
Remainder of Auxiliary Building (w/o RHR Pit)	7,000,000
Spent Fuel Pool Walls & Floor	1,000,000
Remainder of Fuel Building above elevation 17.5'	8,000,000
Service Building above elevation 17.5'	8,000,000
Miscellaneous Structures/Soil/Asphalt	10,000,000
Total	100,000,000

TABLE 2
Containment Wall (Outside of Liner) Samples

	Sample # 181						Sample 182						Sample 183						Sample 184							
Radio-nuclide	181-1C-01	181-1C-02	181-3C-01	181-4C-01	181-6C-01	181-6C-02	182-1C-01	182-1C-02	182-4C	182-5C-01	182-9C-01	182-9C-02	183-1C-01	183-1C-02	183-5C-01	183-6C-01	183-9C-01	183-9C-02	184-1C-01	184-1C-02	184-3C-01	184-5C-01	184-8C-01	184-8C-02	Average of all Containment Wall Samples	Scaling Factor for Containment Walls to Co-60 (Using Sample 181-1C-01 for C-14, RHR Pit Scaling Factors for others)
	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	
H-3	3.85	2.55	2.63	13.20	2.31	4.28	8.37	2.56	2.43	11.40	2.34	2.47	2.31	7.54	5.29	2.48	2.09	2.28	6.28	3.10	13.00	2.39	2.26	24.10	5.48	Use Sample Avg.
C-14	0.51	0.51					0.54	0.51					0.52	0.57					0.56	0.57					0.54	2.52
Mn-54	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.04	0.02	0.02	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.22	0.04	Use RHR Pit Factor
Fe-55																									N/A	Use RHR Pit Factor
Co-60	0.20	0.05	0.02	0.02	0.06	0.04	0.07	0.04	0.14	0.07	0.04	0.04	0.04	0.07	0.02	0.04	0.03	0.04	0.14	0.08	0.03	0.03	0.03	0.03	0.06	Use Sample Avg.
Ni-63																									N/A	Use RHR Pit Factor
Sr-90	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	Use Sample Avg.
Nb-94	0.02	0.02	0.02	0.02	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.01	0.02	0.03	0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.02	0.02	Use RHR Pit Factor
Tc-99	0.64	0.64					0.63	0.61					0.74	0.73					0.71	0.68					0.67	Use RHR Pit Factor
Ag-108m	0.02	0.02	0.02	0.01	0.02	0.03	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	Use RHR Pit Factor
Cs-134	0.03	0.02	0.02	0.02	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.03	0.04	0.02	0.02	0.04	0.03	0.04	0.03	0.03	0.04	0.03	0.03	0.03	0.03	Use RHR Pit Factor
Cs-137	0.20	0.04	0.02	0.02	0.03	0.03	0.07	0.05	0.08	0.03	0.03	0.03	0.04	0.04	0.03	0.04	0.03	0.23	0.06	0.06	0.03	0.03	0.03	0.02	0.05	Use Sample Avg.
Eu-152	0.05	0.05	0.05	0.04	0.07	0.08	0.07	0.07	0.06	0.07	0.08	0.07	0.07	0.06	0.06	0.08	0.07	0.09	0.07	0.06	0.07	0.07	0.06	0.06	0.07	Use RHR Pit Factor
Eu-154	0.06	0.05	0.06	0.05	0.10	0.08	0.08	0.07	0.08	0.07	0.12	0.10	0.10	0.06	0.06	0.11	0.08	0.10	0.08	0.08	0.09	0.08	0.09	0.08	0.08	Use RHR Pit Factor
Eu-155	0.06	0.05	0.06	0.05	0.08	0.10	0.08	0.07	0.08	0.07	0.08	0.08	0.06	0.07	0.06	0.09	0.07	0.09	0.08	0.07	0.07	0.08	0.08	0.07	0.07	Use RHR Pit Factor
Pu-238																									N/A	Use RHR Pit Factor
Pu-239																									N/A	Use RHR Pit Factor
Pu-241																									N/A	Use RHR Pit Factor
Am-241	0.07	0.10	0.08	0.07	0.11	0.21	0.14	0.10	0.15	0.10	0.05	0.17	0.04	0.12	0.07	0.07	0.10	0.14	0.10	0.11	0.12	0.15	0.11	0.15	0.11	Use RHR Pit Factor
Cm-243																									N/A	Use RHR Pit Factor

Notes: 1. Sample Results in Bold Type are <Minimum Detectable Activity (MDA)
2. N/A - Sample Not Analyzed for these Radionuclides

TABLE 3

Containment Floor & Wall Samples

	Sample # 175		Sample 176		Sample 177		Sample 178		Sample 179		Sample 180		Containment Sump Sample # 185								Containment Sump Sample 186								Average Scaling Factor (to Co-60) for Containment Floor/Sump Surface Samples	Average of Surface Samples Diluted Over Total Depth
Radio-nuclide	175-1C-01	175-1C-02	176-1C-01	176-1C-02	177-1C-01	177-1C-02	178-1C-01	178-1C-02	179-1C-01	179-1C-02	180-1C-01	180-1C-02	185-1C-01	185-1C-02	185-1C-03	185-1C-04	185-1C-05	185-1C-06	185-1C-07	185-1C-08	186-1C-01	186-1C-02	186-1C-03	186-1C-04	186-1C-05	186-1C-06	186-1C-07	pCi/g		
	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	Use Samp Avg	1285.00	
H-3													1400.00								1170.00							Use Samp Avg	1285.00	
C-14	720.00	0.52	350.00	0.50									70.00	0.50	0.51						25.40	0.57	0.54					27.087	N/A	
Mn-54	0.10	0.06	0.07	0.02	0.07	0.04	0.06	0.03	0.09	0.10	0.02	0.02	0.38	0.03	0.03	0.03	0.04	0.03	0.03	0.02	0.13	0.02	0.05	0.03	0.07	0.03	0.02	0.010	N/A	
Fe-55													74.00								10.20							0.226	N/A	
Co-60	7.78	0.07	23.10	0.02	6.43	0.04	3.98	0.03	5.20	0.15	1.68	0.03	240.00	0.38	0.09	0.08	0.11	0.03	0.03	0.10	70.90	0.02	0.07	0.08	0.10	0.03	0.03	Use Samp Avg	0.67	
Ni-63													415.00								1620.00							12.289	N/A	
Sr-90													20.10								0.95							0.049	N/A	
Nb-94	0.07	0.05	0.06	0.02	0.05	0.03	0.04	0.03	0.07	0.09	0.02	0.02	0.29	0.03	0.02	0.03	0.04	0.02	0.03	0.02	0.09	0.02	0.04	0.02	0.07	0.03	0.02	0.007	N/A	
Tc-99	0.66	0.68	0.63	0.63									2.84	0.73	0.69						0.91	0.60	0.77					0.034	N/A	
Ag-108m	0.11	0.04	0.07	0.02	0.09	0.03	0.08	0.02	0.09	0.07	0.03	0.01	0.57	0.04	0.02	0.03	0.03	0.02	0.02	0.04	0.03	0.02	0.03	0.02	0.06	0.02	0.02	0.011	N/A	
Cs-134	0.11	0.06	0.08	0.02	0.09	0.04	0.06	0.04	0.27	0.12	0.05	0.02	25.50	0.04	0.03	0.04	0.05	0.03	0.03	0.03	1.25	0.02	0.06	0.04	0.08	0.03	0.03	0.031	N/A	
Cs-137	34.90	0.05	17.00	0.06	32.50	0.06	19.70	0.03	19.50	0.10	8.98	0.02	1270.00	6.02	0.15	0.01	0.12	0.03	0.12	3.52	584.00	1.59	0.04	0.10	0.16	0.03	0.04	Use Samples	2.69	
Eu-152	0.25	0.11	0.17	0.05	0.23	0.08	0.18	0.08	0.21	0.20	0.08	0.04	1.30	0.15	0.06	0.09	0.11	0.06	0.07	0.09	0.60	0.06	0.10	0.07	0.16	0.07	0.06	0.028	N/A	
Eu-154	0.25	0.18	0.14	0.06	0.14	0.09	0.14	0.09	0.23	0.31	0.06	0.05	1.86	0.08	0.09	0.10	0.13	0.09	0.09	0.09	0.23	0.05	0.16	0.10	0.21	0.87	0.07	0.024	N/A	
Eu-155	0.18	0.10	0.17	0.07	0.18	0.09	0.12	0.10	0.16	0.14	0.07	0.04	0.80	0.10	0.07	0.08	0.10	0.07	0.07	0.10	0.47	0.06	0.10	0.08	0.13	0.08	0.07	0.021	N/A	
Pu-238													5.08								0.63							0.015	N/A	
Pu-239													1.92								0.24							0.006	N/A	
Pu-241													54.80								9.86							0.184	N/A	
Am-241	0.27	0.15	0.27	0.07	0.24	0.13	0.07	0.20	0.24	0.07	0.13	0.07	7.06	0.14	0.09	0.05	0.08	0.09	0.10	0.22	0.74	0.08	0.20	0.17	0.20	0.11	0.16	0.033	N/A	
Cm-243													1.70								0.11							0.004	N/A	

Radio-nuclide	Containment Floor				Containment Internal Walls						
	Duratek Sample 1/27/99 SML #1 First 0.5 inch	Duratek Sample 1/27/99 SML #1 0.5 to 1 inch	Duratek Sample 1/27/99 SML #1 1 to 1.5 inch	Avg Over All Samp at SML #1	Duratek Sample 1/27/99 SML #2 First 0.5 inch	Duratek Sample 1/27/99 SML #2 0.5 to 1 inch	Avg Over All Samp at SML #2	Duratek Sample 1/27/99 SML #3 First 0.5 inch	Duratek Sample 1/27/99 SML #3 0.5 to 1 inch	Duratek Sample 1/27/99 SML #3 1 to 1.5 inch	Avg Over All Samp at SML #3
	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g
Co-60	23.40	1.00	0.58	8.33	0.39	0.50	0.45	1.68	0.23	0.52	0.81
Cs-134	2.76	0.68	0.64	1.36	0.63	1.40	1.02	0.21	0.41	0.66	0.43
Cs-137	279.00	0.49	0.76	93.42	2.12	1.10	1.61	13.66	0.60	0.58	4.95

Notes: 1. Sample Results in Bold Type are <Minimum Detectable Activity (MDA)
2. N/A - Not Applicable, Scaling Factors used to determine concentrations

Table 4

Residual Heat Exchanger (RHR) Pit Floor Samples

Radio-nuclide	Sample # 165						Sample # 166					Survey Area 2002			Survey Area 2008			Average over Full Thickness	Scaling Factor to Co-60 for Outside Containment (Use Sample 165-1C-01 except as noted)
	165-1C-01	165-1C-02	165-3C-01	165-3C-04	165-5C-01	165-6C-01	166-1C-01	166-2C-01	166-3C-01	166-5C-01	166-7C-01	GTS Duratek Sample 1/27/99 SML #1 First 0.5 inch.	GTS Duratek Sample 1/27/99 SML #1 0.5 to 1 inch	GTS Duratek Sample 1/27/99 SML #1 1 to 1.5 inch.	GTS Duratek Sample 1/27/99 SML #1 First 0.5 inch.	GTS Duratek Sample 1/27/99 SML #1 0.5 to 1 inch	GTS Duratek Sample 1/27/99 SML #1 1 to 1.5 inch.		
	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	
H-3	11.20	16.40	8.17	9.43	1.29	2.54	23.70	3.07	11.50	4.24	1.44							8.45	N/A use Average
C-14	0.77	0.45					0.76	0.77										0.07	0.011
Mn-54	0.18	0.03	0.04	0.02	0.03	0.04	0.07	0.03	0.02	0.03	0.03							0.01	0.003
Fe-55	49.90	3.31					3.87	4.10										2.34	0.737
Co-60	67.70	0.21	0.05	0.39	0.04	0.79	11.70	0.21	0.06	0.02	0.42	6.93	0.42	0.93	13.10	5.50	0.54	1.73	N/A use Average
Ni-63	21.80	2.09					23.70	1.43										1.98	0.322
Sr-90	4.59	0.03					1.74	0.01										0.28	0.068
Nb-94	0.13	0.03	0.04	0.02	0.03	0.03	0.06	0.03	0.02	0.02	0.02							0.01	0.002
Tc-99	0.86	0.50					0.79	0.82										0.07	0.013
Ag-108m	0.24	0.02	0.03	0.02	0.03	0.02	0.09	0.03	0.02	0.02	0.02							0.01	0.004
Cs-134	0.32	0.03	0.05	0.03	0.04	0.04	0.15	0.04	0.03	0.03	0.04				0.63	0.84	0.84	0.03	0.005
Cs-137	226.00	0.16	0.04	0.23	0.04	0.25	39.80	0.16	0.04	0.03	0.14	5.38	0.55	0.82	5.38	1.55	1.35	5.78	N/A use Average
Eu-152	0.59	0.07	0.10	0.06	0.07	0.07	0.23	0.09	0.06	0.06	0.07							0.04	0.009
Eu-154	0.29	0.09	0.12	0.06	0.09	0.08	0.90	0.09	0.08	0.09	0.09							0.05	0.004
Eu-155	0.45	0.06	0.10	0.06	0.07	0.06	0.19	0.11	0.07	0.07	0.07							0.03	0.007
Pu-238	0.76	0.07					0.92	0.07										0.07	0.011
Pu-239	0.21	0.05					0.28	0.05										0.02	0.003
Pu-241	11.90	4.11					7.94	2.96										0.86	0.176
Am-241	0.97	0.04	0.08	0.07	0.04	0.04	0.90	0.08	0.10	0.10	0.15							0.08	0.014
Cm-243	0.24	0.07					0.11	0.04										0.02	0.004

Notes: 1. Sample Results in Bold Type are <Minimum Detectable Activity (MDA)

Table 5
RHR Pit Wall Samples

	Sample # 78							Sample # 171						Sample # 172						Sample # 173					Sample 174				Average All Wall Samples
Radio- nuclide	78-C- 1C-1	78-C- 1C-2	78-C- 1C-3	78-C- 2C-1	78-C- 3C-1	78-C- 3C-2	78-C- 3C-3	171- 1C-01	171- 1C-02	171- 2C-04	171- 3C-03	171- 4C-03	171- 5C-01	172- 1C-01	172- 1C-02	171- 3C-02	172- 4C-01	172- 5C-01	172- 5C-02	173- 1C-01	173- 1C-02	173- 2C-03	173- 3C-01	173- 3C-02	174- 1C-01	174- 1C-02	174- 4C-02	174- 4C-01	
	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	
H-3	12.3	25.9	25.8	3.27	20.6	18.4	5.62	13.80	17.40	1.50	1.61	7.92	2.64	12.10	8.77	1.04	1.54	1.56	1.55	6.50	6.42	1.48	1.31	1.43	7.71	N/C	6.20	N/C	7.66
C-14								0.72	0.64											0.74	0.67				0.64		0.74		N/A
Mn-54	0.092	0.0829	0.0829	0.0865	0.0762	0.0892	0.0931	0.02	0.04	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.04	0.02	0.06	0.03	N/A
Fe-55								2.72	3.36											3.78	4.94				4.02		4.50		N/A
Co-60	0.173	0.108	0.0936	0.125	0.0812	0.125	0.139	0.15	0.04	0.12	0.09	0.05	0.03	0.06	0.04	0.04	0.11	0.24	1.04	0.21	0.03	0.03	0.04	0.09	0.91	0.12	0.12	0.54	0.18
Ni-63								1.19	1.07											1.48	1.08				1.52		1.65		N/A
Sr-90	0.211	0.0696	0.0504	0.0575	0.0584	0.088	0.0904	0.02	0.02	0.01	0.02	0.01	0.01	0.01					0.03	0.09	0.02	0.01	0.01	0.01	0.67	N/C	0.04	N/C	0.07
Nb-94	0.081	0.076	0.0699	0.0782	0.0444	0.0786	0.0926	0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.03	0.02	0.03	0.02	0.05	0.02	N/A
Tc-99								0.89	0.73											0.81	0.74				0.80		0.77		N/A
Ag-108m	0.013	0.0589	0.0691	0.0659	0.0579	0.0635	0.0506	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.02	0.22	0.02	0.03	0.02	0.03	0.02	0.05	0.03	N/A
Cs-134	0.279	0.0875	0.107	0.0993	0.0955	0.116	0.0128	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.05	0.03	0.07	0.04	N/A
Cs-137	7.59	0.0743	0.0905	0.0998	0.0746	0.111	0.104	0.23	0.06	0.24	0.14	0.05	0.05	0.02	0.03	0.03	0.12	1.03	1.06	0.53	0.04	0.02	0.04	0.55	1.03	0.05	0.10	4.08	0.63
Eu-152	0.303	0.178	0.225	0.221	0.174	0.233	0.194	0.06	0.08	0.06	0.07	0.08	0.06	0.06	0.08	0.07	0.07	0.10	0.07	0.06	0.06	0.06	0.08	0.07	0.09	0.06	0.15	0.09	N/A
Eu-154	0.256	0.194	0.207	0.288	0.213	0.255	0.261	0.07	0.09	0.08	0.08	0.10	0.08	0.07	0.10	0.10	0.07	0.08	0.08	0.09	0.08	0.08	0.09	0.07	0.09	0.07	0.19	0.07	N/A
Eu-155	0.272	0.18	0.181	0.219	0.168	0.214	0.224	0.07	0.07	0.07	0.07	0.10	0.07	0.07	0.08	0.08	0.76	0.11	0.08	0.06	0.08	0.07	0.10	0.08	0.08	0.06	0.15	0.09	N/A
Pu-238	0.014	0.0134				0.0234	0.0147	0.10	0.04											0.09	0.08				0.06		0.06		N/A
Pu-239	0.016	0.0133				0.0132	0.0259	0.02	0.03											0.08	0.06				0.01		0.03		N/A
Pu-241								2.32	2.74											2.64	2.72				2.74		2.48		N/A
Am-241	0.017	0.0411				0.0224	0.0352	0.04	0.04	0.13	0.10	0.20	0.10	0.12	0.13	0.13	0.11	0.16	0.12	0.02	0.06	0.10	0.14	0.14	0.05	0.09	0.05	0.12	N/A
Cm-243	0.031	0.0413				0.0225	0.0418	0.05	0.03											0.02	0.05				0.04		0.05		N/A

Notes: 1. Sample Results in Bold Type are <Minimum Detectable Activity (MDA)
2. N/A - Not Applicable, Scaling Factors used to determine concentrations
3. N/C - Samples Not Analyzed for Radionuclide

Table 6**Waste Disposal Building Basement Floors-Elevation 0'**

Radionuclide	GTS Sample Dated 1/27/99 First 0.5 inch. pCi/g	GTS Sample Dated 1/27/99 0.5 to 1 inch. pCi/g	GTS Sample Dated 1/27/99 1 to 1.5 inch. pCi/g	Average over Total Thickness pCi/g
Co-60	160.55	0.65	0.58	2.79
Nb-94	0.28	0.43	<MDA	0.00
Cs-134	1.30	0.18	0.54	0.02
Cs-137	264.00	0.72	0.52	4.59
Eu-154	4.05	<MDA	<MDA	0.07
Eu-155	0.86	<MDA	<MDA	0.01
Am-241	11.03	<MDA	<MDA	0.19

Note: 1. Sample Results in Bold Type are <Minimum Detectable Activity (MDA)

Table 7**Primary Auxiliary Building Sample (Other then RHR Pit)**

Radionuclide	PAB Pipe Chase			
	GTS Sample Dated 1/27/99 First 0.5 inch.	GTS Sample Dated 1/27/99 0.5 to 1 inch.	GTS Sample Dated 1/27/99 1 to 1.5 inch.	Average over Total Thickness
	pCi/g	pCi/g	pCi/g	pCi/g
Co-60	34.10	1.00	1.00	1.42
Cs-134	5.18	0.13	0.07	0.22
Cs-137	74.00	0.91	0.28	3.08

Note: 1. Sample Results in Bold Type are <Minimum Detectable Activity (MDA)

Table 8

Average Waste Concentration Calculation

Source of Concrete Waste	Estimated Waste Weight (Million lbs)	Contam-ination Levels Based On	Average Co-60 Concen-tration by Source (pCi/g)	Average Cs-137 Concen-tration by Source (pCi/g)	Average H-3 Concen-tration by Source (pCi/g)	C-14 Scaling Factor to Co-60	C-14 Concen-tration (pCi/g)	Mn-54 Scaling Factor to Co-60	Mn-54 Concen-tration (pCi/g)	Fe-55 Scaling Factor to Co-60	Fe-55 Concen-tration (pCi/g)	Ni-63 Scaling Factor to Co-60	Ni-63 Concen-tration (pCi/g)	Sr-90 Scaling Factor to Co-60	Sr-90 Concen-tration (pCi/g)	Nb-94 Scaling Factor to Co-60	Nb-94 Concen-tration (pCi/g)	Tc-99 Scaling Fator to Co-60	Tc-99 Concen-tration (pCi/g)	Ag-108m Scaling Factor to Co-60	Ag-108m Concen-tration
Containment Walls	40	Actual	0.06	0.05	5.48	2.522	0.143	0.003	0.000	0.737	0.042	0.322	0.018	Use Actual	0.011	0.0020	0.0001	0.0127	0.0007	0.0036	0.0002
Cont. Floor & Internal	20	Actual Floor	0.67	2.69	1285.00	27.087	18.105	0.010	0.006	0.226	0.151	12.289	8.214	0.0486	0.032	0.0072	0.0048	0.0343	0.0229	0.0112	0.0075
RHR Floors	1	Actual	1.73	5.78	8.45	0.011	0.020	0.003	0.005	0.737	1.272	0.322	0.556	0.0678	0.117	0.0020	0.0034	0.0127	0.0219	0.0036	0.0062
RHR Walls	2	Actual	0.18	0.63	7.66	0.011	0.002	0.003	0.000	0.737	0.130	0.322	0.057	Use Actual	0.073	0.0020	0.0003	0.0127	0.0022	0.0036	0.0006
Waste Disposal Walls	2.5	RHR Walls	0.18	0.63	7.66	0.011	0.002	0.003	0.000	0.737	0.130	0.322	0.057	RHR Walls	0.073	0.0020	0.0003	0.0127	0.0022	0.0036	0.0006
Waste Disposal Floors	0.5	Actual	2.79	4.59	8.45	0.011	0.032	0.003	0.007	0.737	2.058	0.322	0.899	0.0678	0.189	0.0020	0.0055	0.0127	0.0354	0.0036	0.0100
PAB Above El. 17.5'	7	Cont. Floor	0.67	2.69	7.66	0.011	0.008	0.003	0.002	0.737	0.493	0.322	0.215	0.0486	0.032	0.0020	0.0013	0.0127	0.0085	0.0036	0.0024
Fuel Pool Walls & Floor	1	RHR Floors	1.73	5.78	8.45	0.011	0.020	0.003	0.005	0.737	1.272	0.322	0.556	0.0678	0.117	0.0020	0.0034	0.0127	0.0219	0.0036	0.0062
Remainder of Fuel Bldg	8	RHR Walls	0.18	0.63	7.66	0.011	0.002	0.003	0.000	0.737	0.130	0.322	0.057	RHR Walls	0.073	0.0020	0.0003	0.0127	0.0022	0.0036	0.0006
Service Building	8	Cont. Walls	0.06	0.05	5.48	0.011	0.001	0.003	0.000	0.737	0.042	0.322	0.018	Cont. Walls	0.011	0.0020	0.0001	0.0127	0.0007	0.0036	0.0002
Misc Struct/Soil/Asphalt	10	Cont. Walls	0.06	0.05	5.48	0.011	0.001	0.003	0.000	0.737	0.042	0.322	0.018	Cont. Walls	0.011	0.0020	0.0001	0.0127	0.0007	0.0036	0.0002
Total	100	Weighted Avg. Conc.	0.284	0.974	261.88		3.68		1.67E-03		0.14		1.69		2.77E-02		1.25E-03		6.49E-03		2.04E-03

Source of Concrete Waste	Estimated Waste Weight (Million lbs)	Contam-ination Levels	Average Co-60 Concen-tration by Source (pCi/g)	Cs-134 Scaling Factor to Co-60	Cs-134 Concen-tration (pCi/g)	Eu-152 Scaling Factor to Co-60	Eu-152 Concen-tration (pCi/g)	Eu-154 Scaling Factor to Co-60	Eu-154 Concen-tration (pCi/g)	Eu-155 Scaling Factor to Co-60	Eu-155 Concen-tration (pCi/g)	Pu-238 Scaling Factor to Co-60	Pu-238 Concen-tration (pCi/g)	Pu-239 Scaling Factor to Co-60	Pu-239 Concen-tration (pCi/g)	Pu-241 Scaling Fator to Co-60	Pu-241 Concen-tration (pCi/g)	Am-241 Scaling Fator to Co-60	Am-241 Concen-tration (pCi/g)	Cm-243 Scaling Fator to Co-60	Cm-243 Concen-tration (pCi/g)
Containment Walls	40	Actual	0.06	0.0048	0.0003	0.0087	0.0005	0.0043	0.0002	0.0066	0.0004	0.0112	0.0006	0.0031	0.0002	0.1758	0.0099	0.0143	0.0008	0.0036	0.0002
Cont. Floor & Internal	20	Actual Floor	0.67	0.0312	0.0209	0.0277	0.0185	0.0236	0.0158	0.0214	0.0143	0.0150	0.0101	0.0057	0.0038	0.1837	0.1228	0.0332	0.0222	0.0043	0.0029
RHR Floors	1	Actual	1.73	0.0048	0.0082	0.0087	0.0150	0.0043	0.0075	0.0066	0.0114	0.0112	0.0193	0.0031	0.0053	0.1758	0.3034	0.0143	0.0246	0.0036	0.0062
RHR Walls	2	Actual	0.18	0.0048	0.0008	0.0087	0.0015	0.0043	0.0008	0.0066	0.0012	0.0112	0.0020	0.0031	0.0005	0.1758	0.0310	0.0143	0.0025	0.0036	0.0006
Waste Disposal Walls	2.5	RHR Walls	0.18	0.0048	0.0008	0.0087	0.0015	0.0043	0.0008	0.0066	0.0012	0.0112	0.0020	0.0031	0.0005	0.1758	0.0310	0.0143	0.0025	0.0036	0.0006
Waste Disposal Floors	0.5	Actual	2.79	0.0048	0.0133	0.0087	0.0243	0.0043	0.0121	0.0066	0.0185	0.0112	0.0313	0.0031	0.0086	0.1758	0.4908	0.0143	0.0398	0.0036	0.0100
PAB Above El. 17.5'	7	Cont. Floor	0.67	0.0048	0.0032	0.0087	0.0058	0.0043	0.0029	0.0066	0.0044	0.0112	0.0075	0.0031	0.0021	0.1758	0.1175	0.0143	0.0095	0.0036	0.0024
Fuel Pool Walls & Floor	1	RHR Floors	1.73	0.0048	0.0082	0.0087	0.0150	0.0043	0.0075	0.0066	0.0114	0.0112	0.0193	0.0031	0.0053	0.1758	0.3034	0.0143	0.0246	0.0036	0.0062
Remainder of Fuel Bldg	8	RHR Walls	0.18	0.0048	0.0008	0.0087	0.0015	0.0043	0.0008	0.0066	0.0012	0.0112	0.0020	0.0031	0.0005	0.1758	0.0310	0.0143	0.0025	0.0036	0.0006
Service Building	8	Cont. Walls	0.06	0.0048	0.0003	0.0087	0.0005	0.0043	0.0002	0.0066	0.0004	0.0112	0.0006	0.0031	0.0002	0.1758	0.0099	0.0143	0.0008	0.0036	0.0002
Misc Struct/Soil/Asphalt	10	Cont. Walls	0.06	0.0048	0.0003	0.0087	0.0005	0.0043	0.0002	0.0066	0.0004	0.0112	0.0006	0.0031	0.0002	0.1758	0.0099	0.0143	0.0008	0.0036	0.0002
Total	100	Weighted Avg. Conc.	0.28		4.89E-03		5.01E-03		3.81E-03		3.85E-03		3.69E-03		1.23E-03		5.09E-02		6.58E-03		1.11E-03

Table 9**Post Closure Dose Calculation**

Radio-nuclide	Dose Equivalent per Concentration of Radionuclide - Resident Farmer (mrem/yr per pCi/g)	Weighted Average of All Waste (pCi/g)	Post Closure Dose for Avg of All Waste (mrem/yr)
H-3	1.045E-05	261.88	2.737E-03
C-14	3.060E-01	3.68	1.126E+00
Mn-54	6.286E-25	1.67E-03	1.052E-27
Fe-55	0.000E+00	0.14	0.000E+00
Co-60	1.653E-21	0.28	4.692E-22
Ni-63	0.000E+00	1.69	0.000E+00
Sr-90	0.000E+00	0.03	0.000E+00
Nb-94	9.961E-01	1.25E-03	1.246E-03
Tc-99	2.221E-01	6.49E-03	1.441E-03
Ag-108m	5.764E-01	2.04E-03	1.176E-03
Cs-134	5.881E-26	4.89E-03	2.875E-28
Cs-137	6.850E-27	0.97	6.674E-27
Eu-152	1.567E-23	5.01E-03	7.854E-26
Eu-154	5.997E-23	3.81E-03	2.286E-25
Eu-155	0.000E+00	3.85E-03	0.000E+00
Pu-238	2.004E-06	3.69E-03	7.398E-09
Pu-239	0.000E+00	1.23E-03	0.000E+00
Pu-241	0.000E+00	5.09E-02	0.000E+00
Am-241	0.000E+00	6.58E-03	0.000E+00
Cm-243	0.000E+00	1.11E-03	0.000E+00
Total Post Closure Dose (mrem/yr)			1.133E+00

Note: 1. Values in Bold Type are based on Minimum Detectable Activity (MDA)
(i.e. Radionuclide was not detected at the MDA concentration)

Docket No. 50-213
CY-04-168

Attachment 2
Haddam Neck Plant
Microshield Calculations

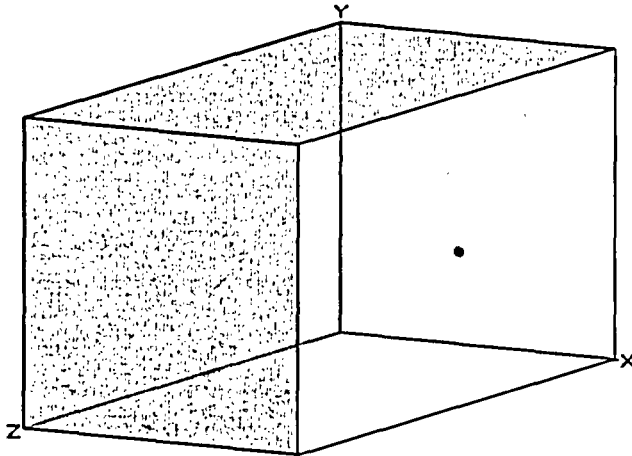
September 2004

MicroShield v5.01 (5.01-00091)
Lockheed Martin Energy Systems

Page : 1
DOS File: CY-OC.MS5
Run Date: September 8, 2004
Run Time: 10:05:00 AM
Duration: 00:00:16

File Ref: CY-USEI
Date: 9/8/04
By: ZZ
Checked: [Signature]

Case Title: Transport - Side OC
Description: CY Transport - Side Dose Receptor On Contact
Geometry: 13 - Rectangular Volume



Source Dimensions
Length 304.8 cm 10 ft 0.0 in
Width 609.6 cm 20 ft 0.0 in
Height 304.8 cm 10 ft 0.0 in

Dose Points
1 X Y Z
307.6575 cm 152.4 cm 304.8 cm
10 ft 1.1 in 5 ft 0.0 in 10 ft 0.0 in

Shields

Shield Name	Dimension	Material	Density
Source	3.46e+06 in ³	Concrete	1
Shield 1	.125 in	Iron	7.86
Air Gap		Air	0.00122

Source Input
Grouping Method : Standard Indices
Number of Groups : 25
Lower Energy Cutoff : 0.015
Photons < 0.015 : Excluded

Library : Grove

Nuclide	curies	becquerels	$\mu\text{Ci}/\text{cm}^3$	Bq/cm^3
Ba-137m	5.2183e-005	1.9308e+006	9.2140e-007	3.4092e-002
Co-60	1.6084e-005	5.9511e+005	2.8400e-007	1.0508e-002
Cs-137	5.5161e-005	2.0410e+006	9.7400e-007	3.6038e-002

Buildup
The material reference is : Source

Integration Parameters
X Direction 30
Y Direction 30
Z Direction 30

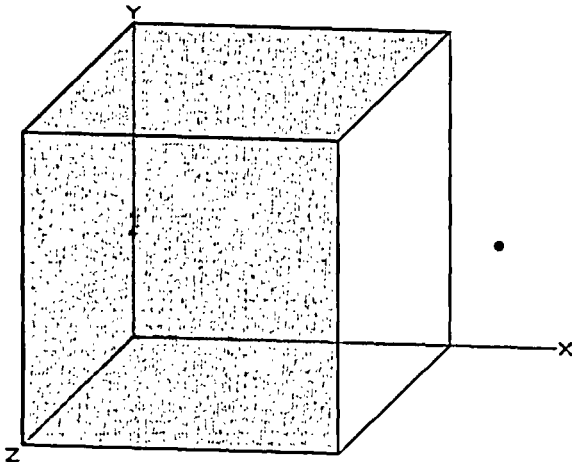
Energy MeV	Activity photons/sec	Results			
		Fluence Rate MeV/cm ² /sec No Buildup	Fluence Rate MeV/cm ² /sec With Buildup	Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup
0.03	1.137e+05	1.282e-15	2.408e-15	1.270e-17	2.386e-17
0.04	2.684e+04	2.866e-10	7.703e-10	1.267e-12	3.407e-12
0.6	1.737e+06	6.711e-02	2.021e-01	1.310e-04	3.945e-04
1.0	5.951e+05	5.316e-02	1.331e-01	9.800e-05	2.454e-04
1.5	5.951e+05	1.043e-01	2.290e-01	1.755e-04	3.853e-04
TOTALS:	3.068e+06	2.246e-01	5.642e-01	4.045e-04	1.025e-03

MicroShield v5.01 (5.01-00091)
Lockheed Martin Energy Systems

Page : 1
DOS File: CY-1M.MS5
Run Date: September 8, 2004
Run Time: 10:00:30 AM
Duration: 00:00:16

File Ref: CY-USEI
Date: 9/8/04
By: 77
Checked: 77

Case Title: Transport - Side 1M
Description: CY Transport - Side Dose Receptor at one (1) meter
Geometry: 13 - Rectangular Volume



Source Dimensions
Length 304.8 cm 10 ft 0.0 in
Width 609.6 cm 20 ft 0.0 in
Height 304.8 cm 10 ft 0.0 in

Dose Points
1 X Y Z
406.7175 cm 152.4 cm 304.8 cm
13 ft 4.1 in 5 ft 0.0 in 10 ft 0.0 in

Shields
Shield Name Dimension Material Density
Source 3.46e+06 in³ Concrete 1
Shield 1 .125 in Iron 7.86
Air Gap Air 0.00122

Source Input
Grouping Method : Standard Indices
Number of Groups : 25
Lower Energy Cutoff : 0.015
Photons < 0.015 : Excluded

Library : Grove

Nuclide	curies	becquerels	$\mu\text{Ci}/\text{cm}^3$	Bq/cm^3
Ba-137m	5.2183e-005	1.9308e+006	9.2140e-007	3.4092e-002
Co-60	1.6084e-005	5.9511e+005	2.8400e-007	1.0508e-002
Cs-137	5.5161e-005	2.0410e+006	9.7400e-007	3.6038e-002

Buildup
The material reference is : Source

Integration Parameters
X Direction 30
Y Direction 30
Z Direction 30

Energy MeV	Activity photons/sec	Fluence Rate MeV/cm ² /sec No Buildup	Results		Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup
			Fluence Rate MeV/cm ² /sec With Buildup			
0.03	1.137e+05	2.962e-15	5.467e-15		2.935e-17	5.418e-17
0.04	2.684e+04	2.613e-10	6.950e-10		1.156e-12	3.074e-12
0.6	1.737e+06	4.729e-02	1.306e-01		9.231e-05	2.550e-04
1.0	5.951e+05	3.619e-02	8.365e-02		6.670e-05	1.542e-04
1.5	5.951e+05	6.890e-02	1.404e-01		1.159e-04	2.362e-04
TOTALS:	3.068e+06	1.524e-01	3.547e-01		2.749e-04	6.454e-04

MicroShield v5.01 (5.01-00091)
Lockheed Martin Energy Systems

Page : 1
DOS File: CYDRIV.MS5
Run Date: September 8, 2004
Run Time: 9:33:13 AM
Duration: 00:00:16

File Ref: CY-USEI
Date: 9/8/4
By: ZZ
Checked: JA

Case Title: Transport - Driver
Description: CY Transport - Driver @ 2 M
Geometry: 13 - Rectangular Volume



Source Dimensions

Length	609.6 cm	20 ft 0.0 in
Width	304.8 cm	10 ft 0.0 in
Height	304.8 cm	10 ft 0.0 in

Dose Points

	<u>X</u>	<u>Y</u>	<u>Z</u>
# 1	815.975 cm	152.4 cm	152.4 cm
	26 ft 9.3 in	5 ft 0.0 in	5 ft 0.0 in

Shields

Shield Name	Dimension	Material	Density
Source	3.46e+06 in ³	Concrete	1
Shield 1	.125 in	Iron	7.86
Shield 2	80.0 in	Air	0.00122
Shield 3	.125 in	Iron	7.86
Air Gap		Air	0.00122

Source Input

Grouping Method : Standard Indices

Number of Groups : 25

Lower Energy Cutoff : 0.015

Photons < 0.015 : Excluded

Library : Grove

Nuclide	curies	becquerels	$\mu\text{Ci}/\text{cm}^3$	Bq/cm ³
Ba-137m	5.2183e-005	1.9308e+006	9.2140e-007	3.4092e-002
Co-60	1.6084e-005	5.9511e+005	2.8400e-007	1.0508e-002
Cs-137	5.5161e-005	2.0410e+006	9.7400e-007	3.6038e-002

Buildup

The material reference is : Source

Integration Parameters

X Direction	30
Y Direction	30
Z Direction	30

Results

Energy MeV	Activity photons/sec	Fluence Rate MeV/cm ² /sec No Buildup	Fluence Rate MeV/cm ² /sec With Buildup	Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup
0.03	1.137e+05	3.620e-24	7.332e-24	3.588e-26	7.266e-26
0.04	2.684e+04	2.341e-14	7.567e-14	1.036e-16	3.346e-16
0.6	1.737e+06	1.567e-02	4.625e-02	3.059e-05	9.028e-05
1.0	5.951e+05	1.232e-02	2.968e-02	2.270e-05	5.471e-05
1.5	5.951e+05	2.381e-02	4.982e-02	4.006e-05	8.382e-05

Page : 2
DOS File: CYDRIV.MS5
Run Date: September 8, 2004
Run Time: 9:33:13 AM
Duration: 00:00:16

<u>Energy</u> <u>MeV</u>	<u>Activity</u> <u>photons/sec</u>	<u>Fluence Rate</u> <u>MeV/cm²/sec</u> <u>No Buildup</u>	<u>Fluence Rate</u> <u>MeV/cm²/sec</u> <u>With Buildup</u>	<u>Exposure Rate</u> <u>mR/hr</u> <u>No Buildup</u>	<u>Exposure Rate</u> <u>mR/hr</u> <u>With Buildup</u>
TOTALS:	3.068e+06	5.180e-02	1.258e-01	9.336e-05	2.288e-04

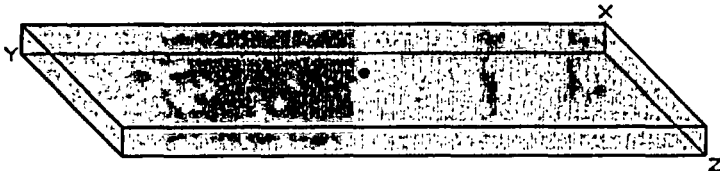
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Lockheed Martin Energy Systems

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Run Time: 9:24:49 AM
Duration: 00:00:18

File Ref: CY-USEI
Date: 9/8/04
By: JZ
Checked: JZ

Case Title: CY - USEI
Description: CY material in USEI cell
Geometry: 13 - Rectangular Volume

Source Dimensions
Length 609.6 cm 20 ft 0.0 in
Width 1.2e+4 cm 400 ft
Height 1.2e+4 cm 400 ft



Dose Points
1 X 655.32 cm 21 ft 6.0 in Y 6096 cm 200 ft Z 6096 cm 200 ft

Shields
Shield Name Dimension Material Density
Source 3.20e+06 ft³ Concrete 1.5
Air Gap Air 0.00122

Source Input
Grouping Method : Standard Indices
Number of Groups : 25
Lower Energy Cutoff : 0.015
Photons < 0.015 : Excluded
Library : Grove

Nuclide	curies	becquerels	$\mu\text{Ci}/\text{cm}^3$	Bq/cm^3
Ba-137m	1.2515e-001	4.6306e+009	1.3812e-006	5.1103e-002
Co-60	3.8602e-002	1.4283e+009	4.2600e-007	1.5762e-002
Cs-137	1.3230e-001	4.8950e+009	1.4600e-006	5.4020e-002

Buildup
The material reference is : Source

Integration Parameters
X Direction 30
Y Direction 30
Z Direction 30

Energy MeV	Activity photons/sec	Results			
		Fluence Rate MeV/cm ² /sec No Buildup	Fluence Rate MeV/cm ² /sec With Buildup	Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup
0.03	2.727e+08	1.097e-05	1.464e-05	1.087e-07	1.450e-07
0.04	6.437e+07	1.264e-05	1.973e-05	5.589e-08	8.726e-08
0.6	4.167e+09	1.208e-01	2.959e-01	2.359e-04	5.776e-04
1.0	1.428e+09	8.830e-02	1.880e-01	1.628e-04	3.465e-04
1.5	1.428e+09	1.633e-01	3.139e-01	2.748e-04	5.282e-04
TOTALS:	7.361e+09	3.725e-01	7.979e-01	6.736e-04	1.452e-03

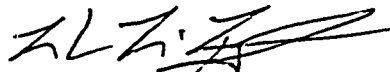
Docket No. 50-213
CY-04-168

Attachment 3
Haddam Neck Plant
Resident/Farmer Dose Assessment

September 2004

Assessment of the Radiological Effects on Future Residents
from the Alternative Disposal of the Solid Waste from the Decommissioning
of the Haddam Neck Plant at the US Ecology Idaho Hazardous Waste Landfill

Prepared by:



Mark McHugh, CHP
WESKEM, LLC

Prepared for:



Russ Meyer, CHP
US Ecology Idaho

August 2004

Assessment of the Radiological Effects on Future Residents
from the Alternative Disposal of the Solid Waste from the Decommissioning
of the Haddam Neck Plant at the US Ecology Idaho Hazardous Waste Landfill

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Assessment of the Radiological Effects on Future Residents
from the Alternative Disposal of the Solid Waste from the Decommissioning
of the Haddam Neck Plant at the US Ecology Idaho Hazardous Waste Landfill

1.0 Purpose

This assessment calculates the radiological effect per given activity concentration per isotope to the future resident farmer at the US Ecology Idaho disposal facility from the alternative disposal of wastes containing residual radioactive material contamination. These wastes are from decommissioning activities conducted at the Connecticut Yankee Haddam Neck Plant.

2.0 Background

US Ecology Idaho operates a hazardous waste landfill under a permit issued by the State of Idaho. The facility has a successful history of disposal of wastes contaminated with residual radioactive materials contaminated with source material (i.e., ^{238}U and ^{232}Th) that has been exempted under 10CFR40. The input parameters used herein have been used previously by US Ecology staff to evaluate the radiological effects of disposal of this exempt source material to the resident farmer as an Average Member of the Critical Group (AMCG) who might live upon the disposal facility at some time after facility closure up to 1,000 years in the future.

Connecticut Yankee (CY) is decommissioning the Haddam Neck Nuclear Power Plant (HNP) in accordance with an NRC approved License Termination Plan (LTP). Waste materials generated during the decommissioning activities vary greatly in the amount of residual radioactive material that they contain. Connecticut Yankee is seeking NRC approval to dispose of decommissioning materials containing very low quantities of residual radioactive material at the US Ecology Idaho landfill.

3.0 Methodology

3.1 Isotopic Concentrations

The dose assessment was performed using the RESRAD 6.22 computer code. Except where specifically noted, the RESRAD default parameters were used as input parameters. The CY License Termination Plan (LTP) identifies 20 potential isotopes of concern in the subject waste. Each of these isotopes were included in the model at a soil concentration of one (1) pCi/gram. Therefore, the dose assessment results indicate a dose equivalent per soil concentration per isotope (i.e., in mrem/year per pCi/g per isotope), and are not intended to be evaluated as a direct output (i.e., isotopes may be present in less or greater concentrations than one (1) pCi/gram).

Assessment of the Radiological Effects on Future Residents
from the Alternative Disposal of the Solid Waste from the Decommissioning
of the Haddam Neck Plant at the US Ecology Idaho Hazardous Waste Landfill

Table 3-1: Isotopes of Concern

• ^3H	• ^{14}C
• ^{54}Mn	• ^{55}Fe
• ^{60}Co	• ^{63}Ni
• ^{90}Sr	• ^{94}Nb
• ^{99}Tc	• $^{108\text{m}}\text{Ag}$
• ^{134}Cs	• ^{137}Cs
• ^{152}Eu	• ^{154}Eu
• ^{155}Eu	• ^{238}Pu
• $^{239/240}\text{Pu}$	• ^{241}Pu
• ^{241}Am	• $^{243/240}\text{Cm}$

3.2 The Model

The RESRAD computer code is utilized to calculate doses, risks, and guidance values for residual concentrations of radionuclides in material. The code was designed by the Department of Energy (DOE) to demonstrate compliance with DOE Order 5400.5.

The radiation dose, as determined by RESRAD, is the Total Effective Dose Equivalent (TEDE) from the sum of external radiation plus the Committed Effective Dose Equivalent (CEDE) from internally deposited radionuclides. The critical population group is a relatively small, homogeneous group that is representative of those individuals in the population that could reside at the site after closure. The exposure scenario represents the reasonable maximally exposed resident farmer, who resides, works, grows crops, and raises livestock on site. The "Aquatic Foods" pathway was suppressed due to the topography of the area around the USEI landfill (i.e., it is an arid region with the nearest surface water source two (2) miles distant).

Because this scenario is based on "prudently conservative" assumptions that tend to overestimate potential doses, use of this scenario results in estimated doses that will be greater than exposure to future residents. The highest dose per year for each isotope was used to determine the potential effects of that isotope. Copies of the graphic outputs for TEDE for each isotope at one (1) pCi/g are included in Appendix A.

RESRAD input parameters for the subject calculation, as well as their bases, are provided in Appendices B and C, and include calculations using site specific material characteristics, as determined from the site hydro-geological report(Reference 3). Otherwise, RESRAD default parameters were used. No institutional control period was credited (i.e., the model was evaluated from the time of waste emplacement to 1,000 years thereafter).

Assessment of the Radiological Effects on Future Residents
from the Alternative Disposal of the Solid Waste from the Decommissioning
of the Haddam Neck Plant at the US Ecology Idaho Hazardous Waste Landfill

4.0 Results

The isotopes of concern can be roughly divided into four different groups for the purpose of this dose assessment. These are:

1. relatively short-lived isotopes that do not emit sufficiently penetrating gammas to penetrate the cap at the time of placement and that are not sufficiently water soluble to reach the water table prior to significant dispersion or radioactive decay (e.g., ^{55}Fe , ^{63}Ni , ^{90}Sr);
2. relatively short-lived isotopes that emit sufficiently penetrating gammas to penetrate the cap at the time of placement and that are not sufficiently water soluble to reach the water table prior to significant dispersion or radioactive decay (e.g., ^{60}Co , ^{137}Cs , ^{152}Eu);
3. water soluble isotopes that reach the water table prior to significant dispersion or radioactive decay (e.g., $^{108\text{m}}\text{Ag}$, ^{14}C , ^{94}Nb , ^{99}Tc , ^3H); and
4. isotopes that are sufficiently long-lived to remain in place until significant cap erosion occurs (e.g., ^{238}Pu).

Each of these groups exhibit similar dose characteristics, although some more significant than others. The first group poses no dose hazard in the subject model (i.e., zero (0) mrem of dose equivalent from the time of placement through 1,000 years thereafter). The second poses an initial external dose hazard, although of negligible magnitude in all cases, which reduces with time through radioactive decay. The third is the primary dose hazard for the analyzed scenario. These isotopes are sufficiently water soluble to reach the water table prior to decay or dispersion, with the resultant dose equivalent peaking at ~ 122 years after placement. The last group consists of ^{238}Pu , whose progeny is sufficiently long-lived to pose Radon and direct dose hazards near the 1,000 year point (i.e., progeny in-growth coordinated with cap erosion). While this last group exhibits different dose characteristics, the actual magnitude of the associated dose hazard is negligible. Other alpha emitting radionuclides, although physically similar to ^{238}Pu , do not include Radon as a progeny in their decay chain and therefore pose no dose hazard.

5.0 Conclusion

This assessment establishes a dose equivalent per year per activity concentration to the future Resident Farmer Average Member of the Critical Group as a result of the subject disposal activities for each isotope of concern. Since, the relationship between activity concentration, for any given isotope, and resultant dose equivalent are linear, these values can be weighted by the actual isotopic concentrations in the waste stream to determine a dose equivalent estimate for the disposal activity.

Assessment of the Radiological Effects on Future Residents
from the Alternative Disposal of the Solid Waste from the Decommissioning
of the Haddam Neck Plant at the US Ecology Idaho Hazardous Waste Landfill

Table 4-1: Dose Equivalent per Concentration per Isotope

Isotope	Time after Placement to Peak Dose (Years)	Dose Equivalent per Concentration at Time of Peak Dose (mrem/year per pCi/gram)
³ H	115.2	1.045E-5
¹⁴ C	122.2	3.060E-1
⁵⁴ Mn	0	6.286E-25
⁵⁵ Fe	0	0
⁶⁰ Co	0	1.653E-21
⁶³ Ni	0	0
⁹⁰ Sr	0	0
⁹⁴ Nb	122.2	9.961E-1
⁹⁹ Tc	122.2	2.221E-1
^{108m} Ag	122.2	5.764E-1
¹³⁴ Cs	0	5.881E-26
¹³⁷ Cs	0	6.850E-27
¹⁵² Eu	0	1.567E-23
¹⁵⁴ Eu	0	5.997E-23
¹⁵⁵ Eu	0	0
²³⁸ Pu	1,000	2.004E-8
²³⁹ Pu	0	0
²⁴¹ Pu	0	0
²⁴¹ Am	0	
²⁴³ Cm	0	

Assessment of the Radiological Effects on Future Residents
from the Alternative Disposal of the Solid Waste from the Decommissioning
of the Haddam Neck Plant at the US Ecology Idaho Hazardous Waste Landfill

6.0 Appendices

Appendix A: RESRAD Graphic Output for Resident Farmer Disposal Scenario

Appendix B: RESRAD Report of Input Parameters and Resultant TEDE for Resident
Farmer Disposal Scenario

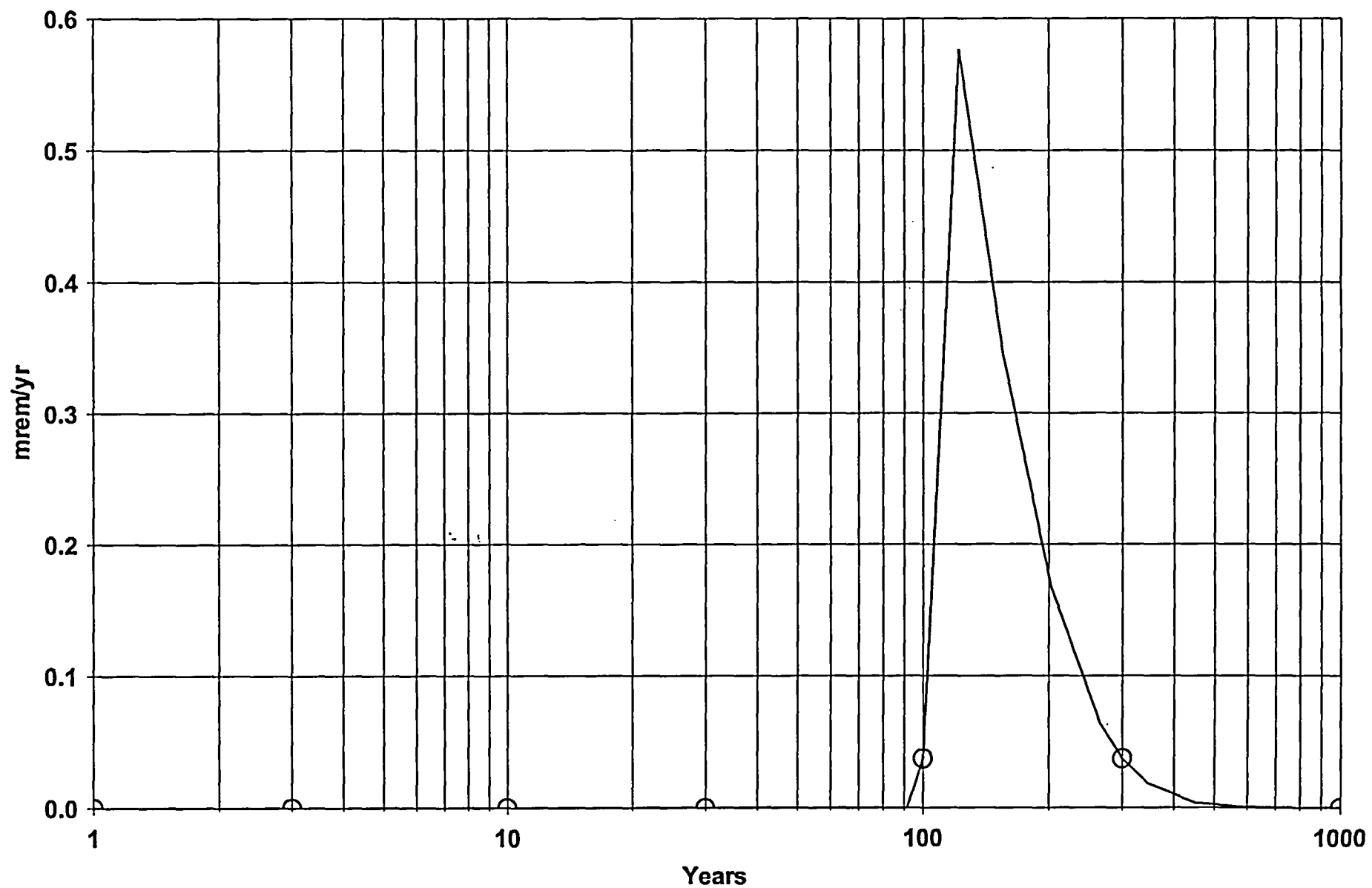
Appendix C: Technical Bases for RESRAD Input Parameters

**Assessment of the Radiological Effects on Future Residents
from the Alternative Disposal of the Solid Waste from the Decommissioning
of the Haddam Neck Plant at the US Ecology Idaho Hazardous Waste Landfill**

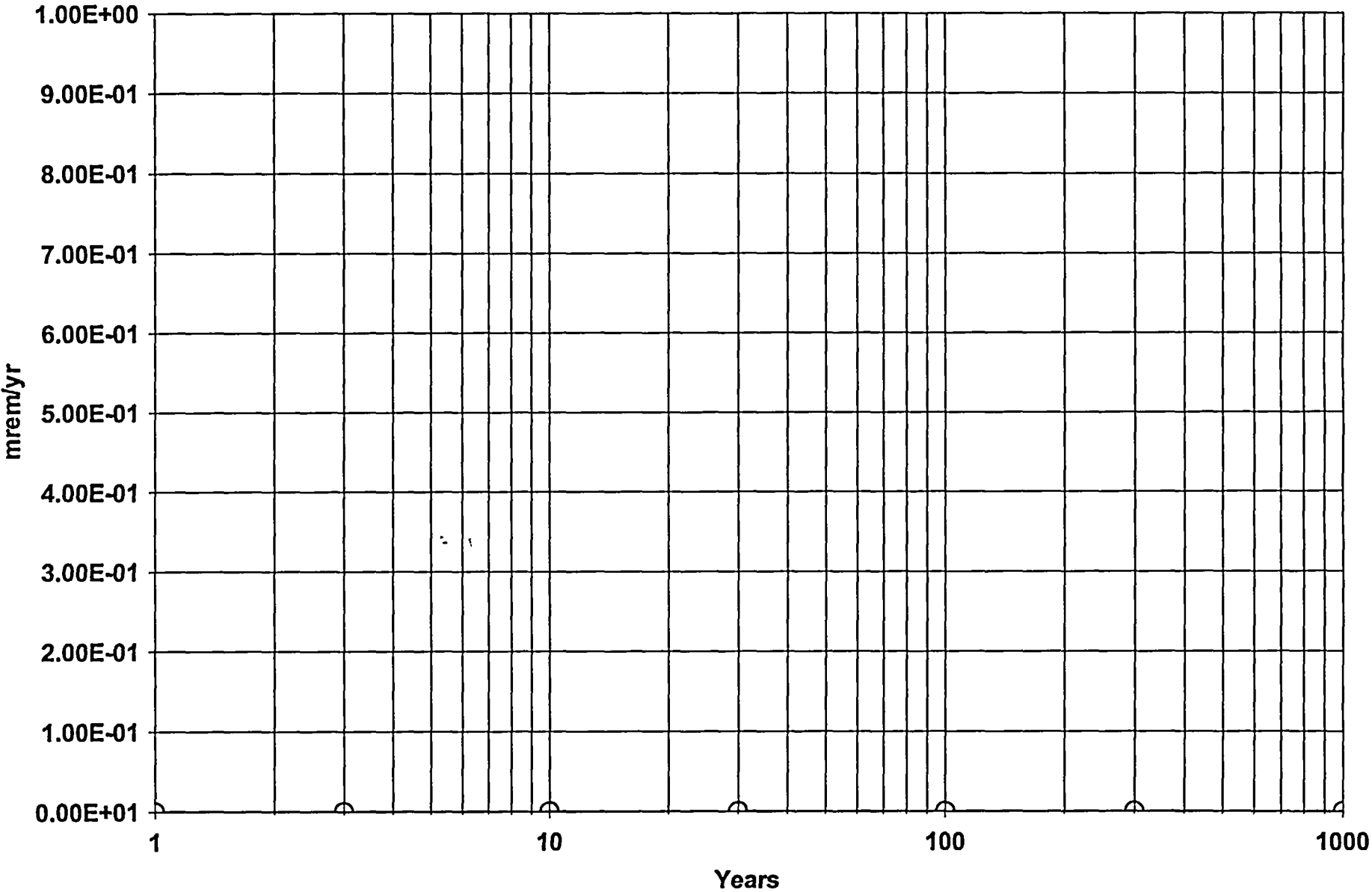
APPENDIX A

RESRAD Graphic Output for Resident Farmer Scenario

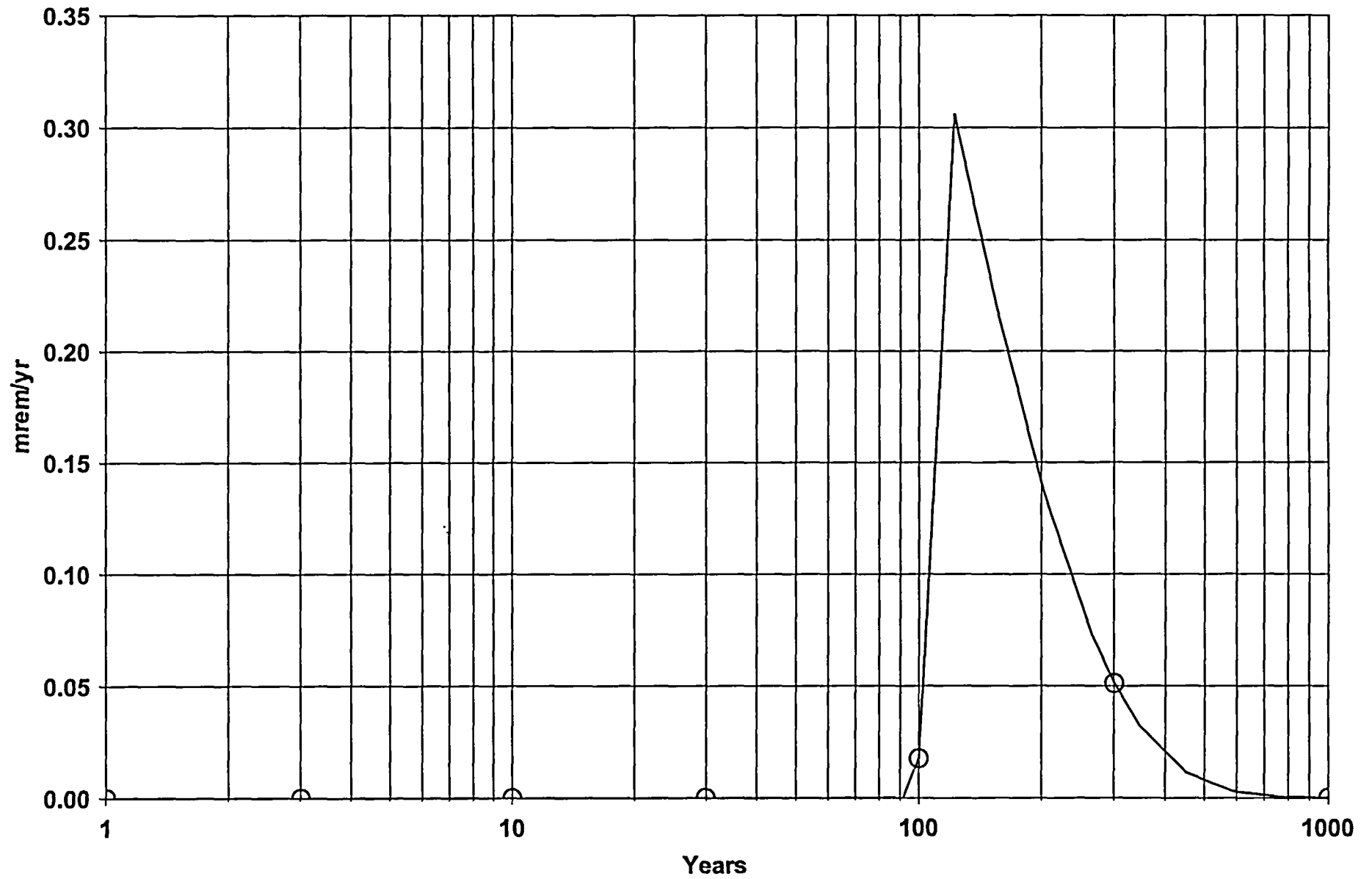
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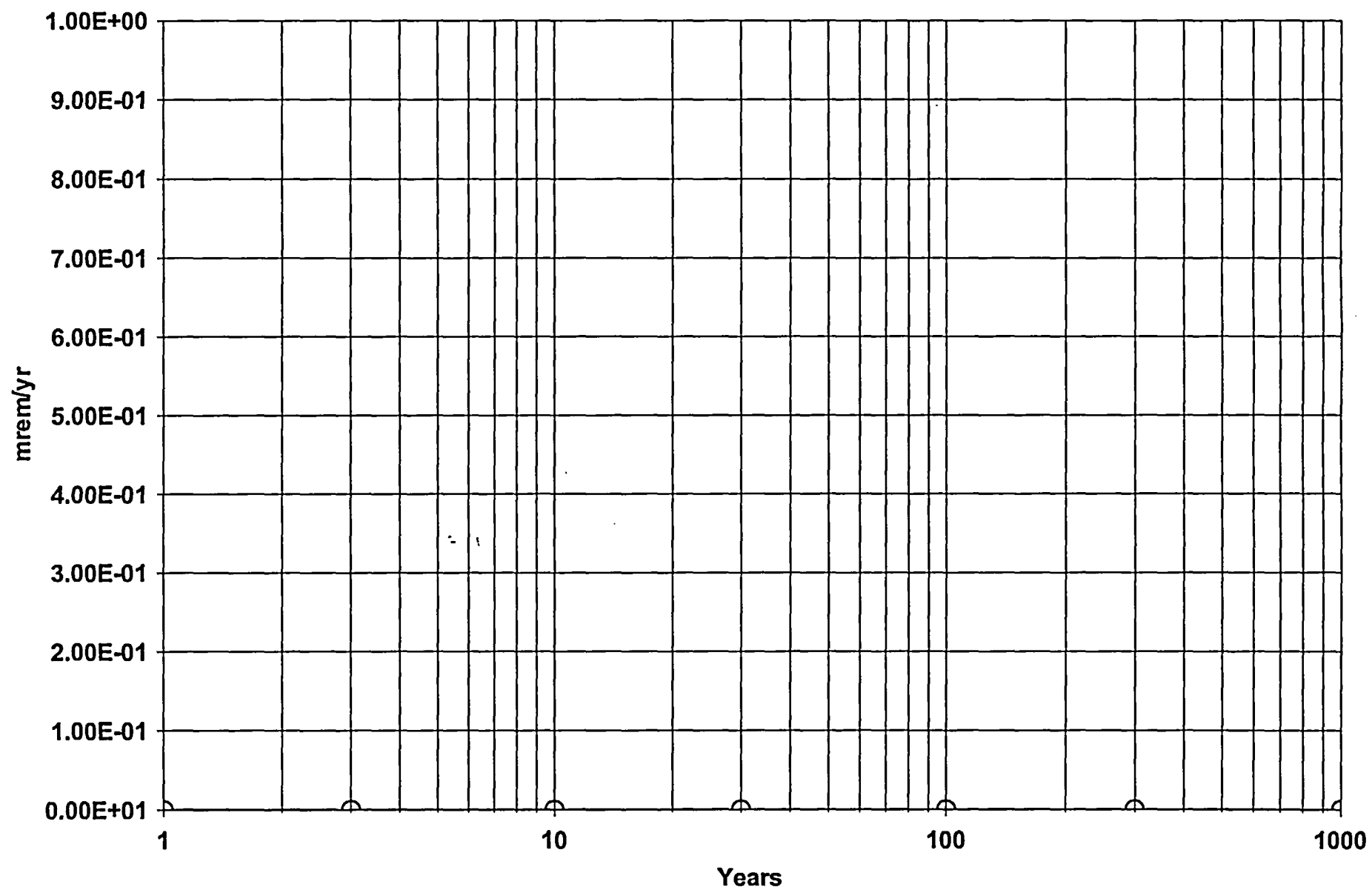
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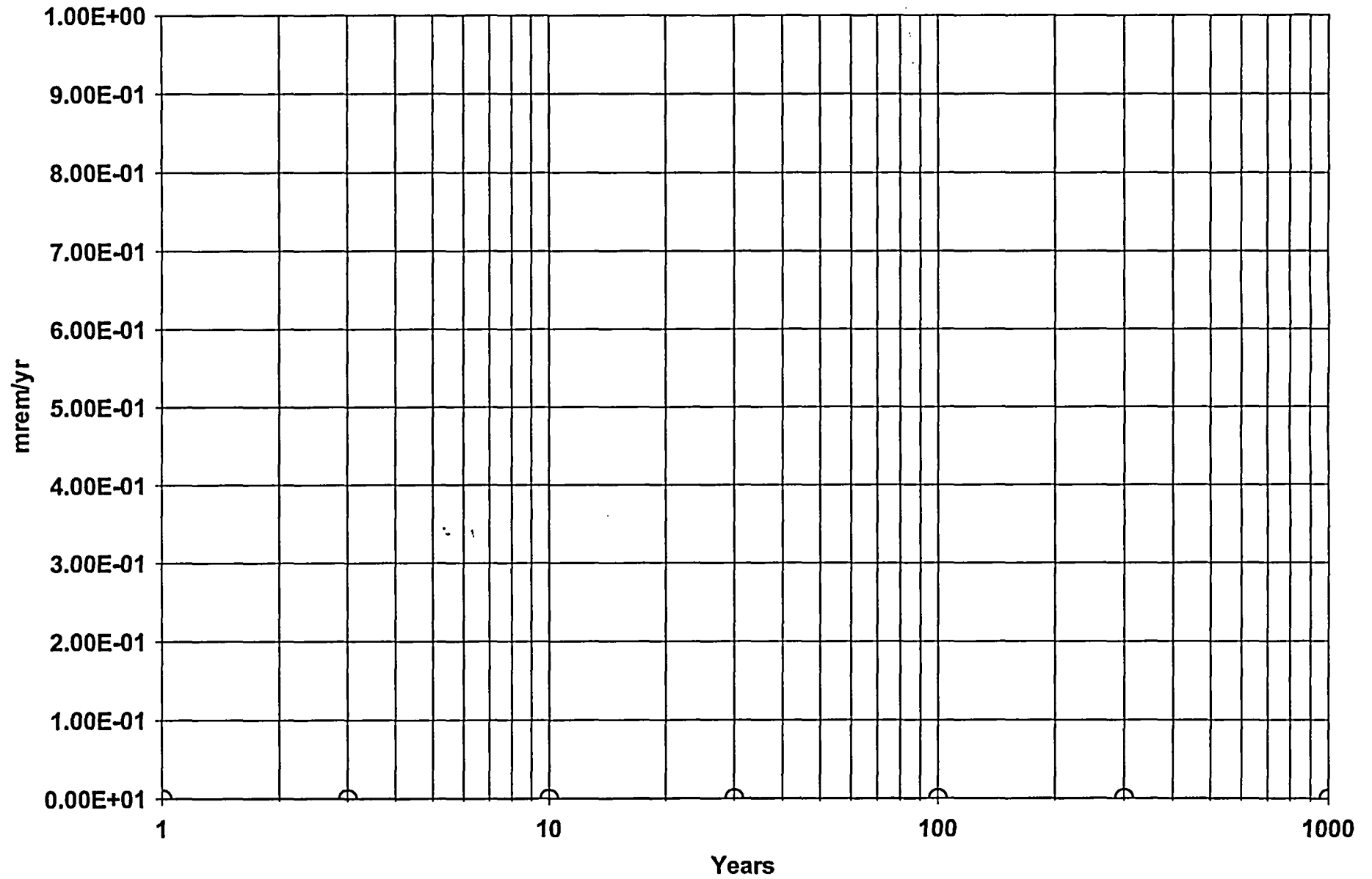
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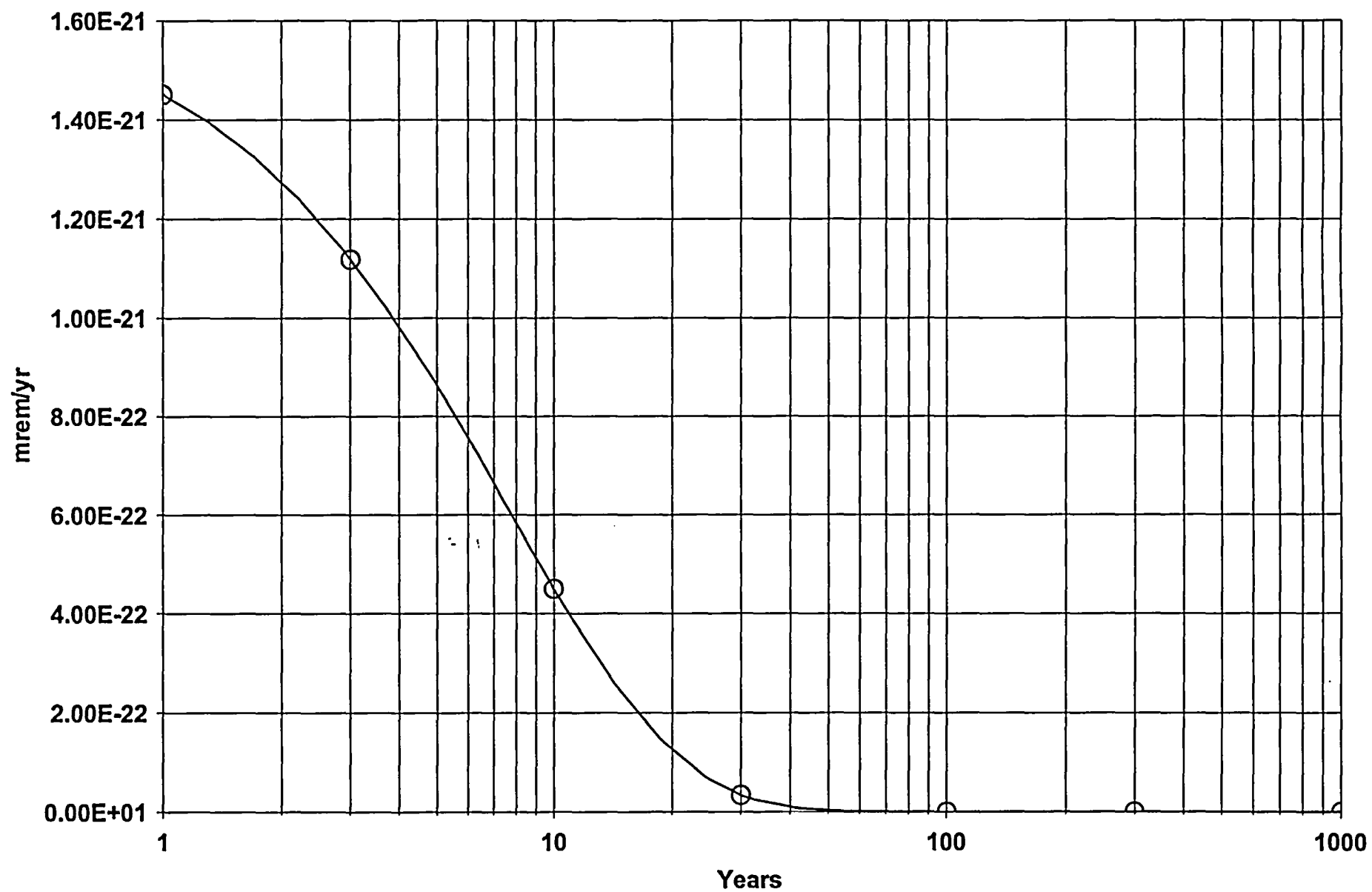
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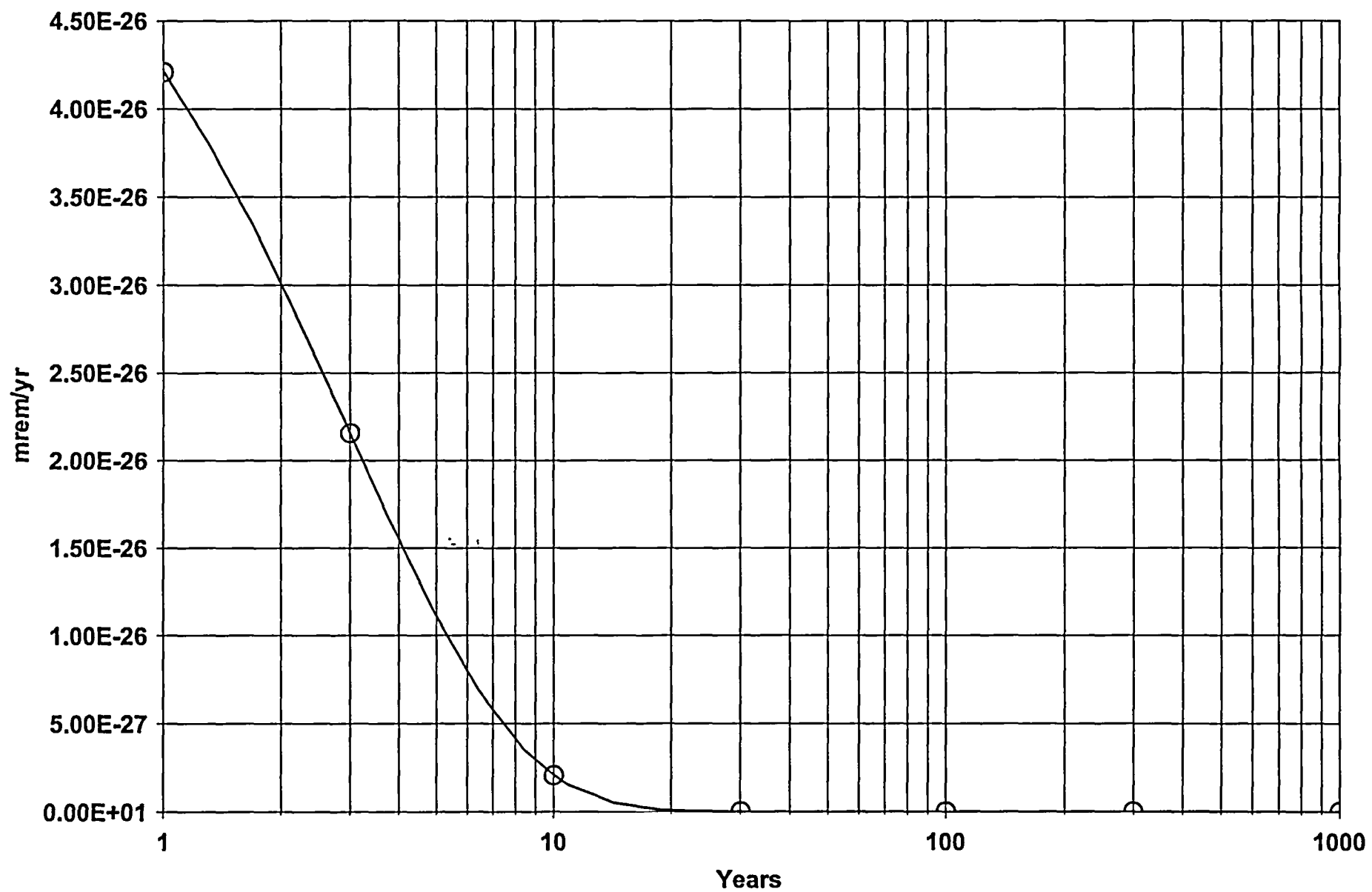
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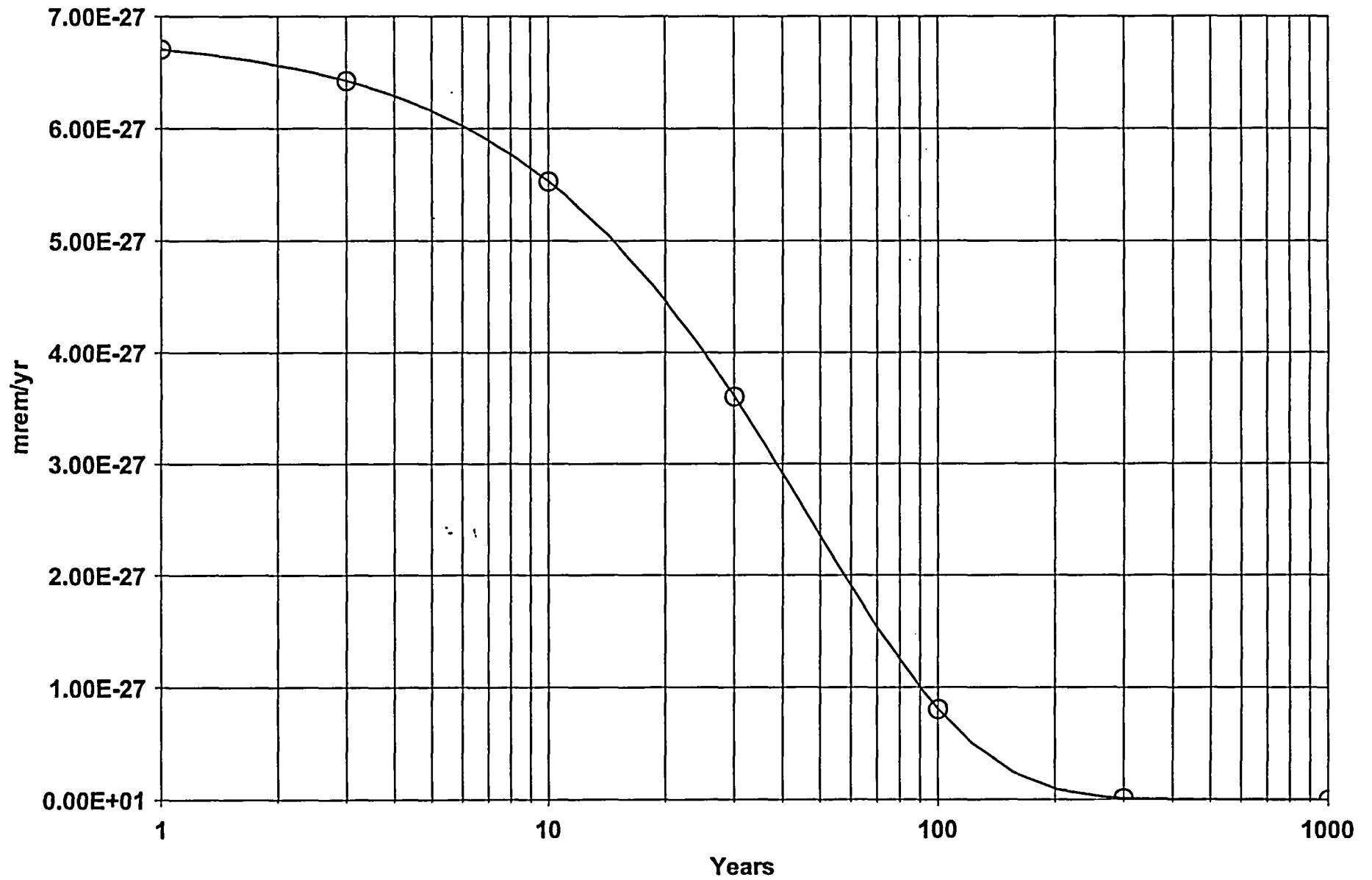
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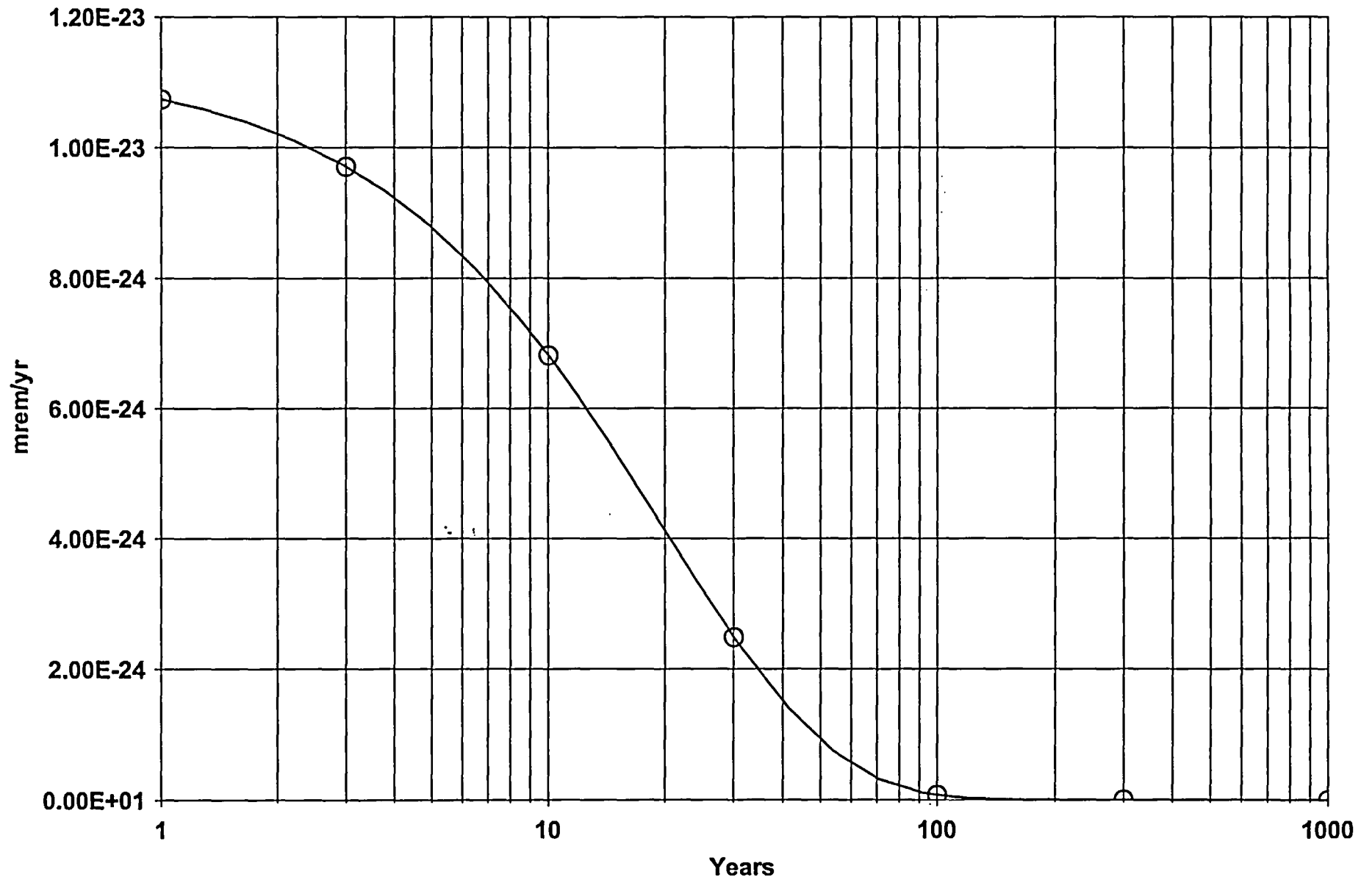
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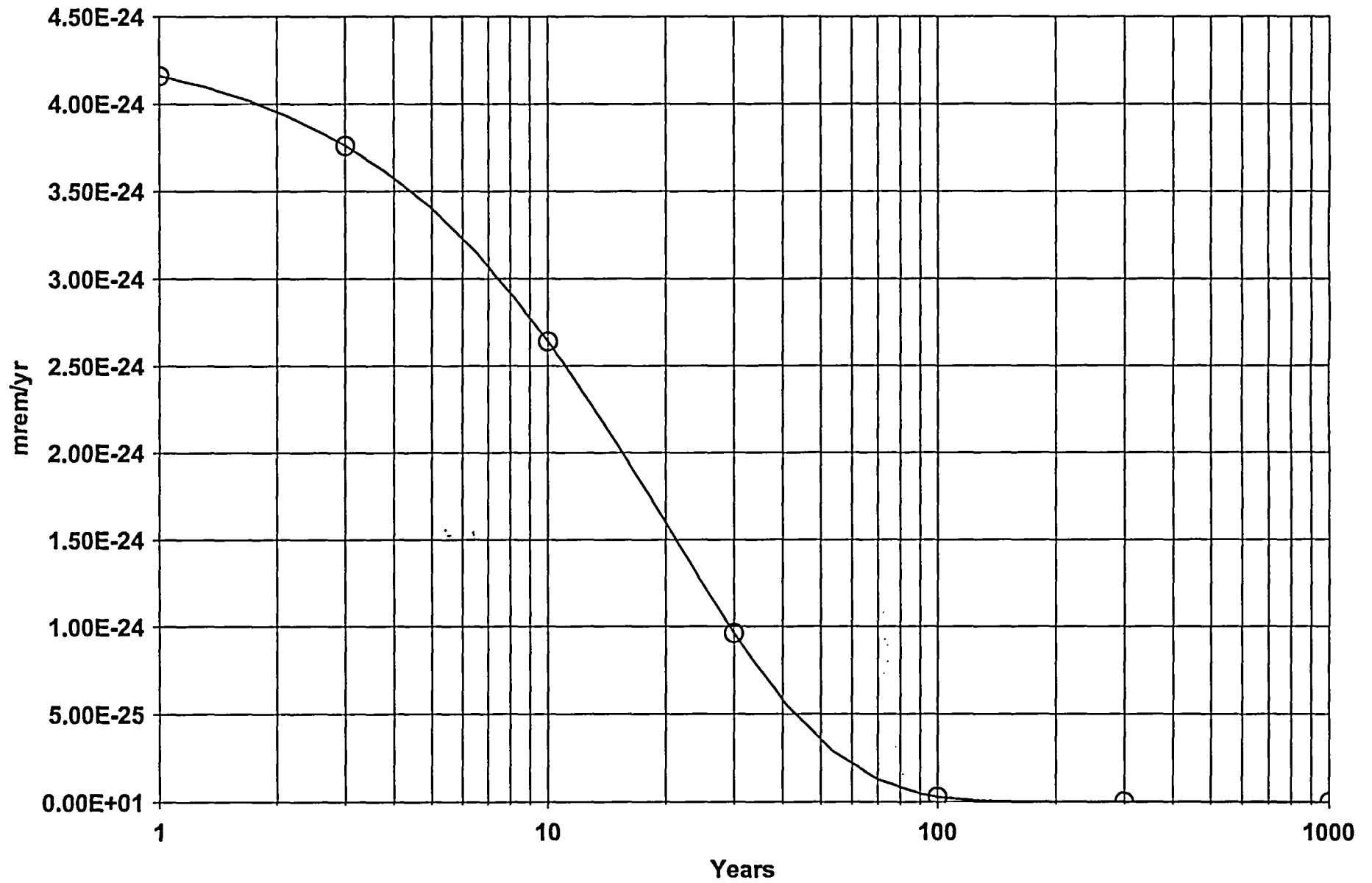
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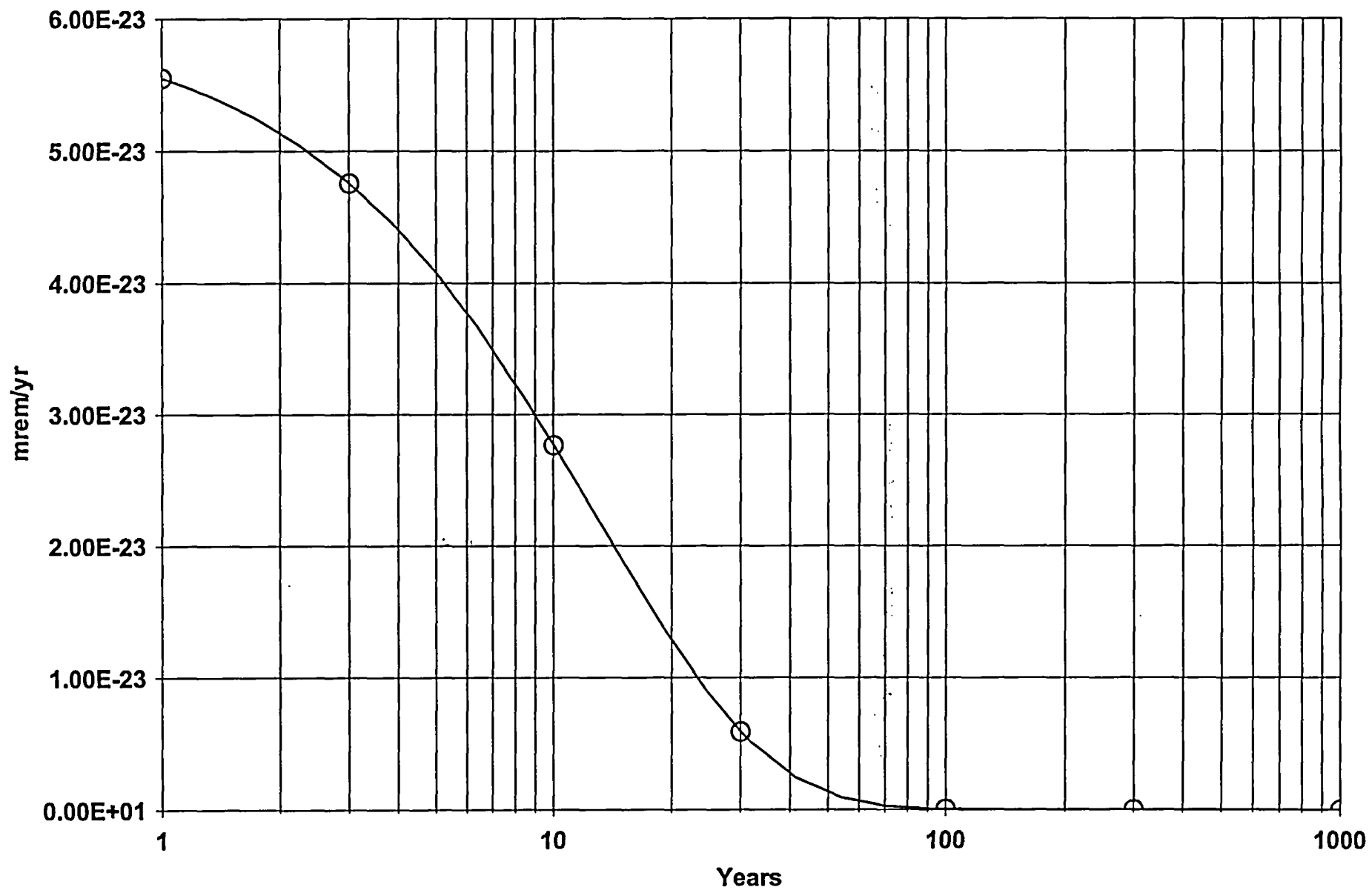
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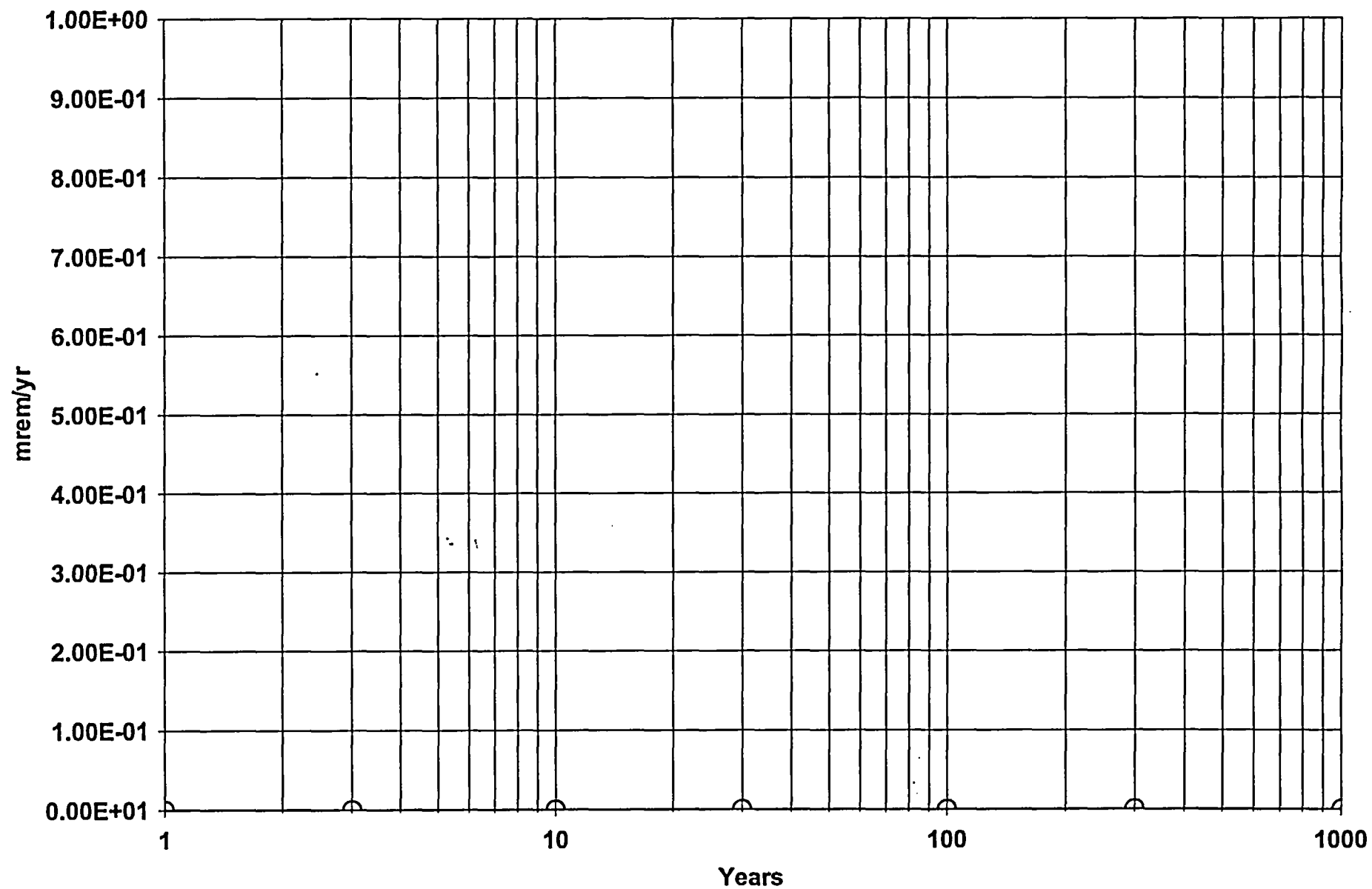
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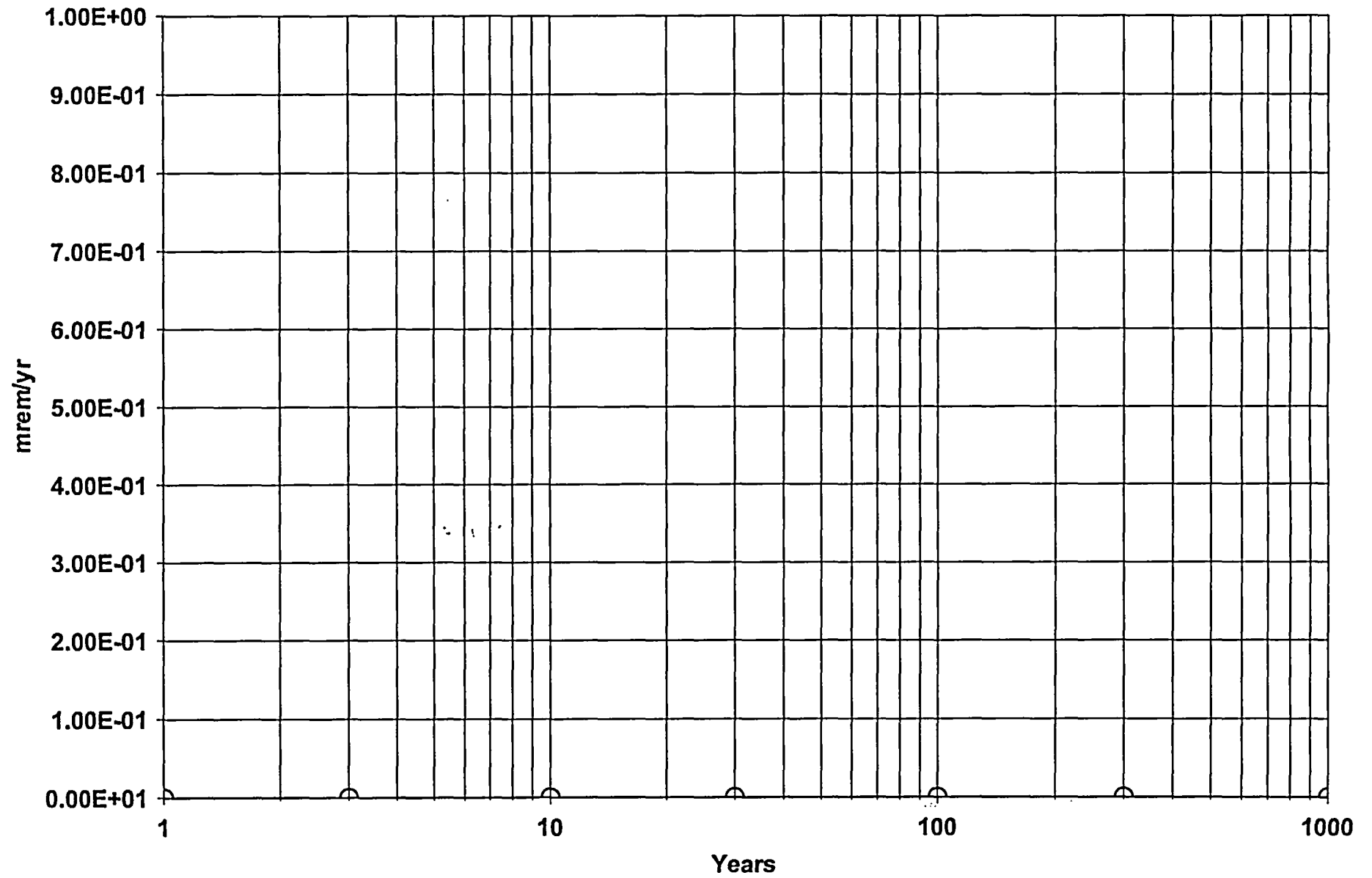
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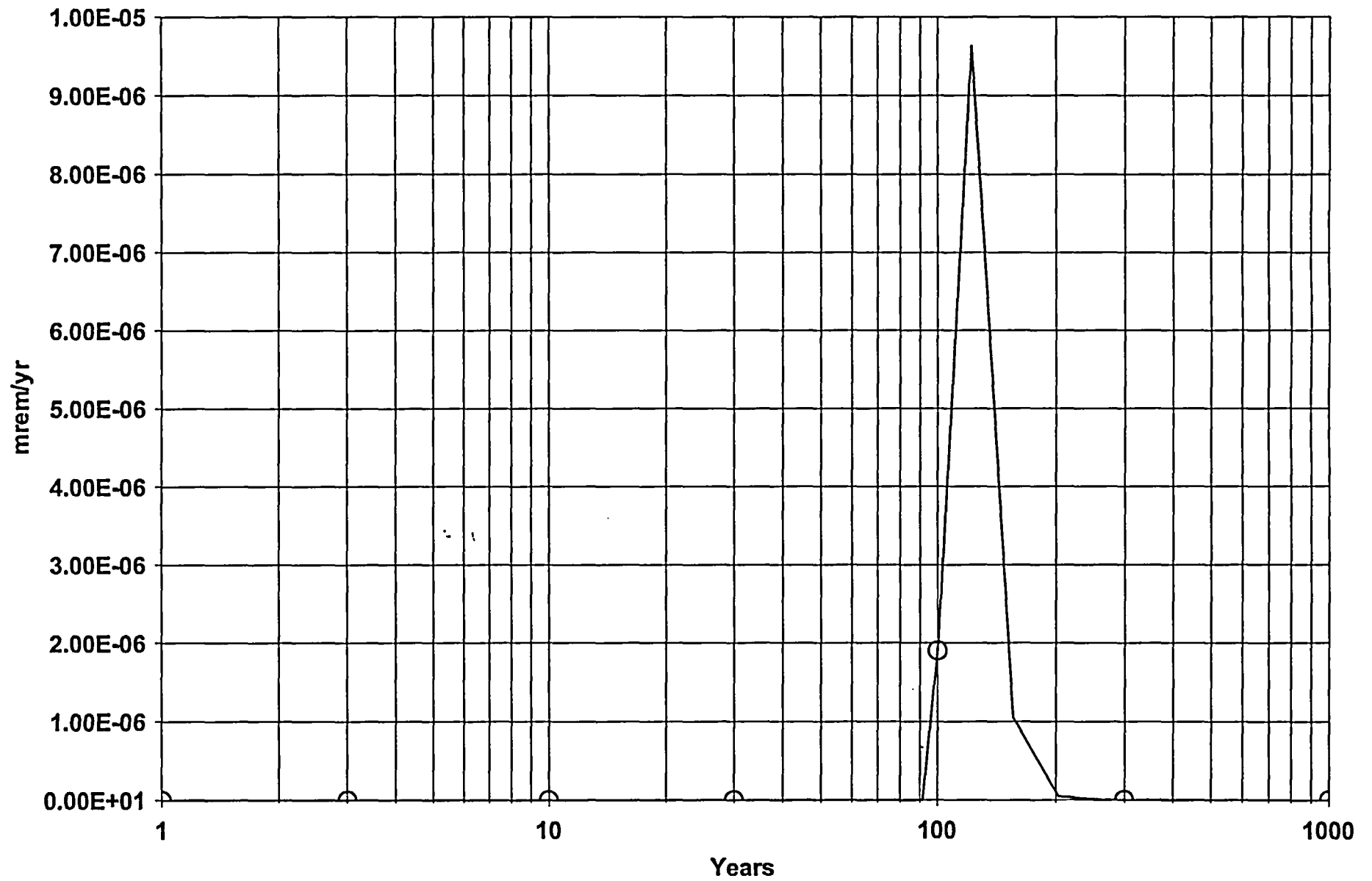
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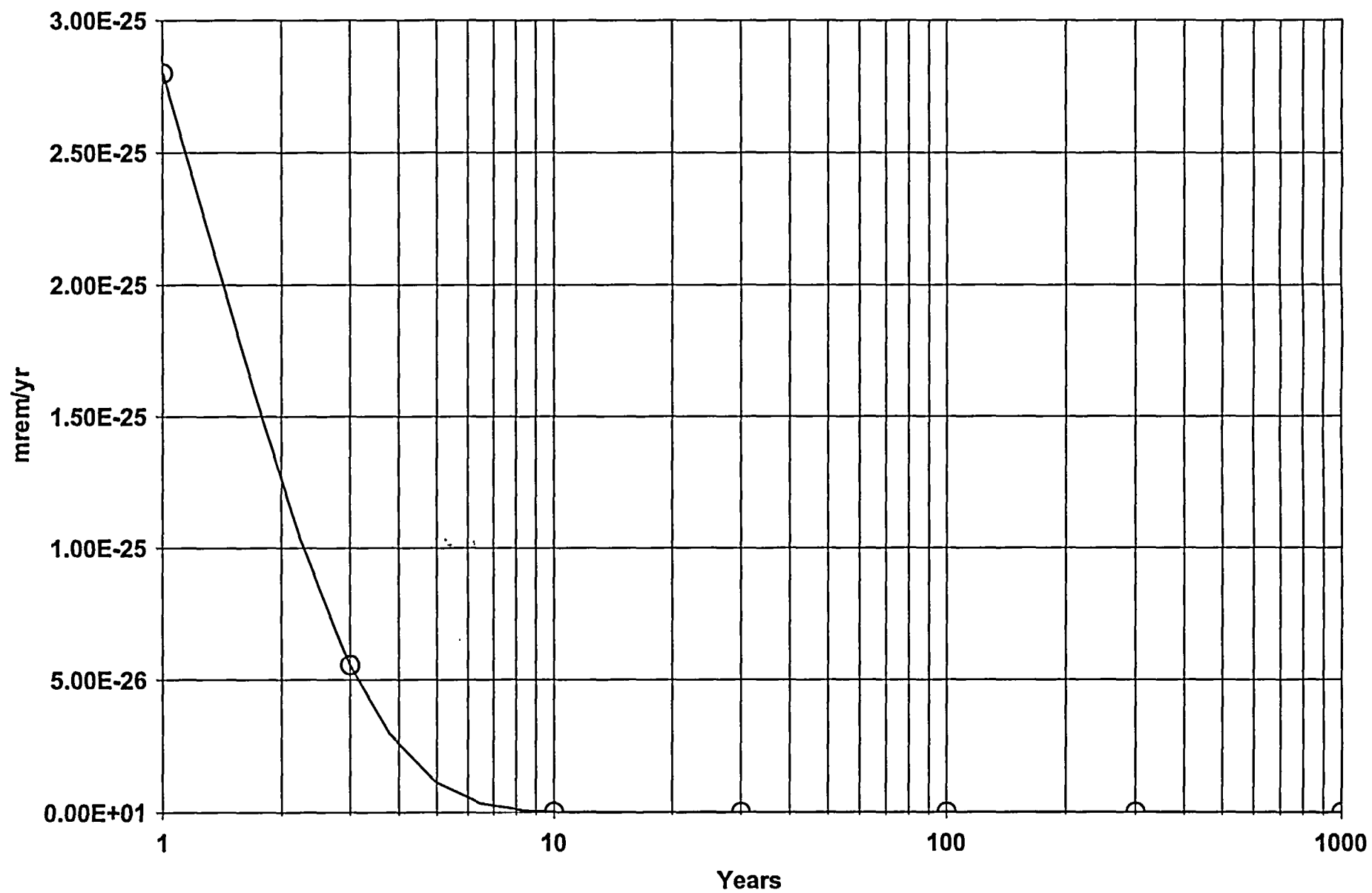
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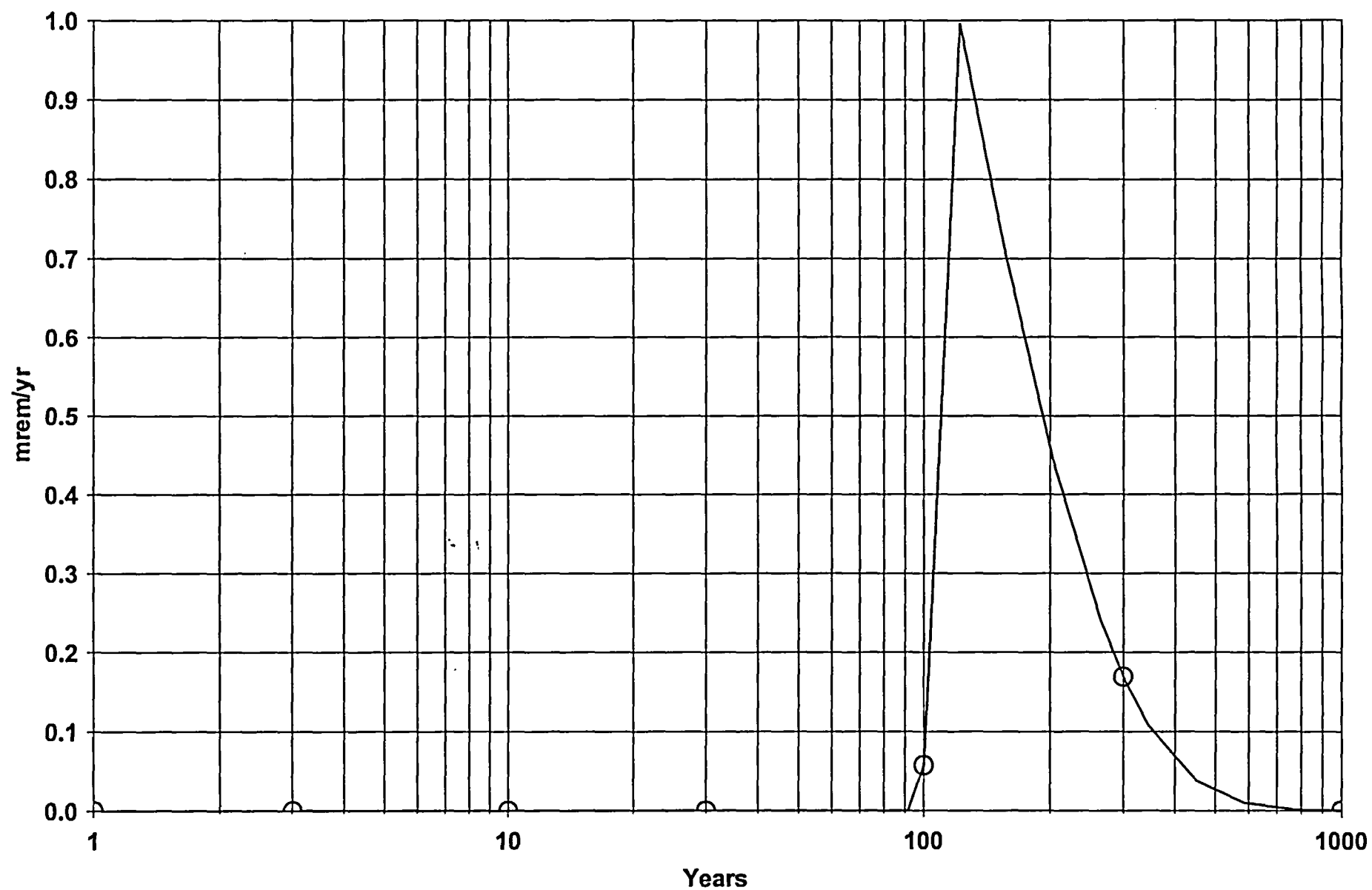
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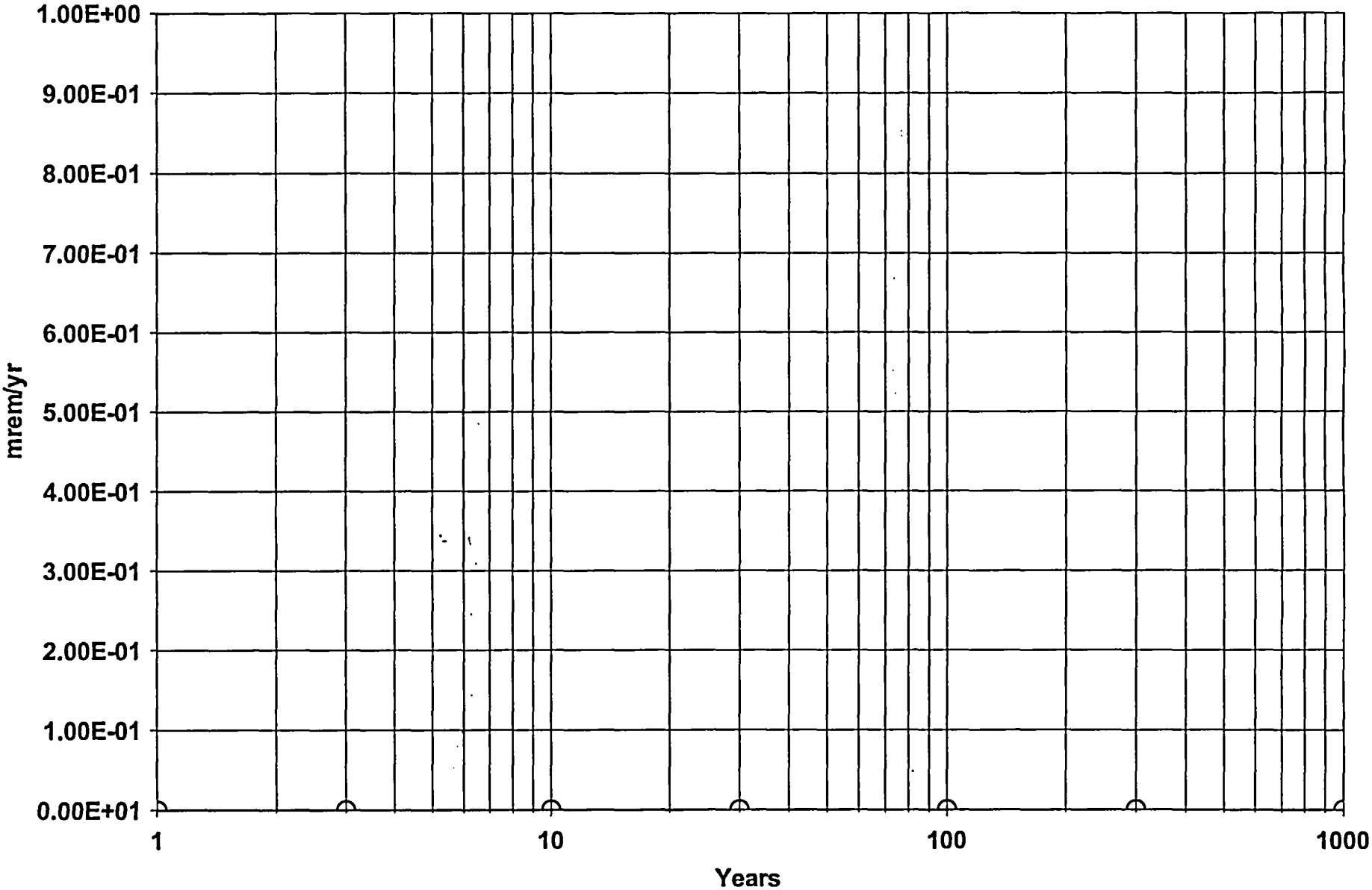
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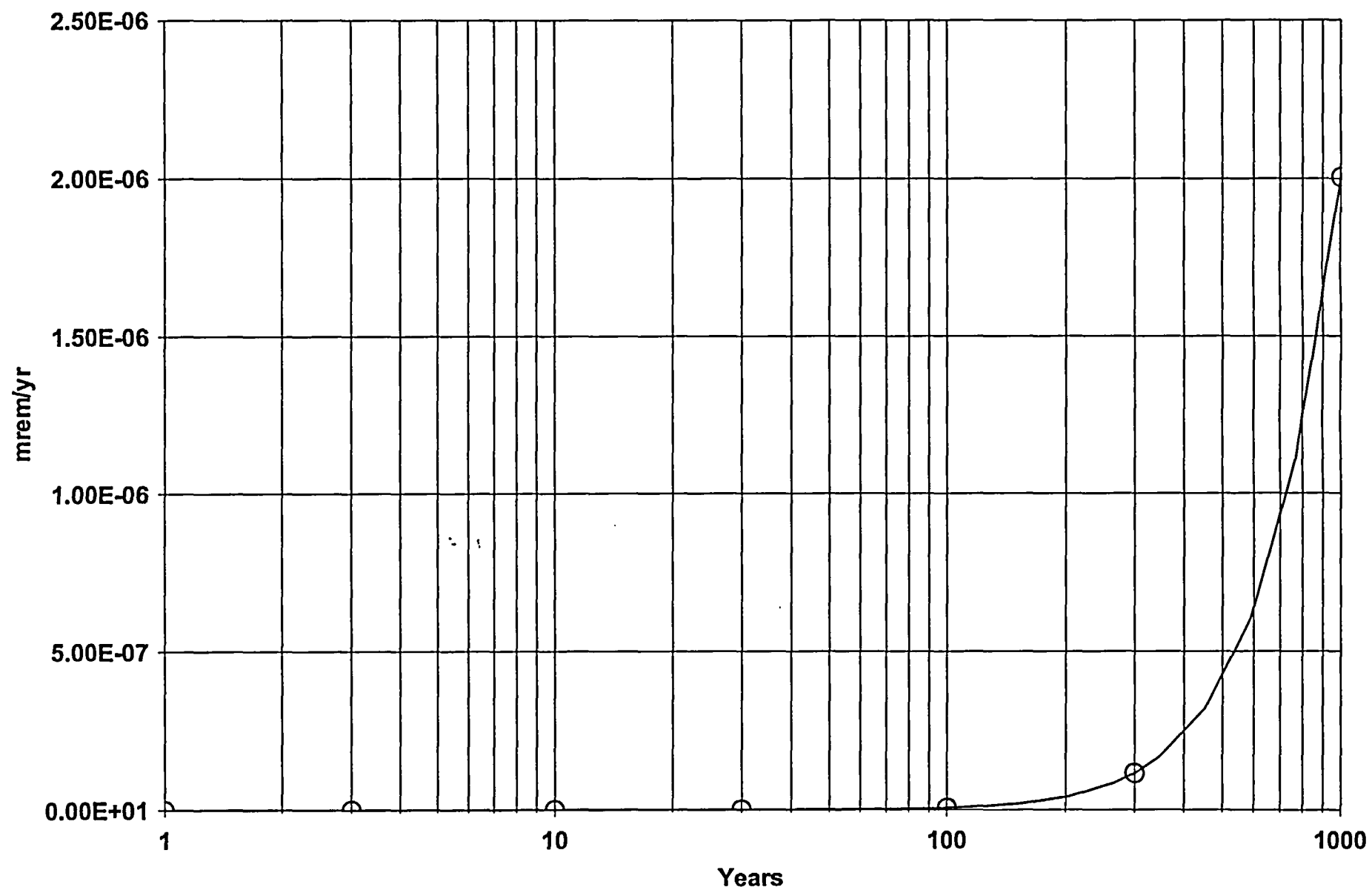
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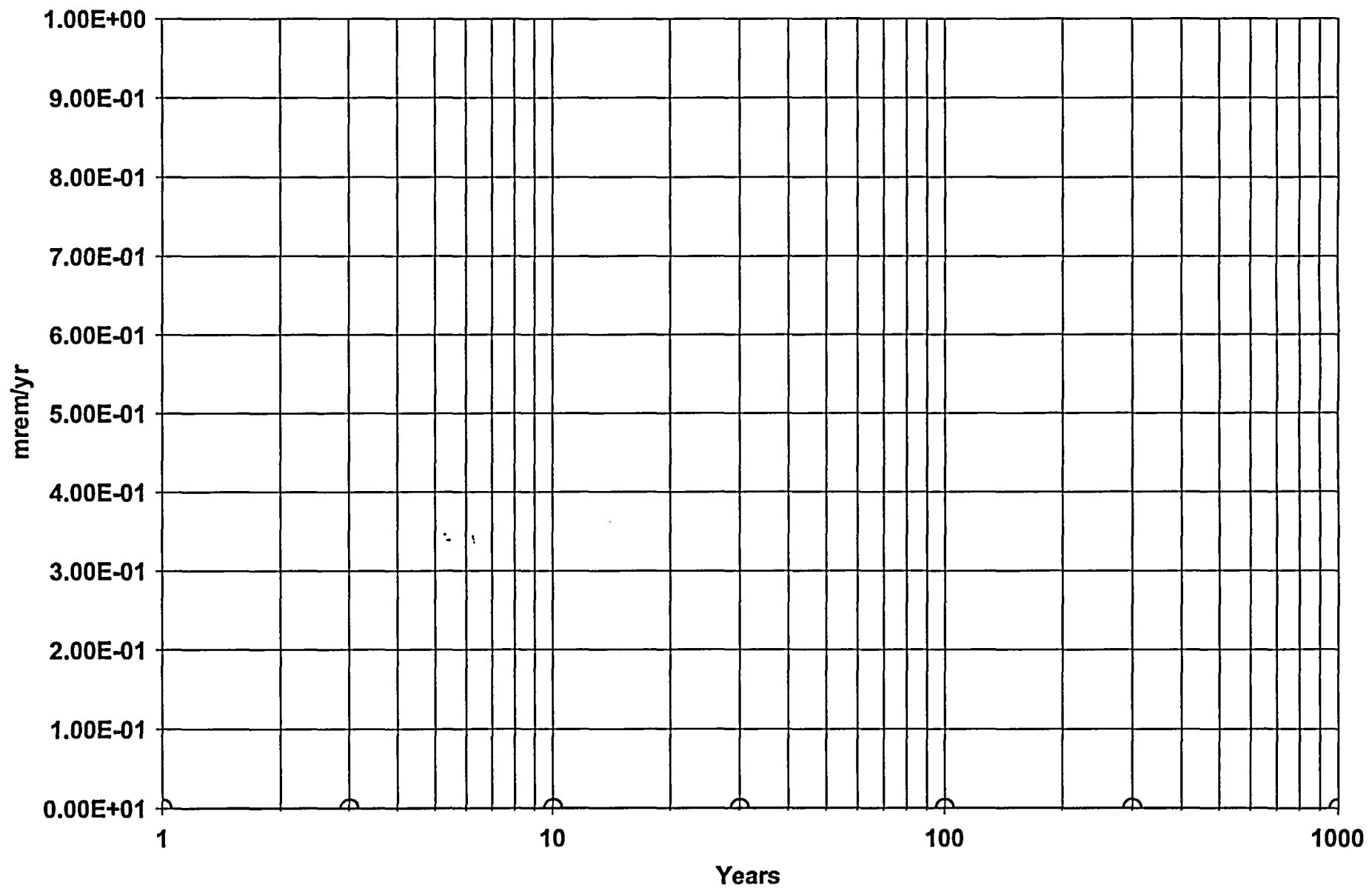
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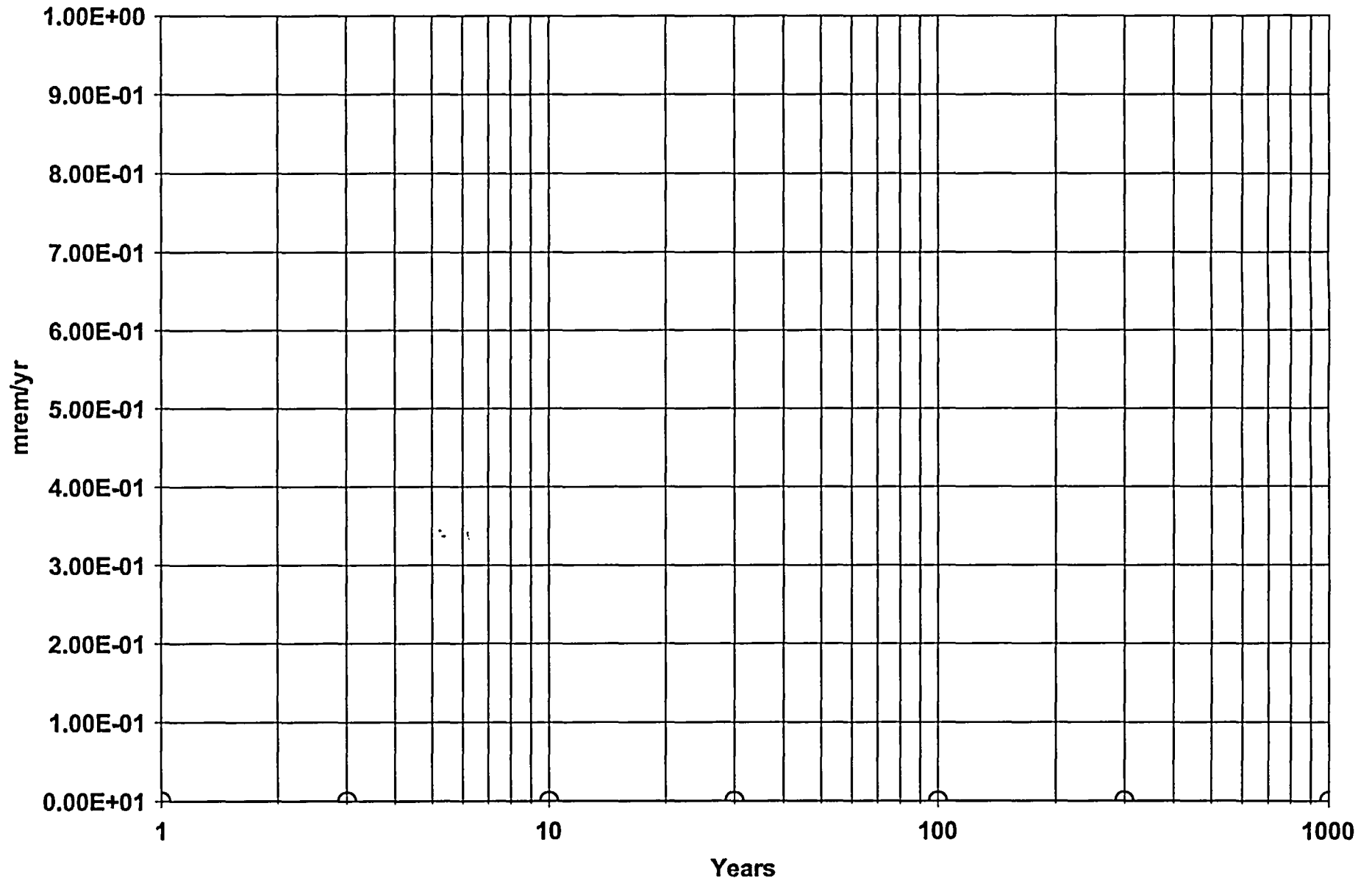
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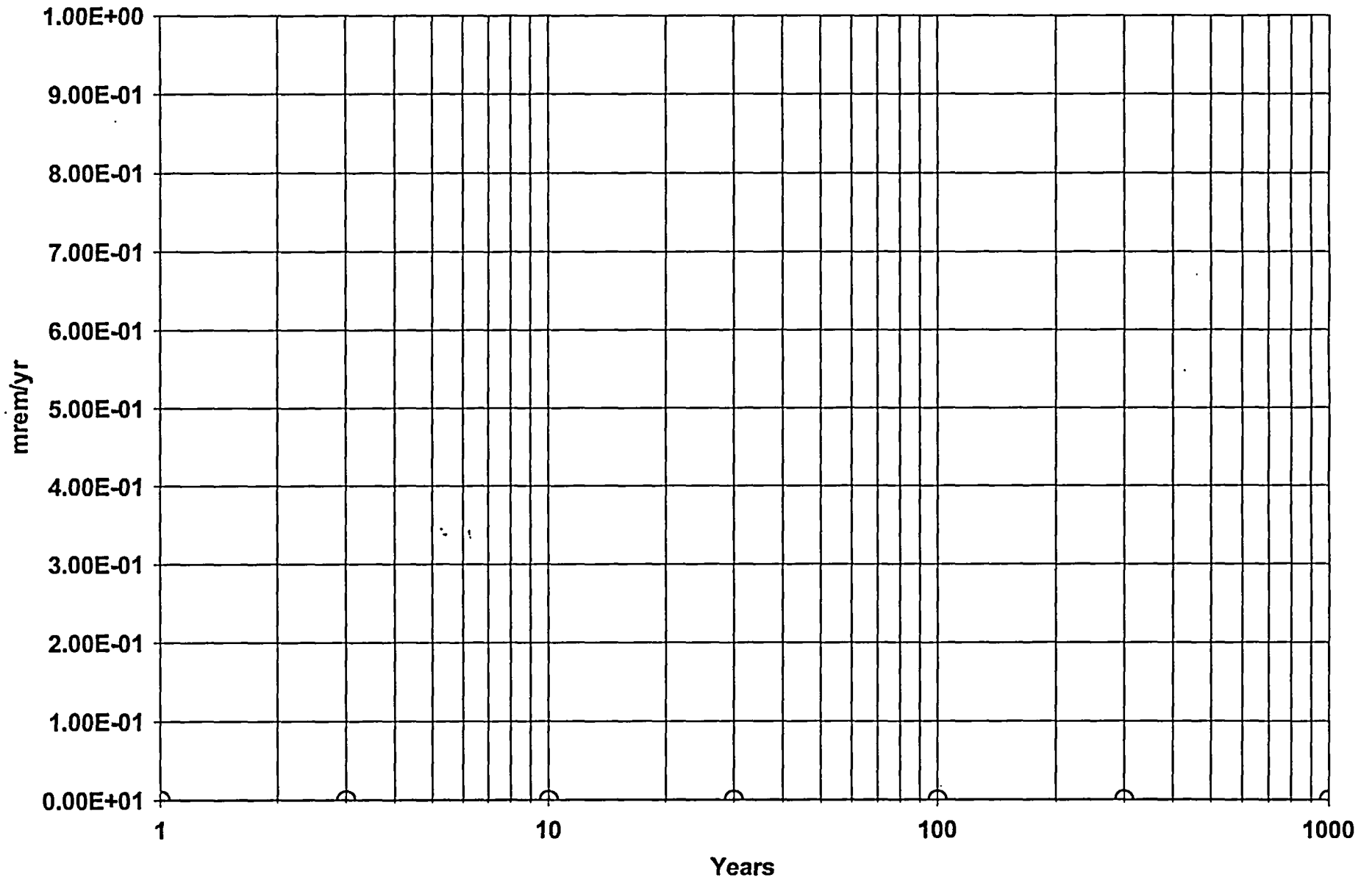
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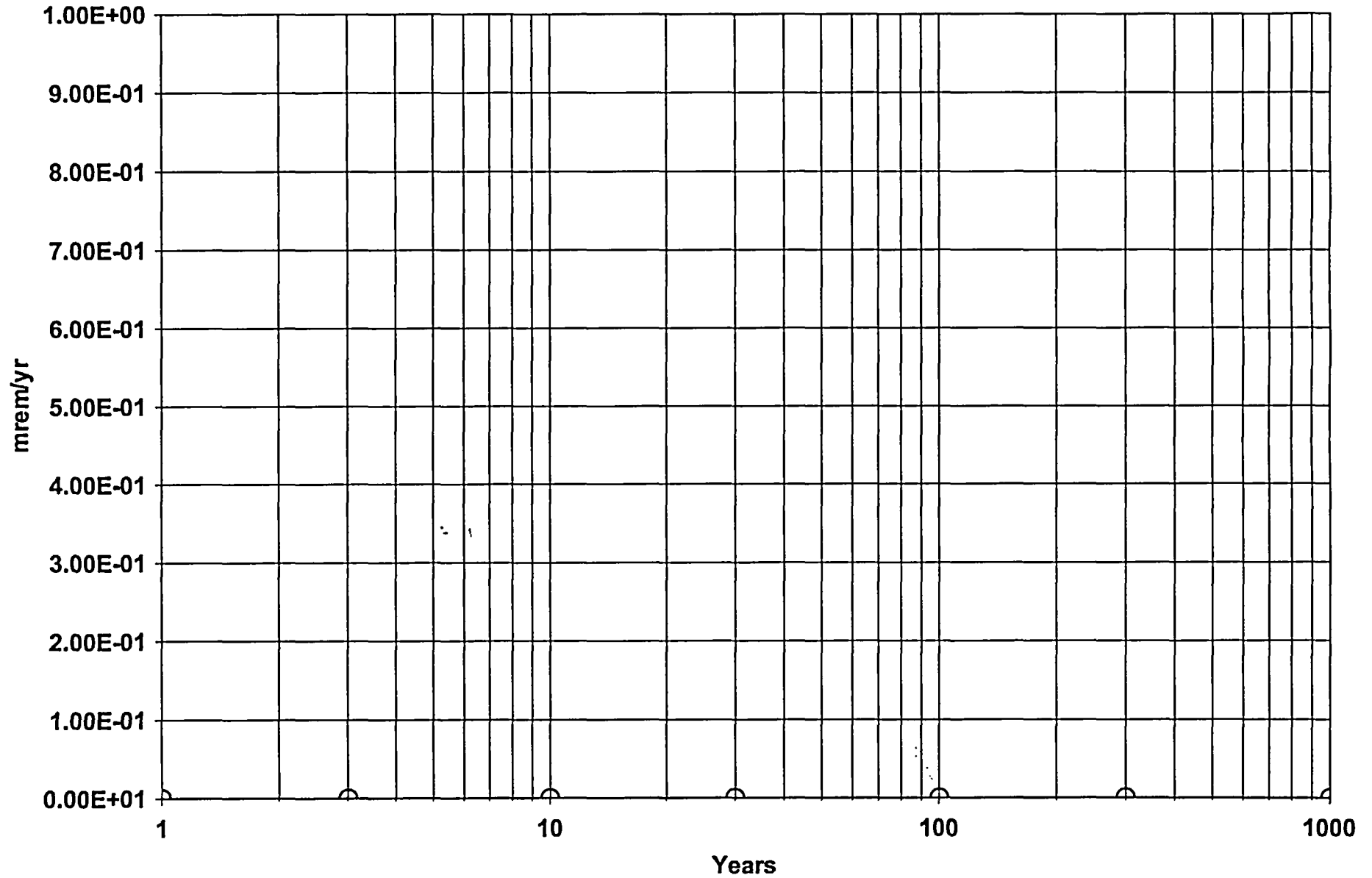
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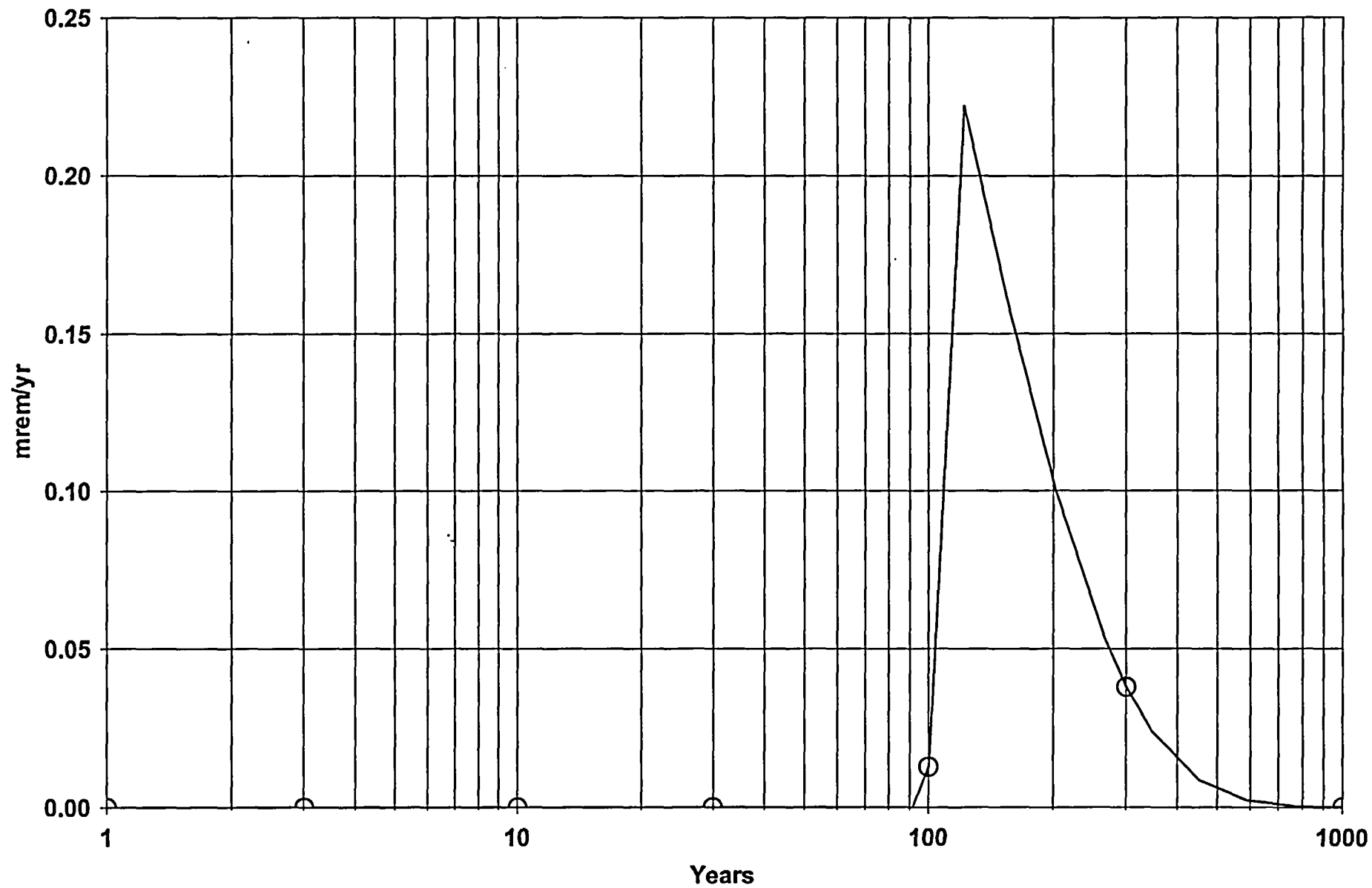
DOSE: Pu-241b, All Pathways Summed



DOSE: Sr-90, All Pathways Summed



DOSE: Tc-99, All Pathways Summed



Assessment of the Radiological Effects on Future Residents
from the Alternative Disposal of the Solid Waste from the Decommissioning
of the Haddam Neck Plant at the US Ecology Idaho Hazardous Waste Landfill

APPENDIX B

**RESRAD Report of Input Parameters and Resultant TEDE
for Resident Farmer Disposal Scenario**

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Dose Conversion Factor (and Related) Parameter Summary ...	2
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Total Dose Components	
Time = 0.000E+00	21
Time = 1.000E+00	23
Time = 3.000E+00	25
Time = 1.000E+01	27
Time = 3.000E+01	29
Time = 1.000E+02	31
Time = 3.000E+02	33
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Dose Conversion Factor (and Related) Parameter Summary
File: HEAST 1995 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.720E+00	6.720E+00	DCF2(1)
B-1	Ag-108m+D	2.830E-04	2.830E-04	DCF2(2)
B-1	Am-241	4.440E-01	4.440E-01	DCF2(3)
B-1	Am-243+D	4.400E-01	4.400E-01	DCF2(4)
B-1	C-14	2.090E-06	2.090E-06	DCF2(5)
B-1	Cm-243	3.070E-01	3.070E-01	DCF2(6)
B-1	Co-60	2.190E-04	2.190E-04	DCF2(8)
B-1	Cs-134	4.630E-05	4.630E-05	DCF2(9)
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(10)
B-1	Eu-152	2.210E-04	2.210E-04	DCF2(11)
B-1	Eu-154	2.860E-04	2.860E-04	DCF2(13)
B-1	Eu-155	4.140E-05	4.140E-05	DCF2(14)
B-1	Fe-55	2.690E-06	2.690E-06	DCF2(15)
B-1	Gd-152	2.430E-01	2.430E-01	DCF2(16)
B-1	H-3	6.400E-08	6.400E-08	DCF2(17)
B-1	Mn-54	6.700E-06	6.700E-06	DCF2(18)
B-1	Nb-94	4.140E-04	4.140E-04	DCF2(19)
B-1	Ni-63	6.290E-06	6.290E-06	DCF2(20)
B-1	Np-237+D	5.400E-01	5.400E-01	DCF2(21)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(22)
B-1	Pb-210+D	1.380E-02	1.380E-02	DCF2(23)
B-1	Po-210	9.400E-03	9.400E-03	DCF2(24)
B-1	Pu-238	3.920E-01	3.920E-01	DCF2(25)
B-1	Pu-239	4.290E-01	4.290E-01	DCF2(26)
B-1	Pu-241+D	8.250E-03	8.250E-03	DCF2(27)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2(29)
B-1	Sr-90+D	1.310E-03	1.310E-03	DCF2(30)
B-1	Tc-99	8.330E-06	8.330E-06	DCF2(31)
B-1	Th-229+D	2.160E+00	2.160E+00	DCF2(32)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(33)
B-1	U-233	1.350E-01	1.350E-01	DCF2(34)
B-1	U-234	1.320E-01	1.320E-01	DCF2(35)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(36)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3(1)
D-1	Ag-108m+D	7.620E-06	7.620E-06	DCF3(2)
D-1	Am-241	3.640E-03	3.640E-03	DCF3(3)
D-1	Am-243+D	3.630E-03	3.630E-03	DCF3(4)
D-1	C-14	2.090E-06	2.090E-06	DCF3(5)
D-1	Cm-243	2.510E-03	2.510E-03	DCF3(6)
D-1	Co-60	2.690E-05	2.690E-05	DCF3(8)
D-1	Cs-134	7.330E-05	7.330E-05	DCF3(9)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(10)
D-1	Eu-152	6.480E-06	6.480E-06	DCF3(11)
D-1	Eu-154	9.550E-06	9.550E-06	DCF3(13)
D-1	Eu-155	1.530E-06	1.530E-06	DCF3(14)
D-1	Fe-55	6.070E-07	6.070E-07	DCF3(15)
D-1	Gd-152	1.610E-04	1.610E-04	DCF3(16)
D-1	H-3	6.400E-08	6.400E-08	DCF3(17)

Dose Conversion Factor (and Related) Parameter Summary (continued)
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Menu	Parameter	Current Value	Default	Parameter Name
D-1	Mn-54	2.770E-06	2.770E-06	DCF3(18)
D-1	Nb-94	7.140E-06	7.140E-06	DCF3(19)
D-1	Ni-63	5.770E-07	5.770E-07	DCF3(20)
D-1	Np-237+D	4.440E-03	4.440E-03	DCF3(21)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(22)
D-1	Pb-210+D	5.370E-03	5.370E-03	DCF3(23)
D-1	Po-210	1.900E-03	1.900E-03	DCF3(24)
D-1	Pu-238	3.200E-03	3.200E-03	DCF3(25)
D-1	Pu-239	3.540E-03	3.540E-03	DCF3(26)
D-1	Pu-241+D	6.850E-05	6.850E-05	DCF3(27)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3(29)
D-1	Sr-90+D	1.530E-04	1.530E-04	DCF3(30)
D-1	Tc-99	1.460E-06	1.460E-06	DCF3(31)
D-1	Th-229+D	4.030E-03	4.030E-03	DCF3(32)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(33)
D-1	U-233	2.890E-04	2.890E-04	DCF3(34)
D-1	U-234	2.830E-04	2.830E-04	DCF3(35)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3(36)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Ag-108m+D, plant/soil concentration ratio, dimensionless	1.500E-01	1.500E-01	RTF(2,1)
D-34	Ag-108m+D, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-03	3.000E-03	RTF(2,2)
D-34	Ag-108m+D, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.500E-02	2.500E-02	RTF(2,3)
D-34				
D-34	Am-241 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(3,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF(3,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(3,3)
D-34				
D-34	Am-243+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(4,1)
D-34	Am-243+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF(4,2)
D-34	Am-243+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(4,3)
D-34				
D-34	C-14 , plant/soil concentration ratio, dimensionless	5.500E+00	5.500E+00	RTF(5,1)
D-34	C-14 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.100E-02	3.100E-02	RTF(5,2)
D-34	C-14 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.200E-02	1.200E-02	RTF(5,3)
D-34				
D-34	Cm-243 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Cm-243 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(6,2)
D-34	Cm-243 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(6,3)
D-34				
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(8,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(8,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(8,3)
D-34				
D-34	Cs-134 , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(9,1)
D-34	Cs-134 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(9,2)
D-34	Cs-134 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(9,3)

Dose Conversion Factor (and Related) Parameter Summary (continued)

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Menu	Parameter	Current Value	Default	Parameter Name
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(10,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(10,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(10,3)
D-34				
D-34	Eu-152 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(11,1)
D-34	Eu-152 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	2.000E-03	RTF(11,2)
D-34	Eu-152 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(11,3)
D-34				
D-34	Eu-154 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(13,1)
D-34	Eu-154 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	2.000E-03	RTF(13,2)
D-34	Eu-154 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(13,3)
D-34				
D-34	Eu-155 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(14,1)
D-34	Eu-155 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	2.000E-03	RTF(14,2)
D-34	Eu-155 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(14,3)
D-34				
D-34	Fe-55 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(15,1)
D-34	Fe-55 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(15,2)
D-34	Fe-55 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(15,3)
D-34				
D-34	Gd-152 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(16,1)
D-34	Gd-152 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	2.000E-03	RTF(16,2)
D-34	Gd-152 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(16,3)
D-34				
D-34	H-3 , plant/soil concentration ratio, dimensionless	4.800E+00	4.800E+00	RTF(17,1)
D-34	H-3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.200E-02	1.200E-02	RTF(17,2)
D-34	H-3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-02	1.000E-02	RTF(17,3)
D-34				
D-34	Mn-54 , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF(18,1)
D-34	Mn-54 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-04	5.000E-04	RTF(18,2)
D-34	Mn-54 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(18,3)
D-34				
D-34	Nb-94 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(19,1)
D-34	Nb-94 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-07	3.000E-07	RTF(19,2)
D-34	Nb-94 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(19,3)
D-34				
D-34	Ni-63 , plant/soil concentration ratio, dimensionless	5.000E-02	5.000E-02	RTF(20,1)
D-34	Ni-63 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(20,2)
D-34	Ni-63 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-02	2.000E-02	RTF(20,3)
D-34				
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF(21,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(21,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(21,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(22,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(22,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(22,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(23,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(23,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(23,3)

Dose Conversion Factor (and Related) Parameter Summary (continued)
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Menu	Parameter	Current Value	Default	Parameter Name
D-34	Po-210 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(24,1)
D-34	Po-210 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(24,2)
D-34	Po-210 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.400E-04	3.400E-04	RTF(24,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(25,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(25,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(25,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(26,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(26,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(26,3)
D-34				
D-34	Pu-241+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(27,1)
D-34	Pu-241+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(27,2)
D-34	Pu-241+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(27,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(29,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(29,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(29,3)
D-34				
D-34	Sr-90+D , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF(30,1)
D-34	Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-03	8.000E-03	RTF(30,2)
D-34	Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(30,3)
D-34				
D-34	Tc-99 , plant/soil concentration ratio, dimensionless	5.000E+00	5.000E+00	RTF(31,1)
D-34	Tc-99 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(31,2)
D-34	Tc-99 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(31,3)
D-34				
D-34	Th-229+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(32,1)
D-34	Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(32,2)
D-34	Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(32,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(33,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(33,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(33,3)
D-34				
D-34	U-233 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(34,1)
D-34	U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(34,2)
D-34	U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(34,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(35,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(35,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(35,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(36,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(36,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(36,3)
D-34				
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)

Dose Conversion Factor (and Related) Parameter Summary (continued)
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Menu	Parameter	Current Value	Default	Parameter Name
D-5	Ag-108m+D, fish	5.000E+00	5.000E+00	BIOFAC(2,1)
D-5	Ag-108m+D, crustacea and mollusks	7.700E+02	7.700E+02	BIOFAC(2,2)
D-5				
D-5	Am-241, fish	3.000E+01	3.000E+01	BIOFAC(3,1)
D-5	Am-241, crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(3,2)
D-5				
D-5	Am-243+D, fish	3.000E+01	3.000E+01	BIOFAC(4,1)
D-5	Am-243+D, crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(4,2)
D-5				
D-5	C-14, fish	5.000E+04	5.000E+04	BIOFAC(5,1)
D-5	C-14, crustacea and mollusks	9.100E+03	9.100E+03	BIOFAC(5,2)
D-5				
D-5	Cm-243, fish	3.000E+01	3.000E+01	BIOFAC(6,1)
D-5	Cm-243, crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(6,2)
D-5				
D-5	Co-60, fish	3.000E+02	3.000E+02	BIOFAC(8,1)
D-5	Co-60, crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(8,2)
D-5				
D-5	Cs-134, fish	2.000E+03	2.000E+03	BIOFAC(9,1)
D-5	Cs-134, crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(9,2)
D-5				
D-5	Cs-137+D, fish	2.000E+03	2.000E+03	BIOFAC(10,1)
D-5	Cs-137+D, crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(10,2)
D-5				
D-5	Eu-152, fish	5.000E+01	5.000E+01	BIOFAC(11,1)
D-5	Eu-152, crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(11,2)
D-5				
D-5	Eu-154, fish	5.000E+01	5.000E+01	BIOFAC(13,1)
D-5	Eu-154, crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(13,2)
D-5				
D-5	Eu-155, fish	5.000E+01	5.000E+01	BIOFAC(14,1)
D-5	Eu-155, crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(14,2)
D-5				
D-5	Fe-55, fish	2.000E+02	2.000E+02	BIOFAC(15,1)
D-5	Fe-55, crustacea and mollusks	3.200E+03	3.200E+03	BIOFAC(15,2)
D-5				
D-5	Gd-152, fish	2.500E+01	2.500E+01	BIOFAC(16,1)
D-5	Gd-152, crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(16,2)
D-5				
D-5	H-3, fish	1.000E+00	1.000E+00	BIOFAC(17,1)
D-5	H-3, crustacea and mollusks	1.000E+00	1.000E+00	BIOFAC(17,2)
D-5				
D-5	Mn-54, fish	4.000E+02	4.000E+02	BIOFAC(18,1)
D-5	Mn-54, crustacea and mollusks	9.000E+04	9.000E+04	BIOFAC(18,2)
D-5				
D-5	Nb-94, fish	3.000E+02	3.000E+02	BIOFAC(19,1)
D-5	Nb-94, crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(19,2)
D-5				
D-5	Ni-63, fish	1.000E+02	1.000E+02	BIOFAC(20,1)
D-5	Ni-63, crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(20,2)
D-5				

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: HEAST 1995 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(21,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(21,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(22,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(22,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(23,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(23,2)
D-5				
D-5	Po-210 , fish	1.000E+02	1.000E+02	BIOFAC(24,1)
D-5	Po-210 , crustacea and mollusks	2.000E+04	2.000E+04	BIOFAC(24,2)
D-5				
D-5	Pu-238 , fish	3.000E+01	3.000E+01	BIOFAC(25,1)
D-5	Pu-238 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(25,2)
D-5				
D-5	Pu-239 , fish	3.000E+01	3.000E+01	BIOFAC(26,1)
D-5	Pu-239 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(26,2)
D-5				
D-5	Pu-241+D , fish	3.000E+01	3.000E+01	BIOFAC(27,1)
D-5	Pu-241+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(27,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(29,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(29,2)
D-5				
D-5	Sr-90+D , fish	6.000E+01	6.000E+01	BIOFAC(30,1)
D-5	Sr-90+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(30,2)
D-5				
D-5	Tc-99 , fish	2.000E+01	2.000E+01	BIOFAC(31,1)
D-5	Tc-99 , crustacea and mollusks	5.000E+00	5.000E+00	BIOFAC(31,2)
D-5				
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(32,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(32,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(33,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(33,2)
D-5				
D-5	U-233 , fish	1.000E+01	1.000E+01	BIOFAC(34,1)
D-5	U-233 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(34,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(35,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(35,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(36,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(36,2)

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	9.000E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.360E+01	2.000E+00	---	THICKO
R011	Length parallel to aquifer flow (m)	3.385E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	5.000E+00	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ag-108m	1.000E+00	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Am-241	1.000E+00	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): C-14	1.000E+00	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): Cm-243	1.000E+00	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): Co-60	1.000E+00	0.000E+00	---	S1(8)
R012	Initial principal radionuclide (pCi/g): Cs-134	1.000E+00	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g): Cs-137	1.000E+00	0.000E+00	---	S1(10)
R012	Initial principal radionuclide (pCi/g): Eu-152	1.000E+00	0.000E+00	---	S1(11)
R012	Initial principal radionuclide (pCi/g): Eu-154	1.000E+00	0.000E+00	---	S1(13)
R012	Initial principal radionuclide (pCi/g): Eu-155	1.000E+00	0.000E+00	---	S1(14)
R012	Initial principal radionuclide (pCi/g): Fe-55	1.000E+00	0.000E+00	---	S1(15)
R012	Initial principal radionuclide (pCi/g): H-3	1.000E+00	0.000E+00	---	S1(17)
R012	Initial principal radionuclide (pCi/g): Mn-54	1.000E+00	0.000E+00	---	S1(18)
R012	Initial principal radionuclide (pCi/g): Nb-94	1.000E+00	0.000E+00	---	S1(19)
R012	Initial principal radionuclide (pCi/g): Ni-63	1.000E+00	0.000E+00	---	S1(20)
R012	Initial principal radionuclide (pCi/g): Pu-238	1.000E+00	0.000E+00	---	S1(25)
R012	Initial principal radionuclide (pCi/g): Pu-239	1.000E+00	0.000E+00	---	S1(26)
R012	Initial principal radionuclide (pCi/g): Pu-241	1.000E+00	0.000E+00	---	S1(27)
R012	Initial principal radionuclide (pCi/g): Sr-90	1.000E+00	0.000E+00	---	S1(30)
R012	Initial principal radionuclide (pCi/g): Tc-99	1.000E+00	0.000E+00	---	S1(31)
R012	Concentration in groundwater (pCi/L): Ag-108m	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Am-241	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): C-14	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Cm-243	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(8)
R012	Concentration in groundwater (pCi/L): Cs-134	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(10)
R012	Concentration in groundwater (pCi/L): Eu-152	not used	0.000E+00	---	W1(11)
R012	Concentration in groundwater (pCi/L): Eu-154	not used	0.000E+00	---	W1(13)
R012	Concentration in groundwater (pCi/L): Eu-155	not used	0.000E+00	---	W1(14)
R012	Concentration in groundwater (pCi/L): Fe-55	not used	0.000E+00	---	W1(15)
R012	Concentration in groundwater (pCi/L): H-3	not used	0.000E+00	---	W1(17)
R012	Concentration in groundwater (pCi/L): Mn-54	not used	0.000E+00	---	W1(18)
R012	Concentration in groundwater (pCi/L): Nb-94	not used	0.000E+00	---	W1(19)
R012	Concentration in groundwater (pCi/L): Ni-63	not used	0.000E+00	---	W1(20)
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00	---	W1(25)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00	---	W1(26)
R012	Concentration in groundwater (pCi/L): Pu-241	not used	0.000E+00	---	W1(27)
R012	Concentration in groundwater (pCi/L): Sr-90	not used	0.000E+00	---	W1(30)
R012	Concentration in groundwater (pCi/L): Tc-99	not used	0.000E+00	---	W1(31)
R013	Cover depth (m)	3.600E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.780E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-04	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.160E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	8.000E+00	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	7.500E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.840E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	6.700E+00	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	7.000E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	6.100E+01	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Ag-108m				
R016	Contaminated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.964E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Am-241				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.537E-05	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for C-14				
R016	Contaminated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.964E-03	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for Cm-243				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	1.378E+03	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	-1.000E+00	-1.000E+00	1.378E+03	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	1.378E+03	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.250E-06	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.722E-06	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for Cs-134				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.722E-06	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCU(10,1)
R016	Saturated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.722E-06	ALEACH(10)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(10)
R016	Distribution coefficients for Eu-152				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCU(11,1)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.087E-06	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Eu-154				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCC(13)
R016	Unsaturated zone 1 (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCU(13,1)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCS(13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.087E-06	ALEACH(13)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(13)
R016	Distribution coefficients for Eu-155				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCC(14)
R016	Unsaturated zone 1 (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCU(14,1)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCS(14)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.087E-06	ALEACH(14)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(14)
R016	Distribution coefficients for Fe-55				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(15)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCU(15,1)
R016	Saturated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCS(15)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.722E-06	ALEACH(15)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(15)
R016	Distribution coefficients for H-3				
R016	Contaminated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCC(17)
R016	Unsaturated zone 1 (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCU(17,1)
R016	Saturated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCS(17)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.964E-03	ALEACH(17)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(17)
R016	Distribution coefficients for Mn-54				
R016	Contaminated zone (cm**3/g)	2.000E+02	2.000E+02	---	DCNUCC(18)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+02	2.000E+02	---	DCNUCU(18,1)
R016	Saturated zone (cm**3/g)	2.000E+02	2.000E+02	---	DCNUCS(18)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.604E-06	ALEACH(18)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(18)
R016	Distribution coefficients for Nb-94				
R016	Contaminated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCC(19)
R016	Unsaturated zone 1 (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCU(19,1)
R016	Saturated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCS(19)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.964E-03	ALEACH(19)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(19)
R016	Distribution coefficients for Ni-63				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(20)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCU(20,1)
R016	Saturated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCS(20)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.722E-06	ALEACH(20)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(20)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Pu-238				
R016	Contaminated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCC(25)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCU(25,1)
R016	Saturated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCS(25)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.610E-07	ALEACH(25)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(25)
R016	Distribution coefficients for Pu-239				
R016	Contaminated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCC(26)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCU(26,1)
R016	Saturated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCS(26)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.610E-07	ALEACH(26)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(26)
R016	Distribution coefficients for Pu-241				
R016	Contaminated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCC(27)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCU(27,1)
R016	Saturated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCS(27)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.610E-07	ALEACH(27)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(27)
R016	Distribution coefficients for Sr-90				
R016	Contaminated zone (cm**3/g)	3.000E+01	3.000E+01	---	DCNUCC(30)
R016	Unsaturated zone 1 (cm**3/g)	3.000E+01	3.000E+01	---	DCNUCU(30,1)
R016	Saturated zone (cm**3/g)	3.000E+01	3.000E+01	---	DCNUCS(30)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.708E-05	ALEACH(30)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(30)
R016	Distribution coefficients for Tc-99				
R016	Contaminated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCC(31)
R016	Unsaturated zone 1 (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCU(31,1)
R016	Saturated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCS(31)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.964E-03	ALEACH(31)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(31)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.537E-05	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Am-243				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.537E-05	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Gd-152				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCC(16)
R016	Unsaturated zone 1 (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCU(16,1)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	8.249E+02	DCNUCS(16)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.087E-06	ALEACH(16)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(16)
R016	Distribution coefficients for daughter Np-237				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCC(21)
R016	Unsaturated zone 1 (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCU(21,1)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCS(21)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.686E-06	ALEACH(21)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(21)
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(22)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(22,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(22)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.433E-05	ALEACH(22)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(22)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(23)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(23,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(23)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.719E-05	ALEACH(23)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(23)
R016	Distribution coefficients for daughter Po-210				
R016	Contaminated zone (cm**3/g)	1.000E+01	1.000E+01	---	DCNUCC(24)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+01	1.000E+01	---	DCNUCU(24,1)
R016	Saturated zone (cm**3/g)	1.000E+01	1.000E+01	---	DCNUCS(24)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.693E-04	ALEACH(24)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(24)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(29)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(29,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(29)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.454E-05	ALEACH(29)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(29)
R016	Distribution coefficients for daughter Th-229				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(32)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(32,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(32)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.870E-08	ALEACH(32)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(32)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(33)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(33,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(33)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.870E-08	ALEACH(33)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(33)
R016	Distribution coefficients for daughter U-233				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(34)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(34,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(34)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.433E-05	ALEACH(34)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(34)
R016	Distribution coefficients for daughter U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(35)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(35,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(35)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.433E-05	ALEACH(35)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(35)
R016	Distribution coefficients for daughter U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(36)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(36,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(36)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.433E-05	ALEACH(36)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(36)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	1.000E+00	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.450E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.450E-01	FMEAT
R018	Contamination fraction of milk	-1	-1	0.450E-01	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	1.000E+00	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	2.000E-05	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	3.000E-02	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	2.000E-02	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	9.800E-01	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	3.000E-01	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	7.000E-07	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	1.000E-10	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	8.000E-01	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	2.000E-01	2.000E-01	---	AVFG5
C14	DCF correction factor for gaseous forms of C14	8.894E+01	8.894E+01	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	1.500E-01	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	2.400E+00	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	4.000E-01	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	1.000E-01	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	5.000E-02	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	3.000E-02	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	2.000E-06	2.000E-06	---	DIFCV
R021	in foundation material	3.000E-07	3.000E-07	---	DIFFL
R021	in contaminated zone soil	2.000E-06	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	5.000E-01	5.000E-01	---	REXG
R021	Height of the building (room) (m)	2.500E+00	2.500E+00	---	HRM
R021	Building interior area factor	0.000E+00	0.000E+00	code computed (time dependent)	FAI
R021	Building depth below ground surface (m)	-1.000E+00	-1.000E+00	code computed (time dependent)	DMFL
R021	Emanating power of Rn-222 gas	2.500E-01	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for risk	1	---	---	KYMAX

Summary of Pathway Selections

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

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	900.00 square meters	Ag-108m	1.000E+00
Thickness:	33.60 meters	Am-241	1.000E+00
Cover Depth:	3.60 meters	C-14	1.000E+00
		Cm-243	1.000E+00
		Co-60	1.000E+00
		Cs-134	1.000E+00
		Cs-137	1.000E+00
		Eu-152	1.000E+00
		Eu-154	1.000E+00
		Eu-155	1.000E+00
		Fe-55	1.000E+00
		H-3	1.000E+00
		Mn-54	1.000E+00
		Nb-94	1.000E+00
		Ni-63	1.000E+00
		Pu-238	1.000E+00
		Pu-239	1.000E+00
		Pu-241	1.000E+00
		Sr-90	1.000E+00
		Tc-99	1.000E+00

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 5.000E+00 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	1.768E-15	2.647E-14	3.076E-13	8.047E-12	1.893E-10	1.247E-01	2.953E-01	2.391E-04
M(t):	3.535E-16	5.294E-15	6.153E-14	1.609E-12	3.786E-11	2.495E-02	5.905E-02	4.781E-05

Maximum TDOSE(t): 2.101E+00 mrem/yr at t = 122.1 ± 0.2 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.221E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ag-108m	1.014E-27	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
C-14	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cm-243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	2.080E-28	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-134	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	5.012E-28	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-152	3.286E-26	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-154	4.764E-27	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-155	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Fe-55	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Mn-54	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Nb-94	9.131E-26	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ni-63	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	1.038E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.307E-25	0.0000	0.000E+00	0.0000	1.038E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and Fraction of Total Dose At t = 1.221E+02 years

Water Dependent Pathways

Radio- Nuclide Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ag-108m	5.112E-01	0.2434	0.000E+00	0.0000	0.000E+00	0.0000	3.674E-02	0.0175	1.480E-03	0.0007	2.698E-02	0.0128	5.764E-01	0.27
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
C-14	2.698E-01	0.1284	0.000E+00	0.0000	0.000E+00	0.0000	3.201E-02	0.0152	1.127E-03	0.0005	3.074E-03	0.0015	3.060E-01	0.1457
Cm-243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.080E-28	0.0000
Cs-134	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.286E-26	0.0000
Eu-154	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.764E-27	0.0000
Eu-155	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Fe-55	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	8.607E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.571E-07	0.0000	1.986E-08	0.0000	5.364E-08	0.0000	9.638E-06	0.0000
Mn-54	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Nb-94	9.315E-01	0.4434	0.000E+00	0.0000	0.000E+00	0.0000	6.459E-02	0.0308	2.689E-07	0.0000	3.927E-06	0.0000	9.961E-01	0.4742
Ni-63	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.038E-08	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	1.912E-01	0.0910	0.000E+00	0.0000	0.000E+00	0.0000	3.047E-02	0.0145	2.032E-05	0.0000	4.257E-04	0.0002	2.221E-01	0.1057
Total	1.904E+00	0.9063	0.000E+00	0.0000	0.000E+00	0.0000	1.638E-01	0.0780	2.628E-03	0.0013	3.049E-02	0.0145	2.101E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ag-108m	5.402E-27	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
C-14	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cm-243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	1.653E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-134	5.881E-26	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	6.850E-27	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-152	1.567E-23	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-154	5.997E-23	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-155	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Fe-55	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Mn-54	6.286E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Nb-94	2.540E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ni-63	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	1.768E-15	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.730E-21	0.0000	0.000E+00	0.0000	1.768E-15	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ag-108m	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.402E-27	0.00
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
C-14	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cm-243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.653E-21	0.0000
Cs-134	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.881E-26	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.850E-27	0.0000
Eu-152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.567E-23	0.0000
Eu-154	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.997E-23	0.0000
Eu-155	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Fe-55	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Mn-54	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.286E-25	0.0000
Nb-94	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.540E-25	0.0000
Ni-63	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.768E-15	1.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.768E-15	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ag-108m	5.329E-27	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
C-14	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cm-243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	1.451E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-134	4.209E-26	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	6.705E-27	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-152	1.490E-23	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-154	5.550E-23	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-155	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Fe-55	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Mn-54	2.800E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Nb-94	2.519E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ni-63	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	2.647E-14	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.522E-21	0.0000	0.000E+00	0.0000	2.647E-14	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ag-108m	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.329E-27	0.00
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
C-14	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cm-243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.451E-21	0.0000
Cs-134	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.209E-26	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.705E-27	0.0000
Eu-152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.490E-23	0.0000
Eu-154	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.550E-23	0.0000
Eu-155	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Fe-55	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Mn-54	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.800E-25	0.0000
Nb-94	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.519E-25	0.0000
Ni-63	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.647E-14	1.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.647E-14	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ag-108m	5.185E-27	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
C-14	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cm-243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	1.119E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-134	2.156E-26	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	6.424E-27	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-152	1.347E-23	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-154	4.755E-23	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-155	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Fe-55	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Mn-54	5.558E-26	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Nb-94	2.477E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ni-63	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	3.076E-13	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.180E-21	0.0000	0.000E+00	0.0000	3.076E-13	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ag-108m	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.185E-27	0.00
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
C-14	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cm-243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.119E-21	0.0000
Cs-134	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.156E-26	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.424E-27	0.0000
Eu-152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.347E-23	0.0000
Eu-154	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.755E-23	0.0000
Eu-155	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Fe-55	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Mn-54	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.558E-26	0.0000
Nb-94	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.477E-25	0.0000
Ni-63	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.076E-13	1.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.076E-13	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ag-108m	4.711E-27	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
C-14	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cm-243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	4.500E-22	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-134	2.074E-27	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	5.530E-27	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-152	9.458E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-154	2.768E-23	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-155	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Fe-55	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Mn-54	1.935E-28	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Nb-94	2.336E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ni-63	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	8.047E-12	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	4.874E-22	0.0000	0.000E+00	0.0000	8.047E-12	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ag-108m	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.711E-27	0.00
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
C-14	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cm-243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.500E-22	0.0000
Cs-134	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.074E-27	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.530E-27	0.0000
Eu-152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.458E-24	0.0000
Eu-154	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.768E-23	0.0000
Eu-155	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Fe-55	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Mn-54	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.935E-28	0.0000
Nb-94	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.336E-25	0.0000
Ni-63	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.047E-12	1.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.047E-12	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ag-108m	3.582E-27	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
C-14	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cm-243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	3.335E-23	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-134	2.578E-30	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	3.603E-27	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-152	3.444E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-154	5.897E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-155	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Fe-55	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Mn-54	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Nb-94	1.975E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ni-63	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	1.893E-10	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	4.289E-23	0.0000	0.000E+00	0.0000	1.893E-10	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ag-108m	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.582E-27	0.00
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
C-14	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cm-243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.335E-23	0.0000
Cs-134	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.578E-30	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.603E-27	0.0000
Eu-152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.444E-24	0.0000
Eu-154	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.897E-24	0.0000
Eu-155	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Fe-55	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Mn-54	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Nb-94	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.975E-25	0.0000
Ni-63	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.893E-10	1.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.893E-10	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ag-108m	1.373E-27	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
C-14	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cm-243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	3.694E-27	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-134	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	8.047E-28	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-152	1.004E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-154	2.633E-26	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-155	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Fe-55	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Mn-54	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Nb-94	1.099E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ni-63	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	5.945E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.425E-25	0.0000	0.000E+00	0.0000	5.945E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ag-108m	3.314E-02	0.2657	0.000E+00	0.0000	0.000E+00	0.0000	2.327E-03	0.0187	8.461E-05	0.0007	1.676E-03	0.0134	3.723E-02	0.29
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
C-14	1.555E-02	0.1246	0.000E+00	0.0000	0.000E+00	0.0000	1.788E-03	0.0143	5.998E-05	0.0005	1.759E-04	0.0014	1.757E-02	0.1409
Cm-243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.694E-27	0.0000
Cs-134	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.047E-28	0.0000
Eu-152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.004E-25	0.0000
Eu-154	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.633E-26	0.0000
Eu-155	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Fe-55	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	1.705E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.842E-07	0.0000	3.630E-09	0.0000	1.049E-08	0.0000	1.903E-06	0.0000
Mn-54	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Nb-94	5.358E-02	0.4296	0.000E+00	0.0000	0.000E+00	0.0000	3.630E-03	0.0291	1.364E-08	0.0000	2.165E-07	0.0000	5.721E-02	0.4587
Ni-63	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.945E-09	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	1.099E-02	0.0881	0.000E+00	0.0000	0.000E+00	0.0000	1.706E-03	0.0137	1.027E-06	0.0000	2.337E-05	0.0002	1.272E-02	0.1020
Total	1.133E-01	0.9080	0.000E+00	0.0000	0.000E+00	0.0000	9.451E-03	0.0758	1.456E-04	0.0012	1.876E-03	0.0150	1.247E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ag-108m	8.876E-29	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
C-14	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cm-243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-134	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	1.110E-29	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-152	4.119E-30	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-154	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-155	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Fe-55	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Mn-54	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Nb-94	2.057E-26	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ni-63	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	2.250E-30	0.0000	0.000E+00	0.0000	1.152E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.067E-26	0.0000	0.000E+00	0.0000	1.152E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ag-108m	3.305E-02	0.1119	0.000E+00	0.0000	0.000E+00	0.0000	2.377E-03	0.0080	9.597E-05	0.0003	1.746E-03	0.0059	3.727E-02	0.12
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
C-14	4.507E-02	0.1526	0.000E+00	0.0000	0.000E+00	0.0000	5.351E-03	0.0181	1.887E-04	0.0006	5.137E-04	0.0017	5.112E-02	0.1731
Cm-243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-134	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.110E-29	0.0000
Eu-152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.119E-30	0.0000
Eu-154	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-155	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Fe-55	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	6.778E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.542E-12	0.0000	1.567E-13	0.0000	4.225E-13	0.0000	7.590E-11	0.0000
Mn-54	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Nb-94	1.580E-01	0.5352	0.000E+00	0.0000	0.000E+00	0.0000	1.096E-02	0.0371	4.576E-08	0.0000	6.669E-07	0.0000	1.690E-01	0.5723
Ni-63	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.152E-07	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	3.261E-02	0.1105	0.000E+00	0.0000	0.000E+00	0.0000	5.200E-03	0.0176	3.476E-06	0.0000	7.269E-05	0.0002	3.789E-02	0.1283
Total	2.688E-01	0.9102	0.000E+00	0.0000	0.000E+00	0.0000	2.389E-02	0.0809	2.881E-04	0.0010	2.333E-03	0.0079	2.953E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ag-108m	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
C-14	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cm-243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-134	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-154	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-155	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Fe-55	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Mn-54	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Nb-94	5.836E-29	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ni-63	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	1.025E-28	0.0000	0.000E+00	0.0000	2.004E-06	0.0084	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.608E-28	0.0000	0.000E+00	0.0000	2.004E-06	0.0084	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ag-108m	6.852E-07	0.0029	0.000E+00	0.0000	0.000E+00	0.0000	4.928E-08	0.0002	1.990E-09	0.0000	3.620E-08	0.0002	7.727E-07	0.00
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
C-14	3.917E-05	0.1639	0.000E+00	0.0000	0.000E+00	0.0000	4.651E-06	0.0195	1.640E-07	0.0007	4.465E-07	0.0019	4.443E-05	0.1859
Cm-243	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-134	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-154	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Eu-155	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Fe-55	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Mn-54	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Nb-94	1.460E-04	0.6106	0.000E+00	0.0000	0.000E+00	0.0000	1.013E-05	0.0424	4.226E-11	0.0000	6.160E-10	0.0000	1.561E-04	0.6529
Ni-63	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.004E-06	0.0084
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Tc-99	3.078E-05	0.1288	0.000E+00	0.0000	0.000E+00	0.0000	4.909E-06	0.0205	3.281E-09	0.0000	6.861E-08	0.0003	3.576E-05	0.1496
Total	2.166E-04	0.9060	0.000E+00	0.0000	0.000E+00	0.0000	1.974E-05	0.0826	1.693E-07	0.0007	5.519E-07	0.0023	2.391E-04	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Branch Fraction* t=	DSR(j,t) (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ag-108m	Ag-108m	1.000E+00	5.402E-27	5.329E-27	5.185E-27	4.711E-27	3.582E-27	3.723E-02	3.727E-02	7.727E-02
Am-241	Am-241	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Am-241	Np-237	1.000E+00	5.828E-42	1.751E-41	4.095E-41	1.240E-40	3.701E-40	1.341E-39	5.295E-39	5.009E-39
Am-241	U-233	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Am-241	Th-229	1.000E+00	0.000E+00	0.000E+00	0.000E+00	1.401E-45	2.102E-44	8.324E-43	3.050E-41	3.484E-41
Am-241	ΣDSR(j)		5.828E-42	1.751E-41	4.095E-41	1.240E-40	3.701E-40	1.342E-39	5.325E-39	5.358E-39
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.757E-02	5.112E-02	4.443E-05
Cm-243	Cm-243	9.976E-01	8.594E-39	8.408E-39	8.048E-39	6.903E-39	4.453E-39	9.600E-40	1.198E-41	0.000E+00
Cm-243	Pu-239	9.976E-01	0.000E+00	0.000E+00	0.000E+00	1.401E-45	2.803E-45	5.605E-45	9.809E-45	4.905E-44
Cm-243	U-235	9.976E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Cm-243	Pa-231	9.976E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.401E-45	4.764E-44
Cm-243	Ac-227	9.976E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.204E-45	2.522E-43
Cm-243	ΣDSR(j)		8.594E-39	8.408E-39	8.048E-39	6.903E-39	4.453E-39	9.600E-40	1.199E-41	3.489E-43
Cm-243	Cm-243	2.400E-03	2.068E-41	2.023E-41	1.936E-41	1.661E-41	1.071E-41	2.309E-42	2.803E-44	0.000E+00
Cm-243	Am-243	2.400E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Cm-243	Pu-239	2.400E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Cm-243	U-235	2.400E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Cm-243	Pa-231	2.400E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Cm-243	Ac-227	2.400E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Cm-243	ΣDSR(j)		2.068E-41	2.023E-41	1.936E-41	1.661E-41	1.071E-41	2.309E-42	2.803E-44	0.000E+00
Co-60	Co-60	1.000E+00	1.653E-21	1.451E-21	1.119E-21	4.500E-22	3.335E-23	3.694E-27	1.844E-38	0.000E+00
Cs-134	Cs-134	1.000E+00	5.881E-26	4.209E-26	2.156E-26	2.074E-27	2.578E-30	1.747E-40	0.000E+00	0.000E+00
Cs-137	Cs-137	1.000E+00	6.850E-27	6.705E-27	6.424E-27	5.530E-27	3.603E-27	8.047E-28	1.110E-29	3.428E-36
Eu-152	Eu-152	7.208E-01	1.130E-23	1.074E-23	9.708E-24	6.817E-24	2.483E-24	7.236E-26	2.969E-30	1.401E-45
Eu-152	Eu-152	2.792E-01	4.376E-24	4.160E-24	3.761E-24	2.641E-24	9.616E-25	2.803E-26	1.150E-30	0.000E+00
Eu-152	Gd-152	2.792E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Eu-152	ΣDSR(j)		4.376E-24	4.160E-24	3.761E-24	2.641E-24	9.616E-25	2.803E-26	1.150E-30	0.000E+00
Eu-154	Eu-154	1.000E+00	5.997E-23	5.550E-23	4.755E-23	2.768E-23	5.897E-24	2.633E-26	5.075E-33	0.000E+00
Eu-155	Eu-155	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Fe-55	Fe-55	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.903E-06	7.590E-11	6.219E-31
Mn-54	Mn-54	1.000E+00	6.286E-25	2.800E-25	5.558E-26	1.935E-28	1.835E-35	0.000E+00	0.000E+00	0.000E+00

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

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g)								
			t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Nb-94	Nb-94	1.000E+00		2.540E-25	2.519E-25	2.477E-25	2.336E-25	1.975E-25	5.721E-02	1.690E-01	1.561E-04
Ni-63	Ni-63	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-238	Pu-238	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-238	U-234	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-238	Th-230	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-238	Ra-226	1.000E+00		1.768E-15	2.647E-14	3.076E-13	8.047E-12	1.893E-10	5.945E-09	1.152E-07	2.004E-06
Pu-238	Pb-210	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-238	Po-210	1.000E+00		0.000E+00	0.000E+00	2.803E-45	3.531E-43	2.527E-41	2.208E-39	9.392E-38	5.700E-36
Pu-238	ΣDSR(j)			1.768E-15	2.647E-14	3.076E-13	8.047E-12	1.893E-10	5.945E-09	1.152E-07	2.004E-06
Pu-239	Pu-239	1.000E+00		3.817E-42	3.826E-42	3.844E-42	3.907E-42	4.097E-42	4.839E-42	7.777E-42	4.096E-41
Pu-239	U-235	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.401E-45	1.822E-44
Pu-239	Pa-231	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.605E-45	7.147E-44	9.613E-43	4.400E-41
Pu-239	Ac-227	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.408E-45	2.228E-43	4.322E-42	2.312E-40
Pu-239	ΣDSR(j)			3.817E-42	3.826E-42	3.844E-42	3.907E-42	4.111E-42	5.133E-42	1.306E-41	3.162E-40
Pu-241	Pu-241	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-241	Am-241	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-241	Np-237	1.000E+00		2.803E-45	2.102E-44	1.093E-43	8.898E-43	5.895E-42	3.592E-41	1.664E-40	1.652E-39
Pu-241	U-233	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-241	Th-229	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.682E-44	8.380E-43	1.097E-40
Pu-241	ΣDSR(j)			2.803E-45	2.102E-44	1.093E-43	8.898E-43	5.895E-42	3.593E-41	1.672E-40	1.762E-39
Pu-241	Pu-241	2.450E-05		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-241	Np-237	2.450E-05		0.000E+00	0.000E+00	1.401E-45	2.803E-45	4.204E-45	7.006E-45	1.121E-44	5.325E-44
Pu-241	U-233	2.450E-05		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-241	Th-229	2.450E-05		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.006E-45
Pu-241	ΣDSR(j)			0.000E+00	0.000E+00	1.401E-45	2.803E-45	4.204E-45	7.006E-45	1.121E-44	6.026E-44
Sr-90	Sr-90	1.000E+00		5.327E-36	5.212E-36	4.991E-36	4.287E-36	2.776E-36	6.067E-37	7.872E-39	1.401E-45
Tc-99	Tc-99	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.272E-02	3.789E-02	3.576E-05

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
 The DSR includes contributions from associated (half-life ≤ 30 days) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
 Basic Radiation Dose Limit = 5.000E+00 mrem/yr

Nuclide	(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ag-108m		*2.608E+13	*2.608E+13	*2.608E+13	*2.608E+13	*2.608E+13	1.343E+02	1.342E+02	6.471E+06
Am-241		*3.424E+12	*3.424E+12	*3.424E+12	*3.424E+12	*3.424E+12	*3.424E+12	*3.424E+12	*3.424E+12
C-14		*4.454E+12	*4.454E+12	*4.454E+12	*4.454E+12	*4.454E+12	2.845E+02	9.781E+01	1.125E+05
Cm-243		*5.159E+13	*5.159E+13	*5.159E+13	*5.159E+13	*5.159E+13	*5.159E+13	*5.159E+13	*5.159E+13
Co-60		*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15	*1.131E+15
Cs-134		*1.294E+15	*1.294E+15	*1.294E+15	*1.294E+15	*1.294E+15	*1.294E+15	*1.294E+15	*1.294E+15
Cs-137		*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13	*8.701E+13
Eu-152		*1.765E+14	*1.765E+14	*1.765E+14	*1.765E+14	*1.765E+14	*1.765E+14	*1.765E+14	*1.765E+14
Eu-154		*2.639E+14	*2.639E+14	*2.639E+14	*2.639E+14	*2.639E+14	*2.639E+14	*2.639E+14	*2.639E+14
Eu-155		*4.651E+14	*4.651E+14	*4.651E+14	*4.651E+14	*4.651E+14	*4.651E+14	*4.651E+14	*4.651E+14
Fe-55		*2.409E+15	*2.409E+15	*2.409E+15	*2.409E+15	*2.409E+15	*2.409E+15	*2.409E+15	*2.409E+15
H-3		*9.594E+15	*9.594E+15	*9.594E+15	*9.594E+15	*9.594E+15	2.627E+06	6.588E+10	*9.594E+15
Mn-54		*7.744E+15	*7.744E+15	*7.744E+15	*7.744E+15	*7.744E+15	*7.744E+15	*7.744E+15	*7.744E+15
Nb-94		*1.875E+11	*1.875E+11	*1.875E+11	*1.875E+11	*1.875E+11	8.739E+01	2.959E+01	3.203E+04
Ni-63		*5.916E+13	*5.916E+13	*5.916E+13	*5.916E+13	*5.916E+13	*5.916E+13	*5.916E+13	*5.916E+13
Pu-238		*1.711E+13	*1.711E+13	1.625E+13	6.214E+11	2.641E+10	8.411E+08	4.341E+07	2.495E+06
Pu-239		*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10	*6.212E+10
Pu-241		*1.030E+14	*1.030E+14	*1.030E+14	*1.030E+14	*1.030E+14	*1.030E+14	*1.030E+14	*1.030E+14
Sr-90		*1.365E+14	*1.365E+14	*1.365E+14	*1.365E+14	*1.365E+14	*1.365E+14	*1.365E+14	*1.365E+14
Tc-99		*1.696E+10	*1.696E+10	*1.696E+10	*1.696E+10	*1.696E+10	3.930E+02	1.320E+02	1.398E+05

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)

and Single Radionuclide Soil Guidelines G(i,t) in pCi/g

at tmin = time of minimum single radionuclide soil guideline

and at tmax = time of maximum total dose = 122.1 ± 0.2 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ag-108m	1.000E+00	122.2 ± 0.2	5.763E-01	8.676E+00	5.764E-01	8.674E+0
Am-241	1.000E+00	0.000E+00	0.000E+00	*3.424E+12	0.000E+00	*3.424E+1
C-14	1.000E+00	122.2 ± 0.2	3.060E-01	1.634E+01	3.060E-01	1.634E+01
Cm-243	1.000E+00	0.000E+00	0.000E+00	*5.159E+13	0.000E+00	*5.159E+13
Co-60	1.000E+00	0.000E+00	1.653E-21	*1.131E+15	2.080E-28	*1.131E+15
Cs-134	1.000E+00	0.000E+00	5.881E-26	*1.294E+15	0.000E+00	*1.294E+15
Cs-137	1.000E+00	0.000E+00	6.850E-27	*8.701E+13	5.012E-28	*8.701E+13
Eu-152	1.000E+00	0.000E+00	1.567E-23	*1.765E+14	3.286E-26	*1.765E+14
Eu-154	1.000E+00	0.000E+00	5.997E-23	*2.639E+14	4.764E-27	*2.639E+14
Eu-155	1.000E+00	0.000E+00	0.000E+00	*4.651E+14	0.000E+00	*4.651E+14
Fe-55	1.000E+00	0.000E+00	0.000E+00	*2.409E+15	0.000E+00	*2.409E+15
H-3	1.000E+00	115.2 ± 0.2	1.045E-05	4.784E+05	9.638E-06	5.188E+05
Mn-54	1.000E+00	0.000E+00	6.286E-25	*7.744E+15	0.000E+00	*7.744E+15
Nb-94	1.000E+00	122.2 ± 0.2	9.960E-01	5.020E+00	9.961E-01	5.020E+00
Ni-63	1.000E+00	0.000E+00	0.000E+00	*5.916E+13	0.000E+00	*5.916E+13
Pu-238	1.000E+00	1.000E+03	2.004E-06	2.495E+06	1.038E-08	4.816E+08
Pu-239	1.000E+00	0.000E+00	0.000E+00	*6.212E+10	0.000E+00	*6.212E+10
Pu-241	1.000E+00	0.000E+00	0.000E+00	*1.030E+14	0.000E+00	*1.030E+14
Sr-90	1.000E+00	0.000E+00	0.000E+00	*1.365E+14	0.000E+00	*1.365E+14
Tc-99	1.000E+00	122.2 ± 0.2	2.221E-01	2.251E+01	2.221E-01	2.251E+01

*At specific activity limit

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

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
			t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ag-108m	Ag-108m	1.000E+00	5.402E-27	5.329E-27	5.185E-27	4.711E-27	3.582E-27	3.723E-02	3.727E-02	7.727E-02	
Am-241	Am-241	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Am-241	Pu-241	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Am-241	ΣDOSE(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Np-237	Am-241	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Np-237	Pu-241	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Np-237	Pu-241	2.450E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Np-237	ΣDOSE(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
U-233	Am-241	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
U-233	Pu-241	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
U-233	Pu-241	2.450E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
U-233	ΣDOSE(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Th-229	Am-241	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Th-229	Pu-241	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Th-229	Pu-241	2.450E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Th-229	ΣDOSE(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.757E-02	5.112E-02	4.443E-05	
Cm-243	Cm-243	9.976E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Cm-243	Cm-243	2.400E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Cm-243	ΣDOSE(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Pu-239	Cm-243	9.976E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Pu-239	Cm-243	2.400E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Pu-239	Pu-239	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Pu-239	ΣDOSE(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
U-235	Cm-243	9.976E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
U-235	Cm-243	2.400E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
U-235	Pu-239	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
U-235	ΣDOSE(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Pa-231	Cm-243	9.976E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Pa-231	Cm-243	2.400E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Pa-231	Pu-239	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Pa-231	ΣDOSE(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Ac-227	Cm-243	9.976E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Ac-227	Cm-243	2.400E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Ac-227	Pu-239	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Ac-227	ΣDOSE(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Am-243	Cm-243	2.400E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Co-60	Co-60	1.000E+00	1.653E-21	1.451E-21	1.119E-21	4.500E-22	3.335E-23	3.694E-27	0.000E+00	0.000E+00	

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

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr								
			t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Cs-134	Cs-134	1.000E+00		5.881E-26	4.209E-26	2.156E-26	2.074E-27	2.578E-30	0.000E+00	0.000E+00	0.000E+00
Cs-137	Cs-137	1.000E+00		6.850E-27	6.705E-27	6.424E-27	5.530E-27	3.603E-27	8.047E-28	1.110E-29	0.000E+00
Eu-152	Eu-152	7.208E-01		1.130E-23	1.074E-23	9.708E-24	6.817E-24	2.483E-24	7.236E-26	2.969E-30	0.000E+00
Eu-152	Eu-152	2.792E-01		4.376E-24	4.160E-24	3.761E-24	2.641E-24	9.616E-25	2.803E-26	1.150E-30	0.000E+00
Eu-152	ΣDOSE(j)			1.567E-23	1.490E-23	1.347E-23	9.458E-24	3.444E-24	1.004E-25	4.119E-30	0.000E+00
Gd-152	Eu-152	2.792E-01		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Eu-154	Eu-154	1.000E+00		5.997E-23	5.550E-23	4.755E-23	2.768E-23	5.897E-24	2.633E-26	0.000E+00	0.000E+00
Eu-155	Eu-155	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Fe-55	Fe-55	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.903E-06	7.590E-11	0.000E+00
Mn-54	Mn-54	1.000E+00		6.286E-25	2.800E-25	5.558E-26	1.935E-28	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Nb-94	Nb-94	1.000E+00		2.540E-25	2.519E-25	2.477E-25	2.336E-25	1.975E-25	5.721E-02	1.690E-01	1.561E-04
Ni-63	Ni-63	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-238	Pu-238	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Pu-238	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-230	Pu-238	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ra-226	Pu-238	1.000E+00		1.768E-15	2.647E-14	3.076E-13	8.047E-12	1.893E-10	5.945E-09	1.152E-07	2.004E-06
Pb-210	Pu-238	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Po-210	Pu-238	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-241	Pu-241	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-241	Pu-241	2.450E-05		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-241	ΣDOSE(j)			0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Sr-90	Sr-90	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Tc-99	Tc-99	1.000E+00		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.272E-02	3.789E-02	3.576E-05

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g								
			t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ag-108m	Ag-108m	1.000E+00		1.000E+00	9.847E-01	9.548E-01	8.571E-01	6.296E-01	2.139E-01	9.788E-03	2.006E-04
Am-241	Am-241	1.000E+00		1.000E+00	9.983E-01	9.950E-01	9.833E-01	9.507E-01	8.448E-01	6.030E-01	1.852E-01
Am-241	Pu-241	1.000E+00		0.000E+00	1.562E-03	4.460E-03	1.259E-02	2.463E-02	2.883E-02	2.078E-02	6.383E-03
Am-241	ΣS(j):			1.000E+00	9.999E-01	9.994E-01	9.959E-01	9.753E-01	8.737E-01	6.238E-01	1.916E-01
Np-237	Am-241	1.000E+00		0.000E+00	3.236E-07	9.692E-07	3.212E-06	9.474E-06	2.980E-05	7.618E-05	1.558E-04
Np-237	Pu-241	1.000E+00		0.000E+00	2.550E-10	2.221E-09	2.209E-08	1.494E-07	7.969E-07	2.394E-06	5.139E-06
Np-237	Pu-241	2.450E-05		0.000E+00	7.748E-12	2.217E-11	6.298E-11	1.259E-10	1.634E-10	1.645E-10	1.637E-10
Np-237	ΣS(j):			0.000E+00	3.239E-07	9.715E-07	3.234E-06	9.624E-06	3.059E-05	7.857E-05	1.610E-04
U-233	Am-241	1.000E+00		0.000E+00	7.078E-13	6.363E-12	7.042E-11	6.265E-10	6.690E-09	5.397E-08	4.268E-07
U-233	Pu-241	1.000E+00		0.000E+00	3.732E-16	9.833E-15	3.350E-13	7.271E-12	1.502E-10	1.579E-09	1.374E-08
U-233	Pu-241	2.450E-05		0.000E+00	1.708E-17	1.489E-16	1.487E-15	1.018E-14	5.713E-14	2.000E-13	6.904E-13
U-233	ΣS(j):			0.000E+00	7.082E-13	6.373E-12	7.075E-11	6.338E-10	6.840E-09	5.555E-08	4.405E-07
Th-229	Am-241	1.000E+00		0.000E+00	2.241E-17	6.044E-16	2.231E-14	5.970E-13	2.143E-11	5.301E-10	1.487E-08
Th-229	Pu-241	1.000E+00		0.000E+00	8.882E-21	7.054E-19	8.142E-17	5.521E-15	4.171E-13	1.454E-11	4.682E-10
Th-229	Pu-241	2.450E-05		0.000E+00	5.426E-22	1.431E-20	4.888E-19	1.070E-17	2.284E-16	2.648E-15	3.136E-14
Th-229	ΣS(j):			0.000E+00	2.242E-17	6.051E-16	2.240E-14	6.026E-13	2.184E-11	5.446E-10	1.533E-08
C-14	C-14	1.000E+00		1.000E+00	9.900E-01	9.702E-01	9.041E-01	7.389E-01	3.648E-01	4.853E-02	4.169E-05
Cm-243	Cm-243	9.976E-01		9.976E-01	9.736E-01	9.274E-01	7.822E-01	4.809E-01	8.763E-02	6.762E-04	2.729E-11
Cm-243	Cm-243	2.400E-03		2.400E-03	2.342E-03	2.231E-03	1.882E-03	1.157E-03	2.108E-04	1.627E-06	6.565E-14
Cm-243	ΣS(j):			1.000E+00	9.760E-01	9.296E-01	7.841E-01	4.821E-01	8.784E-02	6.778E-04	2.735E-11
Pu-239	Cm-243	9.976E-01		0.000E+00	2.839E-05	8.313E-05	2.550E-04	6.116E-04	1.075E-03	1.172E-03	1.148E-03
Pu-239	Cm-243	2.400E-03		0.000E+00	3.224E-12	2.855E-11	3.000E-10	2.322E-09	1.657E-08	6.732E-08	2.320E-07
Pu-239	Pu-239	1.000E+00		1.000E+00	1.000E+00	9.999E-01	9.997E-01	9.991E-01	9.970E-01	9.911E-01	9.708E-01
Pu-239	ΣS(j):			1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.997E-01	9.981E-01	9.923E-01	9.719E-01
U-235	Cm-243	9.976E-01		0.000E+00	1.404E-14	1.243E-13	1.307E-12	1.012E-11	7.253E-11	2.987E-10	1.082E-09
U-235	Cm-243	2.400E-03		0.000E+00	1.061E-21	2.829E-20	1.005E-18	2.419E-17	6.356E-16	8.849E-15	1.122E-13
U-235	Pu-239	1.000E+00		0.000E+00	9.848E-10	2.954E-09	9.845E-09	2.952E-08	9.817E-08	2.926E-07	9.539E-07
U-235	ΣS(j):			0.000E+00	9.848E-10	2.954E-09	9.847E-09	2.953E-08	9.824E-08	2.929E-07	9.549E-07
Pa-231	Cm-243	9.976E-01		0.000E+00	9.919E-20	2.646E-18	9.398E-17	2.265E-15	5.964E-14	8.367E-13	1.091E-11
Pa-231	Cm-243	2.400E-03		0.000E+00	5.617E-27	4.506E-25	5.378E-23	3.971E-21	3.694E-19	1.685E-17	7.660E-16
Pa-231	Pu-239	1.000E+00		0.000E+00	1.042E-14	9.376E-14	1.041E-12	9.366E-12	1.038E-10	9.266E-10	1.001E-08
Pa-231	ΣS(j):			0.000E+00	1.042E-14	9.376E-14	1.042E-12	9.368E-12	1.038E-10	9.274E-10	1.002E-08
Ac-227	Cm-243	9.976E-01		0.000E+00	7.853E-22	6.220E-20	7.107E-18	4.654E-16	2.989E-14	6.618E-13	1.021E-11
Ac-227	Cm-243	2.400E-03		0.000E+00	3.560E-29	8.491E-27	3.275E-24	6.657E-22	1.574E-19	1.218E-17	6.955E-16
Ac-227	Pu-239	1.000E+00		0.000E+00	1.097E-16	2.915E-15	1.022E-13	2.386E-12	5.817E-11	7.520E-10	9.391E-09
Ac-227	ΣS(j):			0.000E+00	1.097E-16	2.915E-15	1.023E-13	2.386E-12	5.820E-11	7.527E-10	9.401E-09
Am-243	Cm-243	2.400E-03		0.000E+00	2.230E-07	6.529E-07	2.002E-06	4.792E-06	8.362E-06	8.853E-06	7.814E-06
Co-60	Co-60	1.000E+00		1.000E+00	8.768E-01	6.740E-01	2.685E-01	1.935E-02	1.945E-06	7.355E-18	0.000E+00

Individual Nuclide Soil Concentration
 Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g								
			t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Cs-134	Cs-134	1.000E+00		1.000E+00	7.145E-01	3.648E-01	3.468E-02	4.172E-05	2.518E-15	1.541E-44	0.000E+00
Cs-137	Cs-137	1.000E+00		1.000E+00	9.772E-01	9.330E-01	7.937E-01	5.000E-01	9.920E-02	9.761E-04	9.224E-11
Eu-152	Eu-152	7.208E-01		7.208E-01	6.843E-01	6.167E-01	4.285E-01	1.515E-01	3.976E-03	1.210E-07	1.879E-23
Eu-152	Eu-152	2.792E-01		2.792E-01	2.651E-01	2.389E-01	1.660E-01	5.867E-02	1.540E-03	4.686E-08	7.280E-24
Eu-152	ΣS(j):			1.000E+00	9.493E-01	8.556E-01	5.945E-01	2.101E-01	5.516E-03	1.678E-07	2.607E-23
Gd-152	Eu-152	2.792E-01		0.000E+00	1.746E-15	4.977E-15	1.397E-14	2.722E-14	3.426E-14	3.444E-14	3.439E-14
Eu-154	Eu-154	1.000E+00		1.000E+00	9.243E-01	7.895E-01	4.549E-01	9.413E-02	3.794E-04	5.462E-11	6.182E-35
Eu-155	Eu-155	1.000E+00		1.000E+00	8.696E-01	6.575E-01	2.472E-01	1.511E-02	8.526E-07	6.198E-19	0.000E+00
Fe-55	Fe-55	1.000E+00		1.000E+00	7.736E-01	4.629E-01	7.675E-02	4.521E-04	7.090E-12	3.565E-34	0.000E+00
H-3	H-3	1.000E+00		1.000E+00	9.360E-01	8.201E-01	5.164E-01	1.377E-01	1.348E-03	2.451E-09	1.985E-29
Mn-54	Mn-54	1.000E+00		1.000E+00	4.448E-01	8.800E-02	3.031E-04	2.785E-11	6.548E-36	0.000E+00	0.000E+00
Nb-94	Nb-94	1.000E+00		1.000E+00	9.901E-01	9.705E-01	9.049E-01	7.409E-01	3.679E-01	4.981E-02	4.548E-05
Ni-63	Ni-63	1.000E+00		1.000E+00	9.928E-01	9.786E-01	9.303E-01	8.052E-01	4.857E-01	1.146E-01	7.303E-04
Pu-238	Pu-238	1.000E+00		1.000E+00	9.921E-01	9.766E-01	9.240E-01	7.890E-01	4.538E-01	9.346E-02	3.704E-04
J-234	Pu-238	1.000E+00		0.000E+00	2.824E-06	8.404E-06	2.725E-05	7.568E-05	1.956E-04	3.228E-04	3.472E-04
Th-230	Pu-238	1.000E+00		0.000E+00	1.273E-11	1.139E-10	1.243E-09	1.062E-08	9.954E-08	5.952E-07	2.764E-06
Ra-226	Pu-238	1.000E+00		0.000E+00	1.839E-15	4.944E-14	1.805E-12	4.676E-11	1.510E-09	2.894E-08	4.702E-07
Pb-210	Pu-238	1.000E+00		0.000E+00	1.421E-17	1.133E-15	1.325E-13	9.245E-12	7.206E-10	2.222E-08	4.393E-07
Po-210	Pu-238	1.000E+00		0.000E+00	3.953E-18	6.252E-16	1.081E-13	8.638E-12	7.073E-10	2.211E-08	4.388E-07
Pu-241	Pu-241	1.000E+00		1.000E+00	9.530E-01	8.655E-01	6.179E-01	2.360E-01	8.118E-03	5.351E-07	1.244E-21
Pu-241	Pu-241	2.450E-05		2.450E-05	2.335E-05	2.121E-05	1.514E-05	5.781E-06	1.989E-07	1.311E-11	3.047E-26
Pu-241	ΣS(j):			1.000E+00	9.530E-01	8.655E-01	6.179E-01	2.360E-01	8.119E-03	5.351E-07	1.244E-21
Sr-90	Sr-90	1.000E+00		1.000E+00	9.764E-01	9.309E-01	7.877E-01	4.888E-01	9.200E-02	7.786E-04	4.342E-11
Tc-99	Tc-99	1.000E+00		1.000E+00	9.901E-01	9.705E-01	9.051E-01	7.415E-01	3.691E-01	5.028E-02	4.690E-05

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

RESRAD.EXE execution time = 7.40 seconds

**Assessment of the Radiological Effects on Future Residents
from the Alternative Disposal of the Solid Waste from the Decommissioning
of the Haddam Neck Plant at the US Ecology Idaho Hazardous Waste Landfill**

APPENDIX C

Technical Bases for RESRAD Input Parameters

**Assessment of the Radiological Effects on Future Residents
from the Alternative Disposal of the Solid Waste from the Decommissioning
of the Haddam Neck Plant at the US Ecology Idaho Hazardous Waste Landfill**

General

Appendix C contains a list of all input parameters used to model the disposal of the Connecticut Yankee Haddam Neck Plant decommissioning waste at the US Ecology Landfill. Twelve (12) site specific parameters were used. All other values not specifically addressed herein are the recommended values selected by the developers of RESRAD and are discussed in the RESRAD manual [Reference 1].

References

Four (4) principal references were used in developing the parameters contained in this section. These are:

1. ANL/EAD/LD-2, "Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.0," C. Yu et al, Argonne National Laboratory, September, 1993.
2. Notification of a Class I Modification, Administrative and Informational Changes to Waste Acceptance Parameters, Appendix A, RESRAD Modeling of Post Closure Dose, Page 2, EnviroSAFE Services of Idaho, Inc., 2000.
3. CH2M Hill, Hydrogeologic Characterization and Ground Water Monitoring Considerations for Proposed Cell 14 Expansion Area at EnviroSAFE Services of Idaho - Site B, Pages 35 -39, EnviroSAFE Services of Idaho, 1993.

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Parameters Specific to USEI.

- 1) **Area of contaminated zone:**

900 square meters - Estimated by the disposal facility for disposal of the anticipated volume of waste material (i.e., 1E8 pounds of waste at 1.5 g/cc density with a 33.6 m depth in a circular area).
- 2) **Thickness of contaminated zone:**

33.6 meters - Estimated by the disposal facility for designated disposal cell.
- 3) **Length parallel to aquifer flow:**

33.85 meters - the diameter of the circular area associated with the disposal volume.
- 4) **Cover depth:**

3.6 meters - designated cover depth for the disposal cell.
- 5) **Density of cover material:**

1.78 grams per cubic centimeter - compacted cover material density [Reference 2].
- 6) **Cover erosion rate:**

1E-4 meters per year - erosion rate for landfill area [Reference 3].
- 7) **Contaminated zone hydraulic conductivity:**

31.6 meters per year - groundwater transport rate through compacted landfill material [Reference 2].
- 8) **Evapotranspiration coefficient:**

0.75 - Evapotranspiration factor for landfill [Reference 2].
- 9) **Precipitation**

0.184 meters per year - annual rainfall for landfill area [[Reference 2].

**Assessment of the Radiological Effects on Future Residents
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10) Saturated zone hydraulic conductivity:

6.7 meters per year - groundwater transport rate within the saturated zone [Reference 2].

11) Saturated zone hydraulic gradient:

7E-3 - the groundwater gradient within the saturated zone [Reference 2].

12) Unsaturated zone thickness:

61 meters - distance between the contaminated zone (i.e., landfill material) and saturated zone (i.e., water table) [Reference 3].