Plum Brook Reactor Facility

Technical Basis Document

Revised Dose Assessment for Plum Brook Sediments

PBRF-TBD-08-006
Revision No. 0

Prepared By:	[illegible]	Date:	3-12-09
Independent Technical Review:	[illegible]	Date:	3/18/09
Other Review:	N/A	Date:	
Other Review:	N/A	Date:	
Cognizant Manager Approval:	W. Stoner / [illegible]	Date:	3/18/09
RSO Approval:	W. Stoner / [illegible]	Date:	3/18/09

Form
AD-04/02
Rev 0

NASA PBRF

DECOMMISSIONING PROJECT
CHANGE/CANCELLATION RECORD

DOCUMENT TITLE:	DOCUMENT NO:	REVISION NO:
Revised Dose Assessment for Plum Brook Sediments	**TBD-08-006**	**0**

Revision 0: Initial issue of Procedure

Form
AD-01/ 3
Rev 1

LIST OF EFFECTIVE PAGES

DOCUMENT NO: TBD-08-006 REVISION NO.: 0

Page No.	Revision Level	Page No.	Revision Level	Page No.	Revision Level
Cover Page	0				
Change/Cancellation Record	0				
LOEP	0				
TOC (3 pages)	0				
Text pages 7 thru 56	0				
Appendix A (10 pages)	0				
Appendix B (498 pages)	0				
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1.0 Executive Summary

The Plum Brook originates in the southwest corner of the 6400 acre NASA Plum Brook facility in Erie County, Ohio. It terminates in Sandusky Bay on the shore of Lake Erie northeast of the city of Sandusky. Cesium-137, Co-60, and possibly other radionuclides, entered the Plum Brook as a result of Plum Brook Reactor Facility (PBRF) operations from 1963 to 1973. The radionuclides were released in liquid effluents through a monitoring station into a man-made ditch that emptied into the Plum Brook near the northeastern boundary of the PBRF. As part of the PBRF decommissioning, an investigation was conducted of residual radioactive contamination in soil and sediment on the facility and in the Plum Brook. This included measurements of sediment samples collected from the Plum Brook north of the facility in the summer of 2005. From these initial measurements, it was determined that Cs-137 and smaller concentrations of Co-60 were present in the Plum Brook in areas accessible by the public.

An extensive campaign was conducted by NASA from 2005 through 2007 to determine the levels and extent of radioactive contaminants in the Plum Brook and environs. Samples of soil and sediments were collected from 900 locations along the four mile stream course from the PBRF to Sandusky Bay. The samples were analyzed by gamma spectroscopy for Cs-137 and other gamma emitting radionuclides. It was found that Cs-137 is the predominant man-made radionuclide in the Plum Brook with detectable concentrations measured along the stream course from the PBRF and into Sandusky Bay. Cobalt-60 was detected in less than 10 % of the samples and at average concentration of less than 1 pCi/g. Most of the Co-60 was measured in sediment samples collected from the Plum Brook near the PBRF. Detectable concentrations of Cs-137 were measured in sediments deposited in the stream bottom, along the stream banks and in delta deposits in the stream mouth and surrounding wetlands. Detectable concentrations of PBRF radionuclides were not found in Plum Brook water.

The NASA, PBRF Decommissioning Program Manager directed that a study be performed to estimate radiation doses that could be received by members of the public from contaminated Plum Brook sediments and to obtain derived concentration guideline levels (DCGLs) for the sediments. Accordingly, the RESRAD© computer code developed by Argonne National Laboratory and approved by the NRC was used to perform an initial dose assessment. Exposure scenarios developed by the NRC for assessment of radiation doses to future occupants of decommissioned nuclear facility sites were used as the starting point. They were modified to describe exposure conditions for members of the public that could come in contact with contaminated Plum Brook sediments [NASA 2008].

Doses to members of the public were calculated for four exposure scenarios. The scenarios are based on potential exposure conditions representative of the major stream hydrologic regimes. Two residential scenarios were placed in the stream meander sections. Most of the near-stream residences are located in these sections. These include the stream and stream banks that run from the Northern PBRF boundary to the Plum Brook Country Club. These exposure scenarios are the:

- Suburban Gardner. This scenario assumes that a resident grows vegetables in a garden on soil that is supplemented with (mixed with) contaminated sediments excavated from the nearby stream bank. Radiation exposure is received primarily from direct exposure while working in the garden about 120 hours a year and from consumption of vegetables grown in the garden.
- Brook-side Resident. A residence is assumed to be constructed on land contaminated with sediments deposited in the vicinity of the stream during a large flood event prior to construction of the home. Exposure to the resident is received primarily from direct exposure while inside the house (1096 hours per year) and while occupying contaminated outdoor areas while doing yard work (80 hours per year).

Two scenarios are set in the flood plain and estuary. Here, the principal means of public access to the stream are through the Plum Brook Country club golf course and the Putnam Nature Preserve. The scenarios are the:

- Country Club Worker. The dose receptor for this scenario is a worker at the Plum Brook Country Club, located on the Plum Brook about 2 ½ miles downstream (north) of the PBRF. The worker is assumed to spend about 15 hours a week traveling on and maintaining landscaping adjacent to a cart path constructed on contaminated sediment used as fill.
- Recreationist. It is assumed that the most likely means for public exposure in the estuary is through recreational use. The dose receptor is a fisherman who occupies the stream and stream bank while fishing in the stream mouth-estuary located between Us Rt. 6 and Sandusky Bay. The fisherman spends about 10 hours a week for 10 weeks a year at the stream and consumes game fish caught there.

The initial dose assessment was performed under the assumption that a final status survey would subsequently be required to ensure that members of the public would receive less than 25 mrem/y. The dose assessment focused on the exposure from Cs-137. It also used a simplified source term description consisting of a single-layer source volume for each scenario and assumed an average Cs-137 concentration of 1 pCi/g throughout the Plum Brook. The highest dose from exposure to Cs-137 was obtained for the Brook-side Resident, 0.17 ± 0.17 mrem/y per pCi/g (average dose ± one standard deviation). This result was used to calculate DCGLs corresponding to a range of dose criteria that could provide an acceptable basis for evaluating potential corrective actions. It was determined that the DCGL for Cs-137 could be as high as be 144 pCi/g average concentration without exceeding the 25 mrem/y dose criterion [NASA 2008]. These results were presented to the NRC and the Ohio EPA in a public meeting in September 2008 [USNRC 2008]. Alternative approaches were discussed for demonstrating that areas of the Plum Brook accessible to the public that were impacted by contaminated sediments satisfy the 25 mrem/yr dose criterion. The alternative approaches are:

- Establish DCGLs and perform final status survey using MARSSIM guidance
- Characterize and perform a dose assessment.

It was agreed that the latter approach was the most practical and was acceptable to all parties. The NRC identified requirements for an acceptable dose assessment [USNRC 2008]. Subsequently NASA determined that additional information and evaluation were required. Two tasks were identified. A detailed description of the distribution of radionuclides of PBRF origin in the Plum Brook and environs was to be developed followed by a revised dose assessment. The results of the present dose assessment are summarized:

> The dose to members of the public from Plum Brook sediments contaminated with Cs-137 and Co-60 was calculated for four exposure scenarios. The scenarios represent a range of possible conditions whereby members of the public could receive radiation doses from contaminated sediments. The calculated dose to individuals exposed in the four scenarios range from 0.65 to 1.17 mrem/y. The average of the doses to the four scenario receptors is 0.88 ± 0.22 mrem/y.
>
> This result shows that the dose to an individual is well below the 25 mrem/y dose agreed by the principal stakeholders as being acceptable for the Plum Brook areas impacted by contaminated sediments. This conclusion is further supported by direct measurements of radiation doses and dose rates at locations on the Plum Brook selected to represent settings similar to those of the exposure scenarios. The measured doses are less than the calculated doses at three of the four locations and in close agreement with the calculated doses at the fourth location.
>
> Additional perspective is provided by comparison with the dose to the public from the Cs-137 fallout from atmospheric weapons testing that remains in the environment. The annual average dose to individuals in the northern hemisphere from fallout Cs-137 is reported to be about 0.5 mrem/y (with an estimated uncertainty of ± 100 %.). Thus, the calculated doses from exposure to Plum Brook sediments are indistinguishable from the “background” dose received from the fallout Cs-137 burden in the Plum Brook watershed.

2.0 Introduction

The Plum Brook is one of several surface streams that drain the 6400 acre NASA Plum Brook facility in Erie County, Ohio. It originates in farmland south of the facility and terminates in Sandusky Bay on the shore of Lake Erie northeast of the city of Sandusky. Cesium-137, Co-60, and possibly other radionuclides, entered the Plum Brook as a result of Plum Brook Reactor Facility (PBRF) operations from 1963 to 1973. The radionuclides were released in liquid effluents through a monitoring station into a man-made ditch that emptied into the Plum Brook near the northeastern boundary of the PBRF. As part of the PBRF decommissioning, an investigation was conducted of residual radioactive contamination in soil and sediment on the facility and in the Plum Brook. This included measurements of sediment samples collected from the Plum Brook north of the facility in the summer of 2005. From these initial measurements, it was determined that Cs-137 and Co-60 were present in the Plum Brook in areas accessible by the public.

This report presents an assessment of radiation doses to members of the public that could come in contact with sediments contaminated with radionuclides of PBRF origin. The objective is to demonstrate that the doses are less than the NRC 25 mrem/yr dose criterion. The present report is a revision of an initial dose assessment performed in 2008 [NASA 2008]. It is based on a recent and more complete description of sediment characterization [NASA 2009].

3.0 Background

An extensive campaign was conducted by NASA from 2005 through 2007 to determine the levels and extent of radioactive contaminants in the Plum Brook and environs. Samples of soil and sediments were collected from 900 locations along the four mile stream course from the PBRF to Sandusky Bay. The samples were analyzed by gamma spectroscopy for Cs-137 and other gamma emitting radionuclides. It was found that Cs-137 is the predominant man-made radionuclide in the Plum Brook with detectable concentrations measured along the stream course from the PBRF and into Sandusky Bay. Cobalt-60 was detected in less than 10 % of the samples and at an average concentration less than 0.5 pCi/g. Most of the Co-60 was measured in sediment samples collected from the Plum Brook near the PBRF. Detectable concentrations of Cs-137 were measured in sediments deposited in the stream bottom, along the stream banks and in delta deposits in the stream mouth and surrounding wetlands. Detectable concentrations of radionuclides of PBRF origin were not found in Plum Brook water.

An initial dose assessment was performed in 2008 to determine derived concentration guidelines (DCGLs) for the sediments. It was performed under the assumption that a final status survey would subsequently be required to ensure that members of the public would receive less than 25 mrem/y. It used a simplified source term description consisting of a single-layer source volume for each scenario. The highest single nuclide doses for unit concentration were obtained for the

Brookside Resident. They were: 1.7 ± 01.7 E-01 and 6.79 ± 7.08 E-01 mrem/y per pCi/g (average dose ± one standard deviation) for Cs-137 and Co-60 respectively. These results were used to calculate DCGLs corresponding to a range of dose criteria that could provide an acceptable basis for evaluating potential corrective actions and a final status survey. It was determined that the DCGL for Cs-137 could be as high as be 144 pCi/g average concentration and Co-60 up to 36 pCi/g without exceeding the 25 mrem/y dose criterion [NASA 2008]. These results were presented to the NRC and the Ohio EPA in a public meeting in September 2008 [USNRC 2008]. Alternative approaches were discussed for demonstrating that areas of the Plum Brook accessible to the public impacted by contaminated sediments satisfy the 25 mrem/yr dose criterion. The alternative approaches were:

- Establish DCGLs and perform final status survey using MARSSIM guidance
- Characterize and perform a dose assessment.

It was agreed that the latter approach was the most practical and was acceptable to all parties. The NRC identified requirements for an acceptable dose assessment [USNRC 2008].

The doses calculated in the initial dose assessment for Plum Brook sediment DCGLs were obtained from dose modeling performed with the RESRAD computer code [NASA 2008].[1] This was accomplished following guidance issued by the US Nuclear Regulatory Commission (NRC) for dose assessment and development of site-specific DCGLs [USNRC 2003]. The NASA PBRF Project Manager requested that similar methods be used in a revised dose assessment to demonstrate that the 25 mrem/y dose criterion is satisfied in lieu of a final status survey.[2] It would take into account a more detailed source term description for from Plum Brook sediments.

Principal steps for performing environmental dose assessments within this framework and followed in the present assessment are:

a. develop a conceptual site model
b. select appropriate exposure scenarios
c. determine values for key dose modeling parameters and
d. calculate the dose to individuals most likely to be exposed using an NRC-approved computer code such as RESRAD.

Conceptual site models are representations of the environment at a contaminated site that describe the physical, chemical and biological processes that determine the transport of contaminants from the points of release through environmental media to exposed individuals or

[1] The RESRAD code was developed by Argonne National Laboratory for the US Department of Energy [ANL 2003]. The NRC has approved it for use by licensees to determine compliance with the NRC Decommissioning license termination rule [USNRC 2003].

[2] Per this request, the dose assessment utilizes the RESRAD code and has adapted exposure scenarios identified by the NRC for use at urban sites to simulate conditions at the Plum Brook.

groups [ASTM 1998]. The conceptual site model provides a framework for assessing doses or risks from the contaminants released from a facility.

The exposure scenario incorporates the contaminant source characteristics[3], environmental transport pathways and human dose receptor characteristics into a dose calculation model. Exposure scenarios for environmental dose modeling describe:

- how the radioactive material moves from the source through the environment
- where and how humans are exposed to the environmental concentrations (and to direct radiation from the source)
- individual habits that determine exposure [USNRC 2003].

A scenario is "constructed" by identifying pathways and selecting values for parameters in the equations that describe the transport of radionuclides. The parameters are classified as physical, metabolic (or biological) and behavioral. Physical parameters include site characteristics and the area, thickness and depth below the surface of the contaminated soil. They also include geologic, hydrologic and meteorological parameters that describe the site and the movement of radionuclides through the physical environment to intermediate (food chain) pathways and direct pathways to the receptor. Metabolic parameters describe the transport of radionuclides through food-chain pathways. Finally, behavioral parameters describe the physical occupancy, dietary habits, drinking water intake and breathing rates of individuals exposed to direct radiation, contaminated food, water and air.

The Resident Farmer scenario was used by NASA to derive DCGLs for the principal radionuclides of concern in PBRF soil [NASA 2006]. In this scenario, a farmer moves onto a site that has been released for unrestricted use, grows and consumes food and uses water drawn from an aquifer under the site. The Resident Farmer scenario is illustrated in the schematic in Figure 1. The exposure pathways include:

- external exposure from contaminated soil
- inhalation of suspended soil
- ingestion of soil
- ingestion of drinking water
- consumption of plants and plant products grown in the contaminated soil and irrigated by water from the aquifer
- consumption of products from animals fed by plants grown in the contaminated soil and water from the aquifer
- consumption of fish from a pond supplied with water from the aquifer [USNRC 2003].

The Resident Farmer is a standardized generic scenario used to obtain soil concentration guidelines (DCGLs) for release of sites for unrestricted use. It is expected to yield conservative predicted values of dose per unit concentration of radionuclides in soil [ANL 2001]. "The

[3] The terminology used by the US NRC to describe radiation source characteristics in environmental dose modeling is "source term abstraction" [USNRC 2000].

generic models and default parameters are intended to estimate the upper range of the dose that an individual could receive and are expected to overestimate the dose at most sites" [USNRC 1998]. Dose assessments using this approach estimate prospective risks (dose) to reference individuals. Assessment of doses from contaminated sediments that have been transported to publicly accessible areas in the vicinity of the Plum Brook requires some modifications to this approach. This suggests the use of exposure scenarios that are more representative of exposure conditions in the Plum Brook environs. In this light, other scenarios have been identified by the NRC. They include an urban or suburban residential scenario which is described as "a subset of the Resident Farmer scenario", for urban or suburban settings where farming is not a realistic projected use [USNRC 2003]. Other scenarios identified by the NRC for urban and suburban settings include:

- Recreational User - at a site where only recreational use occurs
- Maintenance Worker – similar to a recreational user scenario, but involves groundskeepers or building maintenance workers [USNRC 2003].

The RESRAD code can accommodate exposure scenarios such as those identified above by selecting appropriate pathways from the total set of pathways and by adjusting values of parameters in the equations that calculate the transport of radionuclides through the pathways [ANL 2001]. This is the approach taken in the present dose assessment.

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5.0 Site Description – Plum Brook Conceptual Site Model

What follows is a conceptual site model for the Plum Brook and environs. It includes a description of the geology, hydrology, and environmental characteristics that determine how Cs-137 and other radionuclides entered and were transported downstream in the Plum Brook. The model includes a description of demographics and land use to identify exposure pathways. To provide perspective on estimated doses from contaminated Plum Brook sediments, the impact of the co-existing environmental burden of Cs-137 from nuclear weapons fallout is discussed.

5.1 Overview

Plum Brook is one of several streams that drains the NASA Plum Brook Facility It originates in farmland south of the facility and empties into Sandusky Bay, a total stream course distance of about 6.5 miles. The portion of interest is the stream and its nearby environs that contains or is impacted by sediments containing Cs-137, Co-60 and possibly other radionuclides released from the PBRF. This portion of the stream course comprises the Plum Brook watershed that lies between the juncture of Pentolite Ditch and Sandusky Bay, a stream-course distance of about 4 miles. In its course from PBRF to the Bay, the stream passes through farmland, residential areas, commercial areas, municipal land, a country club and a protected conservation area (a wetland). The entire drainage area (or watershed area) associated with the Plum Brook and its tributaries, comprises an area of about six square miles. Only a portion of the watershed, an area of 1.6 square miles comprises the area potentially impacted by the contaminated sediments. This is the area drained directly by the Plum Brook that lies between the northern PBRF boundary and Sandusky Bay. The watershed includes portions of Perkins and Huron Townships on the outskirts of the city of Sandusky.

5.2 Geology of the Plum Brook Drainage Area

The Plum Brook watershed terrain is nearly flat with a gentle slope that trends from south to north dropping in elevation from 620 feet above sea level at Pentolite Ditch to 570 feet at Sandusky Bay. The Plum Brook drainage area consists of surface glacial till underlain by shale, mudstone and limestone formations [Hatfield 1988]. The glacial till comprises dense clay and unconsolidated sand, silt and gravels. The glacial till typically ranges from 10 to 20 feet thick and lies above fractured-weathered shale and limestone beds. The stream ravine is largely confined to surface deposits. It occasionally contacts thin beds of shale and limestone above the underlying water-bearing formation, the Delaware Limestone. Figure 2 shows a cross section view of the geology in the Plum Brook watershed. Note that the vertical scale is exaggerated.

The Delaware Limestone is a bedded, fractured water-bearing limestone formation ranging from 15 to 20 meters thick in the vicinity of Sandusky. It is underlain by older

limestone formations up to several hundred feet thick. The water table, or potentiometric surface,[4] in the vicinity of the PBRF is encountered at two levels. A shallow, unconfined water table is observed in permeable surface deposits, at typical depths of 10 feet below land surface (BLS). An artesian or confined potentiometric surface in the Delaware Limestone is encountered at a typical depth of 20 feet BLS near the PBRF. The top of the regional aquifer (a confined water-bearing zone) associated with this potentiometric surface is observed at about 50 feet BLS in the vicinity of the PBRF [Haag 2008d].

5.3 Stream Hydrology and Surface features

The Plum Brook watershed is divided into drainage areas for purposes of flow estimation as shown in Figure 2 [Haag 2007b]. For the simplified conceptual model, three major surface drainage regimes are described – each has been modified to varying degrees by human activities. Modifications include culverts, highway overpasses, storm drain outfalls and dredging. From its origin at the southwest corner of the NASA Plum Brook Reservation to the juncture with Pentolite Ditch near the northern PBRF site boundary, the stream comprises a series of channels and ditches, some of which have been modified and straightened. From the PBRF northern boundary to the interior of the Plum Brook Country Club (PBCC), the Plum Brook is characterized as a narrow meandering stream and from the PBCC north to Sandusky Bay, the stream widens into a floodplain-wetland [Haag 2007b]. There are no known public uses of the water, except for irrigation at the PBCC [USACE 2004].

Stream flows are not measured in the Plum Brook watershed, but average flows have been estimated using techniques developed by the US Geological Survey [Haag 2007b][5]. As would be expected, the flow increases as one proceeds downstream from the PBRF to Sandusky Bay. Average estimated annual stream flows at key stream junctures are:

- 3.3 CFS, where a small tributary empties into Plum Brook just south of US Rt. 2.
- 5.5 CFS at US Rt. 6 where the upper flood plain merges into the Stream Mouth wetlands.

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[4] The water table is defined as the upper boundary or top surface of the zone of saturation in a soil profile or geologic formation. In some cases, subsurface water may be “confined” by impermeable formations surrounding the water-bearing zone and the water level will rise above the confined layer when it is penetrated by a tightly cased well. The term “potentiometric surface” is used to designate the level to which the water rises above its nominal level in a cased well or other constriction. In an unconfined aquifer, the potentiometric surface is the water table [OSU 2008].

[5] This method is based on the following assumptions: 1) the main water source is precipitation surface runoff, 2) there are no significant other sources such as groundwater (springs) or man-produced sources (storm drains or other outfalls – there are some storm drains, but these are not considered to be significant sources under normal flow conditions), 3) there is no significant loss to the underlying water table and 4) that the natural surface runoff patterns in the watershed have not been significantly altered. Also note that the estimated flows are annual averages and significant variation occurs with seasonal precipitation patterns. The upper stream sections (from its origin south of the PBRF to near Bogart Rd.) exhibit intermittent flow [NASA 1959].

Under normal flow conditions, stream channel cross sections at water level in the meandering sections range from two or three feet up to about 10 feet in width. Stream average water depth is typically one foot or less, but the stream depth in a typical meander will vary from several inches deep at the inner radius (point bar) to one-to-two feet deep at the outer radius (cut bank). In the meandering sections, the stream banks are steeply pitched and thickly vegetated with natural growth vines, bushes and trees. The vertical distance from the water course to the bank tops is approximately 4 to 6 feet under normal flow conditions. Most of the banks along the section extending from Route 2 north to the PBCC are heavily overgrown. However, in the residential area between US Route 2 and the PBCC, the stream banks are landscaped at several streamside residences.

North of the PBCC, the stream flood plain and estuary surface features are quite different from the meandering sections. The present stream channel is considerably wider and the stream banks are much less pronounced. The water depth at mid-stream increases from about two feet to four feet (in “scoured areas”) at the US 6 highway bridge to 4 to 5 feet (or more) at the stream mouth in the Plum Brook estuary. Wetland with marsh vegetation extends several hundred feet from the stream on either side.

5.4 Land Use

Land use in the Plum Brook watershed is characterized as suburban low-to-medium density development. Land use is controlled by local zoning. Division of the Plum Brook watershed into zoning categories is shown in Table 1.

Table 1, Plum Brook Watershed Zoning
(from PBRF to Sandusky Bay)

Area	Zoning Category				
	Residential	Agricultural	Commercial	Government-Municipal	Recreational
Square Miles	0.56	0.3	0.21	0.19	0.36
Acres	361	191	134	120	230
Fraction of total watershed area	0.35	0.18	0.13	0.12	0.22

Table 1 Note. Areas of the watershed zoning apportionment were calculated from electronic property tax maps maintained by the Erie County Auditors Office [Erie 2008].

Thirty five percent of the 1.6 square mile watershed land area, 0.56 square miles, is zoned residential. The resident population density in the Plum Brook watershed is lower than the Erie County average of 312 persons per square mile and the population density in the immediate vicinity of the stream is much lower. As of late 2006, 42 residences bordered the stream between the PBRF and Sandusky Bay. All but two of these are located south of the PBCC. Most, if not all of the residences bordering the stream appear to be single

family residences. It is estimated that the average population density, in the residential areas that border the stream is only 10 to 20 persons per square mile [Case 2007].

Eighteen percent of the watershed land area, or 0.3 square miles is zoned agricultural. The agricultural land is located between the PBRF and Bogart Rd and north of the Plum Brook Country Club. There are only two stream-side residences between the PBCC and Sandusky Bay. From examination of satellite photos and tours of the watershed, it is observed that most of the land zoned as agricultural is planted in row crops or is fallow (2007 growing season). No dairy pastures or commercial-vegetable truck farms are observed in the watershed.

Thirteen percent of the watershed land area, or 0.21 square miles, is zoned commercial. Most of the commercial-zoned land lies between Bogart Road and US Rt. 2. This includes the Milan Ave. (US Rt. 250) crossing (bridge over large culvert) proceeding to just north of US Rt. 2, a stream distance of slightly less than one mile. The commercial properties bordering the stream include motels, a large gas station, restaurants and several small store-front businesses. While no census count data is available for the commercially zoned area, the occupancy is of a transient nature. The highest average occupancy is estimated to be 50 hours a week for employees of the businesses and none of the employees of these businesses or motel guests are expected to be in proximity to the stream for more than a few minutes per day. Much of the stream that borders commercial properties is lined with riprap, concrete channels and is bordered by fences and guard rails. In view of these conditions, public contact with contaminated sediments is highly unlikely in the commercial-zoned areas.

Twelve percent of the watershed land area, or 0.19 square miles is zoned government (mostly municipal). All of this property lies between the PBRF north boundary and Rt. 2. This land includes a school bus maintenance facility and parking lot, a school administrative building, the site of a former sewage treatment plant and the US Rt. 2 highway right-of-way. None of the occupied buildings are in close proximity to the stream (all are more than 200 ft distant).

Twenty two percent, or 0.36 square mile (230 acres) of the watershed land area is zoned recreational. About 140 acres of this land area is occupied by the Plum Brook Country Club, which is traversed by the stream. The stream crosses several fairways and the maintenance-storage area. Three ponds that at one time were connected to the Plum Brook are located on the PBCC. A small pond is located on the golf course and two larger ponds are located near the maintenance and storage area in the northwest portion of the PBCC. The Plum Brook within the Country Club is accessible by employees and recreational golfers.

The remainder of the watershed zoned as recreational, about 70 acres north of US Rt. 6, lies within the Putnam Nature Preserve, owned by the Erie Metro Park district. The portion of the Preserve occupied by the Plum Brook flood plain and wetlands is undeveloped and public access is limited for portions of the year because it is protected

species habitat. Access to about 50% of the area has been restricted for about six months of the year due to Bald Eagle nesting [Haag 2008d].

5.5 Stream Sections for Exposure Scenarios

For the dose assessment, the Plum Brook is divided into four sections. This division considers stream hydrologic characteristics and land use patterns. The division is chosen to match stream characteristics with land use patterns to construct the exposure scenarios. The four stream sections are summarized in Table 2. They are identified as:

1. Upper Stream – from Plum Brook Reactor Facility to State Route 2
2. Lower Stream – from State Route 2 to the approximate center of the Plum Brook Country Club property
3. Upper Flood Plain – from Plum Brook Country Club to US Route 6
4. Lower Flood Plain and estuary – from US Route 6 to Sandusky Bay.[6]

Table 2, Summary of Plum Brook Stream Sections

Section	Stream Course (mi)	Watershed Area (mi^2)	Political Jurisdiction	Land Use (zoning)	Public Access
1 -Upper Stream (meander)	1.6	0.7	Perkins Township	30% Residential 30% Agricultural 30% Commercial 10% Government/Muni.	Private property, or access by permission only
2 - Lower Stream (meander)	1	0.59	Perkins & Huron Township.	60% Residential 20% Government/Muni. 20% Commercial – recreational (Golf Club)	Private property, or access by permission only
3 - Upper Flood Plain	0.85	0.22	Huron Township.	60% Commercial - recreational (Golf Club) 40% Agricultural	Private property, or access by permission only
4 - Lower Flood Plain and Mouth	0.55	0.11	Huron Township.	100% Erie Metro Park	Public access (limited).

Section 1 encompasses the largest land area in the watershed, about 0.7 square miles. It is zoned 30% residential, 30 % agricultural, 30% commercial and 10% Government (Municipal). The stream passes through the largest commercial zoned area in the watershed, the commercial strip along Milan Avenue (US 250) between Bogart Rd and Rt. 2. The stream course in this commercial strip, about 0.5 miles in length, has been altered considerably by culverts, underpasses and retaining walls. The residential zoned portion has the highest potential for members of the public to come in contact with contaminated sediments in this stream section. There are 15 residences adjacent to the

[6] The companion report, Radiological Characterization of Plum Brook Sediments, contains figures from satellite photos and maps that show the Plum Brook stream sections [NASA 2009].

Plum Brook in this stream section. Most of the residences are located between the PBRF northern boundary and Bogart Road, a distance of about one mile. The residences are typically modest ranch homes, a few of which are located fairly close to the stream. Several of these properties include small vegetable and flower gardens. As discussed above, the remainder of the watershed in this section is agricultural, commercial and municipal government and offers minimal opportunities for contact with Plum Brook sediments by members of the public.

Section 2, lies between Rt. 2 and the mid-portion of the PBCC and encompasses a stream course distance of about one mile. It comprises the lower stream meander hydrologic regime. The surrounding watershed of this section is 0.59 square miles. It is zoned 60% residential, 20% Government (municipal) and 20% commercial-recreational (country club). There are about 25 stream-side residences (houses located within 50 to 150 feet of the stream) between Rt. 2 and the PBCC. Several of these homes are on lots that encompass the stream and the stream banks are landscaped. No vegetable gardens are observed in residential properties bordering the stream (some have flower gardens). As discussed below, several of these homes are located on lots impacted by stream flood events, particularly the flood of 1969. Most of the homes were constructed after 1969. It is noted that the watershed area encompassed by this section contains the highest housing density of the entire watershed, even though the streamside housing density is low.

Section 3 comprises 0.85 miles of the stream course and 0.22 square miles of watershed. It includes the northern half of the PBCC and the upper flood plain below US Rt. 6, is zoned 60% commercial-recreational and 40% agricultural. It contains two residences, located north of the PBCC. Occupancy of areas potentially impacted by contaminated sediments is predominately recreational use (golf)) and PBCC maintenance activities.

Section 4, the lower flood plain-stream mouth is located between US Rt. 6 and Sandusky Bay. It encompasses about ½ mile of the stream course and a watershed area of 0.11 square miles (70 acres). It is zoned 100% recreational with public access controlled by the Erie Metro Parks. The width of the stream increases and the width of the watershed - drainage area decreases as the stream approaches Sandusky Bay.

5.6 Sediment Characteristics

Cesium-137 has been measured in Plum Brook sediments along the watercourse from the PBRF to Sandusky bay. This section summarizes what is currently known about the distribution of contaminated sediments. It is a summary of the detailed description of sediment characteristics in the companion radiological characterization report [NASA 2009]. Cesium-137 and other radionuclides were released from the PBRF via the facility liquid effluent pathway to the Pentolite Ditch[7]. The cesium, mostly in soluble form when

[7] A review of radioactivity releases from the Plum Brook Reactor Facility in liquid effluents to the Pentolite Ditch during the period of operation from 1963 to 1973 was conducted in 2006 [Crooks 2006]. From this review, it is estimated that a total of between 5 and 7.2 millicuries of Cs-137 were released. While the discussion focuses on the

released to the Pentolite Ditch, was believed to rapidly adsorb onto suspended clay sediment particles in the ditch. From Pentolite Ditch, it was transported downstream in the form of suspended solid particulates [Crooks 2006, Haag 2007a]. Over time, contaminated sediments were transported to the Plum Brook estuary and into Sandusky Bay where it was deposited in bottom sediments.

Sediments in the Plum Brook comprise a mixture of particles derived from the surrounding soils and the formations through which the stream passes. It includes silt, sand, clays and organic particulates. They range in size from a few 10's of microns in diameter (silts and clay fines) up to several millimeters in diameter (sands). In the stream mouth and lower flood plain, sediment layers are deposited on or adjacent to peat deposits. The movement of Cs-137 adsorbed onto clay sediments is controlled by physical processes. The Cs-137 is predominantly associated with smaller sediment clay size fractions and its movement is controlled by fine sediment transport [Perk 2002].

Sediment transport and deposition in the Plum Brook is a complex process strongly affected by stream flow conditions. Deposition and transport in the meandering stream sections is controlled by changes in stream velocity. This process dominates during normal flow conditions when the stream is confined to the channel. During periods of high flow, but at less than flood conditions, sediment is deposited onto the stream banks. It is also resuspended from previous deposits and carried downstream. Under flood conditions, large scale suspension and redistribution of sediment occurs. Sediment deposits are laid down adjacent to the stream banks and beyond, depending on the magnitude of the flooding. When major floods occur, backwaters are created which slowly recede, leaving sediment deposits at some distance from the stream.

It is important for dose assessment purposes to consider the "fate" or long-term behavior of radionuclides released from the PBRF to the Plum Brook environs. As indicated above, Cs-137 was rapidly adsorbed onto clay mineral particles once the Cs-137-bearing water effluent was released to the Pentolite Ditch. This waterway was constructed as an open excavation six to eight feet deep. Even though the soils on the Plum Brook Facility have been highly disturbed over time by various construction activities [USACE 2004], the native soils include an abundance of clay minerals identified as illites [USDA 2006]. This type of clay strongly binds Cs-137 in a nearly irreversible manner [Perk 2002]. Over time the contaminated sediments tend to be covered with "new" sediments which are continually added to the stream through soil erosion. The buried sediments are a sink for the Cs-137 and Co-60 which become less available with time for transfer to environmental pathways.

A significant effort was made by NASA for the radiological characterization of Plum Brook sediments. Samples of sediment were collected from 900 locations along the 4

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behavior of cesium-bearing sediments, the fate and transport of Co-60 is also of interest. In general, Co-60 behaves similarly to Cs-137 in aquatic environments; it is strongly associated with mineral sediments [Eisen 1997].

mile stream course from Pentolite Ditch at the PBRF and extending into Sandusky Bay. Cores were collected at each location to provide for determination of radionuclide concentration vs. depth. Over 3100 sub-samples (aliquots) from these cores were analyzed by gamma spectroscopy. Characteristics of the Cs-137-bearing sediments are summarized in Table 3. As seen in the table, Cs-137 concentrations are distributed non-uniformly along the stream from the PBRF to Sandusky Bay. Highest maximum and average concentrations are observed in the proximity of the PBRF and tend to decrease with distance from the PBRF.

Table 3, Plum Brook Sediment Characteristics

Stream Section	Measured Concentrations (pCi/g) (1)	Sediment Characteristics
1 Upper Stream and 2 Lower Stream	Cs-137 2.4E-02 to 7.24 E+01 (2) Average: 1.2 E+00 (3) Co-60 1.0 E-01 to 1.0 E+00 (2) Average: 1.3 E-01 (3)	a. Stream channel lower silt ledge deposits (in meanders). Highest Cs-137 concentrations are often at 6 – 12 in. depth b. Channel side wall surface contamination believed to be usually less than 6 inches into the dense clay till c. Flood backwater deposits (from major flood events) sediments could have been deposited from tens to hundreds of feet from stream.
3 Upper Flood Plain	Cs-137 3.0 E-02 to 1.42 E+01 (2) Average: 5.4 E-01 (3) Co-60 Detected in only one sample: 2.2 E-01 pCi/g (3)	a. Stream channel bottom deposits with maximum Cs-137 concentrations at depth less than 1 ft. b. Surrounding alluvial deposits up to 400 feet in width with maximum Cs-137 concentrations typically at depths less than one foot. c. Portion of Flood Plain on PBCC includes three ponds. d. Flood event backwater deposits around the periphery of the flood plain.
4 Lower Flood Plain –Stream Mouth	Cs-137 2.0 E-02 to 2.06 E+01 (2) Average: 5.9 E-01 (3) Co-60 5.0 E-02 to 2.6 E-01 (2) Average: 2.3 E-01 (3)	a. Over time, the stream channel, nominally 10 to 20 feet wide, has shifted laterally over an area up to several hundred feet in width (former channels are now silted over). Maximum Cs-137 concentrations in the present and former channels are observed in 0 to 6 in depth. However, 2/3 of the total inventory is at depths greater than 6 inches. b. Surrounding alluvial silt and clay deposits up to 1000 feet in width. c. Peat underlying stream channel, inter-bedded with alluvium transitioning to peat deposits in the Bay. d. Isolated pond adjacent to stream channel. e. Flood event backwater sediment deposits (non-uniform) across the flood plain.

Table 3 Notes.

1. The precision of measured concentration with depth is limited by the length of core sections used; typically (0 to 6 in and then 12 in. increments below 6 in.).
2. In the table, the minimum concentration reported is the MDA (minimum detectable activity concentration) when less than 100 % of samples are > MDA. For analysis of Cs-137 in soil and sediment samples under typical counting procedures, the MDA is ~ 0.02 to 0.08 pCi/g and for Co-60 it is ~ 0.05 to 0.2 pCi/g.
3. The estimated average concentrations reported in the table are averages of samples collected from locations selected from a systematic sampling plan, usually with a randomly selected starting point. The averages include results from all depths.

As indicated above, the samples collected in the 2005 – 2007 characterization survey were analyzed by gamma spectroscopy and Co-60 was detected in addition to Cs-137 (no other man-made gamma emitting radionuclides were detected). Cobalt-60 was measured above minimum detection levels in 7% of the samples. The fraction of both Cs-137 and Co-60 "detects" (sample concentration >MDA) decreased with distance downstream from the PBRF. To illustrate, Cs-137 was measured >MDA in 90% of the samples collected from stream sections 1 and 2 and in 42% of samples collected north of the Plum Brook Country Club (flood plain, stream mouth and Bay). Cobalt-60 was measured in 11% of the samples collected between the PBRF and the PBCC and in only 1% of samples collected north of the PBCC. The overall average concentration of Co-60 is 0.076 pCi/g (the maximum concentration measured was 1.7 pCi/g). No significant difference in the average concentration was observed versus downstream distance from the PBRF. Nor was any consistent relation observed between Co-60 and Cs-137 concentrations (activity ratios) in individual samples or in samples grouped by stream section. Examination of Co-60 concentrations versus depth shows that most of the Co-60 is associated with sediments at depths greater than 6 inches.

Sediment samples were also sent to a vendor laboratory for gamma spectroscopic and analysis for tritium, Sr-90 and isotopic uranium. They were selected to represent the entire stream course. The samples included a sample from the Pentolite Ditch, the Plum Brook near Columbus Avenue (stream section 1) and Plum Brook near US Rt. 6 (stream section 3). Only uranium was detected above environmental MDA levels, but at concentrations consistent with background concentrations [STA 2005].

5.7 Impact of Fallout Cesium-137

Cesium-137 (and other long-lived radionuclides including, H-3, C-14 and Sr-90) have been deposited world-wide from nuclear weapons fallout. A large fraction of Cs-137 bomb-debris was injected into the upper atmosphere from above-ground weapons tests. The Cs-137 attached to particulates and aerosols which circulated in the upper atmosphere and eventually deposited on the surface of the earth; most was carried down in rainfall. A total of 26 million Curies of Cs-137 was produced by atmospheric weapons tests [Beck 2002]. Most was deposited in the northern hemisphere between 1949 and the mid 1960's. The 1986 Chernobyl reactor accident in the Ukraine released considerable Cs-137 as well (about 2.3 million curies), but most was deposited in Europe and the European Artic [Izrael 2007].

Cumulative Cs-137 deposition on the earth's surface at the latitude corresponding to Sandusky, OH (40 ºN) was approximately 140 millicuries per km^2 (360 mCi/mi^2) [NCRP 2006]. This equates to approximately 2.3 curies deposited on the entire Plum Brook watershed and 590 millicuries deposited on the 1.6 mi^2 area Plum Brook watershed impacted by Cs-137 from the PBRF. Most of this deposition occurred by the mid-1960's; more than

one Cs-137 half-life has since elapsed. None-the-less, a significant Cs-137 inventory from fallout deposition remains in the watershed.[8]

The Cs-137 deposited from fallout rapidly becomes attached to clay and organic particles in the soil and becomes "essentially non-exchangeable" [Ritchie 1990]. Over 95% of fallout Cs-137 deposited on land surface is retained in undisturbed soil and sediments [NCRP 2006]. Movement of Cs-137 in the environment is primarily governed by physical processes, mainly related to fine-sediment transport [Perk 2002].The fate of locally deposited fallout Cs-137 is highly dependent on soil type, land use and precipitation. In temperate climates with soil types of northern Ohio, the Cs-137 inventory is largely divided between the soil and sediments deposited in waterways.[9] Cesium -137 deposited on soil gradually moves downward in the soil column through leaching and precipitation at lower depths. In agricultural areas, relatively uniform mixing of Cs-137 occurs to the depth of plowing or tilling, whereas in undisturbed land, the concentration decreases with depth. Cesium-137 in near-surface soil is also continually removed as soil particles are entrained and moved by surface water runoff and erosion. Over time, the waterborne Cs-137 bearing sediments are transported downstream [Ritchie 1990]. The fallout Cs-137 deposited on the 6 square mile Plum Brook watershed is by far the major source of the current Cs-137 inventory in the flood plain and estuary.

Information on fallout Cs-137 concentrations in northern Ohio freshwater sediments is available from several research studies. Radionuclides in the environment, including Cs-137, Be-7 and Pb-210, are used to "measure" soil erosion and sediment transport. Recent studies provide information on current levels of Cs-137 in freshwater sediments in the vicinity of Sandusky. Ketterer and Matisoff reported Cs-137 concentrations in Old Woman Creek and its estuary at Lake Erie, about 15 miles east of Sandusky Bay [Kett 2002, Matis 2002]. A maximum concentration of 0.5 pCi/g was measured in undisturbed near-surface soil (at 7 cm depth in an island on the creek). Concentrations of up to1.3 pCi/g were measured in sediment deposits in the estuary (at a depth of 20 cm). Bernal recently measured Cs-137 concentrations from 3 to 8.8 pCi/g in Old Woman Creek estuary sediments [Bernal 2008]. In a study of sedimentation in a nearby reservoir (Ballville Dam on the Sandusky River, near Fremont, OH), Cs-137 concentrations of up to 6 pCi/g (at 30 cm depth) were reported [Evans 2002].

Everyone receives radiation exposure from fallout radionuclides in the environment. Exposure to fallout Cs-137 currently constitutes the largest component of the average annual dose from fallout radionuclides in the US. However, it is a small fraction of the average annual dose received by individuals from background radiation, medical uses and other

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[8] The fallout deposition of Cs-137 in the 40 to 50 ºN latitude region resulted in an average concentration in soil of 0.7 pCi/g (0 to 15 cm depth) in the mid-1960's [NCRP 2006]. This translates to an average concentration of about 0.26 pCi/g at present and constitutes the source of Cs-137 that is readily measured as "background" in most soil.

[9] When fallout Cs-137 is initially deposited in areas with growing vegetation, including livestock fodder (foliar deposition), a significant fraction may enter the food chain and result in dose to humans from consumption of contaminated milk and other foodstuffs. However, the fraction of the total environmental inventory that is in the terrestrial food chain rapidly decreases over time, after the initial growing season, as the uptake by plants from the soil is limited [NCRP 2006].

sources. The average dose to individuals in the US from all sources of radiation is about 360 mrem per year [NCRP 1987]. The estimated annual average dose to individuals (adults) in the US from Cs-137 was approximately 8 mrem in 1965. It had declined to about 0.5 mrem in 2000 [Bouv 2002].

5.8 Exposure Scenarios

Four exposure scenarios are established for the dose assessment. They are: Suburban Gardener, Brook-side Resident, Country Club Maintenance Worker and Recreationist. Each scenario was developed by matching Plum Brook stream-environment characteristics with land use most representative of each section of the Plum Brook watershed. It should be noted that while the exposure scenarios are considerably more representative of potential exposure conditions than the generic resident farmer scenario, they still involve conservative assumptions. To illustrate, occupancy time is found to be the parameter that most influences the calculated dose in three of the four scenarios. Most areas of the Plum Brook are inhospitable and difficult to access, with the exception of the Plum Brook Country Club golf course. In the absence of detailed information on human contact with contaminated Plum Brook sediments, occupancy factors from NRC studies of postulated scenarios for urban contaminated sites are used. The exposure scenarios are summarized in Table 4.

Table 4, Scenario Summary

Scenario Title	Plum Brook Stream Section	Dose Receptor	Source	Pathways
Suburban Gardener	Upper Stream	Resident	Vegetable garden located on flood backwater area or on soil supplemented with excavated stream bank-sediment.	Direct exposure, Inhalation, direct ingestion of sediment and consumption of vegetables from garden
Brook-side Resident	Lower Stream	Resident	Layer of sediment from flood event adjacent to and partially underneath house	Direct exposure, inhalation and direct ingestion of sediment
Country Club Maintenance Worker	Upper Flood Plain	Landscape Maintenance Worker	Soil and sediment from ponds used as fill on golf course walkway	Direct exposure, inhalation and direct ingestion of sediment
Natural Area Recreation Day User	Lower Flood Plain & River Mouth	Recreational user (seasonal use)	Stream bottom and adjacent alluvial deposits	Direct exposure, fish consumption, inhalation and direct ingestion of sediment

The Suburban Gardener scenario is suggested by the observation that several residences along the upper meandering stream section (between PBRF and Rt. 2) have gardens. It is assumed that the garden is located on near the stream bank and the garden soil was supplemented by sediment excavated by the resident from the banks of Plum Brook. The garden is assumed to be 186 m^2 (about 45 x 45 ft.)[10]**.** The Suburban Gardener exposure pathways include direct exposure while working in the garden (123 hours per year), ingestion of Cs-137 and Co-60 from eating vegetables grown in the garden, direct soil ingestion and inhalation. The contaminated sediment is mixed with uncontaminated soil by tilling. A conservative assumption is that the contaminated soil-sediment mixture lies on the surface of the garden in a three inch thick layer. The Suburban Gardner scenario is illustrated in Figure 3.

The Brookside Resident scenario is suggested by the observation that some houses in the lower stream meander section were constructed after the 1969 flood event and are located near the stream. In this scenario it is assumed that a home was constructed on land where contaminated sediments were deposited. It is also assumed that the home is situated on an area of contaminated sediment that extends partially beneath the house. The house is assumed to have a 2000 ft^2 (186 m^2) footprint and the contaminated zone is 45.6 m^2 in area. The exposure pathways are direct exposure to a resident inside the house (attenuated by the house-structure), direct exposure to contaminated sediments outside the house (lawn mowing and landscaping maintenance), ingestion of contaminated soil and inhalation of suspended sediment (dust).[11] The resident is assumed to spend 1096 hours per year in the portion of the house located on contaminated sediment and 80 hours a year on the contaminated portion of the outdoor property. See Figure 4 for a schematic of the Brookside Resident scenario.

The Country Club Maintenance worker is based on the observation that soil containing sediment from Plum Brook has been used as landscaping fill on the Plum Brook Country Club golf course. This material was taken from spoil piles that were excavated from two ponds impacted by contaminated sediments. These ponds were at one time connected to Plum Brook. They are currently used to store water pumped from the book for irrigating the golf course. It is assumed that contaminated sediment was used to fill-in an area 3 meters wide on either side of a golf cart path that extends for 100 meters. The sediment is in a three-inch thick layer on the surface and the maintenance worker spends an average of 15 hours a week during the 30 week golfing season traveling along the path and performing landscape maintenance along the pathway.[12] The Country Club Maintenance worker scenario is illustrated by the schematic in Figure 5.

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[10] This is the area of the garden used in a sample problem evaluated by the NRC in NUREG/CR-5512 for a residential exposure scenario [USNRC 2001]. It is assumed that enough material was excavated to establish a three-inch layer of garden surface soil/sediment. This amount of material constitutes 18.5 cubic yards; a medium-sized dump truck load,

[11] The area of the house and the area of the contaminated soil beneath the house correspond to those used in a sample problem evaluated by the NRC in NUREG/CR-5512 [NRC 2001].

[12] The volume of soil/sediment assumed to be placed along the cart path constitutes 60 cubic yards.

The Recreationist scenario was developed to represent occupancy and exposure of a member of the public in the stream-mouth estuary. This individual is assumed to be exposed from direct radiation, inhalation and direct ingestion of contaminated sediments while walking and standing on the contaminated stream bank and alluvial deposits in the adjacent wetlands. The Recreationist is assumed to be a fisherman who spends about 10 hours a week for 10 weeks each year in the stream. He or she consumes game fish caught in the Plum Brook stream mouth.[13] The contaminated zone is assumed to be a band of sediment 1500 m^2 in area that underlies the stream bank in an area that is accessible to the public just north of the Rt. 6 overpass. The Recreationist scenario setting and pathways are illustrated in Figure 6. The size of the contaminated zone was established considering characterization information and the calculated Cs-137 inventory associated with contaminated zones of different sizes. This is discussed in Section 6.4, Sensitivity Analysis.

6.0 Dose Calculations with RESRAD

This section describes preparation and performance of dose calculations with RESRAD, Version 6.4, for the four exposure scenarios described in the previous section. This constitutes the following:

- Selection of dose pathways
- Source term abstraction
- Establishing parameter values
- Sensitivity analysis
- Setup and performance of RESRAD case runs.

While outlined here as a series of steps, the dose assessment is actually an iterative process. This has required modifications to some of the initial assumptions and parameter values along the way. What is described here represents the final setup used with RESRAD for the dose results reported in Section 7.

6.1 Pathway Selection

As described in Section 3.0, and illustrated in Figure 1, the RESRAD code has provisions for calculating doses to an individual from eight exposure pathways. Pathways for the present dose assessment have been established based on the Plum Brook conceptual site model and exposure scenarios as described in Section 5.0. The eight exposure pathways of RESRAD have been reduced to five that are applicable. They are:

[13] A fisheries biologist was consulted who is familiar with the Lake Erie south shore and Sandusky Bay regional fishery habitat. Game fish enter Sandusky Bay each season and may occasionally enter the Plum Brook estuary. However the estuary is not a preferred habitat or a spawning ground. Fish typically found in the estuary and upper flood plain include carp and various minnows [Weimer 2008].

- Direct exposure from radioactivity contamination in the ground (soil or sediments)
- Consumption of produce grown in contaminated soil
- Consumption of contaminated fish caught in nearby surface water
- Ingestion of trace quantities of contaminated soil or sediment
- Inhalation of airborne contamination suspended from contaminated surface soil or sediment.

The remaining RESRAD pathways: drinking water from a local well in contact with contaminated water, consumption of meat products from domestic animals fed with fodder grown on contaminated soil and radon inhalation are eliminated. No domestic water supply wells are identified in vicinity of the Plum Brook.[14] All residences and businesses in the Plum Brook watershed obtain domestic water from municipal water supplies, primarily from Lake Erie [OSU 1998]. While several farms are identified in the Plum Brook watershed, all of the land zoned for agricultural use that borders the Plum Brook is either fallow or planted in row crops. None of the residences bordering the Plum Brook are on land that is zoned agricultural. Hence, the meat consumption pathway is not credible. Finally, the radon inhalation pathway is eliminated because radon precursors (uranium or radium) are not among the radionuclides that have been measured in PBRF liquid effluents, the original source of contamination in the sediments [NASA 2009]. The dose pathways that apply to each of the exposure scenarios are identified in Table 5.

Table 5, Summary of Exposure Scenario Pathways

Scenario	Plum Brook Stream Section	Dose Receptor	Pathways
Suburban Gardener	Upper Stream	Resident	Direct exposure, Inhalation, direct ingestion of sediment and consumption of vegetables from garden.
Brook-side Resident	Lower Stream	Resident	Direct exposure, inhalation and direct ingestion of sediment.
Country Club Maintenance Worker	Upper Flood Plain	Landscape Maintenance Worker	Direct exposure, inhalation and direct ingestion of sediment.
Natural Area Recreation Day User	Lower Flood Plain & Estuary	Recreational user (seasonal use)	Direct exposure, fish consumption, inhalation and direct ingestion of sediment.

[14] The primary ground water resource in Erie County is in the thick bedded limestone deposits that underlie the region (see Section 5.2). However, most of this resource has been impacted by underground disposal of storm wastewaters from nearby communities and is not considered acceptable for public use [OSU 1998].

6.2 Source Term Abstraction

Results of the radiological characterization of Plum Brook sediments and the features of RESRAD are considered in developing source terms. Characterization results show that Cs-137 (and Co-60) contamination of PBRF origin are not distributed uniformly or continuously along the Plum Brook but tend to be located in small areas or "pockets" on a horizontal scale of about one meter (or less) in the stream meander sections and in larger lens-shaped deposits in areas impacted by flood backwaters, the flood plain and estuary [NASA 2009]. Areas with detectable activity typically exhibit non-uniform vertical distribution. Often, the highest concentrations are found in subsurface layers.

The RESRAD code is designed to calculate doses from radioactive material uniformly distributed in a layer of soil called the "contaminated zone." This can be modeled as either a circular disk (cylinder) or as a polygon. The thickness and area can be varied without practical limits, but the dimensions are constant for a given case. It can be modeled as a surface layer or as a subsurface layer overlain by an uncontaminated covering soil layer of specified thickness (the cover zone) [ANL 2001].

In view of the non-uniform distribution of contaminated sediments, source term models are developed comprised of multiple components. Source terms are modeled as a combination of volume sources of uniform contaminant concentration.[15] Each RESRAD case is limited to one source volume. Source terms with more than one source volume are implemented via multiple case runs. The operating assumption is that the doses are additive; the total scenario dose is obtained as the sum of doses from individual source term elements. This is not always the case as discussed below. Scenario-specific source term models are developed. The source term models are summarized in Table 6.

Table 6, Exposure Scenario Source Models

Scenario	Principal Source	Localized Area of Elevated Activity
Suburban Gardener	Surface layer of soil-sediment mixture 186 m^2 in area & 3 in. thick.	Modeled as a cylindrical three-layer source of one meter radius. Each layer is 6 in. thick. (1)
Brook-side Resident	Three-layer source 186 m^2 in area. Surface layer is 6 in. thick. Subsurface layers are 9 in. thick.	Modeled as cylindrical three-layer source of one meter radius. Each layer is 6 in. thick.
Country Club Maintenance Worker	Surface layer of soil-sediment mixture 600 m^2 in area & 3 in. thick.	Modeled as cylindrical three-layer source; three meter radius. Surface layer is 6 in. thick; subsurface layers are each 12 in. thick. (2)
Natural Area Recreation Day User	Three-layer source 1500 m^2 in area. Surface layer is 6 in. thick. Subsurface layers are 12 in. thick (3)	Modeled as cylindrical three-layer source; three meter radius. Surface layer is 6 in. thick; subsurface layers are each 12 in. thick. (4)

[15] Doses are calculated by RESRAD for each source term element with a input concentration of 1 pCi/g for a single radionuclide The scenario doses are then calculated with Microsoft EXCEL® using the estimated concentrations of Cs-137 and Co-60 in each source term component.

Table 6 Notes:

1. The plant food pathway is suppressed for the Suburban Gardner local area elevated activity source dose calculation. It is assumed to be located on the nearby stream bank outside of the garden.
2. The local elevated area source is as described for Cs-137. No elevated area source is used for the Co-60 dose calculation. It is not assumed to be present in the Plum Brook flood plain [NASA 2009].
3. The principal contaminated zone source model as described is for the Cs-137 direct exposure pathway. For Co-60, a single layer contaminated zone source model is used. As explained in the text, a separate source model consisting of a single layer is used for the Cs-137 fish pathway dose calculation.
4. Modeled as described for the Cs-137 direct exposure pathway. No elevated area Co-60 source is used as only very low levels are measured in estuary sediments. As discussed in the text, a separate source model consisting of a single layer is used for the Cs-137 fish pathway dose calculation.

As seen in Table 6 the source term model for each scenario consists of two source volumes: the principal contaminated zone source and a localized small area source of elevated activity. Depending on the scenario, the sources are composed of either single or multiple layers or strata. Direct pathway doses from multiple sources including multiple layer sources are obtained as the sum of the doses calculated by RESRAD for each source term component. This is an application of the "superposition principle" used extensively in radiation shielding calculations [Shultis 2000].

Separate source term models are developed for the Recreationist scenario direct exposure and fish ingestion pathways for Cs-137 dose calculations. As shown in Figure 7, the direct exposure pathway source term model consists of two source volumes, each composed of three strata. They are the principal contaminated zone source and the local elevated area source. This is the same approach as used for the other scenarios with multi-layer sources.

To provide a conservative estimate of the dose from the fish consumption pathway, the contaminated zone is placed in direct contact with the saturated zone.[16] The contaminated zone is placed immediately above the saturated zone by eliminating the intervening unsaturated zone strata. All the radionuclides released (leached) from the contaminated zone to the saturated zone are transported to a nearby well or surface water body [ANL 2001]. For the hydrologic transport calculations in this scenario, the RESRAD mass balance model option is used.[17] These special provisions maximize the transport of

[16] The conceptual source term model which places the contaminated zone in direct contact with the saturated zone closely simulates the physical setting in the Plum Brook estuary. Here the sediments are in direct contact with the stream and the local water table in the adjacent wetlands is at the same elevation as the surface water.

[17] Use of the mass balance option was recommended by the ANL-EAD RESRAD team [Gnan 2008].

contaminants to the groundwater and hence to the Plum Brook surface water where it enters the aquatic food chain and is taken up by fish.

Modeling the source term for the fish consumption pathway as multiple-layer sources was abandoned as it causes conflicts with competing requirements. The spatial relationship between multi-layer source elements cannot be preserved if each element is placed in contact with the saturated zone to maximize contaminant transport. To avoid this issue, the principal contaminated zone and local elevated area sources are modeled as single-layer sources of 30 in. thickness.[18] The Recreationist scenario fish consumption pathway Cs-137 source term and hydrologic model are illustrated in Figure 8.

Sediment samples from the Plum Brook flood plain and estuary yielded a low frequency of Co-60 detection (~ 1%) measured at very low concentrations [NASA 2009]. The characterization data does not suggest a multiple-layer Co-60 source term model. The Recreationist Scenario dose calculations for Co-60 can be accomplished using a source term model comprised of a single layer contaminated zone source. The conceptual source term and hydrologic transport model for Recreationist scenario is illustrated in Figure 9.

Uncertainties that attend the source term models adopted for this dose assessment contribute to the uncertainties in calculated doses. These arise from two main causes: inherent uncertainties in the RESRAD model and uncertainties in the source term descriptions. A separate source of uncertainty, model parameter uncertainty, is discussed in Section 6.4, Sensitivity Analysis). The RESRAD model and similar environmental radiological assessment models require that complex environmental settings be reduced to compartments of uniform characteristics with constant rate transfer processes. The first cause, model uncertainty, is outside the scope of this discussion, but it should be recognized as a contributor. Its' effect is difficult to quantify, other than to state that it causes the magnitude of uncertainties in calculated doses to be underestimated.

Uncertainties in source terms arise from variations in the physical distribution of contaminated sediments, the radionuclides present at any location and their concentrations. These uncertainties are discussed in Section 5.6, Sediment Characteristics, and in the Plum Brook characterization report [NASA 2009].

[18] To obtain doses in mrem/y, the dose from unit radionuclide concentration (mrem/y per pCi/g) is multiplied by the estimated activity concentration of each source volume. The source volume concentration for the primary contaminated zone Cs-137 single-layer source is estimated as the average concentration in the 0 to 30 in. depth. The source volume concentration for the Cs-137 local elevated area single-layer source is estimated as the average of the maximum concentrations in the 0 to 30 in. depth layers [NASA 2009]

6.3 Parameter Selection

This section identifies values of the variable RESRAD parameters used to calculate doses for the four exposure scenarios. Parameters are grouped for discussion similar to the organization in RESRAD user input dialog boxes and in RESRAD output reports:

- Dose conversion, food transfer and bioaccumulation factors
- Contaminated Zone Parameters
- Cover and Contaminated Zone Hydrologic Data
- Saturated Zone Hydrologic Data
- Uncontaminated and Unsaturated Zone Hydrologic Data
- Distribution Coefficients
- Dust Inhalation and External Gamma Parameters
- Ingestion Pathway Dietary Parameters
- Ingestion Pathway Non-dietary Parameters

Parameter values for each pathway selected for each scenario are listed and discussed in Appendix D, RESRAD Parameter Selection Supporting Information. Explanation and justification for values and references are provided. The principal parameter values for each scenario are listed for convenience here in Tables 7 through 12. Note that water pathway parameters apply only to a limited extent to the Suburban Gardner Pathway and not at all to the Brookside Resident and Country Club Maintenance Worker scenarios. Hydrologic parameters for cover and contaminated zone, unsaturated zone and saturated zones are identical, so the latter two are not listed here. They are listed in Appendix D.

Table 7, Dose Conversion, Food Transfer and Bioaccumulation Factors - All Scenarios

Parameter	Parameter Value
DCF for external ground radiation – Cs-137 (FRG 11) (1) (2)	3.606 mrem/y per pCi/g
DCF for inhalation – Cs-137	3.19 E-05 mrem/pCi
DCF for ingestion – Cs-137	5.0 E-05 mrem/pCi
Food transfer, plant/soil concentration ratio – Cs-137	4.0 E-02
Freshwater fish bioaccumulation factor – Cs-137	2.0 E+03
DCF for external ground radiation – Co-60 (FRG 11)	1.622 E+01 mrem/y per pCi/g
DCF for inhalation – Co-60	2.19 E-04 mrem/pCi
DCF for ingestion – Co-60	2.69 E-05 mrem/pCi
Food transfer, plant/soil concentration ratio – Co-60	8.0 E-02
Freshwater fish bioaccumulation factor – Co-60	3.0 E+02

Table 7 notes:

1. DCF is an abbreviation for dose conversion factor.
2. FRG 11 is Federal Guidance Report No 11 [USEPA 1988].

Table 8, Contaminated Zone Parameters

Parameter	Parameter Value			
	Suburban Gardner	Brookside Resident	PBCC Worker	Recreationist
Area of contaminated zone	186 m^2 (1)	186 m^2 (1)	600 m^2 (2)	1500 m^2 (2)
Thickness of contaminated zone	3 in. (0.076 m) (3)	6 in. (0.15 m) (4)	3 in. (0.076 m) (5)	6 in. (0.15 m) (6)
Density of contaminated zone	1.522 g/cm^3	1.522 g/cm^3	1.522 g/cm^3	1.522 g/cm^3
Length parallel to aquifer flow	19.3 m	NA	NA	44 m
Time since placement of material	0 years	0 years	0 years	0 years
Time for calculations	0, 1, 3, 1000 y	0, 1, 3, 1000 y	0, 1, 3, 1000 y	0, 1, 3, 1000 y

Table 8 Notes:

1. The source model also includes a small area (3.14 m^2) source component of elevated activity.
2. The source model also includes a small area (28.3 m^2) source component of elevated activity.
3. The small area elevated activity source model component has three layers each 6 in. thick.
4. The primary contaminated zone source is modeled as three layers; a 6 in surface layer and two subsurface layers 9 in. thick. The elevated activity source is modeled as three layers each 6 in. thick.
5. The small area elevated activity source model component has a surface layer 6 in. thick and two subsurface layers, each 12 in. thick.
6. The primary contaminated zone source is modeled as three layers; a 6 in surface layer and two subsurface layers, each 12 in. thick. The small area elevated activity source is modeled as three layers; a 6 in. thick surface layer and two 12 in. thick subsurface layers.

Table 9, Cover and Contaminated Zone Hydrologic Parameters

Parameter	Parameter Value			
	Suburban Gardner	Brookside Resident	PBCC Worker	Recreationist
Density of cover material	1.522 g/cm^3	1.522 g/cm^3	1.522 g/cm^3	1.522 g/cm^3
Contaminated zone erosion rate	0.001 m/yr	NA	NA	0.001 m/yr
Contaminated zone total porosity	0.45	NA	NA	0.45
Contaminated zone field capacity	0.20	NA	NA	0.20
Contaminated zone hydraulic conductivity	270 m/yr	NA	NA	270 m/yr
Contaminated zone b parameter	7.12	NA	NA	7.12
Evapotranspiration coefficient	0.5	NA	NA	0.5
Precipitation	0.86 m/yr	NA	NA	0.86 m/yr
Irrigation	1.04 m/yr	NA	NA	NA
Irrigation mode	Overhead	NA	NA	NA
Runoff coefficient	0.3	NA	NA	NA
Watershed area for stream or pond	1.81 E06 m^2	NA	NA	2.85 E05 m^2

Table 10, Occupancy, External Exposure and Dust Parameters

Parameter	Parameter Value			
	Suburban Gardner	Brookside Resident	PBCC Worker	Recreationist
Inhalation rate	8400 m^3/yr	8400 m^3/yr	14000 m^3/yr	14000 m^3/yr
Mass loading for inhalation	1 E-04 g/m^3	1 E-04 g/m^3	1 E-04 g/m^3	1 E-04 g/m^3
Dilution length for airborne dust	3 m	3 m	3 m	3 m
Exposure duration	365.25 days	365.25 days	365.25 days	365.25 days
Shielding factor, inhalation	0.40	0.40	0.40	0.40
Shielding factor, external gamma	0.7	0.7	0.7	0.7
Fraction of time indoors, onsite	0.0	0.125 (1096 h/y)	0.0	0.0
Fraction of time outdoors, onsite	0.014 (123 h/y)	0.0091 (80 h/y)	0.051 (450 h /y)	0.0125 (105 h/y)
Shape factor, external gamma	1	1	1	1
Soil Ingestion Rate	18.3 g/y	18.3 g/y	36.5 g/y	18.3 g/y

Table 11, Dietary Ingestion Pathway Parameters

Parameter	Parameter Value			
	Suburban Gardner	Brookside Resident	PBCC Worker	Recreationist
Fruit, vegetable, and grain consumption rate	160 kg/yr	NA	NA	NA
Leafy vegetable consumption rate	14.5 kg/yr	NA	NA	NA
Fraction of plant food from site	0.5	NA	NA	NA
Fish Consumption Rate	NA	NA	NA	5.4 kg/y
Contaminated fraction of aquatic food	NA	NA	NA	0.5

Table 12, Distribution Coefficients for Suburban Gardner and Recreationist Scenarios

Parameter	Parameter Value
Cs-137 distribution coefficient - Contaminated Zone	4600 cm^3/g
Cs-137 distribution coefficient - Unsaturated Zone	4600 cm^3/g
Cs-137 distribution coefficient - Saturated Zone	1000 cm^3/g
Co-60 distribution coefficient - Contaminated Zone	1000 cm^3/g
Co-60 distribution coefficient - Unsaturated Zone	1000 cm^3/g
Co-60 distribution coefficient - Saturated Zone	1000 cm^3/g

6.4 Sensitivity Analysis

This section describes the sensitivity and uncertainty analysis. The first objective is to identify the RESRAD model parameters that have the most significant effect on the calculated doses. In this context "sensitivity" is defined as "the degree to which model outputs are affected by changes in input values".[19] The second objective is to obtain uncertainty estimates for calculated doses. The sensitivity and uncertainty analysis is described in detail in Appendix F. A summary is provided here.

A "screening analysis" is performed to identify the most sensitive parameters. First, the most significant pathway contributors to dose are identified. This is accomplished by calculating doses from unit concentration (1pCi/g) of Cs-137 and Co-60 for each scenario using the parameter values developed in Appendix D. Then the total scenario and pathway doses for each radionuclide are calculated using the concentrations of each radionuclide from the recent characterization report [NASA 2009]. The results are evaluated to obtain a ranking of the pathways, based on their relative contribution to total scenario dose. The results are shown in Table 13. The table shows that the direct exposure (ground) pathway is the dominant pathway in all scenarios.

[19] From EPA *Draft Guidance on the Development, Evaluation and Application of Regulatory Environmental Models* [USEPA 2003].

Table 13, Pathway Ranking

Scenario	Nuclide	Pathway	Dose (mrem/y) (1)	Fraction of Maximum Dose (2)
Brookside Res	Cs-137	Ground	2.43E-01	1.00E+00
CC Worker	Cs-137	Ground	1.46E-01	6.00E-01
Brookside Res	Co-60	Ground	1.16E-01	4.76E-01
CC Worker	Co-60	Ground	1.06E-01	4.38E-01
Recreationist	Cs-137	Ground	3.63E-02	1.49E-01
Suburban Gardner	Cs-137	Ground	3.09E-02	1.27E-01
Recreationist	Co-60	Ground	3.02E-02	1.24E-01
Suburban Gardner	Cs-137	Plant	1.73E-02	7.13E-02
Suburban Gardner	Co-60	Ground	1.34E-02	5.53E-02
Suburban Gardner	Co-60	Plant	1.91E-03	7.86E-03
Recreationist	Cs-137	Fish	2.94E-04	1.21E-03
Recreationist	Co-60	Fish	2.14E-05	8.80E-05

Table 13 Notes:

1. The pathway doses listed here may not be in exact agreement with those reported in Section 7 as the sensitivity analyses were conducted prior to some of the final dose assessment RESRAD case runs.
2. Pathways are ranked by the ratio (fraction): pathway dose ÷ maximum pathway dose (Brookside Resident ground pathway dose from Cs-137).

The next step in the screening analysis is to screen input parameters, focusing on the most dose-significant pathways identified in Table 13. Principal parameters for each pathway in the four scenarios are identified in Section 6.3. The RESRAD sensitivity analysis capability is used to perform a comprehensive screening of the input parameters for two representative exposure scenarios: the Suburban Gardner and Recreationist scenarios. They represent all the pathways considered in the dose assessment: direct exposure to ground source, ingestion of garden vegetables, ingestion of fish, inhalation of suspended sediment-dust and direct ingestion of contaminated sediment. Sensitivity analysis reports are generated for each parameter. Non-significant input variables (parameters) are identified and eliminated from further consideration. Then, the parameters that show sensitivity effects are identified and ranked. Table 14 shows the results of the sensitivity ranking for the representative scenarios. The sensitivity index is defined and calculated as described in Appendix F.

Table 14, Parameter Ranking by Sensitivity Index

Scenario	Parameter	D_{min} (mrem/y per pCi/g)	D_{max} (mrem/y per pCi/g)	Sensitivity Index
Suburban Gardner (1)	Contaminated Zone Thickness	2.20E-02	6.30E-02	0.65
Suburban Gardner (1)	Outdoor Time Fraction	2.70E-02	6.40E-02	0.58
Suburban Gardner (1)	Contaminated fraction Plant Food	3.25E-02	5.30E-02	0.39
Suburban Gardner (1)	Depth of Roots	3.30E-02	5.35E-02	0.38
Suburban Gardner (1)	Non-leafy Vegetable Consumption	3.30E-02	5.20E-02	0.37
Suburban Gardner (1)	Contaminated Zone Density	3.05E-02	4.70E-02	0.35
Suburban Gardner (1)	Contaminated Zone Area	3.52E-02	4.15E-02	0.15
Suburban Gardner (1)	Leafy Vegetable Consumption	3.57E-02	4.00E-02	0.11
Recreationist (2)	Outdoor Time Fraction	1.80E-02	6.95E-02	0.74
Recreationist (2)	Contaminated Zone Density	2.68E-02	3.85E-02	0.30
Recreationist (2)	Contaminated Zone Thickness	2.65E-02	3.77E-02	0.30
Recreationist (2)	Contaminated Zone Area	3.40E-02	3.66E-02	0.07
Recreationist (2)	Contaminated Zone K_d	3.50E-02	3.51E-02	0.00
Recreationist (2)	Contaminated fraction Aquatic Food	3.50E-02	3.51E-02	0.00
Recreationist (2)	Fish Consumption	3.50E-02	3.51E-02	0.00

Table 14 Notes:

1. Parameters are ranked within the Suburban Gardner parameter set.
2. Parameters are ranked within the Recreationist parameter set.

The parameter sensitivity ranking is used as the starting point for the uncertainty analysis. The main objective is to establish a consistent and reasonable basis for estimation of uncertainties in the doses calculated with RESRAD. By incorporating the parameters with the greatest sensitivity, the main sources of error from parameter uncertainties are included in the calculated doses.[20] The uncertainty analysis was performed using the RESRAD probabilistic mode. From the screening results listed in Table 14, a set of key-sensitive parameters was established for each scenario. Even though the Brookside Resident and Country Club Maintenance Worker scenarios were not screened directly, only the direct exposure pathway is significant in these scenarios. The RESRAD direct pathway model parameters identified as sensitive for the Suburban Gardner and Recreationist were assigned to these scenarios for the probabilistic dose calculations in the dose assessment.

The probability sampling distributions assigned to the four scenarios are listed in Tables 15 through 18. The basis for selection of the probabilistic sampling distributions is provided in Appendix F. The parameter sets developed in Appendix D and the sampling distributions developed in Appendix F are then used in the RESRAD case runs for assessment of doses in the probabilistic mode.

[20] See Appendix F, Sensitivity Analysis, for additional discussion of uncertainties in calculated doses.

Table 15, Suburban Gardner Parameter Probability Sampling Distributions

Parameter	Nominal Value	Sampling Distribution	Sampling Distribution Parameters
Contaminated Zone Thickness	0.076 m	Normal	0.076, 0.038 (1)
Outdoor Time Fraction	0.014	Normal	0.014, 0.007 (1)
Depth of Roots	0.9 m	Uniform	min = 0.3, max = 4.0 (2)
Contaminated fraction Plant Food	0.5	Triangular	0.25, 0.5, 0.75 (3)
Contaminated Zone Area	186 m^2	Triangular	90, 186, 280 (3)
Non-leafy Vegetable Consumption	160 kg/y	Triangular	135, 160, 318 (3)
Contaminated Zone Density	1.552 g/cm^3	Truncated Normal	1.5, 0.23, lower quantile = 0.001, upper quantile = 0.999 (4)

Table 15 – 18 notes:

1. Normal distribution defining parameters are the mean and standard deviation listed in that order.
2. Uniform distribution defining parameters are the minimum and maximum values.
3. Triangular distribution defining parameters are the minimum, mode and maximum values listed in that order.
4. Truncated normal distribution defining parameters are the mean, standard deviation, lower quantile and upper quantile listed in that order [ANL 2001].

Table 16, Brookside Resident Parameter Probability Sampling Distributions

Parameter	Nominal Value	Sampling Distribution	Sampling Distribution Parameters
Indoor Time Fraction	0.125	Normal	0.125, 0.063
Contaminated Zone Thickness	0.15 m	Normal	0.15, 0.075
Contaminated Zone Density	1.522 g/cm^3	Truncated Normal	1.5, 0.23, lower quantile = 0.001, upper quantile = 0.999
Outdoor Time Fraction	0.0091	Normal	0.0091, 0.005
Contaminated Zone Area	186 m^2	Triangular	90, 186, 280

Table 17, Country Club Worker Parameter Probability Sampling Distributions

Parameter	Nominal Value	Sampling Distribution	Sampling Distribution Parameters
Outdoor Time Fraction	0.051	Normal	0.051, 0.025
Contaminated Zone Thickness	0.076 m	Normal	0.076, 0.038
Contaminated Zone Density	1.522 g/cm^3	Truncated Normal	1.5, 0.23, lower quantile = 0.001, upper quantile = 0.999
Contaminated Zone Area	600 m^2	Triangular	300, 600, 900

Table 18, Recreationist Parameter Probability Sampling Distributions

Parameter	Nominal Value	Sampling Distribution	Sampling Distribution Parameters
Outdoor Time Fraction	0.0125	Normal	0.0125, 0.006
Contaminated Zone K_d – Cs-137	4600 cm^3/g	Lognormal-N	6.1, 2.33 (1)
Contaminated Zone K_d – Co-60	1000 cm^3/g	Lognormal-N	5.46, 2.53 (1)
Contaminated Zone Thickness	0.15 m	Normal	0.15, 0.075 (1)
Fish Transfer Factor (bioaccumulation factor) for Cs	2000 l/kg	Lognormal-N	7.6, 0.7 (1)
Fish Transfer Factor (bioaccumulation factor) for Co	300 l/kg	Lognormal-N	5.7, 1.1 (1)
Fish Consumption	5.4 kg/y	Triangular	2.7, 5.4, 8.1
Contaminated fraction Aquatic Food	0.5	Triangular	0, 0.39, 1
Contaminated Zone Area	1500 m^2 (2)	Triangular	750, 1500, 2250
Contaminated Zone Density	1.522 g/cm^3	Truncated Normal	1.5, 0.23, lower quantile = 0.001, upper quantile = 0.999

Table 18 Notes:

1. Lognormal-N defining parameters are the mean and standard deviation of the underlying normal distribution listed in that order [ANL 2001].
2. The area of the contaminated zone was selected using results from the recent Plum Brook sediment characterization report [NASA 2009] and considering Cs-137 inventory vs. source volumes. See Appendix F, Sensitivity Analysis for a summary of this evaluation.

6.5 Case Run Summary

The dose assessment results are obtained from the RESRAD case run reports compiled in Appendix B. The appendix includes an index which identifies the run date, case title and description, the report pages, the input file name and the dose calculation results. Single radionuclide sources of unit concentration were used as input for each source term component for each scenario. Each case was setup with the basic-deterministic mode parameter input values specified in Appendix D. Each case was run in probabilistic mode with input variable sampling distributions and defining parameters specified in Appendix F. The recorded results include deterministic dose, probabilistic dose and uncertainties all in mrem/y per pCi/g for the total dose and ingestion pathways as applicable. [21]

[21] Precautions are taken to avoid “double counting” of pathway doses for the Recreationist scenario. The Fish ingestion pathway is suppressed for the Cs-137 direct pathway source term model case runs and the direct pathway is suppressed for the fish pathway source term model case runs.

7.0 Results

The RESRAD single radionuclide doses for unit concentration are reported for each component of the scenario source term models in mrem/y per pCi/g. Then the single radionuclide pathway doses in mrem/y for each scenario are calculated by multiplying the unit concentration doses by the radionuclide concentrations of each source term component. The total pathway doses are obtained as the sum of the single radionuclide doses. Total scenario doses are obtained as the sum of the total radionuclide pathway doses. Uncertainties in the resultant doses are calculated using standard error propagation formulae.[22] Age-dependent doses were also calculated and these are discussed. The calculated direct pathway doses for each scenario are compared to doses measured at selected locations along the Plum Brook with thermoluminescence dosimeters and portable radiological survey instruments.

7.1 Dose from Unit Concentration

The calculated RESRAD results in dose per unit concentration for the four scenarios are reported in Tables 19 through 22. The doses are probabilistic results. the peak value of the mean doses (maximum dose is at time zero) and uncertainty as one standard deviation of the mean are reported. The dose calculation results are obtained from the RESRAD case run reports in Appendix B. It is seen that the scenario dose from Co-60 is greater than the dose from Cs-137 for unit activity concentrations. However, as discussed in the next section, when the actual (estimated) source term activity concentrations are considered, the dose contribution from Cs-137 greatly exceeds the dose from Co-60.

Table 19, Suburban Gardner Dose from Unit Concentration

Source Term Component and Dose Pathway	Cs-137 (mrem/y per pCi/g)		Co-60 (mrem/y per pCi/g)	
	Dose	Uncertainty	Dose	Uncertainty
Cont. Zone 3 in Total	3.59E-02	2.30E-02	1.09E-01	4.50E-02
Cont. Zone 3 in Direct	2.40E-02	1.53E-02	9.69E-02	3.72E-02
Cont. Zone 3 in Plant	1.19E-02	1.46E-02	1.21E-02	1.49E-02
Elev. local Area layer 1; 6 in Total	8.14E-03	5.16E-03	3.37E-02	2.37E-02
Elev. local Area layer 2; 6 in Total	2.53E-03	2.95E-03	1.28E-02	1.29E-02
Elev. local Area layer 3; 6 in Total	1.05E-03	2.41E-03	5.54E-03	1.04E-02
Total Dose from Unit Conc.	4.76E-02	2.39E-02	1.61E-01	5.25E-02

[22] Error propagation formulae are listed in Appendix C, Environmental Dosimetry Study.

Table 20, Brookside Resident Dose from Unit Concentration

Source Term Component and Dose Pathway	Cs-137 (mrem/y per pCi/g)		Co-60 (mrem/y per pCi/g)	
	Dose	Uncertainty	Dose	Uncertainty
Cont. Zone layer 1, 6 in., Total	2.21E-01	1.21E-01	9.38E-01	5.24E-01
Cont. Zone layer 2, 9 in., Total	3.19E-02	1.69E-02	2.01E-01	1.08E-01
Cont. Zone layer 3, 9 in., Total	1.51E-02	4.56E-02	8.23E-02	2.06E-01
Elev. local Area layer 1; 6 in., Total	5.54E-03	3.92E-03	2.29E-02	1.66E-02
Elev. local Area layer 2; 6 in., Total	1.71E-03	2.02E-03	8.66E-03	8.83E-03
Elev. local Area layer 3; 6 in., Total	6.96E-04	1.64E-03	3.67E-03	7.06E-03
Total Dose from Unit Conc.	2.76E-01	1.30E-01	1.26E+00	5.74E-01

Table 21, Maintenance Worker Dose from Unit Concentration

Source Term Component and Dose Pathway	Cs-137 (mrem/y per pCi/g)		Co-60 (mrem/y per pCi/g)	
	Dose	Uncertainty	Dose	Uncertainty
Cont. Zone 3 in., Total	9.78E-02	6.20E-02	3.97E-01	2.57E-01
Elev. local Area layer 1; 6 in., Total	5.62E-02	3.87E-02	NA	NA
Elev. local Area layer 2; 6 in., Total	2.53E-02	3.14E-02	NA	NA
Elev. local Area layer 3; 6 in., Total	6.97E-03	2.48E-02	NA	NA
Total Dose from Unit Conc.	1.86E-01	8.33E-02	3.97E-01	2.57E-01

Table 22, Recreationist Dose from Unit Concentration

Source Term Component and Dose Pathway	Cs-137 (mrem/y per pCi/g)		Co-60 (mrem/y per pCi/g)	
	Dose	Uncertainty	Dose	Uncertainty
Cont. Zone layer 1, 6 in., Direct	3.22E-02	1.83E-02	1.27E-01	7.80E-02
Cont. Zone layer 2, 12 in., Direct	7.29E-03	1.01E-02	NA	NA
Cont. Zone layer 3, 12 in., Direct	2.11E-03	7.75E-03	NA	NA
Elev. local Area layer 1; 6 in., Direct	2.01E-02	1.22E-02	NA	NA
Elev. local Area layer 2; 12 in., Direct	6.19E-03	7.47E-03	NA	NA
Cont. Zone layer 1, 6 in., Fish	NA	NA	3.95E-03	1.70E-02
Elev. local Area layer 3; 12 in., Direct	1.63E-03	5.36E-03	NA	NA
Cont. Zone 30 in thick, Fish	3.70E-02	1.75E-01	NA	NA
Elev. local Area 30 in thick, Fish	6.95E-04	3.30E-03	NA	NA
Total Dose from Unit Conc.	1.07E-01	1.77E-01	1.31E-01	7.98E-02

7.2 Scenario Doses

Doses for each source term component taking into account the source term concentrations are calculated for each scenario. The dose from each radionuclide is calculated as the product of the dose from unit concentration and the source term component concentrations. Total radionuclide doses for each pathway are obtained as the sum of the Cs-137 and Co-60 doses. The total dose for each scenario is then obtained as the sum of the total radionuclide pathway doses. To aid reviewers, the input radionuclide concentrations and results of these calculations are presented below in a pair of tables for each scenario.

Table 23 shows the source term component concentrations and Table 24 shows the calculated doses for the Suburban Gardner scenario. The source term component radionuclide concentrations are obtained from the recent characterization report [NASA 2009]. The total scenario dose is 7.96 ± 3.87 E-01 mrem and Cs-137 contributes 90% of

the total. The table shows the effect of the local elevated area source components with their high Cs-137 concentrations. The elevated area source term components contribute 93 % of the total scenario dose. The contaminated garden source term contributes 7 % of the total dose and the plant consumption pathway contributes only 2 % of the total dose (28% of the total dose from the garden source term component). This result is driven by the conservative assumption that the dose receptor is exposed to the elevated activity source 100% of the time that he or she is working in the garden.

Table 23, Suburban Gardner Source Term Component Concentrations

Source Term Component	Cs-137 (pCi/g)		Co-60 (pCi/g)	
	Concentration	Uncertainty	Concentration	Uncertainty
Cont. Zone 3 in	1.20E+00	2.80E+00	1.30E-01	7.00E-02
Elev. local Area layer 1; 6 in	5.78E+01	2.26E+00	1.60E+00	2.10E-01
Elev. local Area layer 2; 6 in	7.24E+01	2.77E+00	6.53E-01	1.40E-01
Elev. local Area layer 3; 6 in	2.05E+01	1.10E+00	2.88E-01	9.00E-02

Table 24, Suburban Gardner Doses from Source Term Components and Total Dose

Source Term Component and Dose Pathway	Cs-137 (mrem/y)		Co-60 (mrem/y)		Total (mrem/y)	
	Dose	Uncertainty	Dose	Uncertainty	Dose	Uncertainty
Cont. Zone 3 in Total	4.31E-02	1.04E-01	1.42E-02	9.61E-03	5.73E-02	1.05E-01
Cont. Zone 3 in Direct	2.88E-02	6.97E-02	1.26E-02	8.33E-03	4.14E-02	7.02E-02
Cont. Zone 3 in Plant	1.43E-02	3.76E-02	1.57E-03	2.11E-03	1.59E-02	3.77E-02
Elev. local Area layer 1; 6 in Total	4.70E-01	2.99E-01	5.39E-02	3.86E-02	5.24E-01	3.01E-01
Elev. local Area layer 2; 6 in Total	1.83E-01	2.14E-01	8.36E-03	8.61E-03	1.92E-01	2.14E-01
Elev. local Area layer 3; 6 in Total	2.15E-02	4.94E-02	1.60E-03	5.82E-04	2.31E-02	4.94E-02
Total Dose (1)	7.18E-01	3.85E-01	7.80E-02	4.07E-02	7.96E-01	3.87E-01
Total Plant Dose	1.43E-02	3.76E-02	1.57E-03	2.11E-03	1.59E-02	3.77E-02

Table 24 Note:
1. The totals are the sums of the source term component total doses – the contaminated zone direct and plant pathway doses are excluded from the scenario totals.

Table 25 shows the source term component concentrations and Table 26 shows the calculated doses for the Brookside Resident scenario. The total scenario dose is 9.24 ± 4.41 E-01 mrem/y. Cesium-137 contributes 80% of the total and local area elevated activity source contributes 54%. The contribution from the elevated activity source is somewhat less relative to the other scenarios because the dose receptor only receives exposure from this source when he or she is out of doors working on the lawn and landscaping. The source is assumed to be located near to, but not underneath the house.

Table 25, Brookside Resident Source Term Component Concentrations

Source Term Component	Cs-137 (pCi/g)		Co-60 (pCi/g)	
	Concentration	Uncertainty	Concentration	Uncertainty
Cont. Zone layer 1; 6 in	9.80E-01	1.31E+00	1.10E-01	4.00E-02
Cont. Zone layer 2; 9 in	1.42E+00	3.19E+00	1.40E-01	8.00E-02
Cont. Zone layer 3; 9 in	1.20E+00	3.39E+00	1.40E-01	8.00E-02
Elev. local Area layer 1; 6 in	5.78E+01	2.26E+00	1.60E+00	2.10E-01
Elev. local Area layer 2; 6 in	7.24E+01	2.77E+00	6.53E-01	1.40E-01
Elev. local Area layer 3; 6 in	2.05E+01	1.10E+00	2.88E-01	9.00E-02

Table 26, Brookside Resident Doses from Source Term Components and Total dose

Source Term Component (1)	Cs-137 (mrem/y)		Co-60 (mrem/y)		Total (mrem/y)	
	Dose	Uncertainty	Dose	Uncertainty	Dose	Uncertainty
Cont. Zone layer 1; 6 in	2.17E-01	3.13E-01	1.03E-01	6.88E-02	3.20E-01	3.20E-01
Cont. Zone layer 2; 9 in	4.53E-02	1.05E-01	2.81E-02	2.21E-02	7.34E-02	1.07E-01
Cont. Zone layer 3; 9 in	1.81E-02	7.49E-02	1.15E-02	2.96E-02	2.96E-02	8.06E-02
Elev. local Area layer 1; 6 in	3.20E-01	2.27E-01	3.66E-02	2.70E-02	3.57E-01	2.29E-01
Elev. local Area layer 2; 6 in	1.24E-01	1.46E-01	5.65E-03	5.89E-03	1.29E-01	1.46E-01
Elev. local Area layer 3; 6 in	1.43E-02	3.45E-03	1.06E-03	2.06E-03	1.53E-02	4.02E-03
Total Dose	7.38E-01	4.33E-01	1.86E-01	8.28E-02	9.24E-01	4.41E-01

Table 26 Note:
1. Only the direct exposure pathway is significant; the total dose is not broken down into pathway dose contributions.

Table 27 shows the source term component concentrations and Table 28 shows the calculated doses for the Country Club Maintenance Worker scenario. The total scenario dose is 1.17 ± 0.61 E+00 mrem/y. The Cs-137 in the soil and sediments contributes 92% of the total dose and the local elevated area source contributes 80%.

Table 27, Country Club Maintenance Worker Source Term Component Concentrations

Source Term Component	Cs-137 (pCi/g)		Co-60 (pCi/g)	
	Concentration	Uncertainty	Concentration	Uncertainty
Cont. Zone 3 in	1.38E+00	1.84E+00	2.45E-01	7.43E-02
Elev. local Area layer 1; 6 in	1.42E+01	8.90E-01	NA	NA
Elev. local Area layer 2; 12 in	4.70E+00	5.10E-01	NA	NA
Elev. local Area layer 3; 12 in	2.90E+00	3.45E-01	NA	NA

Table 28, Country Club Maintenance Worker Doses from Source Term Components and Total Dose

Source Term Component (1)	Cs-137 (mrem/y)		Co-60 (mrem/y)		Total (mrem/y)	
	Dose	Uncertainty	Dose	Uncertainty	Dose	Uncertainty
Cont. Zone 3 in	1.35E-01	1.99E-01	9.73E-02	6.95E-02	2.32E-01	2.11E-01
Elev. local Area layer 1; 6 in	7.98E-01	5.52E-01	NA	NA	7.98E-01	5.52E-01
Elev. local Area layer 2; 12 in	1.19E-01	1.48E-01	NA	NA	1.19E-01	1.48E-01
Elev. local Area layer 3; 12 in	2.02E-02	7.20E-02	NA	NA	2.02E-02	7.20E-02
Totals	1.07E+00	6.09E-01	9.73E-02	6.95E-02	1.17E+00	6.13E-01

Table 28 Note:

1. Only the direct exposure pathway is significant; the total dose is not broken down into pathway dose contributions

Table 29 shows the source term component concentrations and Table 30 shows the calculated doses for the Recreationist scenario. The total dose is 6.47 ± 3.37 E-01 mrem/y. The Cs-137 in the soil and sediments contributes 95 % and the local elevated area source contributes 85 % of the total dose. The fish consumption pathway contributes 6 % of the total dose.

Table 29, Recreationist Source Term Component Concentrations

Source Term Component	Cs-137 (pCi/g)		Co-60 (pCi/g)	
	Concentration	Uncertainty	Concentration	Uncertainty
Cont Zone layer 1; 6 in	1.02E+00	2.56E+00	2.30E-01	8.00E-02
Cont Zone layer 2; 12 in	7.80E-01	1.69E+00	NA (3)	NA
Cont Zone layer 3; 12 in	3.50E-01	8.30E-01	NA	NA
Elev local Area layer 1; 6 in	2.06E+01	1.40E+00	NA	NA
Elev local Area layer 2; 12 in	1.57E+01	9.90E-01	NA	NA
Elev local Area layer 3; 12 in	1.68E+01	1.10E+00	NA	NA
Cont Zone layer 1; 30 in (1)	7.17E-01	3.39E-01	NA	NA
Elev local Area layer 1; 30 in (2)	1.77E+01	2.57E+00	NA	NA

Table 29 Notes:

1. Special source term component for Cs-137 fish consumption pathway dose calculation. The average concentration of Cs-137 in the primary contamination source in all layers is used.
2. Special source term component for Cs-137 fish consumption pathway dose calculation. The average of the maximum concentrations concentration of Cs-137 in all depth layers from 0 to 30 in. is used.
3. Not applicable. The only Co-60 source term component > 0 concentration is the first layer of the primary contaminated zone.

Table 30, Recreationist Doses from Source Term Components and Total Dose

Source Term Component (1)	Cs-137 (mrem/y)		Co-60 (mrem/y)		Total (mrem/y)	
	Dose	Uncertainty	Dose	Uncertainty	Dose	Uncertainty
Cont. Zone layer 1; 6 in.	3.28E-02	8.45E-02	2.92E-02	2.10E-02	6.21E-02	8.70E-02
Cont. Zone layer 2; 12 in.	5.69E-03	1.46E-02	NA	NA	5.69E-03	1.46E-02
Cont. Zone layer 3; 12 in.	7.39E-04	3.23E-03	NA	NA	7.39E-04	2.09E-02
Elev. local Area layer 1; 6 in.	4.14E-01	2.53E-01	NA	NA	4.14E-01	2.53E-01
Elev. local Area layer 2; 12 in.	9.72E-02	1.17E-01	NA	NA	9.72E-02	1.17E-01
Elev. local Area layer 3; 12 in.	2.74E-02	9.01E-02	NA	NA	2.74E-02	9.01E-02
Cont. Zone layer 1; 6 in. Co-60 fish	NA	NA	9.09E-04	3.92E-03	9.09E-04	3.92E-03
Cont. Zone 30 in. for Cs-137 Fish	2.65E-02	1.26E-01	NA	NA	2.65E-02	1.26E-01
Elev. local Area 30 in. for CS-137 Fish	1.23E-02	5.84E-02	NA	NA	1.23E-02	5.84E-02
Total	6.17E-01	3.35E-01	3.01E-02	2.10E-02	6.47E-01	3.37E-01
Total Fish	3.88E-02	1.39E-01	9.09E-04	3.92E-03	3.97E-02	1.39E-01

Tables 31 and 32 show the dose breakdown for the scenarios. Table 31 shows the percent contributions from each radionuclide and Table 32 shows the percent contributions from the source term elements. It is seen that Cs-137 contributes 89% (on average) and Co-60 contributes only 10% (on average) of the total dose to the scenario receptors. The local area elevated activity sources contribute 78 % (on average) of the total dose whereas the principal contaminated zone sources contribute only 22%.

Table 31, Scenario Dose Contributions from Cs-137 and Co-60

Scenario	Total Scenario Dose (mrem/y)	Cs-137 Dose (mrem/y)	Fraction of Total dose (%)	Co-60 Dose (mrem/y)	Fraction of Total dose (%)
Suburban Gardner	7.96 ± 3.87 E-01	7.18 ± 3.85 E-01	90	7.80 ± 4.07 E-02	10
Brookside Resident	9.24 ± 4.41 E-01	7.38 ±4.33 E-01	80	1.86 ± 0.83 E-01	20
CC maintenance Worker	1.17 ± 0.61 E+00	1.07 ± 0.61 E+00	92 (1)	9.73 ± 6.95 E-02	7 (1)
Recreationist	6.47 ± 3.37 E-01	6.17 ± 3.35 E-01	95	3.01 ± 2.10 E-02	5

Table 31 Note:
1. The percent contributions total to < 100 % due to the effect of rounding in the calculations.

Table 32, Scenario Dose Contributions from Source Term Elements

Scenario	Total Scenario Dose	Primary Contaminated Zone Source	Fraction of Total dose (%)	Local Elevated Activity Source	Fraction of Total dose (%)
Suburban Gardner	7.96 ± 3.87 E-01	5.73 ± 10.5 E-02	7	7.39 ± 3.73 E-01	93
Brookside Resident	9.24 ± 4.41 E-01	4.23 ± 3.47 E-01	46	5.02 ± 2.71 E-01	54
CC maintenance Worker	1.17 ± 0.61 E+00	2.32 ± 2.11 E-01	20	9.37 ± 8.07 E-01	80
Recreationist	6.47 ± 3.37 E-01	9.59 ± 15.5 E-02	15	5.51 ± 2.99 E-01	85

7.3 Age-Dependent Dose

In methods approved by the NRC for evaluating doses from residual contamination at decommissioned sites, the dose receptor is assumed to be an adult. The default parameters for RESRAD models and exposure scenarios are based on adults. Information on the releases to the Plum Brook has been provided by NASA to the public on several occasions and questions have been raised about doses and potential risks to children. What are the effects on the calculated doses if age-dependent values of critical parameters are used to calculate the doses? As a result, NASA has requested that a technical evaluation be performed to address this issue. An evaluation of age-dependent doses from Plum Brook sediments was conducted in 2008 [NASA 2008a]. This report is included as Attachment E and is summarized here.

The US EPA and NRC policy has been that use of an adult as the receptor for dose and risk assessments is generally acceptable and is protective of children [USEPA 1994, USNRC 2003]. Also, US Government-approved age-dependent dose factors were not available when this policy was established. And as a practical matter, no means existed to calculate doses to children using codes such as RESRAD. However, beginning in 1989 the International Commission on Radiological Protection (ICRP) issued age-dependent dose factors for assessment of doses to the public from intake of radionuclides, culminating in the issuance of ICRP Report No. 72 in 1996. [ICRP 1996]. The developers of RESRAD have incorporated ICRP-72 age-dependent dose factors in version 6.4 of the code released in December 2007 [USDOE 2008]. It is now possible, using RESRAD to calculate doses to individuals other than adults from exposure to Plum Brook sediments.

Doses to members of the public of various age groups who could come into contact with Plum Brook sediments were calculated (age-dependent doses). Three exposure scenarios were selected to examine the effects of age-dependent dose model parameters and to obtain a reasonable upper-bound estimate of the dose to a child. The highest calculated

dose was 0.13 mrem/y per pCi/g of Cs-137 for a small child who is in direct contact with contaminated sediments for 450 hours a year. This could be achieved by a child who plays outdoors an average of 15 hours a week for 30 weeks a year in an area containing contaminated sediments. This is considered to be a bounding scenario as there are limited opportunities for any significant contact with Plum Brook sediments. The highest calculated dose to a child is less than the highest dose to an adult, 1.7 ± 1.7 E-01 mrem/y per pCi/g calculated in the dose assessment reported by NASA in June, 2008 [NASA 2008]. [23]

Overall, the doses from exposure to individuals from contaminated sediments are not strongly age-dependent. It is concluded that the use of adults as dose receptors for calculated doses is reasonable for assessment of dose and risk. There is no age group which receives a higher dose than adults.

7.4 Comparison of Calculated and Measured Doses

Direct measurements of radiation dose rates in the vicinity of the Plum Brook were performed for comparison with the calculated doses. Measurements were performed at selected locations along the Plum Brook using Thermoluminescent dosimeters (TLDs) and low-range radiological survey instruments. The TLDs were placed for 15 weeks at selected locations along the Plumb Brook. Locations were selected to represent exposure scenario settings used in the dose assessment and other locations of interest. These included locations representing typical or average exposure conditions and locations where higher than average concentrations of Cs-137 were measured in Plum Brook sediments. In addition, dose rate measurements were taken with low-range survey instruments at each TLD location at time of placement and again at removal. The TLD and survey instrument measurements and their results are described in Appendix C.

As discussed in results in the previous sections, the dose assessment predicts that most of the dose is received by the “direct” exposure pathway. That is, whole body dose due to penetrating gamma radiation emitted from Cs-137 and Co-60 in the sediments. The measurement results are compared to direct exposure pathway outdoor dose rates calculated using RESRAD results for the four exposure scenarios. The principal conclusions from the environmental dose measurements are:

- The 95% upper confidence limit of the doses measured with TLDs are less than the direct pathway doses calculated with RESRAD for all measurement locations except at the location selected to represent the Brookside Resident scenario. In this case the calculated and measured doses are equivalent.

[23] The assessment of age-dependent doses [NASA 2008a] was reported in a companion report to the initial dose assessment [NASA 2008]. Calculated age-dependent doses were compared to the adult doses from Cs-137 in the 2008 report.

- Identical results are obtained from measurements using an independent method - dose rates measured with microR meters. This comparison shows that measured dose rates are less than calculated dose rates at all locations except the Brookside Resident scenario location where measured and calculated dose rates are equivalent.

These results confirm that the dose assessment results are conservative.

7.5 Summary and Conclusions

The dose to members of the public from Plum Brook sediments contaminated with Cs-137 and Co-60 was calculated for four exposure scenarios. The scenarios represent conservative assumptions regarding a range of possible conditions whereby members of the public could receive radiation doses from the contaminated sediments. The dose to individuals exposed in the scenarios range from 0.65 to 1.2 mrem/y. The average of the doses to the four scenario receptors is 0.88 ± 0.22 mrem/y.

This result shows that the dose to an individual is well below the 25 mrem/y dose agreed by the principal stakeholders as being acceptable for Plum Brook areas impacted by contaminated sediments. This conclusion is further supported by measurements of radiation doses at locations on the Plum Brook selected to represent settings similar to those of the exposure scenarios. The measured doses are less than the calculated doses at three of the four locations and comparable to the calculated doses at the fourth location.

Additional perspective is provided by comparison with the dose to the public from Cs-137 fallout from atmospheric weapons testing that remains in the environment. The annual average dose to individuals in the northern hemisphere from fallout Cs-137 is reported to be about 0.5 mrem/y (with an estimated uncertainty of ± 100%). Thus, the calculated doses from exposure to Plum Brook sediments are indistinguishable from the “background” dose received from the fallout Cs-137 burden in the Plum Brook watershed.

Appendices

Appendix A – Figures

Appendix B – RESRAD Case Run Reports

Appendix C – Environmental Dosimetry Study

Appendix D – RESRAD Parameter Selection Supporting Information

Appendix E – Age-Dependent Dose from Plum Brook Sediments

Appendix F – Sensitivity Analysis

Revised Dose Assessment for Plum Brook Sediments

PBRF-TBD-08-006

Appendix A

Figures

Figure 1, RESRAD Exposure Pathways
(Figure courtesy of ANL – EAD)

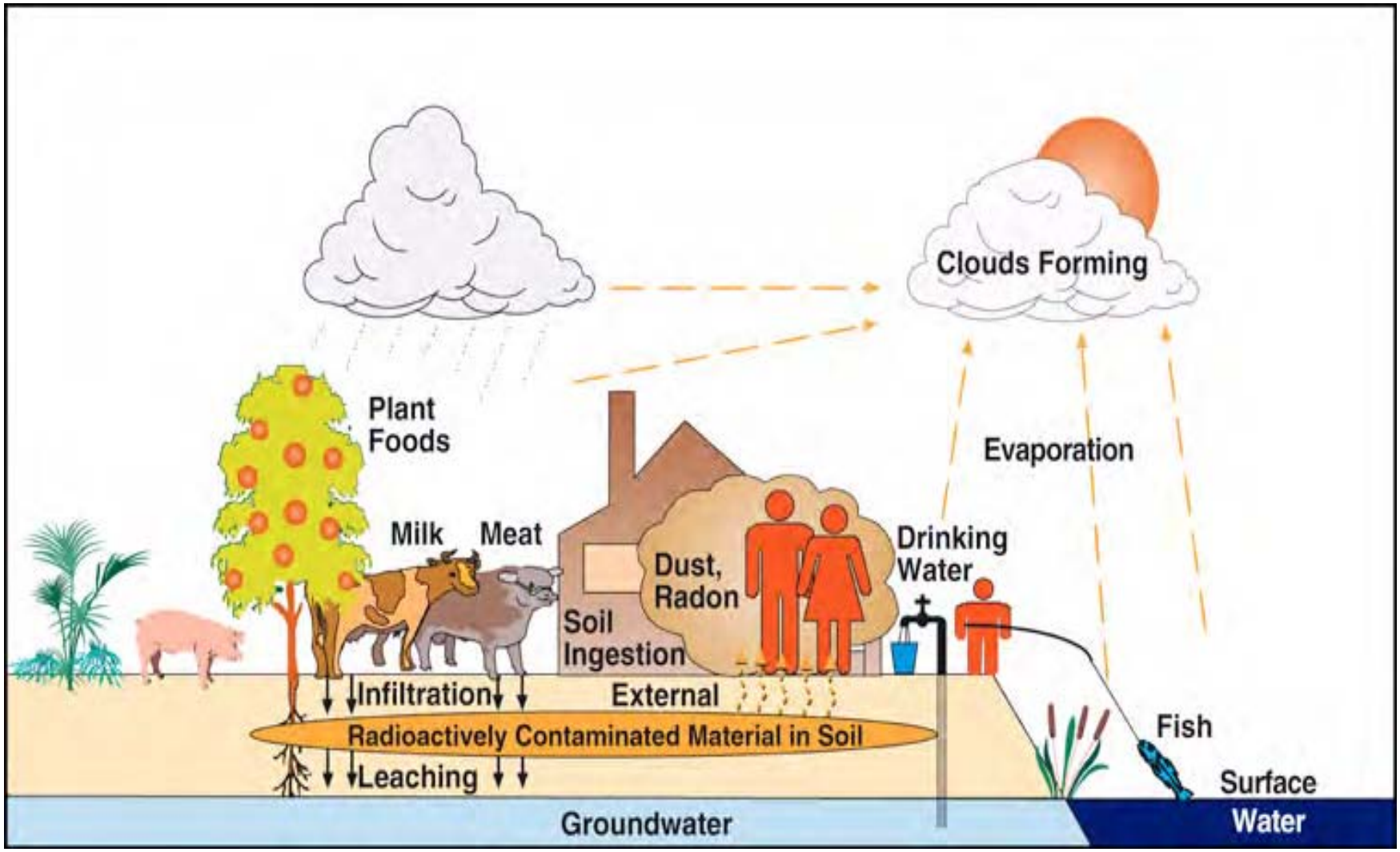


Figure 2, Geologic Cross Section in the Vicinity of PBRF

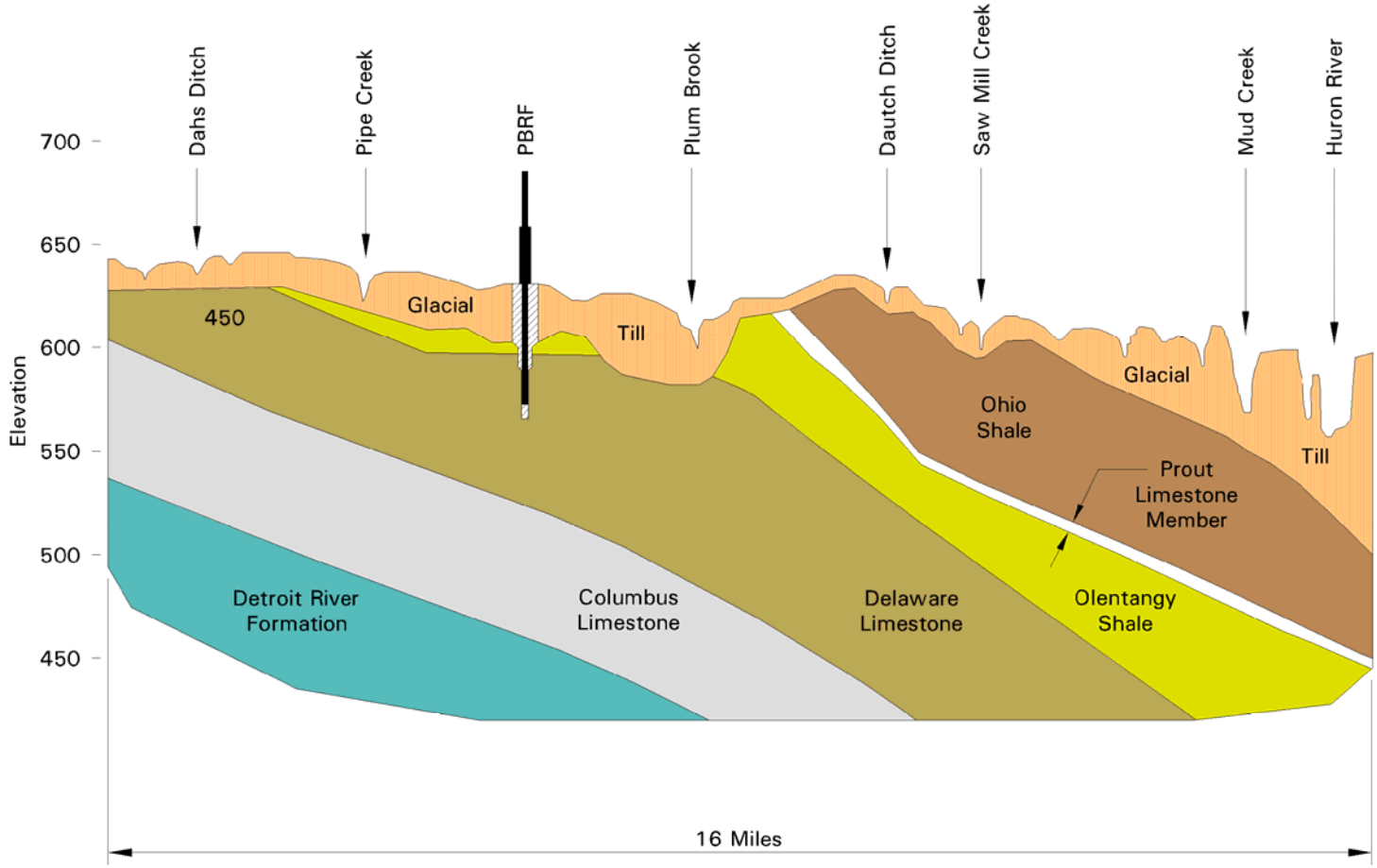


Figure 3, Suburban Gardner Exposure Scenario

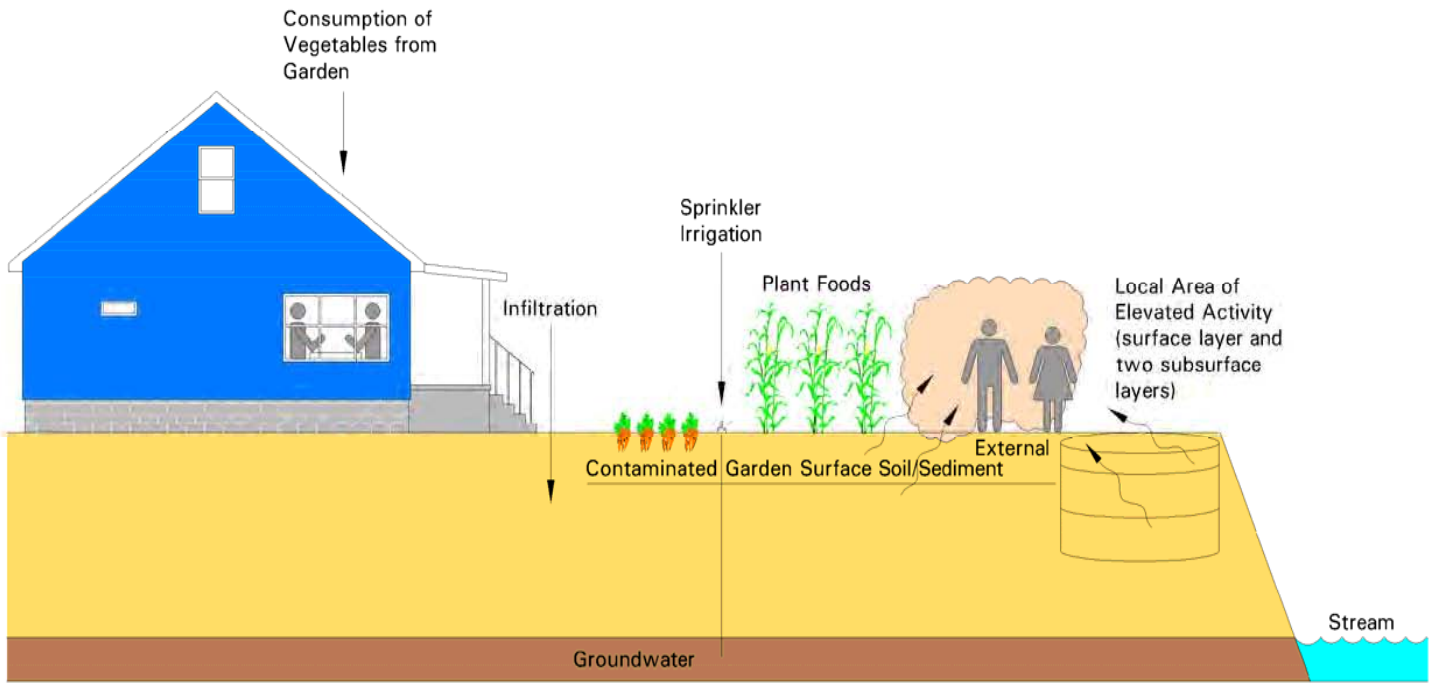


Figure 4, Brookside Resident Exposure Scenario

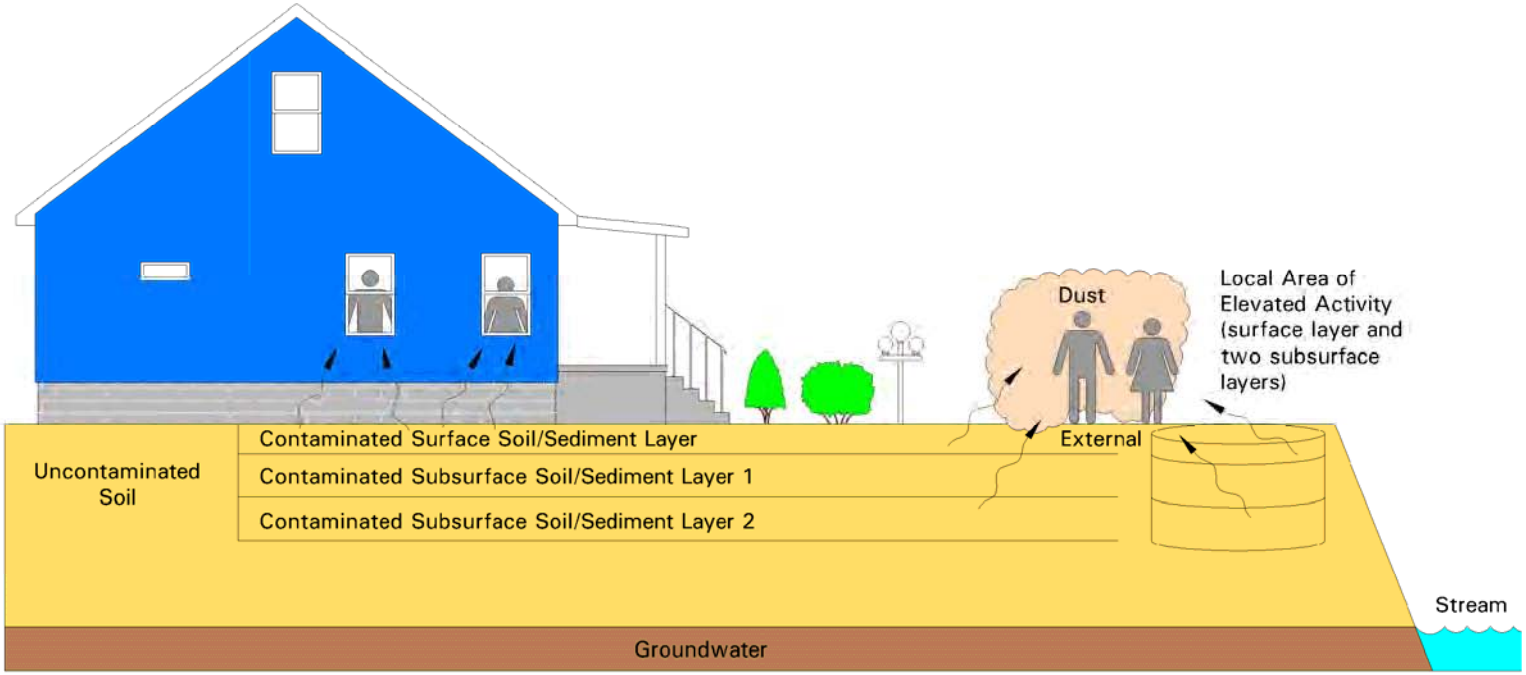


Figure 5, Country Club Maintenance Worker Exposure Scenario

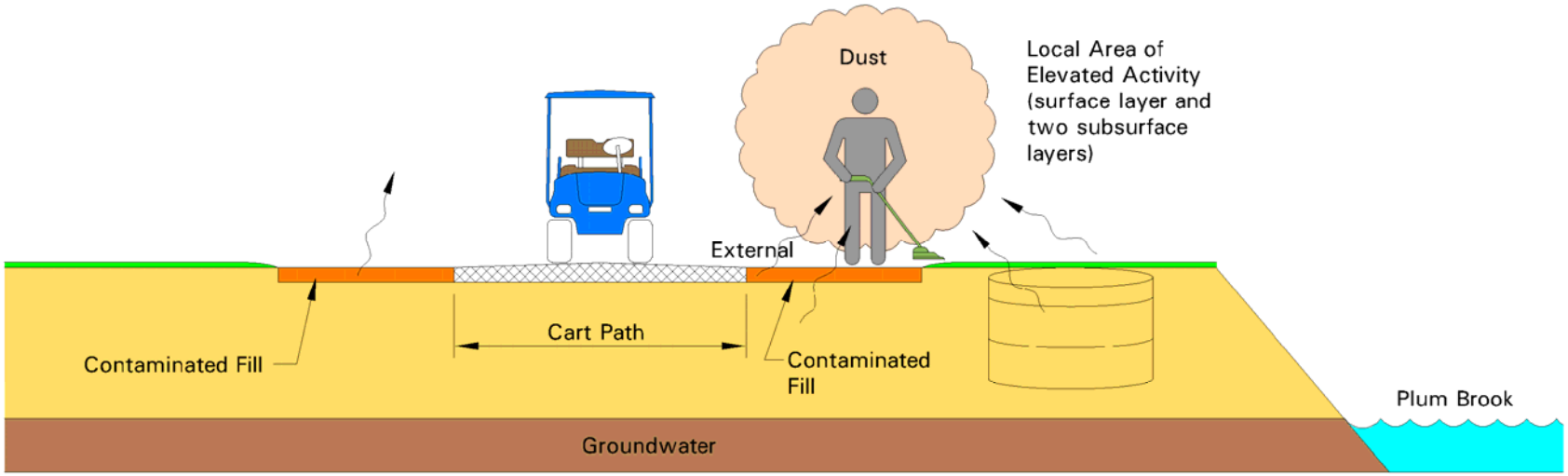


Figure 6, Recreationist Exposure Scenario

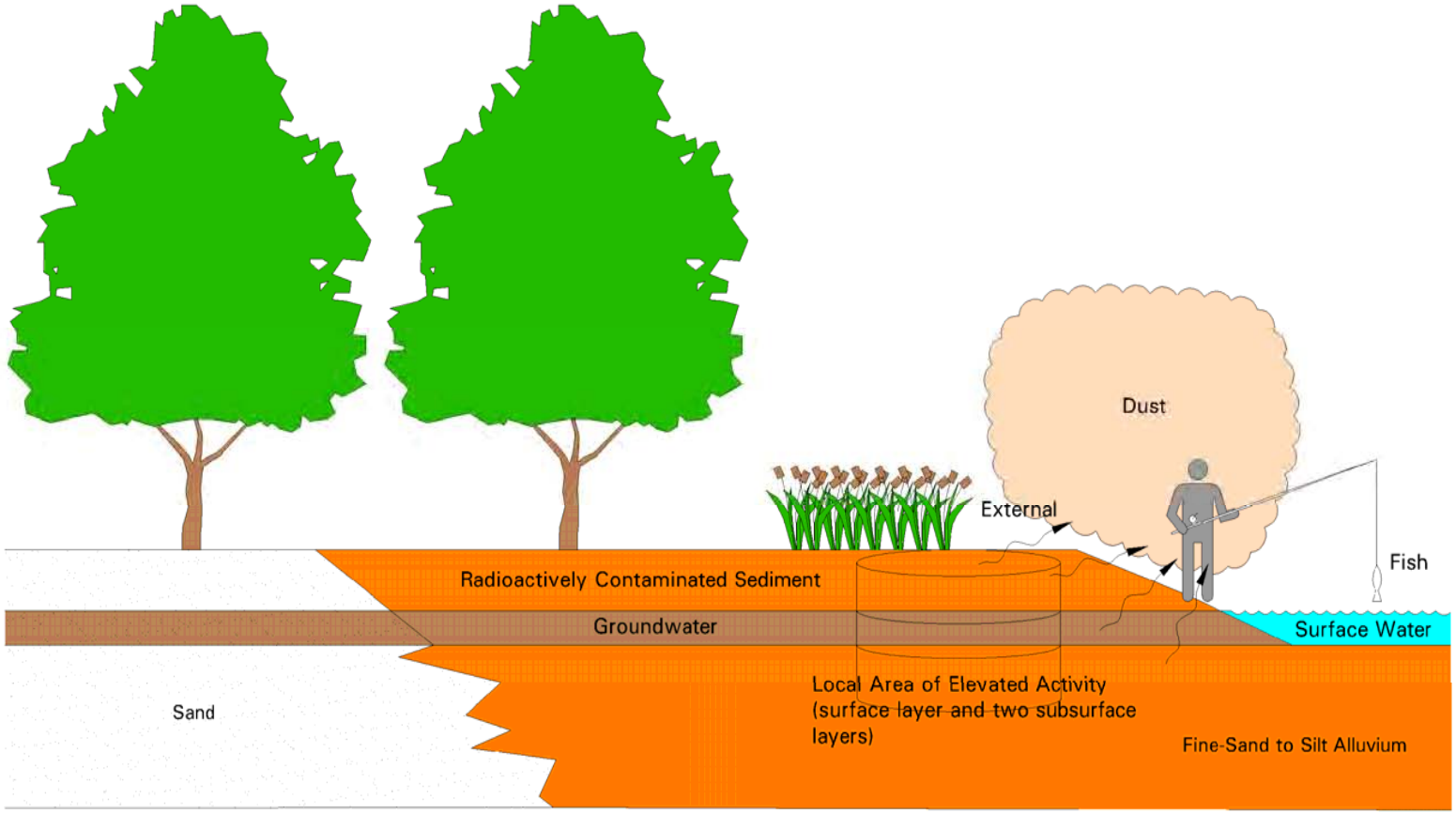


Figure 7, Model for Recreationist Cs-137 Direct Exposure Pathway

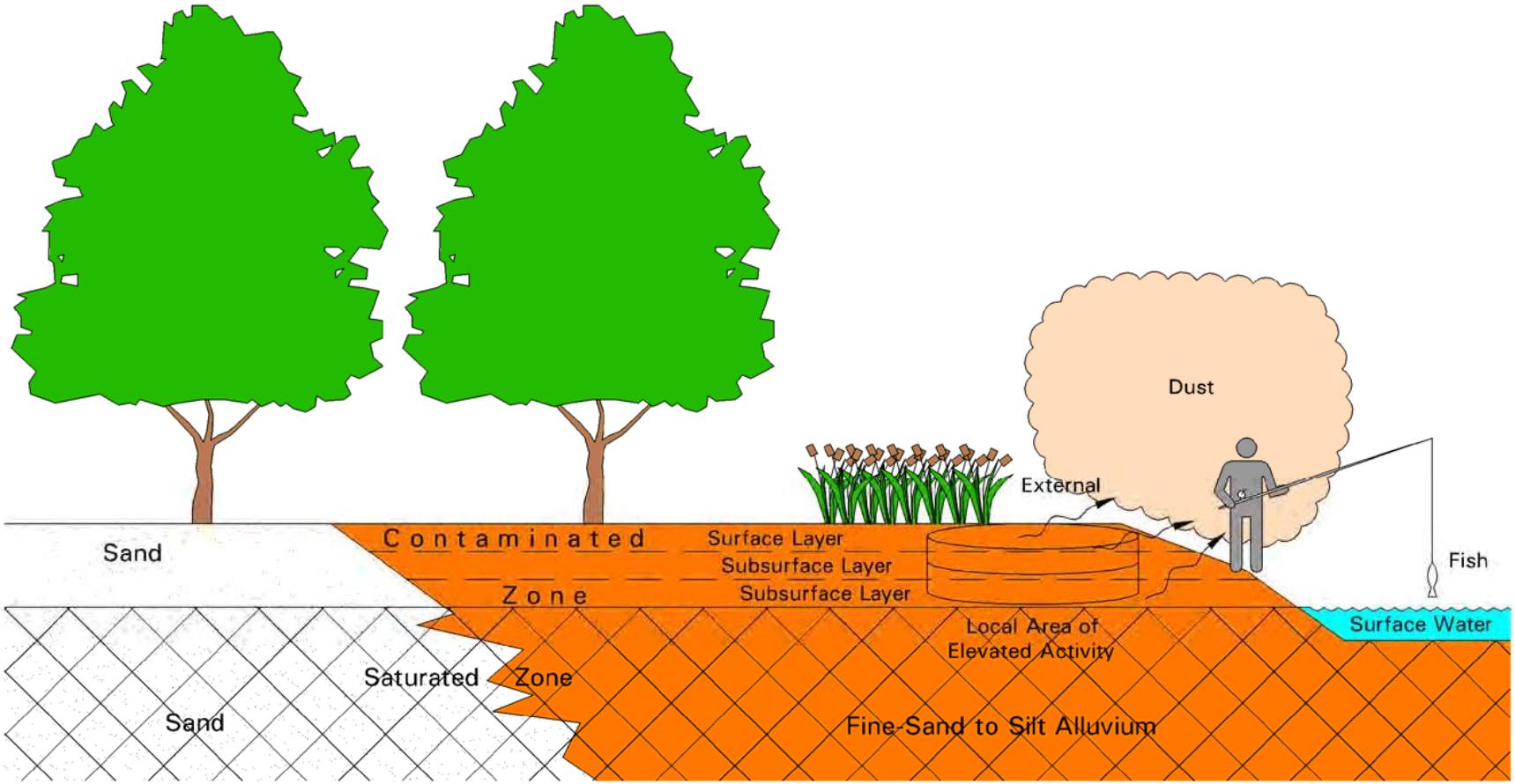


Figure 8, Model for Recreationist Cs-137 Fish Consumption Pathway

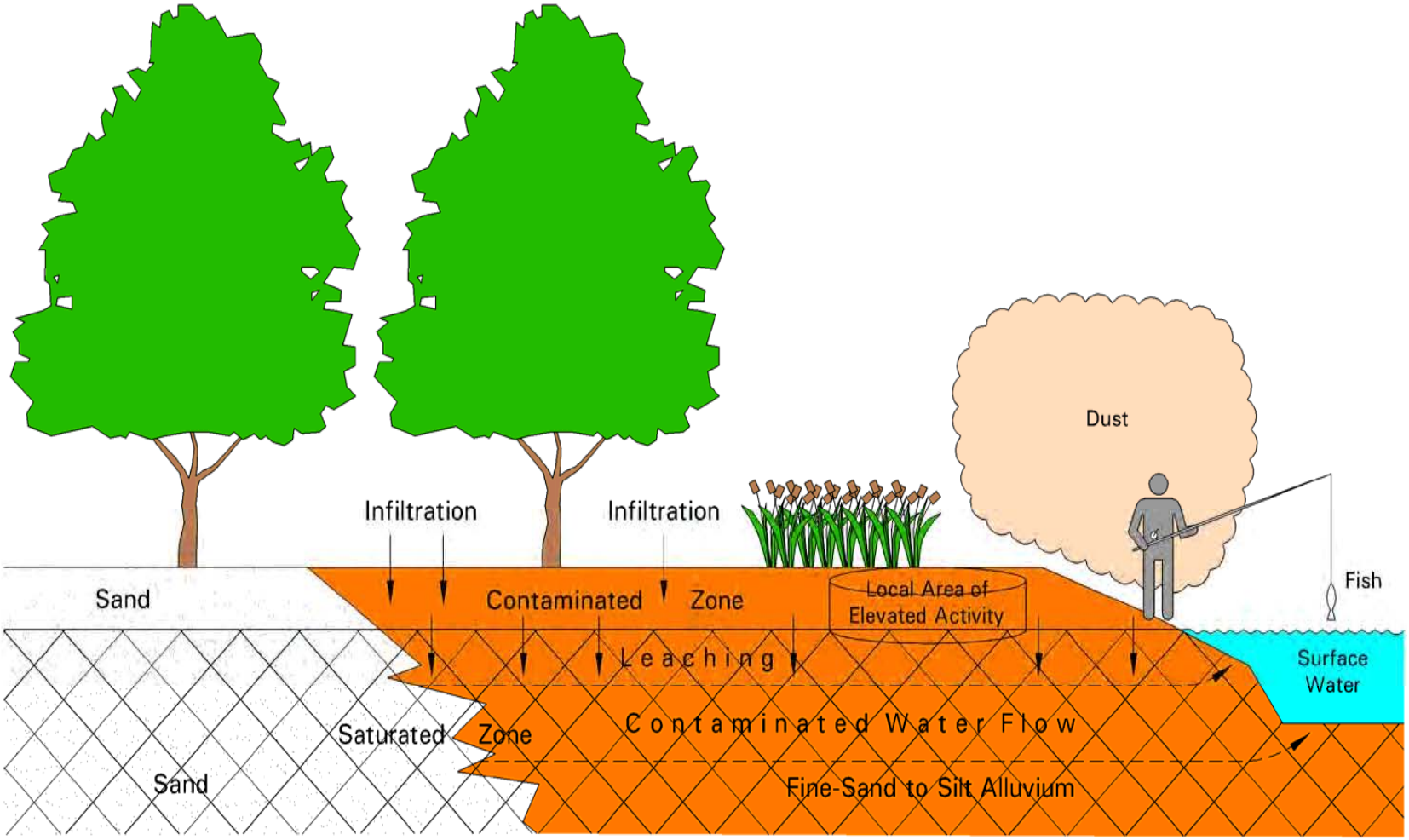
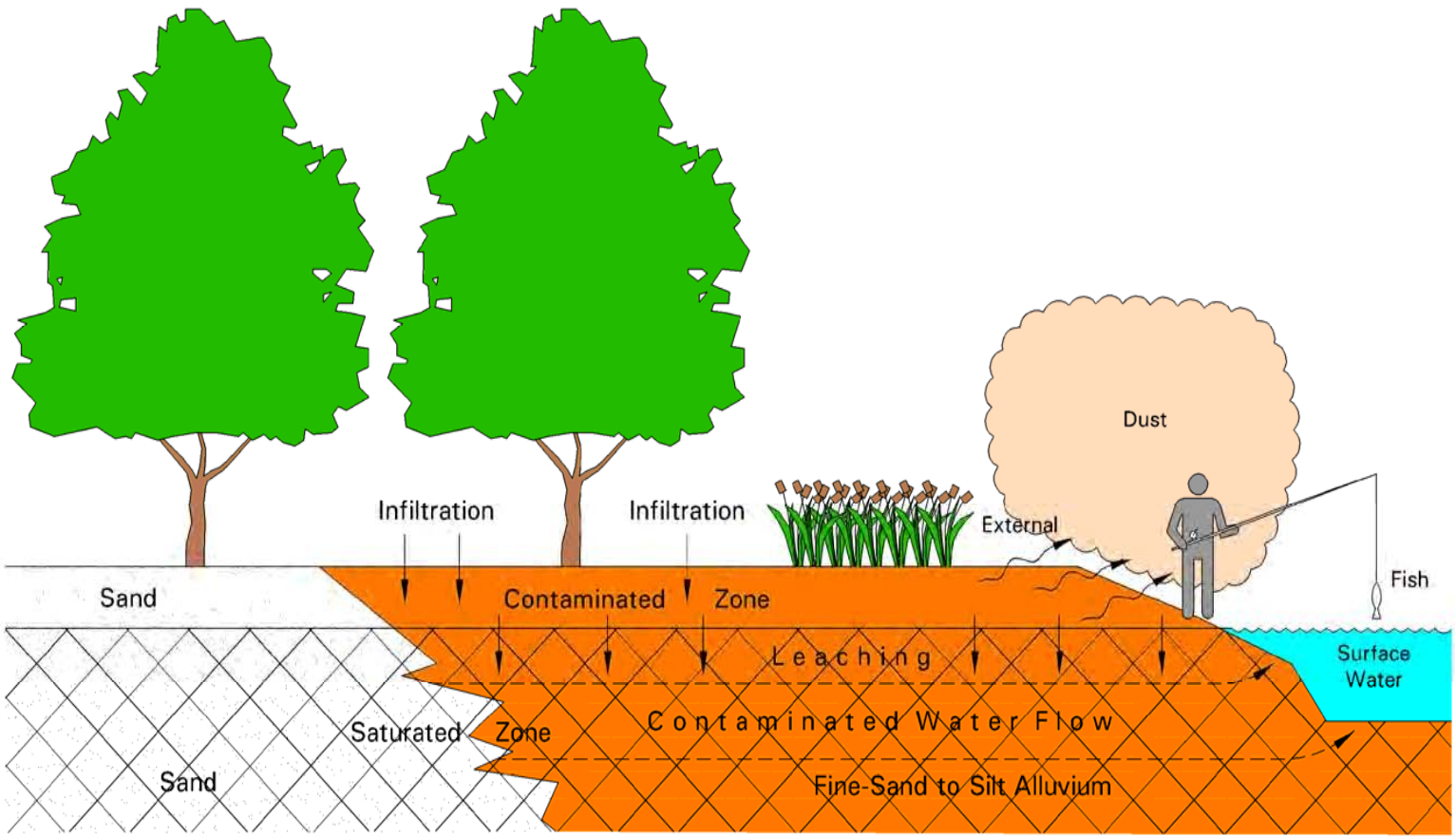


Figure 9, Model for Recreationist Co-60 Direct Exposure and Fish Consumption Pathways



Revised Dose Assessment for Plum Brook Sediments

PBRF-TBD-08-006

Appendix B

RESRAD Case Run Reports

Index

Run Date	Case Title	Description	Pages	File Name	Result (mrem)	
					Deterministic	Probabilistic
2/8/09	Suburban Gardener	Base case - unit Concentration Cs-137 (3 in. thick surface source)	Part I: 1-9 Part VI: 1-3, 5,8,23. 15 pp.	02080901	4.017E-02	Total: 3.59 ± 2.30 E-02 Gnd: 2.40 ± 1.53 E-02 Plant: 1.19 ± 1.46 E-02
2/8/09	Suburban Gardener	Base case - unit Concentration Co-60 (3 in. thick surface source)	Part I: 1-9 Part VI: 1-3, 5,8,23. 15 pp.	02080902	1.179 E-01	Total: 1.09 ± 0.45 E-01 Gnd: 9.69 ± 3.72 E-02 Plants: 1.21 ± 1.49 E-02
2/8/09	Suburban Gardener	Elevated local area surface source No. 1 - unit Cs-137 (one m. radius, 6 in thick)	Part I: 1-9 Part VI: 1-3, 5,23. 14 pp.	02080903	8.75 E-03	Total: 8.14 ± 5.16 E-03
2/8/09	Suburban Gardener	Elevated local area subsurface source No. 2 - unit Cs-137 (one m. radius, 6 in thick with 6 in cover)	Part I: 1-9 Part VI: 1-3, 5,23. 14 pp.	02080904	2.03 E-03	Total: 2.53 ± 2.95 E-03
2/8/09	Suburban Gardener	Elevated local area subsurface source No. 3 - unit Cs-137 (one m. radius, 6 in thick with 12 in cover)	Part I: 1-9 Part VI: 1-3, 5,23. 14 pp.	02080905	2.689 E-04	Total: 1.05 ± 2.41 E-03
2/8/09	Suburban Gardener	Elevated local area surface source No. 1 - unit Co-60 (one m. radius, 6 in thick)	Part I: 1-9 Part VI: 1-3, 5,23. 14 pp.	02080906	3.589 E-02	Total: 3.37 ± 2.37 E-02
2/8/09	Suburban Gardener	Elevated local area subsurface source No. 2 - unit Co-60 (one m. radius, 6 in thick with 6 in cover)	Part I: 1-9 Part VI: 1-3, 5,23. 14 pp.	02080907	1.151 E-02	Total: 1.28 ± 1.29 E-02
2/8/09	Suburban Gardener	Elevated local area subsurface source No 3 - unit Co-60 (one m. radius, 6 in thick with 12 in cover)	Part I: 1-9 Part VI: 1-3, 5,23. 14 pp.	02080908	2.239 E-03	Total: 5.54 ±10.4 E-03
	Suburban Gardener Notes	Plant food pathway turned off for local elevated area source calculations. The elevated area is not in the garden. Total pages = 114 for 8 case runs.				
2/9/09	Brook-side Resident	Base case - unit Cs-137 (6 in. thick surface source)	Part I: 1-9 Part VI: 1-3, 5,18, 23 15 pp.	02090901	2.468E-01	2.21 ± 1.21 E-01
2/9/09	Brook-side Resident	Base case subsurface source - unit Cs-137 (9 in. thick source with 6 in cover)	Part I: 1-9 Part VI: 1-3, 5,18, 23 15 pp.	02090902	3.459 E-02	3.19 ± 1.69 E-02
2/9/09	Brook-side Resident	Base case subsurface source - unit Cs-137 (9 in. thick source with 15 in cover)	Part I: 1-9 Part VI: 1-3, 5,18, 23 15 pp.	02090903	1.305 E-03	1.51 ± 4.56 E-02
2/9/09	Brook-side Resident	Base case unit Co-60 (6 in. thick surface source)	Part I: 1-9 Part VI: 1-3, 5,18, 23 15 pp.	02090904	1.045 E 00	9.38 ± 5.24 E-01

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Run Date	Case Title	Description	Pages	File Name	Result (mrem)	
					Deterministic	Probabilistic
2/9/09	Brook-side Resident	Base case subsurface source - unit Co-60 (9 in. thick source with 6 in cover)	Part I: 1-9 Part VI: 1-3, 5,18, 23 15 pp.	02090905	2.20 E-01	2.01 ± 1.08 E-01
2/9/09	Brook-side Resident	Base case subsurface source - unit Co-60 (9 in. thick source with 15 in cover)	Part I: 1-9 Part VI: 1-3, 5,18, 23 15 pp.	02090906	1.493 E-02	8.23 ± 20.6 E-02
2/9/09	Brook-side Resident	Elevated local area surface source - unit Cs-137 (one m. radius, 6 in thick)	Part I: 1-9 Part VI: 1-3, 5,18, 23 15 pp.	02090907	5.685 E-03	5.54 ± 3.92 E-03
2/9/09	Brook-side Resident	Elevated local area subsurface source - unit Cs-137 (one m. radius, 6 in thick with 6 in cover)	Part I: 1-9 Part VI: 1-3, 5,18, 23 15 pp.	02090908	1.318 E-03	1.71 ± 2.02 E-03
2/9/09	Brook-side Resident	Elevated local area subsurface source - unit Cs-137 (one m. radius, 6 in thick with 12 in cover)	Part I: 1-9 Part VI: 1-3, 5,18, 23 15 pp.	02090909	1.633 E -04	6.96 ± 16.4 E-04
2/9/09	Brook-side Resident	Elevated local area surface source - unit Co-60 (one m. radius, 6 in thick)	Part I: 1-9 Part VI: 1-3, 5,18, 23 15 pp.	02090910	2.332 E-02	2.29 ± 1.66 E-02
2/9/09	Brook-side Resident	Elevated local area subsurface source - unit Co-60 (one m. radius, 6 in thick with 6 in cover)	Part I: 1-9 Part VI: 1-3, 5,18, 23 15 pp.	02090911	7.480 E-03	8.66 ± 8.83 E-03
2/9/09	Brook-side Resident	Elevated local area subsurface source - unit Co-60 (one m. radius, 6 in thick with 12 in cover)	Part I: 1-9 Part VI: 1-3, 5,18, 23 15 pp.	02090912	1.377 E-03	3.67 ± 7.06 E-03
2/9/09	Brook-side Resident Notes	Local area elevated source is not beneath the house. It only affects the outdoor exposure FOTD = 0.0091 and FOIN = 0. Checked the effect of adding density of cover as a probabilistic sampling parameter for case: Cs-137 9 in subsurface with 15 in cover (file No. 02090903). The probabilistic dose increased from 1.51 to 1.89 E-02 mrem/y, but the overall PRCC score decreased from 0.82 to 0.80. Stayed with the original parameter set. Total pages = 180 for 12 case runs.				
2/10/09	Country Club Worker	Base case - unit Concentration Cs-137 (3 in. thick surface source)	Part I: 1-9 Part VI: 1-3, 5,18, 23 15 pp.	02100901	1.056 E-01	9.78 ± 6.20 E-02
2/10/09	Country Club Worker	Base case - unit Concentration Co-60 (3 in. thick surface source)	Part I: 1-9 Part VI: 1-3, 5,18, 23 15 pp.	02100902	4.251 E-01	3.97 ± 2.57 E -01
2/10/09	Country Club Worker	Elevated local area surface source - unit Cs-137 (3 m. radius, 6 in thick)	Part I: 1-9 Part VI: 1-3, 5,18, 23 15 pp.	02100903	6.047 E-02	5.62 ± 3.87 E-02

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Run Date	Case Title	Description	Pages	File Name	Result (mrem)	
					Deterministic	Probabilistic
2/10/09	Country Club Worker	Elevated local area subsurface source - unit Cs-137 (3 m. radius, 12 in thick with 6 in cover)	Part I: 1-9 Part VI: 1-3, 5,18, 23 15 pp.	02100904	1.825 E-02	2.53 ± 3.14 E-02
2/10/09	Country Club Worker	Elevated local area subsurface source - unit Cs-137 (3 m. radius, 12 in thick with 18 in cover)	Part I: 1-9 Part VI: 1-3, 5,18, 23 15 pp.	02100905	2.350 E-04	6.97 ± 24.8 E-03
2/10/09	Country Club Worker Notes	Total pages = 75 for 5 case runs.				
2/25/09	Recreationist	Base case - unit Cs-137 (6 in. thick surface source)	Part I: 1-8 Part VI: 1-3, 5, 18, 23 14 pp.	02110901	3.557 E-02 3.556 E-02	Total: 3.22 ± 1.83 E-02 Gnd: 3.22 ± 1.83 E-02
2/25/09	Recreationist	Base case subsurface source - unit Cs-137 (12 in. thick source with 6 in cover)	Part I: 1-8 Part VI: 1-3, 5, 18, 23 14 pp.	02110903	4.461 E-03 4.461 E-03	Total: 7.29 ± 10.1 E-03 Gnd: 7.28 ± 10.1 E-03
2/25/09	Recreationist	Base case subsurface source - unit Cs-137 (12 in. thick source with 18 in cover)	Part I: 1-8 Part VI: 1-3, 5, 18, 23 14 pp.	02110904	5.299 E-04 5.299 E-05	Total: 2.11 ± 7.75 E-03 Gnd: 2.11 ± 7.75 E-03
2/11/09	Recreationist	Base case - unit Co-60 (6 in. thick surface source)	Part I: 1-8 Part VI: 1-3, 5, 13, 18, 23 15 pp.	02110902	1.508 E-01 1.507 E-01	Total: 1.31 ± 0.78 E-01 Gnd: 1.27 ± 0.80 E-01 Fish: 3.95 ± 0.17 E-03
2/25/09	Recreationist	Elevated local area surface source - unit Cs-137 for direct pathway (3 m. radius, 6 in thick)	Part I: 1-8 Part VI: 1-3, 5, 18, 23 14 pp.	02110905	2.296 E-02 2.296 E-02	Total: 2.01 ± 1.22 E-02 Gnd: 2.01 ± 1.22 E-02
2/25/09	Recreationist	Elevated local area subsurface source - unit Cs-137 for direct pathway (3 m. radius, 12 in thick with 6 in cover)	Part I: 1-8 Part VI: 1-3, 5, 18, 23 14 pp.	02120901	4.348 E-03 4.348 E-03	Total: 6.19 ± 7.47 E-03 Gnd: 6.19 ± 7.47 E-03
2/25/09	Recreationist	Elevated local area subsurface source - unit Cs-137 for direct pathway (3 m. radius, 12 in thick with 18 in cover)	Part I: 1-8 Part VI: 1-3, 5, 18, 23 14 pp.	02120902	5.282 E -05 5.282 E-05	Total: 1.63 ± 5.36 E-03 Gnd: 1.63 ± 5.36 E-03
2/25/09	Recreationist	Contaminated zone model for unit Cs-137 fish pathway, 30 in. thick source (0.76m), 1500 m^2 area, no cover.	Part I: 1-8 Part VI: 1-3, 13, 18, 23 14 pp.	02120903	3.158 E-04 3.044 E-04	Total: 3.73 ± 17.5 E-02 Fish: 3.70 ± 17.5 E-02

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Run Date	Case Title	Description	Pages	File Name	Result (mrem)	
					Deterministic	Probabilistic
2/25/09	Recreationist	Elevated local area model for unit Cs-137 fish pathway, 30 in. thick source (0.76m), 28.3 m^2 area, no cover.	Part I: 1-8 Part VI: 1-3, 13, 18, 23 14 pp.	02120904	6.113 E-06 5.744 E-06	Total: 7.01 ± 33.0 E-04 Fish: 6.95 ± 33.0 E-04
	Recreationist Notes	The fish ingestion pathway is suppressed for the case runs for the Cs-137 primary contaminated zone sources and the local elevated area sources – only the direct pathway (and direct inhalation and dust ingestion pathways) are active. The direct pathway is suppressed for the case runs established for the special source models established for the Cs-137 fish pathway dose calculations. Total pages = 127 for 9 case runs.				

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Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.860E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	7.600E-02	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.930E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.810E+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)	1.522E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.500E-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)	2.700E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	5.000E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	8.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	3.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.522E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.500E-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	7.120E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	1.000E+03	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.543E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.400E-02	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)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	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	5.000E-01	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	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)	not used	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)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	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	not used	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	not used	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)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	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)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

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 dose	17	---	---	LYMAX
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	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	186.00 square meters	Cs-137	1.000E+00
Thickness:	0.08 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	4.017E-02	3.882E-02	3.623E-02	0.000E+00
M(t):	1.607E-03	1.553E-03	1.449E-03	0.000E+00

Maximum TDOSE(t): 4.017E-02 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	2.574E-02	0.6408	2.082E-08	0.0000	0.000E+00	0.0000	1.443E-02	0.3592	0.000E+00	0.0000	0.000E+00	0.0000	1.185E-06	0.0000
Total	2.574E-02	0.6408	2.082E-08	0.0000	0.000E+00	0.0000	1.443E-02	0.3592	0.000E+00	0.0000	0.000E+00	0.0000	1.185E-06	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	4.017E-02	1.0000
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	4.017E-02	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.014	.007		
2	AREA	TRIANGULAR	90	186	280	
3	THICK0	NORMAL	.076	.038		
4	DIET(1)	TRIANGULAR	135	160	318	
5	DROOT	UNIFORM	.3	4		
6	FPLANT	TRIANGULAR	.25	.5	.75	
7	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.49E-01	1.49E-01	1.44E-01	1.36E-01	0.00E+00
Avg	0.00E+00	3.59E-02	3.59E-02	3.47E-02	3.23E-02	0.00E+00
Std	0.00E+00	2.30E-02	2.30E-02	2.24E-02	2.12E-02	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.49E-01	1.49E-01	1.44E-01	1.36E-01	0.00E+00
Avg	0.00E+00	3.59E-02	3.59E-02	3.47E-02	3.23E-02	0.00E+00
Std	0.00E+00	2.30E-02	2.30E-02	2.24E-02	2.12E-02	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic results summary : Suburban Gardner for TBD 08-006 unit Cs-137 Dose Assessment File: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02080901.RAD

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	7.23E-02	7.04E-02	6.66E-02	0.00E+00
Avg	2.40E-02	2.32E-02	2.17E-02	0.00E+00
Std	1.53E-02	1.49E-02	1.42E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	7.23E-02	7.04E-02	6.66E-02	0.00E+00
Avg	2.40E-02	2.32E-02	2.17E-02	0.00E+00
Std	1.53E-02	1.49E-02	1.42E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Plant (Water Ind.)

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.09E-01	1.06E-01	9.96E-02	0.00E+00
Avg	1.19E-02	1.15E-02	1.06E-02	0.00E+00
Std	1.46E-02	1.42E-02	1.33E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.09E-01	1.06E-01	9.96E-02	0.00E+00
Avg	1.19E-02	1.15E-02	1.06E-02	0.00E+00
Std	1.46E-02	1.42E-02	1.33E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

RESRAD Regression and Correlation output 02/09/09 09:29 Page: Coef 1
Title : Suburban Gardner for TBD 08-006 unit Cs-137 Dose Assessment Base Case
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02080901.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	2	0.77	2	0.47	2	0.84	2	0.53
Area of contaminated zone	7	0.15	7	0.06	5	0.30	5	0.11
Thickness of contaminated zone	1	0.86	1	0.67	1	0.89	1	0.68
Fruit, vegetable, and grain consumption	5	0.24	5	0.10	6	0.29	6	0.10
Depth of roots	3	-0.69	3	-0.38	3	-0.70	3	-0.34
Plant food	4	0.27	4	0.11	4	0.32	4	0.12
Density of contaminated zone	6	0.18	6	0.07	7	0.18	7	0.06
R-SQUARE		0.84		0.84		0.88		0.88

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.860E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	7.600E-02	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.930E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.810E+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)	1.522E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.500E-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)	2.700E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	5.000E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	8.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	3.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.522E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.500E-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	7.120E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.096E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.400E-02	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)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	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	5.000E-01	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	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)	not used	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)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	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	not used	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	not used	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)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	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)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

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 dose	17	---	---	LYMAX
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	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	186.00 square meters	Co-60	1.000E+00
Thickness:	0.08 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.179E-01	1.017E-01	7.568E-02	0.000E+00
M(t):	4.715E-03	4.068E-03	3.027E-03	0.000E+00

Maximum TDOSE(t): 1.179E-01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.032E-01	0.8755	1.352E-07	0.0000	0.000E+00	0.0000	1.468E-02	0.1245	0.000E+00	0.0000	0.000E+00	0.0000	6.026E-07	0.0000
Total	1.032E-01	0.8755	1.352E-07	0.0000	0.000E+00	0.0000	1.468E-02	0.1245	0.000E+00	0.0000	0.000E+00	0.0000	6.026E-07	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	1.179E-01	1.0000
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	1.179E-01	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.014	.0007		
2	AREA	TRIANGULAR	90	186	280	
3	THICK0	NORMAL	.076	.038		
4	DIET(1)	TRIANGULAR	135	160	318	
5	DROOT	UNIFORM	.3	4		
6	FPLANT	TRIANGULAR	.25	.5	.75	
7	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Co-60						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	2.49E-01	2.49E-01	2.16E-01	1.63E-01	0.00E+00
Avg	0.00E+00	1.09E-01	1.09E-01	9.40E-02	6.98E-02	0.00E+00
Std	0.00E+00	4.52E-02	4.52E-02	3.98E-02	3.07E-02	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	2.49E-01	2.49E-01	2.16E-01	1.63E-01	0.00E+00
Avg	0.00E+00	1.09E-01	1.09E-01	9.40E-02	6.98E-02	0.00E+00
Std	0.00E+00	4.52E-02	4.52E-02	3.98E-02	3.07E-02	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.71E-01	1.49E-01	1.14E-01	0.00E+00
Avg	9.69E-02	8.35E-02	6.21E-02	0.00E+00
Std	3.72E-02	3.28E-02	2.55E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.71E-01	1.49E-01	1.14E-01	0.00E+00
Avg	9.69E-02	8.35E-02	6.21E-02	0.00E+00
Std	3.72E-02	3.28E-02	2.55E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Plant (Water Ind.)

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.11E-01	9.65E-02	7.24E-02	0.00E+00
Avg	1.21E-02	1.04E-02	7.71E-03	0.00E+00
Std	1.49E-02	1.29E-02	9.66E-03	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.11E-01	9.65E-02	7.24E-02	0.00E+00
Avg	1.21E-02	1.04E-02	7.71E-03	0.00E+00
Std	1.49E-02	1.29E-02	9.66E-03	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

RESRAD Regression and Correlation output 02/09/09 10:01 Page: Coef 1
Title : Suburban Gardner for TBD 08-006 unit Co-60 Dose Assessment Base Case
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02080902.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	5	0.22	5	0.06	4	0.49	4	0.12
Area of contaminated zone	4	0.32	4	0.09	5	0.41	5	0.09
Thickness of contaminated zone	1	0.96	1	0.93	1	0.98	1	0.92
Fruit, vegetable, and grain consumption	6	0.19	6	0.05	7	0.29	7	0.06
Depth of roots	2	-0.58	2	-0.18	3	-0.66	3	-0.18
Plant food	7	0.15	7	0.04	6	0.32	6	0.07
Density of contaminated zone	3	0.57	3	0.18	2	0.68	2	0.20
R-SQUARE		0.93		0.93		0.96		0.96

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	3.142E+00	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.817E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.400E-02	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	3.14 square meters	Cs-137	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	8.750E-03	8.504E-03	8.032E-03	0.000E+00
M(t):	3.500E-04	3.402E-04	3.213E-04	0.000E+00

Maximum TDOSE(t): 8.750E-03 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	8.750E-03	1.0000	2.657E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.964E-08	0.0000
Total	8.750E-03	1.0000	2.657E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.964E-08	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	8.750E-03	1.0000
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	8.750E-03	1.0000

*Sum of all water independent and dependent pathways.

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Part VI: Uncertainty Analysis

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.014	.007		
2	AREA	TRIANGULAR	1	3.14	6.28	
3	THICK0	NORMAL	.15	.076		
4	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	2.91E-02	2.91E-02	2.84E-02	2.71E-02	0.00E+00
Avg	0.00E+00	8.14E-03	8.14E-03	7.92E-03	7.49E-03	0.00E+00
Std	0.00E+00	5.61E-03	5.61E-03	5.48E-03	5.22E-03	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	2.91E-02	2.91E-02	2.84E-02	2.71E-02	0.00E+00
Avg	0.00E+00	8.14E-03	8.14E-03	7.92E-03	7.49E-03	0.00E+00
Std	0.00E+00	5.61E-03	5.61E-03	5.48E-03	5.22E-03	0.00E+00

∑ALL is total dose summed for all nuclides.

RESRAD, Version 6.4 T½ Limit = 180 days 02/09/2009 10:23 Page 5
Probabilistic results summary : Suburban Gardner for TBD 08-006 unit Cs-137 Dose Assessment File: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02080903.RAD

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.54E-02	2.48E-02	2.36E-02	0.00E+00
Avg	8.07E-03	7.85E-03	7.42E-03	0.00E+00
Std	5.27E-03	5.15E-03	4.90E-03	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.54E-02	2.48E-02	2.36E-02	0.00E+00
Avg	8.07E-03	7.85E-03	7.42E-03	0.00E+00
Std	5.27E-03	5.15E-03	4.90E-03	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

RESRAD Regression and Correlation output 02/09/09 10:51 Page: Coef 1
Title : Suburban Gardner for TBD 08-006 unit Cs-137 Dose Assessment Elev Area 1
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02080903.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	1	0.86	1	0.67	1	0.83	1	0.65
Area of contaminated zone	3	0.69	3	0.38	3	0.63	3	0.35
Thickness of contaminated zone	2	0.78	2	0.49	2	0.75	2	0.50
Density of contaminated zone	4	0.23	4	0.10	4	0.17	4	0.08
R-SQUARE		0.84		0.84		0.81		0.81

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	3.142E+00	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	1.500E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.817E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.400E-02	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	3.14 square meters	Cs-137	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.15 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	2.028E-03	2.004E-03	1.955E-03	0.000E+00
M(t):	8.113E-05	8.015E-05	7.820E-05	0.000E+00

Maximum TDOSE(t): 2.028E-03 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	2.028E-03	1.0000	8.850E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.320E-10	0.0000
Total	2.028E-03	1.0000	8.850E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.320E-10	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	2.028E-03	1.0000
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	2.028E-03	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.014	.007		
2	AREA	TRIANGULAR	1	3.14	6.28	
3	THICK0	NORMAL	.15	.076		
4	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999
5	COVER0	NORMAL	.15	.076		

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	DOSE(j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.79E-02	1.79E-02	1.74E-02	1.65E-02	0.00E+00
Avg	0.00E+00	2.53E-03	2.53E-03	2.50E-03	2.42E-03	0.00E+00
Std	0.00E+00	2.95E-03	2.95E-03	2.90E-03	2.78E-03	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.79E-02	1.79E-02	1.74E-02	1.65E-02	0.00E+00
Avg	0.00E+00	2.53E-03	2.53E-03	2.50E-03	2.42E-03	0.00E+00
Std	0.00E+00	2.95E-03	2.95E-03	2.90E-03	2.78E-03	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.79E-02	1.74E-02	1.65E-02	0.00E+00
Avg	2.53E-03	2.50E-03	2.42E-03	0.00E+00
Std	2.95E-03	2.90E-03	2.78E-03	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.79E-02	1.74E-02	1.65E-02	0.00E+00
Avg	2.53E-03	2.50E-03	2.42E-03	0.00E+00
Std	2.95E-03	2.90E-03	2.78E-03	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

RESRAD Regression and Correlation output 02/09/09 11:19 Page: Coef 1
Title : Suburban Gardner for TBD 08-006 unit Cs-137 Dose Assessment Elev Area 2
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02080904.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	2	0.63	2	0.43	2	0.78	2	0.48
Area of contaminated zone	4	0.29	4	0.16	3	0.60	3	0.29
Thickness of contaminated zone	3	0.37	3	0.21	4	0.60	4	0.28
Density of contaminated zone	5	-0.03	5	-0.01	5	-0.14	5	-0.05
Cover depth	1	-0.79	1	-0.68	1	-0.88	1	-0.70
R-SQUARE		0.72		0.72		0.86		0.86

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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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)	3.142E+00	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	3.000E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.817E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.400E-02	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	3.14 square meters	Cs-137	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.30 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	2.689E-04	2.662E-04	2.607E-04	0.000E+00
M(t):	1.076E-05	1.065E-05	1.043E-05	0.000E+00

Maximum TDOSE(t): 2.689E-04 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	2.689E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.689E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	2.689E-04	1.0000
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	2.689E-04	1.0000

*Sum of all water independent and dependent pathways.

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Part VI: Uncertainty Analysis

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.014	.007		
2	AREA	TRIANGULAR	1	3.14	6.28	
3	THICK0	NORMAL	.15	.076		
4	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999
5	COVER0	NORMAL	.3	.15		

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.63E-02	1.63E-02	1.59E-02	1.51E-02	0.00E+00
Avg	0.00E+00	1.05E-03	1.05E-03	1.03E-03	1.00E-03	0.00E+00
Std	0.00E+00	2.41E-03	2.41E-03	2.36E-03	2.26E-03	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.63E-02	1.63E-02	1.59E-02	1.51E-02	0.00E+00
Avg	0.00E+00	1.05E-03	1.05E-03	1.03E-03	1.00E-03	0.00E+00
Std	0.00E+00	2.41E-03	2.41E-03	2.36E-03	2.26E-03	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.63E-02	1.59E-02	1.51E-02	0.00E+00
Avg	1.05E-03	1.03E-03	1.00E-03	0.00E+00
Std	2.41E-03	2.36E-03	2.26E-03	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.63E-02	1.59E-02	1.51E-02	0.00E+00
Avg	1.05E-03	1.03E-03	1.00E-03	0.00E+00
Std	2.41E-03	2.36E-03	2.26E-03	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

RESRAD Regression and Correlation output 02/09/09 11:28 Page: Coef 1
Title : Suburban Gardner for TBD 08-006 unit Cs-137 Dose Assessment Elev Area 3
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02080905.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	2	0.34	2	0.28	2	0.60	2	0.30
Area of contaminated zone	3	0.14	3	0.11	3	0.48	3	0.22
Thickness of contaminated zone	4	0.12	4	0.09	4	0.41	4	0.18
Density of contaminated zone	5	-0.07	5	-0.05	5	-0.16	5	-0.06
Cover depth	1	-0.60	1	-0.57	1	-0.90	1	-0.83
R-SQUARE		0.43		0.43		0.85		0.85

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	3.142E+00	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.595E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.400E-02	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	3.14 square meters	Co-60	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	3.589E-02	3.120E-02	2.357E-02	0.000E+00
M(t):	1.436E-03	1.248E-03	9.428E-04	0.000E+00

Maximum TDOSE(t): 3.589E-02 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	3.589E-02	1.0000	1.727E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.019E-08	0.0000
Total	3.589E-02	1.0000	1.727E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.019E-08	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	3.589E-02	1.0000
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	3.589E-02	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.014	.007		
2	AREA	TRIANGULAR	1	3.14	6.28	
3	THICK0	NORMAL	.15	.076		
4	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Co-60						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.26E-01	1.26E-01	1.10E-01	8.40E-02	0.00E+00
Avg	0.00E+00	3.37E-02	3.37E-02	2.93E-02	2.22E-02	0.00E+00
Std	0.00E+00	2.37E-02	2.37E-02	2.08E-02	1.59E-02	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.26E-01	1.26E-01	1.10E-01	8.40E-02	0.00E+00
Avg	0.00E+00	3.37E-02	3.37E-02	2.93E-02	2.22E-02	0.00E+00
Std	0.00E+00	2.37E-02	2.37E-02	2.08E-02	1.59E-02	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.26E-01	1.10E-01	8.40E-02	0.00E+00
Avg	3.37E-02	2.93E-02	2.22E-02	0.00E+00
Std	2.37E-02	2.08E-02	1.59E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.26E-01	1.10E-01	8.40E-02	0.00E+00
Avg	3.37E-02	2.93E-02	2.22E-02	0.00E+00
Std	2.37E-02	2.08E-02	1.59E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

RESRAD Regression and Correlation output 02/09/09 11:43 Page: Coef 1
Title : Suburban Gardner for TBD 08-006 unit Co-60 Dose Assessment Elev Area 1
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02080906.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	1	0.86	1	0.66	1	0.83	1	0.64
Area of contaminated zone	3	0.69	3	0.37	3	0.63	3	0.35
Thickness of contaminated zone	2	0.80	2	0.52	2	0.78	2	0.53
Density of contaminated zone	4	0.27	4	0.11	4	0.19	4	0.08
R-SQUARE		0.85		0.85		0.82		0.82

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	3.142E+00	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	1.500E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.595E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.400E-02	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	3.14 square meters	Co-60	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.15 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.151E-02	1.015E-02	7.890E-03	0.000E+00
M(t):	4.605E-04	4.060E-04	3.156E-04	0.000E+00

Maximum TDOSE(t): 1.151E-02 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.151E-02	1.0000	5.644E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.600E-11	0.0000
Total	1.151E-02	1.0000	5.644E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.600E-11	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	1.151E-02	1.0000
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	1.151E-02	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.014	.007		
2	AREA	TRIANGULAR	1	3.14	6.28	
3	THICK0	NORMAL	.15	.076		
4	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999
5	COVER0	NORMAL	.15	.076		

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Co-60						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	7.30E-02	7.30E-02	6.37E-02	4.84E-02	0.00E+00
Avg	0.00E+00	1.28E-02	1.28E-02	1.13E-02	8.72E-03	0.00E+00
Std	0.00E+00	1.29E-02	1.29E-02	1.13E-02	8.73E-03	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	7.30E-02	7.30E-02	6.37E-02	4.84E-02	0.00E+00
Avg	0.00E+00	1.28E-02	1.28E-02	1.13E-02	8.72E-03	0.00E+00
Std	0.00E+00	1.29E-02	1.29E-02	1.13E-02	8.73E-03	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	7.30E-02	6.37E-02	4.84E-02	0.00E+00
Avg	1.28E-02	1.13E-02	8.72E-03	0.00E+00
Std	1.29E-02	1.13E-02	8.73E-03	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	7.30E-02	6.37E-02	4.84E-02	0.00E+00
Avg	1.28E-02	1.13E-02	8.72E-03	0.00E+00
Std	1.29E-02	1.13E-02	8.73E-03	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

RESRAD Regression and Correlation output 02/09/09 11:50 Page: Coef 1
Title : Suburban Gardner for TBD 08-006 unit Co-60 Dose Assessment Elev Area 2
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02080907.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	2	0.71	2	0.48	2	0.81	2	0.52
Area of contaminated zone	4	0.35	4	0.18	4	0.59	4	0.28
Thickness of contaminated zone	3	0.48	3	0.27	3	0.65	3	0.33
Density of contaminated zone	5	0.01	5	0.01	5	-0.10	5	-0.04
Cover depth	1	-0.80	1	-0.65	1	-0.86	1	-0.64
R-SQUARE		0.76		0.76		0.85		0.85

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	3.142E+00	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	3.000E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.595E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.400E-02	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	3.14 square meters	Co-60	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.30 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	2.239E-03	1.978E-03	1.543E-03	0.000E+00
M(t):	8.956E-05	7.910E-05	6.171E-05	0.000E+00

Maximum TDOSE(t): 2.239E-03 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	2.239E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.239E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	2.239E-03	1.0000
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	2.239E-03	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.014	.007		
2	AREA	TRIANGULAR	1	3.14	6.28	
3	THICK0	NORMAL	.15	.076		
4	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999
5	COVER0	NORMAL	.3	.15		

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	DOSE(j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	6.79E-02	6.79E-02	5.93E-02	4.52E-02	0.00E+00
Avg	0.00E+00	5.54E-03	5.54E-03	4.87E-03	3.76E-03	0.00E+00
Std	0.00E+00	1.04E-02	1.04E-02	9.10E-03	6.97E-03	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	6.79E-02	6.79E-02	5.93E-02	4.52E-02	0.00E+00
Avg	0.00E+00	5.54E-03	5.54E-03	4.87E-03	3.76E-03	0.00E+00
Std	0.00E+00	1.04E-02	1.04E-02	9.10E-03	6.97E-03	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	6.79E-02	5.93E-02	4.52E-02	0.00E+00
Avg	5.54E-03	4.87E-03	3.76E-03	0.00E+00
Std	1.04E-02	9.10E-03	6.97E-03	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	6.79E-02	5.93E-02	4.52E-02	0.00E+00
Avg	5.54E-03	4.87E-03	3.76E-03	0.00E+00
Std	1.04E-02	9.10E-03	6.97E-03	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

RESRAD Regression and Correlation output 02/09/09 11:59 Page: Coef 1
Title : Suburban Gardner for TBD 08-006 unit Co-60 Dose Assessment Elev Area 3
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02080908.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	2	0.39	2	0.31	2	0.65	2	0.34
Area of contaminated zone	4	0.17	4	0.12	3	0.52	3	0.24
Thickness of contaminated zone	3	0.17	3	0.12	4	0.49	4	0.22
Density of contaminated zone	5	-0.05	5	-0.04	5	-0.13	5	-0.05
Cover depth	1	-0.65	1	-0.60	1	-0.90	1	-0.80
R-SQUARE		0.49		0.49		0.85		0.85

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.860E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.817E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	1.250E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	9.100E-03	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	186.00 square meters	Cs-137	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	2.468E-01	2.404E-01	2.279E-01	0.000E+00
M(t):	9.874E-03	9.615E-03	9.118E-03	0.000E+00

Maximum TDOSE(t): 2.468E-01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	2.468E-01	0.9999	1.741E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.248E-05	0.0001
Total	2.468E-01	0.9999	1.741E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.248E-05	0.0001

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	2.468E-01	1.0000
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	2.468E-01	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0091	.005		
2	AREA	TRIANGULAR	90	186	280	
3	THICK0	NORMAL	.15	.075		
4	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999
5	FIND	NORMAL	.125	.063		

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	5.99E-01	5.99E-01	5.85E-01	5.57E-01	0.00E+00
Avg	0.00E+00	2.21E-01	2.21E-01	2.16E-01	2.04E-01	0.00E+00
Std	0.00E+00	1.21E-01	1.21E-01	1.19E-01	1.13E-01	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	5.99E-01	5.99E-01	5.85E-01	5.57E-01	0.00E+00
Avg	0.00E+00	2.21E-01	2.21E-01	2.16E-01	2.04E-01	0.00E+00
Std	0.00E+00	1.21E-01	1.21E-01	1.19E-01	1.13E-01	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	5.99E-01	5.85E-01	5.57E-01	0.00E+00
Avg	2.21E-01	2.15E-01	2.04E-01	0.00E+00
Std	1.21E-01	1.19E-01	1.13E-01	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	5.99E-01	5.85E-01	5.57E-01	0.00E+00
Avg	2.21E-01	2.15E-01	2.04E-01	0.00E+00
Std	1.21E-01	1.19E-01	1.13E-01	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	2.12E-02	2.06E-02	1.88E-02	0.00E+00
0.075	3.51E-02	3.41E-02	3.06E-02	0.00E+00
0.100	4.80E-02	4.60E-02	4.36E-02	0.00E+00
0.125	7.15E-02	6.92E-02	6.52E-02	0.00E+00
0.150	8.82E-02	8.57E-02	7.90E-02	0.00E+00
0.175	1.04E-01	1.01E-01	9.46E-02	0.00E+00
0.200	1.10E-01	1.06E-01	9.96E-02	0.00E+00
0.225	1.19E-01	1.16E-01	1.10E-01	0.00E+00
0.250	1.33E-01	1.29E-01	1.23E-01	0.00E+00
0.275	1.47E-01	1.44E-01	1.31E-01	0.00E+00
0.300	1.58E-01	1.54E-01	1.46E-01	0.00E+00
0.325	1.70E-01	1.65E-01	1.56E-01	0.00E+00
0.350	1.76E-01	1.71E-01	1.63E-01	0.00E+00
0.375	1.82E-01	1.77E-01	1.67E-01	0.00E+00
0.400	1.85E-01	1.81E-01	1.73E-01	0.00E+00
0.425	1.94E-01	1.89E-01	1.78E-01	0.00E+00
0.450	2.01E-01	1.97E-01	1.86E-01	0.00E+00
0.475	2.12E-01	2.07E-01	1.96E-01	0.00E+00
0.500	2.20E-01	2.13E-01	2.02E-01	0.00E+00
0.525	2.27E-01	2.21E-01	2.09E-01	0.00E+00
0.550	2.36E-01	2.29E-01	2.15E-01	0.00E+00
0.575	2.40E-01	2.33E-01	2.21E-01	0.00E+00
0.600	2.48E-01	2.41E-01	2.29E-01	0.00E+00
0.625	2.51E-01	2.45E-01	2.33E-01	0.00E+00
0.650	2.60E-01	2.52E-01	2.38E-01	0.00E+00
0.675	2.66E-01	2.59E-01	2.46E-01	0.00E+00
0.700	2.81E-01	2.73E-01	2.59E-01	0.00E+00
0.725	2.91E-01	2.84E-01	2.71E-01	0.00E+00
0.750	3.09E-01	2.99E-01	2.84E-01	0.00E+00
0.775	3.12E-01	3.04E-01	2.89E-01	0.00E+00
0.800	3.22E-01	3.14E-01	2.99E-01	0.00E+00
0.825	3.48E-01	3.39E-01	3.21E-01	0.00E+00
0.850	3.54E-01	3.46E-01	3.28E-01	0.00E+00
0.875	3.70E-01	3.61E-01	3.44E-01	0.00E+00
0.900	3.88E-01	3.78E-01	3.60E-01	0.00E+00
0.925	4.08E-01	3.97E-01	3.78E-01	0.00E+00
0.950	4.28E-01	4.18E-01	3.99E-01	0.00E+00
0.975	4.78E-01	4.66E-01	4.43E-01	0.00E+00
1.000	5.99E-01	5.85E-01	5.57E-01	0.00E+00

RESRAD Regression and Correlation output 02/09/09 15:44 Page: Coef 1
Title : Brookside Resident for TBD 08-006 unit Cs-137 Dose Assessment - 6 in Surface Sou
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02090901.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	3	0.29	3	0.09	4	0.17	4	0.05
Area of contaminated zone	4	0.18	4	0.05	3	0.17	3	0.06
Thickness of contaminated zone	2	0.82	2	0.42	2	0.79	2	0.40
Density of contaminated zone	5	0.04	5	0.01	5	0.00	5	0.00
Indoor time fraction	1	0.95	1	0.85	1	0.94	1	0.85
R-SQUARE		0.92		0.92		0.90		0.90

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.860E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.290E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	1.500E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.121E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	1.250E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	9.100E-03	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	186.00 square meters	Cs-137	1.000E+00
Thickness:	0.23 meters		
Cover Depth:	0.15 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	3.459E-02	3.427E-02	3.364E-02	0.000E+00
M(t):	1.384E-03	1.371E-03	1.345E-03	0.000E+00

Maximum TDOSE(t): 3.459E-02 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	3.459E-02	1.0000	5.801E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.489E-08	0.0000
Total	3.459E-02	1.0000	5.801E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.489E-08	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	3.459E-02	1.0000
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	3.459E-02	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0091	.005		
2	AREA	TRIANGULAR	90	186	280	
3	THICK0	NORMAL	.229	.115		
4	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999
5	FIND	NORMAL	.125	.063		
6	COVER0	NORMAL	.15	.007		

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	8.13E-02	8.13E-02	8.05E-02	7.90E-02	0.00E+00
Avg	0.00E+00	3.19E-02	3.19E-02	3.16E-02	3.10E-02	0.00E+00
Std	0.00E+00	1.69E-02	1.69E-02	1.68E-02	1.65E-02	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	8.13E-02	8.13E-02	8.05E-02	7.90E-02	0.00E+00
Avg	0.00E+00	3.19E-02	3.19E-02	3.16E-02	3.10E-02	0.00E+00
Std	0.00E+00	1.69E-02	1.69E-02	1.68E-02	1.65E-02	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	8.13E-02	8.05E-02	7.90E-02	0.00E+00
Avg	3.19E-02	3.16E-02	3.10E-02	0.00E+00
Std	1.69E-02	1.68E-02	1.65E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	8.13E-02	8.05E-02	7.90E-02	0.00E+00
Avg	3.19E-02	3.16E-02	3.10E-02	0.00E+00
Std	1.69E-02	1.68E-02	1.65E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Probabilistic results summary : Brookside Resident for TBD 08-006 unit Cs-137 D-
ose AssessmenFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02090902.RAD

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	1.92E-03	1.85E-03	1.70E-03	0.00E+00
0.075	6.18E-03	6.12E-03	6.01E-03	0.00E+00
0.100	8.81E-03	8.73E-03	8.57E-03	0.00E+00
0.125	1.07E-02	1.06E-02	1.04E-02	0.00E+00
0.150	1.21E-02	1.20E-02	1.18E-02	0.00E+00
0.175	1.52E-02	1.51E-02	1.48E-02	0.00E+00
0.200	1.68E-02	1.66E-02	1.63E-02	0.00E+00
0.225	1.85E-02	1.83E-02	1.80E-02	0.00E+00
0.250	1.91E-02	1.89E-02	1.85E-02	0.00E+00
0.275	2.04E-02	2.02E-02	1.98E-02	0.00E+00
0.300	2.23E-02	2.20E-02	2.16E-02	0.00E+00
0.325	2.36E-02	2.33E-02	2.29E-02	0.00E+00
0.350	2.50E-02	2.47E-02	2.43E-02	0.00E+00
0.375	2.58E-02	2.56E-02	2.51E-02	0.00E+00
0.400	2.68E-02	2.65E-02	2.60E-02	0.00E+00
0.425	2.76E-02	2.73E-02	2.68E-02	0.00E+00
0.450	2.92E-02	2.89E-02	2.84E-02	0.00E+00
0.475	3.04E-02	3.02E-02	2.96E-02	0.00E+00
0.500	3.24E-02	3.21E-02	3.15E-02	0.00E+00
0.525	3.35E-02	3.31E-02	3.25E-02	0.00E+00
0.550	3.45E-02	3.42E-02	3.36E-02	0.00E+00
0.575	3.53E-02	3.50E-02	3.44E-02	0.00E+00
0.600	3.72E-02	3.69E-02	3.62E-02	0.00E+00
0.625	3.88E-02	3.84E-02	3.77E-02	0.00E+00
0.650	4.01E-02	3.97E-02	3.90E-02	0.00E+00
0.675	4.08E-02	4.04E-02	3.97E-02	0.00E+00
0.700	4.14E-02	4.10E-02	4.02E-02	0.00E+00
0.725	4.27E-02	4.23E-02	4.15E-02	0.00E+00
0.750	4.36E-02	4.32E-02	4.24E-02	0.00E+00
0.775	4.48E-02	4.44E-02	4.36E-02	0.00E+00
0.800	4.66E-02	4.61E-02	4.53E-02	0.00E+00
0.825	4.79E-02	4.74E-02	4.66E-02	0.00E+00
0.850	4.97E-02	4.92E-02	4.83E-02	0.00E+00
0.875	5.15E-02	5.10E-02	5.01E-02	0.00E+00
0.900	5.46E-02	5.41E-02	5.31E-02	0.00E+00
0.925	5.66E-02	5.61E-02	5.51E-02	0.00E+00
0.950	6.22E-02	6.16E-02	6.05E-02	0.00E+00
0.975	6.43E-02	6.37E-02	6.25E-02	0.00E+00
1.000	8.13E-02	8.05E-02	7.90E-02	0.00E+00

RESRAD Regression and Correlation output 02/09/09 16:18 Page: Coef 1
Title : Brookside Resident for TBD 08-006 unit Cs-137 Dose Assessment - 9 in subsurface
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02090902.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	4	0.20	4	0.07	6	0.09	6	0.03
Area of contaminated zone	6	-0.05	6	-0.02	4	-0.12	4	-0.04
Thickness of contaminated zone	2	0.70	2	0.32	2	0.62	2	0.28
Density of contaminated zone	5	0.11	5	0.04	5	0.09	5	0.03
Indoor time fraction	1	0.94	1	0.88	1	0.93	1	0.89
Cover depth	3	-0.40	3	-0.14	3	-0.35	3	-0.13
R-SQUARE		0.89		0.89		0.88		0.88

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.860E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.290E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	3.800E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.121E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	1.250E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	9.100E-03	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	186.00 square meters	Cs-137	1.000E+00
Thickness:	0.23 meters		
Cover Depth:	0.38 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.305E-03	1.293E-03	1.269E-03	0.000E+00
M(t):	5.220E-05	5.171E-05	5.075E-05	0.000E+00

Maximum TDOSE(t): 1.305E-03 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	1.305E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.305E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	1.305E-03	1.0000
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	1.305E-03	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0091	.005		
2	AREA	TRIANGULAR	90	186	280	
3	THICK0	NORMAL	.229	.115		
4	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999
5	FIND	NORMAL	.125	.063		
6	COVER0	NORMAL	.38	.19		

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	DOSE(j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	3.43E-01	3.43E-01	3.34E-01	3.15E-01	2.45E-11
Avg	0.00E+00	1.51E-02	1.51E-02	1.49E-02	1.44E-02	4.32E-13
Std	0.00E+00	4.56E-02	4.56E-02	4.46E-02	4.27E-02	2.79E-12
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	3.43E-01	3.43E-01	3.34E-01	3.15E-01	2.45E-11
Avg	0.00E+00	1.51E-02	1.51E-02	1.49E-02	1.44E-02	4.32E-13
Std	0.00E+00	4.56E-02	4.56E-02	4.46E-02	4.27E-02	2.79E-12

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	3.43E-01	3.34E-01	3.15E-01	2.45E-11
Avg	1.51E-02	1.49E-02	1.44E-02	4.32E-13
Std	4.55E-02	4.46E-02	4.27E-02	2.79E-12
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	3.43E-01	3.34E-01	3.15E-01	2.45E-11
Avg	1.51E-02	1.49E-02	1.44E-02	4.32E-13
Std	4.55E-02	4.46E-02	4.27E-02	2.79E-12

∑ALL is total pathway dose summed for all nuclides.

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	1.80E-06	1.78E-06	1.75E-06	0.00E+00
0.075	7.62E-06	7.55E-06	7.40E-06	0.00E+00
0.100	1.79E-05	1.77E-05	1.74E-05	0.00E+00
0.125	3.25E-05	3.22E-05	3.16E-05	0.00E+00
0.150	4.89E-05	4.84E-05	4.75E-05	0.00E+00
0.175	5.43E-05	5.36E-05	5.20E-05	0.00E+00
0.200	7.25E-05	7.19E-05	7.05E-05	0.00E+00
0.225	1.10E-04	1.09E-04	1.07E-04	0.00E+00
0.250	1.30E-04	1.29E-04	1.26E-04	0.00E+00
0.275	1.56E-04	1.54E-04	1.51E-04	0.00E+00
0.300	1.86E-04	1.84E-04	1.80E-04	0.00E+00
0.325	2.32E-04	2.30E-04	2.25E-04	0.00E+00
0.350	3.27E-04	3.24E-04	3.18E-04	0.00E+00
0.375	4.33E-04	4.29E-04	4.21E-04	0.00E+00
0.400	5.10E-04	5.05E-04	4.95E-04	0.00E+00
0.425	6.10E-04	6.04E-04	5.92E-04	0.00E+00
0.450	7.48E-04	7.41E-04	7.27E-04	0.00E+00
0.475	8.97E-04	8.89E-04	8.73E-04	0.00E+00
0.500	1.07E-03	1.06E-03	1.04E-03	0.00E+00
0.525	1.26E-03	1.25E-03	1.23E-03	0.00E+00
0.550	1.37E-03	1.36E-03	1.34E-03	0.00E+00
0.575	1.70E-03	1.68E-03	1.65E-03	0.00E+00
0.600	1.94E-03	1.92E-03	1.89E-03	0.00E+00
0.625	2.31E-03	2.29E-03	2.25E-03	0.00E+00
0.650	2.95E-03	2.92E-03	2.87E-03	0.00E+00
0.675	3.54E-03	3.51E-03	3.45E-03	0.00E+00
0.700	4.31E-03	4.27E-03	4.19E-03	0.00E+00
0.725	5.40E-03	5.35E-03	5.25E-03	0.00E+00
0.750	6.84E-03	6.78E-03	6.65E-03	0.00E+00
0.775	8.16E-03	8.08E-03	7.93E-03	0.00E+00
0.800	1.22E-02	1.21E-02	1.19E-02	0.00E+00
0.825	1.35E-02	1.34E-02	1.32E-02	0.00E+00
0.850	1.81E-02	1.79E-02	1.76E-02	0.00E+00
0.875	2.36E-02	2.34E-02	2.24E-02	0.00E+00
0.900	3.07E-02	3.05E-02	2.99E-02	0.00E+00
0.925	4.26E-02	4.22E-02	4.15E-02	0.00E+00
0.950	8.96E-02	8.88E-02	8.72E-02	0.00E+00
0.975	1.68E-01	1.66E-01	1.62E-01	4.72E-12
1.000	3.43E-01	3.34E-01	3.15E-01	2.45E-11

RESRAD Regression and Correlation output 02/09/09 17:08 Page: Coef 1
Title : Brookside Resident for TBD 08-006 unit Cs-137 Dose Assessment - 9 in subsurface
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02090903.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	6	-0.08	6	-0.06	6	0.01	6	0.00
Area of contaminated zone	4	-0.12	4	-0.09	5	-0.15	5	-0.06
Thickness of contaminated zone	5	0.12	5	0.09	3	0.34	3	0.15
Density of contaminated zone	3	-0.17	3	-0.14	4	0.18	4	0.08
Indoor time fraction	2	0.20	2	0.16	2	0.48	2	0.23
Cover depth	1	-0.57	1	-0.56	1	-0.90	1	-0.86
R-SQUARE		0.37		0.37		0.82		0.82

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.860E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.595E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	1.250E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	9.100E-03	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	186.00 square meters	Co-60	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.045E+00	9.104E-01	6.903E-01	0.000E+00
M(t):	4.182E-02	3.642E-02	2.761E-02	0.000E+00

Maximum TDOSE(t): 1.045E+00 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.045E+00	1.0000	1.132E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.145E-05	0.0000
Total	1.045E+00	1.0000	1.132E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.145E-05	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	1.045E+00	1.0000
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	1.045E+00	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0091	.005		
2	AREA	TRIANGULAR	90	186	280	
3	THICK0	NORMAL	.15	.075		
4	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999
5	FIND	NORMAL	.125	.063		

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Co-60						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	2.64E+00	2.64E+00	2.31E+00	1.76E+00	0.00E+00
Avg	0.00E+00	9.38E-01	9.38E-01	8.16E-01	6.18E-01	0.00E+00
Std	0.00E+00	5.24E-01	5.24E-01	4.58E-01	3.51E-01	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	2.64E+00	2.64E+00	2.31E+00	1.76E+00	0.00E+00
Avg	0.00E+00	9.38E-01	9.38E-01	8.16E-01	6.18E-01	0.00E+00
Std	0.00E+00	5.24E-01	5.24E-01	4.58E-01	3.51E-01	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.64E+00	2.31E+00	1.76E+00	0.00E+00
Avg	9.38E-01	8.16E-01	6.18E-01	0.00E+00
Std	5.24E-01	4.58E-01	3.51E-01	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.64E+00	2.31E+00	1.76E+00	0.00E+00
Avg	9.38E-01	8.16E-01	6.18E-01	0.00E+00
Std	5.24E-01	4.58E-01	3.51E-01	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	8.54E-02	7.29E-02	5.05E-02	0.00E+00
0.075	1.45E-01	1.26E-01	8.99E-02	0.00E+00
0.100	1.96E-01	1.70E-01	1.28E-01	0.00E+00
0.125	2.97E-01	2.57E-01	1.94E-01	0.00E+00
0.150	3.65E-01	3.19E-01	2.43E-01	0.00E+00
0.175	4.23E-01	3.61E-01	2.65E-01	0.00E+00
0.200	4.53E-01	3.95E-01	2.96E-01	0.00E+00
0.225	5.06E-01	4.41E-01	3.36E-01	0.00E+00
0.250	5.62E-01	4.84E-01	3.64E-01	0.00E+00
0.275	5.97E-01	5.15E-01	3.88E-01	0.00E+00
0.300	6.49E-01	5.68E-01	4.35E-01	0.00E+00
0.325	7.07E-01	6.17E-01	4.62E-01	0.00E+00
0.350	7.45E-01	6.48E-01	4.89E-01	0.00E+00
0.375	7.64E-01	6.65E-01	5.05E-01	0.00E+00
0.400	7.78E-01	6.77E-01	5.14E-01	0.00E+00
0.425	8.17E-01	7.09E-01	5.32E-01	0.00E+00
0.450	8.48E-01	7.38E-01	5.59E-01	0.00E+00
0.475	8.76E-01	7.62E-01	5.77E-01	0.00E+00
0.500	9.24E-01	7.96E-01	6.01E-01	0.00E+00
0.525	9.37E-01	8.16E-01	6.18E-01	0.00E+00
0.550	9.71E-01	8.41E-01	6.34E-01	0.00E+00
0.575	1.01E+00	8.76E-01	6.55E-01	0.00E+00
0.600	1.04E+00	9.07E-01	6.87E-01	0.00E+00
0.625	1.07E+00	9.36E-01	7.14E-01	0.00E+00
0.650	1.11E+00	9.67E-01	7.39E-01	0.00E+00
0.675	1.15E+00	1.01E+00	7.69E-01	0.00E+00
0.700	1.20E+00	1.04E+00	7.87E-01	0.00E+00
0.725	1.24E+00	1.08E+00	8.17E-01	0.00E+00
0.750	1.30E+00	1.13E+00	8.54E-01	0.00E+00
0.775	1.34E+00	1.17E+00	8.94E-01	0.00E+00
0.800	1.38E+00	1.20E+00	9.15E-01	0.00E+00
0.825	1.46E+00	1.27E+00	9.64E-01	0.00E+00
0.850	1.51E+00	1.31E+00	9.97E-01	0.00E+00
0.875	1.60E+00	1.39E+00	1.06E+00	0.00E+00
0.900	1.68E+00	1.47E+00	1.12E+00	0.00E+00
0.925	1.75E+00	1.53E+00	1.17E+00	0.00E+00
0.950	1.85E+00	1.61E+00	1.23E+00	0.00E+00
0.975	2.02E+00	1.76E+00	1.34E+00	0.00E+00
1.000	2.64E+00	2.31E+00	1.76E+00	0.00E+00

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	3	0.29	3	0.08	3	0.17	3	0.05
Area of contaminated zone	4	0.16	4	0.05	4	0.16	4	0.05
Thickness of contaminated zone	2	0.85	2	0.46	2	0.83	2	0.45
Density of contaminated zone	5	0.10	5	0.03	5	0.04	5	0.01
Indoor time fraction	1	0.95	1	0.83	1	0.94	1	0.83
R-SQUARE		0.92		0.92		0.91		0.91

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.

*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.860E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.290E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	1.500E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.355E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	1.250E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	9.100E-03	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	186.00 square meters	Co-60	1.000E+00
Thickness:	0.23 meters		
Cover Depth:	0.15 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	2.201E-01	1.948E-01	1.525E-01	0.000E+00
M(t):	8.804E-03	7.791E-03	6.101E-03	0.000E+00

Maximum TDOSE(t): 2.201E-01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	2.201E-01	1.0000	3.702E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.745E-08	0.0000
Total	2.201E-01	1.0000	3.702E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.745E-08	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	2.201E-01	1.0000
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	2.201E-01	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0091	.005		
2	AREA	TRIANGULAR	90	186	280	
3	THICK0	NORMAL	.229	.115		
4	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999
5	FIND	NORMAL	.125	.063		
6	COVER0	NORMAL	.15	.007		

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Co-60						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	5.04E-01	5.04E-01	4.46E-01	3.49E-01	0.00E+00
Avg	0.00E+00	2.01E-01	2.01E-01	1.78E-01	1.39E-01	0.00E+00
Std	0.00E+00	1.08E-01	1.08E-01	9.59E-02	7.52E-02	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	5.04E-01	5.04E-01	4.46E-01	3.49E-01	0.00E+00
Avg	0.00E+00	2.01E-01	2.01E-01	1.78E-01	1.39E-01	0.00E+00
Std	0.00E+00	1.08E-01	1.08E-01	9.59E-02	7.52E-02	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	5.04E-01	4.46E-01	3.49E-01	0.00E+00
Avg	2.01E-01	1.78E-01	1.39E-01	0.00E+00
Std	1.08E-01	9.59E-02	7.52E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	5.04E-01	4.46E-01	3.49E-01	0.00E+00
Avg	2.01E-01	1.78E-01	1.39E-01	0.00E+00
Std	1.08E-01	9.59E-02	7.52E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	1.11E-02	9.86E-03	7.73E-03	0.00E+00
0.075	4.02E-02	3.52E-02	2.69E-02	0.00E+00
0.100	5.36E-02	4.74E-02	3.72E-02	0.00E+00
0.125	6.72E-02	5.93E-02	4.64E-02	0.00E+00
0.150	7.82E-02	6.92E-02	5.43E-02	0.00E+00
0.175	9.26E-02	8.14E-02	6.29E-02	0.00E+00
0.200	1.05E-01	9.28E-02	7.28E-02	0.00E+00
0.225	1.14E-01	1.01E-01	7.90E-02	0.00E+00
0.250	1.22E-01	1.08E-01	8.47E-02	0.00E+00
0.275	1.29E-01	1.13E-01	8.79E-02	0.00E+00
0.300	1.36E-01	1.20E-01	9.40E-02	0.00E+00
0.325	1.47E-01	1.30E-01	1.01E-01	0.00E+00
0.350	1.55E-01	1.37E-01	1.07E-01	0.00E+00
0.375	1.62E-01	1.44E-01	1.12E-01	0.00E+00
0.400	1.70E-01	1.50E-01	1.17E-01	0.00E+00
0.425	1.76E-01	1.56E-01	1.22E-01	0.00E+00
0.450	1.88E-01	1.66E-01	1.30E-01	0.00E+00
0.475	1.93E-01	1.71E-01	1.34E-01	0.00E+00
0.500	1.98E-01	1.75E-01	1.37E-01	0.00E+00
0.525	2.07E-01	1.83E-01	1.43E-01	0.00E+00
0.550	2.17E-01	1.92E-01	1.50E-01	0.00E+00
0.575	2.28E-01	2.02E-01	1.58E-01	0.00E+00
0.600	2.34E-01	2.07E-01	1.62E-01	0.00E+00
0.625	2.44E-01	2.15E-01	1.68E-01	0.00E+00
0.650	2.53E-01	2.24E-01	1.75E-01	0.00E+00
0.675	2.58E-01	2.28E-01	1.79E-01	0.00E+00
0.700	2.65E-01	2.35E-01	1.84E-01	0.00E+00
0.725	2.70E-01	2.39E-01	1.87E-01	0.00E+00
0.750	2.77E-01	2.45E-01	1.92E-01	0.00E+00
0.775	2.85E-01	2.52E-01	1.97E-01	0.00E+00
0.800	2.96E-01	2.61E-01	2.04E-01	0.00E+00
0.825	3.05E-01	2.71E-01	2.12E-01	0.00E+00
0.850	3.15E-01	2.78E-01	2.18E-01	0.00E+00
0.875	3.29E-01	2.91E-01	2.29E-01	0.00E+00
0.900	3.43E-01	3.04E-01	2.39E-01	0.00E+00
0.925	3.60E-01	3.18E-01	2.49E-01	0.00E+00
0.950	3.84E-01	3.41E-01	2.67E-01	0.00E+00
0.975	4.10E-01	3.62E-01	2.83E-01	0.00E+00
1.000	5.04E-01	4.46E-01	3.49E-01	0.00E+00

RESRAD Regression and Correlation output 02/09/09 16:52 Page: Coef 1
Title : Brookside Resident for TBD 08-006 unit Co-60 Dose Assessment - 9 in subsurface w
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02090905.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	4	0.21	4	0.07	6	0.09	6	0.03
Area of contaminated zone	6	-0.02	6	-0.01	5	-0.09	5	-0.03
Thickness of contaminated zone	2	0.76	2	0.36	2	0.69	2	0.32
Density of contaminated zone	5	0.17	5	0.05	4	0.15	4	0.05
Indoor time fraction	1	0.94	1	0.88	1	0.93	1	0.88
Cover depth	3	-0.33	3	-0.11	3	-0.24	3	-0.09
R-SQUARE		0.90		0.90		0.88		0.88

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.860E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.290E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	3.800E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.355E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	1.250E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	9.100E-03	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	186.00 square meters	Co-60	1.000E+00
Thickness:	0.23 meters		
Cover Depth:	0.38 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.493E-02	1.321E-02	1.035E-02	0.000E+00
M(t):	5.970E-04	5.284E-04	4.138E-04	0.000E+00

Maximum TDOSE(t): 1.493E-02 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.493E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.493E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	1.493E-02	1.0000
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	1.493E-02	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0091	.005		
2	AREA	TRIANGULAR	90	186	280	
3	THICK0	NORMAL	.229	.115		
4	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999
5	FIND	NORMAL	.125	.063		
6	COVER0	NORMAL	.38	.19		

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Co-60						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.41E+00	1.41E+00	1.22E+00	9.24E-01	0.00E+00
Avg	0.00E+00	8.23E-02	8.23E-02	7.24E-02	5.62E-02	0.00E+00
Std	0.00E+00	2.06E-01	2.06E-01	1.80E-01	1.39E-01	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.41E+00	1.41E+00	1.22E+00	9.24E-01	0.00E+00
Avg	0.00E+00	8.23E-02	8.23E-02	7.24E-02	5.62E-02	0.00E+00
Std	0.00E+00	2.06E-01	2.06E-01	1.80E-01	1.39E-01	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.41E+00	1.22E+00	9.24E-01	0.00E+00
Avg	8.23E-02	7.24E-02	5.62E-02	0.00E+00
Std	2.06E-01	1.80E-01	1.39E-01	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.41E+00	1.22E+00	9.24E-01	0.00E+00
Avg	8.23E-02	7.24E-02	5.62E-02	0.00E+00
Std	2.06E-01	1.80E-01	1.39E-01	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

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Probabilistic results summary : Brookside Resident for TBD 08-006 unit Co-60 Dose AssessmentFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02090906.RAD

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	5.69E-05	5.04E-05	3.94E-05	0.00E+00
0.075	1.98E-04	1.75E-04	1.36E-04	0.00E+00
0.100	3.80E-04	3.36E-04	2.63E-04	0.00E+00
0.125	6.15E-04	5.45E-04	4.23E-04	0.00E+00
0.150	7.68E-04	6.60E-04	5.18E-04	0.00E+00
0.175	1.10E-03	9.72E-04	7.61E-04	0.00E+00
0.200	1.21E-03	1.07E-03	8.42E-04	0.00E+00
0.225	1.68E-03	1.49E-03	1.17E-03	0.00E+00
0.250	2.15E-03	1.90E-03	1.47E-03	0.00E+00
0.275	2.48E-03	2.19E-03	1.68E-03	0.00E+00
0.300	2.88E-03	2.50E-03	1.90E-03	0.00E+00
0.325	3.52E-03	3.08E-03	2.36E-03	0.00E+00
0.350	4.17E-03	3.69E-03	2.90E-03	0.00E+00
0.375	5.21E-03	4.61E-03	3.62E-03	0.00E+00
0.400	6.45E-03	5.70E-03	4.46E-03	0.00E+00
0.425	7.93E-03	7.03E-03	5.48E-03	0.00E+00
0.450	9.17E-03	8.10E-03	6.32E-03	0.00E+00
0.475	1.07E-02	9.49E-03	7.45E-03	0.00E+00
0.500	1.31E-02	1.16E-02	9.04E-03	0.00E+00
0.525	1.38E-02	1.22E-02	9.56E-03	0.00E+00
0.550	1.54E-02	1.32E-02	1.04E-02	0.00E+00
0.575	1.83E-02	1.62E-02	1.27E-02	0.00E+00
0.600	1.96E-02	1.73E-02	1.36E-02	0.00E+00
0.625	2.37E-02	2.10E-02	1.64E-02	0.00E+00
0.650	3.03E-02	2.69E-02	2.11E-02	0.00E+00
0.675	3.49E-02	3.08E-02	2.40E-02	0.00E+00
0.700	4.10E-02	3.63E-02	2.85E-02	0.00E+00
0.725	4.67E-02	4.13E-02	3.24E-02	0.00E+00
0.750	5.46E-02	4.82E-02	3.76E-02	0.00E+00
0.775	6.74E-02	5.96E-02	4.66E-02	0.00E+00
0.800	8.02E-02	7.06E-02	5.46E-02	0.00E+00
0.825	9.84E-02	8.71E-02	6.78E-02	0.00E+00
0.850	1.15E-01	9.90E-02	7.72E-02	0.00E+00
0.875	1.56E-01	1.38E-01	1.08E-01	0.00E+00
0.900	2.06E-01	1.83E-01	1.43E-01	0.00E+00
0.925	2.56E-01	2.27E-01	1.78E-01	0.00E+00
0.950	4.82E-01	4.26E-01	3.34E-01	0.00E+00
0.975	7.69E-01	6.79E-01	5.28E-01	0.00E+00
1.000	1.41E+00	1.22E+00	9.24E-01	0.00E+00

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	6	-0.06	6	-0.04	6	-0.01	6	0.00
Area of contaminated zone	5	-0.11	5	-0.09	5	-0.15	5	-0.07
Thickness of contaminated zone	4	0.15	4	0.11	3	0.38	3	0.18
Density of contaminated zone	3	-0.16	3	-0.13	4	0.18	4	0.08
Indoor time fraction	2	0.22	2	0.17	2	0.53	2	0.27
Cover depth	1	-0.62	1	-0.60	1	-0.89	1	-0.84
R-SQUARE		0.42		0.42		0.82		0.82

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	3.140E+00	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.817E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	9.100E-03	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	3.14 square meters	Cs-137	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	5.685E-03	5.525E-03	5.219E-03	0.000E+00
M(t):	2.274E-04	2.210E-04	2.088E-04	0.000E+00

Maximum TDOSE(t): 5.685E-03 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	5.685E-03	1.0000	1.727E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.575E-08	0.0000
Total	5.685E-03	1.0000	1.727E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.575E-08	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	5.685E-03	1.0000
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	5.685E-03	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0091	.005		
2	AREA	TRIANGULAR	1.57	3.14	6.28	
3	THICK0	NORMAL	.15	.075		
4	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	2.03E-02	2.03E-02	1.98E-02	1.89E-02	0.00E+00
Avg	0.00E+00	5.54E-03	5.54E-03	5.38E-03	5.09E-03	0.00E+00
Std	0.00E+00	3.92E-03	3.92E-03	3.82E-03	3.64E-03	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	2.03E-02	2.03E-02	1.98E-02	1.89E-02	0.00E+00
Avg	0.00E+00	5.54E-03	5.54E-03	5.38E-03	5.09E-03	0.00E+00
Std	0.00E+00	3.92E-03	3.92E-03	3.82E-03	3.64E-03	0.00E+00

∑ALL is total dose summed for all nuclides.

RESRAD, Version 6.4 T½ Limit = 180 days 02/09/2009 18:12 Page 5
Probabilistic results summary : Brookside Resident for TBD 08-006 unit Cs-137 D-
ose AssessmenFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02090907.RAD

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.03E-02	1.98E-02	1.89E-02	0.00E+00
Avg	5.54E-03	5.38E-03	5.09E-03	0.00E+00
Std	3.92E-03	3.82E-03	3.64E-03	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.03E-02	1.98E-02	1.89E-02	0.00E+00
Avg	5.54E-03	5.38E-03	5.09E-03	0.00E+00
Std	3.92E-03	3.82E-03	3.64E-03	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.075	3.63E-04	3.54E-04	3.36E-04	0.00E+00
0.100	7.14E-04	6.97E-04	6.63E-04	0.00E+00
0.125	1.08E-03	1.04E-03	9.63E-04	0.00E+00
0.150	1.20E-03	1.16E-03	1.10E-03	0.00E+00
0.175	1.72E-03	1.65E-03	1.56E-03	0.00E+00
0.200	2.02E-03	1.97E-03	1.82E-03	0.00E+00
0.225	2.23E-03	2.17E-03	2.03E-03	0.00E+00
0.250	2.66E-03	2.60E-03	2.43E-03	0.00E+00
0.275	2.81E-03	2.72E-03	2.55E-03	0.00E+00
0.300	3.13E-03	3.05E-03	2.89E-03	0.00E+00
0.325	3.47E-03	3.36E-03	3.14E-03	0.00E+00
0.350	3.65E-03	3.56E-03	3.35E-03	0.00E+00
0.375	3.98E-03	3.88E-03	3.66E-03	0.00E+00
0.400	4.20E-03	4.09E-03	3.84E-03	0.00E+00
0.425	4.48E-03	4.32E-03	4.09E-03	0.00E+00
0.450	4.74E-03	4.61E-03	4.35E-03	0.00E+00
0.475	4.94E-03	4.80E-03	4.50E-03	0.00E+00
0.500	5.10E-03	4.96E-03	4.68E-03	0.00E+00
0.525	5.35E-03	5.18E-03	4.91E-03	0.00E+00
0.550	5.49E-03	5.36E-03	5.05E-03	0.00E+00
0.575	5.77E-03	5.59E-03	5.27E-03	0.00E+00
0.600	6.02E-03	5.84E-03	5.52E-03	0.00E+00
0.625	6.21E-03	6.06E-03	5.77E-03	0.00E+00
0.650	6.46E-03	6.29E-03	5.99E-03	0.00E+00
0.675	6.78E-03	6.62E-03	6.28E-03	0.00E+00
0.700	7.13E-03	6.96E-03	6.63E-03	0.00E+00
0.725	7.50E-03	7.28E-03	6.91E-03	0.00E+00
0.750	7.73E-03	7.51E-03	7.14E-03	0.00E+00
0.775	7.94E-03	7.74E-03	7.34E-03	0.00E+00
0.800	8.24E-03	8.03E-03	7.59E-03	0.00E+00
0.825	8.94E-03	8.67E-03	8.21E-03	0.00E+00
0.850	9.28E-03	9.04E-03	8.55E-03	0.00E+00
0.875	1.01E-02	9.81E-03	9.24E-03	0.00E+00
0.900	1.06E-02	1.03E-02	9.80E-03	0.00E+00
0.925	1.17E-02	1.14E-02	1.08E-02	0.00E+00
0.950	1.29E-02	1.26E-02	1.20E-02	0.00E+00
0.975	1.54E-02	1.51E-02	1.44E-02	0.00E+00
1.000	2.03E-02	1.98E-02	1.89E-02	0.00E+00

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	1	0.88	1	0.71	1	0.86	1	0.70
Area of contaminated zone	3	0.62	3	0.31	3	0.56	3	0.29
Thickness of contaminated zone	2	0.77	2	0.48	2	0.76	2	0.49
Density of contaminated zone	4	0.21	4	0.09	4	0.11	4	0.05
R-SQUARE		0.85		0.85		0.82		0.82

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	3.140E+00	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	1.500E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.817E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	9.100E-03	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	3.14 square meters	Cs-137	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.15 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.318E-03	1.302E-03	1.270E-03	0.000E+00
M(t):	5.272E-05	5.208E-05	5.081E-05	0.000E+00

Maximum TDOSE(t): 1.318E-03 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	1.318E-03	1.0000	5.752E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.578E-11	0.0000
Total	1.318E-03	1.0000	5.752E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.578E-11	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	1.318E-03	1.0000
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	1.318E-03	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0091	.005		
2	AREA	TRIANGULAR	1.57	3.14	6.28	
3	THICK0	NORMAL	.15	.075		
4	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999
5	COVER0	NORMAL	.15	.075		

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	DOSE(j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.20E-02	1.20E-02	1.17E-02	1.11E-02	0.00E+00
Avg	0.00E+00	1.71E-03	1.71E-03	1.69E-03	1.64E-03	0.00E+00
Std	0.00E+00	2.02E-03	2.02E-03	1.98E-03	1.90E-03	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.20E-02	1.20E-02	1.17E-02	1.11E-02	0.00E+00
Avg	0.00E+00	1.71E-03	1.71E-03	1.69E-03	1.64E-03	0.00E+00
Std	0.00E+00	2.02E-03	2.02E-03	1.98E-03	1.90E-03	0.00E+00

∑ALL is total dose summed for all nuclides.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	3.140E+00	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	3.050E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.817E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	9.100E-03	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	3.14 square meters	Cs-137	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.31 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.633E-04	1.616E-04	1.583E-04	0.000E+00
M(t):	6.533E-06	6.465E-06	6.333E-06	0.000E+00

Maximum TDOSE(t): 1.633E-04 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	1.633E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.633E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	1.633E-04	1.0000
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	1.633E-04	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0091	.005		
2	AREA	TRIANGULAR	1.57	3.14	6.28	
3	THICK0	NORMAL	.15	.075		
4	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999
5	COVER0	NORMAL	.305	.152		

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.11E-02	1.11E-02	1.09E-02	1.03E-02	0.00E+00
Avg	0.00E+00	6.96E-04	6.96E-04	6.84E-04	6.61E-04	0.00E+00
Std	0.00E+00	1.64E-03	1.64E-03	1.60E-03	1.53E-03	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.11E-02	1.11E-02	1.09E-02	1.03E-02	0.00E+00
Avg	0.00E+00	6.96E-04	6.96E-04	6.84E-04	6.61E-04	0.00E+00
Std	0.00E+00	1.64E-03	1.64E-03	1.60E-03	1.53E-03	0.00E+00

∑ALL is total dose summed for all nuclides.

RESRAD, Version 6.4 T½ Limit = 180 days 02/09/2009 18:50 Page 18
Probabilistic results summary : Brookside Resident for TBD 08-006 unit Cs-137 D-
ose AssessmenFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02090909.RAD
Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.075	1.39E-06	1.37E-06	1.35E-06	0.00E+00
0.100	3.66E-06	3.62E-06	3.54E-06	0.00E+00
0.125	5.63E-06	5.56E-06	5.44E-06	0.00E+00
0.150	7.07E-06	7.00E-06	6.87E-06	0.00E+00
0.175	1.22E-05	1.21E-05	1.18E-05	0.00E+00
0.200	1.70E-05	1.68E-05	1.63E-05	0.00E+00
0.225	1.95E-05	1.93E-05	1.89E-05	0.00E+00
0.250	2.15E-05	2.13E-05	2.08E-05	0.00E+00
0.275	2.50E-05	2.47E-05	2.42E-05	0.00E+00
0.300	3.23E-05	3.19E-05	3.12E-05	0.00E+00
0.325	3.78E-05	3.72E-05	3.62E-05	0.00E+00
0.350	4.24E-05	4.20E-05	4.11E-05	0.00E+00
0.375	4.57E-05	4.53E-05	4.43E-05	0.00E+00
0.400	5.24E-05	5.19E-05	5.07E-05	0.00E+00
0.425	6.88E-05	6.81E-05	6.67E-05	0.00E+00
0.450	7.59E-05	7.51E-05	7.36E-05	0.00E+00
0.475	8.84E-05	8.57E-05	8.38E-05	0.00E+00
0.500	1.00E-04	9.89E-05	9.62E-05	0.00E+00
0.525	1.16E-04	1.15E-04	1.13E-04	0.00E+00
0.550	1.34E-04	1.33E-04	1.30E-04	0.00E+00
0.575	1.71E-04	1.69E-04	1.66E-04	0.00E+00
0.600	1.98E-04	1.95E-04	1.89E-04	0.00E+00
0.625	2.22E-04	2.19E-04	2.15E-04	0.00E+00
0.650	2.59E-04	2.57E-04	2.52E-04	0.00E+00
0.675	3.60E-04	3.55E-04	3.45E-04	0.00E+00
0.700	4.31E-04	4.26E-04	4.13E-04	0.00E+00
0.725	5.10E-04	5.04E-04	4.94E-04	0.00E+00
0.750	6.17E-04	6.10E-04	5.98E-04	0.00E+00
0.775	7.04E-04	6.95E-04	6.78E-04	0.00E+00
0.800	8.24E-04	8.16E-04	7.99E-04	0.00E+00
0.825	9.28E-04	9.18E-04	9.00E-04	0.00E+00
0.850	1.15E-03	1.14E-03	1.11E-03	0.00E+00
0.875	1.48E-03	1.46E-03	1.43E-03	0.00E+00
0.900	2.04E-03	2.02E-03	1.97E-03	0.00E+00
0.925	2.48E-03	2.44E-03	2.38E-03	0.00E+00
0.950	3.12E-03	3.08E-03	2.98E-03	0.00E+00
0.975	6.79E-03	6.60E-03	6.23E-03	0.00E+00
1.000	1.11E-02	1.09E-02	1.03E-02	0.00E+00

RESRAD Regression and Correlation output 02/09/09 18:50 Page: Coef 1
Title : Brookside Resident for TBD 08-006 unit Cs-137 Dose Assessment - Elev area 6 in s
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02090909.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	2	0.35	2	0.29	2	0.64	2	0.33
Area of contaminated zone	3	0.13	3	0.10	3	0.47	3	0.21
Thickness of contaminated zone	4	0.11	4	0.09	4	0.39	4	0.17
Density of contaminated zone	5	-0.07	5	-0.05	5	-0.17	5	-0.07
Cover depth	1	-0.59	1	-0.55	1	-0.90	1	-0.82
R-SQUARE		0.41		0.41		0.84		0.84

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.11E-02	1.09E-02	1.03E-02	0.00E+00
Avg	6.96E-04	6.84E-04	6.61E-04	0.00E+00
Std	1.64E-03	1.60E-03	1.53E-03	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.11E-02	1.09E-02	1.03E-02	0.00E+00
Avg	6.96E-04	6.84E-04	6.61E-04	0.00E+00
Std	1.64E-03	1.60E-03	1.53E-03	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

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Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.

*Base Case means Default.Lib w/o Associate Nuclide contributions.

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.595E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	9.100E-03	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	3.14 square meters	Co-60	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	2.332E-02	2.027E-02	1.531E-02	0.000E+00
M(t):	9.327E-04	8.107E-04	6.126E-04	0.000E+00

Maximum TDOSE(t): 2.332E-02 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	2.332E-02	1.0000	1.122E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.311E-08	0.0000
Total	2.332E-02	1.0000	1.122E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.311E-08	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	2.332E-02	1.0000
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	2.332E-02	1.0000

*Sum of all water independent and dependent pathways.

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)	3.140E+00	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0091	.005		
2	AREA	TRIANGULAR	1.57	3.14	6.28	
3	THICK0	NORMAL	.15	.075		
4	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Co-60						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	8.76E-02	8.76E-02	7.66E-02	5.86E-02	0.00E+00
Avg	0.00E+00	2.29E-02	2.29E-02	2.00E-02	1.51E-02	0.00E+00
Std	0.00E+00	1.66E-02	1.66E-02	1.45E-02	1.11E-02	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	8.76E-02	8.76E-02	7.66E-02	5.86E-02	0.00E+00
Avg	0.00E+00	2.29E-02	2.29E-02	2.00E-02	1.51E-02	0.00E+00
Std	0.00E+00	1.66E-02	1.66E-02	1.45E-02	1.11E-02	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	8.76E-02	7.66E-02	5.86E-02	0.00E+00
Avg	2.29E-02	2.00E-02	1.51E-02	0.00E+00
Std	1.66E-02	1.45E-02	1.11E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	8.76E-02	7.66E-02	5.86E-02	0.00E+00
Avg	2.29E-02	2.00E-02	1.51E-02	0.00E+00
Std	1.66E-02	1.45E-02	1.11E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.075	1.51E-03	1.31E-03	9.15E-04	0.00E+00
0.100	2.98E-03	2.56E-03	1.88E-03	0.00E+00
0.125	4.38E-03	3.71E-03	2.65E-03	0.00E+00
0.150	5.10E-03	4.39E-03	3.14E-03	0.00E+00
0.175	7.08E-03	6.16E-03	4.29E-03	0.00E+00
0.200	8.21E-03	6.95E-03	5.00E-03	0.00E+00
0.225	9.11E-03	7.95E-03	5.84E-03	0.00E+00
0.250	1.07E-02	9.31E-03	6.71E-03	0.00E+00
0.275	1.13E-02	9.77E-03	7.32E-03	0.00E+00
0.300	1.29E-02	1.10E-02	7.95E-03	0.00E+00
0.325	1.37E-02	1.18E-02	8.84E-03	0.00E+00
0.350	1.50E-02	1.30E-02	9.84E-03	0.00E+00
0.375	1.62E-02	1.40E-02	1.05E-02	0.00E+00
0.400	1.70E-02	1.49E-02	1.12E-02	0.00E+00
0.425	1.82E-02	1.59E-02	1.19E-02	0.00E+00
0.450	1.94E-02	1.67E-02	1.26E-02	0.00E+00
0.475	2.00E-02	1.74E-02	1.33E-02	0.00E+00
0.500	2.10E-02	1.82E-02	1.38E-02	0.00E+00
0.525	2.20E-02	1.90E-02	1.43E-02	0.00E+00
0.550	2.28E-02	1.99E-02	1.50E-02	0.00E+00
0.575	2.35E-02	2.04E-02	1.56E-02	0.00E+00
0.600	2.47E-02	2.16E-02	1.62E-02	0.00E+00
0.625	2.58E-02	2.24E-02	1.69E-02	0.00E+00
0.650	2.67E-02	2.31E-02	1.76E-02	0.00E+00
0.675	2.82E-02	2.43E-02	1.85E-02	0.00E+00
0.700	2.97E-02	2.57E-02	1.93E-02	0.00E+00
0.725	3.14E-02	2.73E-02	2.08E-02	0.00E+00
0.750	3.23E-02	2.82E-02	2.14E-02	0.00E+00
0.775	3.34E-02	2.91E-02	2.21E-02	0.00E+00
0.800	3.40E-02	2.98E-02	2.27E-02	0.00E+00
0.825	3.67E-02	3.21E-02	2.46E-02	0.00E+00
0.850	3.85E-02	3.36E-02	2.56E-02	0.00E+00
0.875	4.15E-02	3.59E-02	2.72E-02	0.00E+00
0.900	4.49E-02	3.92E-02	2.99E-02	0.00E+00
0.925	4.92E-02	4.30E-02	3.27E-02	0.00E+00
0.950	5.42E-02	4.73E-02	3.57E-02	0.00E+00
0.975	6.56E-02	5.73E-02	4.38E-02	0.00E+00
1.000	8.76E-02	7.66E-02	5.86E-02	0.00E+00

RESRAD Regression and Correlation output 02/09/09 18:23 Page: Coef 1
Title : Brookside Resident for TBD 08-006 unit Co-60 Dose Assessment - Elev area 6 in Su
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02090910.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	1	0.88	1	0.70	1	0.86	1	0.69
Area of contaminated zone	3	0.62	3	0.31	3	0.57	3	0.28
Thickness of contaminated zone	2	0.80	2	0.50	2	0.78	2	0.51
Density of contaminated zone	4	0.25	4	0.10	4	0.15	4	0.06
R-SQUARE		0.85		0.85		0.83		0.83

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	3.140E+00	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	1.500E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.595E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	9.100E-03	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	3.14 square meters	Co-60	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.15 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	7.480E-03	6.595E-03	5.127E-03	0.000E+00
M(t):	2.992E-04	2.638E-04	2.051E-04	0.000E+00

Maximum TDOSE(t): 7.480E-03 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	7.480E-03	1.0000	3.669E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.287E-11	0.0000
Total	7.480E-03	1.0000	3.669E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.287E-11	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	7.480E-03	1.0000
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	7.480E-03	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0091	.005		
2	AREA	TRIANGULAR	1.57	3.14	6.28	
3	THICK0	NORMAL	.15	.075		
4	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999
5	COVER0	NORMAL	.15	.075		

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Co-60						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	4.93E-02	4.93E-02	4.30E-02	3.27E-02	0.00E+00
Avg	0.00E+00	8.66E-03	8.66E-03	7.62E-03	5.90E-03	0.00E+00
Std	0.00E+00	8.83E-03	8.83E-03	7.75E-03	5.97E-03	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	4.93E-02	4.93E-02	4.30E-02	3.27E-02	0.00E+00
Avg	0.00E+00	8.66E-03	8.66E-03	7.62E-03	5.90E-03	0.00E+00
Std	0.00E+00	8.83E-03	8.83E-03	7.75E-03	5.97E-03	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	4.93E-02	4.30E-02	3.27E-02	0.00E+00
Avg	8.66E-03	7.62E-03	5.90E-03	0.00E+00
Std	8.83E-03	7.75E-03	5.97E-03	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	4.93E-02	4.30E-02	3.27E-02	0.00E+00
Avg	8.66E-03	7.62E-03	5.90E-03	0.00E+00
Std	8.83E-03	7.75E-03	5.97E-03	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Probabilistic results summary : Brookside Resident for TBD 08-006 unit Co-60 Dose AssessmentFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02090911.RAD

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
	Dose(t), mrem/yr			
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.075	6.04E-04	5.32E-04	3.88E-04	0.00E+00
0.100	8.17E-04	7.21E-04	5.57E-04	0.00E+00
0.125	1.09E-03	9.62E-04	7.34E-04	0.00E+00
0.150	1.24E-03	1.09E-03	8.41E-04	0.00E+00
0.175	1.55E-03	1.36E-03	1.05E-03	0.00E+00
0.200	1.86E-03	1.65E-03	1.29E-03	0.00E+00
0.225	2.07E-03	1.83E-03	1.43E-03	0.00E+00
0.250	2.32E-03	2.05E-03	1.59E-03	0.00E+00
0.275	2.58E-03	2.27E-03	1.76E-03	0.00E+00
0.300	2.72E-03	2.40E-03	1.85E-03	0.00E+00
0.325	3.09E-03	2.73E-03	2.08E-03	0.00E+00
0.350	3.47E-03	3.05E-03	2.31E-03	0.00E+00
0.375	3.73E-03	3.30E-03	2.58E-03	0.00E+00
0.400	3.91E-03	3.46E-03	2.69E-03	0.00E+00
0.425	4.20E-03	3.71E-03	2.88E-03	0.00E+00
0.450	4.58E-03	4.04E-03	3.15E-03	0.00E+00
0.475	5.17E-03	4.57E-03	3.56E-03	0.00E+00
0.500	5.79E-03	5.11E-03	3.99E-03	0.00E+00
0.525	6.30E-03	5.57E-03	4.34E-03	0.00E+00
0.550	6.61E-03	5.83E-03	4.54E-03	0.00E+00
0.575	7.17E-03	6.33E-03	4.94E-03	0.00E+00
0.600	8.07E-03	7.13E-03	5.54E-03	0.00E+00
0.625	8.71E-03	7.67E-03	5.95E-03	0.00E+00
0.650	9.30E-03	8.23E-03	6.41E-03	0.00E+00
0.675	1.01E-02	8.90E-03	6.96E-03	0.00E+00
0.700	1.13E-02	9.92E-03	7.71E-03	0.00E+00
0.725	1.18E-02	1.04E-02	8.16E-03	0.00E+00
0.750	1.25E-02	1.10E-02	8.55E-03	0.00E+00
0.775	1.36E-02	1.20E-02	9.35E-03	0.00E+00
0.800	1.52E-02	1.32E-02	1.01E-02	0.00E+00
0.825	1.60E-02	1.42E-02	1.08E-02	0.00E+00
0.850	1.69E-02	1.48E-02	1.14E-02	0.00E+00
0.875	1.78E-02	1.57E-02	1.22E-02	0.00E+00
0.900	1.99E-02	1.75E-02	1.36E-02	0.00E+00
0.925	2.20E-02	1.94E-02	1.51E-02	0.00E+00
0.950	2.49E-02	2.20E-02	1.71E-02	0.00E+00
0.975	3.19E-02	2.78E-02	2.13E-02	0.00E+00
1.000	4.93E-02	4.30E-02	3.27E-02	0.00E+00

RESRAD Regression and Correlation output 02/09/09 18:31 Page: Coef 1
Title : Brookside Resident for TBD 08-006 unit Co-60 Dose Assessment - Elev area 6 in Su
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02090911.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	2	0.73	2	0.52	2	0.83	2	0.57
Area of contaminated zone	4	0.30	4	0.15	4	0.56	4	0.26
Thickness of contaminated zone	3	0.47	3	0.26	3	0.64	3	0.33
Density of contaminated zone	5	0.01	5	0.01	5	-0.10	5	-0.04
Cover depth	1	-0.79	1	-0.63	1	-0.84	1	-0.60
R-SQUARE		0.76		0.76		0.85		0.85

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	3.140E+00	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	3.050E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.595E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	9.100E-03	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	3.14 square meters	Co-60	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.31 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.377E-03	1.216E-03	9.490E-04	0.000E+00
M(t):	5.509E-05	4.866E-05	3.796E-05	0.000E+00

Maximum TDOSE(t): 1.377E-03 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.377E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.377E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	1.377E-03	1.0000
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	1.377E-03	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0091	.005		
2	AREA	TRIANGULAR	1.57	3.14	6.28	
3	THICK0	NORMAL	.15	.075		
4	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999
5	COVER0	NORMAL	.305	.152		

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Co-60						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	4.64E-02	4.64E-02	4.05E-02	3.08E-02	0.00E+00
Avg	0.00E+00	3.67E-03	3.67E-03	3.22E-03	2.49E-03	0.00E+00
Std	0.00E+00	7.06E-03	7.06E-03	6.18E-03	4.73E-03	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	4.64E-02	4.64E-02	4.05E-02	3.08E-02	0.00E+00
Avg	0.00E+00	3.67E-03	3.67E-03	3.22E-03	2.49E-03	0.00E+00
Std	0.00E+00	7.06E-03	7.06E-03	6.18E-03	4.73E-03	0.00E+00

∑ALL is total dose summed for all nuclides.

RESRAD, Version 6.4 T½ Limit = 180 days 02/09/2009 19:01 Page 5
Probabilistic results summary : Brookside Resident for TBD 08-006 unit Co-60 Dose AssessmentFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02090912.RAD

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	4.64E-02	4.05E-02	3.08E-02	0.00E+00
Avg	3.67E-03	3.22E-03	2.49E-03	0.00E+00
Std	7.06E-03	6.18E-03	4.73E-03	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	4.64E-02	4.05E-02	3.08E-02	0.00E+00
Avg	3.67E-03	3.22E-03	2.49E-03	0.00E+00
Std	7.06E-03	6.18E-03	4.73E-03	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Probabilistic results summary : Brookside Resident for TBD 08-006 unit Co-60 Dose AssessmentFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02090912.RAD

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
	Dose(t), mrem/yr			
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.075	2.29E-05	2.02E-05	1.57E-05	0.00E+00
0.100	5.73E-05	5.06E-05	3.95E-05	0.00E+00
0.125	7.50E-05	6.63E-05	5.13E-05	0.00E+00
0.150	1.12E-04	9.93E-05	7.78E-05	0.00E+00
0.175	1.54E-04	1.36E-04	1.06E-04	0.00E+00
0.200	1.96E-04	1.72E-04	1.34E-04	0.00E+00
0.225	2.25E-04	1.98E-04	1.51E-04	0.00E+00
0.250	2.52E-04	2.23E-04	1.75E-04	0.00E+00
0.275	2.82E-04	2.48E-04	1.92E-04	0.00E+00
0.300	3.16E-04	2.77E-04	2.15E-04	0.00E+00
0.325	3.30E-04	2.92E-04	2.28E-04	0.00E+00
0.350	3.90E-04	3.43E-04	2.55E-04	0.00E+00
0.375	4.60E-04	4.04E-04	3.14E-04	0.00E+00
0.400	5.39E-04	4.77E-04	3.73E-04	0.00E+00
0.425	6.17E-04	5.45E-04	4.25E-04	0.00E+00
0.450	7.27E-04	6.28E-04	4.70E-04	0.00E+00
0.475	7.96E-04	7.04E-04	5.49E-04	0.00E+00
0.500	8.69E-04	7.66E-04	5.95E-04	0.00E+00
0.525	1.03E-03	9.06E-04	7.10E-04	0.00E+00
0.550	1.14E-03	1.01E-03	7.85E-04	0.00E+00
0.575	1.32E-03	1.13E-03	8.28E-04	0.00E+00
0.600	1.55E-03	1.37E-03	1.05E-03	0.00E+00
0.625	1.79E-03	1.56E-03	1.20E-03	0.00E+00
0.650	2.08E-03	1.84E-03	1.44E-03	0.00E+00
0.675	2.55E-03	2.25E-03	1.75E-03	0.00E+00
0.700	3.19E-03	2.82E-03	2.20E-03	0.00E+00
0.725	3.40E-03	3.00E-03	2.35E-03	0.00E+00
0.750	3.98E-03	3.50E-03	2.71E-03	0.00E+00
0.775	4.40E-03	3.89E-03	3.04E-03	0.00E+00
0.800	5.48E-03	4.85E-03	3.80E-03	0.00E+00
0.825	6.24E-03	5.52E-03	4.32E-03	0.00E+00
0.850	7.11E-03	6.28E-03	4.90E-03	0.00E+00
0.875	8.55E-03	7.56E-03	5.89E-03	0.00E+00
0.900	1.04E-02	9.15E-03	7.08E-03	0.00E+00
0.925	1.18E-02	1.05E-02	8.20E-03	0.00E+00
0.950	1.41E-02	1.22E-02	9.50E-03	0.00E+00
0.975	2.78E-02	2.42E-02	1.83E-02	0.00E+00
1.000	4.64E-02	4.05E-02	3.08E-02	0.00E+00

RESRAD Regression and Correlation output 02/09/09 19:01 Page: Coef 1
Title : Brookside Resident for TBD 08-006 unit Co-60 Dose Assessment - Elev area 6 in ss
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02090912.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	2	0.40	2	0.32	2	0.68	2	0.37
Area of contaminated zone	4	0.15	4	0.11	3	0.49	3	0.23
Thickness of contaminated zone	3	0.16	3	0.12	4	0.46	4	0.21
Density of contaminated zone	5	-0.05	5	-0.04	5	-0.15	5	-0.06
Cover depth	1	-0.63	1	-0.59	1	-0.89	1	-0.78
R-SQUARE		0.48		0.48		0.84		0.84

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	6.000E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	7.600E-02	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.543E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	5.100E-02	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	600.00 square meters	Cs-137	1.000E+00
Thickness:	0.08 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.056E-01	1.023E-01	9.597E-02	0.000E+00
M(t):	4.223E-03	4.091E-03	3.839E-03	0.000E+00

Maximum TDOSE(t): 1.056E-01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	1.056E-01	0.9999	1.431E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.392E-05	0.0001
Total	1.056E-01	0.9999	1.431E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.392E-05	0.0001

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	1.056E-01	1.0000
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	1.056E-01	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.051	.025		
2	AREA	TRIANGULAR	300	600	900	
3	THICK0	NORMAL	.076	.038		
4	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	3.30E-01	3.30E-01	3.21E-01	3.05E-01	0.00E+00
Avg	0.00E+00	9.78E-02	9.78E-02	9.46E-02	8.85E-02	0.00E+00
Std	0.00E+00	6.20E-02	6.20E-02	6.04E-02	5.74E-02	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	3.30E-01	3.30E-01	3.21E-01	3.05E-01	0.00E+00
Avg	0.00E+00	9.78E-02	9.78E-02	9.46E-02	8.85E-02	0.00E+00
Std	0.00E+00	6.20E-02	6.20E-02	6.04E-02	5.74E-02	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic results summary : Country Club Worker for TBD 08-006 unit Cs-137
Dose AssessmeFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02100901.RAD

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	3.30E-01	3.21E-01	3.05E-01	0.00E+00
Avg	9.78E-02	9.46E-02	8.85E-02	0.00E+00
Std	6.20E-02	6.04E-02	5.74E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	3.30E-01	3.21E-01	3.05E-01	0.00E+00
Avg	9.78E-02	9.46E-02	8.85E-02	0.00E+00
Std	6.20E-02	6.04E-02	5.74E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Probabilistic results summary : Country Club Worker for TBD 08-006 unit Cs-137
Dose AssessmeFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02100901.RAD
Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
	Dose(t), mrem/yr			
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	1.20E-03	2.20E-04	0.00E+00	0.00E+00
0.075	1.19E-02	1.07E-02	8.54E-03	0.00E+00
0.100	2.06E-02	1.90E-02	1.64E-02	0.00E+00
0.125	2.61E-02	2.46E-02	2.14E-02	0.00E+00
0.150	3.00E-02	2.85E-02	2.40E-02	0.00E+00
0.175	3.64E-02	3.46E-02	3.09E-02	0.00E+00
0.200	3.97E-02	3.81E-02	3.49E-02	0.00E+00
0.225	4.68E-02	4.50E-02	4.14E-02	0.00E+00
0.250	5.30E-02	5.14E-02	4.73E-02	0.00E+00
0.275	5.64E-02	5.37E-02	4.93E-02	0.00E+00
0.300	5.84E-02	5.62E-02	5.31E-02	0.00E+00
0.325	6.39E-02	6.16E-02	5.72E-02	0.00E+00
0.350	6.99E-02	6.68E-02	6.11E-02	0.00E+00
0.375	7.26E-02	7.03E-02	6.50E-02	0.00E+00
0.400	7.68E-02	7.44E-02	6.95E-02	0.00E+00
0.425	8.11E-02	7.86E-02	7.32E-02	0.00E+00
0.450	8.68E-02	8.40E-02	7.86E-02	0.00E+00
0.475	8.89E-02	8.57E-02	8.02E-02	0.00E+00
0.500	9.12E-02	8.84E-02	8.33E-02	0.00E+00
0.525	9.61E-02	9.29E-02	8.62E-02	0.00E+00
0.550	1.02E-01	9.86E-02	9.26E-02	0.00E+00
0.575	1.06E-01	1.03E-01	9.65E-02	0.00E+00
0.600	1.09E-01	1.06E-01	9.91E-02	0.00E+00
0.625	1.15E-01	1.11E-01	1.04E-01	0.00E+00
0.650	1.20E-01	1.16E-01	1.10E-01	0.00E+00
0.675	1.22E-01	1.19E-01	1.12E-01	0.00E+00
0.700	1.28E-01	1.24E-01	1.16E-01	0.00E+00
0.725	1.30E-01	1.27E-01	1.19E-01	0.00E+00
0.750	1.38E-01	1.33E-01	1.24E-01	0.00E+00
0.775	1.42E-01	1.37E-01	1.29E-01	0.00E+00
0.800	1.46E-01	1.41E-01	1.33E-01	0.00E+00
0.825	1.52E-01	1.47E-01	1.38E-01	0.00E+00
0.850	1.59E-01	1.54E-01	1.45E-01	0.00E+00
0.875	1.71E-01	1.65E-01	1.54E-01	0.00E+00
0.900	1.84E-01	1.79E-01	1.68E-01	0.00E+00
0.925	1.91E-01	1.86E-01	1.76E-01	0.00E+00
0.950	2.06E-01	2.00E-01	1.89E-01	0.00E+00
0.975	2.39E-01	2.33E-01	2.21E-01	0.00E+00
1.000	3.30E-01	3.21E-01	3.05E-01	0.00E+00

RESRAD Regression and Correlation output 02/10/09 09:39 Page: Coef 1
Title : Country Club Worker for TBD 08-006 unit Cs-137 Dose Assessment 3 in Surface Sour
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02100901.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	1	0.91	1	0.73	1	0.88	1	0.71
Area of contaminated zone	4	0.21	4	0.07	4	0.22	4	0.09
Thickness of contaminated zone	2	0.86	2	0.59	2	0.83	2	0.57
Density of contaminated zone	3	0.31	3	0.11	3	0.23	3	0.09
R-SQUARE		0.88		0.88		0.85		0.85

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	6.000E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	7.600E-02	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.096E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	5.100E-02	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	600.00 square meters	Co-60	1.000E+00
Thickness:	0.08 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	4.251E-01	3.672E-01	2.739E-01	0.000E+00
M(t):	1.700E-02	1.469E-02	1.096E-02	0.000E+00

Maximum TDOSE(t): 4.251E-01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	4.250E-01	1.0000	9.289E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.081E-06	0.0000
Total	4.250E-01	1.0000	9.289E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.081E-06	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	4.251E-01	1.0000
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	4.251E-01	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.051	.025		
2	AREA	TRIANGULAR	300	600	900	
3	THICK0	NORMAL	.076	.038		
4	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	DOSE(j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.39E+00	1.39E+00	1.21E+00	9.19E-01	0.00E+00
Avg	0.00E+00	3.97E-01	3.97E-01	3.43E-01	2.55E-01	0.00E+00
Std	0.00E+00	2.57E-01	2.57E-01	2.24E-01	1.70E-01	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.39E+00	1.39E+00	1.21E+00	9.19E-01	0.00E+00
Avg	0.00E+00	3.97E-01	3.97E-01	3.43E-01	2.55E-01	0.00E+00
Std	0.00E+00	2.57E-01	2.57E-01	2.24E-01	1.70E-01	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.39E+00	1.21E+00	9.19E-01	0.00E+00
Avg	3.97E-01	3.43E-01	2.55E-01	0.00E+00
Std	2.57E-01	2.24E-01	1.70E-01	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.39E+00	1.21E+00	9.19E-01	0.00E+00
Avg	3.97E-01	3.43E-01	2.55E-01	0.00E+00
Std	2.57E-01	2.24E-01	1.70E-01	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	4.42E-03	7.89E-04	0.00E+00	0.00E+00
0.075	4.65E-02	3.60E-02	2.18E-02	0.00E+00
0.100	8.29E-02	6.48E-02	4.30E-02	0.00E+00
0.125	1.02E-01	8.60E-02	5.70E-02	0.00E+00
0.150	1.19E-01	9.61E-02	6.84E-02	0.00E+00
0.175	1.43E-01	1.20E-01	8.22E-02	0.00E+00
0.200	1.59E-01	1.38E-01	9.77E-02	0.00E+00
0.225	1.85E-01	1.59E-01	1.16E-01	0.00E+00
0.250	2.15E-01	1.83E-01	1.30E-01	0.00E+00
0.275	2.24E-01	1.89E-01	1.39E-01	0.00E+00
0.300	2.36E-01	2.04E-01	1.49E-01	0.00E+00
0.325	2.55E-01	2.21E-01	1.61E-01	0.00E+00
0.350	2.75E-01	2.36E-01	1.74E-01	0.00E+00
0.375	2.91E-01	2.50E-01	1.79E-01	0.00E+00
0.400	3.10E-01	2.68E-01	1.96E-01	0.00E+00
0.425	3.27E-01	2.84E-01	2.12E-01	0.00E+00
0.450	3.46E-01	2.99E-01	2.22E-01	0.00E+00
0.475	3.56E-01	3.06E-01	2.29E-01	0.00E+00
0.500	3.72E-01	3.21E-01	2.38E-01	0.00E+00
0.525	3.84E-01	3.30E-01	2.46E-01	0.00E+00
0.550	4.10E-01	3.49E-01	2.53E-01	0.00E+00
0.575	4.29E-01	3.72E-01	2.77E-01	0.00E+00
0.600	4.46E-01	3.84E-01	2.87E-01	0.00E+00
0.625	4.63E-01	3.99E-01	2.97E-01	0.00E+00
0.650	4.86E-01	4.19E-01	3.11E-01	0.00E+00
0.675	5.00E-01	4.33E-01	3.26E-01	0.00E+00
0.700	5.19E-01	4.51E-01	3.36E-01	0.00E+00
0.725	5.33E-01	4.60E-01	3.42E-01	0.00E+00
0.750	5.52E-01	4.73E-01	3.50E-01	0.00E+00
0.775	5.75E-01	4.97E-01	3.74E-01	0.00E+00
0.800	5.95E-01	5.12E-01	3.83E-01	0.00E+00
0.825	6.15E-01	5.31E-01	3.97E-01	0.00E+00
0.850	6.52E-01	5.65E-01	4.24E-01	0.00E+00
0.875	6.77E-01	5.88E-01	4.43E-01	0.00E+00
0.900	7.46E-01	6.47E-01	4.89E-01	0.00E+00
0.925	7.94E-01	6.90E-01	5.21E-01	0.00E+00
0.950	8.55E-01	7.45E-01	5.65E-01	0.00E+00
0.975	9.82E-01	8.50E-01	6.41E-01	0.00E+00
1.000	1.39E+00	1.21E+00	9.19E-01	0.00E+00

RESRAD Regression and Correlation output 02/10/09 10:22 Page: Coef 1
Title : Country Club Worker for TBD 08-006 unit Co-60 Dose Assemmment 3 in Surface Sourc
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02100902.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	1	0.91	1	0.72	1	0.88	1	0.70
Area of contaminated zone	4	0.21	4	0.07	4	0.22	4	0.09
Thickness of contaminated zone	2	0.88	2	0.61	2	0.84	2	0.59
Density of contaminated zone	3	0.34	3	0.12	3	0.23	3	0.09
R-SQUARE		0.89		0.89		0.86		0.86

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	2.827E+01	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	7.600E-02	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.543E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	5.100E-02	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	28.27 square meters	Cs-137	1.000E+00
Thickness:	0.08 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	6.047E-02	5.845E-02	5.460E-02	0.000E+00
M(t):	2.419E-03	2.338E-03	2.184E-03	0.000E+00

Maximum TDOSE(t): 6.047E-02 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	6.047E-02	1.0000	1.033E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.560E-07	0.0000
Total	6.047E-02	1.0000	1.033E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.560E-07	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	6.047E-02	1.0000
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	6.047E-02	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.051	.025		
2	AREA	TRIANGULAR	10	28.3	42.5	
3	THICK0	NORMAL	.076	.038		
4	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	2.17E-01	2.17E-01	2.11E-01	1.99E-01	0.00E+00
Avg	0.00E+00	5.62E-02	5.62E-02	5.42E-02	5.06E-02	0.00E+00
Std	0.00E+00	3.87E-02	3.87E-02	3.76E-02	3.56E-02	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	2.17E-01	2.17E-01	2.11E-01	1.99E-01	0.00E+00
Avg	0.00E+00	5.62E-02	5.62E-02	5.42E-02	5.06E-02	0.00E+00
Std	0.00E+00	3.87E-02	3.87E-02	3.76E-02	3.56E-02	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.17E-01	2.11E-01	1.99E-01	0.00E+00
Avg	5.62E-02	5.42E-02	5.06E-02	0.00E+00
Std	3.87E-02	3.76E-02	3.56E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.17E-01	2.11E-01	1.99E-01	0.00E+00
Avg	5.62E-02	5.42E-02	5.06E-02	0.00E+00
Std	3.87E-02	3.76E-02	3.56E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Probabilistic results summary : Country Club Worker for TBD 08-006 unit Cs-137

Dose AssessmeFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02100903.RAD

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	5.54E-04	1.10E-04	0.00E+00	0.00E+00
0.075	5.66E-03	5.07E-03	4.01E-03	0.00E+00
0.100	9.84E-03	9.12E-03	7.78E-03	0.00E+00
0.125	1.35E-02	1.30E-02	1.03E-02	0.00E+00
0.150	1.50E-02	1.43E-02	1.34E-02	0.00E+00
0.175	1.77E-02	1.65E-02	1.54E-02	0.00E+00
0.200	2.09E-02	1.99E-02	1.79E-02	0.00E+00
0.225	2.47E-02	2.33E-02	2.12E-02	0.00E+00
0.250	2.71E-02	2.58E-02	2.37E-02	0.00E+00
0.275	2.97E-02	2.82E-02	2.50E-02	0.00E+00
0.300	3.25E-02	3.14E-02	2.90E-02	0.00E+00
0.325	3.52E-02	3.35E-02	3.10E-02	0.00E+00
0.350	3.83E-02	3.62E-02	3.36E-02	0.00E+00
0.375	3.98E-02	3.83E-02	3.56E-02	0.00E+00
0.400	4.21E-02	4.06E-02	3.76E-02	0.00E+00
0.425	4.54E-02	4.33E-02	4.00E-02	0.00E+00
0.450	4.72E-02	4.57E-02	4.27E-02	0.00E+00
0.475	4.93E-02	4.76E-02	4.44E-02	0.00E+00
0.500	5.14E-02	4.91E-02	4.57E-02	0.00E+00
0.525	5.33E-02	5.16E-02	4.77E-02	0.00E+00
0.550	5.61E-02	5.42E-02	5.03E-02	0.00E+00
0.575	5.89E-02	5.71E-02	5.34E-02	0.00E+00
0.600	6.29E-02	6.02E-02	5.53E-02	0.00E+00
0.625	6.60E-02	6.40E-02	6.02E-02	0.00E+00
0.650	6.92E-02	6.68E-02	6.24E-02	0.00E+00
0.675	7.01E-02	6.79E-02	6.36E-02	0.00E+00
0.700	7.30E-02	7.03E-02	6.61E-02	0.00E+00
0.725	7.56E-02	7.31E-02	6.81E-02	0.00E+00
0.750	7.70E-02	7.44E-02	6.92E-02	0.00E+00
0.775	7.89E-02	7.62E-02	7.10E-02	0.00E+00
0.800	8.19E-02	7.92E-02	7.45E-02	0.00E+00
0.825	8.85E-02	8.54E-02	7.95E-02	0.00E+00
0.850	9.31E-02	9.02E-02	8.45E-02	0.00E+00
0.875	1.00E-01	9.73E-02	9.21E-02	0.00E+00
0.900	1.07E-01	1.04E-01	9.77E-02	0.00E+00
0.925	1.14E-01	1.11E-01	1.04E-01	0.00E+00
0.950	1.30E-01	1.26E-01	1.19E-01	0.00E+00
0.975	1.54E-01	1.49E-01	1.41E-01	0.00E+00
1.000	2.17E-01	2.11E-01	1.99E-01	0.00E+00

RESRAD Regression and Correlation output 02/10/09 10:54 Page: Coef 1
Title : Country Club Worker for TBD 08-006 unit Cs-137 Dose Assessment 6 in Local Area s
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02100903.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	1	0.90	1	0.68	1	0.87	1	0.65
Area of contaminated zone	3	0.47	3	0.17	3	0.42	3	0.17
Thickness of contaminated zone	2	0.89	2	0.63	2	0.86	2	0.63
Density of contaminated zone	4	0.35	4	0.12	4	0.25	4	0.10
R-SQUARE		0.90		0.90		0.86		0.86

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	2.827E+01	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.050E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	1.500E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.845E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	5.100E-02	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	28.27 square meters	Cs-137	1.000E+00
Thickness:	0.31 meters		
Cover Depth:	0.15 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.825E-02	1.806E-02	1.769E-02	0.000E+00
M(t):	7.300E-04	7.225E-04	7.078E-04	0.000E+00

Maximum TDOSE(t): 1.825E-02 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	1.825E-02	1.0000	6.820E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.330E-09	0.0000
Total	1.825E-02	1.0000	6.820E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.330E-09	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	1.825E-02	1.0000
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	1.825E-02	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.051	.025		
2	AREA	TRIANGULAR	10	28.3	42.5	
3	THICK0	NORMAL	.305	.152		
4	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999
5	COVER0	NORMAL	.15	.076		

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	2.03E-01	2.03E-01	1.98E-01	1.89E-01	0.00E+00
Avg	0.00E+00	2.53E-02	2.53E-02	2.50E-02	2.43E-02	0.00E+00
Std	0.00E+00	3.14E-02	3.14E-02	3.08E-02	2.97E-02	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	2.03E-01	2.03E-01	1.98E-01	1.89E-01	0.00E+00
Avg	0.00E+00	2.53E-02	2.53E-02	2.50E-02	2.43E-02	0.00E+00
Std	0.00E+00	3.14E-02	3.14E-02	3.08E-02	2.97E-02	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.03E-01	1.98E-01	1.89E-01	0.00E+00
Avg	2.53E-02	2.50E-02	2.43E-02	0.00E+00
Std	3.14E-02	3.08E-02	2.97E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.03E-01	1.98E-01	1.89E-01	0.00E+00
Avg	2.53E-02	2.50E-02	2.43E-02	0.00E+00
Std	3.14E-02	3.08E-02	2.97E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

RESRAD, Version 6.4 T½ Limit = 180 days 02/10/2009 11:55 Page 18
Probabilistic results summary : Country Club Worker for TBD 08-006 unit Cs-137
Dose AssessmeFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02100904.RAD
Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	5.70E-04	5.64E-04	5.54E-04	0.00E+00
0.075	1.46E-03	1.44E-03	1.42E-03	0.00E+00
0.100	2.16E-03	2.14E-03	2.10E-03	0.00E+00
0.125	2.71E-03	2.69E-03	2.64E-03	0.00E+00
0.150	3.53E-03	3.50E-03	3.44E-03	0.00E+00
0.175	4.25E-03	4.21E-03	4.13E-03	0.00E+00
0.200	4.62E-03	4.58E-03	4.50E-03	0.00E+00
0.225	5.23E-03	5.16E-03	5.03E-03	0.00E+00
0.250	5.77E-03	5.72E-03	5.62E-03	0.00E+00
0.275	6.25E-03	6.19E-03	6.08E-03	0.00E+00
0.300	6.52E-03	6.45E-03	6.31E-03	0.00E+00
0.325	6.99E-03	6.93E-03	6.80E-03	0.00E+00
0.350	7.63E-03	7.56E-03	7.41E-03	0.00E+00
0.375	8.59E-03	8.51E-03	8.35E-03	0.00E+00
0.400	9.59E-03	9.50E-03	9.31E-03	0.00E+00
0.425	1.04E-02	1.03E-02	1.01E-02	0.00E+00
0.450	1.14E-02	1.13E-02	1.11E-02	0.00E+00
0.475	1.30E-02	1.29E-02	1.26E-02	0.00E+00
0.500	1.34E-02	1.32E-02	1.30E-02	0.00E+00
0.525	1.47E-02	1.46E-02	1.43E-02	0.00E+00
0.550	1.53E-02	1.51E-02	1.48E-02	0.00E+00
0.575	1.68E-02	1.66E-02	1.63E-02	0.00E+00
0.600	1.77E-02	1.76E-02	1.73E-02	0.00E+00
0.625	2.09E-02	2.07E-02	2.04E-02	0.00E+00
0.650	2.34E-02	2.32E-02	2.27E-02	0.00E+00
0.675	2.52E-02	2.50E-02	2.45E-02	0.00E+00
0.700	2.89E-02	2.86E-02	2.80E-02	0.00E+00
0.725	3.06E-02	3.03E-02	2.96E-02	0.00E+00
0.750	3.26E-02	3.22E-02	3.15E-02	0.00E+00
0.775	3.69E-02	3.66E-02	3.58E-02	0.00E+00
0.800	4.00E-02	3.96E-02	3.88E-02	0.00E+00
0.825	4.53E-02	4.48E-02	4.38E-02	0.00E+00
0.850	4.97E-02	4.92E-02	4.83E-02	0.00E+00
0.875	5.63E-02	5.57E-02	5.46E-02	0.00E+00
0.900	6.27E-02	6.20E-02	6.08E-02	0.00E+00
0.925	6.99E-02	6.89E-02	6.71E-02	0.00E+00
0.950	8.75E-02	8.66E-02	8.47E-02	0.00E+00
0.975	1.22E-01	1.19E-01	1.12E-01	0.00E+00
1.000	2.03E-01	1.98E-01	1.89E-01	0.00E+00

Title : Country Club Worker for TBD 08-006 unit Cs-137 Dose Assessment 12 in Local Sourc
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02100904.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	2	0.59	2	0.41	2	0.74	2	0.45
Area of contaminated zone	4	0.13	4	0.07	4	0.37	4	0.16
Thickness of contaminated zone	3	0.21	3	0.12	3	0.37	3	0.16
Density of contaminated zone	5	-0.08	5	-0.04	5	-0.18	5	-0.07
Cover depth	1	-0.78	1	-0.70	1	-0.88	1	-0.76
R-SQUARE		0.69		0.69		0.83		0.83

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	2.827E+01	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.050E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	4.570E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.845E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	5.100E-02	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	28.27 square meters	Cs-137	1.000E+00
Thickness:	0.31 meters		
Cover Depth:	0.46 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	2.350E-04	2.329E-04	2.286E-04	0.000E+00
M(t):	9.402E-06	9.314E-06	9.143E-06	0.000E+00

Maximum TDOSE(t): 2.350E-04 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	2.350E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.350E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	2.350E-04	1.0000
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	2.350E-04	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.051	.025		
2	AREA	TRIANGULAR	10	28.3	42.5	
3	THICK0	NORMAL	.305	.152		
4	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999
5	COVER0	NORMAL	.457	.228		

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	DOSE(j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	2.03E-01	2.03E-01	1.98E-01	1.88E-01	1.24E-11
Avg	0.00E+00	6.97E-03	6.97E-03	6.85E-03	6.61E-03	9.34E-13
Std	0.00E+00	2.48E-02	2.48E-02	2.43E-02	2.33E-02	2.46E-12
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	2.03E-01	2.03E-01	1.98E-01	1.88E-01	1.24E-11
Avg	0.00E+00	6.97E-03	6.97E-03	6.85E-03	6.61E-03	9.34E-13
Std	0.00E+00	2.48E-02	2.48E-02	2.43E-02	2.33E-02	2.46E-12

∑ALL is total dose summed for all nuclides.

Probabilistic results summary : Country Club Worker for TBD 08-006 unit Cs-137
Dose AssessmeFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02100905.RAD

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.03E-01	1.98E-01	1.88E-01	1.24E-11
Avg	6.97E-03	6.85E-03	6.61E-03	9.34E-13
Std	2.48E-02	2.43E-02	2.33E-02	2.46E-12
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.03E-01	1.98E-01	1.88E-01	1.24E-11
Avg	6.97E-03	6.85E-03	6.61E-03	9.34E-13
Std	2.48E-02	2.43E-02	2.33E-02	2.46E-12

∑ALL is total pathway dose summed for all nuclides.

Probabilistic results summary : Country Club Worker for TBD 08-006 unit Cs-137
Dose AssessmeFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02100905.RAD
Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
	Dose(t), mrem/yr			
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	8.36E-08	8.28E-08	8.13E-08	0.00E+00
0.075	4.97E-07	4.92E-07	4.83E-07	0.00E+00
0.100	1.07E-06	1.06E-06	1.04E-06	0.00E+00
0.125	1.84E-06	1.82E-06	1.79E-06	0.00E+00
0.150	4.08E-06	4.05E-06	3.97E-06	0.00E+00
0.175	5.41E-06	5.36E-06	5.27E-06	0.00E+00
0.200	7.50E-06	7.43E-06	7.29E-06	0.00E+00
0.225	1.10E-05	1.08E-05	1.06E-05	0.00E+00
0.250	1.57E-05	1.56E-05	1.53E-05	0.00E+00
0.275	2.17E-05	2.15E-05	2.11E-05	0.00E+00
0.300	2.52E-05	2.50E-05	2.45E-05	0.00E+00
0.325	3.49E-05	3.45E-05	3.39E-05	0.00E+00
0.350	4.22E-05	4.19E-05	4.11E-05	0.00E+00
0.375	5.02E-05	4.97E-05	4.88E-05	0.00E+00
0.400	6.68E-05	6.62E-05	6.49E-05	0.00E+00
0.425	7.82E-05	7.75E-05	7.60E-05	0.00E+00
0.450	9.30E-05	9.21E-05	9.05E-05	0.00E+00
0.475	1.02E-04	1.01E-04	9.87E-05	0.00E+00
0.500	1.27E-04	1.26E-04	1.24E-04	0.00E+00
0.525	1.74E-04	1.73E-04	1.69E-04	0.00E+00
0.550	1.97E-04	1.95E-04	1.91E-04	0.00E+00
0.575	2.37E-04	2.35E-04	2.30E-04	0.00E+00
0.600	3.25E-04	3.22E-04	3.16E-04	0.00E+00
0.625	5.13E-04	5.08E-04	4.98E-04	0.00E+00
0.650	6.59E-04	6.53E-04	6.41E-04	0.00E+00
0.675	8.43E-04	8.35E-04	8.20E-04	0.00E+00
0.700	1.01E-03	9.98E-04	9.80E-04	0.00E+00
0.725	1.35E-03	1.33E-03	1.29E-03	0.00E+00
0.750	1.79E-03	1.77E-03	1.74E-03	0.00E+00
0.775	2.47E-03	2.45E-03	2.40E-03	0.00E+00
0.800	2.91E-03	2.89E-03	2.83E-03	0.00E+00
0.825	3.91E-03	3.87E-03	3.80E-03	5.16E-13
0.850	5.78E-03	5.73E-03	5.63E-03	1.72E-12
0.875	7.76E-03	7.68E-03	7.53E-03	3.17E-12
0.900	1.35E-02	1.34E-02	1.31E-02	3.88E-12
0.925	1.86E-02	1.84E-02	1.81E-02	4.95E-12
0.950	4.25E-02	4.21E-02	4.12E-02	8.20E-12
0.975	9.64E-02	9.50E-02	9.25E-02	9.77E-12
1.000	2.03E-01	1.98E-01	1.88E-01	1.24E-11

RESRAD Regression and Correlation output 02/10/09 11:37 Page: Coef 1
Title : Country Club Worker for TBD 08-006 unit Cs-137 Dose Assessment 6 in Local Area s
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02100905.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	2	0.28	2	0.24	2	0.48	2	0.22
Area of contaminated zone	4	0.06	4	0.05	3	0.34	3	0.14
Thickness of contaminated zone	5	0.04	5	0.03	4	0.22	4	0.09
Density of contaminated zone	3	-0.07	3	-0.06	5	-0.14	5	-0.06
Cover depth	1	-0.51	1	-0.49	1	-0.91	1	-0.88
R-SQUARE		0.31		0.31		0.84		0.84

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.500E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.817E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.250E-02	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)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	1500.00 square meters	Cs-137	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	3.557E-02	3.467E-02	3.292E-02	0.000E+00
M(t):	1.423E-03	1.387E-03	1.317E-03	0.000E+00

Maximum TDOSE(t): 3.557E-02 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	3.556E-02	0.9997	7.649E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.126E-05	0.0003
Total	3.556E-02	0.9997	7.649E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.126E-05	0.0003

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	3.557E-02	1.0000
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	3.557E-02	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0125	.006		
2	AREA	TRIANGULAR	750	1500	2250	
3	THICK0	NORMAL	.15	.076		
4	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	9.45E-02	9.45E-02	9.23E-02	8.79E-02	0.00E+00
Avg	0.00E+00	3.22E-02	3.22E-02	3.13E-02	2.97E-02	0.00E+00
Std	0.00E+00	1.83E-02	1.83E-02	1.79E-02	1.71E-02	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	9.45E-02	9.45E-02	9.23E-02	8.79E-02	0.00E+00
Avg	0.00E+00	3.22E-02	3.22E-02	3.13E-02	2.97E-02	0.00E+00
Std	0.00E+00	1.83E-02	1.83E-02	1.79E-02	1.71E-02	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	9.45E-02	9.22E-02	8.79E-02	0.00E+00
Avg	3.22E-02	3.13E-02	2.97E-02	0.00E+00
Std	1.83E-02	1.79E-02	1.71E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	9.45E-02	9.22E-02	8.79E-02	0.00E+00
Avg	3.22E-02	3.13E-02	2.97E-02	0.00E+00
Std	1.83E-02	1.79E-02	1.71E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	8.43E-04	4.65E-04	0.00E+00	0.00E+00
0.075	5.36E-03	5.02E-03	4.45E-03	0.00E+00
0.100	7.59E-03	7.34E-03	6.93E-03	0.00E+00
0.125	1.02E-02	9.97E-03	9.49E-03	0.00E+00
0.150	1.17E-02	1.13E-02	1.03E-02	0.00E+00
0.175	1.39E-02	1.34E-02	1.23E-02	0.00E+00
0.200	1.57E-02	1.52E-02	1.42E-02	0.00E+00
0.225	1.72E-02	1.67E-02	1.59E-02	0.00E+00
0.250	1.82E-02	1.76E-02	1.67E-02	0.00E+00
0.275	1.97E-02	1.92E-02	1.82E-02	0.00E+00
0.300	2.16E-02	2.10E-02	1.98E-02	0.00E+00
0.325	2.39E-02	2.29E-02	2.13E-02	0.00E+00
0.350	2.49E-02	2.43E-02	2.29E-02	0.00E+00
0.375	2.59E-02	2.52E-02	2.38E-02	0.00E+00
0.400	2.72E-02	2.63E-02	2.48E-02	0.00E+00
0.425	2.88E-02	2.79E-02	2.63E-02	0.00E+00
0.450	2.96E-02	2.88E-02	2.72E-02	0.00E+00
0.475	3.06E-02	2.99E-02	2.84E-02	0.00E+00
0.500	3.14E-02	3.05E-02	2.87E-02	0.00E+00
0.525	3.22E-02	3.13E-02	2.98E-02	0.00E+00
0.550	3.37E-02	3.27E-02	3.09E-02	0.00E+00
0.575	3.48E-02	3.39E-02	3.22E-02	0.00E+00
0.600	3.58E-02	3.48E-02	3.31E-02	0.00E+00
0.625	3.76E-02	3.66E-02	3.48E-02	0.00E+00
0.650	3.86E-02	3.76E-02	3.56E-02	0.00E+00
0.675	4.02E-02	3.92E-02	3.72E-02	0.00E+00
0.700	4.17E-02	4.05E-02	3.86E-02	0.00E+00
0.725	4.33E-02	4.21E-02	4.00E-02	0.00E+00
0.750	4.46E-02	4.35E-02	4.14E-02	0.00E+00
0.775	4.58E-02	4.45E-02	4.23E-02	0.00E+00
0.800	4.79E-02	4.67E-02	4.41E-02	0.00E+00
0.825	4.96E-02	4.83E-02	4.57E-02	0.00E+00
0.850	5.18E-02	5.03E-02	4.76E-02	0.00E+00
0.875	5.33E-02	5.20E-02	4.97E-02	0.00E+00
0.900	5.61E-02	5.48E-02	5.22E-02	0.00E+00
0.925	5.82E-02	5.68E-02	5.40E-02	0.00E+00
0.950	6.32E-02	6.17E-02	5.87E-02	0.00E+00
0.975	6.93E-02	6.76E-02	6.44E-02	0.00E+00
1.000	9.45E-02	9.23E-02	8.79E-02	0.00E+00

RESRAD Regression and Correlation output 02/25/09 15:05 Page: Coef 1
Title : Recreationist for TBD 08-006 unit Cs-137 Dose Assessment Cont Zone surface 6 in
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02110901.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	1	0.89	1	0.78	1	0.87	1	0.78
Area of contaminated zone	3	0.15	3	0.06	3	0.16	3	0.07
Thickness of contaminated zone	2	0.75	2	0.47	2	0.70	2	0.43
Density of contaminated zone	4	0.15	4	0.06	4	0.12	4	0.05
R-SQUARE		0.83		0.83		0.81		0.81

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.500E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.050E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	1.500E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.520E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.845E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.250E-02	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)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	1500.00 square meters	Cs-137	1.000E+00
Thickness:	0.31 meters		
Cover Depth:	0.15 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	4.461E-03	4.421E-03	4.342E-03	0.000E+00
M(t):	1.784E-04	1.768E-04	1.737E-04	0.000E+00

Maximum TDOSE(t): 4.461E-03 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	4.461E-03	1.0000	2.549E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.753E-08	0.0000
Total	4.461E-03	1.0000	2.549E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.753E-08	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	4.461E-03	1.0000
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	4.461E-03	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0125	.006		
2	AREA	TRIANGULAR	750	1500	2250	
3	THICK0	NORMAL	.305	.152		
4	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999
5	COVER0	NORMAL	.15	.076		
6	DENSCV	TRUNCATED NORMAL	1.52	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	8.20E-02	8.20E-02	8.01E-02	7.63E-02	0.00E+00
Avg	0.00E+00	7.29E-03	7.29E-03	7.20E-03	7.03E-03	0.00E+00
Std	0.00E+00	1.01E-02	1.01E-02	9.94E-03	9.62E-03	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	8.20E-02	8.20E-02	8.01E-02	7.63E-02	0.00E+00
Avg	0.00E+00	7.29E-03	7.29E-03	7.20E-03	7.03E-03	0.00E+00
Std	0.00E+00	1.01E-02	1.01E-02	9.94E-03	9.62E-03	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	8.20E-02	8.00E-02	7.62E-02	0.00E+00
Avg	7.28E-03	7.20E-03	7.03E-03	0.00E+00
Std	1.01E-02	9.93E-03	9.62E-03	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	8.20E-02	8.00E-02	7.62E-02	0.00E+00
Avg	7.28E-03	7.20E-03	7.03E-03	0.00E+00
Std	1.01E-02	9.93E-03	9.62E-03	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Probabilistic results summary : Recreationist for TBD 08-006 unit Cs-137 Dose Assessment ConFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02110903.RAD

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	1.23E-04	1.22E-04	1.20E-04	0.00E+00
0.075	2.71E-04	2.69E-04	2.63E-04	0.00E+00
0.100	4.35E-04	4.29E-04	4.23E-04	0.00E+00
0.125	5.48E-04	5.43E-04	5.34E-04	0.00E+00
0.150	6.93E-04	6.87E-04	6.74E-04	0.00E+00
0.175	8.31E-04	8.23E-04	8.06E-04	0.00E+00
0.200	9.21E-04	9.11E-04	8.92E-04	0.00E+00
0.225	1.17E-03	1.16E-03	1.15E-03	0.00E+00
0.250	1.36E-03	1.35E-03	1.33E-03	0.00E+00
0.275	1.55E-03	1.53E-03	1.49E-03	0.00E+00
0.300	1.94E-03	1.93E-03	1.91E-03	0.00E+00
0.325	2.13E-03	2.11E-03	2.09E-03	0.00E+00
0.350	2.36E-03	2.33E-03	2.28E-03	0.00E+00
0.375	2.70E-03	2.68E-03	2.62E-03	0.00E+00
0.400	2.90E-03	2.88E-03	2.85E-03	0.00E+00
0.425	3.24E-03	3.19E-03	3.10E-03	0.00E+00
0.450	3.37E-03	3.34E-03	3.28E-03	0.00E+00
0.475	3.69E-03	3.65E-03	3.58E-03	0.00E+00
0.500	3.88E-03	3.85E-03	3.75E-03	0.00E+00
0.525	4.26E-03	4.22E-03	4.16E-03	0.00E+00
0.550	4.72E-03	4.70E-03	4.63E-03	0.00E+00
0.575	5.19E-03	5.14E-03	5.03E-03	0.00E+00
0.600	5.50E-03	5.45E-03	5.33E-03	0.00E+00
0.625	5.78E-03	5.73E-03	5.61E-03	0.00E+00
0.650	6.22E-03	6.15E-03	6.03E-03	0.00E+00
0.675	6.67E-03	6.60E-03	6.48E-03	0.00E+00
0.700	7.22E-03	7.17E-03	7.02E-03	0.00E+00
0.725	7.81E-03	7.73E-03	7.58E-03	0.00E+00
0.750	8.72E-03	8.50E-03	8.26E-03	0.00E+00
0.775	9.31E-03	9.21E-03	9.00E-03	0.00E+00
0.800	9.80E-03	9.71E-03	9.58E-03	0.00E+00
0.825	1.09E-02	1.08E-02	1.06E-02	0.00E+00
0.850	1.26E-02	1.26E-02	1.23E-02	0.00E+00
0.875	1.36E-02	1.34E-02	1.31E-02	0.00E+00
0.900	1.81E-02	1.80E-02	1.77E-02	0.00E+00
0.925	2.19E-02	2.17E-02	2.14E-02	0.00E+00
0.950	2.80E-02	2.77E-02	2.72E-02	0.00E+00
0.975	4.09E-02	4.04E-02	3.94E-02	0.00E+00
1.000	8.20E-02	8.01E-02	7.63E-02	0.00E+00

RESRAD Regression and Correlation output 02/25/09 15:15 Page: Coef 1
Title : Recreationist for TBD 08-006 unit Cs-137 Dose Assessment Cont Zone subsurface 12
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02110903.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	2	0.45	2	0.30	2	0.69	2	0.44
Area of contaminated zone	6	-0.01	6	-0.01	5	-0.09	5	-0.04
Thickness of contaminated zone	3	0.25	3	0.15	4	0.37	4	0.19
Density of contaminated zone	5	-0.14	5	-0.08	6	0.00	6	0.00
Cover depth	1	-0.77	1	-0.72	1	-0.83	1	-0.69
Density of cover material	4	-0.21	4	-0.12	3	-0.45	3	-0.24
R-SQUARE		0.66		0.66		0.79		0.79

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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new

Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.500E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.050E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	4.570E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.520E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.845E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.250E-02	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)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	1500.00 square meters	Cs-137	1.000E+00
Thickness:	0.31 meters		
Cover Depth:	0.46 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	5.299E-05	5.251E-05	5.157E-05	0.000E+00
M(t):	2.119E-06	2.100E-06	2.063E-06	0.000E+00

Maximum TDOSE(t): 5.299E-05 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	5.299E-05	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.299E-05	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	5.299E-05	1.0000
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	5.299E-05	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0125	.006		
2	AREA	TRIANGULAR	750	1500	2250	
3	THICK0	NORMAL	.305	.152		
4	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999
5	COVER0	NORMAL	.457	.228		
6	DENSCV	TRUNCATED NORMAL	1.52	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	DOSE(j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	7.57E-02	7.57E-02	7.38E-02	7.01E-02	5.16E-12
Avg	0.00E+00	2.11E-03	2.11E-03	2.07E-03	2.00E-03	3.62E-13
Std	0.00E+00	7.75E-03	7.75E-03	7.59E-03	7.26E-03	9.02E-13
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	7.57E-02	7.57E-02	7.38E-02	7.01E-02	5.16E-12
Avg	0.00E+00	2.11E-03	2.11E-03	2.07E-03	2.00E-03	3.62E-13
Std	0.00E+00	7.75E-03	7.75E-03	7.59E-03	7.26E-03	9.02E-13

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	7.57E-02	7.38E-02	7.00E-02	5.16E-12
Avg	2.11E-03	2.07E-03	2.00E-03	3.62E-13
Std	7.75E-03	7.59E-03	7.26E-03	9.01E-13
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	7.57E-02	7.38E-02	7.00E-02	5.16E-12
Avg	2.11E-03	2.07E-03	2.00E-03	3.62E-13
Std	7.75E-03	7.59E-03	7.26E-03	9.01E-13

∑ALL is total pathway dose summed for all nuclides.

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	1.39E-08	1.38E-08	1.36E-08	0.00E+00
0.075	4.50E-08	4.46E-08	4.38E-08	0.00E+00
0.100	1.71E-07	1.69E-07	1.67E-07	0.00E+00
0.125	3.07E-07	3.05E-07	3.01E-07	0.00E+00
0.150	4.11E-07	4.07E-07	4.00E-07	0.00E+00
0.175	7.01E-07	6.96E-07	6.86E-07	0.00E+00
0.200	1.56E-06	1.54E-06	1.51E-06	0.00E+00
0.225	1.97E-06	1.96E-06	1.91E-06	0.00E+00
0.250	2.97E-06	2.95E-06	2.89E-06	0.00E+00
0.275	4.82E-06	4.77E-06	4.67E-06	0.00E+00
0.300	6.32E-06	6.26E-06	6.14E-06	0.00E+00
0.325	1.01E-05	9.97E-06	9.83E-06	0.00E+00
0.350	1.40E-05	1.39E-05	1.36E-05	0.00E+00
0.375	1.71E-05	1.69E-05	1.65E-05	0.00E+00
0.400	2.06E-05	2.04E-05	2.01E-05	0.00E+00
0.425	2.53E-05	2.51E-05	2.46E-05	0.00E+00
0.450	3.52E-05	3.48E-05	3.42E-05	0.00E+00
0.475	3.98E-05	3.94E-05	3.86E-05	0.00E+00
0.500	5.03E-05	4.98E-05	4.88E-05	0.00E+00
0.525	6.07E-05	5.98E-05	5.85E-05	0.00E+00
0.550	7.90E-05	7.80E-05	7.61E-05	0.00E+00
0.575	8.82E-05	8.73E-05	8.57E-05	0.00E+00
0.600	1.06E-04	1.05E-04	1.03E-04	0.00E+00
0.625	1.21E-04	1.20E-04	1.18E-04	0.00E+00
0.650	1.50E-04	1.49E-04	1.46E-04	0.00E+00
0.675	1.75E-04	1.73E-04	1.68E-04	0.00E+00
0.700	2.26E-04	2.23E-04	2.19E-04	0.00E+00
0.725	3.31E-04	3.27E-04	3.20E-04	0.00E+00
0.750	4.42E-04	4.39E-04	4.34E-04	0.00E+00
0.775	5.51E-04	5.45E-04	5.32E-04	0.00E+00
0.800	7.72E-04	7.63E-04	7.46E-04	0.00E+00
0.825	9.66E-04	9.57E-04	9.39E-04	3.20E-13
0.850	1.22E-03	1.20E-03	1.17E-03	8.71E-13
0.875	2.04E-03	2.02E-03	1.97E-03	1.30E-12
0.900	4.23E-03	4.19E-03	4.12E-03	1.75E-12
0.925	6.40E-03	6.35E-03	6.25E-03	2.01E-12
0.950	1.03E-02	1.01E-02	9.88E-03	2.69E-12
0.975	2.61E-02	2.59E-02	2.52E-02	3.33E-12
1.000	7.57E-02	7.38E-02	7.01E-02	5.16E-12

RESRAD Regression and Correlation output 02/25/09 15:25 Page: Coef 1
Title : Recreationist for TBD 08-006 unit Cs-137 Dose Assessment Cont Zone subsurface 2
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02110904.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	3	0.07	3	0.06	3	0.41	3	0.22
Area of contaminated zone	6	-0.03	6	-0.03	5	-0.13	5	-0.06
Thickness of contaminated zone	4	0.04	4	0.03	4	0.21	4	0.11
Density of contaminated zone	2	-0.18	2	-0.15	6	0.00	6	0.00
Cover depth	1	-0.56	1	-0.55	1	-0.84	1	-0.78
Density of cover material	5	-0.03	5	-0.03	2	-0.47	2	-0.26
R-SQUARE		0.34		0.34		0.76		0.76

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.500E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	4.400E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	2.850E+05	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)	1.522E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.500E-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)	2.700E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	5.000E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	8.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	MB	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.595E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.250E-02	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)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	0.000E+00	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	active
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	1500.00 square meters	Co-60	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.508E-01	1.314E-01	9.980E-02	0.000E+00
M(t):	6.032E-03	5.257E-03	3.992E-03	0.000E+00

Maximum TDOSE(t): 1.508E-01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.507E-01	0.9993	4.971E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.737E-06	0.0000
Total	1.507E-01	0.9993	4.971E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.737E-06	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	1.012E-04	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.508E-01	1.0000
Total	0.000E+00	0.0000	1.012E-04	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.508E-01	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0125	.006		
2	AREA	TRIANGULAR	750	1500	2250	
3	THICK0	NORMAL	.15	.075		
4	DCACTC(1)	LOGNORMAL-N	5.46	2.53		
5	BBIO(27,1)	LOGNORMAL-N	5.7	1.1		
6	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999
7	DIET(5)	TRIANGULAR	2.7	5.4	8.1	
8	FR9	TRIANGULAR	0	.39	1	

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Co-60						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	3.99E-01	3.99E-01	3.14E-01	2.34E-01	0.00E+00
Avg	0.00E+00	1.31E-01	1.31E-01	1.06E-01	7.38E-02	0.00E+00
Std	0.00E+00	7.79E-02	7.79E-02	7.00E-02	5.33E-02	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	3.99E-01	3.99E-01	3.14E-01	2.34E-01	0.00E+00
Avg	0.00E+00	1.31E-01	1.31E-01	1.06E-01	7.38E-02	0.00E+00
Std	0.00E+00	7.79E-02	7.79E-02	7.00E-02	5.33E-02	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	3.73E-01	3.13E-01	2.34E-01	0.00E+00
Avg	1.27E-01	1.03E-01	7.28E-02	0.00E+00
Std	7.77E-02	6.94E-02	5.32E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	3.73E-01	3.13E-01	2.34E-01	0.00E+00
Avg	1.27E-01	1.03E-01	7.28E-02	0.00E+00
Std	7.77E-02	6.94E-02	5.32E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Fish Ingestion

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.47E-01	1.89E-01	9.77E-02	0.00E+00
Avg	3.95E-03	2.07E-03	1.01E-03	0.00E+00
Std	1.70E-02	1.14E-02	5.75E-03	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.47E-01	1.89E-01	9.77E-02	0.00E+00
Avg	3.95E-03	2.07E-03	1.01E-03	0.00E+00
Std	1.70E-02	1.14E-02	5.75E-03	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Probabilistic results summary : Recreationist for TBD 08-006 unit Co-60 Dose Assessment ConFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02110902.RAD

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
	Dose(t), mrem/yr			
0.025	4.29E-05	4.09E-07	1.06E-17	0.00E+00
0.050	1.11E-02	3.57E-04	2.65E-06	0.00E+00
0.075	2.50E-02	3.60E-03	1.40E-04	0.00E+00
0.100	3.31E-02	9.62E-03	1.12E-03	0.00E+00
0.125	4.04E-02	1.31E-02	5.54E-03	0.00E+00
0.150	4.34E-02	2.78E-02	7.49E-03	0.00E+00
0.175	4.98E-02	3.33E-02	1.58E-02	0.00E+00
0.200	5.74E-02	3.66E-02	1.95E-02	0.00E+00
0.225	6.42E-02	4.23E-02	2.46E-02	0.00E+00
0.250	7.23E-02	4.72E-02	3.03E-02	0.00E+00
0.275	7.81E-02	5.69E-02	3.50E-02	0.00E+00
0.300	8.45E-02	6.30E-02	3.98E-02	0.00E+00
0.325	8.88E-02	6.85E-02	4.39E-02	0.00E+00
0.350	9.81E-02	7.21E-02	4.82E-02	0.00E+00
0.375	1.02E-01	7.78E-02	5.03E-02	0.00E+00
0.400	1.05E-01	8.52E-02	5.36E-02	0.00E+00
0.425	1.09E-01	8.84E-02	6.04E-02	0.00E+00
0.450	1.14E-01	9.33E-02	6.41E-02	0.00E+00
0.475	1.18E-01	9.84E-02	6.92E-02	0.00E+00
0.500	1.22E-01	1.02E-01	7.23E-02	0.00E+00
0.525	1.29E-01	1.04E-01	7.50E-02	0.00E+00
0.550	1.37E-01	1.08E-01	7.65E-02	0.00E+00
0.575	1.41E-01	1.15E-01	7.89E-02	0.00E+00
0.600	1.48E-01	1.21E-01	8.39E-02	0.00E+00
0.625	1.54E-01	1.24E-01	8.99E-02	0.00E+00
0.650	1.57E-01	1.32E-01	9.32E-02	0.00E+00
0.675	1.62E-01	1.36E-01	9.77E-02	0.00E+00
0.700	1.70E-01	1.39E-01	1.02E-01	0.00E+00
0.725	1.75E-01	1.48E-01	1.06E-01	0.00E+00
0.750	1.85E-01	1.53E-01	1.10E-01	0.00E+00
0.775	1.91E-01	1.62E-01	1.16E-01	0.00E+00
0.800	1.98E-01	1.67E-01	1.21E-01	0.00E+00
0.825	2.09E-01	1.75E-01	1.26E-01	0.00E+00
0.850	2.20E-01	1.81E-01	1.30E-01	0.00E+00
0.875	2.27E-01	1.88E-01	1.37E-01	0.00E+00
0.900	2.34E-01	2.01E-01	1.50E-01	0.00E+00
0.925	2.48E-01	2.11E-01	1.55E-01	0.00E+00
0.950	2.64E-01	2.29E-01	1.67E-01	0.00E+00
0.975	2.82E-01	2.46E-01	1.86E-01	0.00E+00
1.000	3.99E-01	3.14E-01	2.34E-01	0.00E+00

RESRAD Regression and Correlation output 02/11/09 19:09 Page: Coef 1
Title : Recreationist for TBD 08-006 unit Co-60 Dose Asssessment Cont Zone Surface 6 in
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02110902.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	1	0.89	1	0.75	1	0.91	1	0.79
Area of contaminated zone	7	0.07	7	0.03	7	0.09	7	0.03
Thickness of contaminated zone	2	0.78	2	0.48	2	0.78	2	0.45
Kd of Co-60 in Contaminated Zone	8	-0.03	8	-0.01	8	0.07	8	0.03
Fish transfer factor for Co	3	0.38	3	0.16	5	0.18	5	0.07
Density of contaminated zone	4	0.26	4	0.11	3	0.22	3	0.08
Fish consumption	5	0.21	5	0.08	4	0.21	4	0.08
Aquatic food	6	0.21	6	0.08	6	0.17	6	0.06
R-SQUARE		0.86		0.86		0.87		0.87

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	2.830E+01	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.817E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.250E-02	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)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	28.30 square meters	Cs-137	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	2.296E-02	2.233E-02	2.112E-02	0.000E+00
M(t):	9.184E-04	8.932E-04	8.448E-04	0.000E+00

Maximum TDOSE(t): 2.296E-02 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	2.296E-02	1.0000	5.017E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.188E-07	0.0000
Total	2.296E-02	1.0000	5.017E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.188E-07	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	2.296E-02	1.0000
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	2.296E-02	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0125	.006		
2	AREA	TRIANGULAR	14	28.3	42.3	
3	THICK0	NORMAL	.15	.076		
4	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	DOSE(j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	6.25E-02	6.25E-02	6.10E-02	5.81E-02	0.00E+00
Avg	0.00E+00	2.01E-02	2.01E-02	1.95E-02	1.85E-02	0.00E+00
Std	0.00E+00	1.22E-02	1.22E-02	1.19E-02	1.14E-02	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	6.25E-02	6.25E-02	6.10E-02	5.81E-02	0.00E+00
Avg	0.00E+00	2.01E-02	2.01E-02	1.95E-02	1.85E-02	0.00E+00
Std	0.00E+00	1.22E-02	1.22E-02	1.19E-02	1.14E-02	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	6.25E-02	6.10E-02	5.81E-02	0.00E+00
Avg	2.01E-02	1.95E-02	1.85E-02	0.00E+00
Std	1.22E-02	1.19E-02	1.14E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	6.25E-02	6.10E-02	5.81E-02	0.00E+00
Avg	2.01E-02	1.95E-02	1.85E-02	0.00E+00
Std	1.22E-02	1.19E-02	1.14E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Probabilistic results summary : Recreationist for TBD 08-006 unit Cs-137 Dose Assessment ConFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02110905.RAD

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	4.50E-04	1.82E-04	0.00E+00	0.00E+00
0.075	2.53E-03	2.37E-03	2.07E-03	0.00E+00
0.100	4.14E-03	4.04E-03	3.85E-03	0.00E+00
0.125	5.50E-03	5.20E-03	4.64E-03	0.00E+00
0.150	6.36E-03	5.95E-03	5.48E-03	0.00E+00
0.175	7.17E-03	7.00E-03	6.68E-03	0.00E+00
0.200	8.77E-03	8.47E-03	8.07E-03	0.00E+00
0.225	1.01E-02	9.85E-03	9.38E-03	0.00E+00
0.250	1.13E-02	1.10E-02	1.04E-02	0.00E+00
0.275	1.20E-02	1.16E-02	1.09E-02	0.00E+00
0.300	1.27E-02	1.23E-02	1.14E-02	0.00E+00
0.325	1.36E-02	1.33E-02	1.26E-02	0.00E+00
0.350	1.52E-02	1.47E-02	1.37E-02	0.00E+00
0.375	1.58E-02	1.53E-02	1.44E-02	0.00E+00
0.400	1.62E-02	1.58E-02	1.49E-02	0.00E+00
0.425	1.72E-02	1.67E-02	1.57E-02	0.00E+00
0.450	1.80E-02	1.76E-02	1.65E-02	0.00E+00
0.475	1.88E-02	1.84E-02	1.74E-02	0.00E+00
0.500	1.98E-02	1.92E-02	1.80E-02	0.00E+00
0.525	2.02E-02	1.97E-02	1.88E-02	0.00E+00
0.550	2.10E-02	2.03E-02	1.92E-02	0.00E+00
0.575	2.19E-02	2.14E-02	2.03E-02	0.00E+00
0.600	2.23E-02	2.16E-02	2.06E-02	0.00E+00
0.625	2.36E-02	2.29E-02	2.18E-02	0.00E+00
0.650	2.43E-02	2.37E-02	2.25E-02	0.00E+00
0.675	2.50E-02	2.44E-02	2.32E-02	0.00E+00
0.700	2.61E-02	2.55E-02	2.40E-02	0.00E+00
0.725	2.71E-02	2.63E-02	2.50E-02	0.00E+00
0.750	2.83E-02	2.76E-02	2.63E-02	0.00E+00
0.775	2.92E-02	2.85E-02	2.70E-02	0.00E+00
0.800	3.02E-02	2.93E-02	2.76E-02	0.00E+00
0.825	3.11E-02	3.01E-02	2.85E-02	0.00E+00
0.850	3.27E-02	3.18E-02	3.03E-02	0.00E+00
0.875	3.33E-02	3.25E-02	3.09E-02	0.00E+00
0.900	3.63E-02	3.55E-02	3.37E-02	0.00E+00
0.925	3.81E-02	3.72E-02	3.54E-02	0.00E+00
0.950	4.01E-02	3.91E-02	3.71E-02	0.00E+00
0.975	4.74E-02	4.63E-02	4.41E-02	0.00E+00
1.000	6.25E-02	6.10E-02	5.81E-02	0.00E+00

RESRAD Regression and Correlation output 02/25/09 16:07 Page: Coef 1
Title : Recreationist for TBD 08-006 unit Cs-137 Dose Assessment Cont Zone Elev Area 6 i
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02110905.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	1	0.89	1	0.74	1	0.87	1	0.73
Area of contaminated zone	3	0.38	3	0.16	3	0.37	3	0.16
Thickness of contaminated zone	2	0.81	2	0.53	2	0.78	2	0.51
Density of contaminated zone	4	0.19	4	0.08	4	0.13	4	0.05
R-SQUARE		0.85		0.85		0.83		0.83

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	2.830E+01	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.048E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	1.500E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.520E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.847E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.250E-02	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)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	28.30 square meters	Cs-137	1.000E+00
Thickness:	0.30 meters		
Cover Depth:	0.15 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	4.348E-03	4.304E-03	4.218E-03	0.000E+00
M(t):	1.739E-04	1.722E-04	1.687E-04	0.000E+00

Maximum TDOSE(t): 4.348E-03 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	4.348E-03	1.0000	1.672E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.062E-09	0.0000
Total	4.348E-03	1.0000	1.672E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.062E-09	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	4.348E-03	1.0000
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	4.348E-03	1.0000

*Sum of all water independent and dependent pathways.

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Part VI: Uncertainty Analysis

RESRAD Uncertainty Analysis Results

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0125	.006		
2	AREA	TRIANGULAR	14	28.3	42.3	
3	THICK0	NORMAL	.3	.15		
4	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999
5	COVER0	NORMAL	.15	.075		
6	DENSCV	TRUNCATED NORMAL	1.52	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	5.74E-02	5.74E-02	5.60E-02	5.34E-02	0.00E+00
Avg	0.00E+00	6.19E-03	6.19E-03	6.11E-03	5.95E-03	0.00E+00
Std	0.00E+00	7.47E-03	7.47E-03	7.34E-03	7.09E-03	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	5.74E-02	5.74E-02	5.60E-02	5.34E-02	0.00E+00
Avg	0.00E+00	6.19E-03	6.19E-03	6.11E-03	5.95E-03	0.00E+00
Std	0.00E+00	7.47E-03	7.47E-03	7.34E-03	7.09E-03	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	5.74E-02	5.60E-02	5.34E-02	0.00E+00
Avg	6.18E-03	6.11E-03	5.95E-03	0.00E+00
Std	7.47E-03	7.34E-03	7.09E-03	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	5.74E-02	5.60E-02	5.34E-02	0.00E+00
Avg	6.18E-03	6.11E-03	5.95E-03	0.00E+00
Std	7.47E-03	7.34E-03	7.09E-03	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	1.26E-04	1.25E-04	1.23E-04	0.00E+00
0.075	2.70E-04	2.67E-04	2.61E-04	0.00E+00
0.100	4.33E-04	4.30E-04	4.26E-04	0.00E+00
0.125	5.55E-04	5.51E-04	5.42E-04	0.00E+00
0.150	6.93E-04	6.88E-04	6.76E-04	0.00E+00
0.175	8.15E-04	8.08E-04	7.94E-04	0.00E+00
0.200	8.75E-04	8.67E-04	8.52E-04	0.00E+00
0.225	1.15E-03	1.14E-03	1.11E-03	0.00E+00
0.250	1.33E-03	1.31E-03	1.29E-03	0.00E+00
0.275	1.49E-03	1.48E-03	1.46E-03	0.00E+00
0.300	1.85E-03	1.83E-03	1.79E-03	0.00E+00
0.325	2.03E-03	2.02E-03	1.99E-03	0.00E+00
0.350	2.31E-03	2.28E-03	2.23E-03	0.00E+00
0.375	2.49E-03	2.47E-03	2.42E-03	0.00E+00
0.400	2.79E-03	2.76E-03	2.70E-03	0.00E+00
0.425	3.14E-03	3.09E-03	3.02E-03	0.00E+00
0.450	3.23E-03	3.20E-03	3.12E-03	0.00E+00
0.475	3.48E-03	3.45E-03	3.38E-03	0.00E+00
0.500	3.71E-03	3.69E-03	3.64E-03	0.00E+00
0.525	4.11E-03	4.07E-03	3.99E-03	0.00E+00
0.550	4.47E-03	4.44E-03	4.38E-03	0.00E+00
0.575	4.93E-03	4.88E-03	4.78E-03	0.00E+00
0.600	5.27E-03	5.22E-03	5.11E-03	0.00E+00
0.625	5.49E-03	5.41E-03	5.27E-03	0.00E+00
0.650	5.74E-03	5.68E-03	5.56E-03	0.00E+00
0.675	6.33E-03	6.25E-03	6.09E-03	0.00E+00
0.700	6.67E-03	6.61E-03	6.50E-03	0.00E+00
0.725	7.16E-03	7.09E-03	6.94E-03	0.00E+00
0.750	7.69E-03	7.59E-03	7.41E-03	0.00E+00
0.775	8.27E-03	8.17E-03	8.00E-03	0.00E+00
0.800	8.82E-03	8.75E-03	8.61E-03	0.00E+00
0.825	9.85E-03	9.73E-03	9.52E-03	0.00E+00
0.850	1.11E-02	1.10E-02	1.08E-02	0.00E+00
0.875	1.27E-02	1.26E-02	1.22E-02	0.00E+00
0.900	1.58E-02	1.56E-02	1.52E-02	0.00E+00
0.925	1.87E-02	1.84E-02	1.80E-02	0.00E+00
0.950	2.17E-02	2.14E-02	2.09E-02	0.00E+00
0.975	2.85E-02	2.81E-02	2.72E-02	0.00E+00
1.000	5.74E-02	5.60E-02	5.34E-02	0.00E+00

RESRAD Regression and Correlation output 02/25/09 17:00 Page: Coef 1
Title : Recreationist for TBD 08-006 unit Cs-137 Dose Assessment Direct Pwy Elev Local A
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02120901.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	2	0.55	2	0.35	2	0.70	2	0.45
Area of contaminated zone	6	0.04	6	0.02	5	-0.07	5	-0.03
Thickness of contaminated zone	3	0.34	3	0.19	4	0.39	4	0.20
Density of contaminated zone	5	-0.10	5	-0.05	6	0.00	6	0.00
Cover depth	1	-0.80	1	-0.72	1	-0.83	1	-0.68
Density of cover material	4	-0.28	4	-0.16	3	-0.45	3	-0.24
R-SQUARE		0.71		0.71		0.79		0.79

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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MW

Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	2.830E+01	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.050E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	4.570E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.520E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.845E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.250E-02	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)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	28.30 square meters	Cs-137	1.000E+00
Thickness:	0.31 meters		
Cover Depth:	0.46 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	5.282E-05	5.234E-05	5.140E-05	0.000E+00
M(t):	2.113E-06	2.094E-06	2.056E-06	0.000E+00

Maximum TDOSE(t): 5.282E-05 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	5.282E-05	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.282E-05	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	5.282E-05	1.0000
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	5.282E-05	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0125	.006		
2	AREA	TRIANGULAR	14	28.3	42.3	
3	THICK0	NORMAL	.3	.15		
4	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999
5	COVER0	NORMAL	.46	.23		
6	DENSCV	TRUNCATED NORMAL	1.52	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	DOSE(j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	4.99E-02	4.99E-02	4.85E-02	4.59E-02	3.58E-12
Avg	0.00E+00	1.63E-03	1.63E-03	1.60E-03	1.55E-03	2.19E-13
Std	0.00E+00	5.36E-03	5.36E-03	5.24E-03	5.02E-03	5.68E-13
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	4.99E-02	4.99E-02	4.85E-02	4.59E-02	3.58E-12
Avg	0.00E+00	1.63E-03	1.63E-03	1.60E-03	1.55E-03	2.19E-13
Std	0.00E+00	5.36E-03	5.36E-03	5.24E-03	5.02E-03	5.68E-13

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	4.99E-02	4.85E-02	4.59E-02	3.58E-12
Avg	1.63E-03	1.60E-03	1.55E-03	2.19E-13
Std	5.36E-03	5.24E-03	5.02E-03	5.68E-13
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	4.99E-02	4.85E-02	4.59E-02	3.58E-12
Avg	1.63E-03	1.60E-03	1.55E-03	2.19E-13
Std	5.36E-03	5.24E-03	5.02E-03	5.68E-13

∑ALL is total pathway dose summed for all nuclides.

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	1.24E-08	1.23E-08	1.21E-08	0.00E+00
0.075	4.06E-08	4.02E-08	3.95E-08	0.00E+00
0.100	1.56E-07	1.54E-07	1.52E-07	0.00E+00
0.125	2.80E-07	2.78E-07	2.74E-07	0.00E+00
0.150	3.77E-07	3.74E-07	3.67E-07	0.00E+00
0.175	6.49E-07	6.44E-07	6.35E-07	0.00E+00
0.200	1.45E-06	1.43E-06	1.40E-06	0.00E+00
0.225	1.84E-06	1.83E-06	1.79E-06	0.00E+00
0.250	2.77E-06	2.74E-06	2.69E-06	0.00E+00
0.275	4.55E-06	4.50E-06	4.41E-06	0.00E+00
0.300	5.90E-06	5.84E-06	5.73E-06	0.00E+00
0.325	9.44E-06	9.37E-06	9.24E-06	0.00E+00
0.350	1.29E-05	1.27E-05	1.25E-05	0.00E+00
0.375	1.61E-05	1.60E-05	1.56E-05	0.00E+00
0.400	1.95E-05	1.94E-05	1.89E-05	0.00E+00
0.425	2.39E-05	2.37E-05	2.33E-05	0.00E+00
0.450	3.34E-05	3.31E-05	3.25E-05	0.00E+00
0.475	3.78E-05	3.74E-05	3.67E-05	0.00E+00
0.500	4.79E-05	4.75E-05	4.65E-05	0.00E+00
0.525	5.80E-05	5.72E-05	5.59E-05	0.00E+00
0.550	7.53E-05	7.47E-05	7.30E-05	0.00E+00
0.575	8.42E-05	8.34E-05	8.18E-05	0.00E+00
0.600	1.01E-04	1.00E-04	9.83E-05	0.00E+00
0.625	1.17E-04	1.15E-04	1.13E-04	0.00E+00
0.650	1.43E-04	1.42E-04	1.40E-04	0.00E+00
0.675	1.67E-04	1.65E-04	1.61E-04	0.00E+00
0.700	2.18E-04	2.15E-04	2.09E-04	0.00E+00
0.725	3.20E-04	3.16E-04	3.09E-04	0.00E+00
0.750	4.24E-04	4.22E-04	4.17E-04	0.00E+00
0.775	5.26E-04	5.20E-04	5.08E-04	0.00E+00
0.800	7.31E-04	7.23E-04	7.07E-04	0.00E+00
0.825	9.29E-04	9.20E-04	9.02E-04	1.39E-13
0.850	1.17E-03	1.16E-03	1.13E-03	4.12E-13
0.875	1.98E-03	1.96E-03	1.91E-03	8.18E-13
0.900	4.11E-03	4.07E-03	4.00E-03	1.00E-12
0.925	5.41E-03	5.26E-03	5.04E-03	1.21E-12
0.950	8.94E-03	8.83E-03	8.61E-03	1.61E-12
0.975	2.01E-02	1.96E-02	1.88E-02	2.01E-12
1.000	4.99E-02	4.85E-02	4.59E-02	3.58E-12

RESRAD Regression and Correlation output 02/25/09 17:14 Page: Coef 1
Title : Recreationist for TBD 08-006 unit Cs-137 Dose Assessment Direct Pwy Elev Local A
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02120902.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	3	0.09	3	0.07	3	0.41	3	0.22
Area of contaminated zone	6	-0.04	6	-0.03	5	-0.13	5	-0.06
Thickness of contaminated zone	5	0.05	5	0.04	4	0.21	4	0.11
Density of contaminated zone	2	-0.18	2	-0.14	6	0.00	6	0.00
Cover depth	1	-0.60	1	-0.59	1	-0.84	1	-0.78
Density of cover material	4	-0.06	4	-0.05	2	-0.47	2	-0.26
R-SQUARE		0.38		0.38		0.76		0.76

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.500E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	7.600E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	4.400E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	2.850E+05	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)	1.522E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.500E-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)	2.700E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	5.000E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	8.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	MB	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.543E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	not used	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.250E-02	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	not used	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)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	0.000E+00	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	1	---	---	KYMAX

Summary of Pathway Selections

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

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	1500.00 square meters	Cs-137	1.000E+00
Thickness:	0.76 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	3.009E-04	3.089E-04	2.941E-04	0.000E+00
M(t):	1.203E-05	1.236E-05	1.176E-05	0.000E+00

Maximum TDOSE(t): 3.158E-04 mrem/yr at t = 0.1000 ± 0.0002 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 = 1.000E-01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	0.000E+00	0.0000	7.659E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.128E-05	0.0357
Total	0.000E+00	0.0000	7.659E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.128E-05	0.0357

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*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	0.000E+00	0.0000	3.044E-04	0.9640	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.158E-04	1.0000
Total	0.000E+00	0.0000	3.044E-04	0.9640	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.158E-04	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-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	0.000E+00	0.0000	7.677E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.131E-05	0.0376
Total	0.000E+00	0.0000	7.677E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.131E-05	0.0376

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	0.000E+00	0.0000	2.895E-04	0.9622	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.009E-04	1.0000
Total	0.000E+00	0.0000	2.895E-04	0.9622	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.009E-04	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	AREA	TRIANGULAR	750	1500	2250	
2	THICK0	NORMAL	.76	.38		
3	BBIO(55,1)	LOGNORMAL-N	7.6	.7		
4	DCACTC(1)	LOGNORMAL-N	6.1	2.33		
5	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999
6	DIET(5)	TRIANGULAR	2.7	5.4	8.1	
7	FR9	TRIANGULAR	0	.39	1	
8	DCACTS(1)	LOGNORMAL-N	6.1	2.33		

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.00E-01	2.24E+00	2.24E+00	1.12E+00	4.28E-01	1.23E-13
Avg	8.54E-02	3.73E-02	3.70E-02	2.65E-02	1.63E-02	3.63E-15
Std	3.54E-02	1.75E-01	1.75E-01	9.90E-02	4.47E-02	1.46E-14
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.00E-01	2.24E+00	2.24E+00	1.12E+00	4.28E-01	1.23E-13
Avg	8.54E-02	3.73E-02	3.70E-02	2.65E-02	1.63E-02	3.63E-15
Std	3.54E-02	1.75E-01	1.75E-01	9.90E-02	4.47E-02	1.46E-14

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Fish Ingestion

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.24E+00	1.12E+00	4.28E-01	1.23E-13
Avg	3.70E-02	2.65E-02	1.63E-02	3.55E-15
Std	1.75E-01	9.90E-02	4.47E-02	1.45E-14
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.24E+00	1.12E+00	4.28E-01	1.23E-13
Avg	3.70E-02	2.65E-02	1.63E-02	3.55E-15
Std	1.75E-01	9.90E-02	4.47E-02	1.45E-14

∑ALL is total pathway dose summed for all nuclides.

RESRAD, Version 6.4 T½ Limit = 180 days 02/25/2009 17:42 Page 18
Probabilistic results summary : Recreationist for TBD 08-006 unit Cs-137 Dose A-
ssessment FisFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02120903.RAD

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	1.90E-05	1.90E-05	1.38E-05	0.00E+00
0.050	3.17E-05	3.20E-05	2.58E-05	0.00E+00
0.075	5.04E-05	5.12E-05	4.67E-05	0.00E+00
0.100	6.34E-05	6.46E-05	6.07E-05	0.00E+00
0.125	9.20E-05	9.40E-05	8.91E-05	0.00E+00
0.150	1.23E-04	1.25E-04	1.17E-04	0.00E+00
0.175	1.86E-04	1.91E-04	1.80E-04	0.00E+00
0.200	2.20E-04	2.25E-04	2.10E-04	0.00E+00
0.225	2.80E-04	2.73E-04	2.60E-04	0.00E+00
0.250	3.80E-04	3.88E-04	3.68E-04	0.00E+00
0.275	4.82E-04	4.90E-04	4.67E-04	0.00E+00
0.300	5.42E-04	5.51E-04	5.16E-04	0.00E+00
0.325	6.36E-04	6.51E-04	6.21E-04	0.00E+00
0.350	7.28E-04	7.42E-04	7.06E-04	0.00E+00
0.375	8.74E-04	8.84E-04	8.37E-04	0.00E+00
0.400	9.54E-04	9.66E-04	9.19E-04	0.00E+00
0.425	1.25E-03	1.14E-03	1.07E-03	0.00E+00
0.450	1.66E-03	1.57E-03	1.49E-03	0.00E+00
0.475	2.11E-03	2.15E-03	1.99E-03	0.00E+00
0.500	2.39E-03	2.44E-03	2.19E-03	0.00E+00
0.525	2.79E-03	2.87E-03	2.69E-03	0.00E+00
0.550	3.22E-03	3.30E-03	3.00E-03	0.00E+00
0.575	3.70E-03	3.78E-03	3.38E-03	0.00E+00
0.600	4.42E-03	4.52E-03	4.17E-03	0.00E+00
0.625	5.09E-03	5.22E-03	4.74E-03	0.00E+00
0.650	6.01E-03	6.18E-03	5.51E-03	0.00E+00
0.675	7.85E-03	7.62E-03	6.65E-03	0.00E+00
0.700	8.51E-03	8.66E-03	8.19E-03	0.00E+00
0.725	9.85E-03	9.22E-03	8.74E-03	0.00E+00
0.750	1.26E-02	1.19E-02	1.07E-02	0.00E+00
0.775	1.53E-02	1.46E-02	1.36E-02	9.77E-21
0.800	2.11E-02	2.11E-02	1.73E-02	9.37E-17
0.825	2.42E-02	2.38E-02	2.15E-02	1.10E-15
0.850	3.07E-02	3.05E-02	2.52E-02	2.03E-15
0.875	3.87E-02	3.88E-02	3.25E-02	4.10E-15
0.900	4.89E-02	4.87E-02	4.09E-02	6.81E-15
0.925	6.59E-02	6.14E-02	4.77E-02	9.89E-15
0.950	1.15E-01	9.26E-02	6.66E-02	1.65E-14
0.975	2.99E-01	2.69E-01	1.55E-01	4.31E-14
1.000	2.24E+00	1.12E+00	4.28E-01	1.23E-13

RESRAD Regression and Correlation output 02/25/09 17:42 Page: Coef 1
Title : Recreationist for TBD 08-006 unit Cs-137 Dose Assessment Fish Pathway Contaminat
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02120903.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Area of contaminated zone	8	-0.01	8	-0.01	8	0.05	8	0.02
Thickness of contaminated zone	3	0.09	3	0.09	4	0.21	4	0.09
Fish transfer factor for Cs	5	0.05	5	0.05	2	0.46	2	0.20
Kd of Cs-137 in Contaminated Zone	1	-0.10	1	-0.10	1	-0.91	1	-0.87
Density of contaminated zone	6	0.04	6	0.04	6	-0.10	6	-0.04
Fish consumption	2	0.10	2	0.10	5	0.15	5	0.06
Aquatic food	4	0.06	4	0.06	3	0.44	3	0.19
Kd of Cs-137 in Saturated Zone	7	-0.02	7	-0.02	7	0.06	7	0.02
R-SQUARE		0.03		0.03		0.85		0.85

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	2.830E+01	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	7.600E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	6.000E+00	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	2.850E+05	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)	1.522E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.500E-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)	2.700E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	5.000E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	8.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	MB	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.543E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	not used	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.250E-02	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	not used	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)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	0.000E+00	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	1	---	---	KYMAX

Summary of Pathway Selections

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

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	28.30 square meters	Cs-137	1.000E+00
Thickness:	0.76 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	5.832E-06	5.980E-06	5.694E-06	0.000E+00
M(t):	2.333E-07	2.392E-07	2.277E-07	0.000E+00

Maximum TDOSE(t): 6.113E-06 mrem/yr at t = 0.1000 ± 0.0002 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 = 1.000E-01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide 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.
Cs-137	0.000E+00	0.0000	5.024E-08	0.0082	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.192E-07	0.0522
Total	0.000E+00	0.0000	5.024E-08	0.0082	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.192E-07	0.0522

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 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.
Cs-137	0.000E+00	0.0000	5.744E-06	0.9396	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.113E-06	1.0000
Total	0.000E+00	0.0000	5.744E-06	0.9396	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.113E-06	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-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	0.000E+00	0.0000	5.036E-08	0.0086	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.199E-07	0.0549
Total	0.000E+00	0.0000	5.036E-08	0.0086	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.199E-07	0.0549

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	0.000E+00	0.0000	5.462E-06	0.9365	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.832E-06	1.0000
Total	0.000E+00	0.0000	5.462E-06	0.9365	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.832E-06	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	AREA	TRIANGULAR	14	28.3	42.3	
2	THICK0	NORMAL	.76	.38		
3	BBIO(55,1)	LOGNORMAL-N	7.6	.7		
4	DCACTC(1)	LOGNORMAL-N	6.1	2.33		
5	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999
6	DIET(5)	TRIANGULAR	2.7	5.4	8.1	
7	FR9	TRIANGULAR	0	.39	1	
8	DCACTS(1)	LOGNORMAL-N	6.1	2.33		

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.00E-01	4.22E-02	4.22E-02	2.11E-02	8.06E-03	2.32E-15
Avg	8.34E-02	7.01E-04	6.95E-04	4.98E-04	3.06E-04	6.94E-17
Std	3.73E-02	3.30E-03	3.30E-03	1.86E-03	8.41E-04	2.76E-16
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.00E-01	4.22E-02	4.22E-02	2.11E-02	8.06E-03	2.32E-15
Avg	8.34E-02	7.01E-04	6.95E-04	4.98E-04	3.06E-04	6.94E-17
Std	3.73E-02	3.30E-03	3.30E-03	1.86E-03	8.41E-04	2.76E-16

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Fish Ingestion

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	4.22E-02	2.11E-02	8.06E-03	2.31E-15
Avg	6.95E-04	4.97E-04	3.06E-04	6.67E-17
Std	3.30E-03	1.86E-03	8.41E-04	2.73E-16
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	4.22E-02	2.11E-02	8.06E-03	2.31E-15
Avg	6.95E-04	4.97E-04	3.06E-04	6.67E-17
Std	3.30E-03	1.86E-03	8.41E-04	2.73E-16

∑ALL is total pathway dose summed for all nuclides.

RESRAD, Version 6.4 T½ Limit = 180 days 02/25/2009 18:28 Page 18
Probabilistic results summary : Recreationist for TBD 08-006 unit Cs-137 Dose A-
ssessment FisFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02120904.RAD

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	4.42E-07	4.35E-07	3.71E-07	0.00E+00
0.050	6.70E-07	6.74E-07	6.32E-07	0.00E+00
0.075	1.13E-06	1.14E-06	1.06E-06	0.00E+00
0.100	1.33E-06	1.35E-06	1.27E-06	0.00E+00
0.125	1.88E-06	1.92E-06	1.74E-06	0.00E+00
0.150	2.46E-06	2.51E-06	2.31E-06	0.00E+00
0.175	3.74E-06	3.82E-06	3.52E-06	0.00E+00
0.200	4.37E-06	4.44E-06	4.17E-06	0.00E+00
0.225	5.44E-06	5.27E-06	4.98E-06	0.00E+00
0.250	7.29E-06	7.36E-06	7.00E-06	0.00E+00
0.275	9.23E-06	9.46E-06	9.01E-06	0.00E+00
0.300	1.04E-05	1.05E-05	9.88E-06	0.00E+00
0.325	1.22E-05	1.24E-05	1.18E-05	0.00E+00
0.350	1.40E-05	1.40E-05	1.33E-05	0.00E+00
0.375	1.65E-05	1.69E-05	1.59E-05	0.00E+00
0.400	1.81E-05	1.83E-05	1.75E-05	0.00E+00
0.425	2.37E-05	2.16E-05	2.02E-05	0.00E+00
0.450	3.15E-05	2.98E-05	2.82E-05	0.00E+00
0.475	3.98E-05	4.06E-05	3.78E-05	0.00E+00
0.500	4.49E-05	4.60E-05	4.13E-05	0.00E+00
0.525	5.24E-05	5.38E-05	5.07E-05	0.00E+00
0.550	6.04E-05	6.19E-05	5.66E-05	0.00E+00
0.575	6.98E-05	7.13E-05	6.38E-05	0.00E+00
0.600	8.30E-05	8.47E-05	7.85E-05	0.00E+00
0.625	9.57E-05	9.80E-05	8.93E-05	0.00E+00
0.650	1.13E-04	1.16E-04	1.04E-04	0.00E+00
0.675	1.48E-04	1.43E-04	1.25E-04	0.00E+00
0.700	1.60E-04	1.63E-04	1.54E-04	0.00E+00
0.725	1.85E-04	1.74E-04	1.65E-04	0.00E+00
0.750	2.36E-04	2.24E-04	2.02E-04	0.00E+00
0.775	2.88E-04	2.75E-04	2.55E-04	1.84E-22
0.800	3.96E-04	3.96E-04	3.24E-04	2.18E-18
0.825	4.56E-04	4.48E-04	4.04E-04	2.22E-17
0.850	5.77E-04	5.73E-04	4.74E-04	4.47E-17
0.875	7.27E-04	7.30E-04	6.11E-04	8.21E-17
0.900	9.21E-04	9.16E-04	7.68E-04	1.38E-16
0.925	1.24E-03	1.15E-03	8.95E-04	1.87E-16
0.950	2.16E-03	1.74E-03	1.25E-03	3.20E-16
0.975	5.62E-03	5.06E-03	2.91E-03	8.17E-16
1.000	4.22E-02	2.11E-02	8.06E-03	2.32E-15

RESRAD Regression and Correlation output 02/25/09 18:28 Page: Coef 1
Title : Recreationist for TBD 08-006 unit Cs-137 Dose Assessment Fish Pathway Elev Local
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02120904.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Area of contaminated zone	8	0.00	8	0.00	7	0.06	7	0.02
Thickness of contaminated zone	3	0.09	3	0.09	4	0.21	4	0.09
Fish transfer factor for Cs	5	0.05	5	0.05	2	0.45	2	0.20
Kd of Cs-137 in Contaminated Zone	1	-0.10	1	-0.10	1	-0.91	1	-0.87
Density of contaminated zone	6	0.04	6	0.04	6	-0.10	6	-0.04
Fish consumption	2	0.10	2	0.10	5	0.15	5	0.06
Aquatic food	4	0.06	4	0.06	3	0.43	3	0.19
Kd of Cs-137 in Saturated Zone	7	-0.02	7	-0.02	8	0.06	8	0.02
R-SQUARE		0.03		0.03		0.85		0.85

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Revised Dose Assessment for Plum Brook Sediments

PBRF-TBD-08-006

Appendix C

Environmental Dosimetry Study

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1.0 Introduction

Measurements of radiation dose rates in the vicinity of the Plum Brook were performed using environmental thermoluminescence dosimeters (TLDs) and radiological survey meters. Thermoluminescent dosimeters designed for environmental radiation monitoring were placed for 15 weeks at selected locations along the Plumb Brook. Locations were selected to represent exposure scenario settings used in the dose assessment and other locations of interest. These included locations representing typical or average exposure conditions and locations where higher than average concentrations of Cs-137 were measured in Plum Brook sediments. Radiological survey measurements were also taken at each TLD location at the time of placement and again at removal.

2.0 Background

The study was designed to complement the dose assessment for Plum Brook sediments. In the dose assessment, estimated doses to individuals are calculated using computer models and assumptions regarding physical, metabolic and behavioral parameter values. The objective of the measurements described herein is to provide independent confirmation of doses from direct radiation that could be received by individuals in the vicinity of the Plum Brook. The assessment of dose to individuals from Plum Brook sediments as reported in the main report, predicts that most of the dose is received by the "direct" exposure pathway. That is, whole body dose due to penetrating gamma radiation emitted from Cs-137 and Co-60 in the sediments.

Characterization surveys show that contaminated sediments are non-uniformly distributed along the Plum Brook [NASA 2009]. Two sources of direct exposure are evaluated in the dose assessment. The predominant mode of exposure to an individual in the immediate vicinity of Plum Brook is long term exposure to low average concentrations. In the dose assessment, this is modeled as the contaminated zone. There is also the possibility of contact with localized areas of elevated contamination from 50 to about 75 times the average concentration. These are modeled as localized sources of elevated activity.

Measurements of gamma radiation dose and dose rates in locations impacted by contaminated sediments are performed with environmental TLDs and with survey instruments.[1] The expected range of outdoor dose rates in sediment-impacted locations, as determined by the dose assessment, is examined. Table 1 shows the doses calculated using RESRAD results converted to equivalent outdoor dose rates. The calculated outdoor dose rates range from 1.1 μrem/h at the Brookside Resident scenario property to 6.3 μrem/h in the immediate vicinity of the Suburban Gardner scenario garden. Survey instruments used for confirmatory measurements must be capable of measuring net dose rates (above typical local background dose rates) in this range.

[1] The survey instruments used for this study, Ludlum Model 10 microR meters, are calibrated and maintained in accordance with PBRF Instrument Procedures. This includes daily source-performance checks.

Low-range gamma and x-ray survey instruments are capable of measuring dose rates as low as a few μR (or μrem) per hour.[2]

Environmental TLDs are capable of measuring integrated doses as low as approximately 5 mR [Mirion 2008]. The calculated integrated doses for 106-day exposures are also shown in Table 1. They range from 2.81 mrem (Brookside Resident) to 16.12 mrem (Suburban Gardner).

Table 1 , Calculated Direct Pathway Dose Rates and Integrated Doses

Scenario	Total Cs + Co Direct Dose (mrem/y)	Scenario Exposure hours (h/y) (1)	Equivalent Outdoor Exposure Rate (μrem/h) (2)	Outdoor Integrated Dose in 106 d (2542 h) (mrem) (3)
Suburban Gardner	0.78 ± 0.38	123	6.34 ± 3.08	16.12 ± 7.83
Brookside Resident	1.28 ± 1.46	1158	1.11 ± 1.26	2.81 ± 3.20
Country Club Worker	1.17 ± 0.61	450	2.60 ± 1.36	6.61 ± 3.46
Recreationist	0.61 ± 0.31	105	5.78 ± 2.92	14.70 ± 7.43

Table 1 Notes:

1. Scenario exposure hours are obtained from Section 5.6 of the main report.
2. Outdoor exposure rates are calculated as the quotient: total direct dose ÷ exposure hours (with units conversion). The uncertainty is estimated by error propagation.
3. The integrated dose is calculated for an exposure period of 2542 hours, the average duration of the TLD field-exposure in the present study.

[2] The Ludlum Model 19 micro R Meter has a lower limit of detectability (LLD) of approximately 4.5 μR/h (fast response) and approximately 2 μR/h (slow response) [LMI 2009]. In this report, measurements of environmental gamma radiation doses and dose rates may be reported in units of Roentgens (R) or rem. For the purposes of this discussion they are considered equal (1R ~ 0.95 rem) [Turner 1995].

3.0 References

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4.0 Dosimeters

Standard environmental thermoluminescence dosimeters supplied by Global Dosimetry Solutions, Inc. were used for the measurements.[3] The dosimeters are manufactured by Panasonic. Each dosimeter is a three-element packet (or badge) comprised of one lithium borate ($Li_2B_4O_7$, doped with copper) and two calcium sulfate ($CaS0_4$, doped with thulium) TLD chips (elements). The dosimeters are capable of measuring integrated doses from 5 to 5,000 mrem [Mirion 2008]. Representative dosimeters of similar specification have been "performance tested" against applicable performance standards [Prox 2001]. The vendor also maintains accreditation by the National Institutes of Standards and Technology National Laboratory Accreditation Program (NVLAP). The current NVLAP certificate is provided in Attachment C. Dose measurement results are reported in mR (milliroentgen) as the average of the individual element doses. The total uncertainty in the reported dose for each TLD element is 26.4% [Cords 2008]. Dosimeters were mounted on steel posts for placement in the field. The posts were inserted into the ground adjacent to the stream. Each "station" consisted of two TLD packets. One dosimeter was attached at a height of one meter with a second dosimeter attached at a height of 2/3 meter from ground surface. A dosimeter station mock-up is shown in Figure 1. The one meter TLD was placed for measurement of the dose at the dose receptor point for a typical adult. The 2/3 meter TLD was placed to correspond to the dose receptor point for a 10 to 12 year-old child.

Figure 1, Environmental TLD Station Mock-up

[3] Global Dosimetry Solutions, Inc. is a subsidiary of Mirion Technologies, Irvine, CA [Mirion 2008].

5.0 Placement and Retrieval of Dosimeters

Dosimeters were placed in two areas identified as the "study area" and the "background area". The study area includes selected locations downstream of the PBRF water effluent monitoring station (WEMS) at the Pentolite Ditch. The placement locations for the study area and background area TLD stations are shown on local area maps in Figures 2 and 3.

All but one of the study area TLDs stations were placed in areas accessible to the public that are potentially impacted by contamination of PBRF origin. One was placed outside the main study area adjacent to the Pentolite Ditch just below the WEMS outfall, on NASA property. A Cs-137 concentration of 1000 pCi/g was measured at this location in 2005. A station was placed along the Plum Brook just north of Columbus Avenue where a Cs-137 concentration of 72 pCi/g was measured in 2006. A station was placed about half-way between Columbus Avenue and Bogart Rd near the former Waste Water Treatment plant outfall. Concentrations of Cs-137 between 20 and 30 pCi/g were measured in this vicinity. A station was placed on the Plum Brook Country Club (PBCC) and one was placed along the stream just north of the US Rt. 6 overpass.

The dosimeter stations were placed in locations selected to represent exposure scenario settings. The stations placed between Columbus Ave. and Bogart Rd. represent "worst case" settings for the Suburban Gardner and Brookside Resident scenarios. The station placed in the PBCC was located adjacent to a cart path near the PBCC Ponds. This is in an area where contaminated sediment excavated from the PBCC Ponds was used as fill. It was selected to represent the PBCC Worker exposure scenario setting. The station placed in the Plum Brook Estuary just north of the US Rt. 6 overpass was placed in the wetlands next to the stream. It was selected to represent the setting for the Recreationist exposure scenario.

Seven locations were selected for background measurements. All are within the 6400 acre Plum Brook Facility, but outside the PBRF. Background locations were selected at stream locations not impacted by PBRF operations. Four TLD stations were placed along the Plum Brook upstream (south) of the Pentolite Ditch. They covered the stream from its point of entry to the Plum Brook Facility to a point about ½ mi. south of Pentolite Ditch. Locations at three other streams that traverse the facility were also selected. These include Pipe Creek, a large perennial stream and two smaller streams within the Facility: Ransome Creek and Lindsley Ditch. The background locations were selected to represent the range of hydrologic and geologic settings traversed by the Plum Brook.

Dosimeter handling and placement were controlled under a Survey Request prepared in accordance with PBRF procedures.[4] The dosimeter locations and placement instructions are summarized in Table 2. The dosimeters were placed on July 15-17 and retrieved on October 30, 2008. Photos of each location were taken at the time of placement. Radiological survey measurements (dose rates) were also taken at each location at placement and retrieval. Attachment A, Dosimeter Placement Report, documents the date and time of placement and retrieval and the setting and conditions for each location. Control TLDs from the same batch supplied by the vendor were placed in a shielded enclosure during the exposure period.

[4] Survey Request, SR-117, Plum Brook and Environs (Plum Brook Environmental Dosimeter Study), issued July 15, 2008.

Figure 2, Location of Study Area Dosimeters

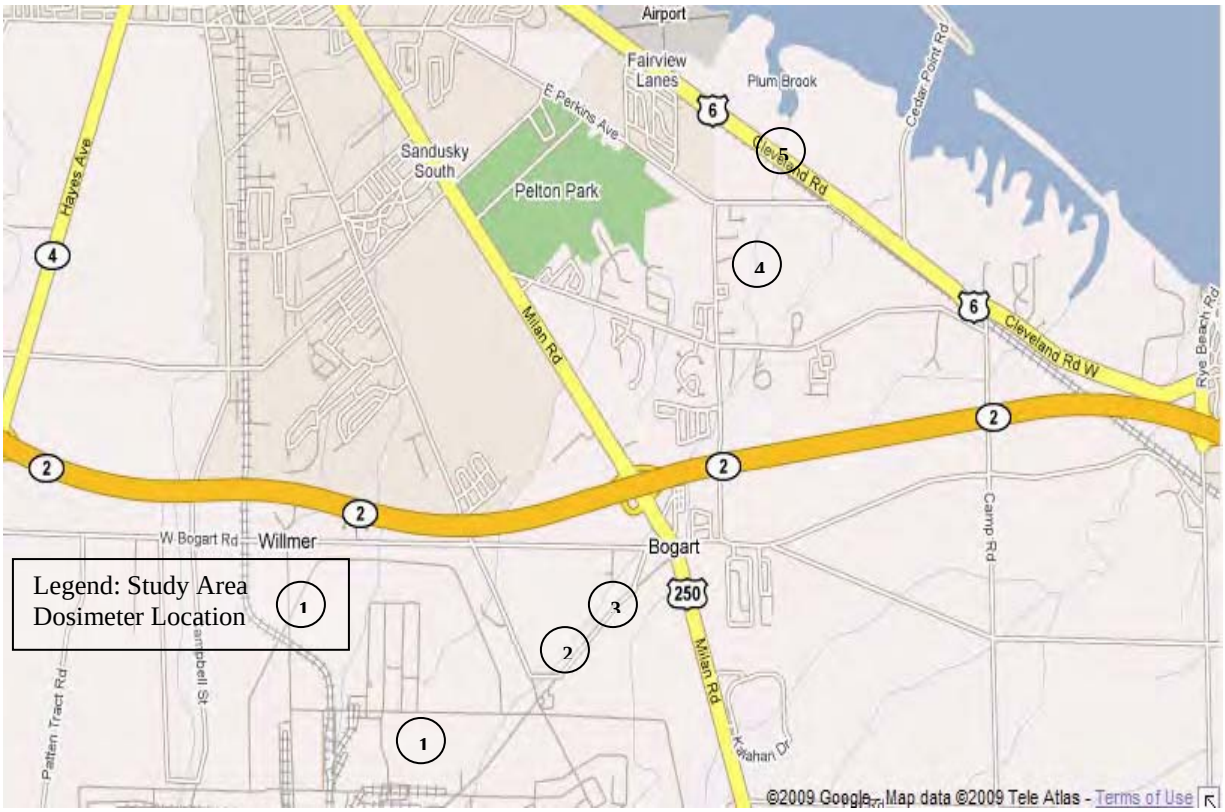


Figure 3, Background Dosimeter Locations

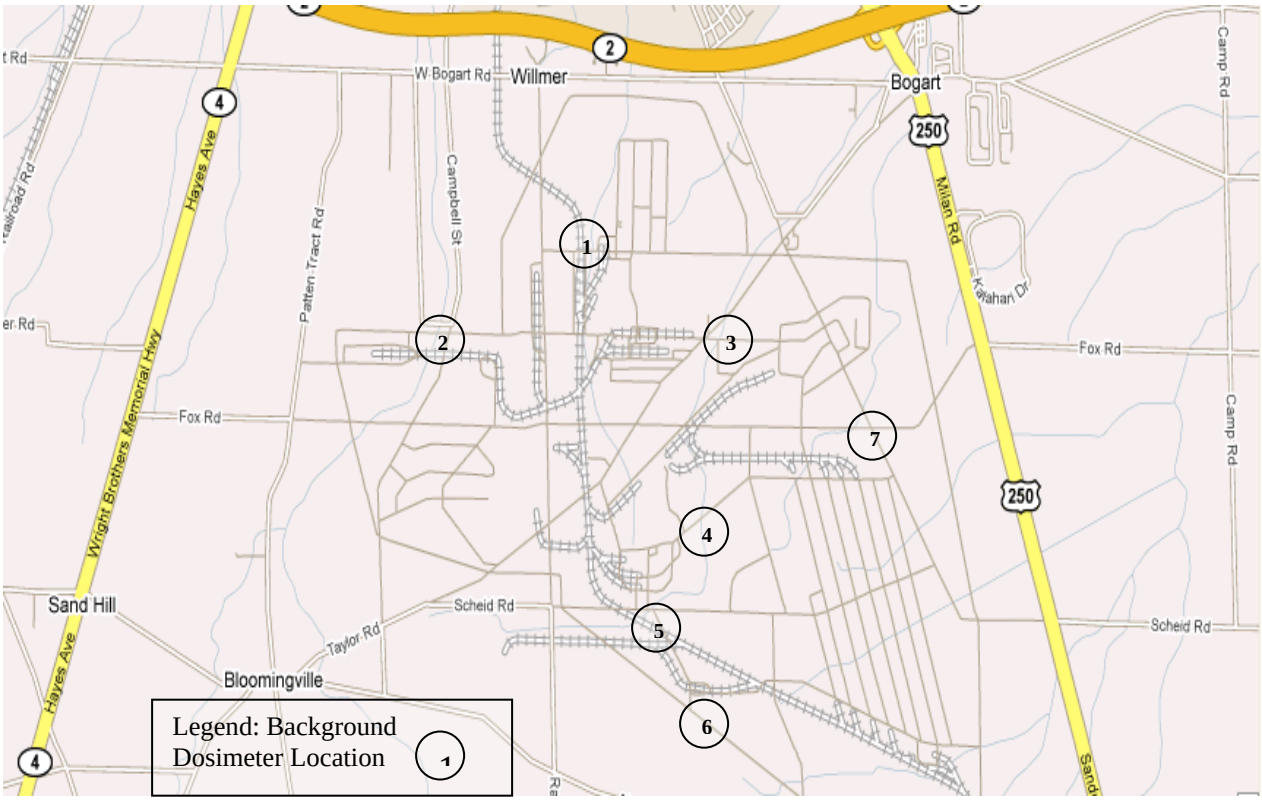


Table 2, Dosimeter Locations and Placement Instructions

1. Location of Background Dosimeters.

BKG-1. Ransome Creek at Pentolite Road crossing just west of the old warehouses (Bldgs. 9201 & 9202). Place the TLD station along the east side of the creek bank north of the road.

BKG-2. Pipe Creek on Maintenance Rd. About 150 yards west of the intersection of Campbell St. and Maintenance Rd. Adjacent to private home located north of the boundary fence. Near Environmental sampling Station No 9. Place the TLD station on the west side of the creek bank south of the road.

BKG-3. Plum Brook at Maintenance Road crossing just east of Taylor Road. Near Environmental Sampling Station No. 4. Place the TLD Station on the west bank of the stream on the south side of the road.

BKG-4. Plum Brook at North Magazine Rd. Approximately 300 yards east of Bldg. 3211 B-2. Place the TLD Station on the west bank south of the road.

BKG-5. Plum Brook at Scheid Road over-crossing. Place the TLD Station on the west bank south of Scheid Road.

BKG-6. Plum Brook crossing at Patrol Road on the south perimeter of the site. The Plum Brook enters the facility from farmland to the south. Place the TLD station on the east bank south of Patrol Road.

BKG-7. Lindsley Ditch at Columbus Avenue overpass, about 1/3 mile south of the NASA Engineering Building (Bldg. 7141). Place the TLD station on the west side of the road on the south bank of the ditch.

2. Locations of Dosimeters in the Measurement Study Area

MSA-1. North Bank of Pentolite Ditch just east of the PBRF Water Effluent Monitoring Station (WEMS) outfall. This is located inside the NASA Plum Brook Facility. The WEMS outfall crosses under Pentolite Road about 250 yards east of the intersection of Line 2 Road and Pentolite Road.

MSA-2. Plum Brook, approximately 170 feet north of the Columbus Avenue overpass – west bank of the stream. This is near the intersection of Columbus and Taylor Roads, just north of the Plum Brook Facility entrance in Perkins Twp, Erie County.

MSA-3. Plum Brook at former Sewage Treatment Facility (directly west of 716 Taylor Road Residence Mailbox). This is in Perkins Twp, Erie County. The TLD station is to be placed adjacent to the outfall of the former Sewage Treatment Plant. This is located 250 yards south (along Taylor Rd) of the intersection of Taylor and Botay Roads and 100 yards west of 716 Taylor Road.

MSA-4. Plum Brook Country Club, 3712 Galloway Rd, Huron Twp. On golf cart overpass southeast of Maintenance Building. This is located in the northwest section of the golf course about ¼ mile south of Perkins Avenue. It is also 350 yards due east of the intersection of Galloway Rd and Valley Lane.

MSA-5. Plum Brook stream mouth north of US Rt. 6 (Cleveland Road), Huron Twp, Erie County. This is in the Putnam Marsh Nature Preserve operated by Erie MetroParks. The TLD station is to be placed along the stream or flood plain/wetlands border at a location approved by Erie MetroParks. The Plum Brook stream crosses Cleveland Road, 680 yards west of the intersection of Cleveland Road and Perkins Avenue.

6.0 Analysis of Results

Results of measurements with TLD and microR meters are presented. Doses measured with TLDs are first converted to dose rates using a simplified method without background subtraction for comparison with microR meter measurements at the dosimetry station locations. Following this, the TLD results are evaluated to obtain the net dose from terrestrial gamma radiation sources for comparison with calculated outdoor dose rates obtained for the exposure scenarios from the RESRAD dose assessment results.

Table 3 shows the reported dose results for the individual TLD badges - from the dosimetry vendor report in Attachment B. The table shows the reported doses from individual badge elements and the calculated badge element averages, which are the reported doses from each dosimeter. The uncertainty of each TLD badge dose is shown in the table as the standard deviation of the badge element doses.[5]

[5] The Dosimetry vendor states that the uncertainty is reported as 0.2643 x the average of the badge element doses in mR; equivalent to the two-sigma uncertainty [Mirion 2008].

Table 3, Dosimeter Results (mR)

Badge #	Location ID	Element 2	Element 3	Element 4	Badge Dose (1)	Standard Deviation (2)
N/A	Control	13.0	13.0	13.0	13.0	0.00
N/A	Control	12.0	12.0	11.0	11.7	0.58
N/A	Control	12.0	12.0	12.0	12.0	0.00
N/A	Control	14.0	16.0	15.0	15.0	1.00
N/A	Control	14.0	15.0	13.0	14.0	1.00
N/A	Control	13.0	14.0	13.0	13.3	0.58
N/A	Control	13.0	14.0	13.0	13.3	0.58
131952	BKG-1A	24.0	22.0	23.0	23.0	1.00
131953	BKG-1B	25.0	24.0	24.0	24.3	0.58
131954	BKG-2A	23.0	23.0	22.0	22.7	0.58
131955	BKG-2B	21.0	23.0	22.0	22.0	1.00
131956	BKG-3A	26.0	25.0	26.0	25.7	0.58
131957	BKG-3B	25.0	24.0	26.0	25.0	1.00
131958	BKG-4A	40.0	41.0	44.0	41.7	2.08
131959	BKG-4B	39.0	38.0	39.0	38.7	0.58
131960	BKG-5A	34.0	33.0	35.0	34.0	1.00
131961	BKG-5B	36.0	35.0	34.0	35.0	1.00
131962	BKG-6A	36.0	37.0	36.0	36.3	0.58
131963	BKG-6B	37.0	36.0	35.0	36.0	1.00
131964	BKG-7A	26.0	25.0	26.0	25.7	0.58
131965	BKG-7B	29.0	29.0	28.0	28.7	0.58
131966	MSA-1A	33.0	33.0	33.0	33.0	0.00
131967	MSA-1B	41.0	41.0	41.0	41.0	0.00
131968	MSA-2A	31.0	31.0	32.0	31.3	0.58
131969	MSA-2B	31.0	30.0	31.0	30.7	0.58
131970	MSA-3A	28.0	27.0	27.0	27.3	0.58
131971	MSA-3B	27.0	27.0	27.0	27.0	0.00
131972	MSA-4A	25.0	25.0	24.0	24.7	0.58
131973	MSA-4B	26.0	24.0	21.0	23.7	2.52
131974	MSA-5A	23.0	23.0	23.0	23.0	0.00
131975	MSA-5B	25.0	24.0	24.0	24.3	0.58

Table 3 Notes:

1. The badge averages reported in this table are calculated from the element doses reported by the vendor shown in Attachment B. They differ slightly from the badge doses reported by the vendor. The vendor report rounded the badge doses to zero decimal places.
2. The standard deviation of the badge element doses is shown in the table.

A comparison is made of measured TLD doses with dose rates measured at each location at placement and removal. The TLD doses reported in mR in Table 3 are converted to μR/h by dividing by the number of hours that the badges were exposed in the field.[6] Table 4 shows the

[6] The duration of the TLD field exposure periods ranged from 2520 to 2566 h. The average was 2542 h.

resulting dose rates at each TLD location and the dose rates measured with a low-range survey meter.[7] The survey meter measurement results are reported as the average of the individual measurements taken at each station. The individual field measurements are reported in Table 9 in Attachment A. This comparison assumes that the TLD exposure prior to and after placement is small in comparison to the exposure from the field placement period. The total life cycle for the TLD batch was 148 days and the average field exposure was 106 days. Dose rates obtained from TLD measurements and from the microR meter measurements are in good agreement. A correlation coefficient (R^2) of 0.89 is obtained from linear regression of TLD vs. μR meter measurements.

Table 4, Comparison of TLD and μR Meter Dose rates

Badge #	Location ID	Time Exposed (hr)	Badge Average (mR)	Average TLD Exposure Rate (μR/h)	Average μR Meter Reading (μR/h)
131952	BKG-1A	2566	23.0	9.0 ± 1.4	7.2 ± 1.3
131953	BKG-1B	2566	24.3	9.5 ± 1.5	7.3 ± 1.5
131954	BKG-2A	2547	22.7	8.9 ± 1.4	7.2 ± 1.3
131955	BKG-2B	2547	22.0	8.7 ± 1.3	7.5 ± 1.6
131956	BKG-3A	2548	25.7	10.1 ± 1.5	8.5 ± 2.7
131957	BKG-3B	2548	25.0	9.8 ± 1.5	8.5 ± 2.7
131958	BKG-4A	2547	41.7	16.4 ± 2.5	17.2 ± 5.3
131959	BKG-4B	2547	38.7	15.2 ± 2.3	17.3 ± 5.2
131960	BKG-5A	2547	34.0	13.4 ± 2.0	14.8 ± 4.6
131961	BKG-5B	2547	35.0	13.7 ± 2.1	14.8 ± 4.6
131962	BKG-6A	2546	36.3	14.3 ± 2.2	17.0 ± 0.9
131963	BKG-6B	2546	36.0	14.1 ± 2.2	17.2 ± 0.8
131964	BKG-7A	2543	25.7	10.1 ± 1.5	9.0 ± 2.2
131965	BKG-7B	2543	28.7	11.3 ± 1.7	8.5 ± 2.1
131966	MSA-1A	2540	33.0	13.0 ± 2.0	17.3 ± 3.3
131967	MSA-1B	2540	41.0	16.1 ± 2.5	18.8 ± 5.5
131968	MSA-2A	2539	31.3	12.3 ± 1.9	9.5 ± 1.6
131969	MSA-2B	2539	30.7	12.1 ± 1.8	10.3 ± 2.3
131970	MSA-3A	2538	27.3	10.8 ± 1.6	9.0 ± 2.2
131971	MSA-3B	2538	27.0	10.6 ± 1.6	9.0 ± 2.2
131972	MSA-4A	2520	24.7	9.8 ± 1.5	7.0 ± 0.5
131973	MSA-4B	2520	23.7	9.4 ± 1.4	7.0 ± 0.5
131974	MSA-5A	2521	23.0	9.1 ± 1.4	8.7 ± 0.5
131975	MSA-5B	2521	24.3	9.7 ± 1.5	8.5 ± 0.5

The TLD results are evaluated further for comparison with the calculated scenario doses. A statistical analysis of the TLD measurement data was performed. It is reported in Attachment D. From this analysis it is concluded that the control badges provide a better estimate of the TLD

[7] The survey instrument used was a Ludlum Model 19 microR meter. Three microR meter measurements were taken at each badge position (1 meter and 2/3 meters from the ground surface) at each TLD station at the time of placement and again at the time of badge removal.

measurement uncertainty for present purposes than does the vendor's reported "generic" badge dose uncertainty. The Appendix D report evaluates the TLD background mean dose and associated uncertainty. These results are used in the evaluation of TLD measurements described below. A simple model is used for estimating the net dose measured with environmental TLDs. In this model, the net TLD dose is assumed to be due to gamma radiation from contaminated sediments.

The life cycle of the TLD badges comprises three main periods: pre-placement, field exposure period and post-placement. Pre-placement is the period from badge annealing at the vendor's facility to placement in the field. Post placement is the period from badge retrieval to badge processing (reading). The badges are designed to measure x, gamma, neutron and high-energy beta radiation. The badge packaging filters-out low energy electrons and beta rays. The principal measured exposure components are gamma rays of terrestrial origin and secondary radiation from cosmic radiation interactions in the atmosphere [Burke 1972]. Natural airborne radioactivity (of cosmic ray origin and radon) also contributes.

The badges are divided into three groups. They are: 10 badges placed in locations in areas impacted by contaminated sediments (identified as MSA badges), 14 badges placed in areas not impacted by contaminated sediments to measure "background" (identified as BKG badges) and 7 control badges. The control badges were placed in a lead-shielded enclosure during the field-exposure period. The minimum thickness was 2 in. This is sufficient to shield-out gamma radiation of terrestrial origin.

During the field exposure period the dose measured by MSA badges includes contributions from: background from terrestrial sources, cosmic rays, naturally occurring airborne radioactivity and contaminated sediment. The BKG badges receive dose contributions from terrestrial sources, cosmic rays and naturally occurring airborne radioactivity. The control badges are exposed to cosmic rays and possibly radon and trace concentrations of radioactive contamination in the lead during the field exposure period.

The model used to estimate the net dose to an individual MSA TLD badge received from contaminated sediments is expressed as:

$E_N = E_T - \overline{E}_B$, where: (Equation 1)

E_N = Net exposure from contaminated sediment,

E_T = Total TLD badge dose,

$\overline{E_B}$ = Average of the background badge doses.

This model assumes the following:

- All the badges receive the same dose prior to and after the field placement period

- The dose contributions to MSA and BKG badges from cosmic rays, terrestrial and naturally occurring airborne radioactivity are approximately equal.

Uncertainties in calculated quantities are estimated by propagation of errors. Formulae for error propagation are given below. The calculated uncertainties are the estimated "standard error" in the calculated result:

Sum or difference of k variables, $X_1, X_2, \ldots, X_k$:

$$S_{sum} = \sqrt{S_1^{\,2} + S_2^{\,2} + \ldots + S_k^{\,2}} \qquad \text{(Equation 2)}$$

Product of a variable and a constant:

$$S_{aX} = \sqrt{a^2 S_x^{\,2}} \qquad \text{(Equation 3)}$$

Product of k variables, $X_1, X_2, \ldots, X_k$:

$$s_{product} = \left(X_1 \cdot X_2 \cdot \ldots X_k\right)\left[\left(\frac{S_1^{\,2}}{X_1^{\,2}}\right) + \left(\frac{S_2^{\,2}}{X_2^{\,2}}\right) + \ldots + \left(\frac{S_k^{\,2}}{X_k^{\,2}}\right)\right]^{\frac{1}{2}} \qquad \text{(Equation 4)}$$

S_j represents the estimated error or uncertainty associated with variable Xj and

a = constant or term with negligible uncertainty [EPA 1980].

The background dose term, $\overline{E_B}$ is determined. First it is noted as shown in Table 3 that the measured background doses at several background locations are significantly higher than the average observed backgrounds. It is determined from observation that the Plum Brook crosses exposed shale outcrops in the central and southern portions of the Facility. These are members of the uranium-bearing Ohio Shale formation [Harrel 1991]. Shale is observed on the ground surface at background locations BKG-3, 4, 5 and 6.[8] Dose rate measurements performed at the time of TLD placement (and removal) showed higher than expected dose rates at locations BKG-4, 5 and 6. To reduce the influence of the exposed shale, BKG-4, 5 and 6 are removed from the data set for calculation of the average background dose. From the analysis in Attachment D, it is concluded that there is no significant difference in the doses measured by TLD badges placed at one meter and 2/3 meter from the ground. Thus, the mean background dose, $\overline{E_B}$, is obtained as the average of the eight BKG badges from the background locations not influenced by the shale outcrop. As shown in Appendix D, the mean background dose is calculated to be 24.63 ± 0.86

[8] The presence of uranium-bearing shale in the vicinity of the Plum Brook is also a confounding factor for gamma dose and dose rate measurements at the study area locations in the steam meander sections. While visible outcrops were not observed by the study team between the Pentolite Ditch and the PBCC, it is known that the Ohio Shale is present such that the stream bed encounters the shale in multiple locations, including the dosimetry study area.

mR. The net exposure (dose) at the measurement study area locations is then obtained by subtracting the mean background dose from the reported TLD badge total doses The results are shown in Table 5. Since the background badges and the MSA badges are from the same batch sent by the vendor, they received the same exposure during pre-and post-placement time intervals in the batch life cycle. These dose contributions are removed from the MSA badge doses through the background subtraction. Thus, the net badge dose is a measure of the contribution (if any) from contaminated sediments.

Table 5, Net TLD Badge Doses Measured at Measurement Study Locations (mR)

Badge Location	Location ID	Reported Badge Dose	Background Subtracted Net Dose
Pentolite Ditch @ WEMS	MSA-1A	33.0	8.38
	MSA-1B	41.0	16.38
Plum Brook @ Columbus Av	MSA-2A	31.3	6.68
	MSA-2B	30.7	6.08
Plum Brook @ WWT site	MSA-3A	27.3	2.68
	MSA-3B	27.0	2.38
Plum Brook @ PBCC	MSA-4A	24.7	0.07
	MSA-4B	23.7	-0.93
Plum Brook @ US Rt 6	MSA-5A	23.0	-1.63
	MSA-5B	24.3	-0.32

Taking into consideration the effect of measurement uncertainties, comparison of the MSA net TLD doses can now be made with the calculated 106 day integrated doses shown in Table 1. As described in Attachment D, two-sided 95% confidence intervals are calculated for the estimated (mean) net badge doses as follows:

$E_N \pm t_{(1-\alpha)} * S$, where: (Equation 5)

E_N = the TLD net dose.

$t_{(1-\alpha.n)}$ = the "t" statistic,

$1 - \alpha$ = the specified confidence level (here set at 95%, $\alpha = 0.05$),

S = the uncertainty or error in the net dose and

n = the "degrees of freedom" of the measurements used to obtain the net TLD dose.[9]

The comparison is shown in Table 6. It shows that the measured doses are all lower than the doses calculated with RESRAD. The mean doses calculated with RESRAD exceed the upper bound of the measured TLD doses for all except the Brookside Resident scenario site. This test

[9] Details of confidence interval calculations are provided in Attachment D.

of equivalence shows that the measured doses are less than the doses calculated with RESRAD at all locations except for the Brookside Residence site. The calculated and measured doses at this location are in close agreement.

Table 6, Comparison of Net TLD and RESRAD Calculated Doses

TLD Badge Location	Location ID	Background Subtracted Net Dose (mR)	95% Confidence Interval		RESRAD Calculated 106 Day Dose (mR) (1)
			Lower Bound	Upper Bound	
Pentolite Ditch @ WEMS (not accessible to the public)	MSA-1A	8.38	5.03	11.72	NA
	MSA-1B	16.38	13.03	19.72	
Plum Brook @ Columbus Av (Suburban Gardner)	MSA-2A	6.68	3.33	10.02	16.12 ± 7.83
	MSA-2B	6.08	2.73	9.42	
Plum Brook @ WWT site (Brookside Resident)	MSA-3A	2.68	-0.67	6.02	2.81 ± 3.20
	MSA-3B	2.38	-0.97	5.72	
Plum Brook @ PBCC (PBCC Maintenance Worker)	MSA-4A	0.07	-3.27	3.42	6.61 ± 3.46
	MSA-4B	-0.93	-4.27	2.42	
Plum Brook @ US Rt 6 (Recreationist)	MSA-5A	-1.63	-4.97	1.72	14.70 ± 7.43
	MSA-5B	-0.32	-3.67	3.02	

Table 6 Note:
1. RESRAD calculated 106 day Integrated doses are from Table 1.

Dose rates measured with microR meters are also compared with dose rates obtained from calculated scenario doses. This comparison is shown in Table 7. Construction of 95% confidence interval lower and upper bounds follows the same approach as described for Table 6. It is summarized in the Table 7 notes. The table supports the same conclusions reached from Table 6. The upper bound of the 95% confidence interval of the measured dose rates is less than the mean calculated dose rate for all except the Brookside Resident location. The measured and calculated dose rates are almost identical for the Brookside Resident.

Table 7, Comparison of MicroR Meter Measurements with Calculated Dose Rates

TLD Badge Location	Location ID	Net μR meter Dose rate (μR) (1)	95% Confidence Interval(2)		RESRAD Calculated Dose Rate (μrem/h) (3)
			Lower Bound	Upper Bound	
Pentolite Ditch @ WEMS (not accessible to the public)	MSA-1A	9.4	7.51	11.29	NA
	MSA-1B	10.9	9.01	12.79	
Plum Brook @ Columbus Av (Suburban Gardner)	MSA-2A	1.5	-0.39	3.39	6.34 ± 3.08
	MSA-2B	2.4	0.51	4.29	
Plum Brook @ WWT site (Brookside Resident)	MSA-3A	1.0	-0.89	2.89	1.11 ± 1.26
	MSA-3B	1.0	-0.89	2.89	
Plum Brook @ PBCC (PBCC Maintenance Worker)	MSA-4A	-0.5	-2.39	1.39	2.60 ± 1.36
	MSA-4B	-0.5	-2.39	1.39	
Plum Brook @ US Rt 6 (Recreationist)	MSA-5A	0.7	-1.19	2.59	5.78 ± 2.92
	MSA-5B	0.5	-1.39	2.39	

Table 7 Notes:

1. Net μR meter dose rates are obtained by subtracting the average background dose rate (7.96 ± 0.29) from the average gross μR meter dose rate at each MSA badge location reported in Table 4. The average gross μR meter dose rates at each MSA badge location are the average of 6 individual measurements and the average background dose rate is estimated as the average of 48 background measurements (six measurements were taken at each background and MSA badge location - three at the time of TLD placement and three at TLD removal.
2. The uncertainty of each net μR meter Dose rate is estimated to be 0.94 (0.944) μR with over 48 degrees of freedom. The value of the student's t statistic used in the construction of the confidence interval bounds is 2.0.
3. The results in this column are from Table 1.

7.0 Conclusions

Dose rates were measured with TLDs and with microR meters at locations along the Plum Brook selected to be representative of exposure scenarios used in the dose assessment with RESRAD. These measurement results are compared to direct exposure pathway outdoor doses calculated using RESRAD results from four exposure scenarios. The principal conclusions are:

- The 95% upper confidence limit of the measured TLD doses are less than the direct pathway doses calculated with RESRAD for all measurement locations except at the location selected to represent the Brookside Resident scenario. In this case the doses are equivalent.

- Identical results are obtained from measurements using an independent method - dose rates measured with microR meters. This comparison shows that measured dose rates are less than calculated dose rates at all locations except the Brookside Resident scenario location where measured and calculated dose rates are equivalent.

These results confirm that the dose assessment results are conservative.

8.0 Attachments

Attachment A –Dosimeter Placement Report

Attachment B – Global Dosimetry Solutions Report

Attachment C – Global Dosimetry Solutions, Inc. National Voluntary Laboratory Accreditation Program (NVLAP) Certification

Attachment D - Splitstone and Associates Review of Environmental Dosimetry Study Draft Report TBD-08-006 – Revised Review Report

Appendix C

Environmental Dosimetry Study

Attachment A

Dosimeter Placement Report

This attachment describes the locations of dosimeter stations and documents the details of their placement for the environmental dosimeter study of the Plum Brook. Dosimeters were placed at five locations designated as measurement study area (MSA) locations and seven locations designated as background reference locations (BKG). Each dosimeter includes two TLDs. One is placed at one meter from the surface to correspond to the "dose receptor point" for whole body dose from external exposure to an adult. A second dosimeter is placed at 2/3 meters from the surface to correspond to the dose receptor point for a juvenile (11 to 12 year old). A summary description and photo of each location is provided followed by an index of the individual TLD badge numbers and a table showing microR meter measurements at placement and removal.

Background Dosimeter Location, BKG-1. The dosimeter station is located on Ransome Creek at the Pentolite Road crossing about 50 yards west of the warehouse Buildings 9201. The TLD station was placed along the east side of the creek bank north of the road. Note. This creek is identified as Taylor Ditch on some maps. The station was set up and the dosimeters placed on 7/15/08 at 1340. The dosimeters were retrieved on 10/30/08 at 1110. Dose rates measured at time of placement at the TLD badge positions ranged from 8 μR/h (at one meter from the ground surface) to 9 μR/h (at 2/3 meter from the ground surface). Figure 4 shows Station BKG-1 as installed at the time of placement.

Figure 4, Background Dosimeter Station BKG-1

Background Dosimeter Location, BKG-2. This is located on Pipe Creek on Maintenance Rd. about 150 yards west of the intersection of Campbell St. and Maintenance Rd. It is just south of a private home located north of the Plum Brook Facility boundary fence. It is near Environmental Sampling Station No 9. The TLD station was placed on the west side of the creek bank south of the road on 7/16/08 at 0845. The dosimeters were retrieved on 10/30/08 at 1125. The dose rate measured at the TLD badge positions at the time of placement ranged from 8 μR/h (at one meter from the ground surface) to 9 μR/h (at 2/3 meter from the ground surface). Figure 5 shows the station as installed at the time of placement.

Figure 5, Background Dosimeter Station BKG-2

Background Dosimeter Location, BKG-3. This TLD station is located on the Plum Brook at the Maintenance Road crossing just east of Taylor Road. It is near Environmental Sampling Station No 4. It was installed on the west bank south of the road on 7/16/08 at 0915. The dosimeters were retrieved on 10/30/08 at 1250. The dose rate measured at time of placement at both the TLD badge positions (at one meter and at 2/3 meter from the ground surface) was 11 μR/h. Figure 6 shows the station as installed at the time of placement.

Figure 6, Background Dosimeter Station BKG-3 as Installed

Background Dosimeter Location, BKG-4. This station is located on the Plum Brook at the North Magazine Rd. over-crossing. It is located approximately 300 yards east of Bldg. 3211 B-2. The TLD Station was placed on the west bank south of the road on 7/16/08 at 1040. The dosimeters were retrieved on 10/30/08 at 1405. The dose rate measured at the time of placement at both TLD badge positions (at one meter and at 2/3 meter from the ground surface) was 22 μR/h. These elevated background dose rates are believed to be influenced by thin layers of bedded shale exposed by the Plum Brook in the southern portions of the site. Figure 7 shows the installation of Station BKG-4 at the time of placement.

Figure 7, Background Dosimeter Station BKG-4 as Installed

Background Dosimeter Location, BKG-5. This station is located on the Plum Brook at the Scheid Road over-crossing. The TLD Station was placed on the west bank south of Scheid Road on 7/16/08 at 1105. The dosimeters were retrieved on 10/30/08 at 1340. The dose rate measured at both TLD badge positions (at one meter and at 2/3 meter from the ground surface) at the time of placement was 19 μR/h. Figure 8 shows the TLD station as installed at the time of placement.

Figure 8, Background TLD Station BKG-5 as Installed

Background Dosimeter Location, BKG-6. This station is located on the Plum Brook at the Patrol Road over-crossing on the south perimeter of the Plum Brook Facility site. The Plum Brook enters the facility from farmland to the south. The TLD station was placed on the east bank south of Patrol Road on 7/16/08 at 1130. Note an unnamed ditch that runs parallel to the road (south side) and joins the Plum Brook from the east. The dosimeters were retrieved on 10/30/08 at 1330. The dose rate measured at both TLD badge positions (at one meter and at 2/3 meter from the ground surface) was 18 μR/h at the time of placement. Figure 9 shows the TLD station as installed at the time of placement.

Figure 9, Background TLD Station BKG-6 as Installed

Background Dosimeter Location, BKG-7. This location is on the Lindsley Ditch at the Columbus Avenue overpass, about 1/3 mile south of the NASA Engineering Building (Bldg. 7141). The TLD station was placed on the west side of the road on the south bank of the ditch on 7/16/08 at 1400. The dosimeters were retrieved on 10/30/08 at 1300. The dose rate measured at both TLD badge positions (at one meter and at 2/3 meter from the ground surface) was 11 μR/h at the time of placement. Figure 10 shows the station as installed at the time of placement.

Figure 10, Dosimeter Station BKG-7 as Installed

Measurement Study Area Dosimeter Location MSA-1. This station is located on the north bank of Pentolite Ditch just east of the PBRF Water Effluent Monitoring Station (WEMS) outfall. This is located inside the NASA Plum Brook Facility. The WEMS outfall crosses under Pentolite Road about 250 yards east of the intersection of Line 2 Road and Pentolite Road. This dosimeter station is placed where the highest concentration of Cs-137 was measured in the sediment, approximately 1000 pCi/g (in 2005). The TLD station was installed on 7/16/08 at 1435. It was placed on the bank just above the water level about 4 feet south of the WEMS concrete abutment. The dosimeters were retrieved on 10/30/08 at 1050. At time of placement, the dose rate measured at the TLD badge positions ranged from 20 μR/h (at one meter from the ground surface) to 24 μR/h (at 2/3 meter from the ground surface). Figure 11 shows the station as installed at the time of placement.

Figure 11, Dosimeter Station MSA-1 as Installed

Measurement Study Area Dosimeter Location MSA-2. This dosimeter station is located on the Plum Brook, approximately 170 feet north of the Columbus Avenue overpass – west bank of the stream. This is near the intersection of Columbus and Taylor Roads, just north of the Plum Brook Facility entrance in Perkins Twp, Erie County. The TLD station was installed on 7/16/08 at 1545. This is a biased location selected to coincide with the location (survey location OL4-2, EMA-1, sm-6 in SR-45) where a Cs-137 concentration of 72 pCi/g was measured in 2006. This location is where the highest concentration of Cs-137 in sediment was measured outside the Plum Brook Facility. At time of placement, the dose rate measured at the TLD badge one-meter position was 11 μR/h. It was 12 μR/h at 2/3 meter from the ground surface. The dosimeters were retrieved on 10/30/08 at 1030. Figure 12 shows the TLD station at the time of placement.

Figure 12, Dosimeter Station MSA-2 as Installed

Measurement Study Area Dosimeter Location MSA-3. This station was installed on the Plum Brook at the former Sewage Treatment Facility located directly west of the 716 Taylor Road Residence in Perkins Twp, Erie County. The TLD station was placed on the stream bank about 10 feet north of the outfall of the former Sewage Treatment Plant on 7/16/08 at 1630. At time of placement, the dose rate measured at both TLD badge positions (at one meter and at 2/3 meter from the ground surface) was 11 μR/h. The dosimeters were retrieved on 10/30/08 at 1010. Figure 13 shows the TLD station at the time of installation.

Figure 13, Dosimeter Station MSA-3 as Installed

Measurement Study Area Dosimeter Location MSA-4. This TLD station is located on the Plum Brook Country Club, 3712 Galloway Rd, in Huron Twp. adjacent to the Plum Brook at a golf cart overpass southeast of the Maintenance Building. This is located in the northwest section of the golf course about 1/3 mile south of Perkins Avenue. The TLD station was placed in a location acceptable to the Country Club Golf Course Superintendent. This location corresponds to the setting for the Maintenance Worker exposure scenario used in the dose assessment study. The station was installed on 7/17/08 at 0940 and the dosimeters were retrieved on 10/30/08 at 0930. The dose rate measured at both TLD badge positions (at one meter and at 2/3 meter from the ground surface) was 8 μR/h at the time of installation. Figure 14 shows the TLD station as installed.

Figure 14, Dosimeter Station MSA-4 as Installed

Measurement Study Area Dosimeter Location MSA-5. This dosimeter station is located on the bank of the Plum Brook stream mouth north of US Rt. 6 (Cleveland Road), Huron Twp, Erie County. This is in the Steinem Nature Preserve operated by Erie MetroParks. The TLD station was placed along the stream at a location approved by Erie MetroParks. The Plum Brook stream crosses Cleveland Road, 680 yards west of the intersection of Cleveland Road and Perkins Avenue. This location corresponds to the setting for the Recreationist exposure scenario used in the dose assessment study. The station was installed on 7/17/08 at 0900 and the dosimeters were retrieved on 10/30/08 at 0950. At the time of installation, the dose rate measured at both TLD badge positions (at one meter and at 2/3 meter from the ground surface) was 8 μR/h. Figure 15 shows the TLD station as installed.

Figure 15, Dosimeter Station MSA-5 as Installed

Table 8, Index of TLD Badge Numbers - Placement & Retrieval Record

Dosimeter ID	Location Code	Description	Date Placed	Time Placed	Date Retrieved	Time Retrieved
2060227	BKG-1A	Ransome Creek at Pentolite Rd	7/15/08	1340	10/30/08	1110
2060228	BKG-1B					
2060229	BKG-2A	Pipe Creek at Maintenance Rd	7/16/08	0845	10/30/08	1125
2060230	BKG-2B					
2060231	BKG-3A	Plum Brook at Maintenance Rd	7/16/08	0915	10/30/08	1250
2060232	BKG-3B					
2060233	BKG-4A	Plum Brook at N. Magazine Rd	7/16/08	1040	10/30/08	1405
2060234	BKG-4B					
2060235	BKG-5A	Plum Brook at Scheid Rd.	7/16/08	1105	10/30/08	1340
2060236	BKG-5B					
2060237	BKG-6A	Plum Brook at Patrol Rd (S)	7/16/08	1130	10/30/08	1330
2060238	BKG-6B					
2060239	BKG-7A	Lindsley Ditch at Columbus Av.	7/16/08	1400	10/30/08	1300
2060240	BKG-7B					
2060241	MSA-1A	Pentolite Ditch at WEMS	7/16/08	1435	10/30/08	1050
2060242	MSA-1B					
2060243	MSA-2A	Plum Brook at Columbus Av.	7/16/08	1545	10/30/08	1030
2060244	MSA-2B					
2060245	MSA-3A	Plum Brook at former Sewage Plant off Taylor Rd	7/16/08	1630	10/30/08	1010
2060246	MSA-3B					
2060247	MSA-4A	PBCC Golf Course	7/17/08	0940	10/30/08	0930
2060248	MSA-4B					
2060249	MSA-5A	Steinem Preserve Erie MetroParks	7/17/08	0905	10/30/08	0950
2060250	MSA-5B					

Table 8 Note. The Badges are placed as pairs on each station. The badges with suffix “A” are placed at one meter from the surface. The badges with suffix “B” are placed at 0.67 meters from the surface

Table 9, MicroR Meter Readings at Dosimeter Stations (μR/h)

Location ID (1)	Placement 1(2)	Placement 2 (2)	Placement 3 (2)	Removal 1 (3)	Removal 2 (3)	Removal 3 (3)	Overall Average	St. Dev. (4)
BKG-1A	9	8	8	6	6	6	7.2	1.3
BKG-1B	9	9	8	6	6	6	7.3	1.5
BKG-2A	8	9	8	6	6	6	7.2	1.3
BKG-2B	9	9	9	6	6	6	7.5	1.6
BKG-3A	11	11	11	6	6	6	8.5	2.7
BKG-3B	11	11	11	6	6	6	8.5	2.7
BKG-4A	22	22	22	12	12	13	17.2	5.3
BKG-4B	21	22	23	13	12	13	17.3	5.2
BKG-5A	19	19	19	10	11	11	14.8	4.6
BKG-5B	19	19	19	11	10	11	14.8	4.6
BKG-6A	17	18	18	16	16	17	17.0	0.9
BKG-6B	18	18	17	16	17	17	17.2	0.8
BKG-7A	11	11	11	7	7	7	9.0	2.2
BKG-7B	10	10	11	6	7	7	8.5	2.1
MSA-1A	21	20	19	12	16	16	17.3	3.3
MSA-1B	24	25	22	12	16	14	18.8	5.5
MSA-2A	11	11	11	8	8	8	9.5	1.6
MSA-2B	12	12	13	8	8	9	10.3	2.3
MSA-3A	11	11	11	7	7	7	9.0	2.2
MSA-3B	11	11	11	7	7	7	9.0	2.2
MSA-4A	8	8	8	7	7	7	7.5	0.5
MSA-4B	8	8	8	7	7	7	7.5	0.5
MSA-5A	8	8	9	9	9	9	8.7	0.5
MSA-5B	8	8	9	8	9	9	8.5	0.5

Table 9 Notes:

1. Three measurements where taken at each Dosimetry station location at one-meter and 2/3-meter from the surface at the time of placement and removal.
2. LMI Model 19 Serial No. 209768
3. LMI Model 19 Serial No. 175945
4. The standard deviation of the measurements underestimates the measurement uncertainty. The two instruments show a consistent difference in response on the lowest meter scale (0 – 25 μR/h). Serial No. 175945 reads consistently lower than 209768.

Appendix C

Environmental Dosimetry Study

Attachment B

Global Dosimetry Solutions Report

Global Dosimetry
Solutions

2652 McGaw Avenue · Irvine, CA 92614 · Tel: (949) 419-1000 · Toll Free: (888) 437-1714 · Fax: (949) 296-1144 · www.dosimetry.com

November 10, 2008

PLUM BROOK OPS SUPPORT GROUP
Attn: ~~Karen Novak~~ Rod Case
6100 COLUMBUS AVENUE
SANDUSKY, OH 44870

Dear Karen,

Enclosed is your environmental report for the locations, and wear periods listed below reported in units of mR:

Account	Location	Wear Date
PSN	00007QTR	7/10/2008

As a reminder, no background has been applied. Only, fade and reader corrections have been applied. If you have any questions please contact me at (949) 419-1000, ext. 2083.

Sincerely,

Randal A. Cords
Technical Data Manager
Global Dosimetry Solutions, Inc.

0105508

REP4110_0

Global Dosimetry Solutions

2652 McGaw Avenue · Irvine, CA 92614 · Tel: (949) 419-1000 · Toll Free: (888) 437-1714 · Fax: (949) 296-1144 · www.dosimetry.com

Global Dosimetry Solutions Environmental Report

Account	PSN PLUM BROOK OPS SUPPORT GROUP
Location	00007QTR
Monitoring Period	7/10/2008
Process	0105508
Arrived at GD	10/31/2008

Badge Number	Name	Exposure mR*			
		Element 2	Element 3	Element 4	Elmnt Avg
	CONTROL-DAILY	13	13	13	13
	CONTROL-DAILY	12	12	11	12
	CONTROL-DAILY	12	12	12	12
	CONTROL-DAILY	14	16	15	15
	CONTROL-DAILY	14	15	13	14
	CONTROL-DAILY	13	14	13	13
	CONTROL-DAILY	13	14	13	13
131952		24	22	23	23
131953		25	24	24	24
131954		23	23	22	23
131955		21	23	22	22
131956		26	25	26	26
131957		25	24	26	25
131958		40	41	44	42
131959		39	38	39	39
131960		34	33	35	34
131961		36	35	34	35
131962		36	37	36	36
131963		37	36	35	36

*- No control exposures have been subtracted, and only element, reader and fade corrections have been made.

Global Dosimetry Solutions

2652 McGaw Avenue · Irvine, CA 92614 · Tel: (949) 419-1000 · Toll Free: (888) 437-1714 · Fax: (949) 296-1144 · www.dosimetry.com

Global Dosimetry Solutions Environmental Report

Account	PSN PLUM BROOK OPS SUPPORT GROUP
Location	00007QTR
Monitoring Period	7/10/2008
Process	0105508
Arrived at GD	10/31/2008

Badge Number	Name	Exposure mR*			
		Element 2	Element 3	Element 4	Elmnt Avg
131964		26	25	26	25
131965		29	29	28	29
131966		33	33	33	33
131967		41	41	41	41
131968		31	31	32	31
131969		31	30	31	31
131970		28	27	27	27
131971		27	27	27	27
131972		25	25	24	25
131973		26	24	21	23
131974		23	23	23	23
131975		25	24	24	24

*- No control exposures have been subtracted, and only element, reader and fade corrections have been made.

REP4129_0

FROM : **PBOSG**
NASA Plum Brook Station
6100 Columbus Avenue
Sandusky, Ohio 44870
1-419-621-3346

TO: **Global Dosimetry Solutions, Inc.**
2652 McGaw Avenue
Irvine, CA 92614
1-949-419-1000
1-800-251-3331

Station Name	Collection Period				Dosimeter Code Number	Comments
	Start		Stop			
	Date	Time	Date	Time		
Control					2060220	Transit Control 7/15-17
Control					2060221	Transit Control 7/15-17
Control					2060222	Transit Control 7/15-17
Control					2060223	Storage Control
Control					2060224	Storage Control
Control					2060225	Storage Control
Control					2060226	Storage Control
BKG-1A	7/15/2008	1340	10/30/2008	1110	2060227	Ransome Creek @ Pentolite Rd
BKG-1B	"	"	"	"	2060228	
BKG-2A	7/16/2008	845	10/30/2008	1125	2060229	Pipe Creek @ Maint. Rd
BKG-2B	"	"	"	"	2060230	
BKG-3A	7/16/2008	0915	10/30/2008	1250	2060231	Plum Brook @ Maint. Rd
BKG-3B	"	"	"	"	2060232	
BKG-4A	7/16/2008	1040	10/30/2008	1405	2060233	Plum Brook @ N. Magaz. RD
BKG-4B	"	"	"	"	2060234	
BKG-5A	7/16/2008	1105	10/30/2008	1340	2060235	Plum Brook @ Scheid Rd.
BKG-5B	"	"	"	"	2060236	
BKG-6A	7/16/2008	1130	10/30/2008	1330	2060237	Plum Brook @ Patrol Rd. S
BKG-6B	"	"	"	"	2060238	
BKG-7A	7/16/2008	1400	10/30/2008	1300	2060239	Lindsley Ditch @ Columbus Av
BKG-7B	"	"	"	"	2060240	
MSA-1A	7/16/2008	1435	10/30/2008	1050	2060241	Pentolite Ditch @ WEMS
MSA-!B	"	"	"	"	2060242	
MSA-2A	7/16/2008	1545	10/30/2008	1030	2060243	Plum Brook @ Columbus Av
MSA-2B	"	"	"	"	2060244	
MSA-3A	7/16/2008	1630	10/30/2008	1010	2060245	Plum Brook @ WWT site
MSA-3B	"	"	"	"	2060246	
MSA-4A	7/17/2008	0940	10/30/2008	0930	2060247	Plum Brook @ PBCC
MSA-4B	"	"	"	"	2060248	
MSA-5A	7/17/2008	0905	10/30/2008	0950	2060249	Plum Brook @ US Rt 6
MSA-5B	"	"	"	"	2060250	

Collected by:
Bruce Mann

Note: The TLD Badges are placed as pairs at each station.
Badges with suffix A are placed one meter from the ground surface.
Badges with suffix B are placed 0.67 meters from the ground surface.

MAIL REPORT TO:
Rod Case, Asst RSO
NASA Plum Brook Reactor Facility
6100 Columbus Avenue
Sandusky, OH 44870

Acct# PSN
Proj# 105508

Appendix C

Environmental Dosimetry Study

Attachment C

Global Dosimetry Solutions, Inc.

National Voluntary Laboratory Accreditation Program (NVLAP) Certification

National Institute of Standards and Technology, NIST Technology Services
National Voluntary Laboratory Accreditation Program Certification

Global Dosimetry Solutions, Inc. NVLAP Lab Code: 100555-0

Address and Contact Information:

2652 McGaw Avenue
Irvine, CA 92614
Contact: Mr. Sander Perle
Phone: 800-251-3331
Fax: 949-296-1146
E-Mail: sperle@mirion.com
Send E-Mail to Laboratory: Global Dosimetry Solutions, Inc.
URL: http://www.dosimetry.com

NVLAP Accreditation Information

Listed below is the scope of accreditation for this laboratory as of January 30, 2009. For additional information, contact NVLAP at (301) 975-4016.

Send E-Mail to NVLAP at: NVLAP@nist.gov

Ionizing Radiation Dosimetry
Accreditation Valid From: July 1, 2008 Through: June 30, 2009

This facility has been evaluated and deemed competent to process the radiation dosimeters listed below through employing the TLD automatic readers: Panasonic model UD710A, UD7900, and Harshaw models 5500 and 8800; MacBeth TD932 densitometer, a custom automatic developer and densitometer for film processing, and a Bicron Autoscan 60 chemical etch system.

_____
WHOLE BODY

This facility is accredited to process the following dosimeters by demonstration of compliance with ANSI HPS N13.11 through testing.

100555 - B, Badge Type 03 - Panasonic TLD 802/822 using UD874 Holder (GDS Holder Code CC) for ANSI N13.11-2001 categories IA, IIA, IIIA, IVA, VAA, VICA

100555 - G, Badge Type 21/22 - RemTrak Wallet Card (GDS Holder Code WC) for ANSI N13.11-2001 categories IB, IIB

100555 - H, Badge Type 16 - Harshaw TLD 760 using Custom Holder (GDS Holder Code PB) for ANSI N13.11-2001 categories IB, IC, IIA, IIIA, IVA, VAA, VICA

National Institute of Standards and Technology, NIST Technology Services
National Voluntary Laboratory Accreditation Program Certification

Global Dosimetry Solutions, Inc. NVLAP Lab Code: 100555-0

100555 - I, Badge Type 14 - Harshaw TLD 100 using Custom Holder (GDS Holder Code PB) for ANSI N13.11-2001 categories IB, IC, IIA, IIIB, IVA, VBB

100555 - N, Badge Type 15 - Harshaw TLD 760 plus CR39 using Custom Holder (GDS Holder Code PB) for ANSI N13.11-2001 category IB, IC, IIA,IIIA, IVA, VAA, VIA

100555 - Q, Badge Type 01 - Kodak Type 2 Film using Custom Holder (GDS Holder Code FB) for ANSI N13.11-2001 categories IB, IC, IIA, IIIB, IVA, VBB, VI

100555 - T, Badge Type 10 - Kodak Type 2 Film plus CR39 using Custom Holder (GDS Holder Code FB) for ANSI N13.11-2001 category VIA

100555 - U, Badge Type 08 - Modified Panasonic 802AT2 using UD831 Holder (GDS Holder Code CN) for ANSI N13.11-2001 categories IA, IIA, IIIA, IVA, VAA, VICA

100555 - V, Badge Type 01 - Kodak Type 2 Film using Design KB Holder (GDS Holder Code KB) for ANSI N13.11-2001 categories IB, IC, IIC, IIIB, IVA

100555 - W, Badge Type 14 - Harshaw TLD 100 using Design DB Holder (GDS Holder Code DB) for ANSI N13.11 categories IB, IC, IIA, IIIB, IVA, VBB

100555 - X, Badge Type 15 - Harshaw TLD 760 plus CR39 using Design DB Holder (GDS Holder Code DB) for ANSI N13.11-2001 categories IB, IC, IIA, IIIA, IVA, VIA

100555 - Y, Badge Type 15C (Type 35) - RadCard TLD MCP plus CR39 Frog Design DB Holder (GDS Holder Code DB) for ANSI N13.11-2001 categories IB, IC, IIA, IIIA, IVA, VAA, VIA

100555 - Z, Badge Type 16 - Harshaw TLD 760 using Design DB Holder (GDS Holder Code DB) for ANSI N13.11-2001 categories IB, IC, IIA, IIIA, IVA, VA, VICA

100555 - A1, Badge Type 16C (Type 36) - RadCard TLD MCP using Design DB Holder (GDS Holder Code DB) for ANSI N13.11-2001 categories IB, IC, IIA, IIIA, IVA, VAA, VICA

100555 - A3, Badge Type 03/04 - Panasonic UD 802 using UD 854A holder for ANSI N13.11-2001 categories IA, IIA, IIIA, IVA, VAA, VICA

National Institute of Standards and Technology, NIST Technology Services
National Voluntary Laboratory Accreditation Program Certification

Global Dosimetry Solutions, Inc. NVLAP Lab Code: 100555-0

EXTREMITY

This facility is accredited to process the following extremity dosimeters by demonstration of compliance with ANSI HPS N13.32 through testing.

100555 - L, Badge Type 19 - Harshaw TLD 100 MeasuRing using Custom Holder (GDS Holder Code M) for ANSI N13.32-1995 categories I, II, IIIA, IVA, VA, VB, VD, VIA, VIIB

100555 - S, Badge Type 18 - Harshaw TLD 100 Ultra Ring using Custom Holder (GDS Holder Code H) for ANSI N13.32-1995 categories I, II, IIIA, IVA, VA, VB, VD, VIA, VIIB

100555 - A2, Badge Type 18 - Flexring for ANSI/HPS N13.32 - 1995 categories II, IVA

Appendix C

Environmental Dosimetry Study

Attachment D

Splitstone and Associates

Review of Environmental Dosimetry Study Draft Report – TBD-08-006 – Revised Review Report

SPLITSTONE & ASSOCIATES
PMB #110
4530 William Penn Hwy.
Murrysville, Pennsylvania 15668
Telephone (724) 325-7421 FAX (724) 327-5958
E-mail: splide@comcast.net

March 9, 2009

Mr. Bruce Mann
Plum Brook Operations Support Group
Attn: Shipping & Receiving Bldg 9209
Plum Brook Station, 6100 Columbus Ave.
Sandusky, Ohio 44870

Dear Mr. Mann:

Subject: Review of Environmental Dosimetry Study Draft Report -
TBD-08-006 Appendix C - Revised Review Report

Summary

I have reviewed the subject draft report. Per your request, my review focused on the following items:

- Evaluate the application of statistical concepts to the treatment of available measurement data.
- Are these concepts appropriate for the interpretation of the available dose measurements and making of comparisons with calculated doses?
- Are the calculated statistics appropriate and accurate?
- Are the application and treatment of measurement error and tests of equivalence between measured and calculated doses adequately explained?

The basic statistical concepts appear to be appropriate for the interpretation of the dose measurement data and comparison with calculated direct pathway doses (RESRAD). The application of those concepts, however, relies too heavily on the estimate of total uncertainty reported by the manufacturer of the thermoluminescence dosimeters (TLDs) in my opinion. This manufacturer reports the total dose uncertainty as being 26.4 percent (Personal communication R. Cords to B. Mann, 2008). It is this value that is used throughout the report as the basis for error propagation without an adequate explanation as to what “26.4 percent” really means.

The data collected from the various TLDs employed during this investigation provide a great deal of empirical information regarding the uncertainty of the dose measurements. This information has not been fully exploited in the subject report. Admittedly, the extraction of that

empirical information is not as straight forward as it could be had the study design been modified slightly. This modification would be to place a second TLD at each height and each location of the field monitoring sites. Such replication would have enabled the direct assessment of the basic measurement "error," i.e. the differences between two TLDs measuring the same thing.

Sans replication, an empirical estimate of measurement variation must be teased out of the available data. Fortunately, the subject report contains a clear description of the study design and TLD placement so that this is possible. The following sections detail the empirical assessment of measurement uncertainty.

Uncertainty of a Single Badge Dose Reading

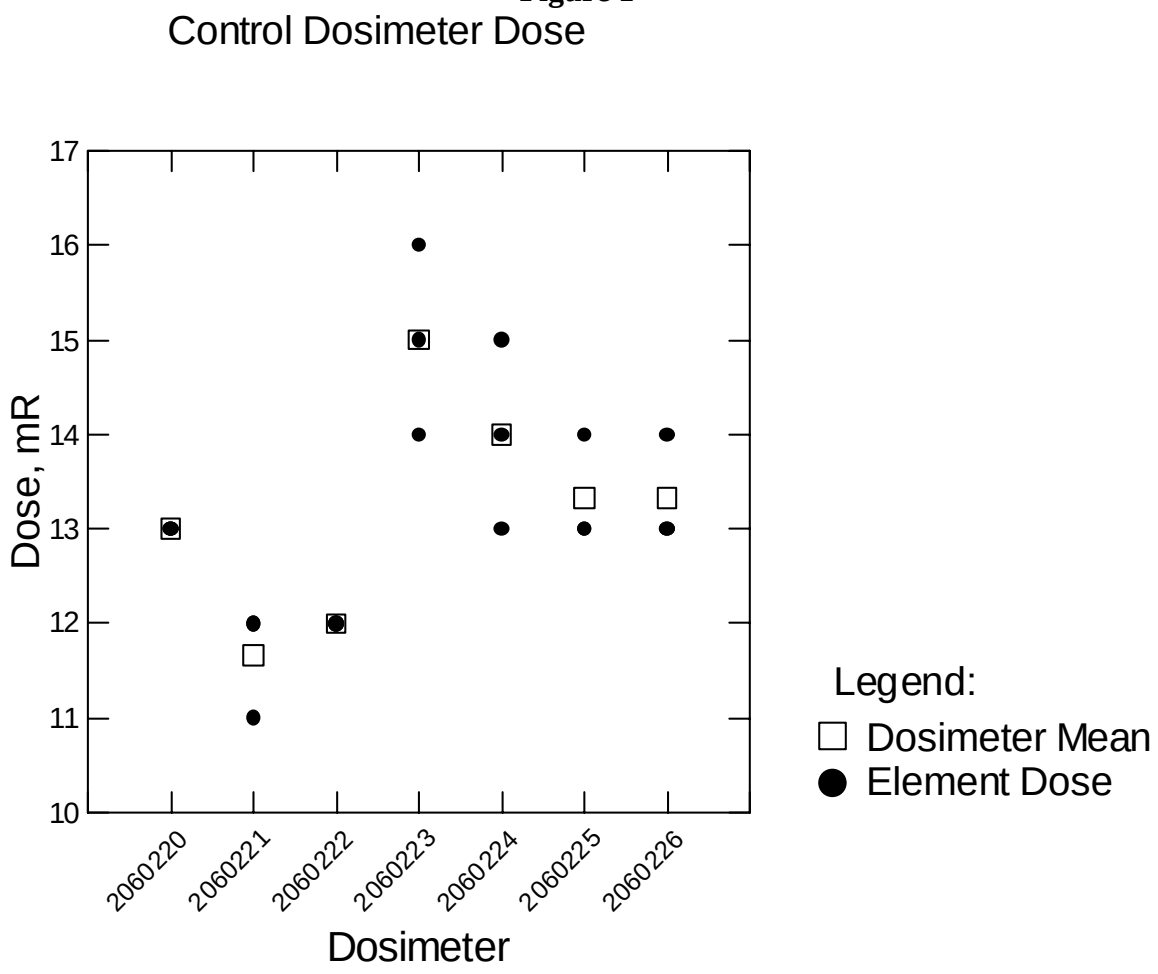
Each TLD badge contains three "elements." Each element records a dose accumulated over the duration of exposure. These three accumulated doses are averaged to produce a badge average accumulated dose. A first step in assessing the measurement system uncertainty is to determine whether or not the variation among element doses is important as compared to the variation among badge average doses. Fortunately, this study provides for such an assessment with the badges in the"Control Group."

The seven badges in the Control Group were placed in a lead-shielded enclosure during the field-exposure period. The thickness of the enclosure was sufficient to shield-out gamma radiation of terrestrial origin. All seven badges were then measuring the same radiation for all practical purposes. A scatter diagram of the resulting dose measurements for each dosimeter element is presented in Figure 1 below.

One might speculate in regard to the pattern of the scatter diagram and the sequence of dosimeter identification numbers. It would have been better from an experimental design perspective to have chosen the dosimeters for each exposure condition at random from the total lot of available dosimeters. For purposes of this investigation, it will be assumed that the dosimeters were numbered at random within the sequence of production.

Note from Figure 1 that there appears to be greater variation among the dosimeter mean doses than that exhibited among the elements within each dosimeter. These components of the total variation in dose measurements can be separately quantified by performing an analysis of variance (ANOVA) as illustrated below. Because one can not identify a specific element dose measurement without identifying a specific dosimeter, the elements are considered to be "nested" within the dosimeter when performing the ANOVA.

Figure 1



The ANOVA is simply the division of the total sum of squared deviations of each element dose measurement from the total mean dose into its component parts. One part is the sum of squared deviations of each dosimeter badge mean dose about the total mean dose. This will be referred to as the "among badges" fraction. The other part is the sum of the squared deviations of each element dose from the mean dose for its specific dosimeter badge. This will be referred to as the "within badges" fraction. The results of these calculations are presented in the following Table 1.

The "degrees of freedom" become the divisor of the sum of squares to estimate the "mean square" or variance associated with that source of variation. Because there are 7 dosimeters in the control group there are 6, (7-1), degrees of freedom available. Because there are 3 elements within each of the 7 dosimeters there are 14, [7(3-1)], degrees of freedom available for the within dosimeter variation. The total degrees of freedom is just the total number of dose measurements minus one, (7•3-1).

Table 1
ANOVA - Control Group

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F-ratio	P-value	Expected Mean Square
Among Badges	23.2386	6	3.873	9.037	<0.001	$S_E^2 + 3S_B^2$
Within Badges	6.000	14	0.429			S_E^2
Total	29.238	20	1.4619			

The "F-ratio" and "P-value" are used to test the hypothesis that the variation among badges is the same as the variation within badges. The F-ratio is simply the ratio of the among mean square to the within mean square and is the well known F statistic. The P-value is the probability that one would get a value of the F-ratio strictly by chance if the mean squares were in fact the same. Thus it represents the probability of being wrong in concluding that the mean squares are different when in fact they are the same. Clearly, there is significantly more variation among badge means than there is among element measurements within a badge.

The expected mean squares symbolize the make up of the variation from each source. The S_E^2 represents the variance among elements within a badge. The S_B^2 represents the variance associated with the mean badge reading from its true value within the control group. That which is desired is the variance associated with a single badge reading, i.e. the mean of the element readings for a single badge. This can be symbolized as follows:

$$S_C^2 = \frac{S_E^2}{3} + S_B^2 \ .$$

This is just the expected mean square for Among Badges divided by the number of elements within a badge.

Defining the variation of the mean of the three element readings within a badge as

$$S_{EM}^2 = \frac{S_E^2}{3}$$

we can re-express the variance of a single badge mean reading as

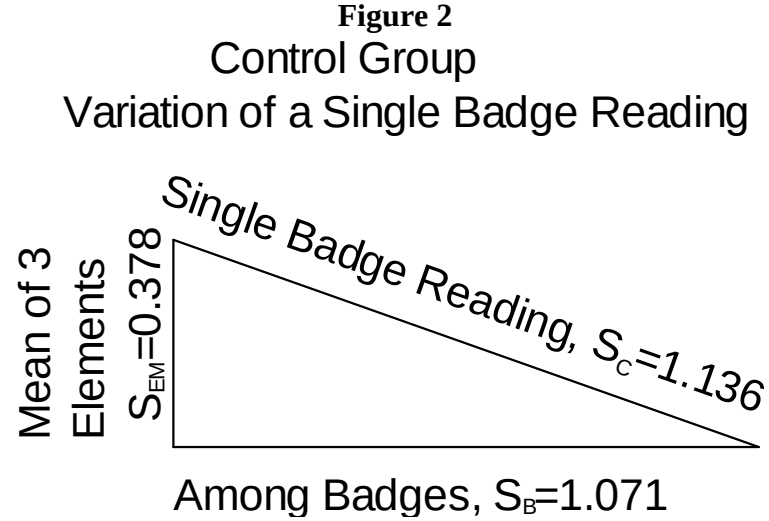
$$S_C^2 = S_{EM}^2 + S_B^2 \ .$$

This relationship indicates that the variation (uncertainty) of a single badge dose measurement is composed of the variation associated with the mean element dose within a badge and the variation of an individual badge measurement from the mean of all badges having the same

exposure. Note also that the above relationship is in the form of a relationship for right triangles theorized by Pythagorus.

Equating the expected mean squares and the estimated mean squares we may obtain estimates for S_B^2 , S_E^2 and subsequently S_{EM}^2 . We may then geometrically represent the relationship as follows.

Figure 2



Thus the estimate of the standard deviation of a single badge dose measurement is 1.136 mR based upon the results from the seven badges in the Control Group. This estimate will be carried forward as the standard deviation of a single badge measurement and become the basic yard stick against which all further analyses are judged.

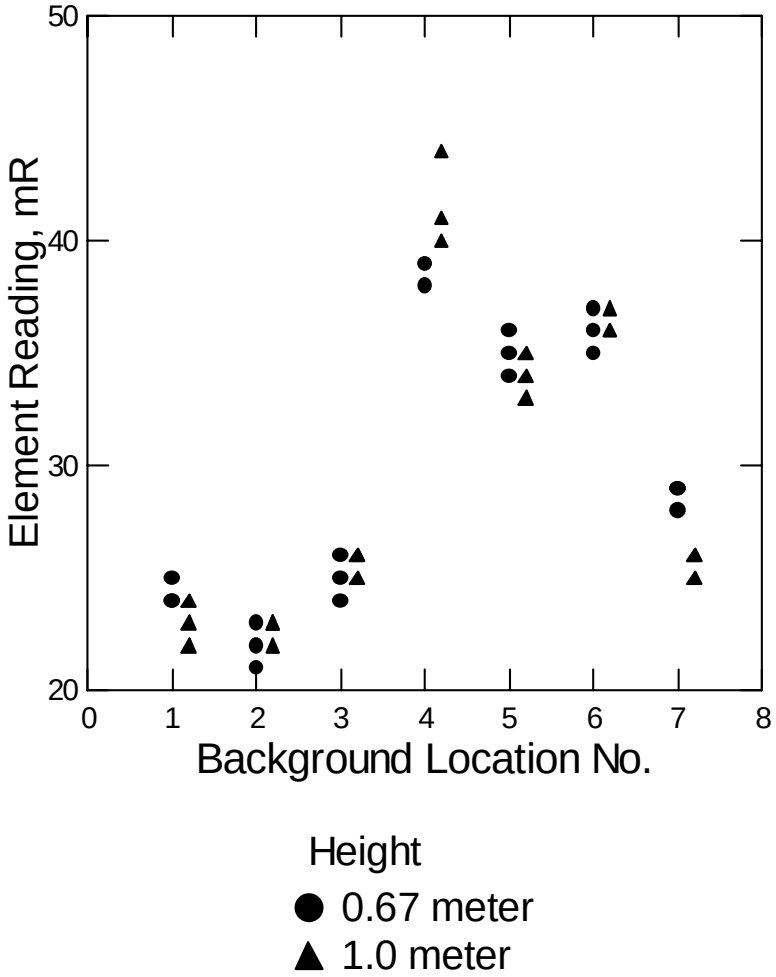
It is standard practice, not necessarily good statistics, to take ±3 standard deviations as some indication of an expression of uncertainty. Doing so, three standard deviations is 3.408 mR and dividing this value by the observed control mean of 13.190 we obtain a ratio of 0.2584 not too different from the manufacturer's 0.2643. One is left to speculate that the manufacturer's claim of 26.43 percent uncertainty may have some degree of confidence built in and is not an estimate of the single badge variance.

Background

Seven locations believed not to be impacted by PBRF operations were chosen as representative of "background" radiological conditions at the site. Two dosimeters were placed at each location. One was placed at a height of 0.67 meter (m) above ground surface to correspond to the modeled dose receptor point for a 10 to 12 year old child. The other was placed at 1m above ground surface corresponding to the modeled dose receptor point for an adult. The dosimeter element results for these background measurements are presented in the following Figure 3.

Figure 3

Background Badge Readings by Location



Most striking in this figure is the apparent difference between the results for background measurements from dosimeters at locations 4, 5 and 6 and the measurements made at the other background locations. Post study investigation revealed that locations 4, 5 and 6 were influenced by an outcrop of the uranium-bearing Ohio Shale formation. The data from these locations provide information on the variation of dose measurements in the field. This is true even though the results at these three locations represent the background dose level for site areas having exposed shale outcrop, not areas similar to the study area. Therefore, the data from these locations are retained for estimating measurement variation, but eliminated for estimating the average background dose.

Another observation from Figure 3 is that the differences between measurements at different heights appear to be not much different than those among elements within a dosimeter. This suggests that there is no significant difference in measurements due to the placement height in the background area. This is confirmed via an ANOVA of the dosimeter averages given in Table 2 below. The variation elements within a dosimeter has minimal influence as indicated for the Control Group and further consideration adds nothing to the evaluation.

Table 2
ANOVA - Background Group

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F-ratio	P-value
Shale	520.350	1	520.350	43.226	0.001
Height	0.032	1	0.032	0.025	0.880
Location within Shale	60.190	5	12.038	9.325	0.009
Height by Location Within Shale	10.857	6	1.810	1.402	0.346
Error from Control Group	7.746	6	1.291		

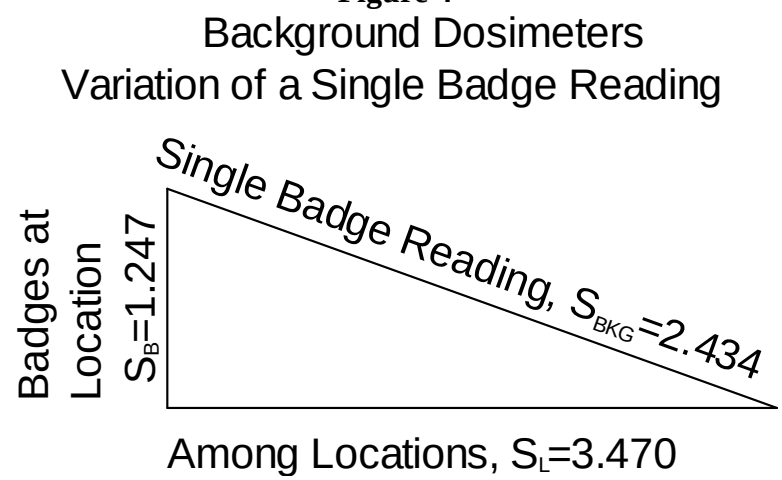
Table 3
ANOVA - Background Dosimeter Readings

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	Expected Mean Square
Among Locations	60.188	5	12.038	$S_B^2 + 3S_L^2$
Between Badges within Locations	10.889	7	1.556	S_B^2
Total	71.077	12	5.923	S_{BKG}^2

Because there is no significant difference in dosimeter readings associated with placement height, the two dosimeter readings at each location can be considered replicate measurements at that location. The variance of a background dosimeter reading can now be estimated as the pooled variance among dosimeter readings within each shale exposure group. This variance can be broken down into two components as shown in Table 3, the variation due to dosimeters at the same location (Between Badges) and the variation due to differences in location within the background area (Among Locations).

This can be geometrically represented as follows.

Figure 4



There are eight badges with exposure not influenced by the shale outcrop. The mean dose, $\overline{E}_B$, is the average badge reading of 24.625. The variance of this average is then

$$S^2_{\overline{BKG}} = \frac{S^2_{BKG}}{8} = 0.7403.$$

Net Dose at Study Locations

Dosimeters were placed at four locations that were thought to represent four modeled dose scenarios. An additional location, MSA-1, was chosen based upon the observation of high field measurements even though it is not generally accessible to the public. Dosimeters were placed at heights of 0.67 m and 1 m at each location. Because there is no evidence to suggest that placement height is not important in the study locations, each dosimeter reading is treated separately.

The net exposure, E_N, as estimated by each badge is calculated by subtracting the average background dose, $\overline{E}_B$, from the total TLD badge dose, E_T.

$$E_N = E_T - \overline{E}_B .$$

The variance of the net exposure is given by,

$$Var(E_N) = Var(E_T) + Var(\overline{E}_B).$$

Now the best estimate of the variance of a single badge reading is provided by S_C^2 from the Control Group. The best estimate of the variance of the average background exposure is $S_{\overline{BKG}}^2$.

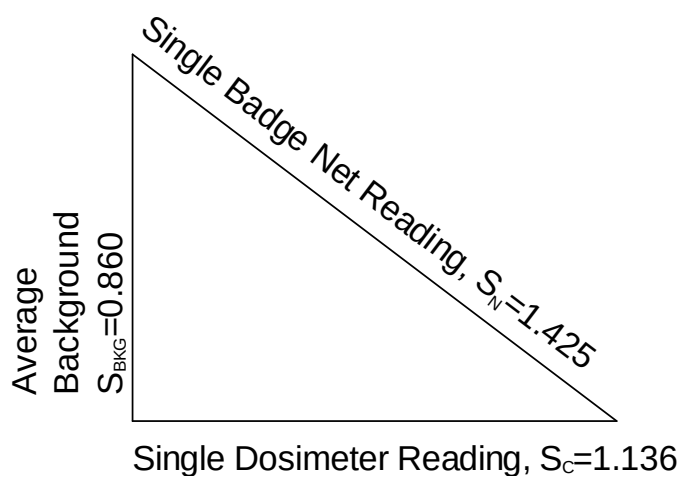
Therefore,

$$Var(E_N) = S_C^2 + S_{\overline{BKG}}^2 = 1.291 + 0.7403 = 2.0313.$$

The standard deviation of a net exposure is then $S_N = 1.425$ mR.

Figure 5

Net Exposure
Variation of a Single Badge Reading



The accumulated data provide no evidence to indicate that the measurement deviations from their respective means are not Normally distributed. Therefore, confidence intervals may be constructed for the expected net exposures using the student's t statistic. However, the variance of a single badge reading is estimated from the Control Group with 6 degrees of freedom, but the variance of the background mean is estimated with 12 degrees of freedom. Therefore, we are faced with some question as to which value of the tabulated student's t to choose. A reasonable approach is to use a "weighted t" following Cochran's approximation.

The weighted "t" is the weighted average of tabulated values of the students t statistic for 6 and 12 degrees of freedom calculated as follows:

$$t_{wgt} = \frac{S_C^2 t_{df=6} + S_{\overline{BKG}}^2 t_{df=12}}{S_C^2 + S_{\overline{BKG}}^2} \quad .$$

Values for some selected degrees of confidence are provided in the following Table 4.

Table 4
Weighted student's t Statistic

	Degree of Confidence	Tabulated t		Weighted t
		df=6	df=12	
One Sided	95%	1.943	1.782	1.884
	99%	3.143	2.624	2.954
Two Sided	95%	2.447	2.179	2.349

I believe that the best story is told by using a two sided confidence interval for the expected (mean) net exposure. I have constructed the attached table as a suggested revision to your Table 10. Note that only the "Resident" RESRAD calculated dose is included within the 95 percent confidence intervals for the mean net dose at the selected locations within the study area. Assuming that the observed individual badge readings are representative of the dose for their respective scenario, the observed net dose is statistically significantly lower than that predicted by RESRAD for all but the residential scenario. Thus the RESRAD predicted doses are conservative.

Dose Rate Estimation

The subject report has paralleled the discussion of dose in mR with a discussion of dose rate in μ rem/h derived from the TLD measurements. The total deviation of badge exposure time for the entire study was 48 hours with the average time of 2,568 hours. This is a less than two percent deviation and suggests that conversion of the exposure results (in mR) to results for dose rates (in μ rem/h) might be accomplished simply by dividing by the average exposure time.

Very truly yours,

SPLITSTONE & ASSOCIATES

Douglas E. Splitstone
Principal

Suggested Revision

Table 10, Lower Confidence Bounds for Net TLD Doses

Badge Location	Location ID	Net Dose, (mR) Background Subtracted	95% Confidence Interval		RESRAD Calculated Integrated Dose (mR 2542 h)
			Lower Bound	Upper Bound	
Pentolite Ditch @ WEMS (Not Accessable)	MSA-1A	8.38	5.03	11.72	NA
	MSA-1B	16.38	13.03	19.72	
Plum Brook @ Columbus Av (Suburban Gardener)	MSA-2A	6.71	3.36	10.06	16.12 ±7.83
	MSA-2B	6.04	2.69	9.39	
Plum Brooke @ WWT site (Brookside Resident)	MSA-3A	2.71	-0.64	6.06	2.81±3.20
	MSA-3B	2.38	-0.97	5.72	
Plum Brooke @ PBCC (Country Club Worker)	MSA-4A	0.04	-3.31	3.39	6.61±3.46
	MSA-4B	-0.96	-4.31	2.39	
Plum Brook @ US Rt16 (Recreationist)	MSA-5A	-1.63	-4.97	1.72	14.70±7.43
	MSA-5B	-0.29	-3.64	3.06	

Revised Dose Assessment for Plum Brook Sediments

PBRF-TBD-08-006

Appendix D

RESRAD Parameter Selection Supporting Information

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1.0 Introduction

This appendix identifies the parameters selected for the four principal exposure scenarios: Suburban Gardner, Brookside Resident, Plum Brook Country Club Maintenance Worker and Recreationist. It documents parameter values, identifies sources of information and provides justification as appropriate. The applicable exposure pathways and source term model are described for each scenario. The RESRAD parameters that apply to each scenario are then presented and discussed. The organization in this appendix follows the structure used by RESRAD for identifying parameters:

- Contaminated Zone Parameters
- Cover and Contaminated Zone Hydrologic Data
- Saturated Zone Hydrologic Data
- Uncontaminated and Unsaturated Zone Hydrologic Data
- Distribution Coefficients
- Dust Inhalation and External Gamma Parameters
- Ingestion Pathway Dietary Parameters
- Ingestion Pathway Non-dietary Parameters
- Dose conversion, food transfer and bioaccumulation factors.

2.0 Exposure Pathways and Source Term Models

The exposure pathways for each scenario are summarized in Table 1. Table 2 summarizes the source terms models. This information is contained in the main report, but is presented here as a guide for identifying the parameters used in each scenario.

Table 1, Summary of Exposure Scenarios

Scenario	Plum Brook Stream Section	Dose Receptor	Source	Pathways
Suburban Gardener	Upper Stream	Resident	Vegetable garden soil supplemented with excavated stream bank-sediment.	Direct exposure, Inhalation, direct ingestion of sediment and consumption of vegetables from garden.
Brook-side Resident	Lower Stream	Resident	Layers of sediment from flood event adjacent to and partially underneath house.	Direct exposure, inhalation and direct ingestion of sediment.
Country Club Maintenance Worker	Upper Flood Plain	Landscape Maintenance Worker	Soil and sediment from ponds used as fill on golf course walkway.	Direct exposure, inhalation and direct ingestion of sediment.
Natural Area Recreation Day User	Lower Flood Plain & Estuary	Recreational user (seasonal use)	Stream bottom and adjacent alluvial deposits.	Direct exposure, fish consumption, inhalation and direct ingestion of sediment.

Table 2, Source Model Details for Exposure Scenarios

Scenario	Principal Source	Localized Area of Elevated Activity	Comments
Suburban Gardener	Surface layer of soil-sediment mixture 3 in. thick.	Modeled as cylindrical three-layer source; one meter radius. Each layer is 6 in. thick. (1)	
Brook-side Resident	Three-layer source. Surface layer is 6 in. thick. Subsurface layers are 9 in. thick.	Modeled as cylindrical three-layer source; one meter radius. Each layer is 6 in. thick.	
Country Club Maintenance Worker	Surface layer of soil-sediment mixture 3 in. thick.	Modeled as cylindrical three-layer source; three meter radius. Surface layer is 6 in. thick; subsurface layers are each 12 in. thick.	Localized elevated activity source is Cs-137 only (no Co-60 activity).
Natural Area Recreation Day User	Three-layer source. Surface layer is 6 in. thick. Subsurface layers are 12 in. thick. (2)	Modeled as cylindrical three-layer source; three meter radius. Surface layer is 6 in. thick; subsurface layers are each 12 in. thick. (3)	Principal source is single-layer only for Co-60. Localized elevated activity source is Cs-137 only (no Co-60 activity).

Table 2 Notes:

1. The plant food pathway is suppressed for the Suburban Gardner localized area elevated activity source. It is assumed to be located outside the garden.
2. Special considerations are required to implement the three-layer source models. The direct exposure pathway dose from Cs-137 is modeled separately from the fish ingestion pathway dose. The direct pathway dose can be modeled by three separate RESRAD cases; one for each layer. The doses from each layer are additive. However, for the fish ingestion pathway dose RESRAD cannot accommodate three distinct contaminated zone layers as the contaminated zone must be in direct contact with the saturated zone. The contaminated zone is treated as a single layer of thickness equal to the total thickness of the three layers.
3. The localized area source for Cs-137 is modeled similarly to the large area source as described in Note 2. The source area is set at 28.3 m^2 (3 meter radius).

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3.0 Parameter Data Tables

The tables which follow summarize the RESRAD parameter values selected for the exposure scenarios. The Suburban Gardner is addressed in Tables 3 through 9; Brookside Resident in Tables 10 and 11; Plum Brook Country Club Maintenance Worker in Tables 12 and 13 and Recreationist in Tables 14 through 19. Distribution coefficients for all scenarios are presented in Table 20. Dose conversion, food transfer and bioaccumulation factors are given in Table 21. For each parameter, the RESRAD parameter name is used as the identifier. The parameter value and units are given and the source or basis for the selected value is given. Note that only the Suburban Gardner and Recreationist scenarios contain pathways that involve hydrologic parameters. Published hydrologic parameter data for Plum Brook sediment settings that lie outside the Plum Brook facility are scarce. Some hydrologic parameter data was provided by a consulting hydrogeologist (Haag Environmental). Of necessity, primary sources are the PBRF FSS Plan (Attachment B) [NASA 2007] and the US Army Corps of Engineers PBRF Hydrogeological Report [USACE 2004]. In the absence of published data or professional observations for local conditions, general hydrology references or RESRAD default values are used [ANL 2001]. For behavioral and food chain parameters, RESRAD default parameter values or values published in US NRC guidance documents are used.

Table 3, Suburban Gardner Scenario: Contaminated Zone Parameters

Parameter	Parameter Value	Source
Area of contaminated zone	186 m^2 (1)	NUREG-5512, Vol. 2, App. B, Sample Problems, (example scenario with a contaminated garden) [USNRC 2001].
Thickness of contaminated zone	3 inches (0.076 m) (2)	Conservative estimate of amount of sediment that could be excavated from the Plum Brook and placed in garden. It would require 19 cu. yd. of sediment to fill the top three inches of the garden.
Density of contaminated zone	1.522 g/cm^3	PBRF Hydrogeologic Report, [USACE 2004] (average value used for unconsolidated deposits).
Length parallel to aquifer flow	19.3 m	Longest distance between sides of contaminated zone; diagonal of 186 m^2 square garden.
Time since placement of material	0 years	RESRAD default
Time for calculations	Through 1000 years	10 CFR 20.1402 [CFR 2003]. Note that maximum doses occur at time 0 years for Cs-137 and Co-60.

Table 3 Notes:

1. There is also a local area elevated activity source component of 3.14 m^2 (one-meter radius).
2. The local area elevated activity source component is comprised of three layers, each 6 inches thick.

Table 4, Suburban Gardner Scenario: Cover and Contaminated Zone Hydrologic Data

Parameter	Parameter Value	Source
Density of cover material	1.522 g/cm^3	PBRF Hydrogeologic Report, [USACE 2004] (average value used for unconsolidated deposits).
Contaminated zone erosion rate	0.001 m/yr	RESRAD default
Contaminated zone total porosity	0.45	Groundwater Hydrology and Hydraulics, [McW 1977]
Contaminated zone field capacity	0.20	RESRAD default
Contaminated zone hydraulic conductivity	270 m/yr	PBRF Hydrogeologic Report [USACE 2004] (uses most conservative value for unconsolidated deposits).
Contaminated zone b parameter	7.12	*Empirical Equations for Some Soil Hydraulic Properties*, (sandy clay loam) [Clapp 1978]
Evapotranspiration coefficient	0.5	RESRAD default
Precipitation	0.86 m/yr	National Climactic Data Center – Ohio [NCDC 2009]
Irrigation	1.04 m/yr	NUREG-1549 [USNRC 1998]
Irrigation mode	Overhead	RESRAD default
Runoff coefficient	0.3	*Handbook on the Principles of Hydrology*, [Gray 1970].
Watershed area for stream or pond	1.81×10^6 m^2	Watershed drainage area for Plum Brook Upper Meander Section [Haag 2007].

Table 5, Suburban Gardner Scenario: Saturated Zone Hydrologic Data

Parameter	Parameter Value	Source
Density of saturated zone	1.522 g/cm^3	PBRF Hydrogeologic Report [USACE 2004] (average value used for unconsolidated deposits).
Saturated zone total porosity	0.45	Groundwater Hydrology and Hydraulics [McW 1977].
Saturated zone effective porosity	0.20	Groundwater Hydrology and Hydraulics [McW 1977].
Saturated zone hydraulic conductivity	270 m/yr	PBRF Hydrogeologic Report [USACE 2004] (use most conservative value for unconsolidated deposits).
Saturated zone hydraulic gradient	0.005 m/m	PBRF Hydrogeologic Report [USACE 2004].
Saturated zone b parameter	NA	
Water table drop rate	0.0 m/yr	Most conservative – minimizes transport time.
Well pump intake depth	8 (m below water table)	PBRF Hydrogeologic Report [USACE 2004].
Mixing model	Nondispersion	RESRAD default
Groundwater well pumping rate	118 m^3/yr	NUREG-1549 [USNRC 1998].

Table 6, Suburban Gardner Scenario: Uncontaminated and Unsaturated Zone Hydrologic Data

Parameter	Parameter Value	Source
Number of unsaturated zone strata	1	PBRF Hydrogeologic Report [USACE 2004]
Unsaturated zone thickness	3.0 m	PBRF Hydrogeologic Report [USACE 2004].
Unsaturated zone soil density	1.522 g/cm^3	PBRF Hydrogeologic Report [USACE 2004] (average value used for unconsolidated deposits).
Unsaturated zone total porosity	0.45	Groundwater Hydrology and Hydraulics [McW 1977].
Unsaturated zone effective porosity	0.20	Groundwater Hydrology and Hydraulics [McW 1977].
Unsaturated zone b parameter	7.12	*Empirical Equations for Some Soil Hydraulic Properties*, (sandy clay loam) [Clapp 1978]
Unsaturated zone hydraulic conductivity	270 m/yr	PBRF Hydrogeologic Report [USACE 2004] (most conservative value used for unconsolidated deposits).

Table 7, Suburban Gardner Scenario: Dust Inhalation and External Gamma Parameters

Parameter	Parameter Value	Source
Inhalation rate	8400 m^3/yr	RESRAD default
Mass loading for inhalation	1×10^{-4} g/m^3	RESRAD default
Dilution length for airborne dust	3 m	RESRAD default
Exposure duration	365.25 days	RESRAD default
Shielding factor, inhalation	0.40	RESRAD default
Shielding factor, external gamma	0.7	RESRAD default
Fraction of time indoors, onsite	0.0	NUREG-5512, Vol 2, App. B, Sample Problems, (example scenario with a contaminated garden) [USNRC 2001].
Fraction of time outdoors, onsite	0.014 (123 h/y)	NUREG-5512, Vol 2, App. B, Sample Problems, (example scenario with a contaminated garden) [USNRC 2001].
Shape factor, external gamma	1	RESRAD default

Table 8, Suburban Gardner Ingestion Pathway Dietary Parameters

Parameter	Parameter Value	Source
Fruit, vegetable, and grain consumption rate	160 kg/yr	RESRAD default.
Leafy vegetable consumption rate	14.5 kg/yr	RESRAD default
Soil ingestion rate	18.3 g/yr	NUREG-1549 [USNRC 1998]
Fraction of plant food from site	0.5	RESRAD default Note RESRAD scales the fraction of intake of plant food by the ratio of the contaminated area to the max garden size (2000 m^2), see Data Collection Hbk [Yu 1993].

Table 9, Suburban Gardner Scenario: Ingestion Pathway Non-dietary Parameters

Parameter	Parameter Value	Source
Mass loading for foliar deposition	1×10^{-4} g/m^3	RESRAD default
Depth of soil mixing layer	0.15 m	RESRAD default
Depth of roots	0.9 m	RESRAD default
Irrigation fraction from groundwater	1	RESRAD default
Wet wt. crop yield for non-leafy vegetables	0.7 kg/m^2	RESRAD default
Wet wt. crop yield for leafy vegetables	1.5 kg/m^2	RESRAD default
Growing season for non-leafy vegetables	0.17 yr	RESRAD default
Growing season for leafy vegetables	0.25 yr	RESRAD default
Translocation factor for non-leafy vegetables	0.1	RESRAD default
Translocation factor for leafy vegetables	1	RESRAD default
Dry foliar interception fraction for non-leafy vegetables	0.25	RESRAD default
Dry foliar interception fraction for leafy vegetables	0.25	RESRAD default
Wet foliar interception fraction for non-leafy vegetables	0.25	RESRAD default
Wet foliar interception fraction for leafy vegetables	0.25	RESRAD default
Weathering removal constant for vegetation	20	RESRAD default
Storage time for fruits, non-leafy vegetables and grain	14 days	RESRAD default
Storage time for leafy vegetables	1 day	RESRAD default

Table 10, Brookside Resident Scenario: Contaminated Zone Parameters

Parameter	Parameter Value	Source
Area of contaminated zone	186 m^2 (1)	NUREG-5512, Vol. 2, App. B, Sample Problems, (example scenario with a contaminated area under a house) [USNRC 2001].
Thickness of contaminated zone (surface layer)	6 inches (0.15 m) (2)	The source term is modeled as a three layer source. The subsurface layers are each 9 in. thick.
Density of contaminated zone	1.522 g/cm^3	PBRF Hydrogeologic Report, [USACE 2004] (average value used for unconsolidated deposits).
Time since placement of material	0 years	RESRAD default
Time for calculations	Through 1000 years	10 CFR 20.1402 [CFR 2003]. Note that maximum doses occur at time 0 years for Cs-137 and Co-60.

Table 10 Notes:

1. There is also a local area elevated activity source component of 3.14 m^2 (one-meter radius).
2. The local area elevated activity source component is comprised of three layers, each 6 inches thick.

Table 11, Brookside Resident Scenario: Dust Inhalation, Ingestion and External Gamma Parameters

Parameter	Parameter Value	Source
Inhalation rate	8400 m^3/yr	RESRAD default
Mass loading for inhalation	1×10^{-4} g/m^3	RESRAD default
Dilution length for airborne dust	3 m	RESRAD default
Exposure duration	365.25 days	RESRAD default
Shielding factor, inhalation	0.40	RESRAD default
Shielding factor, external gamma	0.7	RESRAD default
Fraction of time indoors, onsite	0.125 (1096 h)	RESRAD default occupancy factor (0.5) adjusted by ¼, the ratio of contaminated area under house (45.6 m^2) to total area of contamination (186 m^2)
Fraction of time outdoors, onsite	0.0091 (80 h/y)	Time assumed to be spent working on landscaping and lawn maintenance on portion of lawn that is on contaminated sediment.
Shape factor, external gamma	1	RESRAD default
Soil ingestion rate	18.3 g/yr	NUREG-1549 [USNRC 1998]

Table 12, Country Club Maintenance Worker Scenario: Contaminated Zone Parameters

Parameter	Parameter Value	Source
Area of contaminated zone	600 m^2 (1)	Contaminated sediment is used as fill along a golf cart path. The path is 100 meters long with fill placed in a 3 meter wide swath on each side.
Thickness of contaminated zone (surface layer)	3 inches (0.076 m) (2)	Conservative estimate of amount of sediment that could be excavated from sediment spoil piles at the PBCC and placed along cart path. It would require 60 cu. yd. of sediment to fill the top three inches of the path borders.
Density of contaminated zone	1.522 g/cm^3	PBRF Hydrogeologic Report, [USACE 2004] (average value used for unconsolidated deposits).
Time since placement of material	0 years	RESRAD default
Time for calculations	Through 1000 years	10 CFR 20.1402 [CFR 2003]. Note that maximum doses occur at time 0 years for Cs-137 and Co-60.

Table 12 Notes:

1. The contaminated zone source model is comprised of a single layer 600 m^2 in area. There is also a local area elevated activity source component of 28.3 m^2 (three-meter radius).
2. The local area elevated activity source component is comprised of three layers; a 6 inch thick surface layer and two 12 inch thick subsurface layers. The local area source contains only Cs-137.

Table 13, Country Club Maintenance Worker Scenario: Dust Inhalation, Ingestion and External Gamma Parameters

Parameter	Parameter Value	Source
Inhalation rate	14000 m^3/yr	RESRAD Users Manual Table 2.3 (moderate activity) [ANL 2001].
Mass loading for inhalation	1×10^{-4} g/m^3	RESRAD default
Dilution length for airborne dust	3 m	RESRAD default
Exposure duration	365.25 days	RESRAD default
Shielding factor, inhalation	0.40	RESRAD default
Shielding factor, external gamma	0.7	RESRAD default
Fraction of time indoors, onsite	0	
Fraction of time outdoors, onsite	0.051 (450 h/y)	Worker spends an average of 15 h/wk for a 30 week season.
Shape factor, external gamma	1	RESRAD default
Soil ingestion rate	36.5 g/yr	RESRAD default

Table 14, Recreationist Scenario: Contaminated Zone Parameters

Parameter	Parameter Value	Source
Area of contaminated zone	1500 m^2 (1)	Modeled as a 21.85 meter radius disk source – estimated to be of size comparable to contaminated areas measured in the Plum Brook Estuary.
Thickness of contaminated zone (surface layer)	6 inches (0.15 m) (2)	The source term is modeled as a three layer source. The subsurface layers are each 12 in. thick. (3)
Density of contaminated zone	1.522 g/cm^3	PBRF Hydrogeologic Report, [USACE 2004] (average value used for unconsolidated deposits).
Length parallel to aquifer flow	44 m	Diameter of contaminated zone circular disk source.
Time since placement of material	0 years	RESRAD default
Time for calculations	Through 1000 years	10 CFR 20.1402 [CFR 2003]. Note that maximum doses occur at time 0 years for Cs-137 and Co-60.

Table 14 Notes:

1. There is also a local area elevated activity source component of 28.3 m^2 (three-meter radius).
2. The local area elevated activity source component is comprised of three layers; a 6 inch thick surface layer and two 12 inch thick subsurface layers. The local area source contains only Cs-137.
3. The contaminated zone source model for Co-60 consists of a single layer 6 inched thick.

Table 15, Recreationist Scenario: Cover and Contaminated Zone Hydrologic Data

Parameter	Parameter Value	Source
Density of cover material	1.522 g/cm^3	PBRF Hydrogeologic Report, [USACE 2004] (average value used for unconsolidated deposits).
Contaminated zone erosion rate	0.001 m/yr	RESRAD default
Contaminated zone total porosity	0.45	Groundwater Hydrology and Hydraulics, [McW 1977]
Contaminated zone field capacity	0.20	RESRAD default
Contaminated zone hydraulic conductivity	270 m/yr	PBRF Hydrogeologic Report [USACE 2004] (uses most conservative value for unconsolidated deposits).
Contaminated zone b parameter	7.12	*Empirical Equations for Some Soil Hydraulic Properties*, (sandy clay loam) [Clapp 1978]
Evapotranspiration coefficient	0.5	RESRAD default
Precipitation	0.86 m/yr	National Climactic Data Center – Ohio [NCDC 2009]
Runoff coefficient	0.3	*Handbook on the Principles of Hydrology*, [Gray 1970].
Watershed area for stream or pond	2.85×10^5 m^2	Watershed drainage area for Plum Brook Estuary [Haag 2007].

Table 16, Recreationist Scenario: Saturated Zone Hydrologic Data

Parameter	Parameter Value	Source
Density of saturated zone	1.522 g/cm^3	PBRF Hydrogeologic Report [USACE 2004] (average value used for unconsolidated deposits).
Saturated zone total porosity	0.45	Groundwater Hydrology and Hydraulics [McW 1977].
Saturated zone effective porosity	0.20	Groundwater Hydrology and Hydraulics [McW 1977].
Saturated zone hydraulic conductivity	270 m/yr	PBRF Hydrogeologic Report [USACE 2004] (use most conservative value for unconsolidated deposits).
Saturated zone hydraulic gradient	0.005 m/m	PBRF Hydrogeologic Report [USACE 2004].
Saturated zone b parameter	NA	
Water table drop rate	0.0 m/yr	Most conservative – minimizes transport time.
Mixing model	Mass Balance	Personal communication RESRAD staff [Gnan 2008].

Table 17, Recreationist Scenario: Uncontaminated and Unsaturated Zone Hydrologic Data

Parameter (1)	Parameter Value	Source
Number of unsaturated zone strata	0	Personal communication RESRAD staff [Gnan 2008].
Unsaturated zone thickness	NA	
Unsaturated zone soil density	NA	
Unsaturated zone total porosity	NA	
Unsaturated zone effective porosity	NA	
Unsaturated zone b parameter	NA	
Unsaturated zone hydraulic conductivity	NA	

Table 17 Note:

1. The Recreationist water-related pathway, fish consumption, is modeled by placing the contaminated zone in direct contact with the groundwater table by specifying no intervening layers. This maximizes the transport of the contaminants from sediment to surface water and thence to fish.

Table 18, Recreationist Scenario: Dust Inhalation and External Gamma Parameters

Parameter	Parameter Value	Source
Inhalation rate	14000 m^3/yr	RESRAD Users Manual Table 2.3 (moderate activity) [ANL 2001].
Mass loading for inhalation	1×10^{-4} g/m^3	RESRAD default
Dilution length for airborne dust	3 m	RESRAD default
Exposure duration	365.25 days	RESRAD default
Shielding factor, inhalation	0.40	RESRAD default
Shielding factor, external gamma	0.7	RESRAD default
Fraction of time indoors, onsite	0.0	
Fraction of time outdoors, onsite	0.0125 (105 h/y)	An avid fisherman who spends about 10 h per week, 10 weeks per year.
Shape factor, external gamma	1	RESRAD default

Table 19, Recreationist Scenario: Ingestion Pathway Dietary Parameters

Parameter	Parameter Value	Source
Fish consumption rate	5.4 kg/yr	RESRAD default
Other seafood consumption rate	0 kg/yr	
Soil ingestion rate	18.3 g/yr	NUREG-1549 [USNRC 1998]
Contaminated fraction of aquatic food	0.5	RESRAD default

Table 20, Distribution Coefficients

Parameter	Parameter Value	Source
Cs-137 distribution coefficient - Contaminated Zone (1) (2)	4600 cm^3/g	RESRAD default
Cs-137 distribution coefficient - Unsaturated Zone (3)	4600 cm^3/g	RESRAD default
Cs-137 distribution coefficient - Saturated Zone (1)	1000 cm^3/g	Median value for freshwater sediments reported by Onishi [Till 2008].
Co-60 distribution coefficient - Contaminated Zone (1)	1000 cm^3/g	RESRAD default
Co-60 distribution coefficient - Unsaturated Zone (3)	1000 cm^3/g	RESRAD default
Co-60 distribution coefficient - Saturated Zone (1)	1000 cm^3/g	RESRAD default

Table 20 Notes:

1. Used in Suburban Gardner and Recreationist scenarios.
2. Distribution coefficient (K_d) values for Cs-137 values are conservative. Illitie clay comprises a significant fraction of the soil types which are the source of Plum Brook sediments [USDA 2006]. The reported K_d for illite clay minerals is > 20,000 cm^3/g [NCRP 2006].
3. Used in Suburban Gardner only.

Table 21, Dose Conversion, Food Transfer and Bioaccumulation Factors

Parameter	Parameter Value	Source
DCF for external ground radiation – Cs-137 (FRG 11)	3.606 mrem/y per pCi/g	RESRAD default
DCF for inhalation – Cs-137	3.19 E-05 mrem/pCi	RESRAD default
DCF for ingestion – Cs-137	5.0 E-05 mrem/pCi	RESRAD default
Food transfer, plant/soil concentration ratio – Cs-137	4.0 E-02	RESRAD default
Freshwater fish bioaccumulation factor – Cs-137	2.0 E+03	RESRAD default
DCF for external ground radiation – Co-60 (FRG 11)	1.622 E+01 mrem/y per pCi/g	RESRAD default
DCF for inhalation – Co-60	2.19 E-04 mrem/pCi	RESRAD default
DCF for ingestion – Co-60	2.69 E-05 mrem/pCi	RESRAD default
Food transfer, plant/soil concentration ratio – Co-60	8.0 E-02	RESRAD default
Freshwater fish bioaccumulation factor – Co-60	3.0 E+02	RESRAD default

Table 21 notes:

1. DCF means dose conversion factor
2. FRG means Federal Guidance Report No 11 [USEPA 1988]

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Appendix E

Age-Dependent Dose from Plum Brook Sediments

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1.0 Introduction

Information on the releases of radioactivity to the Plum Brook from the PBRF has been provided by NASA to the public on several occasions. Questions have been raised about doses and potential risks to children. The dose conversion factors and behavioral parameters for RESRAD models and exposure scenarios are based on adults. What are the effects on the calculated doses if age-dependent values of critical parameters are used to calculate the doses? As a result, NASA has requested that a technical evaluation be performed to address this issue. This report describes the assessment of age-dependent doses for selected exposure scenarios and compares them to adult doses calculated in the 2008 dose assessment [NASA 2008].

2.0 Background

Environmental radiation dose calculation models such as RESRAD were developed using dose factors published by the International Commission on Radiological Protection (ICRP) and the US EPA. The dose factors were developed for assessment of doses to adults. In the absence of age-specific dose and risk factors, the assessment of dose and risk to members of the public was limited to adults. The EPA acknowledged this situation in a 1994 Federal Register announcement.[1]

The US NRC concurred with this policy on assessment of doses to future site occupants from residual contamination at decommissioned nuclear facilities.[2] However, beginning in 1989 the International Commission on Radiological Protection (ICRP) issued age-dependent dose factors for assessment of doses to the public from intake of radionuclides, culminating in the issuance of ICRP Report No. 72 in 1996. [ICRP 1996]. Subsequently, the EPA has issued age-dependent cancer risk coefficients for environmental exposure to radionuclides [USEPA 1999].

The developers of RESRAD have incorporated ICRP-72 age-dependent dose factors in version 6.4 of the code released in December 2007 [USDOE 2008]. It is now possible, using RESRAD to calculate doses to individuals other than adults from exposure to Plum Brook sediments. The RESRAD age-dependent dose conversion factors for Cs-137 (from ICRP-72) are shown in Table 1. The table compares them to the adult dose factors in the RESRAD default dose factor library -

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[1] "The actual dose to a particular individual from a given intake (of radioactive material) is dependent on age and sex as well as other characteristics. …implementing limits for the general public expressed as age and sex dependent would be difficult. More importantly, the variability in dose due to these factors is comparable in magnitude to the uncertainty in our estimates of the risks……EPA believes that for purposes of providing radiation protection, the assumptions exemplified by Reference Man adequately characterize the general public and a detailed consideration of age and sex is not generally necessary [USEPA 1994].

[2] "Since age-based dose conversion factors are not being used, the same dose conversion factors are applied to all individuals. Only in rare occasions will a non-adult individual receive a higher dose than an adult in a similar exposure scenario. One example is the milk pathway; children generally drink more milk than adults. If milk was the only pathway that would expose the individual to a dose, then the child would have a slightly higher dose than the adult. But in most situations, especially ones involving multiple pathways, the total intake of the adult is greater than that of a child" [USNRC 2003].

from Federal Guidance Report No. 11(FGR-11) [USEPA 1988]. The latter were used in the recent dose assessment for exposure to Plum Brook sediments [NASA 2008]. Note that the adult dose factor for inhalation has been reduced by over a factor of two from FGR-11, whereas the ingestion dose factor is changed only slightly. The new dose factor library in RESRAD does not include age dependent dose conversion factors for the direct exposure pathway[3].

Table 1, Age-dependent Dose Conversion Factors for Cs-137

Category	Cs-137 Dose Conversion Factors (mrem/pCi)		Source
	Ingestion	Inhalation	
Adult – base case	5.0E-05	3.19E-05	FGR-11 (1)
Adult	4.81E-05	1.44E-05	ICRP-72 (2)
Infant	7.77E-05	4.07E-04	ICRP-72
One-year old	4.44E-05	3.70E-04	ICRP-72
Five-year old	3.55E-05	2.59E-04	ICRP-72
Ten year old	3.70E-05	1.78E-04	ICRP-72
15 year old	4.81E-05	1.55E-04	ICRP-72

Table 1 Notes:

1. FGR-11 is Federal Guidance Report No. 11 [EPA 1988].
2. ICRP-72 is ICRP Report no. 72 [ICRP 1996].

[3] The new ICRP-72 dose conversion factors are limited to internal exposures. As of the present, no effort has been funded to develop age-dependent dose conversion factors for exposure to radiation sources external to the body [Ecker. 2008].

3.0 References

ANL 1993 Argonne National Laboratory, Environmental Assessment Division, *Data Collection Handbook to Support Modeling Impacts of Radioactive Materials in Soil*, April 1993.

ANL 2001 Argonne National Laboratory, Environmental Assessment Division, *User's manual for RESRAD Version 6*, ANL/EAD-4, July 2001.

Ecker. 2008 Keith Eckerman, Oak Ridge National Laboratory, *Personal Communication*, July 22, 2008.

FR 1994 *Federal Radiation Protection Draft Guidance for Exposure of the General Public*, Federal Register Notice 59 FR 66414, Dec. 23, 1994.

ICRP 1996 International Commission on Radiological Protection, *Age-dependent Doses to members of the Public from Intake of Radionuclides, Part 5, Compilation of Ingestion and Inhalation Coefficients*, ICRP Publication 72, Elsevier, 1996.

NASA 2008 National Aeronautics and Space Administration, Plum Brook Reactor Facility, Technical Basis Document, *Assessment of Radiation Exposures from Plum Brook Sediments Contaminated with Cs-137*, PBRF-TBD-07-005, June 2008.

Petous 1991 N. Petoussi, et. al., *Organ Doses for Foetuses, Babies, Children and adults from Environmental Gamma Rays*, Radiation Protection Dosimetry, 1991, Vol. 37 No. 1, pp 31-41.

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

USEPA 1994 US Environmental Protection Agency, *Federal Radiation Protection Guidance for Exposure of the General Public, Proposed Recommendations, Request for Comments and Notice of Public Hearings*, Federal Register 59, December 23, 1994.

USEPA 1997 US Environmental Protection Agency, National Center for Environmental Assessment, *Exposure Factors Handbook*, August 1997.

USEPA 1999 US Environmental Protection Agency, *Cancer Risk Coefficients for Environmental Exposure to Radionuclides*, Federal Guidance Report No. 13, EPA 402-R-99-001, September 1999.

USDOE 2008 Department of Energy, Office of Environmental Policy and Assistance Nuclear Safety and Environmental Information Notice, *Release of RESRAD (V.6.4) and RESRAD-BUILD (V.3.4) Revised Codes: Tools for Evaluating Radiation Doses and Risks*, February 8, 2008.

USNRC 2003 US Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards, *Consolidated NMSS Decommissioning Guidance*, NUREG-1757, Final Report, September 2003.

4.0 Summary of Doses to Adults

The starting point for the present evaluation of doses to children is a review of the estimated doses to adults from Plum Brook sediments. In the recent dose assessment conducted by NASA, doses to adult members of the public were calculated for four exposure scenarios [NASA 2008]. The exposure scenarios are:

- Suburban Gardner. This scenario represents exposure conditions for the portion of the stream nearest the PBRF where a resident grows vegetables in a small garden on soil that is mixed with contaminated sediments. Radiation exposure is received primarily from direct exposure while working in the garden 123 hours a year and from consumption of vegetables grown in the garden.
- Brook-side Resident. A residence is assumed to be constructed on land contaminated with sediments deposited in the vicinity of the stream during a large flood event prior to construction of the home. Exposure to the resident is received primarily from direct exposure while inside the house (1096 hours per year) and while occupying contaminated outdoor areas while doing yard work (80 hours per year).
- Country Club Maintenance Worker. The dose receptor for this scenario is a worker at the Plum Brook Country Club, located on the Plum Brook about 2 ½ miles downstream (north) of the PBRF. The worker is assumed to spend about 15 hours a week, during a 30 week golf season, traveling on and maintaining landscaping adjacent to a golf cart path constructed on contaminated sediment used as fill.
- Recreationist. A fisherman occupies the stream and stream bank while fishing in the stream mouth-flood plain located between US Rt. 6 and Sandusky Bay. The fisherman spends about 10 hours a week for 10 weeks a year at the stream and consumes game fish caught there [NASA 2008].

Table 2 presents the dose from Cs-137 for each of the scenarios. The numbers in parentheses are the percentages of the total dose contributed by each pathway. Probabilistic results are also shown to identify the uncertainty in the calculated doses (mean of the peak dose ± one standard deviation). It is seen that the direct exposure pathway is the largest contributor in all except the Recreationist Scenario. The dose from food consumption is significant in the Suburban Gardner and Recreationist Scenarios. The contributions from inhalation of suspended sediment and direct ingestion of sediment are quite small for all four scenarios. They are shown in Table 3 to provide

a baseline for discussion of pathway contributions to age-dependent doses. The RESRAD case run reports for the four scenarios are included in Attachment A.

Table 2, Calculated Dose to Adults from Cs-137 (mrem/y per pCi/g)

Scenario	Deterministic			Probabilistic
	All Pathways	Direct	Food Consumption	All Pathways
Suburban Gardner	4.0E-02	2.6E-02 (64)	1.4E-02 (36)	4.23 ± 4.10 E-02
Brook-side Resident	1.74E-01	1.74E-01	NA	1.65 ± 1.70 E-01
Country Club Maintenance Worker	1.03E-01	1.03E-01	NA	0.94 ± 1.0 E-01
Recreationist	1.08E-01	3.60E-02 (33)	7.20E-02 (67)	3.77 ± 3.76 E-02

Table 2 Note: The numbers in parentheses are the fraction of the total dose in percent.

Table 3, Dose Contribution from Inhalation and Direct Ingestion Pathways (mrem/y per pCi/g)

Scenario	Inhalation		Direct Soil Ingestion		Total Dose
	Dose	Fraction of Total Dose	Dose	Fraction of Total Dose	
Suburban Gardner	2.08E-08	5.21E-07	2.36E-06	5.91E-05	4.00E-02
Brookside resident	8.66E-08	4.98E-07	2.23E-05	1.28E-04	1.74E-01
Country Club Maintenance Worker	1.40E-07	1.36E-06	2.72E-05	2.65E-04	1.03E-01
Recreationist	1.25E-07	1.16E-06	2.16E-05	2.01E-04	1.08E-01

5.0 Calculation of Age-Dependent Dose - Approach

Two approaches are taken for estimation of age-dependent doses from Cs-137 in Plum Brook sediments. First, doses for age groups are calculated for scenarios selected from the four described above. Then an exposure scenario is developed to provide a bounding estimate for the dose to a child.

The principal factors which influence age-dependent doses calculated with RESRAD are:

- radionuclide-specific dose conversion factors for ingestion and inhalation
- behavioral and metabolic parameters.

As discussed earlier, the new ICRP age-dependent dose conversion factors have been incorporated into RESRAD data libraries. In addition, user-defined age-dependent behavioral and metabolic parameters are required. For the exposure pathways in this analysis they are rates

for: inhalation, direct ingestion of sediment-dust, vegetable consumption and fish consumption. Values for these parameters were obtained for the six ICRP-72 age categories: adult, infant, 1-yr old, 5-year old, 10-year old and 15-year old[4]. They are tabulated in Tables 4 and 5. As seen in the table notes, age categories in the source references do not always align with those of ICRP-72. Explanation of assignments is provided in the notes.

The Suburban Gardner and Recreationist scenarios are selected for calculation of age-dependent doses. These scenarios are selected because they have food consumption pathways, where the effect of age-dependent parameters can be readily observed. Also, a bounding scenario, called the Playground scenario is constructed. The Playground scenario is an extension of the Brookside Resident scenario – modified so the dose receptor is a child who plays in or near the stream and on a play area constructed on land that was impacted by a flood event. The outdoor occupancy time is the most significant factor and it is based on the Country Club Maintenance Worker scenario of the recent study [NASA 2008]. The Maintenance Worker has the greatest outdoor occupancy time of the four original scenarios; 450 hours per year.

Since there are no age-dependent dose conversion factors available for use in RESRAD for the direct exposure pathway, the effect of age-dependence on this pathway dose is treated by an adjustment factor. To a first approximation, age-dependent effective dose equivalents from the direct exposure pathway can be obtained by adjusting the adult dose by a multiplier. Results from calculations published in the Journal, Radiation Protection Dosimetry are used to provide empirical adjustment factors [Petous 1991]. The calculated doses for age categories: infant, 1-yr and 5-yr are adjusted by a factor of 1.3 and the doses for age categories 10-yr and 15-yr are adjusted by a factor of 1.1. This adjustment is only applied to RESRAD doses for direct outdoor exposure to contaminated sediments. It is not applied to direct exposure from indoor occupancy as the indoor exposure model does not lend itself to a simple correction factor based on the source-to-receptor distance.

[4] The principal sources for age-dependent behavioral and metabolic parameter values are the RESRAD Data Collection Handbook [ANL 1993] and the EPA Exposure Factor Handbook [EPA 1994].

Table 4, Age-dependent Inhalation and Direct Ingestion Rates

Age Category	Inhalation (m^3/y)	Direct Soil Ingestion (g/y)
Adult – base case	8,400 to 14,000 (1)	36.5
Infant (2)	1644 (3)	36.5 (8)
One-year old	2483 (4)	73 (8)
Five-year old	3032 (5)	73 (8)
Ten year old	3653 (6)	36.5 (9)
15 year old	6209 (7)	36.5 (9)

Table 4 Notes:

1. The base case adult inhalation rate of 8,400 for the Suburban Gardner is the RESRAD Default value. The value of 14,000 for the Maintenance Worker and Recreationist is from the RESRAD User Manual [ANL 2001] Table 2-3; the recommended value for a Recreationist based on a breathing rate of 1.6 m^3/h for "moderate activities".
2. Infant is defined as < one year old in the EPA Exposure Factors Handbook [USEPA 1997].
3. EPA Exposure Handbook value for infants (Table 5-23, 4.5 m^3/d).
4. EPA Exposure Handbook value for 1-2 year olds (Table 5-23, 6.8 m^3/d).
5. EPA Exposure Handbook value for 3-5 year olds (Table 5-23, 8.3 m^3/d).
6. EPA Exposure Handbook value for 9-11 year olds (Table 5-23, 10 m^3/d).
7. EPA Exposure Handbook value for 15-18 year old males (Table 5-23, 17 m^3/d).
8. EPA Exposure Handbook value for children (Table 4-23). Infants are conservatively assigned the same value as adults (their contact with contaminated sediment is very limited). For 1 and 5 year-olds, adopted the recommendation that 200 mg/d be used as conservative estimate of the mean value.
9. EPA Exposure Handbook value for children (Table 4-23). Used the nominal mean value of 100 mg/d for 10 and 15 year olds.

Table 5, Age-dependent Food Consumption Rates

Age Category	Vegetable Consumption (kg/y) (1)			Fish Consumption (kg/y)
	Total	Vegetables, Fruits and Grains	Leafy Vegetables	
Adult – base case	174	160	14	5.4
Infant (2)	NA	NA	NA	NA
One-year old	38.7 (3)	35.6	3.1	2.1(6)
Five-year old	38.7 (3)	35.6	3.1	2.1(6)
Ten year old	52.2 (4)	48.0	4.2	2.9 (7)
15 year old	75.2 (5)	48.0	4.2	2.9 (7)

Table 5 Notes:

1. Vegetable consumption consists of two categories in RESRAD: garden vegetables, fruits and grains (non-leafy vegetables) and leafy vegetables (spinach and lettuce). In contrast, age-dependent vegetable consumption data in the EPA Exposure Factors Handbook does not make this distinction. Age-dependent total vegetable consumption values are apportioned between vegetables, fruits and grains and leafy vegetables in the same ratios as the adult base case.
2. Infant is defined as < one year old in the EPA Exposure Factors Handbook [USEPA 1997]. Also the infant diet is assumed to consist of milk and processed foods only.
3. EPA Exposure Handbook value for males and females 5 and under (Table 9-19, 106 g/d).
4. EPA Exposure Handbook value for males 6-11 (Table 9-19, 143 g/d).
5. EPA Exposure Handbook value for males 12-19 (Table 9-19, 206 g/d).
6. EPA Exposure Handbook value for age groups 1-5 (Table 10-61, 5.63 g/d).
7. EPA Exposure Handbook value for age groups 6-10 (Table 10-61, 7.94 g/d).

6.0 Age-Dependent Dose Results

Calculated doses to age categories for the three scenarios are shown in Table 6. These results were obtained using RESRAD Version 6.4 in the deterministic mode. The uncertainty in these results is illustrated by Table 7, which shows the age-dependent doses for each scenario obtained from RESRAD probabilistic calculations. The results are the mean of the calculated peak doses (obtained at time = 0 years) ± one standard deviation. The individual RESRAD case run output results are included in Attachment A.

Table 6, Age-dependent Doses – Deterministic Results

Age-Category	Dose from Cs-137 (mrem/y per pCi/g)		
	Suburban Gardner	Recreationist	Playground
Adult	3.94E-02	1.05E-01	1.03E-01
Infant	2.56E-02	3.59E-02	1.03E-01
1-yr	2.84E-02	6.07E-02	1.03E-01
5-yr	2.79E-02	5.58E-02	1.03E-01
10-yr	2.88E-02	6.44E-02	1.03E-01
15-yr	2.97E-02	7.30E-02	1.03E-01

Table 7 Age-dependent Doses - Probabilistic Results

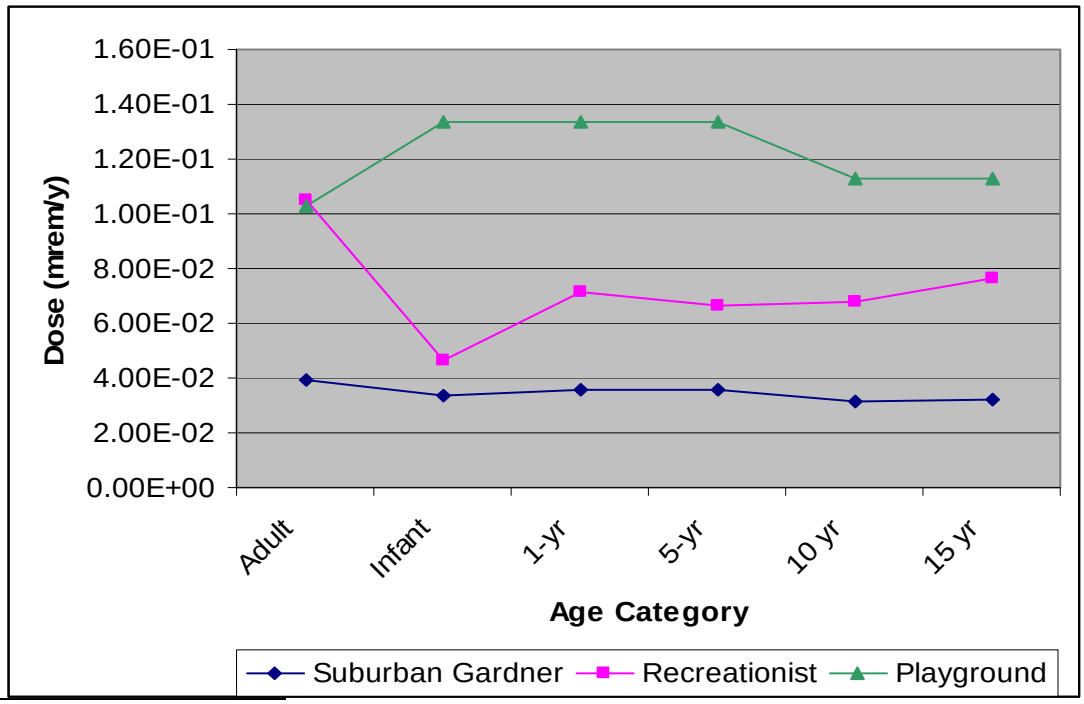
Age-Category	Dose from Cs-137 (mrem/y per pCi/g)		
	Suburban Gardner	Recreationist	Playground
Adult	4.66 ± 4.40 E-02	3.50 ± 4.40 E-02	0.94 ± 1.0 E-01
Infant	2.52 ± 2.79 E-02	3.47 ± 3.40 E-02	0.94 ± 1.0 E
1-yr	2.83 ± 2.94 E-02	3.79 ± 3.70 E-02	0.94 ± 1.0 E
5-yr	2.77 ± 2.91 E-02	3.18 ± 3.24 E-02	0.94 ± 1.0 E
10-yr	2.85 ± 2.96 E-02	3.23 ± 3.26 E-02	0.94 ± 1.0 E
15-yr	2.95 ± 3.02 E-02	3.29 ± 3.29 E-02	0.94 ± 1.0 E

The direct exposure pathway dose was adjusted by an empirical factor as described in the previous section. The age-dependent total doses (with adjustments) for each scenario are shown in Table 8. The Table 8 data is plotted in Figure 1. It is seen that the dose to children exceeds the dose to an adult only in the Playground scenario, where the dose is dominated by the external exposure pathway.[5]

Table 8, Deterministic Age-dependent Doses with Direct Exposure Pathway Adjustment

Age-Category	Dose from Cs-137 (mrem/y per pCi/g)		
	Suburban Gardner	Recreationist	Playground
Adult	3.94E-02	1.05E-01	1.03E-01
Infant	3.32E-02	4.67E-02	1.34E-01
1-yr	3.61E-02	7.15E-02	1.34E-01
5-yr	3.55E-02	6.65E-02	1.34E-01
10-yr	3.13E-02	6.80E-02	1.13E-01
15-yr	3.23E-02	7.66E-02	1.13E-01

Figure 1, Comparison of Age Category Doses



[5] Infant doses are lower than for other age groups in the Suburban Gardner and Recreationist scenarios because their diet does not include vegetables grown in the garden or fish caught in the stream.

The pathway contributions to the age category doses are shown in Tables 9 and 10 for the Suburban Gardner and Recreationist scenarios, respectively. The dose fraction from food ingestion is greatest for the adult in both scenarios. The dose contributions from inhalation and direct ingestion of soil are negligible for all age categories.

Table 9, Suburban Gardner Exposure Pathway Dose Breakdown

	Inhalation		Direct Soil Ingestion		Plant Ingestion		Direct (adjusted)	
Age Category	Dose (mrem/y)	Fraction of Total	Dose (mrem/y)	Fraction of Total	Dose (mrem/y)	Fraction of Total	Dose (mrem/y)	Fraction of Total
Adult	9.42E-08	2.39E-06	2.27E-06	5.77E-05	1.39E-02	3.52E-01	2.56E-02	6.48E-01
Infant	5.20E-08	1.57E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.32E-02	1.00E+00
1-yr old	7.14E-08	2.01E-06	4.20E-06	1.18E-04	2.85E-03	7.90E-02	3.32E-02	9.36E-01
5-yr old	6.10E-08	1.72E-06	3.36E-06	9.46E-05	2.28E-03	6.42E-02	3.32E-02	9.36E-01
10-yr old	5.04E-08	1.61E-06	1.75E-06	5.58E-05	3.20E-03	1.02E-01	2.81E-02	8.98E-01
15-yrold	7.50E-08	2.32E-06	2.27E-06	7.04E-05	4.17E-03	1.29E-01	2.81E-02	8.71E-01

Table 10, Recreationist Exposure Pathway Dose Breakdown

	Inhalation		Direct Soil Ingestion		Fish Ingestion		Direct (adjusted)	
Age Category	Dose (mrem/y)	Fraction of Total	Dose (mrem/y)	Fraction of Total	Dose (mrem/y)	Fraction of Total	Dose (mrem/y)	Fraction of Total
Adult	5.64E-07	5.37E-06	2.08E-05	1.98E-04	6.91E-02	6.58E-01	3.59E-02	3.42E-01
Infant	1.87E-07	4.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.67E-02	1.00E+00
1-yr old	2.57E-07	3.59E-06	3.84E-05	5.37E-04	2.48E-02	3.47E-01	4.67E-02	6.53E-01
5-yr old	2.19E-07	3.30E-06	3.07E-05	4.62E-04	1.98E-02	2.98E-01	4.67E-02	7.01E-01
10-yr old	1.81E-07	2.66E-06	1.60E-05	2.35E-04	2.85E-02	4.19E-01	3.95E-02	5.81E-01
15-yrold	2.69E-07	3.52E-06	2.08E-05	2.72E-04	3.71E-02	4.84E-01	3.95E-02	5.16E-01

7.0 Summary and Conclusions

Doses to members of the public of various age groups who could come into contact with Plum Brook sediments were calculated. Age-dependent doses were calculated for three exposure scenarios selected to illustrate the effects of age-dependent dose model parameters and to obtain a reasonable upper-bound estimate of the dose to a child. The highest calculated dose was 0.13 mrem/y per pCi/g of Cs-137 for a small child who is in direct contact with contaminated sediments for 450 hours a year. This could be achieved by a child who plays outdoors an average of 15 hours a week for 30 weeks a year in an area containing contaminated sediments. This is considered to be a bounding scenario as there are limited opportunities for prolonged contact with Plum Brook sediments. The highest calculated dose to a child is less than the highest dose to an adult, 0.17 mrem/y per pCi/g calculated in the dose assessment reported by NASA in June, 2008 [NASA 2008].

Overall, the doses from exposure to individuals from contaminated sediments are not strongly age-dependent. It is concluded that the use of an adult as the average member of the exposed critical group is reasonable for assessment of the dose and risk impact. There is no age group which receives a higher dose than adults.

Revised Dose Assessment for Plum Brook Sediments

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Appendix E

Age-Dependent Dose from Plum Brook Sediments

Attachment A

Index of RESRAD Case Run Reports

Attachment A - Index of RESRAD Case Run Reports [1]

Run Date	Case Title	Description	File Name	Result (mrem/y per pCi/g Cs-137)	
				Deterministic	Probabilistic
6/3/08	Suburban Gardener Scenario for TBD 07-005 [2]	Area of cont. zone: 186 m^2 Thickness of cont. zone: 3 in (0.076 m) Fr. time outdoors: 0.014 (123 h/y) Fr. time indoors: 0.0	03250801	4.00E-02	4.23 ± 4.10 E-02
6/3/08	Brook-side Resident Scenario for TBD 07-005 [2]	Area of cont. zone: 186 m^2 Thickness of cont. zone: 3 in (0.076 m) Fr. time outdoors: 0.009 (80 h/y) Fr. time indoors: 0.123 (1078 h/y).	06030801	1.74E-01	1.65 ± 1.70 E-01
5/6/08	Country Club Worker Scenario for TBD 07-005 [2]	Area of cont. zone: 600 m^2 Thickness of cont. zone: 3 in (0.076 m) Fr. time outdoors: 0.05 (438 h/y) Fr. time indoors: 0.0	03250803	1.03E-01	9.40 ± 10.0 E-02
6/3/08	Recreationist Scenario for TBD 07-005 [2]	Area of cont. zone: 270000 m^2 Thickness of cont. zone: 6 in (0.152 m) Fr. time outdoors: 0.012 (105 h/y) Fr. time indoors: 0.0	05140806	1.08E-01	3.77 ± 3.76 E-02
7/21/08	Suburban Gardener ICRP-72 Adult	Suburban Gardner with ICRP-72 adult DCF Library, all other parameters are the same as above.	07210801	3.945E-02	4.66 ± 4.40 E-02
7/28/08	Suburban Gardener ICRP-72 Infant	Suburban Gardner with ICRP-72 infant DCF Library. Inhalation and dietary intake parameters adjusted accordingly.	07280801	2.556E-02	2.52 ± 2.79 E-02
7/28/08	Suburban Gardener ICRP-72 one-yr old	Suburban Gardner with ICRP-72 one-yr old DCF Library. Inhalation and dietary intake parameters adjusted accordingly.	07280802	2.842E-02	2.83 ± 2.94 E-02
7/28/08	Suburban Gardener ICRP-72 5-yr old	Suburban Gardner with ICRP-72 5-yr old DCF Library. Inhalation and dietary intake parameters adjusted accordingly.	07280803	2.785E-02	2.77 ± 2.91 E-02
7/28/08	Suburban Gardener ICRP-72 10-yr old	Suburban Gardner with ICRP-72 10-yr old DCF Library. Inhalation and dietary intake parameters adjusted accordingly.	07280804	2.877E-02	2.85 ± 2.96 E-02
7/28/08	Suburban Gardener ICRP-72 15-yr old	Suburban Gardner with ICRP-72 15-yr old DCF Library. Inhalation and dietary intake parameters adjusted accordingly.	07280805	2.973E-02	2.95 ± 3.02 E-02

Attachment A Notes:

1. Attachment A includes results from RESRAD output reports for 19 case runs. Results are included for only three of the six Playground scenario age categories. The dose is the same for all age groups.
2. Results from the 2008 dose assessment report are included here. These are the starting point for the analysis of age-dependent doses.

Attachment A - Index of RESRAD Case Run Reports, Continued

Run Date	Case Title	Description	File Name	Result (mrem/y per pCi/g Cs-137)	
				Deterministic	Probabilistic
7/28/08	Recreationist ICRP-72 Adult	Recreationist with ICRP-72 adult DCF Library. All other parameters are the same as the original scenario.	07280806	1.050E-01	3.50 ± 3.43 E-02
7/28/08	Recreationist ICRP-72 Infant	Recreationist with ICRP-72 infant DCF Library. Inhalation and dietary intake parameters adjusted accordingly.	07280807	3.590E-02	3.47 ± 3.40 E-02
7/28/08	Recreationist ICRP-72 one-yr old	Recreationist with ICRP-72 one-yr old DCF Library. Inhalation and dietary intake parameters adjusted accordingly.	07280808	6.072E-02	3.79 ± 3.70 E-02
7/28/08	Recreationist ICRP-72 5-yr old	Recreationist with ICRP-72 5-yr old DCF Library. Inhalation and dietary intake parameters adjusted accordingly.	07280809	5.576E-02	3.18 ± 3.24 E-02
7/28/08	Recreationist ICRP-72 10-yr old	Recreationist with ICRP-72 10-yr old DCF Library. Inhalation and dietary intake parameters adjusted accordingly.	07280810	6.442E-02	3.23 ± 3.26 E-02
7/28/08	Recreationist ICRP-72 15-yr old	Recreationist with ICRP-72 15-yr old DCF Library. Inhalation and dietary intake parameters adjusted accordingly.	07280811	7.30E-02	3.29 ± 3.29 E-02
7/29/08	Playground ICRP-72 Adult	Playground scenario with ICRP-72 adult DCF Library. All other parameters are the same as the Maintenance Worker scenario.	07290801	1.028E-01	0.94 ± 1.0 E-01
7/29/08	Playground ICRP-72 one-yr old	Playground scenario with ICRP-72 1-yr old DCF Library. Inhalation and soil ingestion parameters are adjusted accordingly.	07290802	1.028E-01	0.94 ± 1.0 E-01
7/29/08	Playground ICRP-72 15-yr old	Playground scenario with ICRP-72 15-yr old DCF Library. Inhalation and soil ingestion parameters are adjusted accordingly.	07290805	1.028E-01	0.94 ± 1.0 E-01

Revised Dose Assessment for Plum Brook Sediments

PBRF-TBD-08-006

Appendix F

Sensitivity Analysis

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1.0 Introduction

This appendix describes the sensitivity analysis for the Plum Brook sediment dose assessment. The dose assessment calculations using RESRAD and the four principal exposure scenarios are evaluated. The first objective is to identify the RESRAD model parameters that have the most significant effect on the calculated doses. In this context "sensitivity" is defined as "the degree to which model outputs are affected by changes in input values".[1] The second objective is to obtain uncertainty estimates for calculated doses. This is accomplished using RESRAD probabilistic analysis capabilities. The most sensitive model parameters are sampled and correlation measures calculated. Corresponding output dose distributions are obtained. These include dose uncertainties and parameter sensitivity rankings. Also discussed are overall uncertainty in calculated doses and source term model assumptions.

2.0 Background and Approach

The approach to be followed is to first perform a "screening analysis" to determine the most sensitive parameters. This is accomplished in two steps. The first step is to identify the most significant pathway contributors to dose among the exposure scenarios developed for the dose assessment. This is accomplished by calculating doses from unit concentration of Cs-137 and Co-60 for each scenario using the standard parameter values developed in Appendix D of this report. Then the total scenario and pathway doses for each radionuclide are calculated using the concentrations of each radionuclide. The results are evaluated to obtain a ranking of the pathways, ranked in terms of their contribution to total scenario dose.

The second part of the screening analysis is to screen input parameters for the most dose-significant pathways. Principal parameters for each pathway in the four scenarios are identified in Appendix D. The RESRAD sensitivity analysis capability is used to perform a comprehensive screening of the input parameters for two representative exposure scenarios: the Suburban Gardner and Recreationist scenarios. They represent all the pathways considered in the dose assessment: direct exposure to ground source, ingestion of garden vegetables, ingestion of fish, inhalation of suspended dust and direct ingestion of suspended dust. Sensitivity analysis reports are generated for each parameter. Non-significant input variables or parameters are identified and eliminated from further consideration. Then, the parameters that show sensitivity effects are identified and ranked.

After the "sensitive" parameters are identified for each exposure scenario, uncertainty analysis is performed using RESRAD probabilistic analysis capabilities. Sampling distributions are selected for the sensitive parameters. Dose distributions, peak mean doses and standard deviations of the mean doses are calculated. Partial rank correlation coefficients are used to confirm the selection of sensitive parameters in the screening analysis. The resultant parameter sets and sampling distributions are then used for the RESRAD case runs in the complete dose assessment.

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[1] From EPA *Draft Guidance on the Development, Evaluation and Application of Regulatory Environmental Models* [USEPA 2003].

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4.0 Analysis

4.1 Pathway Ranking

Doses are calculated for each scenario using the RESRAD deterministic mode with the basic parameter values established in Appendix D. Unit doses (mrem/y per pCi/g) are converted to total dose (mrem/y) by multiplying by concentration of each of the two radionuclides of concern (Cs-137 and Co-60). Table 1 shows the results. The minor pathways, direct ingestion and dust inhalation have been eliminated by inspection as they are less than 0.01 % of the total dose in all scenarios. The Table 1 results are then ranked by sorting on the dose field in descending order. The pathway rankings are shown in Table 2.

The pathway ranking shows that the ground pathway (direct exposure) predominates for all scenarios for both radionuclides. The highest ranked pathway dose is direct exposure to the Brookside Resident from Cs-137. The highest ranked food pathway dose is Suburban Gardner consumption of vegetables contaminated with Cs-137, but it is less than 10% of the highest-ranked pathway dose.

Table 1, Pathway Screening Results

Scenario	Nuclide	Pathway	Unit Dose (mrem/y per pCi/g) (1)	Concentration (pCi/g) (2)	Dose (mrem/y)
Suburban Gardner	Cs-137	Ground	2.57 E-02	1.20	3.09E-02
Suburban Gardner	Cs-137	Plant	1.44 E-02	1.20	1.73E-02
Suburban Gardner	Co-60	Ground	1.03 E-01	0.13	1.34E-02
Suburban Gardner	Co-60	Plant	1.47 E-02	0.13	1.91E-03
Brookside Resident	Cs-137	Ground	2.48 E-01	0.98	2.43E-01
Brookside Resident	Co-60	Ground	1.05 E+00	0.11	1.16E-01
CC Worker	Cs-137	Ground	1.06 E-01	1.38	1.46E-01
CC Worker	Co-60	Ground	4.25 E-01	0.25	1.06E-01
Recreationist	Cs-137	Ground	3.56E-02	1.02	3.63E-02
Recreationist	Cs-137	Fish	2.89E-04	1.02	2.94E-04
Recreationist	Co-60	Ground	1.31E-01	0.23	3.02E-02
Recreationist	Co-60	Fish	9.28E-05	0.23	2.14E-05

Table 1 Notes:

1. Doses obtained using RESRAD deterministic mode results. The pathway doses listed here may not be in exact agreement with final dose calculation results as the sensitivity analysis was conducted while the dose assessment was in progress.
2. Radionuclide concentrations from PBRF TBD-08-005 [NASA 2009], Table 17 (Cs-137) and Table 18 (Co-60).

Table 2, Pathway Ranking

Scenario	Nuclide	Pathway	Dose (mrem/y)	Fraction of Maximum Dose
Brookside Res	Cs-137	Ground	2.43E-01	1.00E+00
CC Worker	Cs-137	Ground	1.46E-01	6.00E-01
Brookside Res	Co-60	Ground	1.16E-01	4.76E-01
CC Worker	Co-60	Ground	1.06E-01	4.38E-01
Recreationist	Cs-137	Ground	3.63E-02	1.49E-01
Suburban Gardner	Cs-137	Ground	3.09E-02	1.27E-01
Recreationist	Co-60	Ground	3.02E-02	1.24E-01
Suburban Gardner	Cs-137	Plant	1.73E-02	7.13E-02
Suburban Gardner	Co-60	Ground	1.34E-02	5.53E-02
Suburban Gardner	Co-60	Plant	1.91E-03	7.86E-03
Recreationist	Cs-137	Fish	2.94E-04	1.21E-03
Recreationist	Co-60	Fish	2.14E-05	8.80E-05

4.2 Parameter Screening

Two main options are available for identifying sensitive parameters, now that the most significant pathways have been identified. Sensitive input parameters may be identified by examination of the RESRAD equations or by using the RESRAD sensitivity analysis facility.

Ground exposure pathway sensitive parameters are identified by examining the RESRAD equation for direct exposure pathway dose. For a single radionuclide, it is of the form [ANL 2001]:

$D \approx S \, x \, DCF \, x \, FO \, x \, FS \, x \, FA \, x \, FC$, where: (Equation 1)

D = dose in mrem/y,

S = source activity concentration in pCi/g,

DCF = dose conversion factor (mrem per pCi/g) in volumetrically contaminated soil, from Federal Guidance Report No. 12 [USEPA 1993],

FO = a term that includes multiplicative factors for occupancy time and shielding,

FS = a dimensionless shape factor (adjusts for non-circular source shapes),

FA = a term that includes multiplicative factors for the source area, thickness and cover thickness and

FC = a depth-and-cover factor that includes terms for time-dependence of source and cover thickness due to erosion and weathering. Note this term is not a factor in the present scenarios, where the maximum dose is obtained at time, t = 0 years.

Note that the DCF and source concentration input parameters are implemented in RESARAD as fixed-constants for each radionuclide. The RESRAD code does not contain provisions for applying sensitivity or uncertainty analysis to these parameters. With this in mind, it is seen from Equation 1 that key input variable parameters include occupancy time (occupancy factor), source area and source thickness. These will be evaluated using the RESRAD sensitivity analysis facility.

Examination of the RESRAD equations does not readily lend itself for screening parameters in dose pathways involving with water transfer processes. This is due to the multiple complex transfer equations. No further attempt is made here to use the RESRAD model equations for parameter screening.

The RESRAD sensitivity analysis tools are used to confirm the results for the direct exposure pathway screening obtained above and to screen the remaining parameters. The sensitivity analysis facility calculates the effect on the total dose from variations in individual parameters, independently, one-at-a-time. The selected parameter value is varied by multiplying and dividing the base parameter value by a user selected factor (typically 1.5, 2, or 3) and the resultant doses are calculated. The RESRAD sensitivity analysis results are available only as graphics showing the dose vs. time for the base case, lower bound and upper bound values for each parameter. The RESRAD graphics reports for the screening analysis are provided in Attachment B.

The list of potentially sensitive parameters is greatly reduced through this process. The results of this screening process are shown in Table 3. The parameters shown were selected by inspection of all the RESRAD sensitivity analysis reports and those showing “significant” sensitivity were selected for further evaluation. Figure 1 is an example of a sensitivity analysis report showing a sensitive parameter, the out door time fraction for the Recreationist Scenario. Figure 2 is a report for a non-sensitive parameter, the saturated zone density for the same scenario.

The parameter screening through RESRAD sensitivity analysis is based primarily on case runs using Cs-137. It is found that for the scenarios and their key pathway parameters examined, the differences between Cs-137 and Co-60 sensitivity are slight –not enough to significantly change the rankings. To confirm this, a few test cases were run for Co-60 parameter sensitivity analysis.

Figure 1, Sensitivity Analysis Report for Sensitive Parameter

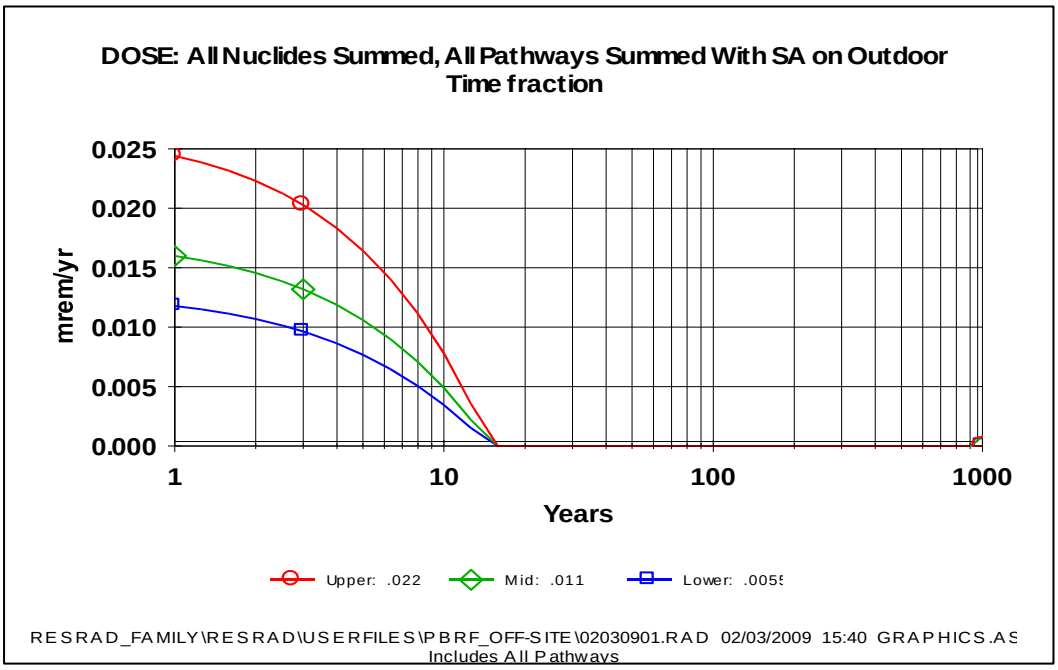
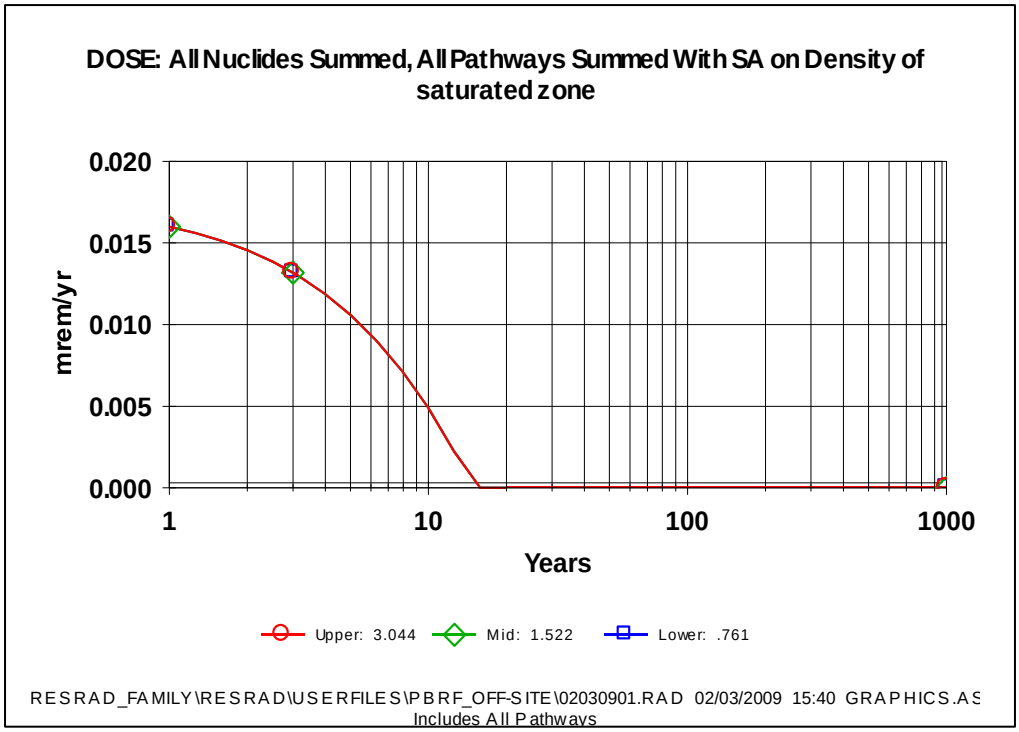


Figure 2, Sensitivity Analysis Report for Non-sensitive Parameter



The parameters identified as showing significant sensitivity are shown in Table 3. They are ranked according to a "sensitivity index" The sensitivity index is calculated for each parameter using a definition adapted from Till and Meyer [Till 1983]. The sensitivity index is defined as:

$SI = 1 - (D_{min} / D_{max})$, where: (Equation 2)

SI = Sensitivity Index (unit-less),

D_{min} = Dose calculated for parameter minimum value and

D_{max} = Dose calculated for parameter maximum value.

Table 3, Parameter Ranking by Sensitivity Index

Scenario	Parameter	D_{min} (mrem/y per pCi/g)	D_{max} (mrem/y per pCi/g)	Sensitivity Index
Suburban Gardner (1)	Contaminated Zone Thickness	2.20E-02	6.30E-02	0.65
Suburban Gardner (1)	Outdoor Time Fraction	2.70E-02	6.40E-02	0.58
Suburban Gardner (1)	Contaminated fraction Plant Food	3.25E-02	5.30E-02	0.39
Suburban Gardner (1)	Depth of Roots	3.30E-02	5.35E-02	0.38
Suburban Gardner (1)	Non-leafy Vegetable Consumption	3.30E-02	5.20E-02	0.37
Suburban Gardner (1)	Contaminated Zone Density	3.05E-02	4.70E-02	0.35
Suburban Gardner (1)	Contaminated Zone Area	3.52E-02	4.15E-02	0.15
Suburban Gardner (1)	Leafy Vegetable Consumption	3.57E-02	4.00E-02	0.11
Recreationist (2)	Outdoor Time Fraction	1.80E-02	6.95E-02	0.74
Recreationist (2)	Contaminated Zone Density	2.68E-02	3.85E-02	0.30
Recreationist (2)	Contaminated Zone Thickness	2.65E-02	3.77E-02	0.30
Recreationist (2)	Contaminated Zone Area	3.40E-02	3.66E-02	0.07
Recreationist (2)	Contaminated Zone K_d	3.50E-02	3.51E-02	0.00
Recreationist (2)	Contaminated fraction Aquatic Food	3.50E-02	3.51E-02	0.00
Recreationist (2)	Fish Consumption	3.50E-02	3.51E-02	0.00

Table 3 Notes:

1. Parameters are ranked within the Suburban Gardner parameter set.
2. Parameters are ranked within the Recreationist parameter set.

4.3 Uncertainty Analysis

The main objective of the uncertainty analysis is to establish a consistent and reasonable basis for estimation of uncertainties in the doses calculated for each scenario with RESRAD. By incorporating the parameters with the greatest sensitivity in the uncertainty analysis, the main error contributions from uncertainties in parameter values are included in the calculated doses. The parameter sets developed in Appendix D and the sampling distributions developed in this section are used in the RESRAD case runs for assessment of doses.

The uncertainty analysis was performed by using the RESRAD probabilistic capability. From the screening results listed in Table 3, a set of key-sensitive parameters was established for each scenario. Even though the Brookside Resident and Country Club Maintenance Worker scenarios were not screened directly, only the direct exposure pathway is significant for these scenarios. The RESRAD direct pathway model parameters identified as sensitive for the Suburban Gardner and Recreationist were assigned to these scenarios.

Sampling distributions to be used in the uncertainty analysis were then selected for each parameter. The following references were consulted: The RESRAD User's Manual [ANL 2001], NUREG/CR-6692 [USNRC 2000], the RESRAD Data Collection Handbook [Yu 1983] and RESRAD sample problem defaults for the Resident Farmer. For parameters where no recommended distributions were found in references, sampling distributions were assigned based on judgment. Criteria for judgment-based selection included use of distributions recommended in the references for similar parameters.[2] Tables 4 through 7 show the parameter distributions selected for each scenario.

In Tables 4 through 7, the nominal parameter values from Appendix D are listed in the second column; the sampling distributions in the third column and the sampling distribution characteristics in the fourth column. For normal distributions, the sampling distribution is completely described by the mean and standard deviation; for triangular, the minimum, mode and maximum; for uniform, the minimum and maximum (in some cases discrete uniform distributions with specified values are used); for truncated normal, the mean, standard deviation and lower and upper quantiles and for lognormal-N, the mean and standard deviation of the underlying normal distribution are specified [ANL 2001].

In column five of Tables 4 through 7, the parameters are ranked according to their relative contribution to the dose uncertainty as measured by correlation analysis of their combined effects. The selected measure, the partial rank correlation coefficient (PRCC) is one of several correlation ranking indices or measures calculated by RESRAD. It is

[2] Experience has shown that for most sensitive parameters, the sampling distribution is not usually critical as long as the range of values is within a range that is reasonable based on literature results or on actual site information. Also, the central tendency should be close to the base value used in the analysis. Exceptions to this are parameters with a very wide range of values and those that are described by highly skewed distributions. In these cases, the log-normal family of distributions tends to provide "better" results (reduced bias and variance) in probabilistic analyses.

used here because it is recommended when widely disparate scales (values) or skewed distributions of inputs and outputs are present [Kamboj 2005].

The partial rank correlation coefficients are listed in column six. Note that the parameter sensitivity rankings in Tables 4 through 7 are only slightly different than the rankings obtained by the one-at-a-time sensitivity analysis results reported in Table 3.

Table 4, Suburban Gardner Uncertainty Analysis Parameters

Parameter	Nominal Value	Sampling Distribution	Sampling Distribution Parameters	Rank (4)	PRCC (5)
Contaminated Zone Thickness (1)	0.076 m	Normal	0.076, 0.038	1 (2)	.89 (.88)
Outdoor Time Fraction (1)	0.014	Normal	0.014, 0.007	2 (1)	.84 (90)
Depth of Roots (2)	0.9 m	Uniform	min = 0.3, max = 4.0	3 (3)	-.70 (-.36)
Contaminated fraction Plant Food (3)	0.5	Triangular	0.25, 0.5, 0.75	4 (7)	.32 (.05)
Contaminated Zone Area (1)	186 m^2	Triangular	90, 186, 280	5 (4)	.30 (.32)
Non-leafy Vegetable Consumption (2)	160 kg/y	Triangular	135, 160, 318	6 (6)	.29 (.14)
Contaminated Zone Density (2)	1.552 g/cm^3	Truncated Normal	1.5, 0.23, lower quantile = 0.001, upper quantile = 0.999	7 (5)	.18 (.27)

Table 4 Notes:

1. Distribution selected on judgment basis – no recommendation or examples in cited sources.
2. Source – NUREG/CR-6692 [USNRC 2000]. Sampling distribution parameters from RESRAD example problem defaults for Resident Farmer.
3. Distribution selected on judgment basis – same distribution as recommended for aquatic food contaminated fraction in NUREG/CR-6692. Distribution parameters established as: minimum = ½ mean, mode = mean and maximum = mean + ½ mean.
4. Probabilistic uncertainty analysis significance ranking. Values in parentheses are Co-60 results.
5. Partial Rank Correlation Coefficient. Values in parentheses are Co-60 results.

Table 5, Brookside Resident Uncertainty Analysis Parameters

Parameter	Nominal Value	Sampling Distribution	Sampling Distribution Parameters	Rank (3)	PRCC (4)
Indoor Time Fraction (1)	0.125	Normal	0.125, 0.063	1 (1)	.87 (.87)
Contaminated Zone Thickness (1)	0.15 m	Normal	0.15, 0.075	2 (2)	.74 (.78)
Contaminated Zone Density (2)	1.522 g/cm^3	Truncated Normal	1.5, 0.23, lower quantile = 0.001, upper quantile = 0.999	3 (3)	.20 (.24)
Outdoor Time Fraction (1)	0.0091	Normal	0.0091, 0.005	4 (4)	.18 (.18)
Contaminated Zone Area (1)	186 m^2	Triangular	90, 186, 280	5 (5)	.13 (.13)

Table 5 Notes:

1. Distribution selected on judgment basis – no recommendation or examples in cited sources.
2. Source – NUREG/CR-6692 [USNRC 2000]. Sampling distribution parameters from RESRAD example problem defaults for Resident Farmer.
3. Probabilistic uncertainty analysis significance ranking. Values in parentheses are Co-60 results.
4. Partial Rank Correlation Coefficient. Values in parentheses are Co-60 results.

Table 6, Country Club Maintenance Worker Uncertainty Analysis Parameters

Parameter	Nominal Value	Sampling Distribution	Sampling Distribution Parameters	Rank (3)	PRCC (4)
Outdoor Time Fraction (1)	0.051	Normal	0.051, 0.025	1 (1)	.88 (.88)
Contaminated Zone Thickness (1)	0.076 m	Normal	0.076, 0.038	2 (2)	.83 (.84)
Contaminated Zone Density (2)	1.522 g/cm^3	Truncated Normal	1.5, 0.23, lower quantile = 0.001, upper quantile = 0.999	3 (3)	.23 (.23)
Contaminated Zone Area (1)	600 m^2	Triangular	300, 600, 900	4 (4)	.22 (.22)

Table 6 Notes:

1. Distribution selected on judgment basis – no recommendation or examples in cited sources.
2. Source – NUREG/CR-6692 [USNRC 2000]. Sampling distribution parameters from RESRAD example problem defaults for Resident Farmer.
3. Probabilistic uncertainty analysis significance ranking. Values in parentheses are Co-60 results.
4. Partial Rank Correlation Coefficient. Values in parentheses are Co-60 results.

Table 7, Recreationist Uncertainty Analysis Parameters

Parameter	Nominal Value	Sampling Distribution	Sampling Distribution Parameters	Rank (5)	PRCC (6)
Outdoor Time Fraction (1)	0.0125	Normal	0.0125, 0.006	1 (1)	.84 (.91)
Contaminated Zone K_d – Cs-137 (2)	4600 cm^3/g	Lognormal-N	6.1, 2.33	2	-.69
Contaminated Zone K_d – Co-60 (2)	1000 cm^3/g	Lognormal-N	5.46, 2.53	(8)	(.07)
Contaminated Zone Thickness (2)	0.15 m	Normal	0.15, 0.075	3 (2)	.67 (.78)
Fish Transfer Factor (bioaccumulation factor) for Cs (3)	2000 l/kg	Lognormal-N	7.6, 0.7	4	.32
Fish Transfer Factor (bioaccumulation factor) for Co (3)	300 l/kg	Lognormal-N	5.7, 1.1	(5)	(.18)
Fish Consumption (4)	5.4 kg/y	Triangular	2.7, 5.4, 8.1	5 (4)	.23 (.21)
Contaminated fraction Aquatic Food (2)	0.5	Triangular	0, 0.39, 1	6 (6)	.21 (.17)
Contaminated Zone Area (1)	1500 m^2	Triangular	750, 1500, 2250	7 (7)	.13 (.09)
Contaminated Zone Density (1)	1.522 g/cm^3	Truncated Normal	1.5, 0.23, lower quantile = 0.001, upper quantile = 0.999	8 (3)	.07 (.22)

Table 7 Notes:

1. Distribution selected on judgment basis – no recommendation or examples in cited sources. The area of the contaminated zone is based on an evaluation discussed in Section 4.4.
2. Source – NUREG/CR-6692 [USNRC 2000]. Sampling distribution parameter values from RESRAD sample problem showing parameter defaults for Resident Farmer.
3. Fish transfer factors were added during probabilistic uncertainty analysis. Source – NUREG/CR-6692 [USNRC 2000]. Sampling distribution parameter values from RESRAD sample problem showing parameter defaults for Resident Farmer.
4. Distribution selected on judgment basis - same distribution as recommended for vegetable consumption in NUREG/CR-6692. Distribution parameters established as: minimum = ½ the mean, mode = mean of 5.5 kg/y and maximum = mean + ½ x mean.
5. Probabilistic uncertainty analysis significance ranking. Values in parentheses are Co-60 results.
6. Partial Rank Correlation Coefficient. Values in parentheses are Co-60 results.

4.4 Discussion

Additional sensitivity analysis topics are discussed. The previous section focuses on the effects of parameter uncertainties in the doses calculated with RESRAD. Other important contributors to the uncertainty in calculated doses are uncertainties in:

- Radionuclides of concern in environmental media and their concentrations
- Dose to individuals from exposure to external radiation and from intakes, i.e., dose conversion factors
- Environmental transport models implemented in codes such as RESRAD [Kocher 2005].

The effects of uncertainties in radionuclide concentrations and in dose conversion factors are not included in the parameter set available for probabilistic analysis in RESRAD. These are treated as fixed constants. It is estimated that uncertainties in these parameters are associated with uncertainty factors of between two and 10 [Kocher 2005].[3] Model uncertainty arises from simplifying assumptions required for practical implementation of environmental assessment codes. In codes like RESRAD, sources are modeled as simple volumes of uniform contamination concentration. The environmental transport of radionuclides in environmental media is modeled assuming compartments of uniform characteristics with constant rate transfer processes. Considering the sources of uncertainty listed above, and others that are not captured in the probabilistic analysis, it is difficult to quantify the total uncertainty in the calculated doses. It is concluded that the magnitude of the uncertainty in the calculated doses is underestimated. The average of the doses for the four exposure scenarios is calculated (estimated) to be less than 1 mrem/y (0.88 ± 0.22). Given the many conservative assumptions used in the present dose assessment, this is considered to be an upper bound estimated dose. It is a factor of 28 below the target dose criterion, 25 mrem/y. Hence, the effect of the total (but unknown) uncertainty is small relative to the dose acceptance level. Uncertainties of an order of magnitude above those estimated here would still place the upper 95% confidence limit of the calculated dose below 25 mrem/y.

The characterization report has shown that contaminated sediment deposits are not continuous along the Plum Brook. They are described as low level concentrations of about 1 pCi/g or less scattered throughout the impacted length of Plum Brook with infrequent discrete deposits with concentrations as high as 72 pCi/g [NASA 2009]. It is common practice in dose assessments to model source terms as two or more volumes of uniform activity. The principal source term is typically modeled as a contaminated zone of area up to 10,000 square meters [4]. The effect of small-areas of elevated activity is typically modeled by defining small area contaminated zones of up to 100 m^2, also of uniform activity concentration. These are used to calculate “area factors” for final status

[3] Uncertainty factors represent the ratio of 95th to 50th percentiles of credible values [Kocher 2005].

[4] The RESRAD default area for the generic Resident Farmer scenario is 10,000 m^2 [ANL 1993].

survey purposes, for example. This approach is used to simulate non-uniform horizontal distribution of contaminants.

In the present study, multiple-layer sources are used to simulate non-uniform vertical distribution of contamination in sediments. Depending on the scenario, the principal contaminated zone and localized small areas of elevated activity are modeled with up to three discrete layers. Calculated Cs-137 doses obtained from single volume source term models are compared with those from multi-layer models for the Brookside Resident and Maintenance Worker scenarios. Tables 8 and 9 compare Brookside Resident contaminated zone source term models. Examination of column two of the tables shows that there is essentially no difference in the dose from unit concentration: 2.68 ± 1.30 E-01 mrem/y per pCi/g for the three-layer model vs. 2.59 ± 1.29 E-01 mrem/y per pCi/g for the single layer model. When the effect of source term activity concentrations is considered, the single layer source term yields a higher dose than the three-layer source term model: 3.76 ± 3.25 E-01 vs. 2.80 ± 3.38 E-01 mrem/y.

Table 8, Calculated Cs-137 Dose for Three-Layer Contaminated Zone - Brookside Resident

Source Term Model Component	RESRAD Dose (mrem/y per pCi/g)	Uncertainty (mrem/y per pCi/g)	Source Term Concentration (pCi/g)	Uncertainty (pCi/g)	Scenario Dose (mrem/y)	Uncertainty (mrem/y)
Cont Zone layer 1; 6 in	2.21E-01	1.21E-01	9.80E-01	1.31E+00	2.17E-01	3.13E-01
Cont Zone layer 2; 9 in	3.19E-02	1.69E-02	1.42E+00	3.19E+00	4.53E-02	1.05E-01
Cont Zone layer 3; 9 in	1.51E-02	4.56E-02	1.20E+00	3.39E+00	1.81E-02	7.49E-02
Total	2.68E-01	1.30E-01			2.80E-01	3.38E-01

Table 9, Calculated Cs-137 Dose for Single Layer Contaminated Zone - Brookside Resident

Contaminated zone modeled as 24 in. single layer	RESRAD Dose (mrem/y per pCi/g)	Uncertainty (mrem/y per pCi/g)	Source Term Concentration (pCi/g)	Uncertainty (pCi/g)	Scenario Dose (mrem/y)	Uncertainty (mrem/y)
Source Term Concentration as Thickness-weighted Mean	2.59E-01	1.29E-01	1.45E+00	1.03E+00	3.76E-01	3.25E-01
Source Term Concentration as Arithmetic Mean	2.59E-01	1.29E-01	1.20E+00	2.20E-01	3.11E-01	1.65E-01

Doses from Cs-137 for alternate elevated activity source term models are compared using CC Maintenance Worker scenario results. The comparison is shown in Tables 10 and 11. Column two of the tables shows that there is a small difference in the dose from unit concentration: 8.85 ± 5.57 E-02 mrem/y per pCi/g for the three-layer model vs. 1.02 ± 0.54 E-01 mrem/y per pCi/g for the 30 in. thick single layer model. When the effect of source term activity concentrations is considered, the three-layer source term yields a

slightly higher dose than the single layer source term model: 9.37 ± 5.76 E-01 vs. 6.0 ± 5.32 E-01 mrem/y. It is noted that the observed differences between doses from multi-layer and single layer source term models are not statistically significant.

Table 10, Calculated Cs-137 Dose for Three-Layer Contaminated Zone – CC Maintenance Worker

Source Term Model Component	RESRAD Dose (mrem/y per pCi/g)	Uncertainty (mrem/y per pCi/g)	Source Term Concentration (pCi/g)	Uncertainty (pCi/g)	Scenario Dose (mrem/y)	Uncertainty (mrem/y)
Elev local Area layer 1; 6 in	5.62E-02	3.87E-02	1.42E+01	8.90E-01	7.98E-01	5.52E-01
Elev local Area layer 2; 12 in	2.53E-02	3.14E-02	4.70E+00	5.10E-01	1.19E-01	1.48E-01
Elev local Area layer 3; 12 in	6.97E-03	2.48E-02	2.90E+00	3.45E-01	2.02E-02	7.20E-02
Total	8.85E-02	5.57E-02			9.37E-01	5.76E-01

Table 11, Calculated Cs-137 Dose for Single Layer Contaminated Zone – CC Maintenance Worker

Contaminated zone modeled as 30 in. single layer	RESRAD Dose (mrem/y per pCi/g)	Uncertainty (mrem/y per pCi/g)	Source Term Concentration (pCi/g)	Uncertainty (pCi/g)	Scenario Dose (mrem/y)	Uncertainty (mrem/y)
Source Term Concentration as Thickness-weighted Mean	1.02E-01	5.42E-02	5.88E+00	1.75E-01	6.00E-01	5.32E-01
Source Term Concentration as Arithmetic Mean	1.02E-01	5.42E-02	7.27E+00	2.79E-01	7.41E-01	5.33E-01

Dose contribution vs. depth is examined for the multi-layer source term models. Table 12 shows dose fractions (in %) vs. layer depth for the two scenarios. These are calculated from the scenario doses (mrem/y) with the specified activity concentrations for each layer included. The surface layer of both source term models contribute over 80 % of the dose on average. The first and second layers combined contribute about 95 % of the dose.

Table 12, Fraction of Dose vs. Depth for Multi-layer Source Term Models

Brookside Resident Principal Contaminated Zone Source Term Model		CC Maintenance Worker Elevated Activity Source Term Model	
Component	% of Total dose	Component	% of Total dose
Cont Zone layer 1; 6 in	77.5	Elev local Area layer 1; 6 in	85.2
Cont Zone layer 2; 9 in	16.1	Elev local Area layer 2; 12 in	12.7
Cont Zone layer 3; 9 in	6.4	Elev local Area layer 3; 12 in	2.2

It is concluded from this brief evaluation that there are tradeoffs against the extra level of effort required to develop and implement complex source term models in RESRAD. It requires that the knowledge of contaminant distribution be commensurate with the level of "refinement" used to model source terms. Based on the examples discussed here it is not clear that detailed source term models improve the accuracy of calculated doses. However, they do promote better understanding of the relative contributions from subsurface layers of contaminated sediments and from local areas of elevated concentration.

The sensitivity analysis also examines the size of the contaminated zone source term used in the Recreationist scenario. No values of this parameter are available in NRC reference scenarios, for example in NUREG/CR-5512 [USNRC 2001] as for the other scenarios. The value for this parameter was selected considering observations from the characterization survey packages for the Plum Brook stream mouth and the Cs-137 inventory contained in contaminated zone source terms. The observation that contaminated sediments are found in lens shaped deposits in the Plum Brook estuary and are of dimensions on the order of 10s of meters is inferred from a review of characterization survey packages [NASA 2009]. The size of the contaminated zone is assumed to be 1500 m^2, modeled as a cylinder of radius 22 (21.85) meters.

As a check on the reasonableness of this assumption, the Cs-137 inventories for contaminated zones within sizes of this range were calculated. The results are shown in Table 13. It is noted that the entire Cs-137 inventory released to the Plum Brook was estimated to be between 5 and 7.2 mCi. [Crooks 2006]. Using the upper end of this range and considering that 36 years have elapsed since 1973, the total remaining inventory is estimated to be no more than 3.15 mCi. This supports the conclusion that a contaminated zone area of 1500 m^2 is a quite conservative assumption. A source term model consisting of a contaminated zone area of 1500 m^2 and an elevated area of 28 m^2 contains 55% of the total Plum Brook inventory of Cs-137 of PBRF origin.

Table 13, Cs-137 Inventory vs. Contaminated Zone Area for Recreationist Scenario

Area (m^2)	Volume (cm^3) (1)	Inventory (mCi) (2)
750	5.84 E+08	1.15
1500	1.15 E+09	1.73
2250	1.71 E+09	2.30

Table 13 Notes:

1. The source volume is comprised of three layers: the first layer is six inches thick and the underlying layers are each 12 inches thick. The total source volume includes an elevated area source of 3 meters radius and 30 inches thickness.
2. The inventories are calculated assuming an average concentration of 1 pCi/g, 0.8 pCi/g and 0.4 pCi/g in the first, second and third layers of the contaminated zone and 18 pCi/g in the elevated area source [NASA 2009].

Revised Dose Assessment for Plum Brook Sediments

PBRF-TBD-08-006

Appendix F

Sensitivity Analysis

Attachment A

RESRAD Case Run Reports

Index of RESRAD Sensitivity Analysis Dose Calculation Case Run Reports

Run Date	Scenario	Description/Title	Page Nos.	Total Pages	File Name	Total dose (mrem)
1/28/09	Suburban Gardner	Unit Cs-137 Sensitivity Analysis Base Case	1-9	9	01280901	4.017 E-02 (deterministic)
1/28/09	Suburban Gardner	Unit Co-60 Sensitivity Analysis Base Case	1-9	9	01280902	1.179 E-01 (deterministic)
1/28/09	Brookside Resident	Unit Cs-137 Sensitivity Analysis Base Case	1-9	9	01280903	2.478 E-01 (deterministic)
1/28/09	Brookside Resident	Unit Co-60 Sensitivity Analysis Base Case	1-9	9	01280904	1.051 E+00 (deterministic)
1/28/09	CC Worker	Unit Cs-137 Sensitivity Analysis Base Case	1-9	9	01280905	1.056 E-01 (deterministic)
1/28/09	CC Worker	Unit Co-60 Sensitivity Analysis Base Case	1-9	9	01280906	4.251 E-01 (deterministic)
2/10/09	Recreationist	Unit Cs-137 Sensitivity Analysis Base Case	1-8	8	02030901	3.586 E-02 (deterministic)
2/10/09	Recreationist	Unit Co-60 Sensitivity Analysis Base Case	1-8	8	02030902	1.508 E-01 (deterministic)
2/4/09	Suburban Gardner	Unit Cs-137 Uncertainty Analysis Base Case	Part I: 1-9, Part VI:1,2,3,5,8,18,23	16	02040901	3.59 ± 2.30 E-02 (probabilistic)
2/4/09	Suburban Gardner	Unit Co-60 Uncertainty Analysis Base Case	Part I: 1-9, Part VI:1,2,3,5,8,18,23	16	02040902	1.09 ± 0.68 E-01 (probabilistic)
2/4/09 (2/9/09)	Brookside Resident	Unit Cs-137 Uncertainty Analysis Base Case	Part I: 1-9, Part VI:1,2,3,5,18,23	15	02040903	2.17 ± 1.20 E-01 (probabilistic)
2/4/09	Brookside Resident	Unit Co-60 Uncertainty Analysis Base Case	Part I: 1-9, Part VI:1,2,3,5,18,23	15	02040904	9.20 ± 5.21 E-01 (probabilistic)

Index of RESRAD Sensitivity Analysis Dose Calculation Case Run Reports

Run Date	Scenario	Description/Title	Page Nos.	Total Pages	File Name	Total dose (mrem)
2/4/09 (25/09)	CC Worker	Unit Cs-137 Uncertainty Analysis Base Case	Part I: 1-9, Part VI:1,2,3,5,18,23	15	02050901	9.78 ± 6.20 E-02 (probabilistic)
2/4/09 (25/09)	CC Worker	Unit Co-60 Uncertainty Analysis Base Case	Part I: 1-9, Part VI:1,2,3,5,18,23	15	02050902	3.97 ± 2.57 E-01 (probabilistic)
2/10/09	Recreationist	Unit Cs-137 Uncertainty Analysis Base Case	Part I: 1-9, Part VI:1,2,3,5,13,18,23	16	02050903	5.71 ± 7.77 E-02 (probabilistic)
2/10/09	Recreationist	Unit Co-60 Uncertainty Analysis Base Case	Part I: 1-9, Part VI:1,2,3,5,13,18,23	16	02050904	1.31 ± 0.80 E-01 (probabilistic)
3/5/09	Brookside Resident	Effect of Modeling Contaminated Zone as Single Layer Source	Part I: 1-8, Part VI:1,2,3, 23	12	03050901	2.95 ± 1.29 E-01 (probabilistic)
3/5/09	CC Worker	Effect of Modeling Elevated Area as Single Layer Source	Part I: 1-8, Part VI:1,2,3, 23	12	03050902	1.02 ± 0.54 E-01 (probabilistic)

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.860E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	7.600E-02	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.930E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.810E+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)	1.522E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.500E-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)	2.700E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	5.000E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	8.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	3.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.522E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.500E-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	7.120E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	1.000E+03	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.543E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.400E-02	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)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	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	5.000E-01	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	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)	not used	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)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	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	not used	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	not used	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)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	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)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

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 dose	17	---	---	LYMAX
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	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	186.00 square meters	Cs-137	1.000E+00
Thickness:	0.08 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	4.017E-02	3.882E-02	3.623E-02	0.000E+00
M(t):	1.607E-03	1.553E-03	1.449E-03	0.000E+00

Maximum TDOSE(t): 4.017E-02 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	2.574E-02	0.6408	2.082E-08	0.0000	0.000E+00	0.0000	1.443E-02	0.3592	0.000E+00	0.0000	0.000E+00	0.0000	1.185E-06	0.0000
Total	2.574E-02	0.6408	2.082E-08	0.0000	0.000E+00	0.0000	1.443E-02	0.3592	0.000E+00	0.0000	0.000E+00	0.0000	1.185E-06	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	4.017E-02	1.0000
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	4.017E-02	1.0000

*Sum of all water independent and dependent pathways.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.860E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	7.600E-02	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.930E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.810E+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)	1.522E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.500E-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)	2.700E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	5.000E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	8.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	3.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.522E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.500E-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	7.120E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.096E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.400E-02	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)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	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	5.000E-01	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	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)	not used	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)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	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	not used	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	not used	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)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	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)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

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 dose	17	---	---	LYMAX
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	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	186.00 square meters	Co-60	1.000E+00
Thickness:	0.08 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.179E-01	1.017E-01	7.568E-02	0.000E+00
M(t):	4.715E-03	4.068E-03	3.027E-03	0.000E+00

Maximum TDOSE(t): 1.179E-01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.032E-01	0.8755	1.352E-07	0.0000	0.000E+00	0.0000	1.468E-02	0.1245	0.000E+00	0.0000	0.000E+00	0.0000	6.026E-07	0.0000
Total	1.032E-01	0.8755	1.352E-07	0.0000	0.000E+00	0.0000	1.468E-02	0.1245	0.000E+00	0.0000	0.000E+00	0.0000	6.026E-07	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	1.179E-01	1.0000
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	1.179E-01	1.0000

*Sum of all water independent and dependent pathways.

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Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.860E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.520E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.714E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	1.250E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	9.100E-03	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	186.00 square meters	Cs-137	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	2.478E-01	2.415E-01	2.292E-01	0.000E+00
M(t):	9.911E-03	9.661E-03	9.167E-03	0.000E+00

Maximum TDOSE(t): 2.478E-01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	2.477E-01	0.9999	1.747E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.255E-05	0.0001
Total	2.477E-01	0.9999	1.747E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.255E-05	0.0001

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	2.478E-01	1.0000
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	2.478E-01	1.0000

*Sum of all water independent and dependent pathways.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.860E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.520E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.548E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	1.250E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	9.100E-03	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	186.00 square meters	Co-60	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.051E+00	9.159E-01	6.950E-01	0.000E+00
M(t):	4.202E-02	3.663E-02	2.780E-02	0.000E+00

Maximum TDOSE(t): 1.051E+00 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.050E+00	1.0000	1.135E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.149E-05	0.0000
Total	1.050E+00	1.0000	1.135E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.149E-05	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	1.051E+00	1.0000
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	1.051E+00	1.0000

*Sum of all water independent and dependent pathways.

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Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	6.000E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	7.600E-02	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.543E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	5.100E-02	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

RESRAD, Version 6.4 T½ Limit = 180 days 01/28/2009 16:34 Page 8
Summary : Country Club Worker for TBD 08-006 unit Cs-137 Sensitivity Analysis Base case
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280905.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	600.00 square meters	Cs-137	1.000E+00
Thickness:	0.08 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.056E-01	1.023E-01	9.597E-02	0.000E+00
M(t):	4.223E-03	4.091E-03	3.839E-03	0.000E+00

Maximum TDOSE(t): 1.056E-01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	1.056E-01	0.9999	1.431E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.392E-05	0.0001
Total	1.056E-01	0.9999	1.431E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.392E-05	0.0001

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	1.056E-01	1.0000
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	1.056E-01	1.0000

*Sum of all water independent and dependent pathways.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	6.000E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	7.600E-02	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.096E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	5.100E-02	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	600.00 square meters	Co-60	1.000E+00
Thickness:	0.08 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	4.251E-01	3.672E-01	2.739E-01	0.000E+00
M(t):	1.700E-02	1.469E-02	1.096E-02	0.000E+00

Maximum TDOSE(t): 4.251E-01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	4.250E-01	1.0000	9.289E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.081E-06	0.0000
Total	4.250E-01	1.0000	9.289E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.081E-06	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	4.251E-01	1.0000
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	4.251E-01	1.0000

*Sum of all water independent and dependent pathways.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.500E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	4.400E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	2.850E+05	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)	1.522E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.500E-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)	2.700E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	5.000E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	8.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	MB	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.817E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.250E-02	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)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	0.000E+00	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	active
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	1500.00 square meters	Cs-137	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	3.586E-02	3.496E-02	3.319E-02	0.000E+00
M(t):	1.434E-03	1.398E-03	1.328E-03	0.000E+00

Maximum TDOSE(t): 3.586E-02 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	3.556E-02	0.9916	7.649E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.126E-05	0.0003
Total	3.556E-02	0.9916	7.649E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.126E-05	0.0003

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	0.000E+00	0.0000	2.887E-04	0.0081	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.586E-02	1.0000
Total	0.000E+00	0.0000	2.887E-04	0.0081	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.586E-02	1.0000

*Sum of all water independent and dependent pathways.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.500E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	4.400E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	2.850E+05	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)	1.522E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.500E-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)	2.700E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	5.000E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	8.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	MB	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.595E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.250E-02	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)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	0.000E+00	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	active
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	1500.00 square meters	Co-60	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.508E-01	1.314E-01	9.980E-02	0.000E+00
M(t):	6.032E-03	5.257E-03	3.992E-03	0.000E+00

Maximum TDOSE(t): 1.508E-01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.507E-01	0.9993	4.971E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.737E-06	0.0000
Total	1.507E-01	0.9993	4.971E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.737E-06	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	1.012E-04	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.508E-01	1.0000
Total	0.000E+00	0.0000	1.012E-04	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.508E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.313E-01	0.9993	4.314E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.979E-06	0.0000
Total	1.313E-01	0.9993	4.314E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.979E-06	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	9.283E-05	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.314E-01	1.0000
Total	0.000E+00	0.0000	9.283E-05	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.314E-01	1.0000

*Sum of all water independent and dependent pathways.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.860E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	7.600E-02	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.930E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.810E+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)	1.522E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.500E-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)	2.700E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	5.000E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	8.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	3.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.522E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.500E-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	7.120E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	1.000E+03	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.543E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.400E-02	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)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	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	5.000E-01	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	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)	not used	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)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	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	not used	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	not used	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)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	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)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

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 dose	17	---	---	LYMAX
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	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	186.00 square meters	Cs-137	1.000E+00
Thickness:	0.08 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	4.017E-02	3.882E-02	3.623E-02	0.000E+00
M(t):	1.607E-03	1.553E-03	1.449E-03	0.000E+00

Maximum TDOSE(t): 4.017E-02 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	2.574E-02	0.6408	2.082E-08	0.0000	0.000E+00	0.0000	1.443E-02	0.3592	0.000E+00	0.0000	0.000E+00	0.0000	1.185E-06	0.0000
Total	2.574E-02	0.6408	2.082E-08	0.0000	0.000E+00	0.0000	1.443E-02	0.3592	0.000E+00	0.0000	0.000E+00	0.0000	1.185E-06	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	4.017E-02	1.0000
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	4.017E-02	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.014	.007		
2	AREA	TRIANGULAR	90	186	280	
3	THICK0	NORMAL	.076	.038		
4	DIET(1)	TRIANGULAR	135	160	318	
5	DROOT	UNIFORM	.3	4		
6	FPLANT	TRIANGULAR	.25	.5	.75	
7	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.49E-01	1.49E-01	1.44E-01	1.36E-01	0.00E+00
Avg	0.00E+00	3.59E-02	3.59E-02	3.47E-02	3.23E-02	0.00E+00
Std	0.00E+00	2.30E-02	2.30E-02	2.24E-02	2.12E-02	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.49E-01	1.49E-01	1.44E-01	1.36E-01	0.00E+00
Avg	0.00E+00	3.59E-02	3.59E-02	3.47E-02	3.23E-02	0.00E+00
Std	0.00E+00	2.30E-02	2.30E-02	2.24E-02	2.12E-02	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	7.23E-02	7.04E-02	6.66E-02	0.00E+00
Avg	2.40E-02	2.32E-02	2.17E-02	0.00E+00
Std	1.53E-02	1.49E-02	1.42E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	7.23E-02	7.04E-02	6.66E-02	0.00E+00
Avg	2.40E-02	2.32E-02	2.17E-02	0.00E+00
Std	1.53E-02	1.49E-02	1.42E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

RESRAD, Version 6.4 T½ Limit = 180 days 02/09/2009 12:17 Page 8
Probabilistic results summary : Suburban Gardner for TBD 08-006 unit Cs-137 Uncertainty AnalFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02040901.RAD

Probabilistic Dose vs Pathway(i): Plant (Water Ind.)

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.09E-01	1.06E-01	9.96E-02	0.00E+00
Avg	1.19E-02	1.15E-02	1.06E-02	0.00E+00
Std	1.46E-02	1.42E-02	1.33E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.09E-01	1.06E-01	9.96E-02	0.00E+00
Avg	1.19E-02	1.15E-02	1.06E-02	0.00E+00
Std	1.46E-02	1.42E-02	1.33E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	6.53E-04	5.92E-05	0.00E+00	0.00E+00
0.050	4.37E-03	4.20E-03	3.88E-03	0.00E+00
0.075	8.00E-03	7.45E-03	5.82E-03	0.00E+00
0.100	9.97E-03	9.37E-03	8.16E-03	0.00E+00
0.125	1.25E-02	1.15E-02	1.07E-02	0.00E+00
0.150	1.38E-02	1.33E-02	1.19E-02	0.00E+00
0.175	1.57E-02	1.50E-02	1.33E-02	0.00E+00
0.200	1.68E-02	1.61E-02	1.47E-02	0.00E+00
0.225	1.74E-02	1.68E-02	1.54E-02	0.00E+00
0.250	1.84E-02	1.78E-02	1.65E-02	0.00E+00
0.275	2.00E-02	1.92E-02	1.76E-02	0.00E+00
0.300	2.14E-02	2.07E-02	1.90E-02	0.00E+00
0.325	2.40E-02	2.31E-02	2.15E-02	0.00E+00
0.350	2.51E-02	2.40E-02	2.24E-02	0.00E+00
0.375	2.60E-02	2.52E-02	2.35E-02	0.00E+00
0.400	2.83E-02	2.72E-02	2.53E-02	0.00E+00
0.425	2.98E-02	2.86E-02	2.67E-02	0.00E+00
0.450	3.09E-02	2.96E-02	2.75E-02	0.00E+00
0.475	3.19E-02	3.08E-02	2.87E-02	0.00E+00
0.500	3.27E-02	3.16E-02	2.94E-02	0.00E+00
0.525	3.37E-02	3.27E-02	3.04E-02	0.00E+00
0.550	3.52E-02	3.41E-02	3.19E-02	0.00E+00
0.575	3.64E-02	3.51E-02	3.29E-02	0.00E+00
0.600	3.72E-02	3.61E-02	3.38E-02	0.00E+00
0.625	3.89E-02	3.77E-02	3.56E-02	0.00E+00
0.650	4.08E-02	3.95E-02	3.71E-02	0.00E+00
0.675	4.27E-02	4.13E-02	3.86E-02	0.00E+00
0.700	4.50E-02	4.35E-02	4.08E-02	0.00E+00
0.725	4.59E-02	4.45E-02	4.19E-02	0.00E+00
0.750	4.70E-02	4.56E-02	4.28E-02	0.00E+00
0.775	4.84E-02	4.69E-02	4.39E-02	0.00E+00
0.800	5.08E-02	4.92E-02	4.61E-02	0.00E+00
0.825	5.56E-02	5.39E-02	5.09E-02	0.00E+00
0.850	5.86E-02	5.70E-02	5.35E-02	0.00E+00
0.875	6.30E-02	6.10E-02	5.75E-02	0.00E+00
0.900	6.62E-02	6.44E-02	6.00E-02	0.00E+00
0.925	6.96E-02	6.76E-02	6.38E-02	0.00E+00
0.950	7.95E-02	7.70E-02	7.16E-02	0.00E+00
0.975	8.85E-02	8.56E-02	8.00E-02	0.00E+00
1.000	1.49E-01	1.44E-01	1.36E-01	0.00E+00

RESRAD Regression and Correlation output 02/09/09 12:17 Page: Coef 1
Title : Suburban Gardner for TBD 08-006 unit Cs-137 Uncertainty Analysis Base Case
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02040901.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	2	0.77	2	0.47	2	0.84	2	0.53
Area of contaminated zone	7	0.15	7	0.06	5	0.30	5	0.11
Thickness of contaminated zone	1	0.86	1	0.67	1	0.89	1	0.68
Fruit, vegetable, and grain consumption	5	0.24	5	0.10	6	0.29	6	0.10
Depth of roots	3	-0.69	3	-0.38	3	-0.70	3	-0.34
Plant food	4	0.27	4	0.11	4	0.32	4	0.12
Density of contaminated zone	6	0.18	6	0.07	7	0.18	7	0.06
R-SQUARE		0.84		0.84		0.88		0.88

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.860E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	7.600E-02	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.930E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.810E+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)	1.522E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.500E-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)	2.700E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	5.000E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	8.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	3.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.522E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.500E-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	7.120E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.096E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.400E-02	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)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	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	5.000E-01	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	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)	not used	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)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	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	not used	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	not used	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)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	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)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

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 dose	17	---	---	LYMAX
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	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	186.00 square meters	Co-60	1.000E+00
Thickness:	0.08 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.179E-01	1.017E-01	7.568E-02	0.000E+00
M(t):	4.715E-03	4.068E-03	3.027E-03	0.000E+00

Maximum TDOSE(t): 1.179E-01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.032E-01	0.8755	1.352E-07	0.0000	0.000E+00	0.0000	1.468E-02	0.1245	0.000E+00	0.0000	0.000E+00	0.0000	6.026E-07	0.0000
Total	1.032E-01	0.8755	1.352E-07	0.0000	0.000E+00	0.0000	1.468E-02	0.1245	0.000E+00	0.0000	0.000E+00	0.0000	6.026E-07	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	1.179E-01	1.0000
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	1.179E-01	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.014	.007		
2	AREA	TRIANGULAR	90	186	280	
3	THICK0	NORMAL	.076	.038		
4	DIET(1)	TRIANGULAR	135	160	318	
5	DROOT	UNIFORM	.3	4		
6	FPLANT	TRIANGULAR	.25	.5	.75	
7	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Co-60						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	3.10E-01	3.10E-01	2.70E-01	2.04E-01	0.00E+00
Avg	0.00E+00	1.09E-01	1.09E-01	9.44E-02	7.01E-02	0.00E+00
Std	0.00E+00	6.78E-02	6.78E-02	5.91E-02	4.49E-02	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	3.10E-01	3.10E-01	2.70E-01	2.04E-01	0.00E+00
Avg	0.00E+00	1.09E-01	1.09E-01	9.44E-02	7.01E-02	0.00E+00
Std	0.00E+00	6.78E-02	6.78E-02	5.91E-02	4.49E-02	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	3.03E-01	2.64E-01	1.99E-01	0.00E+00
Avg	9.74E-02	8.40E-02	6.24E-02	0.00E+00
Std	6.34E-02	5.53E-02	4.19E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	3.03E-01	2.64E-01	1.99E-01	0.00E+00
Avg	9.74E-02	8.40E-02	6.24E-02	0.00E+00
Std	6.34E-02	5.53E-02	4.19E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Plant (Water Ind.)

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.11E-01	9.65E-02	7.24E-02	0.00E+00
Avg	1.21E-02	1.04E-02	7.71E-03	0.00E+00
Std	1.49E-02	1.29E-02	9.66E-03	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.11E-01	9.65E-02	7.24E-02	0.00E+00
Avg	1.21E-02	1.04E-02	7.71E-03	0.00E+00
Std	1.49E-02	1.29E-02	9.66E-03	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
	Dose(t), mrem/yr			
0.025	1.75E-03	1.17E-04	0.00E+00	0.00E+00
0.050	1.21E-02	8.91E-03	4.46E-03	0.00E+00
0.075	1.92E-02	1.59E-02	1.08E-02	0.00E+00
0.100	2.69E-02	2.14E-02	1.56E-02	0.00E+00
0.125	3.29E-02	2.85E-02	1.88E-02	0.00E+00
0.150	3.88E-02	3.36E-02	2.45E-02	0.00E+00
0.175	4.59E-02	3.91E-02	2.75E-02	0.00E+00
0.200	4.81E-02	4.12E-02	2.85E-02	0.00E+00
0.225	5.15E-02	4.35E-02	3.19E-02	0.00E+00
0.250	5.46E-02	4.69E-02	3.37E-02	0.00E+00
0.275	5.66E-02	4.89E-02	3.67E-02	0.00E+00
0.300	6.38E-02	5.41E-02	3.97E-02	0.00E+00
0.325	6.82E-02	5.80E-02	4.28E-02	0.00E+00
0.350	7.76E-02	6.62E-02	4.79E-02	0.00E+00
0.375	8.04E-02	6.89E-02	5.11E-02	0.00E+00
0.400	8.53E-02	7.32E-02	5.33E-02	0.00E+00
0.425	9.15E-02	7.89E-02	5.90E-02	0.00E+00
0.450	9.78E-02	8.43E-02	6.19E-02	0.00E+00
0.475	1.03E-01	8.70E-02	6.41E-02	0.00E+00
0.500	1.07E-01	9.22E-02	6.80E-02	0.00E+00
0.525	1.10E-01	9.47E-02	7.02E-02	0.00E+00
0.550	1.13E-01	9.70E-02	7.17E-02	0.00E+00
0.575	1.16E-01	1.00E-01	7.44E-02	0.00E+00
0.600	1.18E-01	1.02E-01	7.70E-02	0.00E+00
0.625	1.24E-01	1.06E-01	7.94E-02	0.00E+00
0.650	1.31E-01	1.13E-01	8.36E-02	0.00E+00
0.675	1.33E-01	1.15E-01	8.56E-02	0.00E+00
0.700	1.36E-01	1.18E-01	8.79E-02	0.00E+00
0.725	1.44E-01	1.24E-01	9.27E-02	0.00E+00
0.750	1.49E-01	1.28E-01	9.57E-02	0.00E+00
0.775	1.53E-01	1.32E-01	9.87E-02	0.00E+00
0.800	1.64E-01	1.41E-01	1.05E-01	0.00E+00
0.825	1.72E-01	1.49E-01	1.12E-01	0.00E+00
0.850	1.81E-01	1.57E-01	1.17E-01	0.00E+00
0.875	1.92E-01	1.67E-01	1.25E-01	0.00E+00
0.900	2.03E-01	1.76E-01	1.33E-01	0.00E+00
0.925	2.17E-01	1.88E-01	1.41E-01	0.00E+00
0.950	2.43E-01	2.11E-01	1.59E-01	0.00E+00
0.975	2.75E-01	2.39E-01	1.81E-01	0.00E+00
1.000	3.10E-01	2.70E-01	2.04E-01	0.00E+00

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	1	0.93	1	0.69	1	0.90	1	0.69
Area of contaminated zone	5	0.26	5	0.08	4	0.32	4	0.11
Thickness of contaminated zone	2	0.92	2	0.64	2	0.88	2	0.62
Fruit, vegetable, and grain consumption	6	0.12	6	0.03	6	0.14	6	0.05
Depth of roots	4	-0.40	4	-0.12	3	-0.36	3	-0.13
Plant food	7	0.05	7	0.01	7	0.05	7	0.02
Density of contaminated zone	3	0.40	3	0.12	5	0.27	5	0.09
R-SQUARE		0.92		0.92		0.89		0.89

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.860E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.520E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

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)	1.860E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.520E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.714E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	1.250E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	9.100E-03	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

RESRAD, Version 6.4 T½ Limit = 180 days 02/04/2009 20:04 Page 8
Summary : Brookside Resident for TBD 08-006 unit Cs-137 Uncertainty Analysis Base case
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02040903.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	186.00 square meters	Cs-137	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	2.478E-01	2.415E-01	2.292E-01	0.000E+00
M(t):	9.911E-03	9.661E-03	9.167E-03	0.000E+00

Maximum TDOSE(t): 2.478E-01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	2.477E-01	0.9999	1.747E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.255E-05	0.0001
Total	2.477E-01	0.9999	1.747E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.255E-05	0.0001

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	2.478E-01	1.0000
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	2.478E-01	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0091	.005		
2	AREA	TRIANGULAR	90	186	280	
3	THICK0	NORMAL	.15	.075		
4	FIND	NORMAL	.125	.063		
5	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	5.54E-01	5.54E-01	5.41E-01	5.15E-01	0.00E+00
Avg	0.00E+00	2.17E-01	2.17E-01	2.11E-01	2.00E-01	0.00E+00
Std	0.00E+00	1.20E-01	1.20E-01	1.17E-01	1.12E-01	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	5.54E-01	5.54E-01	5.41E-01	5.15E-01	0.00E+00
Avg	0.00E+00	2.17E-01	2.17E-01	2.11E-01	2.00E-01	0.00E+00
Std	0.00E+00	1.20E-01	1.20E-01	1.17E-01	1.12E-01	0.00E+00

∑ALL is total dose summed for all nuclides.

RESRAD, Version 6.4 T½ Limit = 180 days 02/04/2009 20:04 Page 5
Probabilistic results summary : Brookside Resident for TBD 08-006 unit Cs-137 U-
ncertainty AnFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02040903.RAD

Probabilistic Dose vs Pathway(i): Ground External

Nuclide	DOSE(i,j,t), mrem/yr			
(j)	t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	5.54E-01	5.41E-01	5.15E-01	0.00E+00
Avg	2.17E-01	2.11E-01	2.00E-01	0.00E+00
Std	1.20E-01	1.17E-01	1.12E-01	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	5.54E-01	5.41E-01	5.15E-01	0.00E+00
Avg	2.17E-01	2.11E-01	2.00E-01	0.00E+00
Std	1.20E-01	1.17E-01	1.12E-01	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	1.68E-02	1.64E-02	1.54E-02	0.00E+00
0.075	3.90E-02	3.72E-02	3.44E-02	0.00E+00
0.100	5.26E-02	4.93E-02	4.44E-02	0.00E+00
0.125	7.36E-02	7.12E-02	6.65E-02	0.00E+00
0.150	8.45E-02	8.08E-02	7.27E-02	0.00E+00
0.175	9.75E-02	9.34E-02	8.85E-02	0.00E+00
0.200	1.07E-01	1.04E-01	9.74E-02	0.00E+00
0.225	1.19E-01	1.16E-01	1.08E-01	0.00E+00
0.250	1.30E-01	1.25E-01	1.17E-01	0.00E+00
0.275	1.37E-01	1.32E-01	1.25E-01	0.00E+00
0.300	1.49E-01	1.44E-01	1.37E-01	0.00E+00
0.325	1.56E-01	1.52E-01	1.44E-01	0.00E+00
0.350	1.69E-01	1.64E-01	1.56E-01	0.00E+00
0.375	1.78E-01	1.72E-01	1.61E-01	0.00E+00
0.400	1.81E-01	1.76E-01	1.67E-01	0.00E+00
0.425	1.94E-01	1.88E-01	1.78E-01	0.00E+00
0.450	2.08E-01	2.02E-01	1.91E-01	0.00E+00
0.475	2.13E-01	2.07E-01	1.96E-01	0.00E+00
0.500	2.21E-01	2.15E-01	2.03E-01	0.00E+00
0.525	2.26E-01	2.20E-01	2.08E-01	0.00E+00
0.550	2.30E-01	2.24E-01	2.12E-01	0.00E+00
0.575	2.41E-01	2.34E-01	2.19E-01	0.00E+00
0.600	2.44E-01	2.37E-01	2.24E-01	0.00E+00
0.625	2.53E-01	2.46E-01	2.32E-01	0.00E+00
0.650	2.58E-01	2.51E-01	2.38E-01	0.00E+00
0.675	2.68E-01	2.59E-01	2.46E-01	0.00E+00
0.700	2.80E-01	2.72E-01	2.54E-01	0.00E+00
0.725	2.93E-01	2.84E-01	2.69E-01	0.00E+00
0.750	2.96E-01	2.89E-01	2.73E-01	0.00E+00
0.775	3.06E-01	2.98E-01	2.83E-01	0.00E+00
0.800	3.18E-01	3.11E-01	2.95E-01	0.00E+00
0.825	3.26E-01	3.19E-01	3.04E-01	0.00E+00
0.850	3.32E-01	3.24E-01	3.08E-01	0.00E+00
0.875	3.47E-01	3.39E-01	3.23E-01	0.00E+00
0.900	3.63E-01	3.53E-01	3.35E-01	0.00E+00
0.925	3.91E-01	3.82E-01	3.64E-01	0.00E+00
0.950	4.26E-01	4.16E-01	3.97E-01	0.00E+00
0.975	4.73E-01	4.62E-01	4.40E-01	0.00E+00
1.000	5.54E-01	5.41E-01	5.15E-01	0.00E+00

RESRAD Regression and Correlation output 02/04/09 20:04 Page: Coef 1
Title : Brookside Resident for TBD 08-006 unit Cs-137 Uncertainty Analysis Base case
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02040903.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	3	0.23	3	0.09	4	0.18	4	0.08
Area of contaminated zone	4	0.17	4	0.07	5	0.13	5	0.06
Thickness of contaminated zone	2	0.80	2	0.52	2	0.74	2	0.47
Indoor time fraction	1	0.89	1	0.76	1	0.87	1	0.75
Density of contaminated zone	5	0.16	5	0.06	3	0.20	3	0.09
R-SQUARE		0.85		0.85		0.82		0.82

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.

*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.860E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.520E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.548E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	1.250E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	9.100E-03	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	186.00 square meters	Co-60	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.051E+00	9.159E-01	6.950E-01	0.000E+00
M(t):	4.202E-02	3.663E-02	2.780E-02	0.000E+00

Maximum TDOSE(t): 1.051E+00 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.050E+00	1.0000	1.135E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.149E-05	0.0000
Total	1.050E+00	1.0000	1.135E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.149E-05	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	1.051E+00	1.0000
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	1.051E+00	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0091	.005		
2	AREA	TRIANGULAR	90	186	280	
3	THICK0	NORMAL	.15	.075		
4	FIND	NORMAL	.125	.063		
5	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Co-60						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	2.41E+00	2.41E+00	2.10E+00	1.61E+00	0.00E+00
Avg	0.00E+00	9.20E-01	9.20E-01	8.00E-01	6.06E-01	0.00E+00
Std	0.00E+00	5.21E-01	5.21E-01	4.56E-01	3.50E-01	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	2.41E+00	2.41E+00	2.10E+00	1.61E+00	0.00E+00
Avg	0.00E+00	9.20E-01	9.20E-01	8.00E-01	6.06E-01	0.00E+00
Std	0.00E+00	5.21E-01	5.21E-01	4.56E-01	3.50E-01	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.41E+00	2.10E+00	1.61E+00	0.00E+00
Avg	9.20E-01	8.00E-01	6.06E-01	0.00E+00
Std	5.21E-01	4.56E-01	3.50E-01	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.41E+00	2.10E+00	1.61E+00	0.00E+00
Avg	9.20E-01	8.00E-01	6.06E-01	0.00E+00
Std	5.21E-01	4.56E-01	3.50E-01	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	6.92E-02	6.00E-02	4.52E-02	0.00E+00
0.075	1.59E-01	1.38E-01	9.57E-02	0.00E+00
0.100	2.05E-01	1.75E-01	1.31E-01	0.00E+00
0.125	3.05E-01	2.65E-01	1.96E-01	0.00E+00
0.150	3.38E-01	2.96E-01	2.19E-01	0.00E+00
0.175	4.11E-01	3.49E-01	2.59E-01	0.00E+00
0.200	4.40E-01	3.84E-01	2.90E-01	0.00E+00
0.225	4.90E-01	4.25E-01	3.18E-01	0.00E+00
0.250	5.38E-01	4.70E-01	3.50E-01	0.00E+00
0.275	5.75E-01	5.02E-01	3.78E-01	0.00E+00
0.300	6.17E-01	5.32E-01	3.97E-01	0.00E+00
0.325	6.65E-01	5.82E-01	4.34E-01	0.00E+00
0.350	7.04E-01	6.14E-01	4.68E-01	0.00E+00
0.375	7.30E-01	6.35E-01	4.81E-01	0.00E+00
0.400	7.67E-01	6.68E-01	5.03E-01	0.00E+00
0.425	8.05E-01	6.99E-01	5.28E-01	0.00E+00
0.450	8.70E-01	7.61E-01	5.69E-01	0.00E+00
0.475	9.00E-01	7.84E-01	5.93E-01	0.00E+00
0.500	9.27E-01	8.00E-01	6.07E-01	0.00E+00
0.525	9.60E-01	8.34E-01	6.26E-01	0.00E+00
0.550	9.72E-01	8.49E-01	6.38E-01	0.00E+00
0.575	1.00E+00	8.74E-01	6.63E-01	0.00E+00
0.600	1.03E+00	8.90E-01	6.72E-01	0.00E+00
0.625	1.05E+00	9.15E-01	6.93E-01	0.00E+00
0.650	1.09E+00	9.51E-01	7.23E-01	0.00E+00
0.675	1.12E+00	9.78E-01	7.47E-01	0.00E+00
0.700	1.17E+00	1.02E+00	7.74E-01	0.00E+00
0.725	1.21E+00	1.05E+00	7.91E-01	0.00E+00
0.750	1.26E+00	1.10E+00	8.36E-01	0.00E+00
0.775	1.31E+00	1.14E+00	8.70E-01	0.00E+00
0.800	1.35E+00	1.17E+00	8.88E-01	0.00E+00
0.825	1.41E+00	1.23E+00	9.38E-01	0.00E+00
0.850	1.45E+00	1.26E+00	9.59E-01	0.00E+00
0.875	1.49E+00	1.30E+00	9.90E-01	0.00E+00
0.900	1.54E+00	1.35E+00	1.03E+00	0.00E+00
0.925	1.70E+00	1.48E+00	1.12E+00	0.00E+00
0.950	1.86E+00	1.63E+00	1.24E+00	0.00E+00
0.975	2.04E+00	1.78E+00	1.36E+00	0.00E+00
1.000	2.41E+00	2.10E+00	1.61E+00	0.00E+00

RESRAD Regression and Correlation output 02/04/09 20:23 Page: Coef 1
Title : Brookside Resident for TBD 08-006 unit Co-60 Uncertainty Analysis Base case
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02040904.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	3	0.24	3	0.09	4	0.18	4	0.08
Area of contaminated zone	5	0.15	5	0.06	5	0.14	5	0.06
Thickness of contaminated zone	2	0.83	2	0.56	2	0.78	2	0.52
Indoor time fraction	1	0.89	1	0.73	1	0.87	1	0.73
Density of contaminated zone	4	0.20	4	0.08	3	0.24	3	0.10
R-SQUARE		0.86		0.86		0.83		0.83

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	6.000E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	7.600E-02	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.543E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	5.100E-02	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

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Summary : Country Club Worker for TBD 08-006 unit Cs-137 Uncertainty Analysis Base case
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02050901.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	600.00 square meters	Cs-137	1.000E+00
Thickness:	0.08 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.056E-01	1.023E-01	9.597E-02	0.000E+00
M(t):	4.223E-03	4.091E-03	3.839E-03	0.000E+00

Maximum TDOSE(t): 1.056E-01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	1.056E-01	0.9999	1.431E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.392E-05	0.0001
Total	1.056E-01	0.9999	1.431E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.392E-05	0.0001

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	1.056E-01	1.0000
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	1.056E-01	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.051	.025		
2	AREA	TRIANGULAR	300	600	900	
3	THICK0	NORMAL	.076	.038		
4	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	3.30E-01	3.30E-01	3.21E-01	3.05E-01	0.00E+00
Avg	0.00E+00	9.78E-02	9.78E-02	9.46E-02	8.85E-02	0.00E+00
Std	0.00E+00	6.20E-02	6.20E-02	6.04E-02	5.74E-02	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	3.30E-01	3.30E-01	3.21E-01	3.05E-01	0.00E+00
Avg	0.00E+00	9.78E-02	9.78E-02	9.46E-02	8.85E-02	0.00E+00
Std	0.00E+00	6.20E-02	6.20E-02	6.04E-02	5.74E-02	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic results summary : Country Club Worker for TBD 08-006 unit Cs-137
Uncertainty AFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02050901.RAD

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	3.30E-01	3.21E-01	3.05E-01	0.00E+00
Avg	9.78E-02	9.46E-02	8.85E-02	0.00E+00
Std	6.20E-02	6.04E-02	5.74E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	3.30E-01	3.21E-01	3.05E-01	0.00E+00
Avg	9.78E-02	9.46E-02	8.85E-02	0.00E+00
Std	6.20E-02	6.04E-02	5.74E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Probabilistic results summary : Country Club Worker for TBD 08-006 unit Cs-137
Uncertainty AFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02050901.RAD
Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	1.20E-03	2.20E-04	0.00E+00	0.00E+00
0.075	1.19E-02	1.07E-02	8.54E-03	0.00E+00
0.100	2.06E-02	1.90E-02	1.64E-02	0.00E+00
0.125	2.61E-02	2.46E-02	2.14E-02	0.00E+00
0.150	3.00E-02	2.85E-02	2.40E-02	0.00E+00
0.175	3.64E-02	3.46E-02	3.09E-02	0.00E+00
0.200	3.97E-02	3.81E-02	3.49E-02	0.00E+00
0.225	4.68E-02	4.50E-02	4.14E-02	0.00E+00
0.250	5.30E-02	5.14E-02	4.73E-02	0.00E+00
0.275	5.64E-02	5.37E-02	4.93E-02	0.00E+00
0.300	5.84E-02	5.62E-02	5.31E-02	0.00E+00
0.325	6.39E-02	6.16E-02	5.72E-02	0.00E+00
0.350	6.99E-02	6.68E-02	6.11E-02	0.00E+00
0.375	7.26E-02	7.03E-02	6.50E-02	0.00E+00
0.400	7.68E-02	7.44E-02	6.95E-02	0.00E+00
0.425	8.11E-02	7.86E-02	7.32E-02	0.00E+00
0.450	8.68E-02	8.40E-02	7.86E-02	0.00E+00
0.475	8.89E-02	8.57E-02	8.02E-02	0.00E+00
0.500	9.12E-02	8.84E-02	8.33E-02	0.00E+00
0.525	9.61E-02	9.29E-02	8.62E-02	0.00E+00
0.550	1.02E-01	9.86E-02	9.26E-02	0.00E+00
0.575	1.06E-01	1.03E-01	9.65E-02	0.00E+00
0.600	1.09E-01	1.06E-01	9.91E-02	0.00E+00
0.625	1.15E-01	1.11E-01	1.04E-01	0.00E+00
0.650	1.20E-01	1.16E-01	1.10E-01	0.00E+00
0.675	1.22E-01	1.19E-01	1.12E-01	0.00E+00
0.700	1.28E-01	1.24E-01	1.16E-01	0.00E+00
0.725	1.30E-01	1.27E-01	1.19E-01	0.00E+00
0.750	1.38E-01	1.33E-01	1.24E-01	0.00E+00
0.775	1.42E-01	1.37E-01	1.29E-01	0.00E+00
0.800	1.46E-01	1.41E-01	1.33E-01	0.00E+00
0.825	1.52E-01	1.47E-01	1.38E-01	0.00E+00
0.850	1.59E-01	1.54E-01	1.45E-01	0.00E+00
0.875	1.71E-01	1.65E-01	1.54E-01	0.00E+00
0.900	1.84E-01	1.79E-01	1.68E-01	0.00E+00
0.925	1.91E-01	1.86E-01	1.76E-01	0.00E+00
0.950	2.06E-01	2.00E-01	1.89E-01	0.00E+00
0.975	2.39E-01	2.33E-01	2.21E-01	0.00E+00
1.000	3.30E-01	3.21E-01	3.05E-01	0.00E+00

Title : Country Club Worker for TBD 08-006 unit Cs-137 Uncertainty Analysis Base case

Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02050901.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	1	0.91	1	0.73	1	0.88	1	0.71
Area of contaminated zone	4	0.21	4	0.07	4	0.22	4	0.09
Thickness of contaminated zone	2	0.86	2	0.59	2	0.83	2	0.57
Density of contaminated zone	3	0.31	3	0.11	3	0.23	3	0.09
R-SQUARE		0.88		0.88		0.85		0.85

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	6.000E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	7.600E-02	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.096E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	5.100E-02	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	600.00 square meters	Co-60	1.000E+00
Thickness:	0.08 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	4.251E-01	3.672E-01	2.739E-01	0.000E+00
M(t):	1.700E-02	1.469E-02	1.096E-02	0.000E+00

Maximum TDOSE(t): 4.251E-01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	4.250E-01	1.0000	9.289E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.081E-06	0.0000
Total	4.250E-01	1.0000	9.289E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.081E-06	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	4.251E-01	1.0000
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	4.251E-01	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.051	.025		
2	AREA	TRIANGULAR	300	600	900	
3	THICK0	NORMAL	.076	.038		
4	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Co-60						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.39E+00	1.39E+00	1.21E+00	9.19E-01	0.00E+00
Avg	0.00E+00	3.97E-01	3.97E-01	3.43E-01	2.55E-01	0.00E+00
Std	0.00E+00	2.57E-01	2.57E-01	2.24E-01	1.70E-01	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	1.39E+00	1.39E+00	1.21E+00	9.19E-01	0.00E+00
Avg	0.00E+00	3.97E-01	3.97E-01	3.43E-01	2.55E-01	0.00E+00
Std	0.00E+00	2.57E-01	2.57E-01	2.24E-01	1.70E-01	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.39E+00	1.21E+00	9.19E-01	0.00E+00
Avg	3.97E-01	3.43E-01	2.55E-01	0.00E+00
Std	2.57E-01	2.24E-01	1.70E-01	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.39E+00	1.21E+00	9.19E-01	0.00E+00
Avg	3.97E-01	3.43E-01	2.55E-01	0.00E+00
Std	2.57E-01	2.24E-01	1.70E-01	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.050	4.42E-03	7.89E-04	0.00E+00	0.00E+00
0.075	4.65E-02	3.60E-02	2.18E-02	0.00E+00
0.100	8.29E-02	6.48E-02	4.30E-02	0.00E+00
0.125	1.02E-01	8.60E-02	5.70E-02	0.00E+00
0.150	1.19E-01	9.61E-02	6.84E-02	0.00E+00
0.175	1.43E-01	1.20E-01	8.22E-02	0.00E+00
0.200	1.59E-01	1.38E-01	9.77E-02	0.00E+00
0.225	1.85E-01	1.59E-01	1.16E-01	0.00E+00
0.250	2.15E-01	1.83E-01	1.30E-01	0.00E+00
0.275	2.24E-01	1.89E-01	1.39E-01	0.00E+00
0.300	2.36E-01	2.04E-01	1.49E-01	0.00E+00
0.325	2.55E-01	2.21E-01	1.61E-01	0.00E+00
0.350	2.75E-01	2.36E-01	1.74E-01	0.00E+00
0.375	2.91E-01	2.50E-01	1.79E-01	0.00E+00
0.400	3.10E-01	2.68E-01	1.96E-01	0.00E+00
0.425	3.27E-01	2.84E-01	2.12E-01	0.00E+00
0.450	3.46E-01	2.99E-01	2.22E-01	0.00E+00
0.475	3.56E-01	3.06E-01	2.29E-01	0.00E+00
0.500	3.72E-01	3.21E-01	2.38E-01	0.00E+00
0.525	3.84E-01	3.30E-01	2.46E-01	0.00E+00
0.550	4.10E-01	3.49E-01	2.53E-01	0.00E+00
0.575	4.29E-01	3.72E-01	2.77E-01	0.00E+00
0.600	4.46E-01	3.84E-01	2.87E-01	0.00E+00
0.625	4.63E-01	3.99E-01	2.97E-01	0.00E+00
0.650	4.86E-01	4.19E-01	3.11E-01	0.00E+00
0.675	5.00E-01	4.33E-01	3.26E-01	0.00E+00
0.700	5.19E-01	4.51E-01	3.36E-01	0.00E+00
0.725	5.33E-01	4.60E-01	3.42E-01	0.00E+00
0.750	5.52E-01	4.73E-01	3.50E-01	0.00E+00
0.775	5.75E-01	4.97E-01	3.74E-01	0.00E+00
0.800	5.95E-01	5.12E-01	3.83E-01	0.00E+00
0.825	6.15E-01	5.31E-01	3.97E-01	0.00E+00
0.850	6.52E-01	5.65E-01	4.24E-01	0.00E+00
0.875	6.77E-01	5.88E-01	4.43E-01	0.00E+00
0.900	7.46E-01	6.47E-01	4.89E-01	0.00E+00
0.925	7.94E-01	6.90E-01	5.21E-01	0.00E+00
0.950	8.55E-01	7.45E-01	5.65E-01	0.00E+00
0.975	9.82E-01	8.50E-01	6.41E-01	0.00E+00
1.000	1.39E+00	1.21E+00	9.19E-01	0.00E+00

RESRAD Regression and Correlation output 02/05/09 08:17 Page: Coef 1
Title : Country Club Worker for TBD 08-006 unit Co-60 Uncertainty Analysis Base case
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02050902.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	1	0.91	1	0.72	1	0.88	1	0.70
Area of contaminated zone	4	0.21	4	0.07	4	0.22	4	0.09
Thickness of contaminated zone	2	0.88	2	0.61	2	0.84	2	0.59
Density of contaminated zone	3	0.34	3	0.12	3	0.23	3	0.09
R-SQUARE		0.89		0.89		0.86		0.86

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.500E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	4.400E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	2.850E+05	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)	1.522E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.500E-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)	2.700E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	5.000E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	8.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	MB	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.817E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.250E-02	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)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	0.000E+00	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	active
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

RESRAD, Version 6.4 T½ Limit = 180 days 02/10/2009 19:54 Page 7
Summary : Recreationist for TBD 08-006 unit Cs-137 Uncertainty Analysis Base case
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02050903.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	1500.00 square meters	Cs-137	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	3.586E-02	3.496E-02	3.319E-02	0.000E+00
M(t):	1.434E-03	1.398E-03	1.328E-03	0.000E+00

Maximum TDOSE(t): 3.586E-02 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	3.556E-02	0.9916	7.649E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.126E-05	0.0003
Total	3.556E-02	0.9916	7.649E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.126E-05	0.0003

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Cs-137	0.000E+00	0.0000	2.887E-04	0.0081	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.586E-02	1.0000
Total	0.000E+00	0.0000	2.887E-04	0.0081	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.586E-02	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0125	.006		
2	AREA	TRIANGULAR	750	1500	2250	
3	THICK0	NORMAL	.15	.075		
4	BBIO(55,1)	LOGNORMAL-N	7.6	.7		
5	DCACTC(1)	LOGNORMAL-N	6.1	2.33		
6	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999
7	DIET(5)	TRIANGULAR	2.7	5.4	8.1	
8	FR9	TRIANGULAR	0	.39	1	

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	DOSE(j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.18E-01	6.25E-01	6.25E-01	3.74E-01	2.64E-01	0.00E+00
Avg	1.97E-03	5.71E-02	5.71E-02	4.43E-02	3.49E-02	0.00E+00
Std	1.51E-02	7.77E-02	7.77E-02	4.22E-02	2.69E-02	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.18E-01	6.25E-01	6.25E-01	3.74E-01	2.64E-01	0.00E+00
Avg	1.97E-03	5.71E-02	5.71E-02	4.43E-02	3.49E-02	0.00E+00
Std	1.51E-02	7.77E-02	7.77E-02	4.22E-02	2.69E-02	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	8.54E-02	8.08E-02	7.23E-02	0.00E+00
Avg	3.09E-02	2.87E-02	2.57E-02	0.00E+00
Std	1.78E-02	1.76E-02	1.70E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	8.54E-02	8.08E-02	7.23E-02	0.00E+00
Avg	3.09E-02	2.87E-02	2.57E-02	0.00E+00
Std	1.78E-02	1.76E-02	1.70E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Fish Ingestion

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	6.14E-01	3.67E-01	2.25E-01	0.00E+00
Avg	2.62E-02	1.56E-02	9.20E-03	0.00E+00
Std	7.81E-02	4.04E-02	2.23E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	6.14E-01	3.67E-01	2.25E-01	0.00E+00
Avg	2.62E-02	1.56E-02	9.20E-03	0.00E+00
Std	7.81E-02	4.04E-02	2.23E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	1.95E-04	2.26E-05	1.19E-09	0.00E+00
0.050	7.64E-03	6.23E-03	5.14E-04	0.00E+00
0.075	9.72E-03	7.90E-03	6.34E-03	0.00E+00
0.100	1.25E-02	1.05E-02	7.98E-03	0.00E+00
0.125	1.51E-02	1.28E-02	1.02E-02	0.00E+00
0.150	1.71E-02	1.53E-02	1.21E-02	0.00E+00
0.175	1.88E-02	1.76E-02	1.38E-02	0.00E+00
0.200	2.03E-02	1.83E-02	1.59E-02	0.00E+00
0.225	2.29E-02	2.10E-02	1.70E-02	0.00E+00
0.250	2.39E-02	2.24E-02	1.86E-02	0.00E+00
0.275	2.53E-02	2.40E-02	2.04E-02	0.00E+00
0.300	2.62E-02	2.48E-02	2.19E-02	0.00E+00
0.325	2.78E-02	2.64E-02	2.34E-02	0.00E+00
0.350	2.96E-02	2.77E-02	2.46E-02	0.00E+00
0.375	3.25E-02	3.05E-02	2.52E-02	0.00E+00
0.400	3.46E-02	3.18E-02	2.66E-02	0.00E+00
0.425	3.57E-02	3.38E-02	2.96E-02	0.00E+00
0.450	3.69E-02	3.47E-02	3.00E-02	0.00E+00
0.475	3.85E-02	3.56E-02	3.16E-02	0.00E+00
0.500	3.99E-02	3.73E-02	3.25E-02	0.00E+00
0.525	4.13E-02	3.84E-02	3.39E-02	0.00E+00
0.550	4.32E-02	4.03E-02	3.47E-02	0.00E+00
0.575	4.41E-02	4.16E-02	3.62E-02	0.00E+00
0.600	4.52E-02	4.26E-02	3.77E-02	0.00E+00
0.625	4.75E-02	4.38E-02	3.86E-02	0.00E+00
0.650	5.00E-02	4.63E-02	4.07E-02	0.00E+00
0.675	5.17E-02	4.75E-02	4.15E-02	0.00E+00
0.700	5.42E-02	4.98E-02	4.21E-02	0.00E+00
0.725	5.66E-02	5.26E-02	4.39E-02	0.00E+00
0.750	5.80E-02	5.46E-02	4.56E-02	0.00E+00
0.775	5.99E-02	5.64E-02	4.73E-02	0.00E+00
0.800	6.12E-02	5.75E-02	4.94E-02	0.00E+00
0.825	6.51E-02	5.96E-02	5.18E-02	0.00E+00
0.850	7.02E-02	6.25E-02	5.35E-02	0.00E+00
0.875	7.80E-02	6.42E-02	5.52E-02	0.00E+00
0.900	9.31E-02	7.25E-02	5.77E-02	0.00E+00
0.925	1.15E-01	8.40E-02	6.03E-02	0.00E+00
0.950	1.79E-01	1.05E-01	7.06E-02	0.00E+00
0.975	3.35E-01	1.52E-01	8.88E-02	0.00E+00
1.000	6.25E-01	3.74E-01	2.64E-01	0.00E+00

RESRAD Regression and Correlation output 02/10/09 19:54 Page: Coef 1
Title : Recreationist for TBD 08-006 unit Cs-137 Uncertainty Analysis Base case
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02050903.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	1	0.33	1	0.31	1	0.84	1	0.67
Area of contaminated zone	8	0.05	8	0.05	7	0.13	7	0.06
Thickness of contaminated zone	3	0.21	3	0.19	3	0.67	3	0.39
Fish transfer factor for Cs	2	0.23	2	0.21	4	0.32	4	0.15
Kd of Cs-137 in Contaminated Zone	4	-0.15	4	-0.14	2	-0.69	2	-0.41
Density of contaminated zone	5	0.13	5	0.12	8	0.07	8	0.03
Fish consumption	7	0.09	7	0.08	5	0.23	5	0.10
Aquatic food	6	0.12	6	0.11	6	0.21	6	0.09
R-SQUARE		0.21		0.21		0.82		0.82

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Co-60 (Source: FGR 12)	1.622E+01	1.622E+01	DCF1(1)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Co-60	2.190E-04	2.190E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-60	2.690E-05	2.690E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(1,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(1,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.500E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	4.400E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Co-60	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	2.850E+05	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)	1.522E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.500E-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)	2.700E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	5.000E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	8.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	MB	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCC(1)
R016	Saturated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.595E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.250E-02	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)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	0.000E+00	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	active
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	1500.00 square meters	Co-60	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.508E-01	1.314E-01	9.980E-02	0.000E+00
M(t):	6.032E-03	5.257E-03	3.992E-03	0.000E+00

Maximum TDOSE(t): 1.508E-01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	1.507E-01	0.9993	4.971E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.737E-06	0.0000
Total	1.507E-01	0.9993	4.971E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.737E-06	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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Co-60	0.000E+00	0.0000	1.012E-04	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.508E-01	1.0000
Total	0.000E+00	0.0000	1.012E-04	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.508E-01	1.0000

*Sum of all water independent and dependent pathways.

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0125	.006		
2	AREA	TRIANGULAR	750	1500	2250	
3	THICK0	NORMAL	.15	.075		
4	DCACTC(1)	LOGNORMAL-N	5.46	2.53		
5	BBIO(27,1)	LOGNORMAL-N	5.7	1.1		
6	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999
7	DIET(5)	TRIANGULAR	2.7	5.4	8.1	
8	FR9	TRIANGULAR	0	.39	1	

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	DOSE(j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	3.99E-01	3.99E-01	3.14E-01	2.34E-01	0.00E+00
Avg	0.00E+00	1.31E-01	1.31E-01	1.06E-01	7.38E-02	0.00E+00
Std	0.00E+00	7.79E-02	7.79E-02	7.00E-02	5.33E-02	0.00E+00
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	3.99E-01	3.99E-01	3.14E-01	2.34E-01	0.00E+00
Avg	0.00E+00	1.31E-01	1.31E-01	1.06E-01	7.38E-02	0.00E+00
Std	0.00E+00	7.79E-02	7.79E-02	7.00E-02	5.33E-02	0.00E+00

∑ALL is total dose summed for all nuclides.

Probabilistic results summary : Recreationist for TBD 08-006 unit Co-60 Uncertainty AnalysisFile: C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02050904.RAD

Probabilistic Dose vs Pathway(i): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	3.73E-01	3.13E-01	2.34E-01	0.00E+00
Avg	1.27E-01	1.03E-01	7.28E-02	0.00E+00
Std	7.77E-02	6.94E-02	5.32E-02	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	3.73E-01	3.13E-01	2.34E-01	0.00E+00
Avg	1.27E-01	1.03E-01	7.28E-02	0.00E+00
Std	7.77E-02	6.94E-02	5.32E-02	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Fish Ingestion

Nuclide (j)	DOSE(i,j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Co-60				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.47E-01	1.89E-01	9.77E-02	0.00E+00
Avg	3.95E-03	2.07E-03	1.01E-03	0.00E+00
Std	1.70E-02	1.14E-02	5.75E-03	0.00E+00
∑ALL				
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.47E-01	1.89E-01	9.77E-02	0.00E+00
Avg	3.95E-03	2.07E-03	1.01E-03	0.00E+00
Std	1.70E-02	1.14E-02	5.75E-03	0.00E+00

∑ALL is total pathway dose summed for all nuclides.

Cumulative Probability Summary for: Total Dose Over Pathways

Cumulative Probability	Dose(t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
0.025	4.29E-05	4.09E-07	1.06E-17	0.00E+00
0.050	1.11E-02	3.57E-04	2.65E-06	0.00E+00
0.075	2.50E-02	3.60E-03	1.40E-04	0.00E+00
0.100	3.31E-02	9.62E-03	1.12E-03	0.00E+00
0.125	4.04E-02	1.31E-02	5.54E-03	0.00E+00
0.150	4.34E-02	2.78E-02	7.49E-03	0.00E+00
0.175	4.98E-02	3.33E-02	1.58E-02	0.00E+00
0.200	5.74E-02	3.66E-02	1.95E-02	0.00E+00
0.225	6.42E-02	4.23E-02	2.46E-02	0.00E+00
0.250	7.23E-02	4.72E-02	3.03E-02	0.00E+00
0.275	7.81E-02	5.69E-02	3.50E-02	0.00E+00
0.300	8.45E-02	6.30E-02	3.98E-02	0.00E+00
0.325	8.88E-02	6.85E-02	4.39E-02	0.00E+00
0.350	9.81E-02	7.21E-02	4.82E-02	0.00E+00
0.375	1.02E-01	7.78E-02	5.03E-02	0.00E+00
0.400	1.05E-01	8.52E-02	5.36E-02	0.00E+00
0.425	1.09E-01	8.84E-02	6.04E-02	0.00E+00
0.450	1.14E-01	9.33E-02	6.41E-02	0.00E+00
0.475	1.18E-01	9.84E-02	6.92E-02	0.00E+00
0.500	1.22E-01	1.02E-01	7.23E-02	0.00E+00
0.525	1.29E-01	1.04E-01	7.50E-02	0.00E+00
0.550	1.37E-01	1.08E-01	7.65E-02	0.00E+00
0.575	1.41E-01	1.15E-01	7.89E-02	0.00E+00
0.600	1.48E-01	1.21E-01	8.39E-02	0.00E+00
0.625	1.54E-01	1.24E-01	8.99E-02	0.00E+00
0.650	1.57E-01	1.32E-01	9.32E-02	0.00E+00
0.675	1.62E-01	1.36E-01	9.77E-02	0.00E+00
0.700	1.70E-01	1.39E-01	1.02E-01	0.00E+00
0.725	1.75E-01	1.48E-01	1.06E-01	0.00E+00
0.750	1.85E-01	1.53E-01	1.10E-01	0.00E+00
0.775	1.91E-01	1.62E-01	1.16E-01	0.00E+00
0.800	1.98E-01	1.67E-01	1.21E-01	0.00E+00
0.825	2.09E-01	1.75E-01	1.26E-01	0.00E+00
0.850	2.20E-01	1.81E-01	1.30E-01	0.00E+00
0.875	2.27E-01	1.88E-01	1.37E-01	0.00E+00
0.900	2.34E-01	2.01E-01	1.50E-01	0.00E+00
0.925	2.48E-01	2.11E-01	1.55E-01	0.00E+00
0.950	2.64E-01	2.29E-01	1.67E-01	0.00E+00
0.975	2.82E-01	2.46E-01	1.86E-01	0.00E+00
1.000	3.99E-01	3.14E-01	2.34E-01	0.00E+00

Title : Recreationist for TBD 08-006 unit Co-60 Uncertainty Analysis Base case
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02050904.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	1	0.89	1	0.75	1	0.91	1	0.79
Area of contaminated zone	7	0.07	7	0.03	7	0.09	7	0.03
Thickness of contaminated zone	2	0.78	2	0.48	2	0.78	2	0.45
Kd of Co-60 in Contaminated Zone	8	-0.03	8	-0.01	8	0.07	8	0.03
Fish transfer factor for Co	3	0.38	3	0.16	5	0.18	5	0.07
Density of contaminated zone	4	0.26	4	0.11	3	0.22	3	0.08
Fish consumption	5	0.21	5	0.08	4	0.21	4	0.08
Aquatic food	6	0.21	6	0.08	6	0.17	6	0.06
R-SQUARE		0.86		0.86		0.87		0.87

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.860E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	6.090E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.925E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
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	1.000E+00	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	1.250E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	9.100E-03	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	186.00 square meters	Cs-137	1.000E+00
Thickness:	0.61 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	2.698E-01	2.636E-01	2.516E-01	0.000E+00
M(t):	1.079E-02	1.054E-02	1.006E-02	0.000E+00

Maximum TDOSE(t): 2.698E-01 mrem/yr at t = 0.000E+00 years

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.0091	.005		
2	AREA	TRIANGULAR	90	186	280	
3	THICK0	NORMAL	.61	.305		
4	DENSCZ	TRUNCATED NORMAL	1.55	.23	.001	.999
5	FIND	NORMAL	.125	.063		

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t= 0.00E+00	DOSE(j,t), mrem/yr 1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	6.19E-01	6.19E-01	6.05E-01	5.77E-01	3.12E-11
Avg	0.00E+00	2.59E-01	2.59E-01	2.53E-01	2.42E-01	1.55E-12
Std	0.00E+00	1.29E-01	1.29E-01	1.26E-01	1.21E-01	5.42E-12
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	6.19E-01	6.19E-01	6.05E-01	5.77E-01	3.12E-11
Avg	0.00E+00	2.59E-01	2.59E-01	2.53E-01	2.42E-01	1.55E-12
Std	0.00E+00	1.29E-01	1.29E-01	1.26E-01	1.21E-01	5.42E-12

∑ALL is total dose summed for all nuclides.

RESRAD Regression and Correlation output 03/05/09 13:23 Page: Coef 1
Title : Brookside Resident for TBD 08-006 unit Cs-137 Dose Assessment - Sens anal w 24 i
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\03050901.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	4	0.27	4	0.08	4	0.21	4	0.06
Area of contaminated zone	3	0.33	3	0.10	3	0.33	3	0.10
Thickness of contaminated zone	2	0.49	2	0.16	2	0.43	2	0.13
Density of contaminated zone	5	-0.12	5	-0.04	5	-0.20	5	-0.06
Indoor time fraction	1	0.95	1	0.93	1	0.96	1	0.94
R-SQUARE		0.91		0.91		0.93		0.93

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ba-137m (Source: FGR 12)	3.606E+00	3.606E+00	DCF1(1)
A-1	Cs-137 (Source: FGR 12)	7.510E-04	7.510E-04	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	2.827E+01	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	7.620E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+03	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	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): Cs-137	1.000E+00	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.522E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.700E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	7.120E+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)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.040E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	4.600E+03	4.600E+03	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	4.600E+03	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	4.600E+03	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.539E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	5.100E-02	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)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.830E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

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

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 dose	17	---	---	LYMAX
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	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

RESRAD, Version 6.4 T½ Limit = 180 days 03/05/2009 12:42 Page 8
Summary : Country Club Worker for TBD 08-006 unit Cs-137 Dose Assessment Sens Anal w 30 i
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\03050902.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	28.27 square meters	Cs-137	1.000E+00
Thickness:	0.76 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 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+03
TDOSE(t):	1.086E-01	1.061E-01	1.013E-01	0.000E+00
M(t):	4.344E-03	4.244E-03	4.051E-03	0.000E+00

Maximum TDOSE(t): 1.086E-01 mrem/yr at t = 0.000E+00 years

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Dose vs Pathway: Radon (Water Ind.) 7
Dose vs Pathway: Plant (Water Ind.) 8
Dose vs Pathway: Meat (Water Ind.) 9
Dose vs Pathway: Milk (Water Ind.) 10
Dose vs Pathway: Soil Ingestion 11
Dose vs Pathway: Water Ingestion 12
Dose vs Pathway: Fish Ingestion 13
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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	FOTD	NORMAL	.051	.025		
2	AREA	TRIANGULAR	10	28.3	42.5	
3	THICK0	NORMAL	.76	.38		
4	DENSCZ	TRUNCATED NORMAL	1.52	.23	.001	.999

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	DOSE(j,t), mrem/yr t= 0.00E+00	1.00E+00	3.00E+00	1.00E+03
Cs-137						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	2.78E-01	2.78E-01	2.72E-01	2.60E-01	2.18E-11
Avg	0.00E+00	1.02E-01	1.02E-01	1.00E-01	9.54E-02	1.83E-12
Std	0.00E+00	5.42E-02	5.42E-02	5.30E-02	5.06E-02	3.96E-12
∑ALL						
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	2.78E-01	2.78E-01	2.72E-01	2.60E-01	2.18E-11
Avg	0.00E+00	1.02E-01	1.02E-01	1.00E-01	9.54E-02	1.83E-12
Std	0.00E+00	5.42E-02	5.42E-02	5.30E-02	5.06E-02	3.96E-12

∑ALL is total dose summed for all nuclides.

RESRAD Regression and Correlation output 03/05/09 12:42 Page: Coef 1
Title : Country Club Worker for TBD 08-006 unit Cs-137 Dose Assessment Sens Anal w 30 in
Input File : C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\03050902.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC		SRC		PRCC		SRRC	
Repetition =	1		1		1		1	
Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Outdoor time fraction	1	0.87	1	0.83	1	0.88	1	0.85
Area of contaminated zone	3	0.33	3	0.17	3	0.34	3	0.16
Thickness of contaminated zone	2	0.49	2	0.26	2	0.40	2	0.20
Density of contaminated zone	4	0.00	4	0.00	4	-0.02	4	-0.01
R-SQUARE		0.78		0.78		0.79		0.79

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Revised Dose Assessment for Plum Brook Sediments

PBRF-TBD-08-006

Appendix F

Sensitivity Analysis

Attachment B

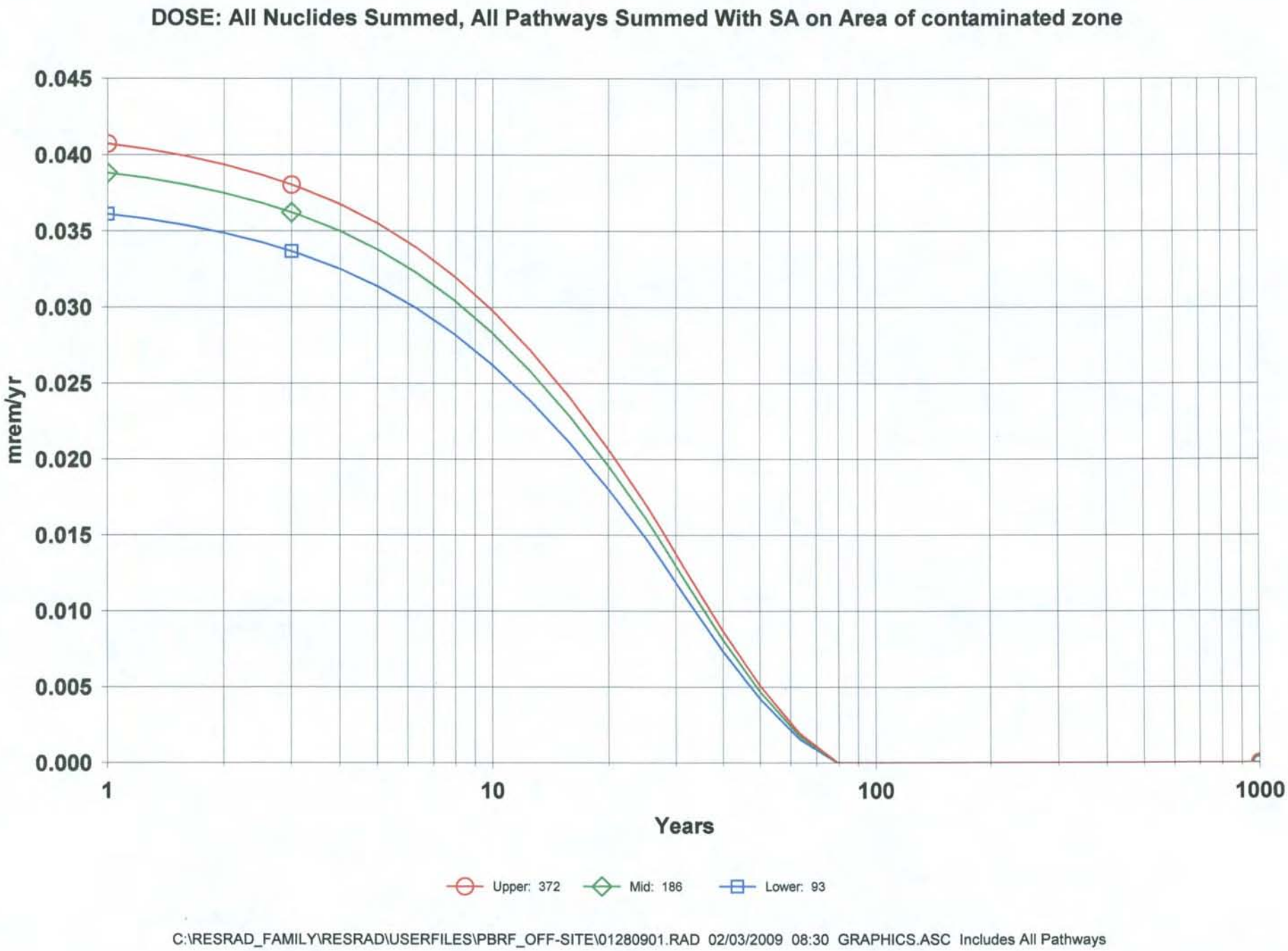
RESRAD Sensitivity Screening Analysis Reports

Sensitivity Screening Analysis – Parameter Report Index

Scenario	Parameter	Sensitivity
Suburban Gardner	Area of Contaminated Zone	Moderate
Suburban Gardner	Thickness of Contaminated Zone	High
Suburban Gardner	Length Parallel to Aquifer Flow	None
Suburban Gardner	Density of Contaminated Zone	High
Suburban Gardner	Contaminated Zone Erosion Rate	Low
Suburban Gardner	Contaminated Zone Total Porosity	None
Suburban Gardner	Contaminated Zone Field Capacity	None
Suburban Gardner	Contaminated Zone Hydraulic Conductivity	None
Suburban Gardner	Contaminated Zone B Parameter	None
Suburban Gardner	Evapotranspiration Coefficient	Very Low
Suburban Gardner	Precipitation	None
Suburban Gardner	Irrigation	None
Suburban Gardner	Runoff Coefficient	None
Suburban Gardner	Watershed Area for Nearby Stream or Pond	None
Suburban Gardner	Density of Saturated Zone	None
Suburban Gardner	Saturated Zone Total Porosity	None
Suburban Gardner	Saturated Zone Effective Porosity	None
Suburban Gardner	Saturated Zone Field Capacity	None
Suburban Gardner	Saturated Zone Hydraulic Conductivity	None
Suburban Gardner	Saturated Zone Hydraulic Gradient	None
Suburban Gardner	Well Pump Intake Depth	None
Suburban Gardner	Thickness of Unsaturated Zone 1	None
Suburban Gardner	Density of Unsaturated Zone 1	None
Suburban Gardner	Total Porosity of Unsaturated Zone 1	None
Suburban Gardner	Effective Porosity of Unsaturated Zone 1	None
Suburban Gardner	Field Capacity of Unsaturated Zone 1	None
Suburban Gardner	b Parameter of Unsaturated Zone 1	None
Suburban Gardner	Hydraulic Conductivity of Unsaturated Zone 1	None
Suburban Gardner	Contaminated Zone Distribution Coefficient	Very Low
Suburban Gardner	Cs-137 Unsaturated Zone Distribution Coefficient	None
Suburban Gardner	Cs-137 Saturated Zone Distribution Coefficient	None
Suburban Gardner	External Gamma Shielding Factor	None
Suburban Gardner	Outdoor Time Fraction	High
Suburban Gardner	Fruit, Vegetable and Grain Consumption	High
Suburban Gardner	Leafy Vegetable Consumption	Low
Suburban Gardner	Contamination Fraction Plant Food	High
Suburban Gardner	Mass Loading for Foliar Deposition	None
Suburban Gardner	Depth of Soil Mixing Layer	None
Suburban Gardner	Depth of Roots	High
Suburban Gardner	Wet Weight Crop Yield for Non-Leafy	None
Suburban Gardner	Wet Weight Crop Yield for Leafy	None
Suburban Gardner	Growing Season for Non-Leafy	None

Sensitivity Screening Analysis – Parameter Report Index

Scenario	Parameter	Sensitivity
Suburban Gardner	Growing Season for Leafy	None
Suburban Gardner	Translocation Factor for Non-Leafy	None
Suburban Gardner	Dry Foliar Interception Fraction for Non-Leafy	None
Suburban Gardner	Dry Foliar Interception Fraction for Leafy	None
Suburban Gardner	Wet Foliar Interception Fraction for Leafy	None
Suburban Gardner	Weathering Removal Constant for Vegetation	None
Suburban Gardner	Storage Time for Fruits, Non-Leafy Vegetables and Grain	None
Suburban Gardner	Storage Time for Leafy Vegetables	None
Recreationist	Area of Contaminated Zone	low
Recreationist	Thickness of Contaminated Zone	High
Recreationist	Length Parallel to Aquifer Flow	None
Recreationist	Density of Contaminated Zone	High
Recreationist	Contaminated Zone Total Porosity	None
Recreationist	Saturated Zone Hydraulic Conductivity	None
Recreationist	Density of Saturated Zone	None
Recreationist	Contaminated Zone Distribution Coefficient	High
Recreationist	Saturated Zone Distribution Coefficient	Low
Recreationist	Outdoor Time Fraction	High
Recreationist	Fish Consumption	Low
Recreationist	Contamination Fraction Aquatic Food	Low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0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: 372
Mid: 186
Lower: 93
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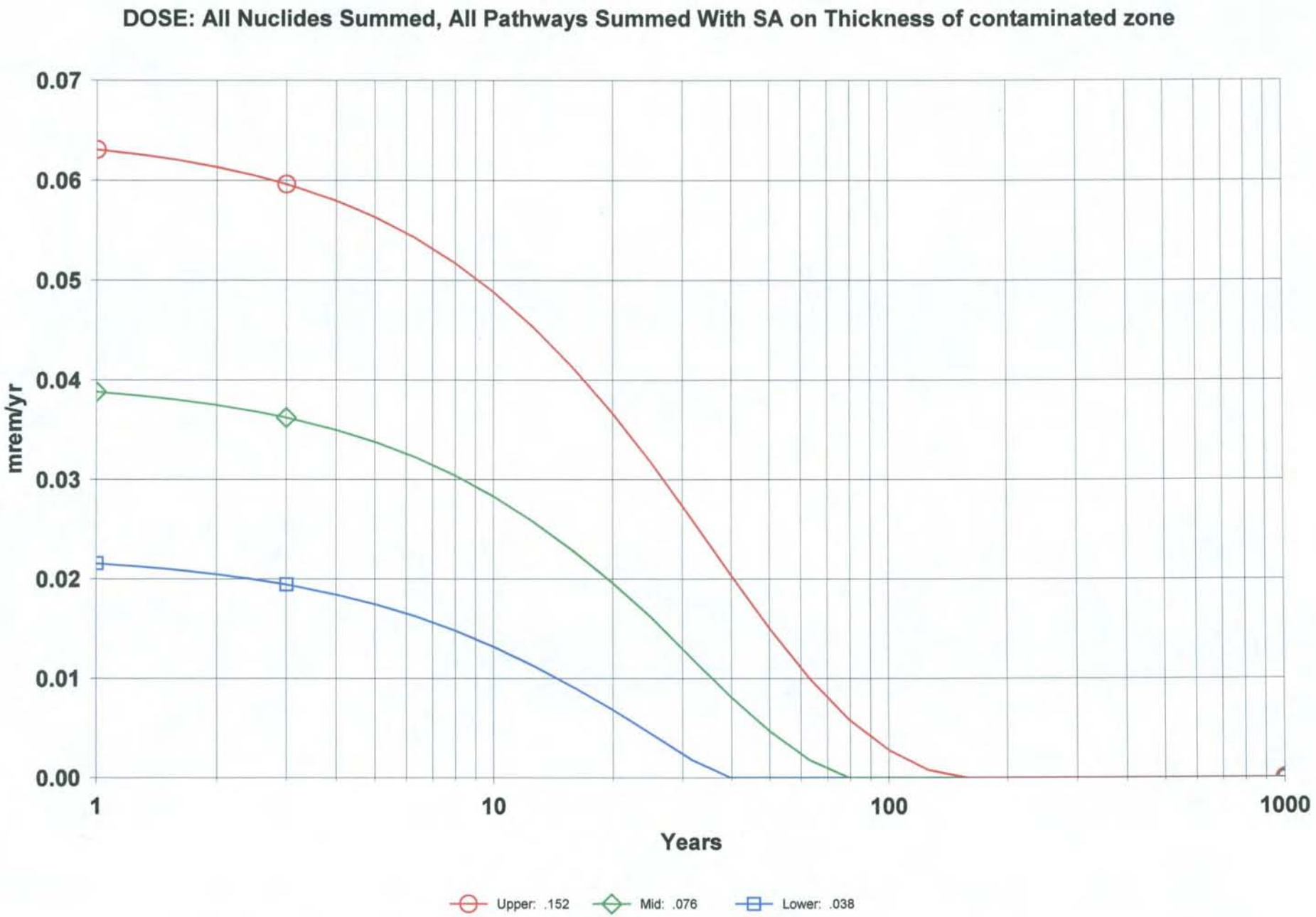

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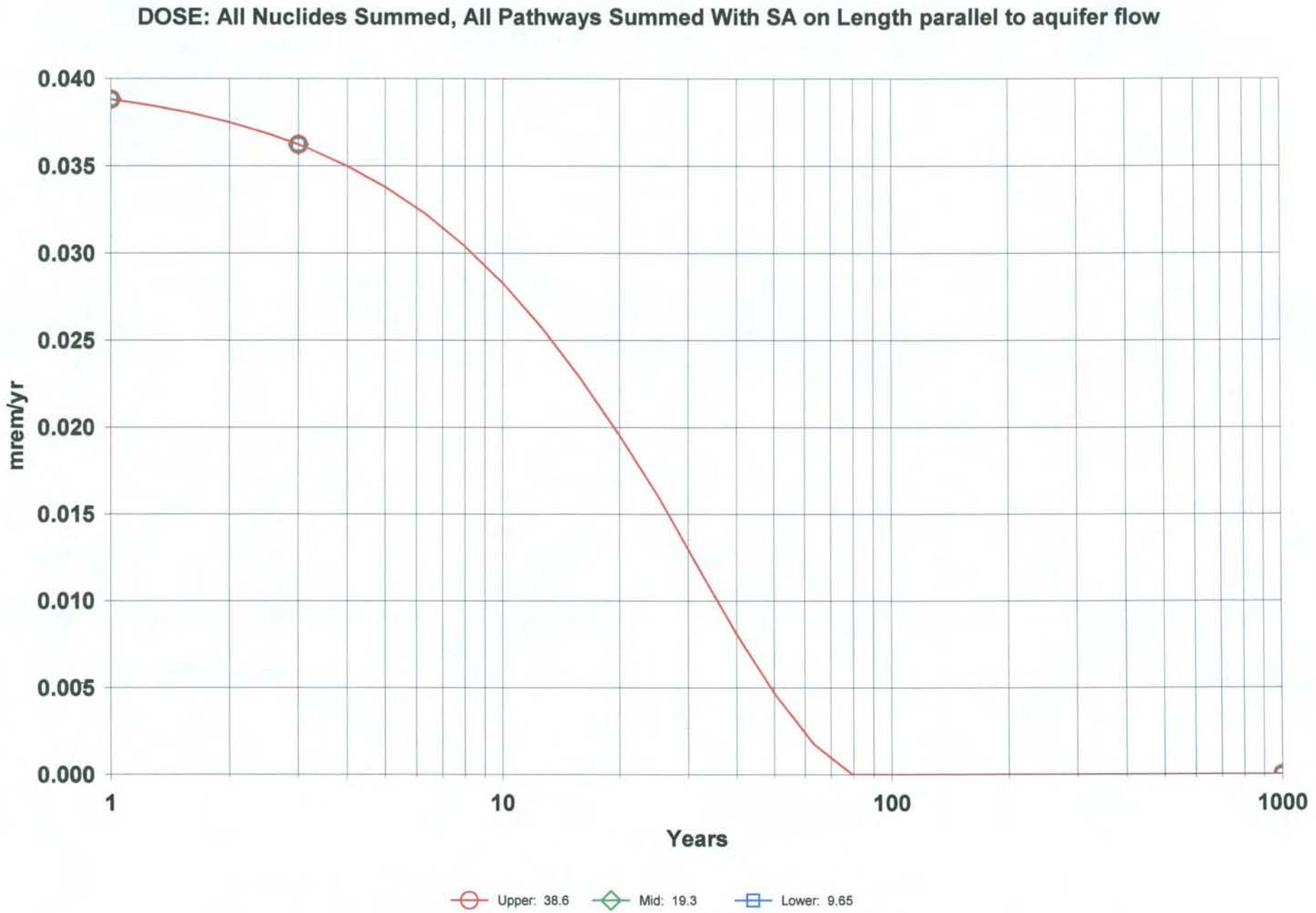

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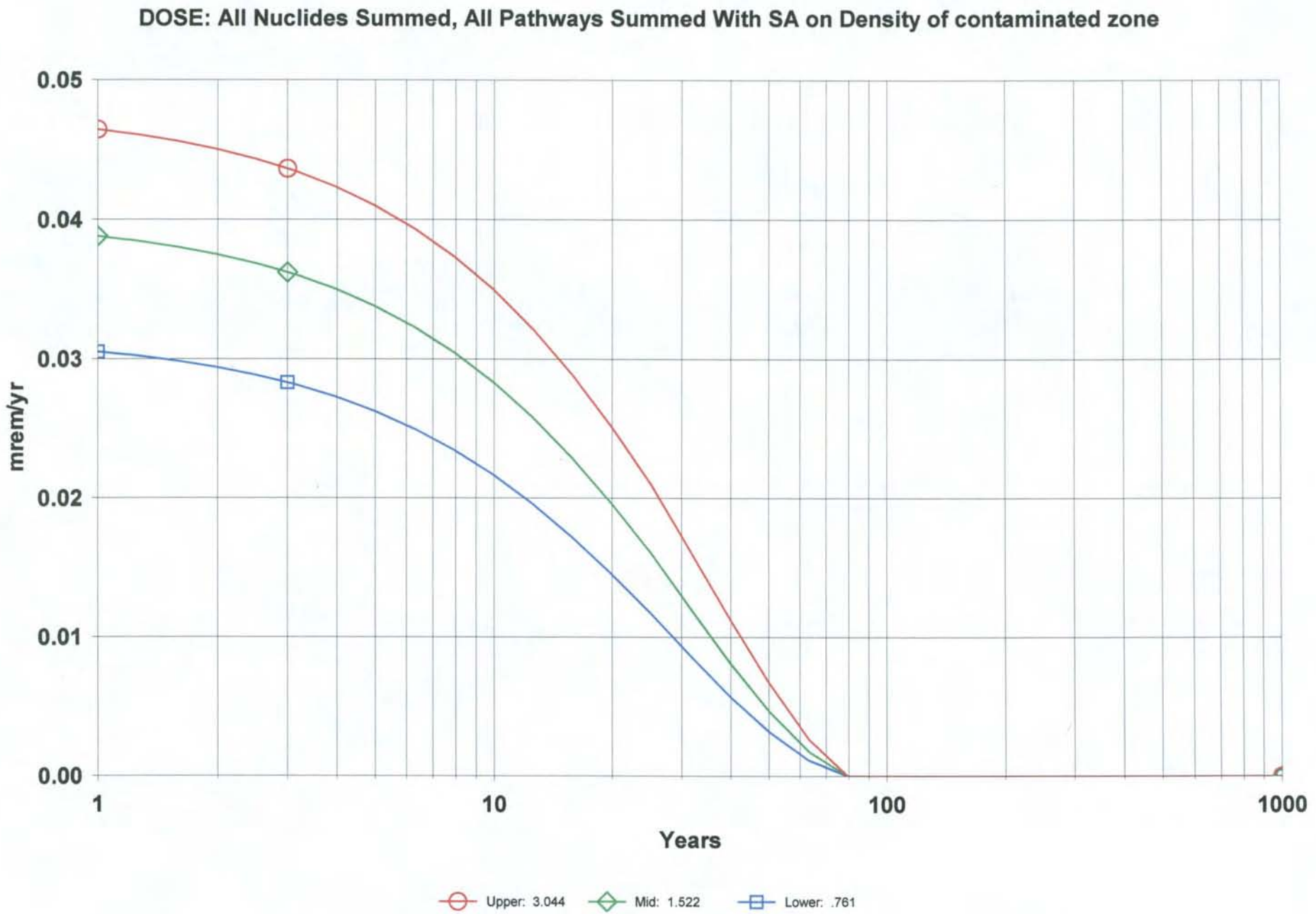

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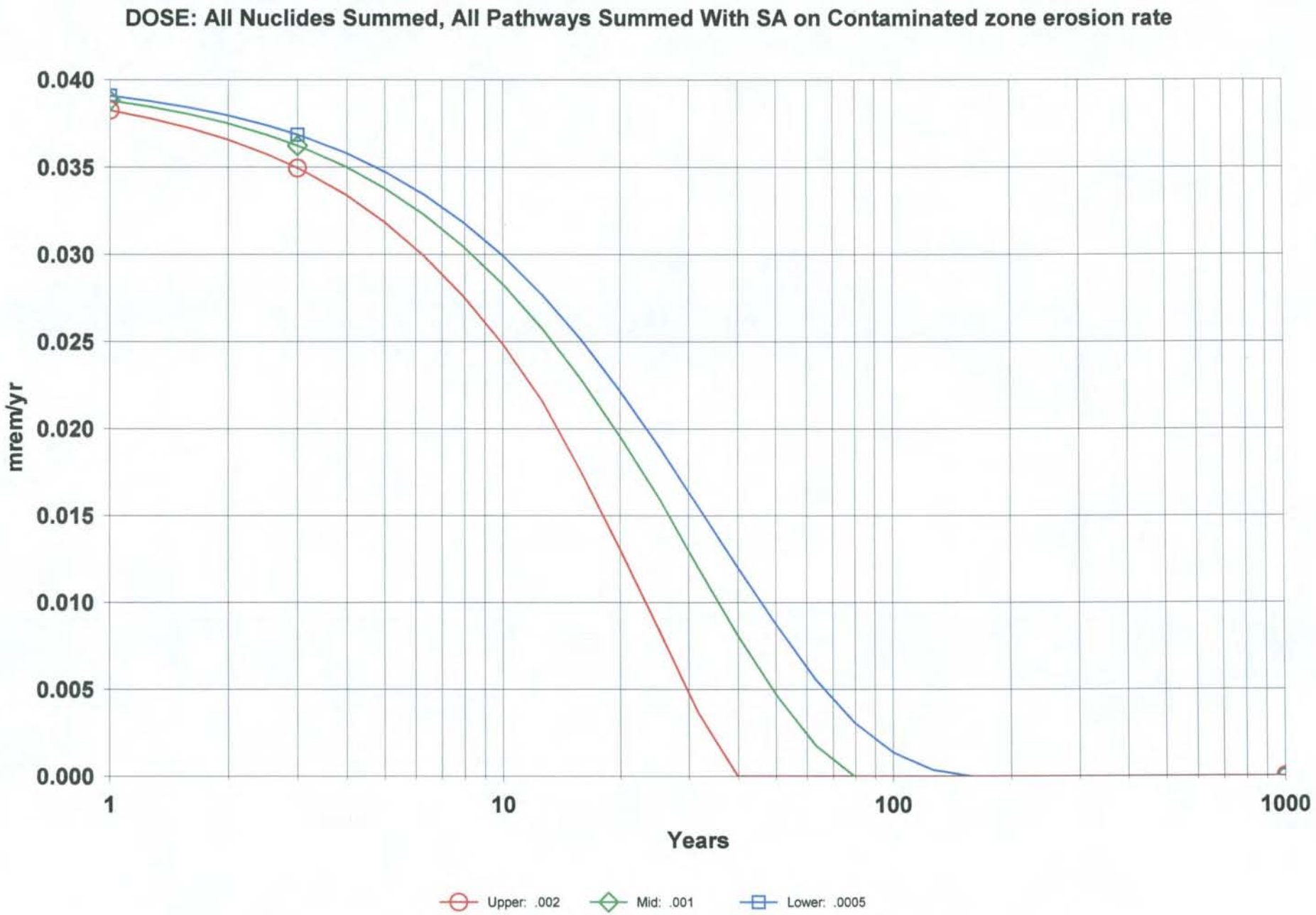

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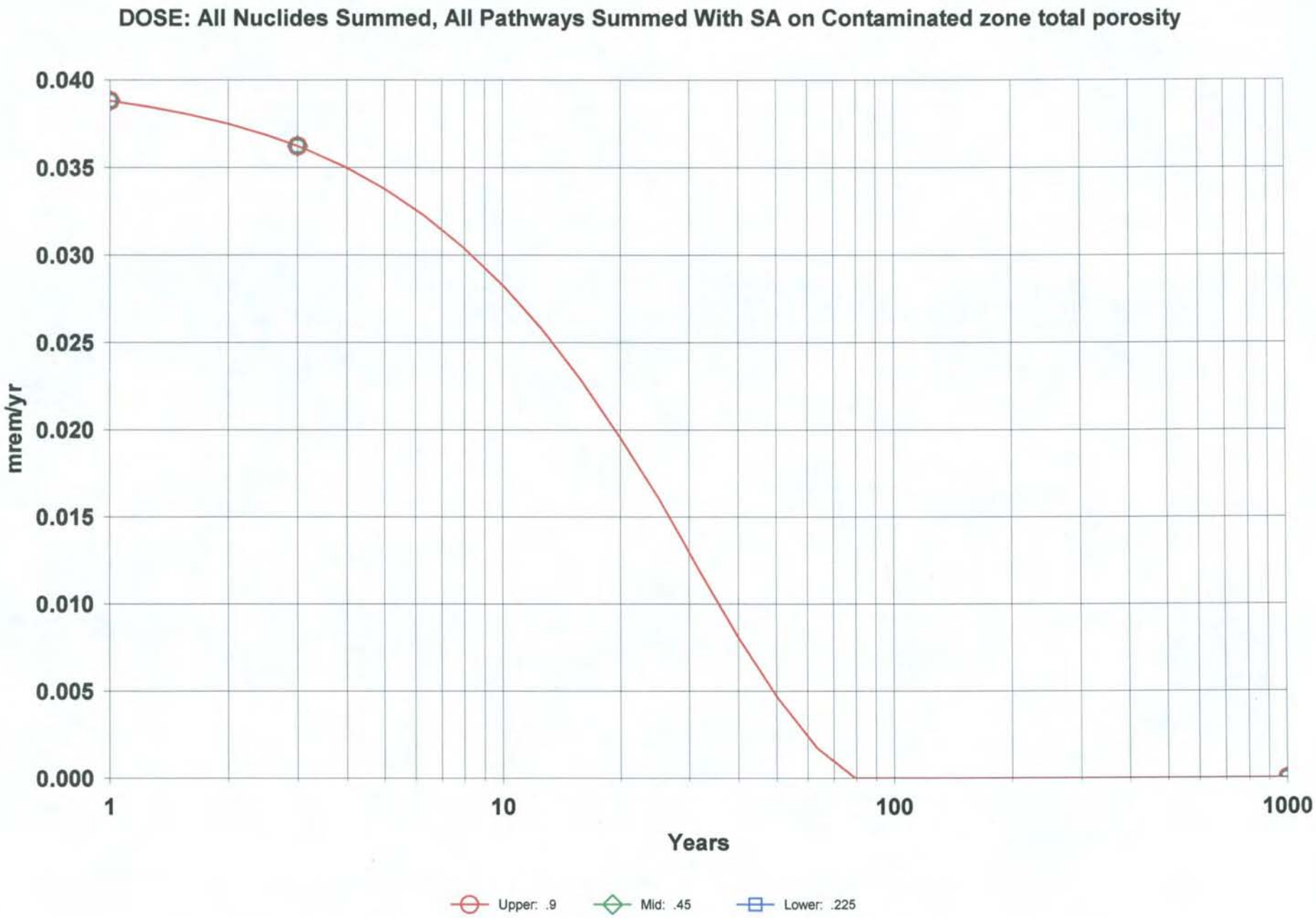

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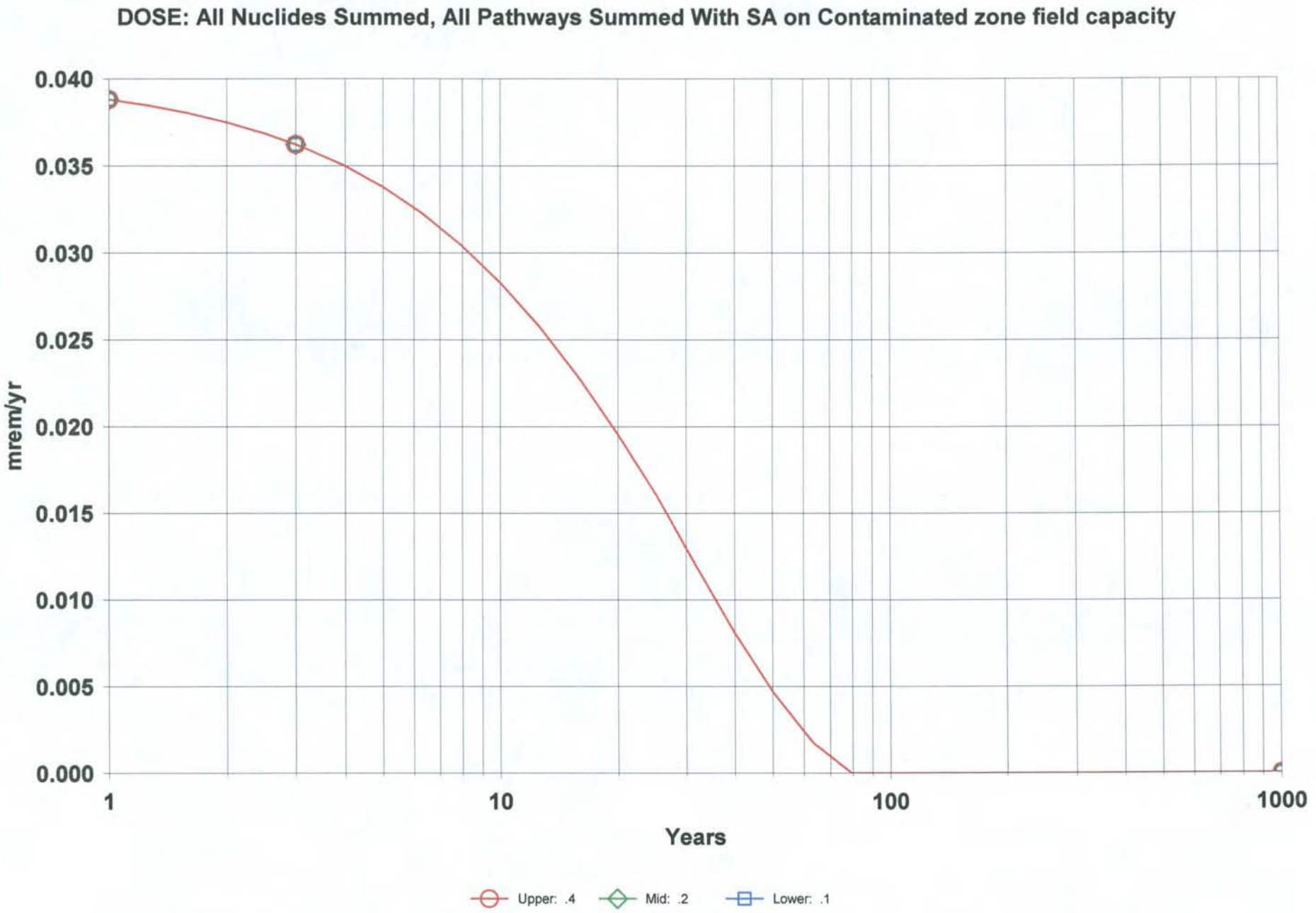

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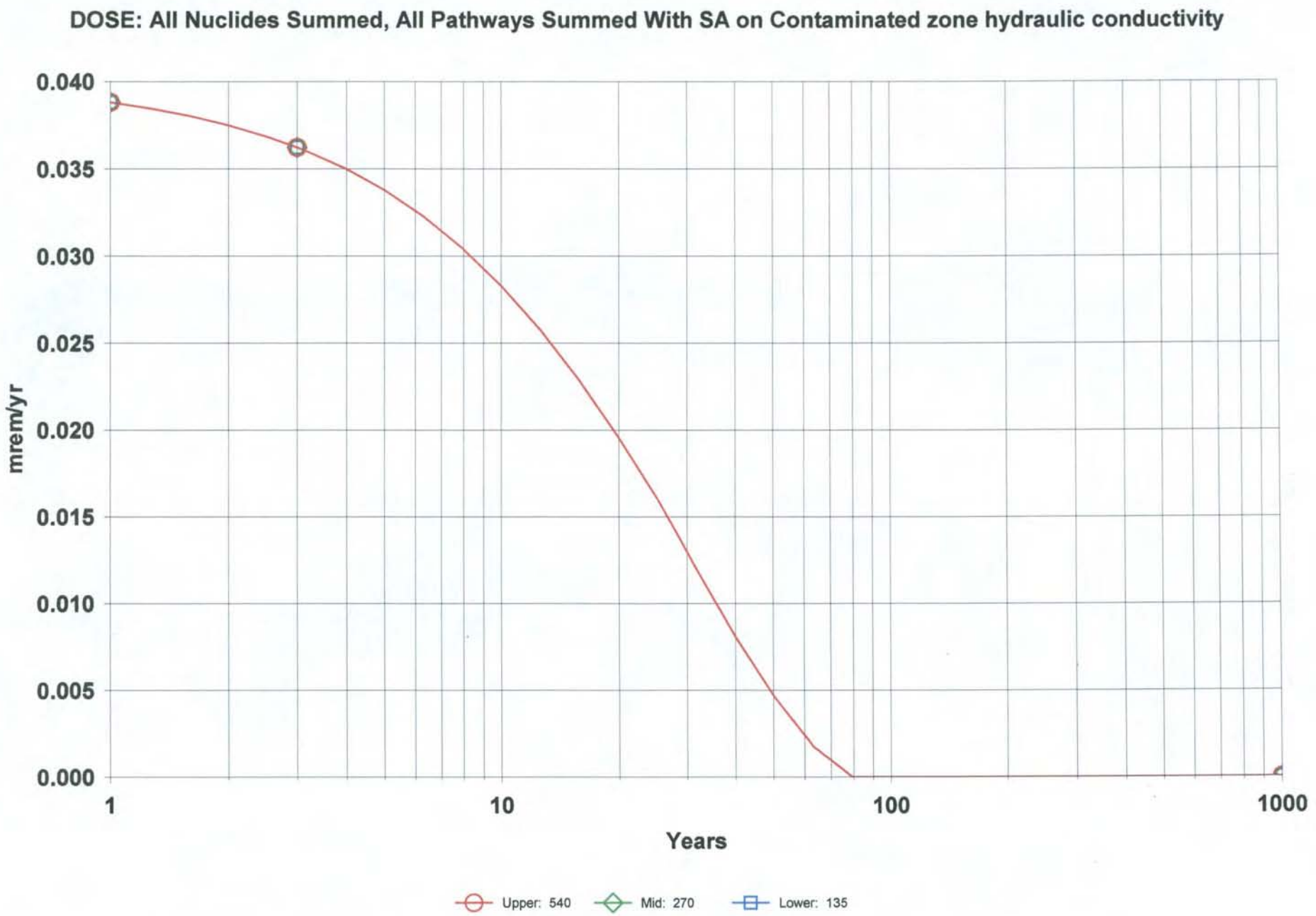

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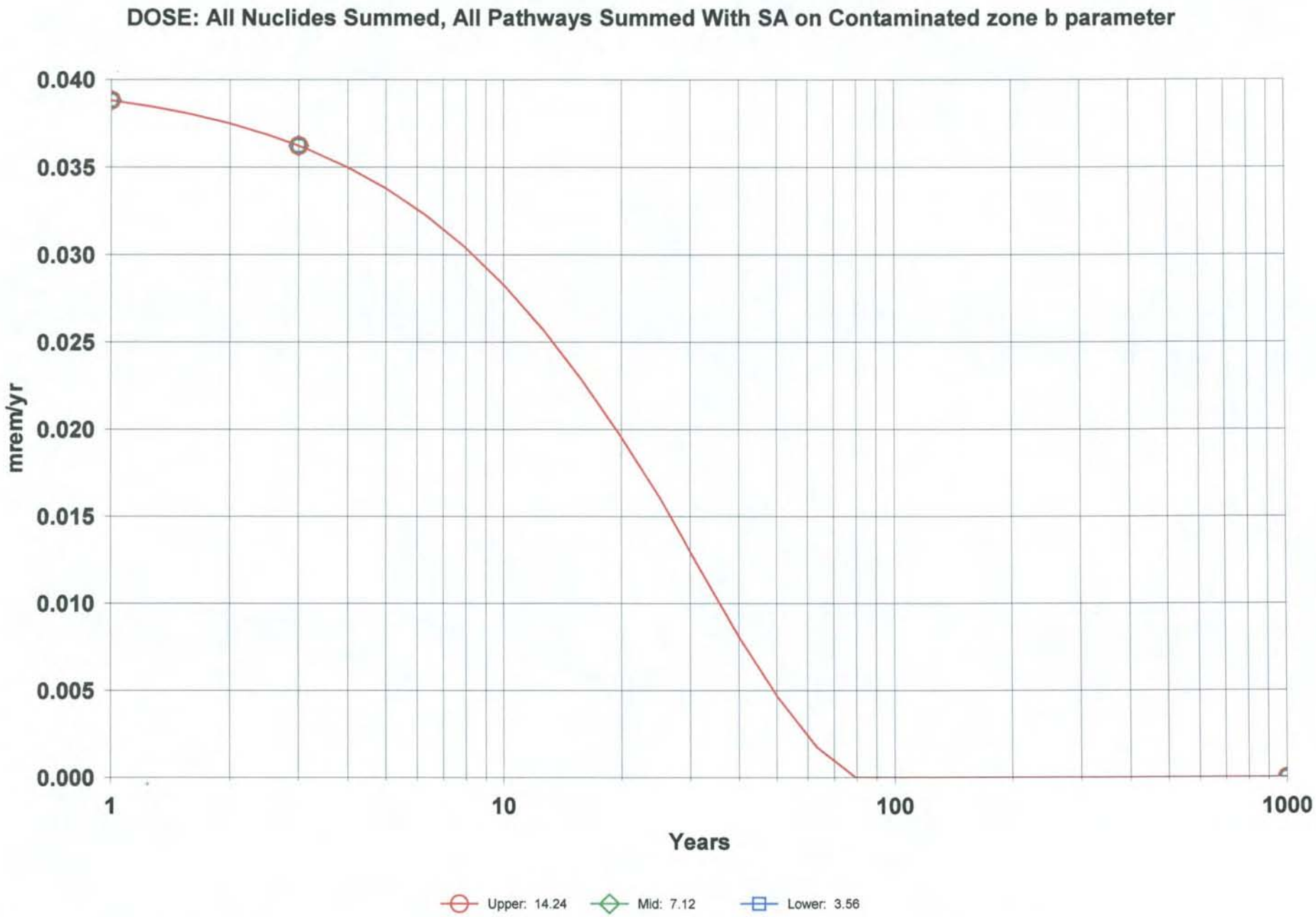

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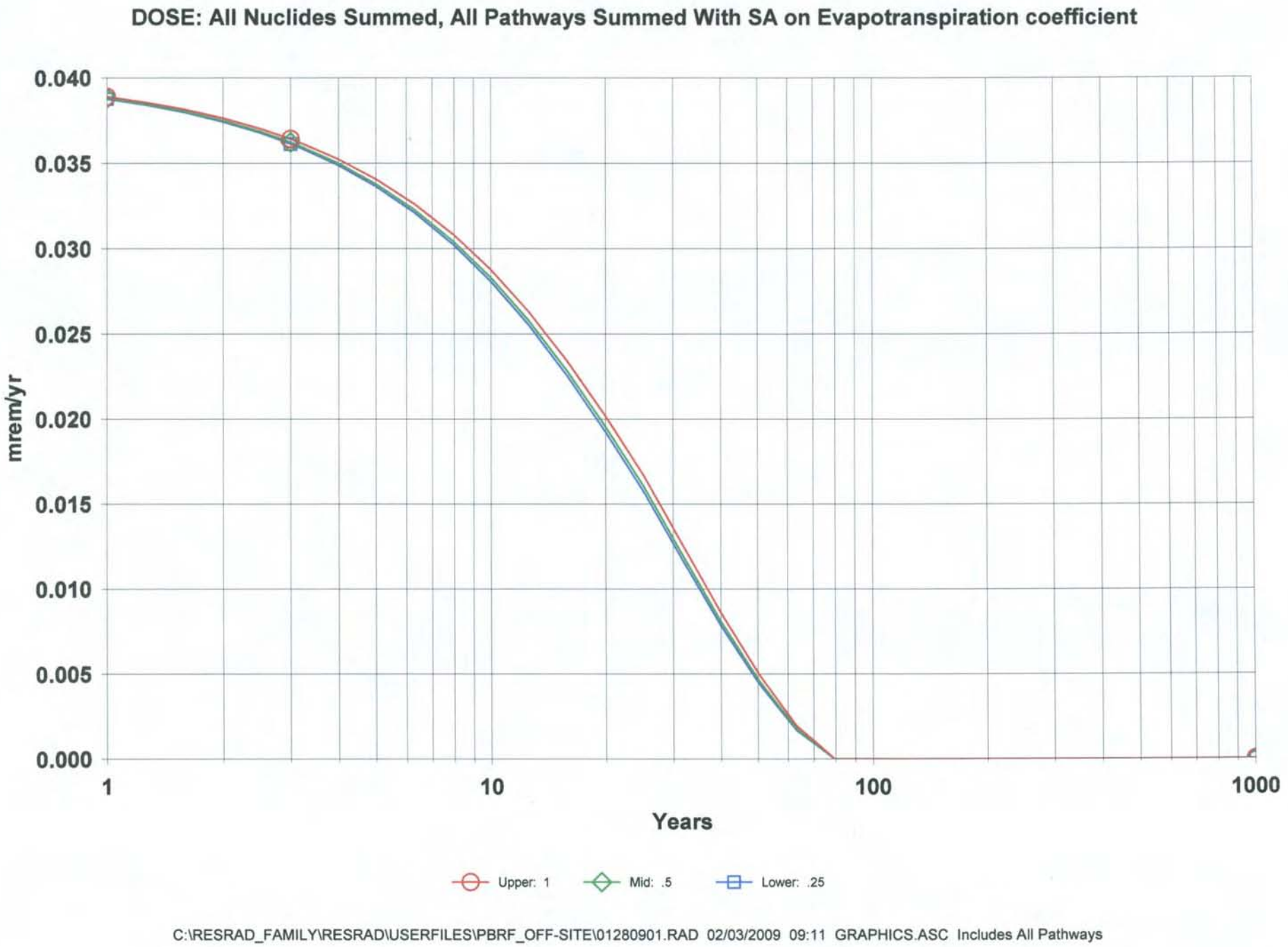
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0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: 1
Mid: .5
Lower: .25
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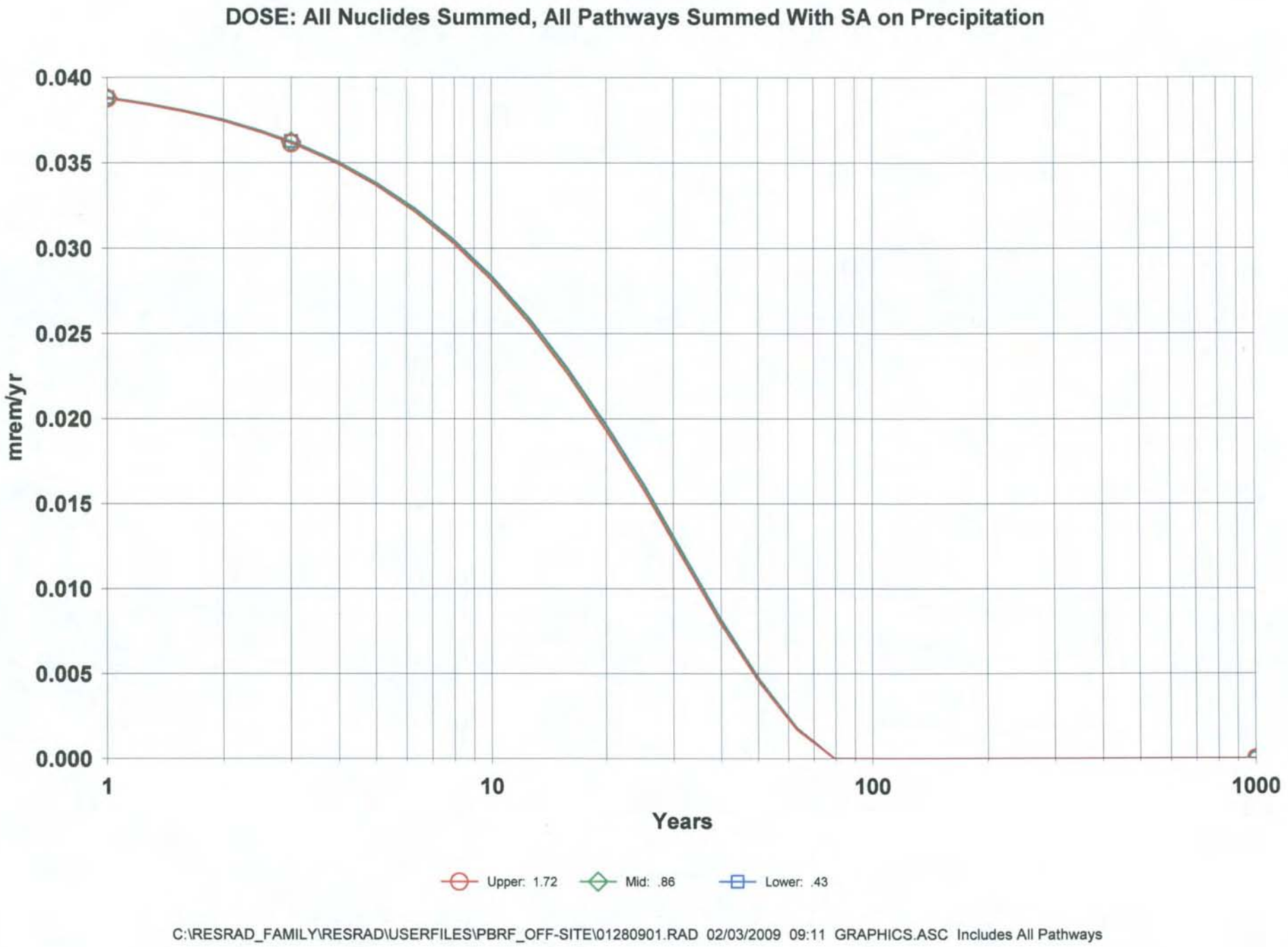
10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0.030
0.025
0.020
0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: 1.72
Mid: .86
Lower: .43
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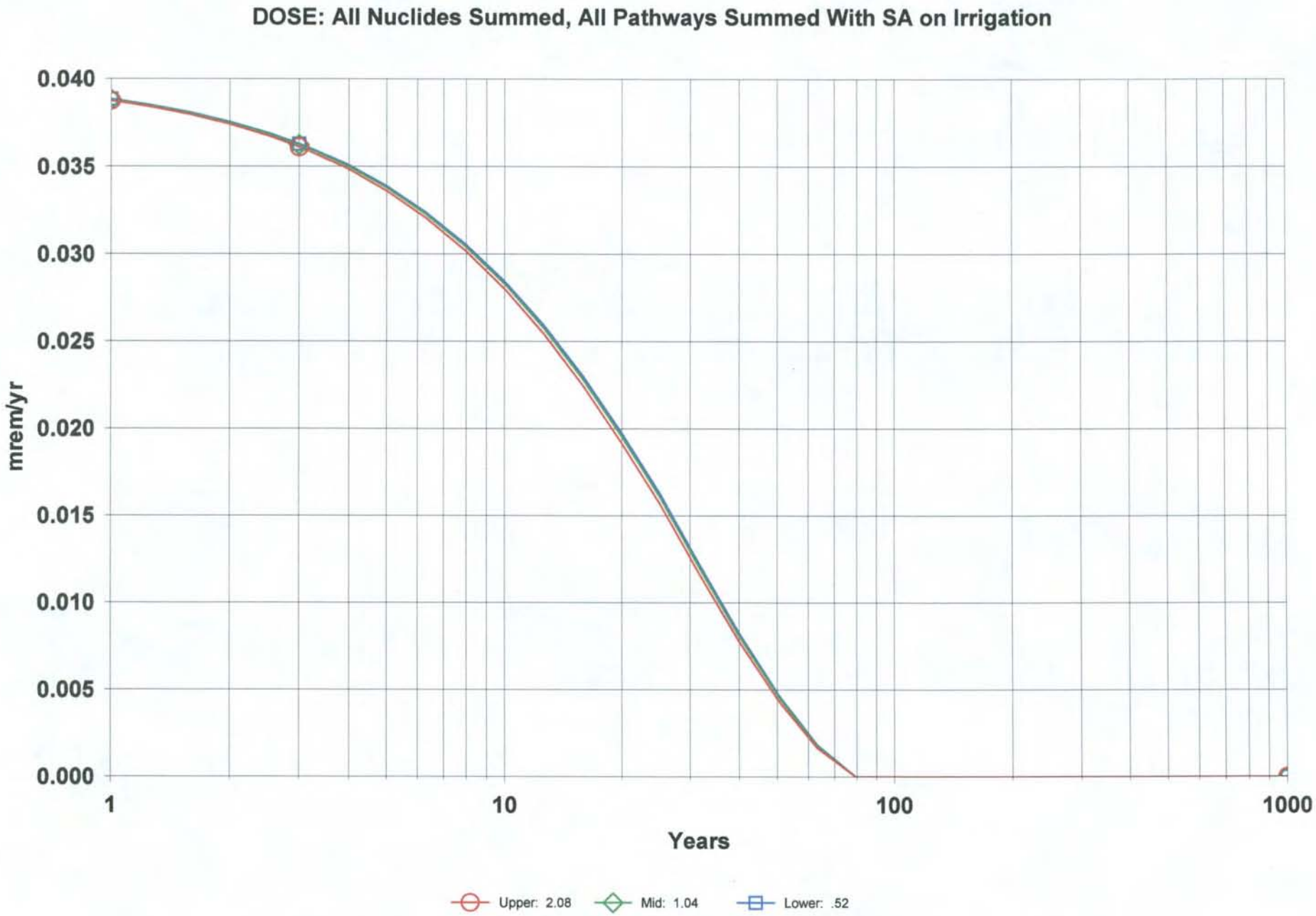

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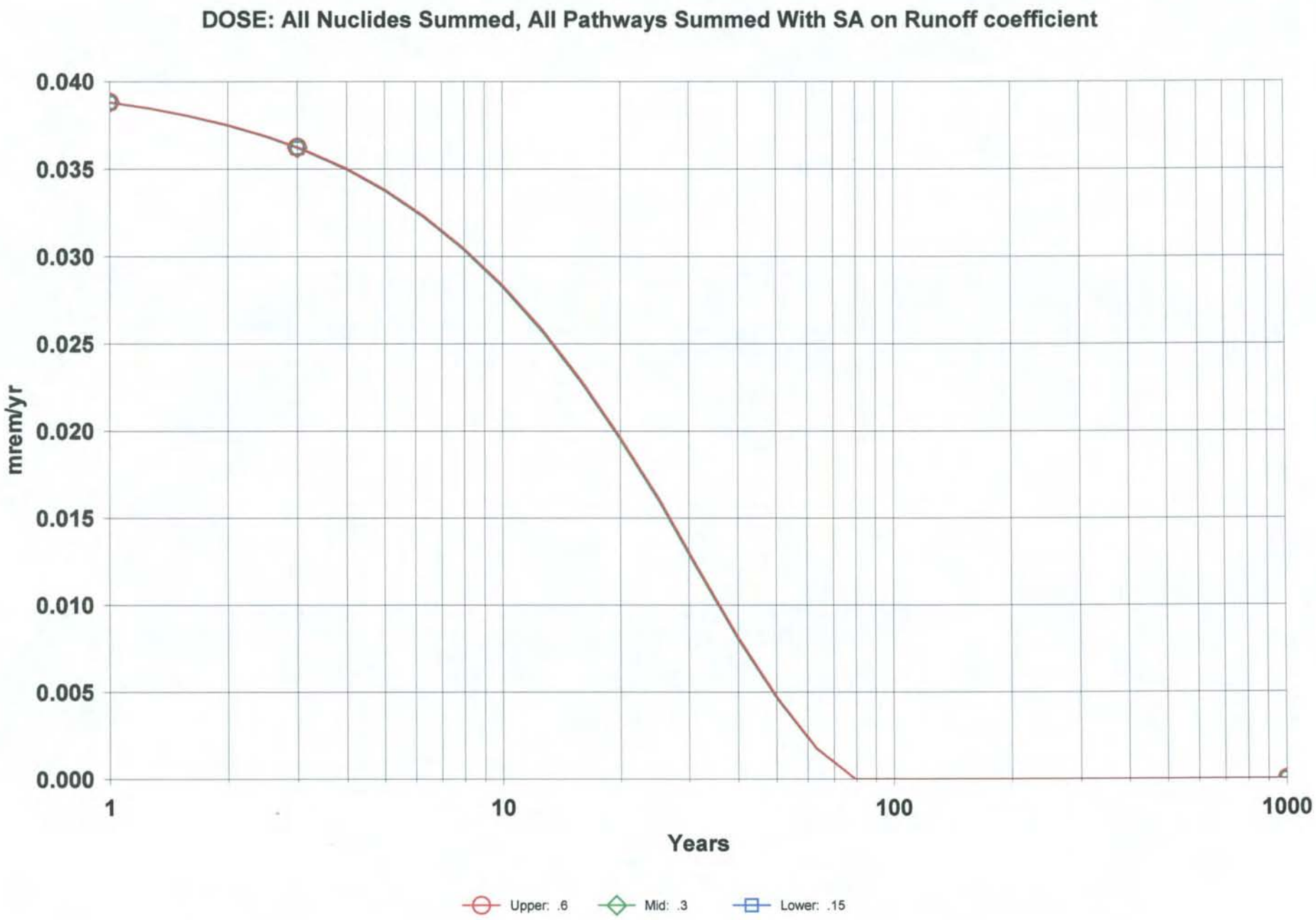

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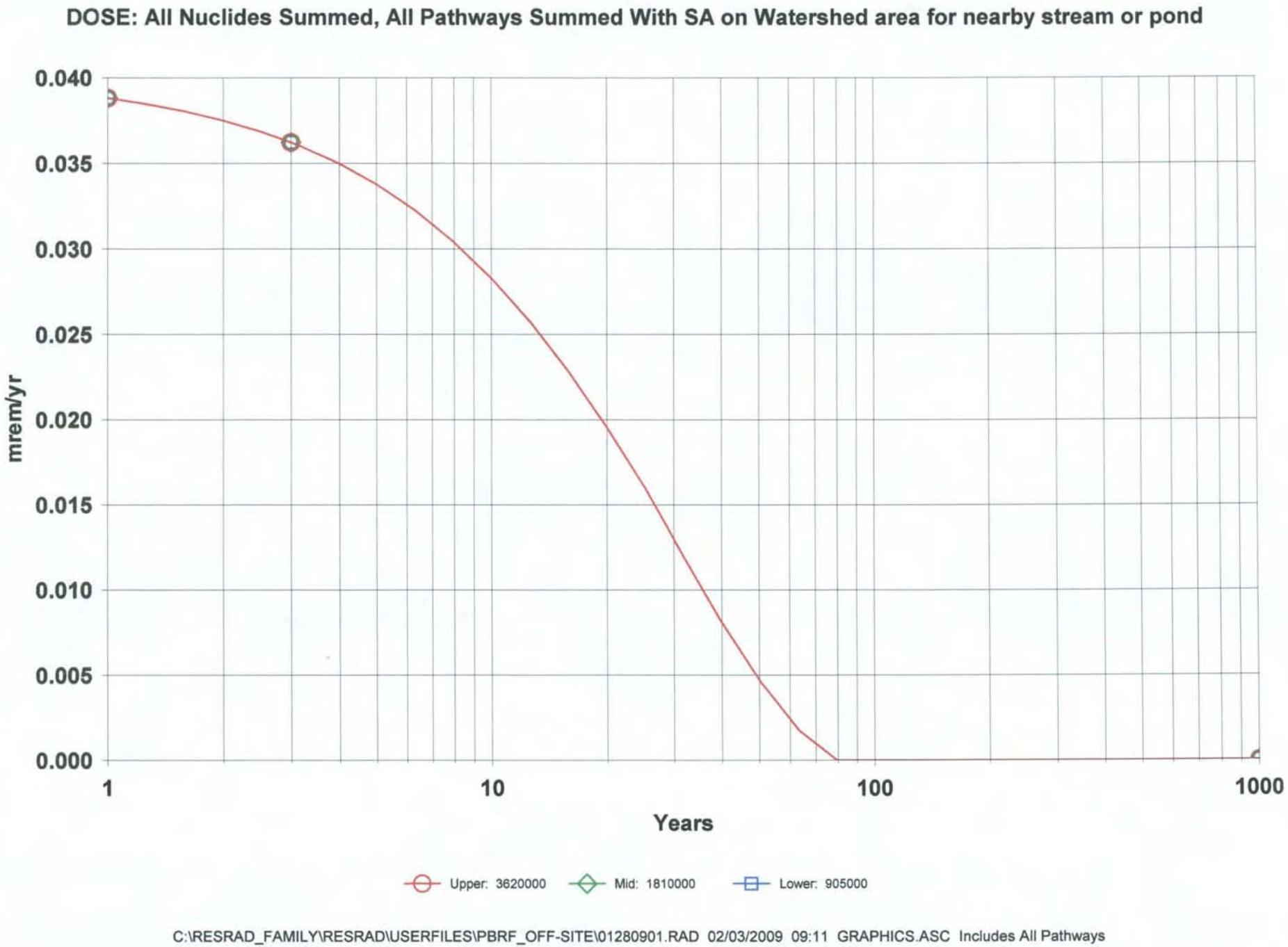
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0.030
0.025
0.020
0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: 3620000
Mid: 1810000
Lower: 905000
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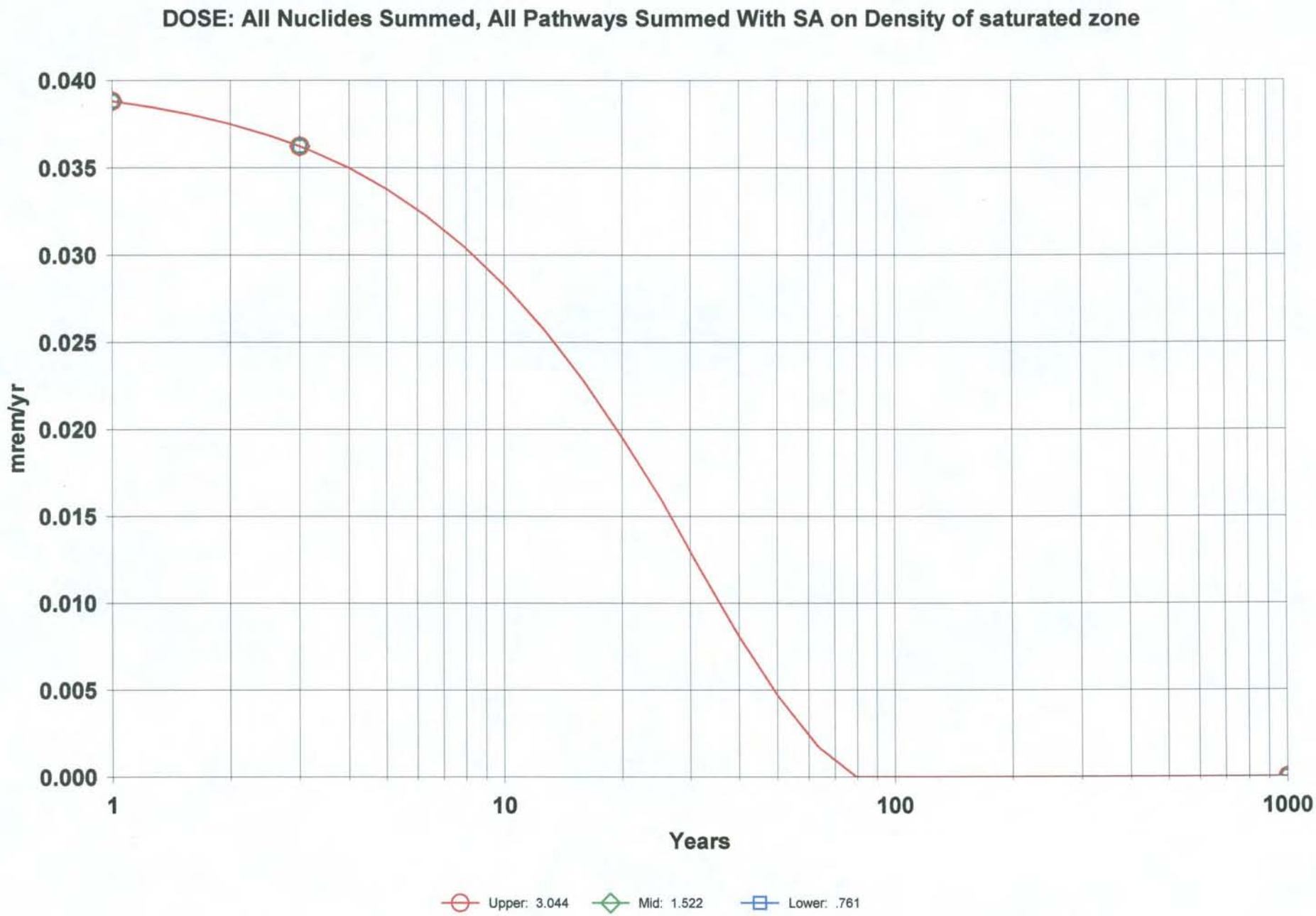

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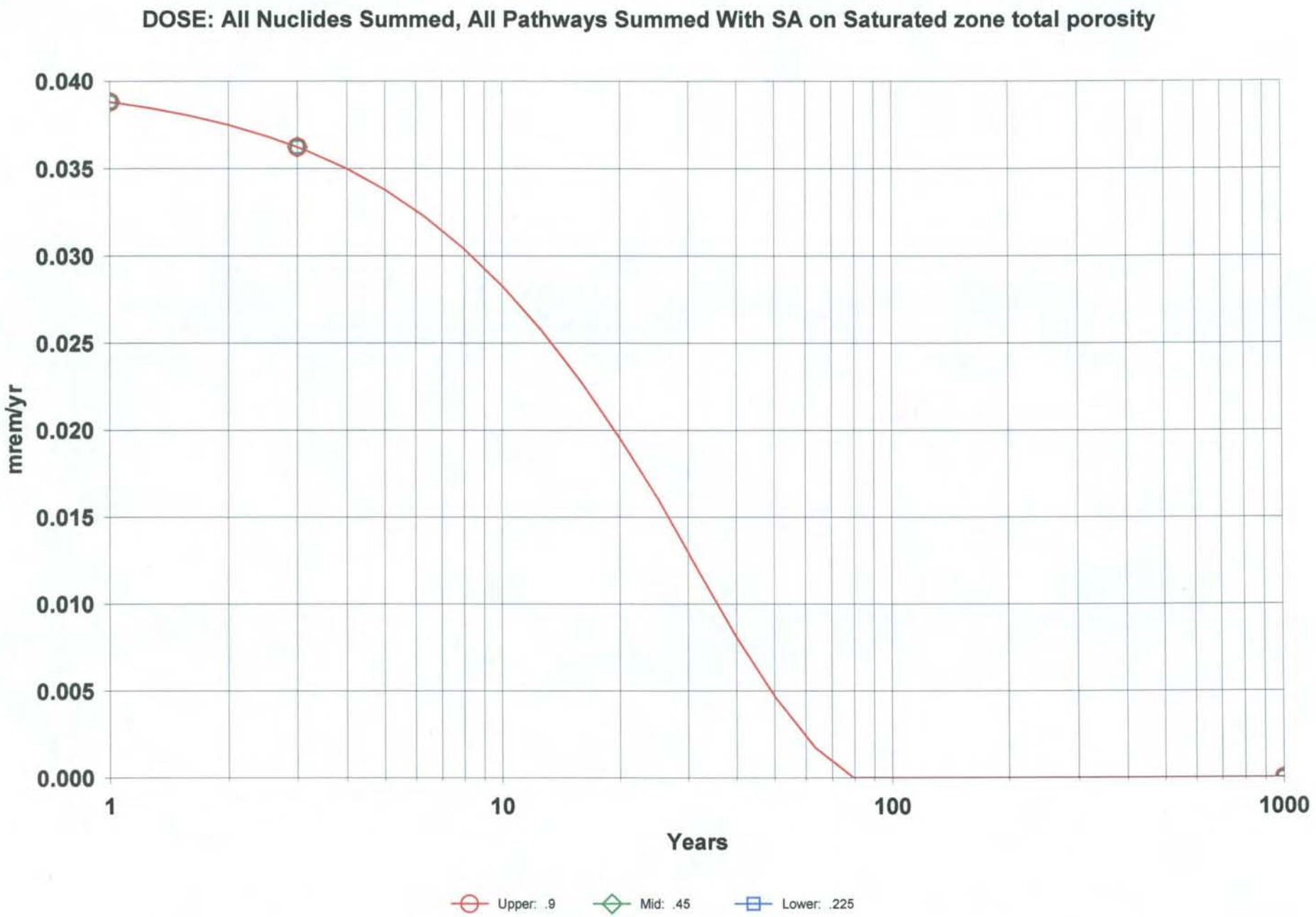

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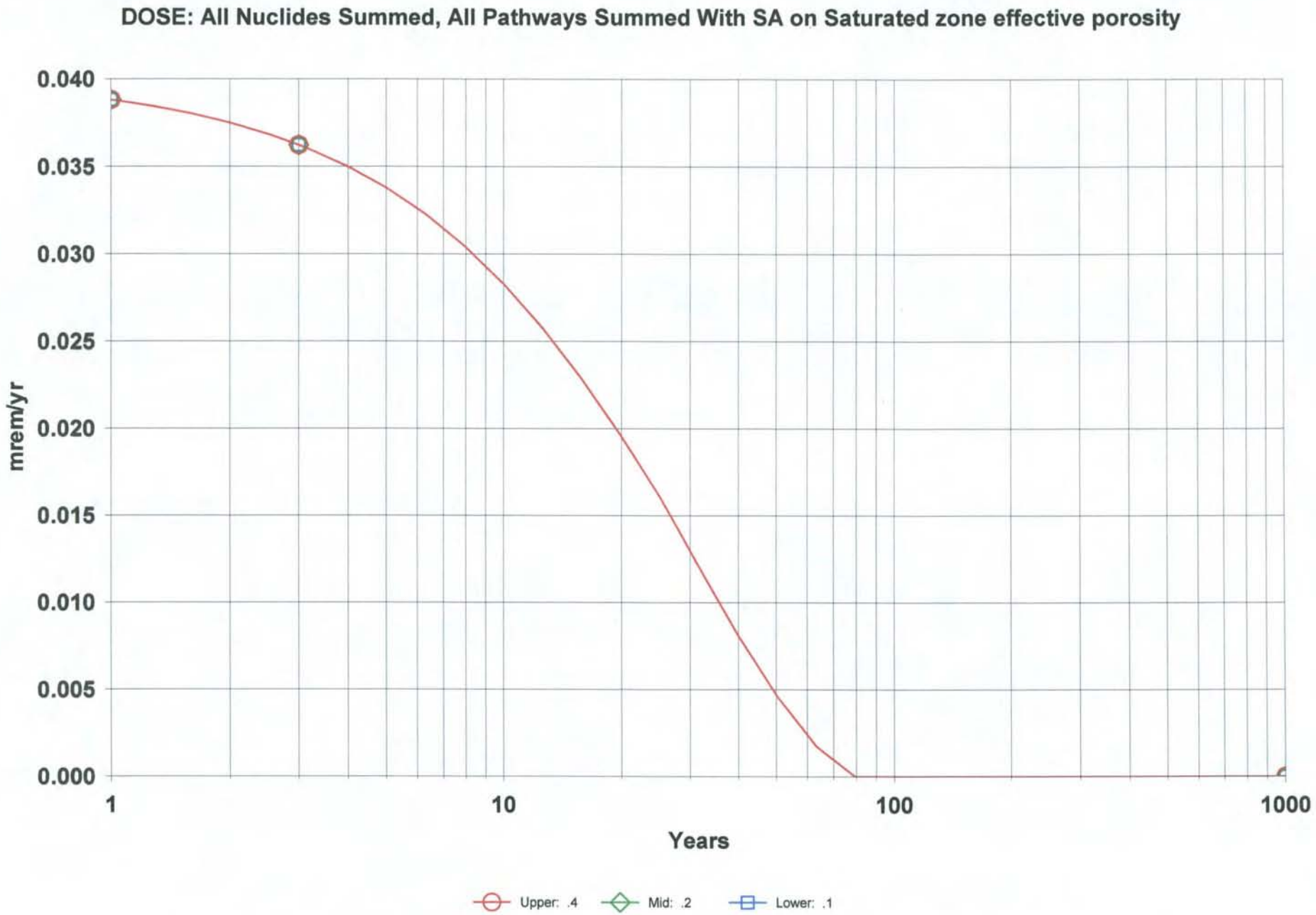
16



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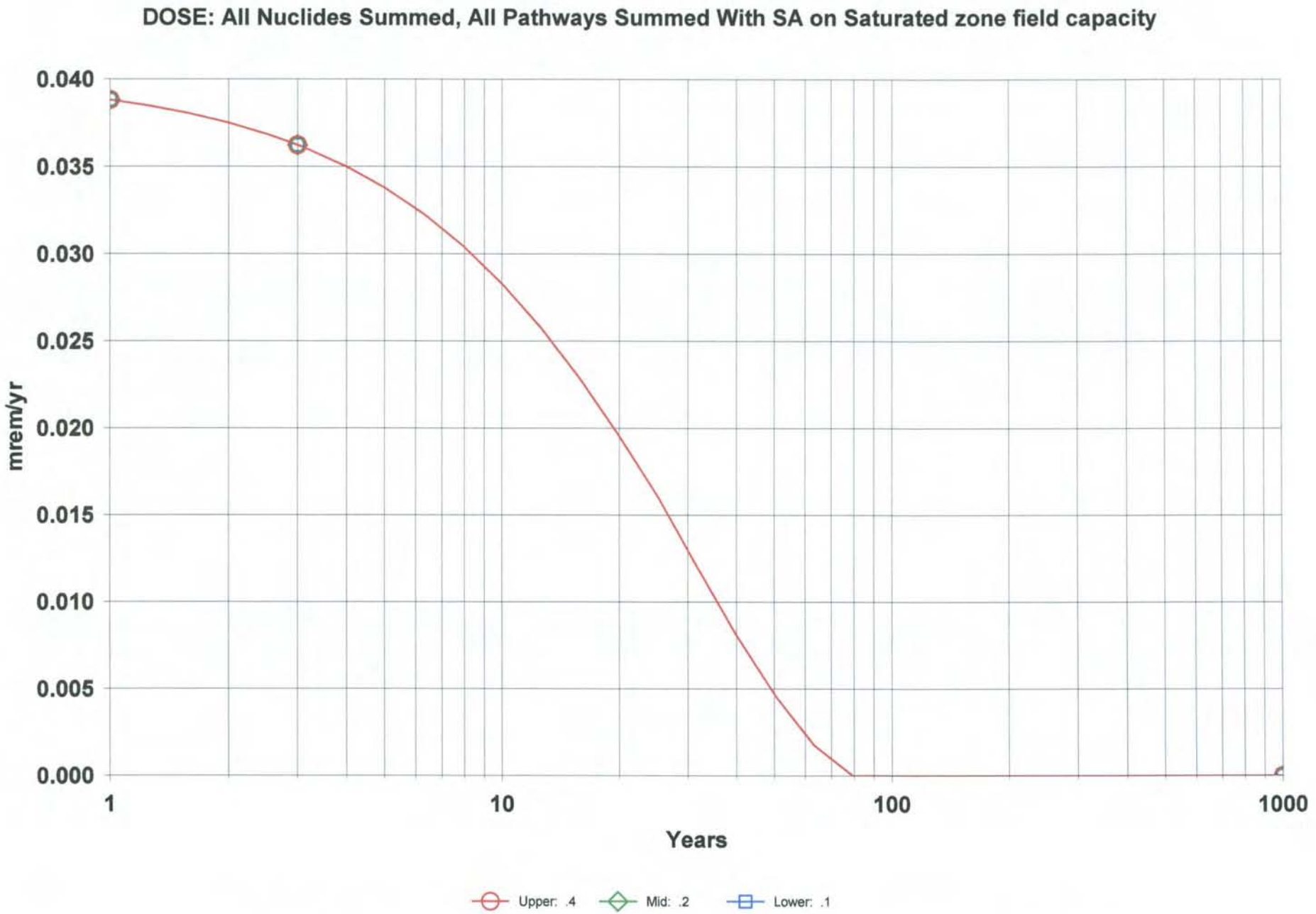

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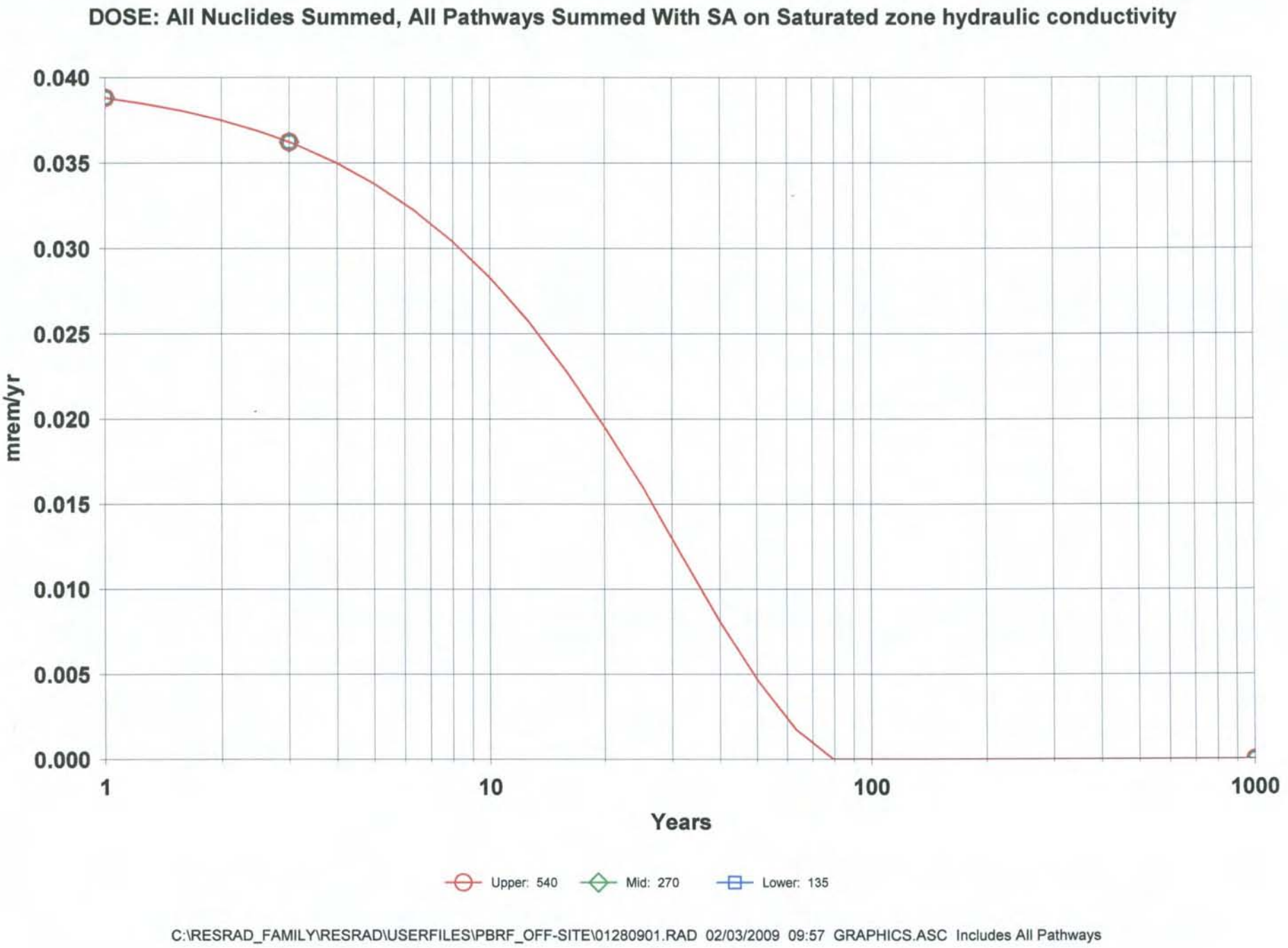
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0.030
0.025
0.020
0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: 540
Mid: 270
Lower: 135
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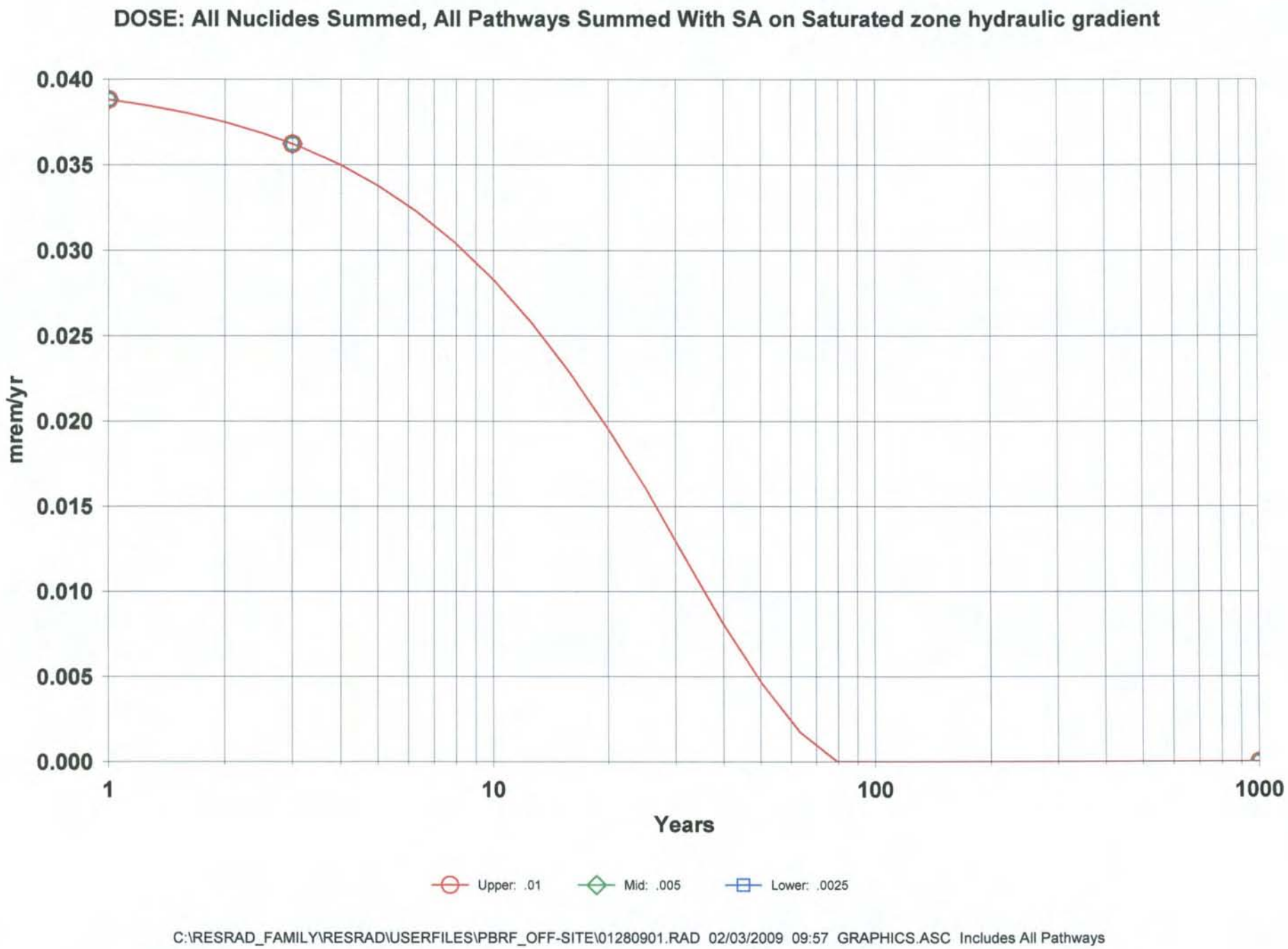
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0.025
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0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: .01
Mid: .005
Lower: .0025
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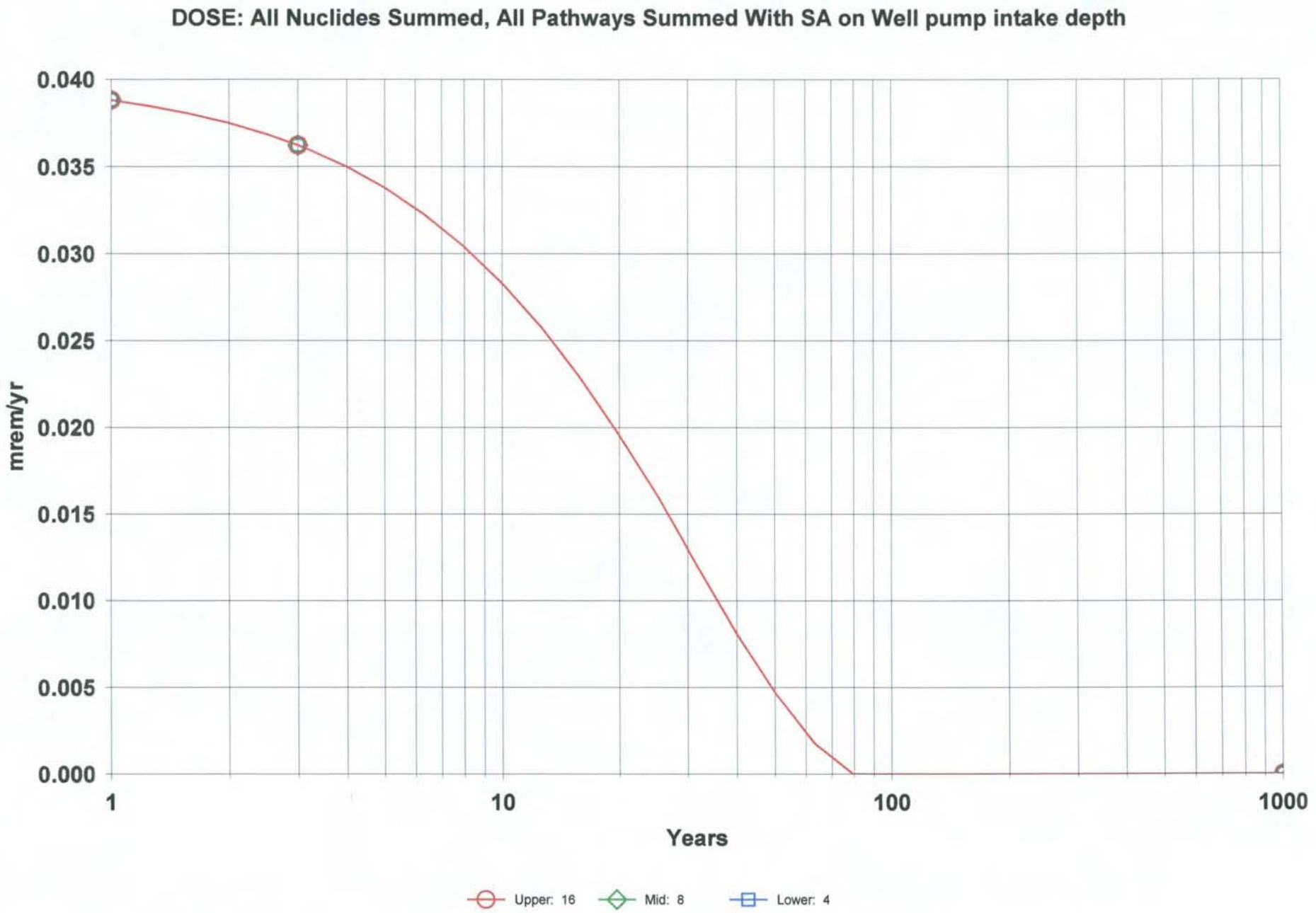

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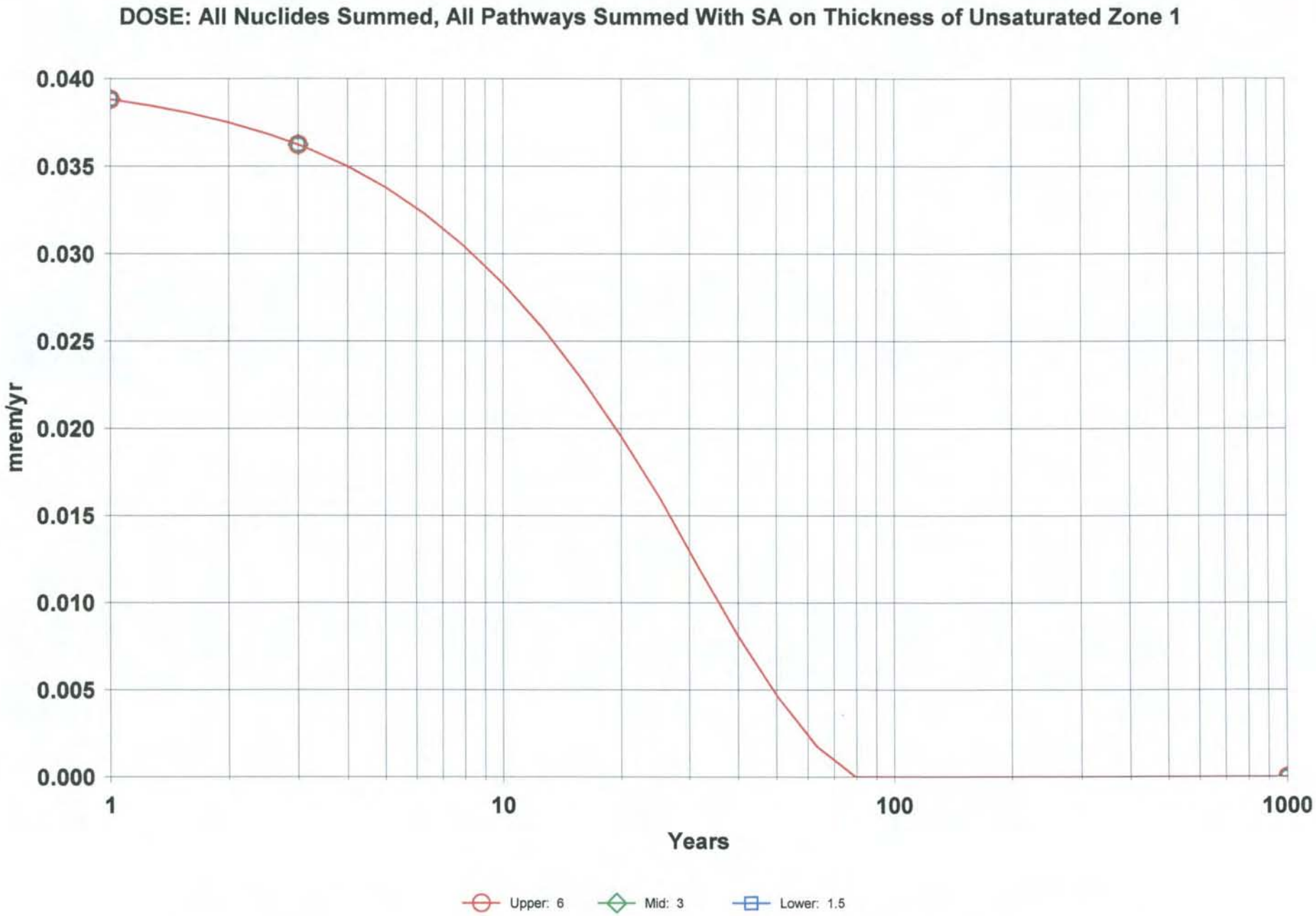
21



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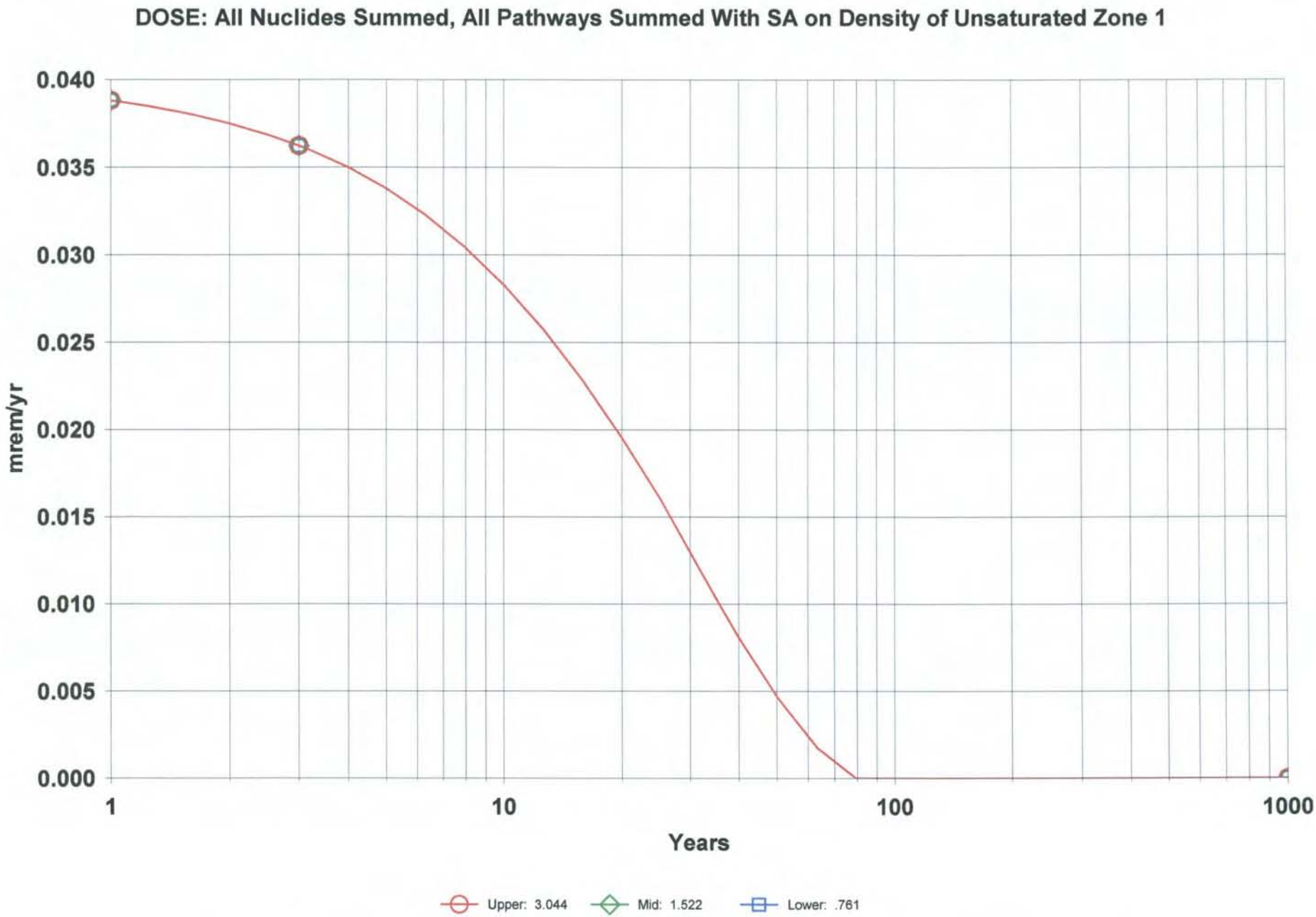
22



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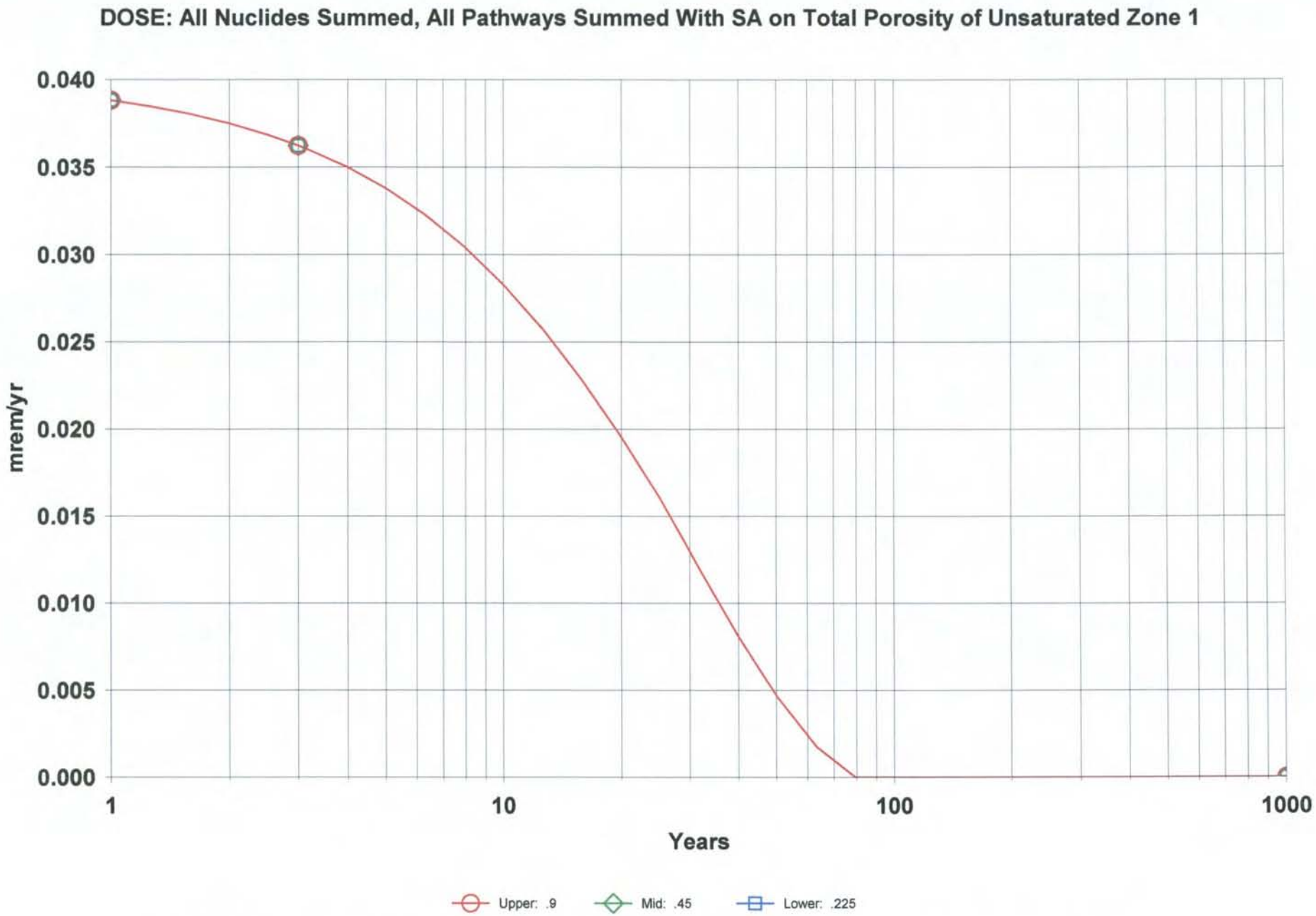

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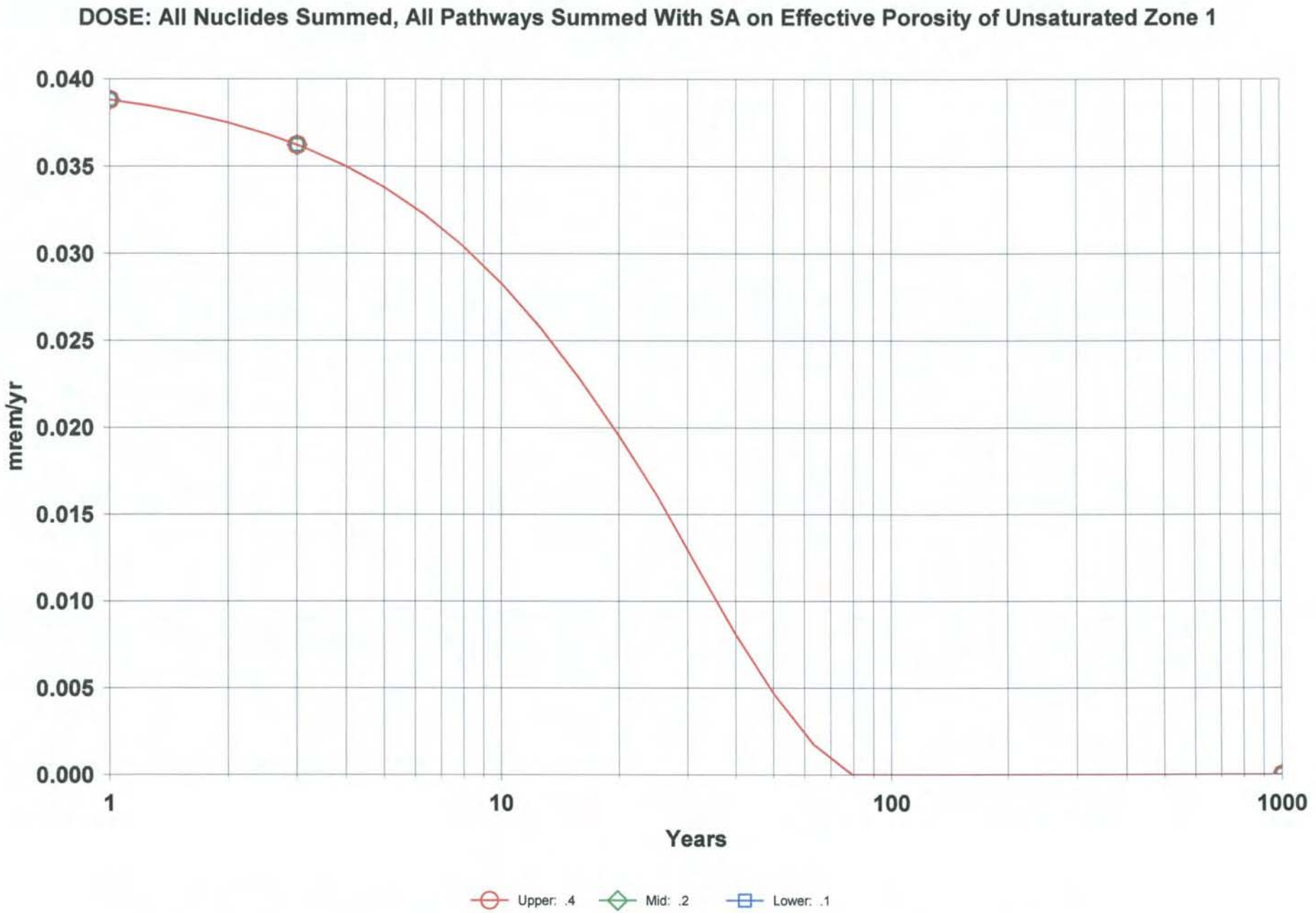

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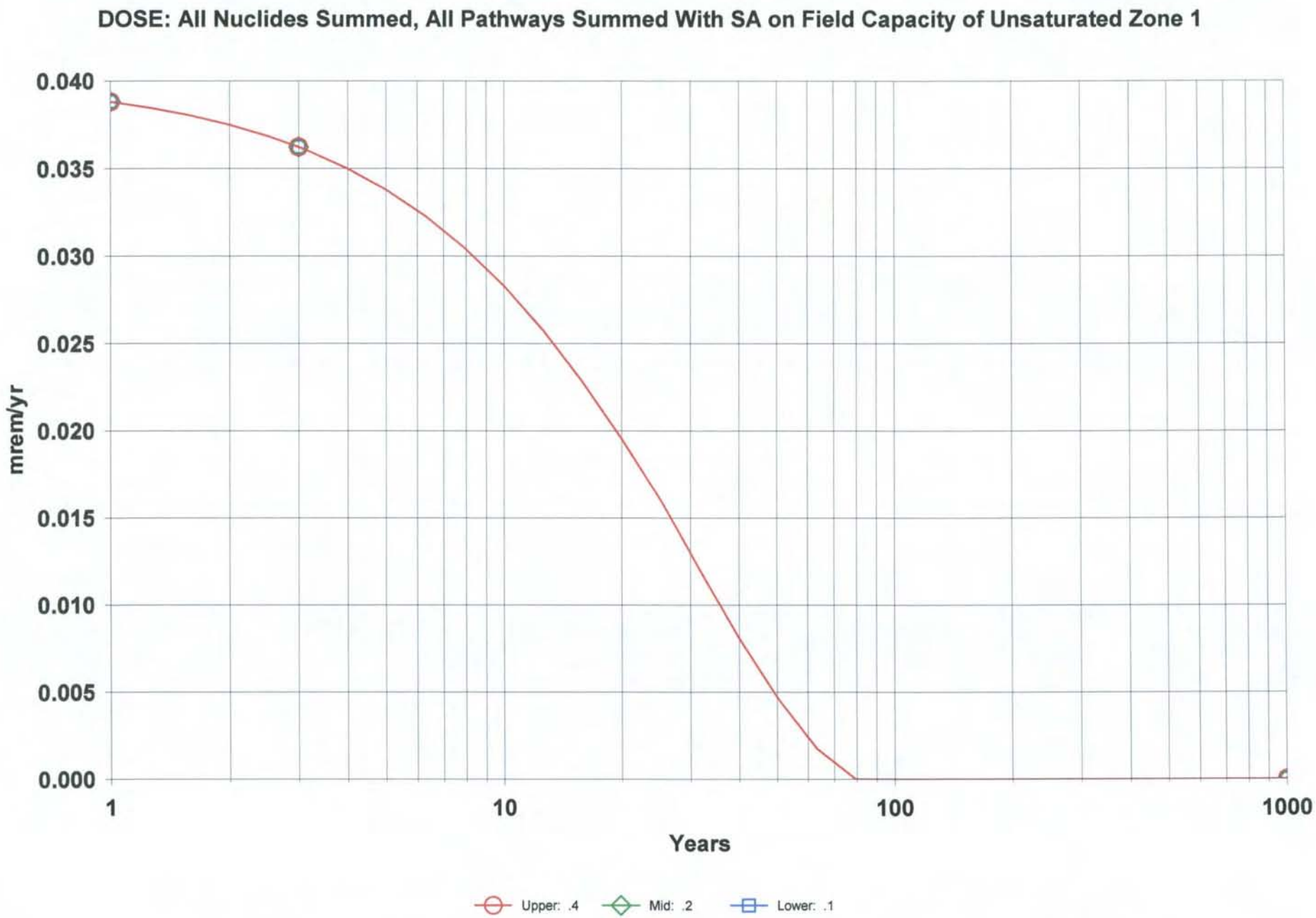

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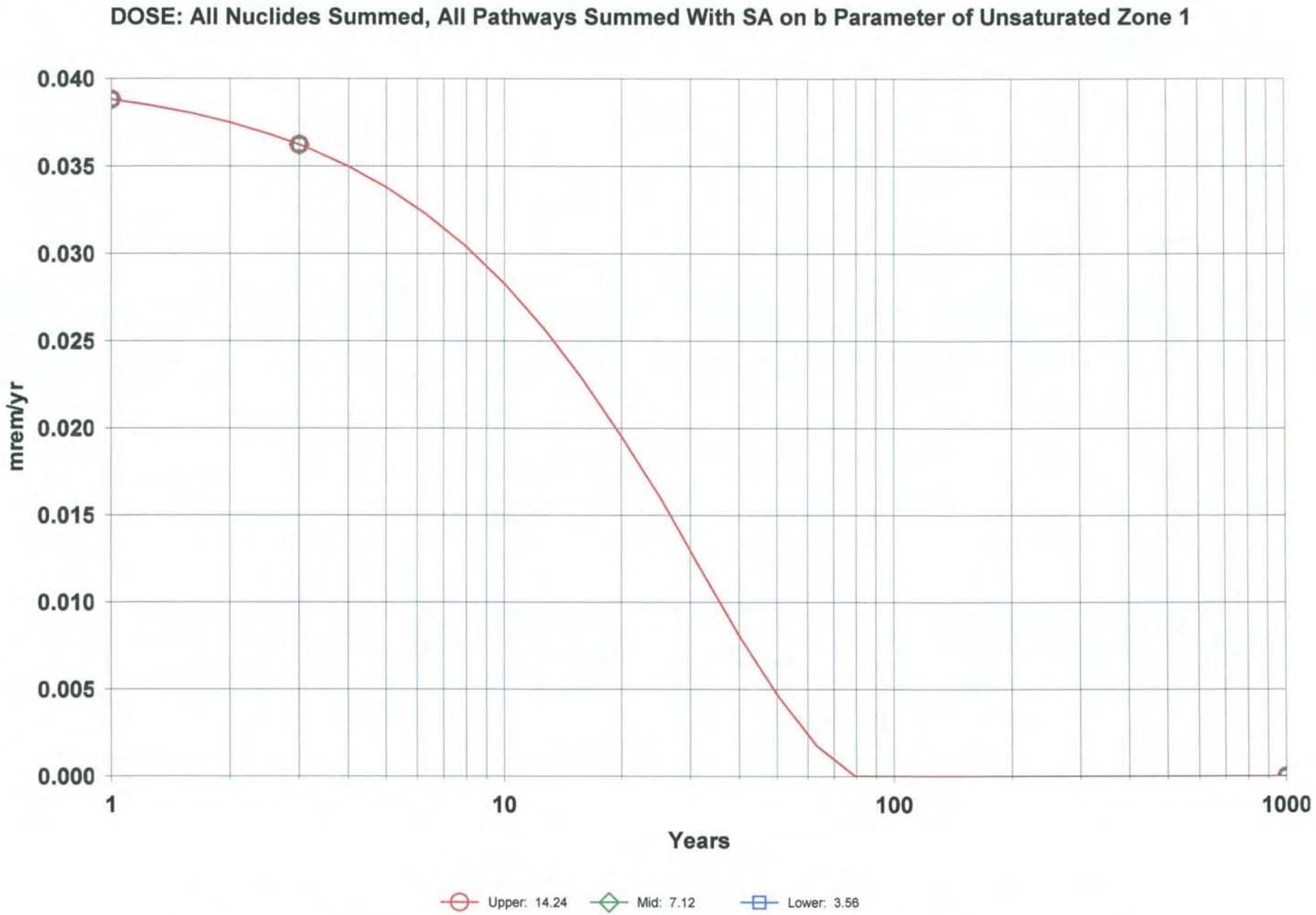

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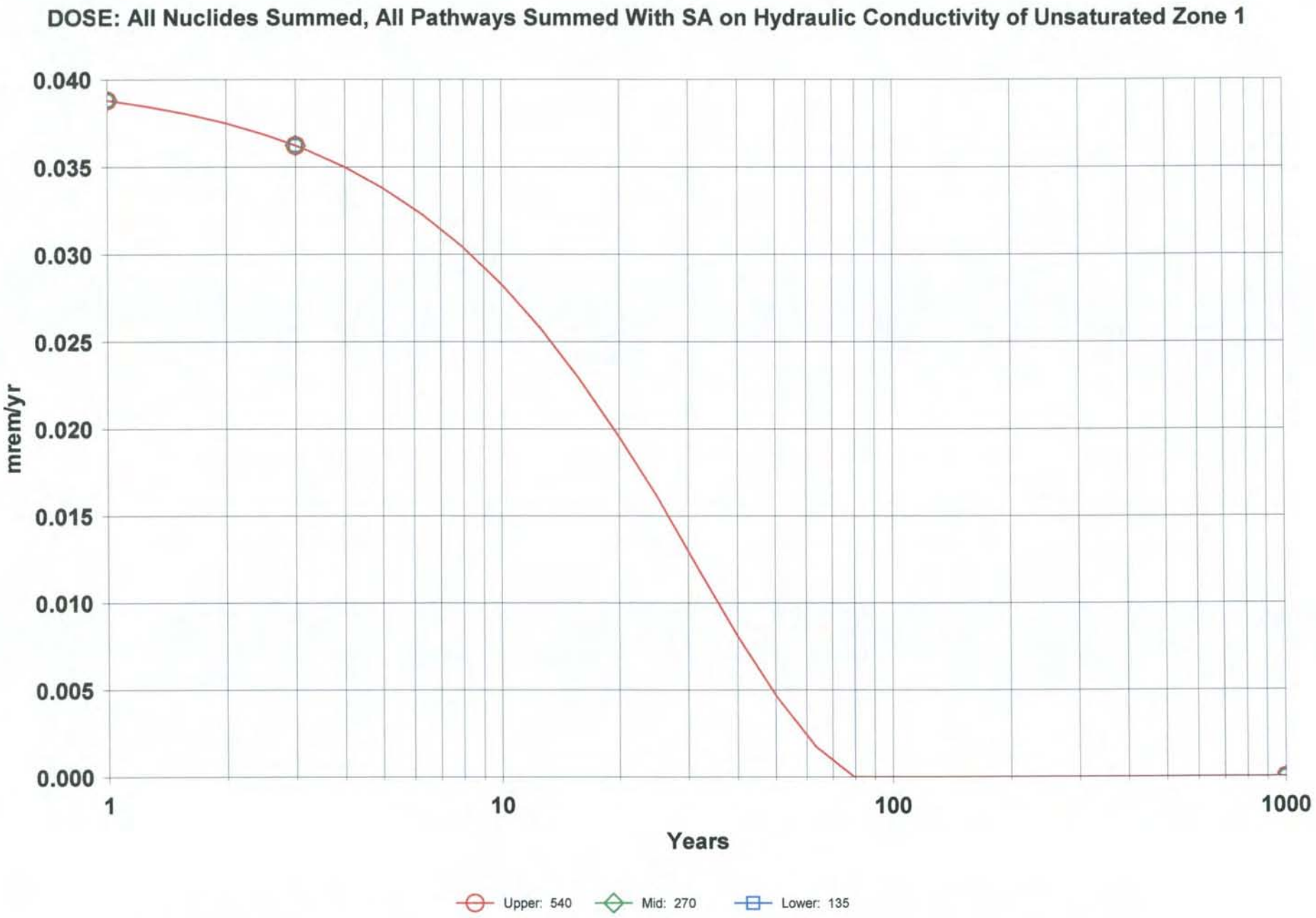
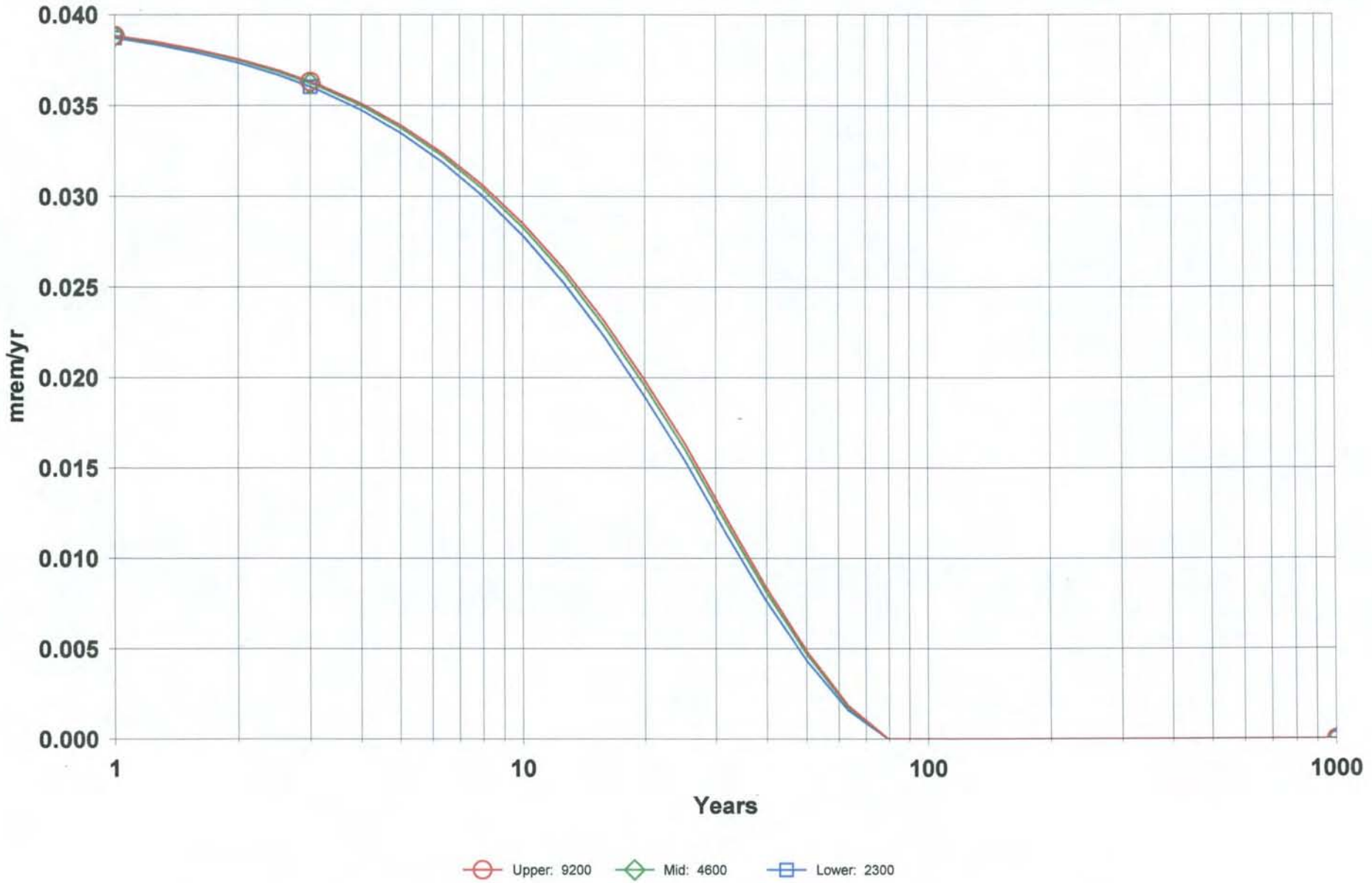
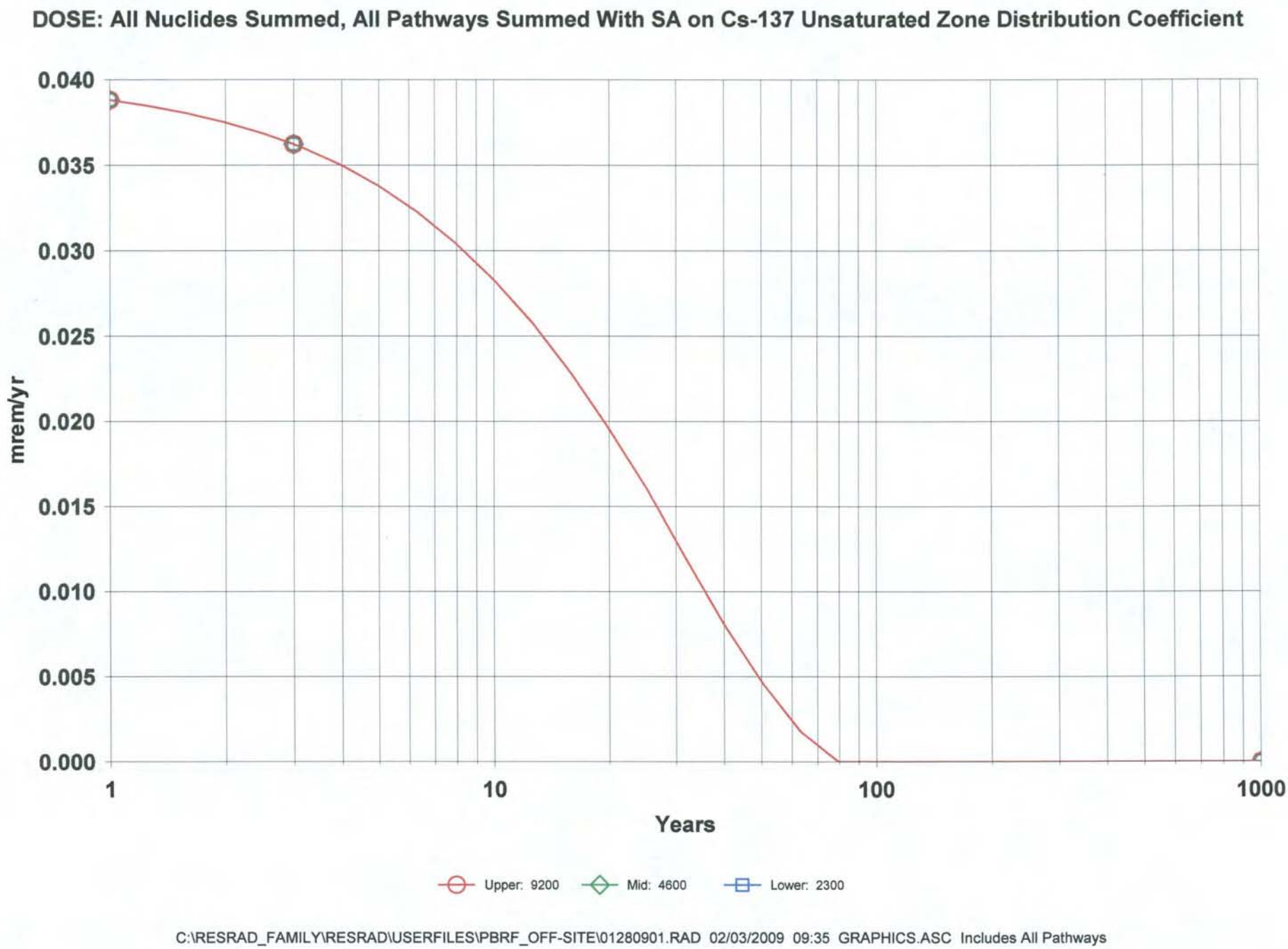


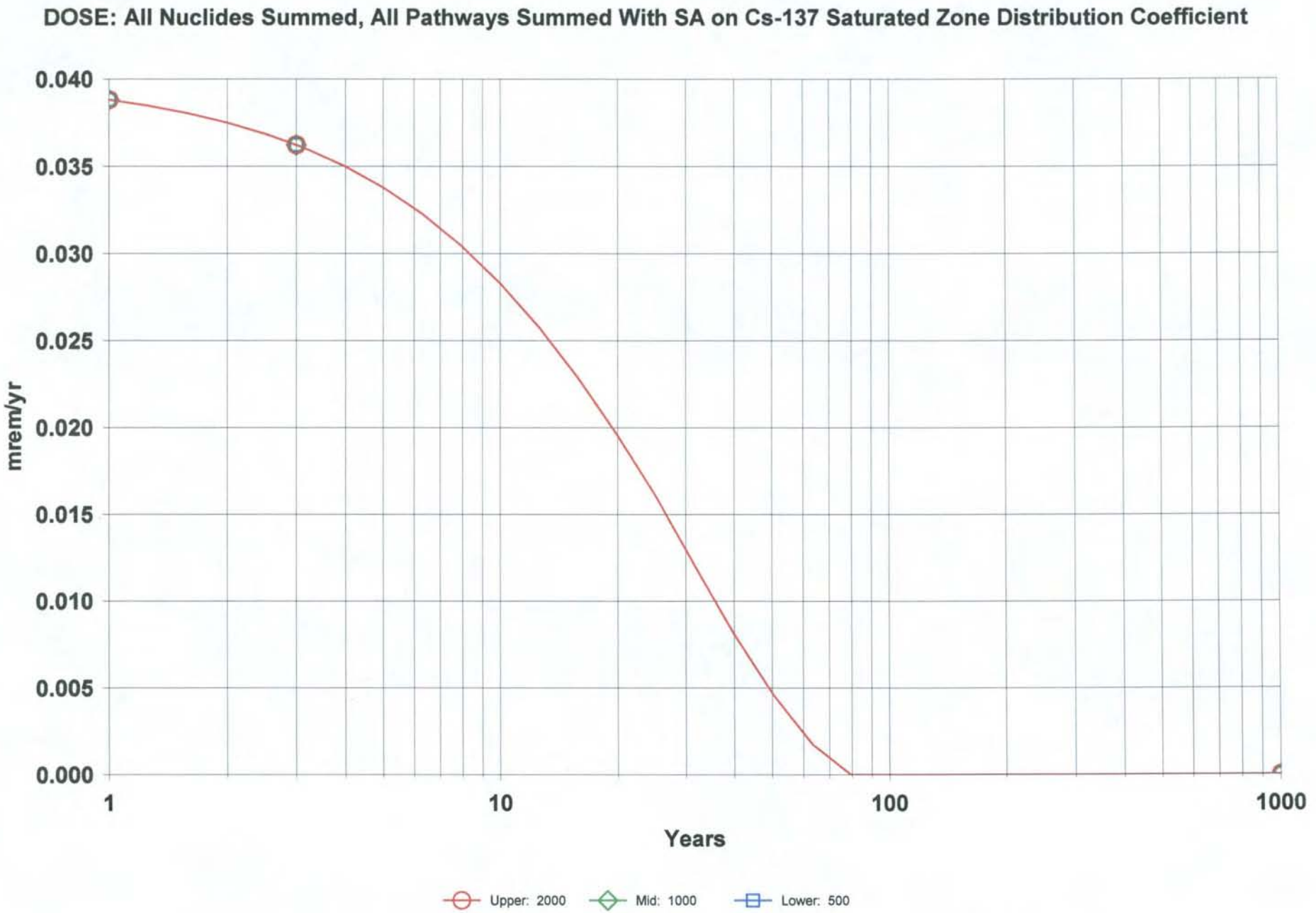
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280901.RAD 02/03/2009 10:26 GRAPHICS.ASC Includes All Pathways

DOSE: All Nuclides Summed, All Pathways Summed With SA on Cs-137 Contaminated Zone Distribution Coefficient

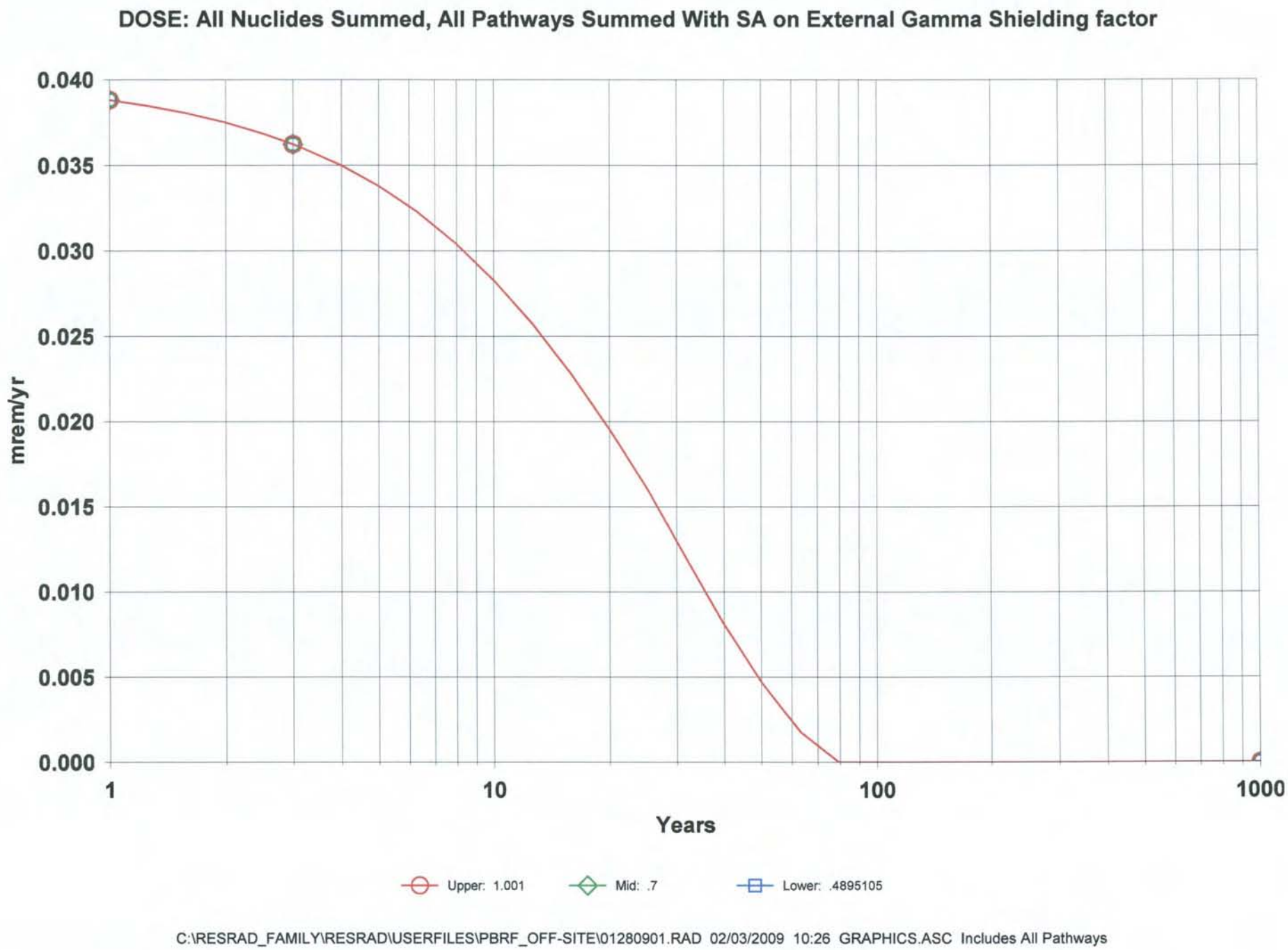


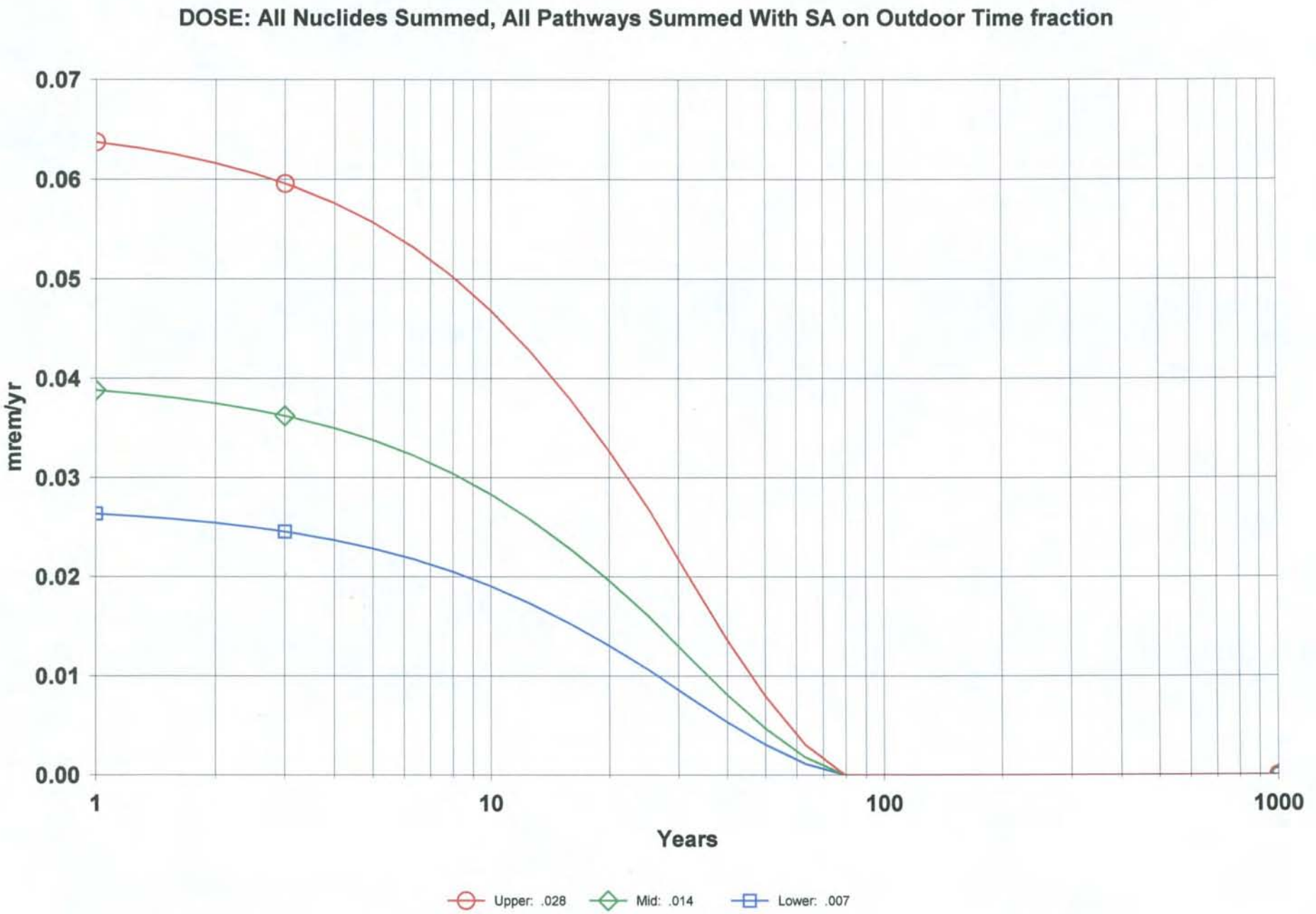
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280901.RAD 02/03/2009 09:35 GRAPHICS.ASC Includes All Pathways


DOSE: All Nuclides Summed, All Pathways Summed With SA on Cs-137 Unsaturated Zone Distribution Coefficient
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: 9200
Mid: 4600
Lower: 2300
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280901.RAD 02/03/2009 09:35 GRAPHICS.ASC Includes All Pathways

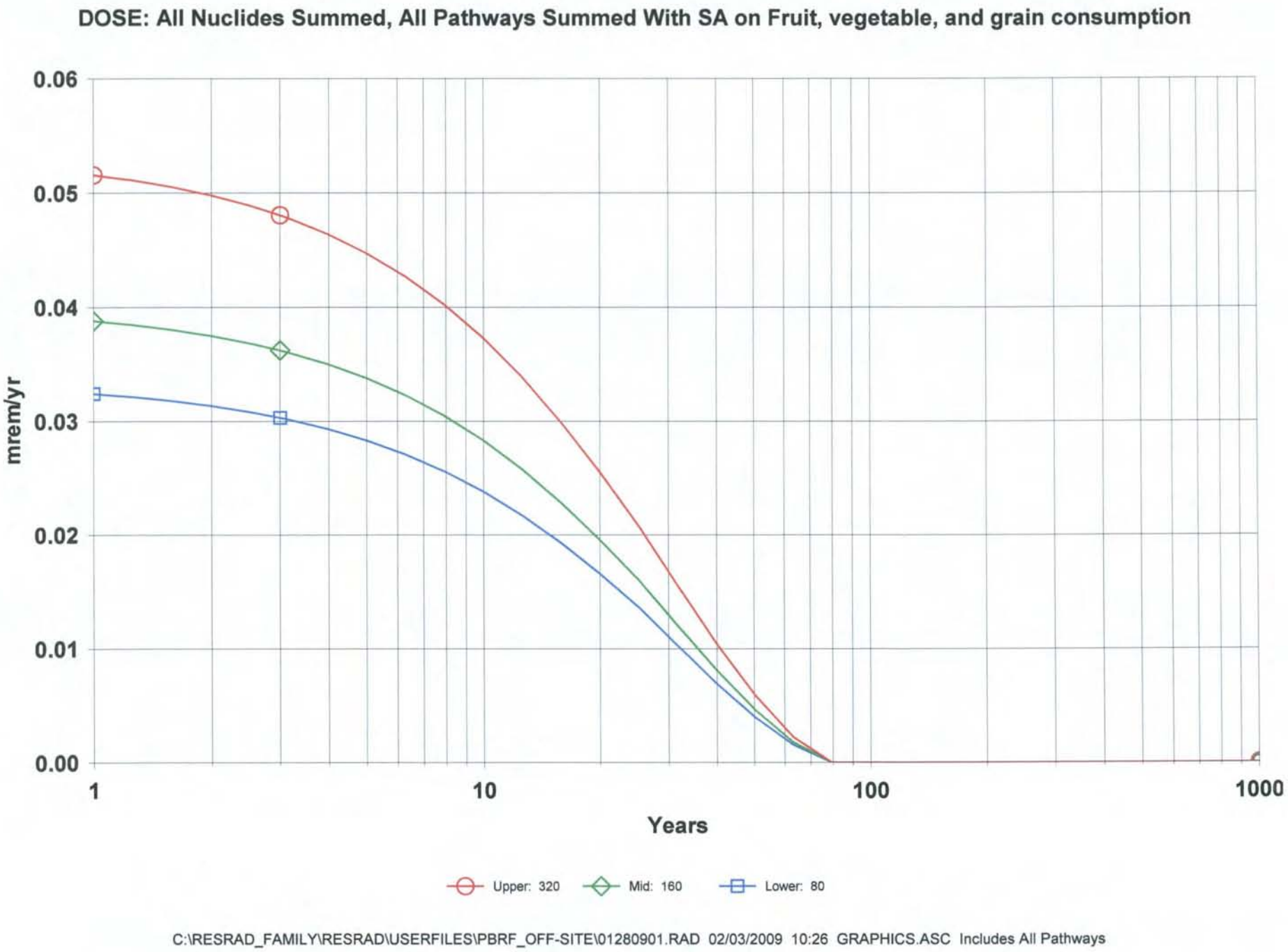


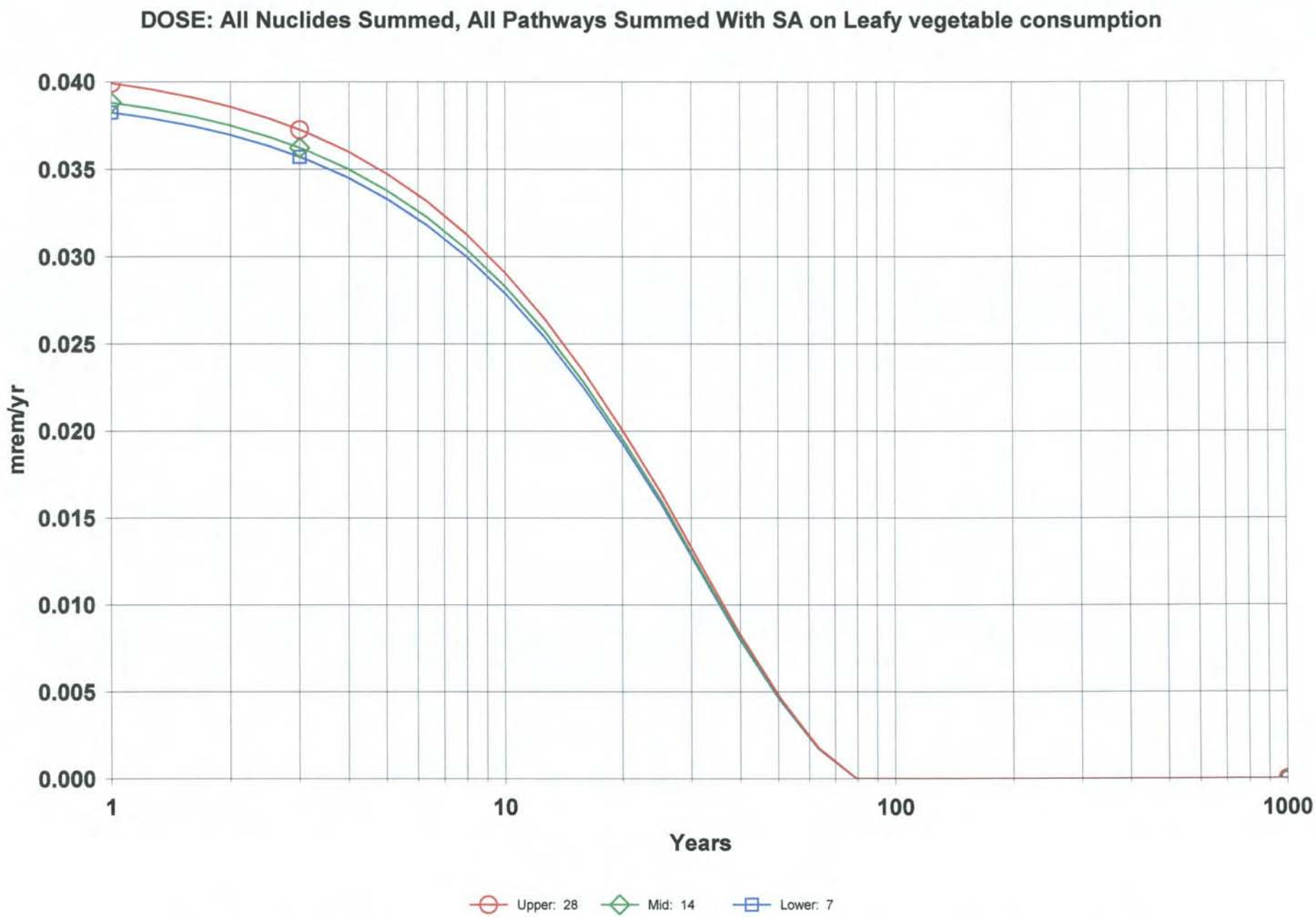
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280901.RAD 02/03/2009 09:35 GRAPHICS.ASC Includes All Pathways


DOSE: All Nuclides Summed, All Pathways Summed With SA on External Gamma Shielding factor
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: 1.001
Mid: .7
Lower: .4895105
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280901.RAD 02/03/2009 10:26 GRAPHICS.ASC Includes All Pathways

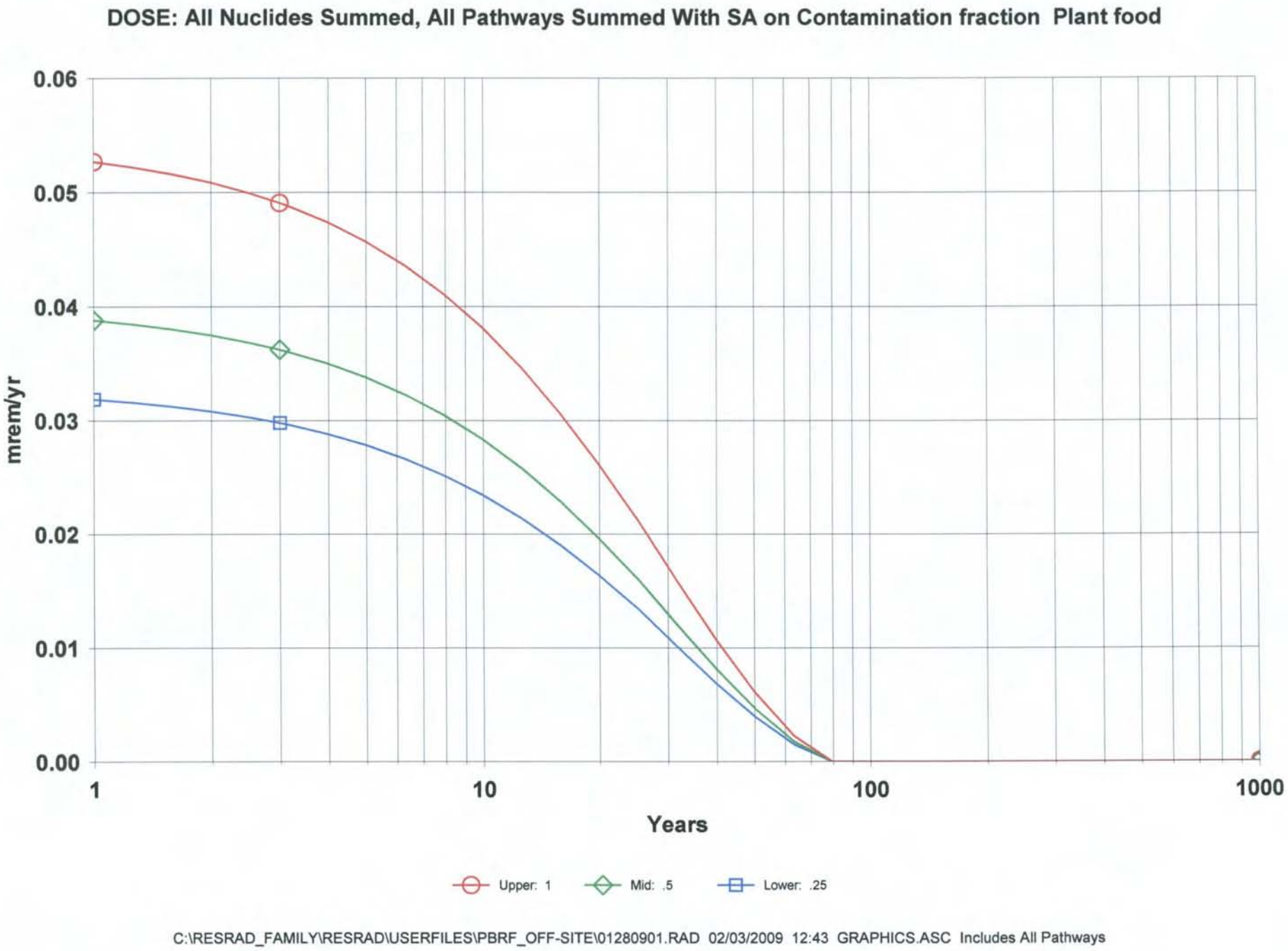


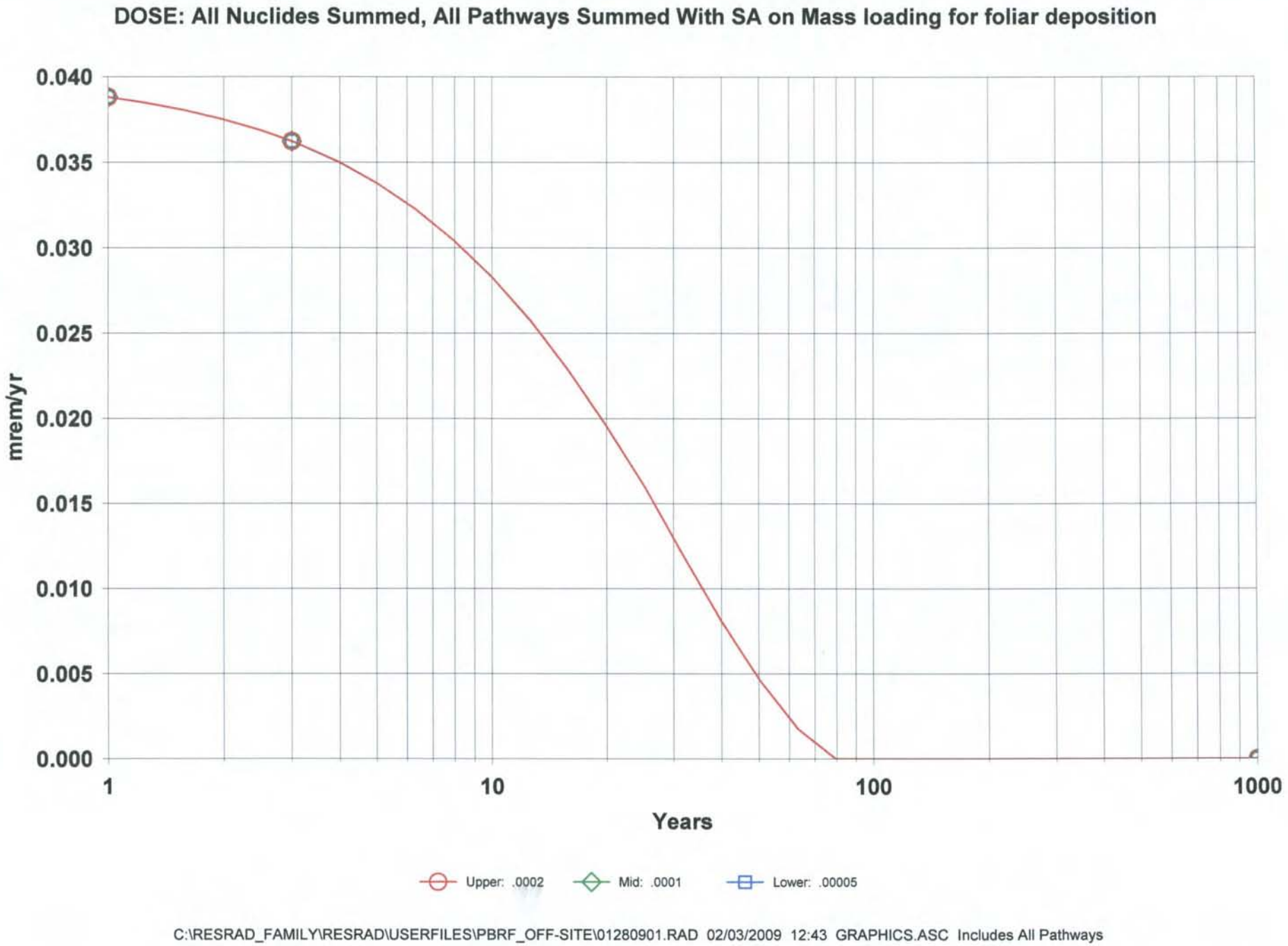
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280901.RAD 02/03/2009 08:30 GRAPHICS.ASC Includes All Pathways

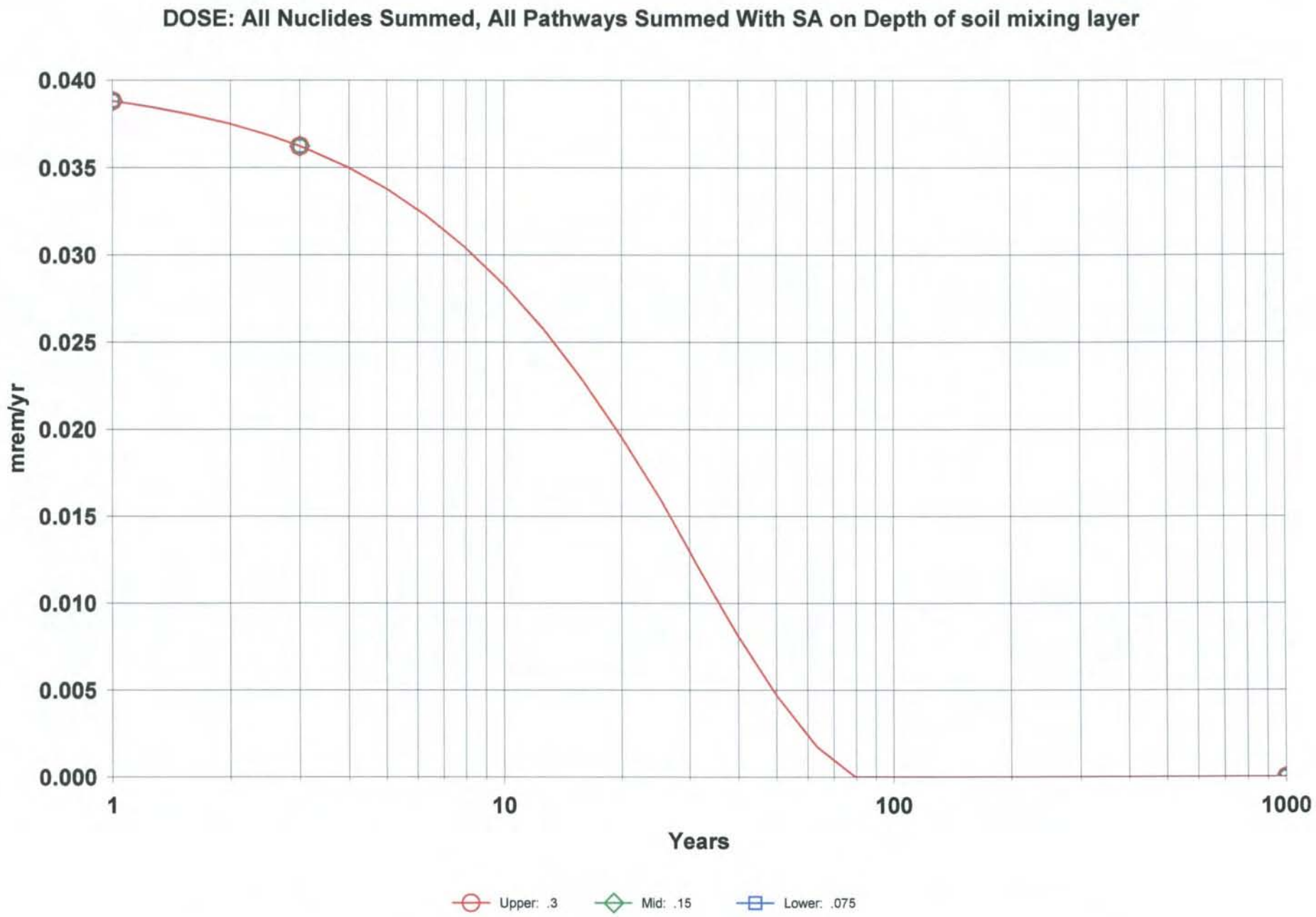

DOSE: All Nuclides Summed, All Pathways Summed With SA on Fruit, vegetable, and grain consumption
0.06
0.05
0.04
0.03
0.02
0.01
0.00
mrem/yr
1
10
100
1000
Years
Upper: 320
Mid: 160
Lower: 80
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280901.RAD 02/03/2009 10:26 GRAPHICS.ASC Includes All Pathways



C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280901.RAD 02/03/2009 10:26 GRAPHICS.ASC Includes All Pathways


DOSE: All Nuclides Summed, All Pathways Summed With SA on Contamination fraction Plant food
0.06
0.05
0.04
0.03
0.02
0.01
0.00
mrem/yr
1
10
100
1000
Years
Upper: 1
Mid: .5
Lower: .25
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280901.RAD 02/03/2009 12:43 GRAPHICS.ASC Includes All Pathways


DOSE: All Nuclides Summed, All Pathways Summed With SA on Mass loading for foliar deposition
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: .0002
Mid: .0001
Lower: .00005
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280901.RAD 02/03/2009 12:43 GRAPHICS.ASC Includes All Pathways



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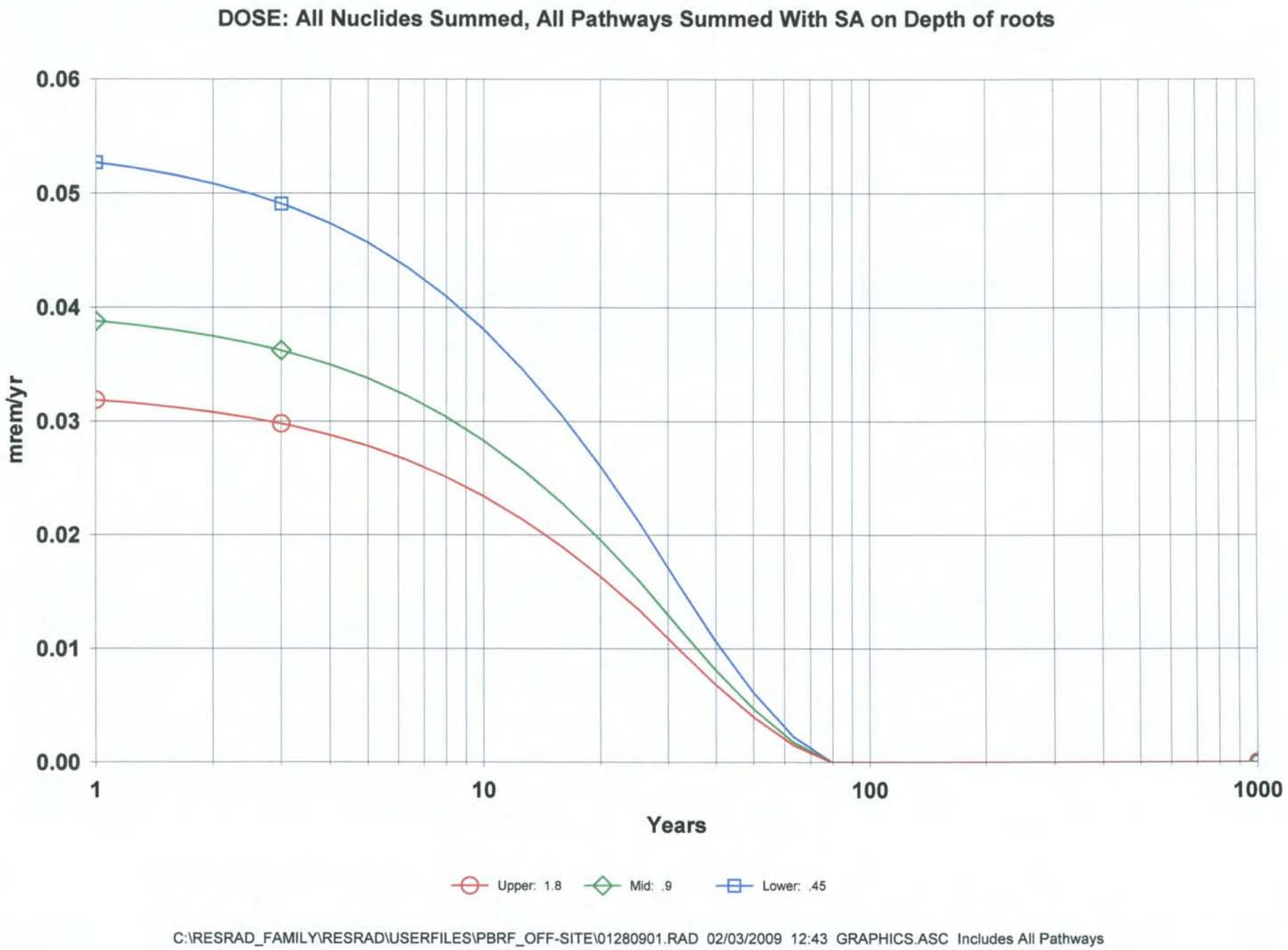
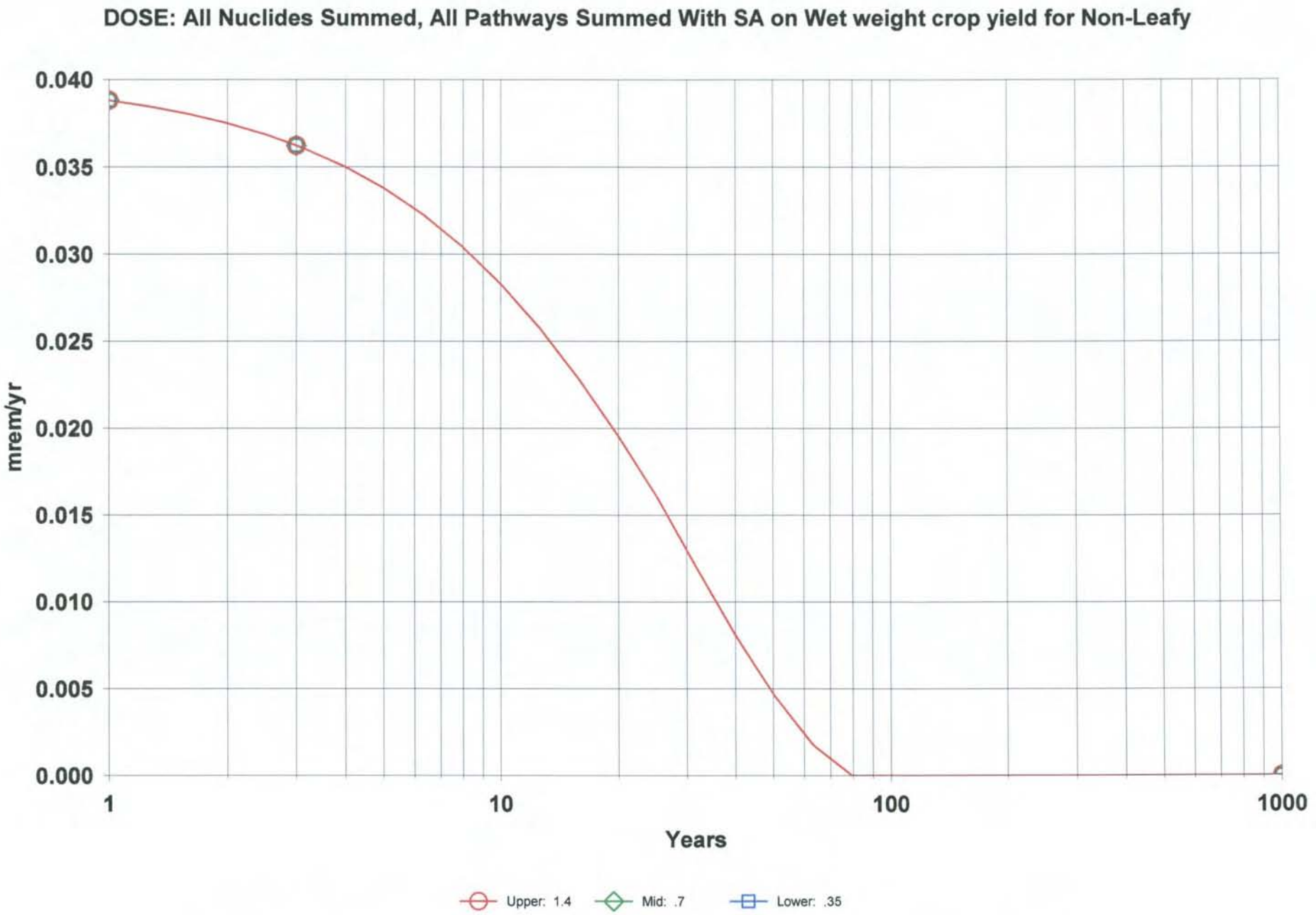
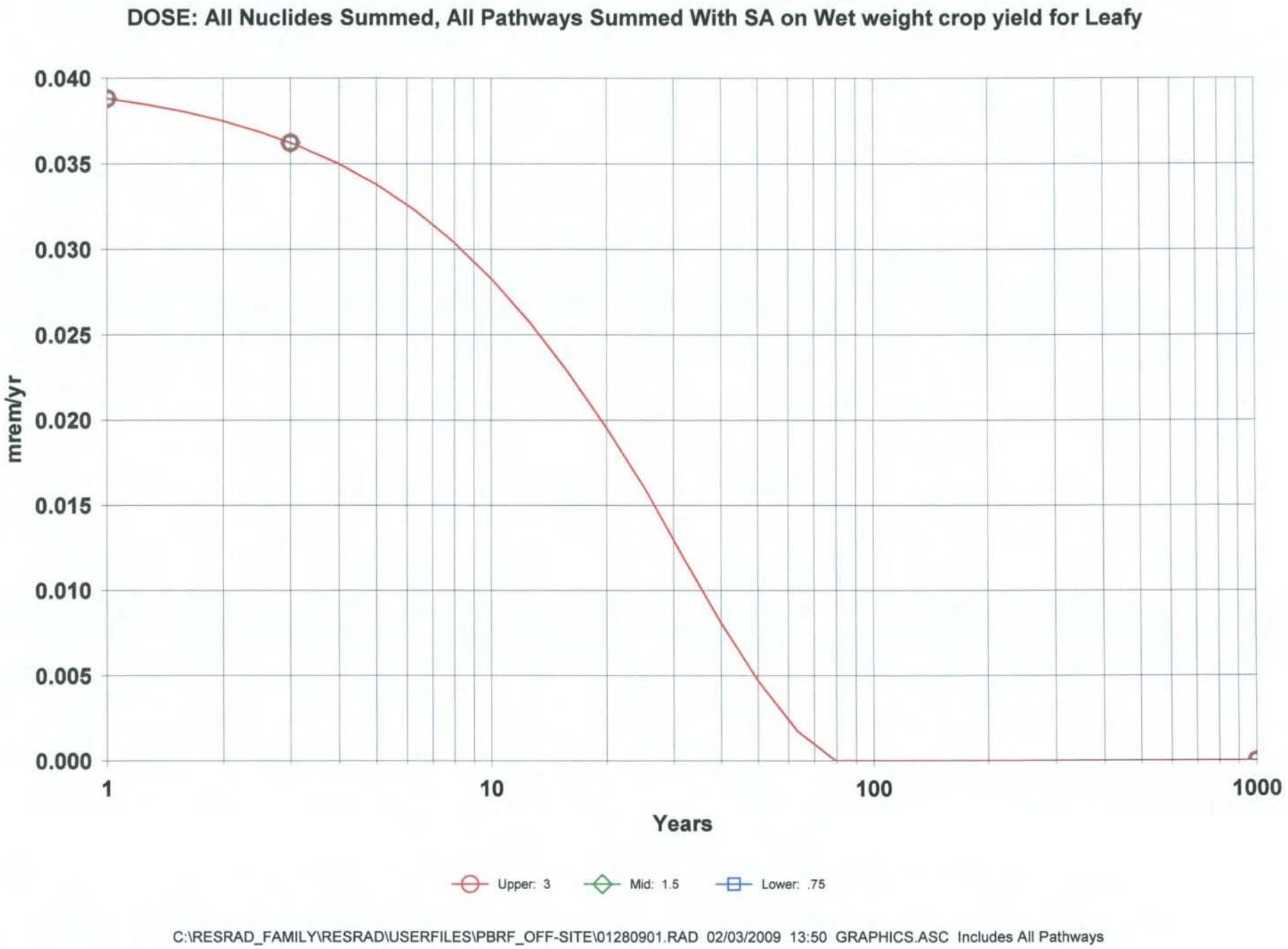
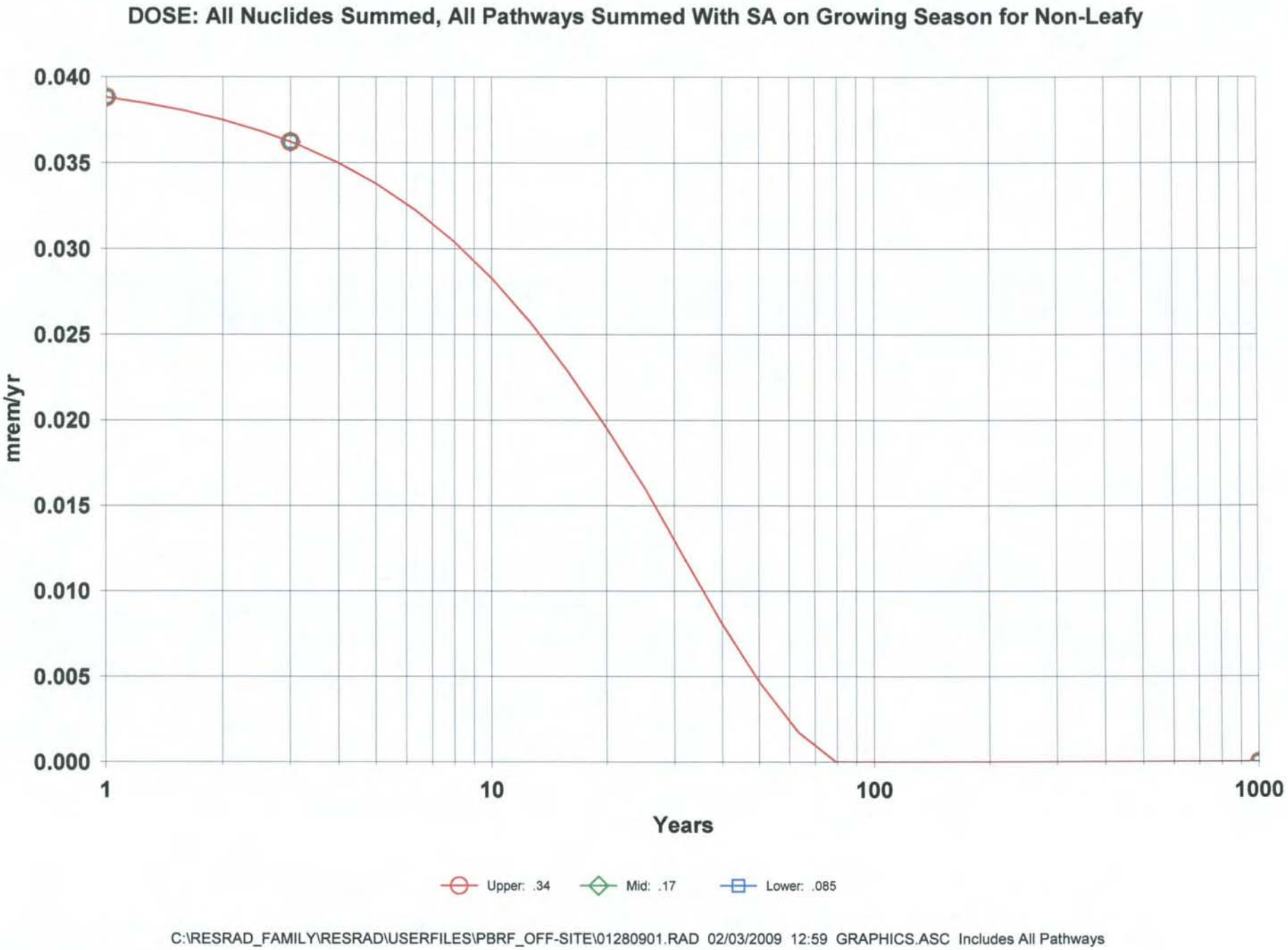
38

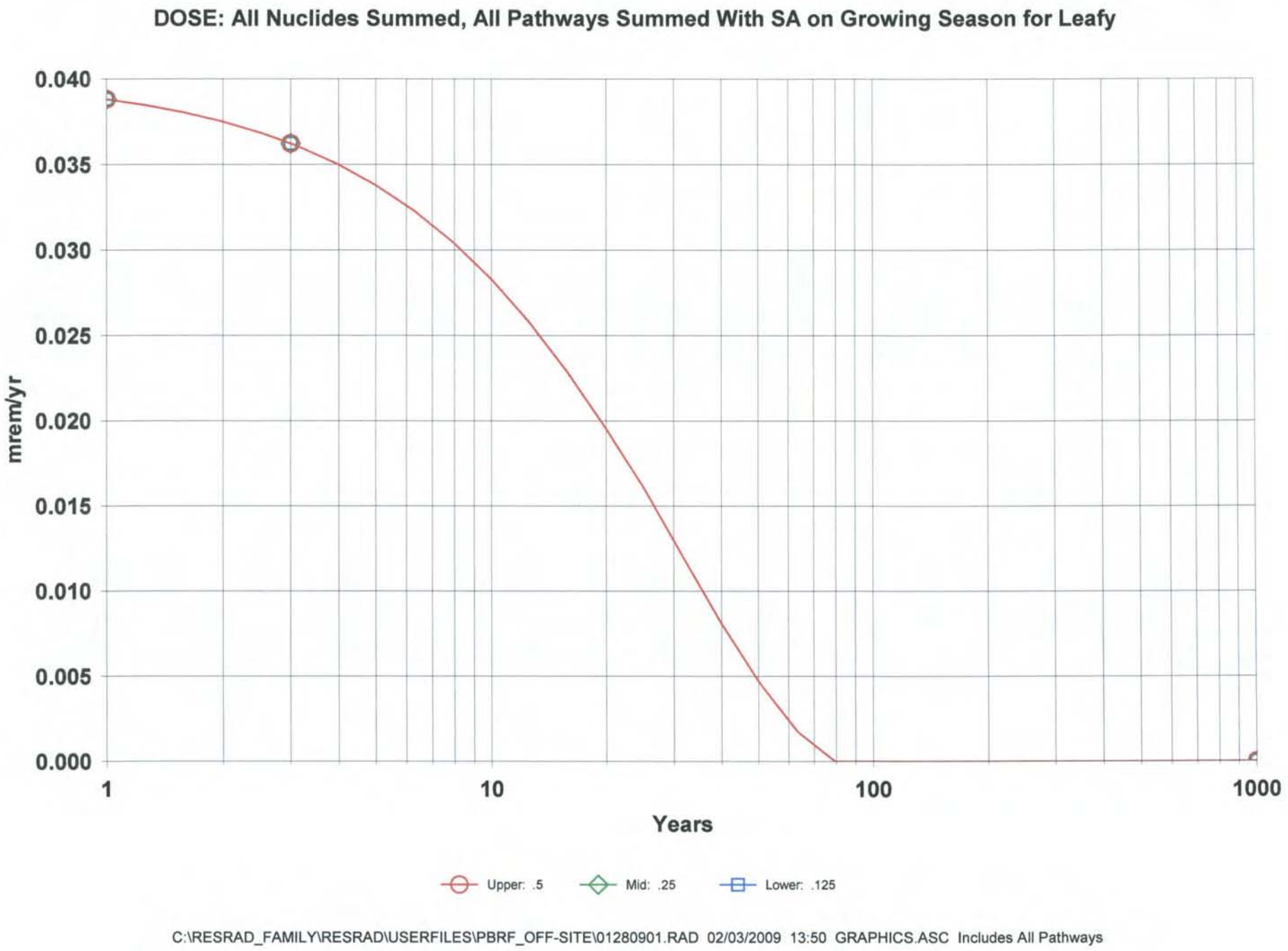

DOSE: All Nuclides Summed, All Pathways Summed With SA on Depth of roots
0.06
0.05
0.04
0.03
0.02
0.01
0.00
mrem/yr
1
10
100
1000
Years
Upper: 1.8
Mid: .9
Lower: .45
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280901.RAD 02/03/2009 12:43 GRAPHICS.ASC Includes All Pathways

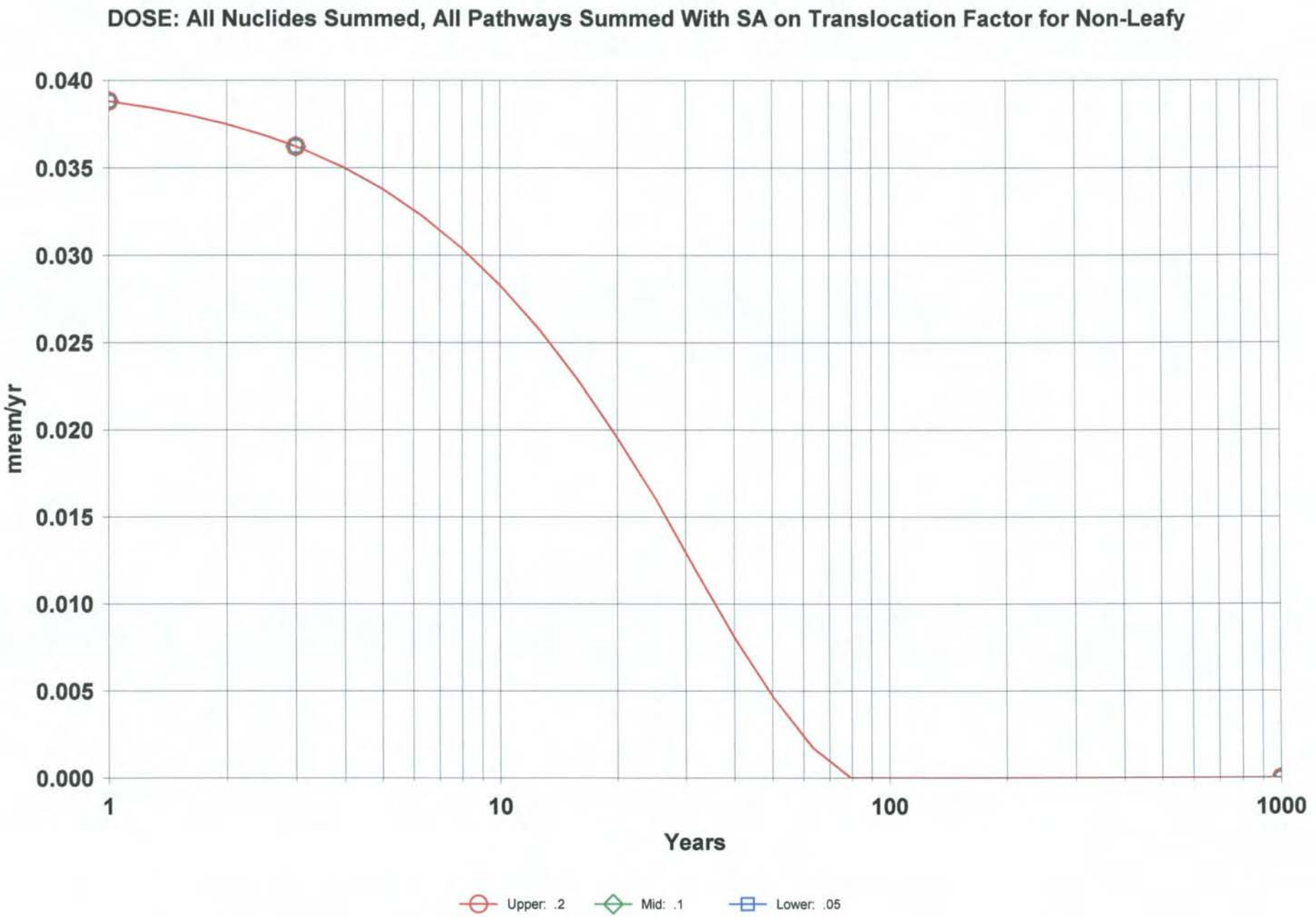


C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280901.RAD 02/03/2009 12:59 GRAPHICS.ASC Includes All Pathways


DOSE: All Nuclides Summed, All Pathways Summed With SA on Wet weight crop yield for Leafy
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: 3
Mid: 1.5
Lower: .75
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280901.RAD 02/03/2009 13:50 GRAPHICS.ASC Includes All Pathways


DOSE: All Nuclides Summed, All Pathways Summed With SA on Growing Season for Non-Leafy
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: .34
Mid: .17
Lower: .085
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280901.RAD 02/03/2009 12:59 GRAPHICS.ASC Includes All Pathways


DOSE: All Nuclides Summed, All Pathways Summed With SA on Growing Season for Leafy
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: .5
Mid: .25
Lower: .125
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280901.RAD 02/03/2009 13:50 GRAPHICS.ASC Includes All Pathways



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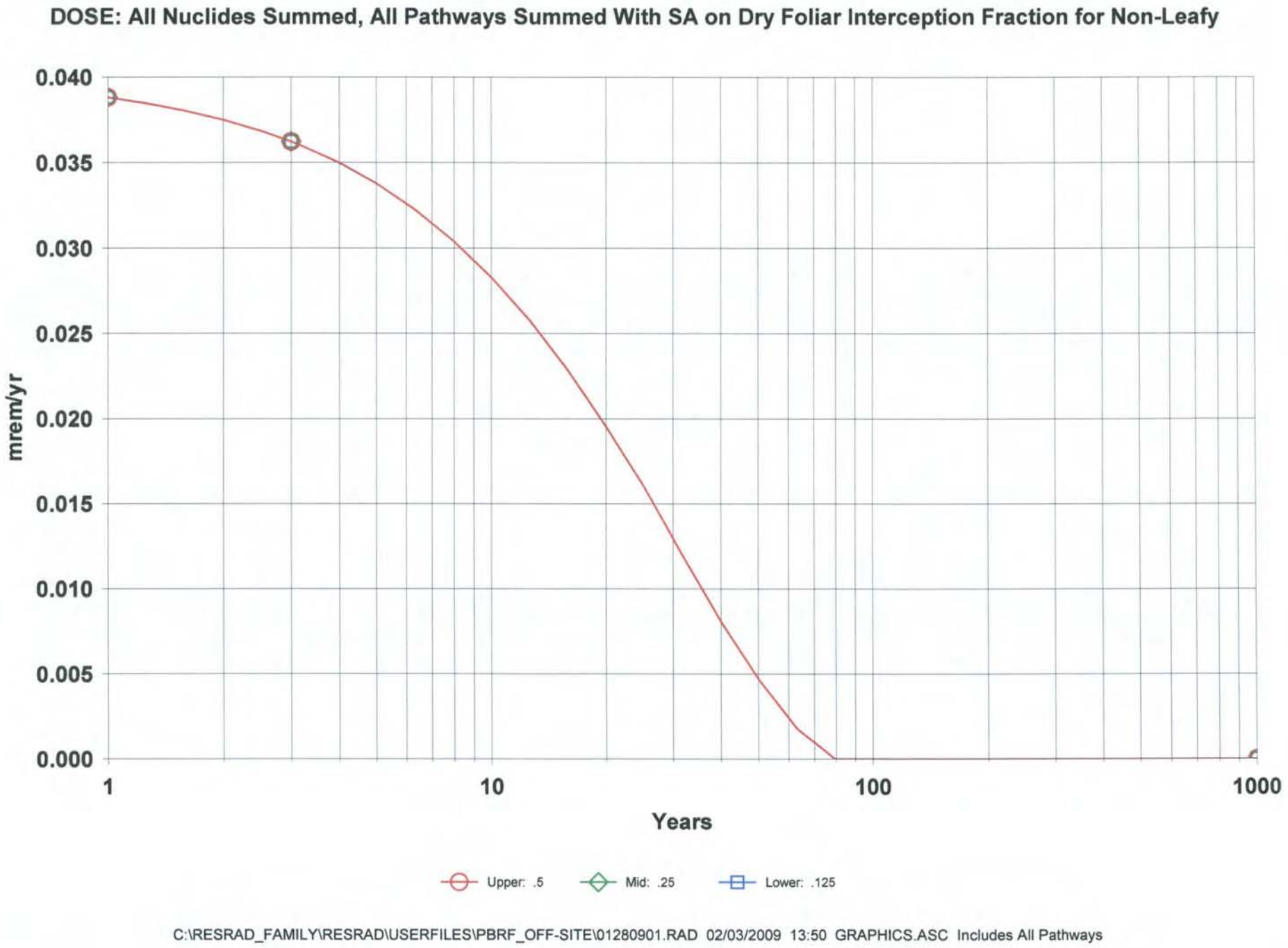
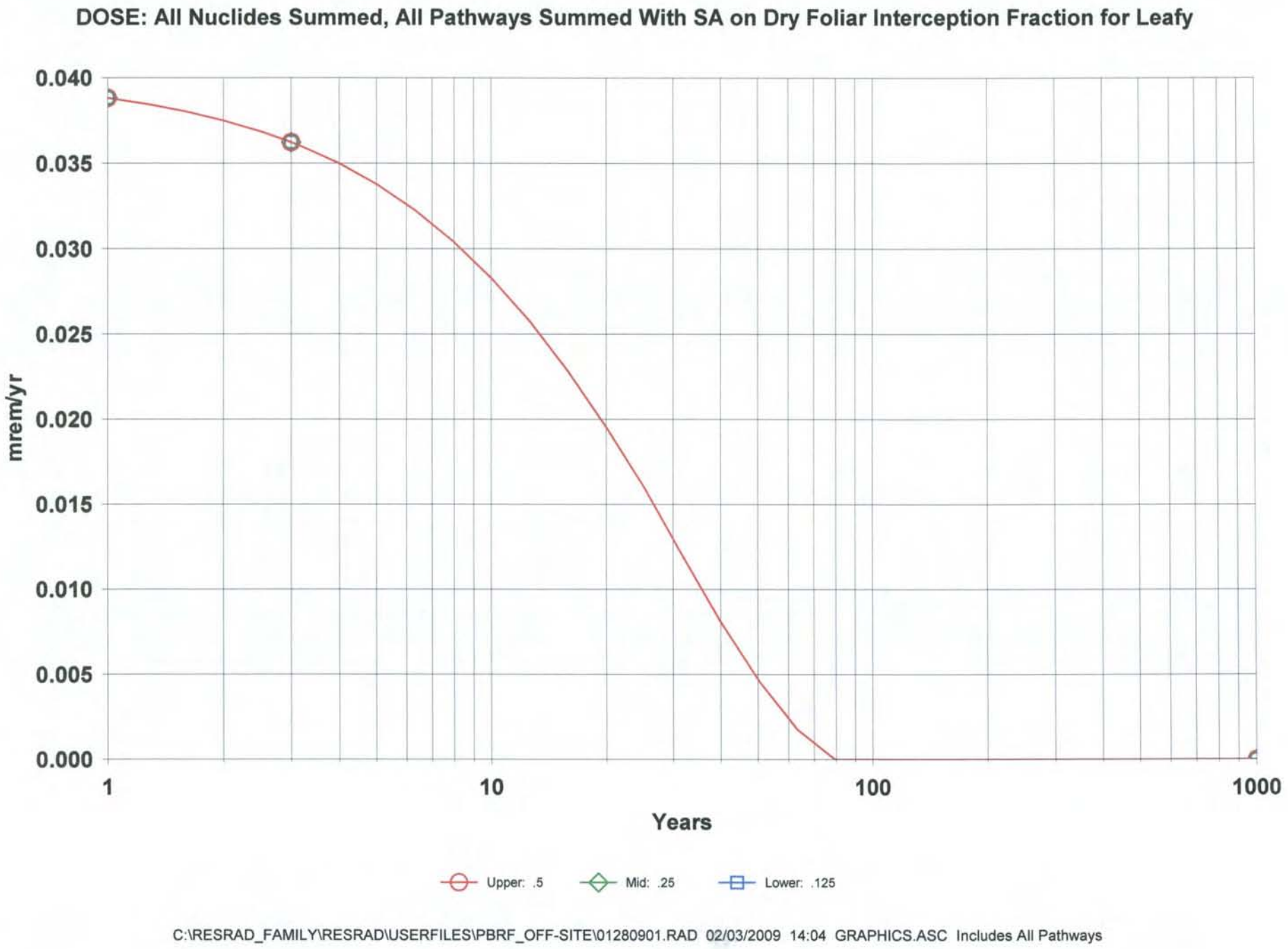
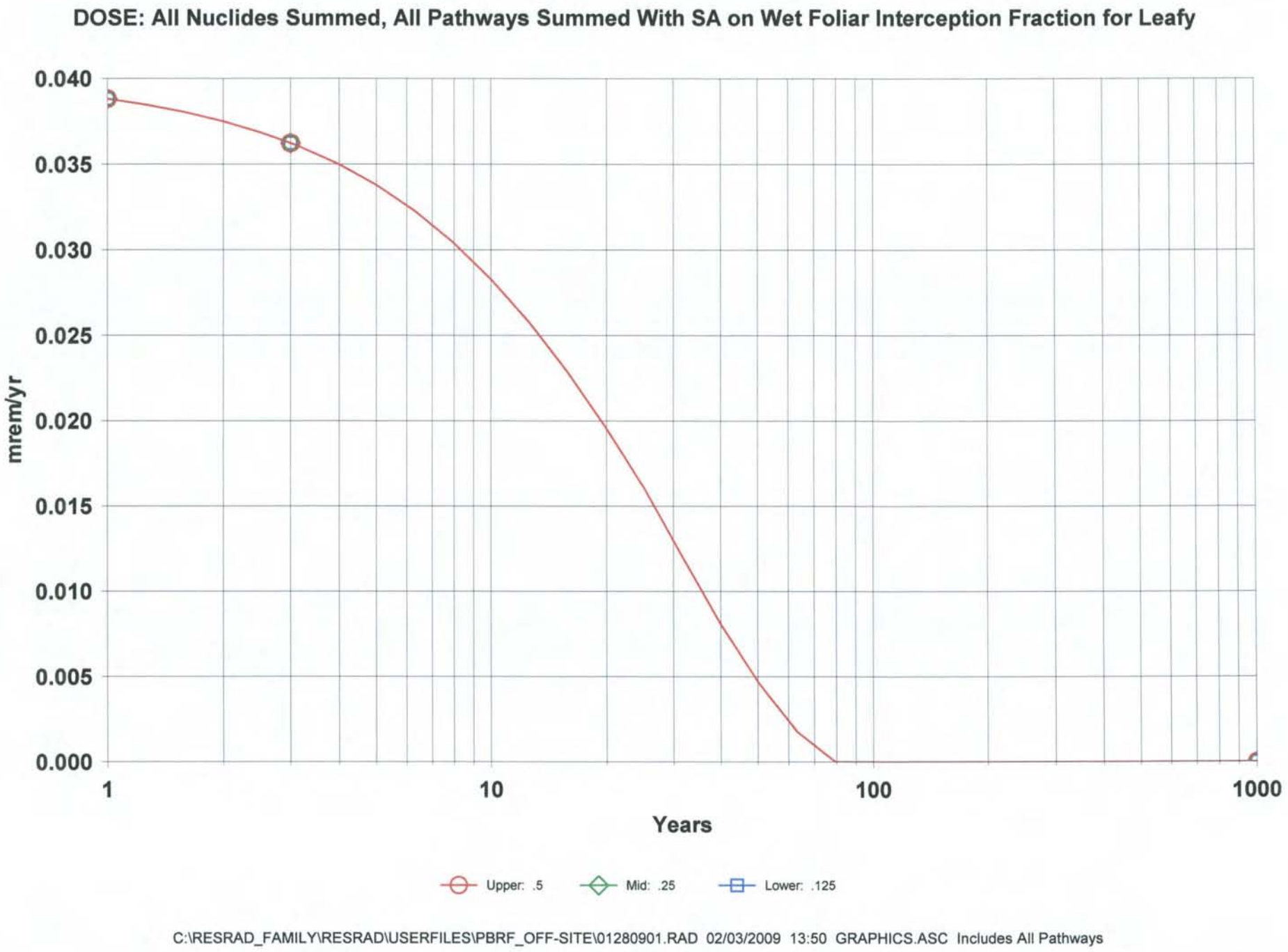
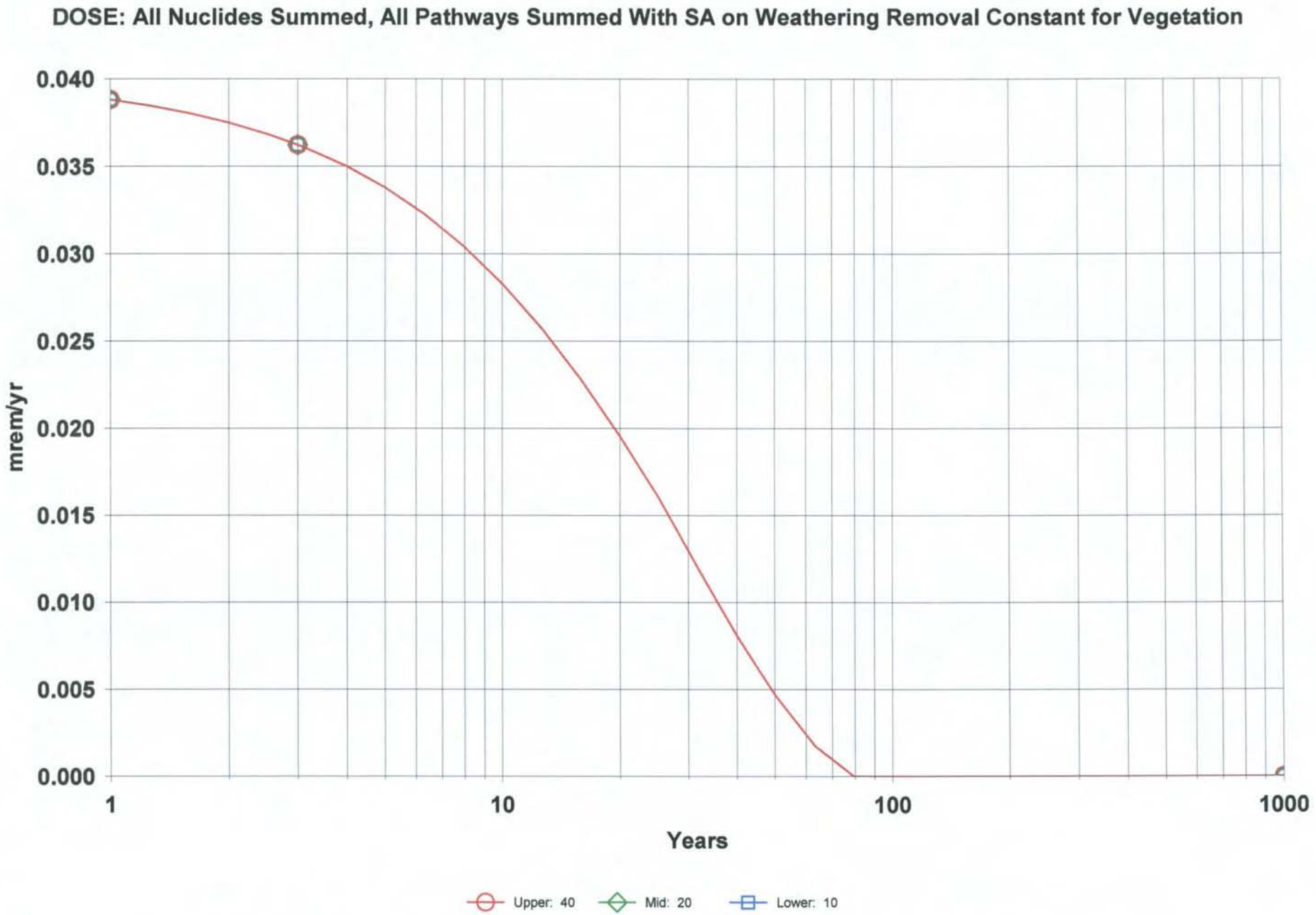

DOSE: All Nuclides Summed, All Pathways Summed With SA on Dry Foliar Interception Fraction for Non-Leafy
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: .5
Mid: .25
Lower: .125
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280901.RAD 02/03/2009 13:50 GRAPHICS.ASC Includes All Pathways


DOSE: All Nuclides Summed, All Pathways Summed With SA on Dry Foliar Interception Fraction for Leafy
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: .5
Mid: .25
Lower: .125
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280901.RAD 02/03/2009 14:04 GRAPHICS.ASC Includes All Pathways


DOSE: All Nuclides Summed, All Pathways Summed With SA on Wet Foliar Interception Fraction for Leafy
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: .5
Mid: .25
Lower: .125
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280901.RAD 02/03/2009 13:50 GRAPHICS.ASC Includes All Pathways



C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\01280901.RAD 02/03/2009 12:59 GRAPHICS.ASC Includes All Pathways

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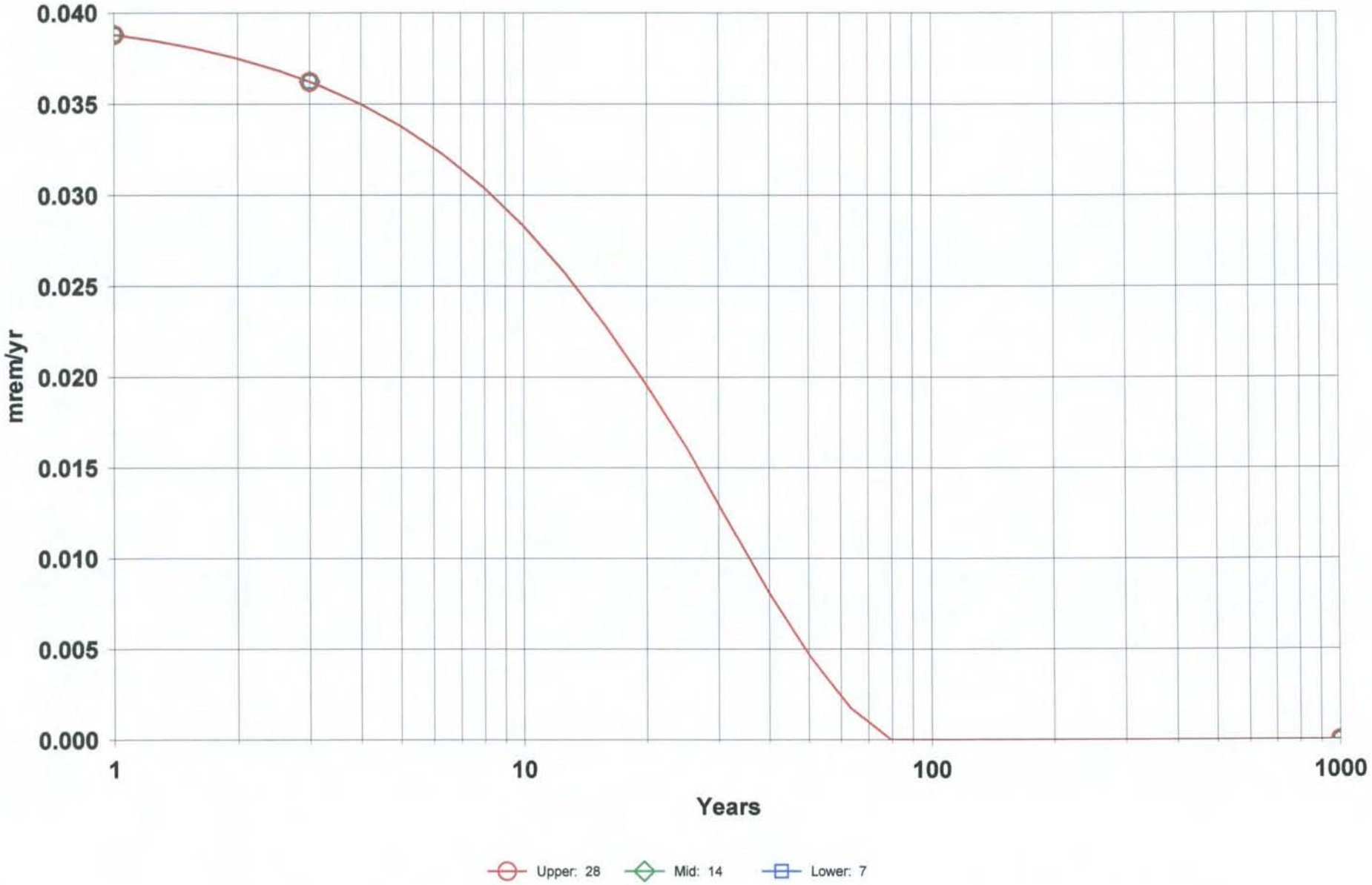
DOSE: All Nuclides Summed, All Pathways Summed With SA on Storage time for Fruits, non-leafy vegetables, and grain



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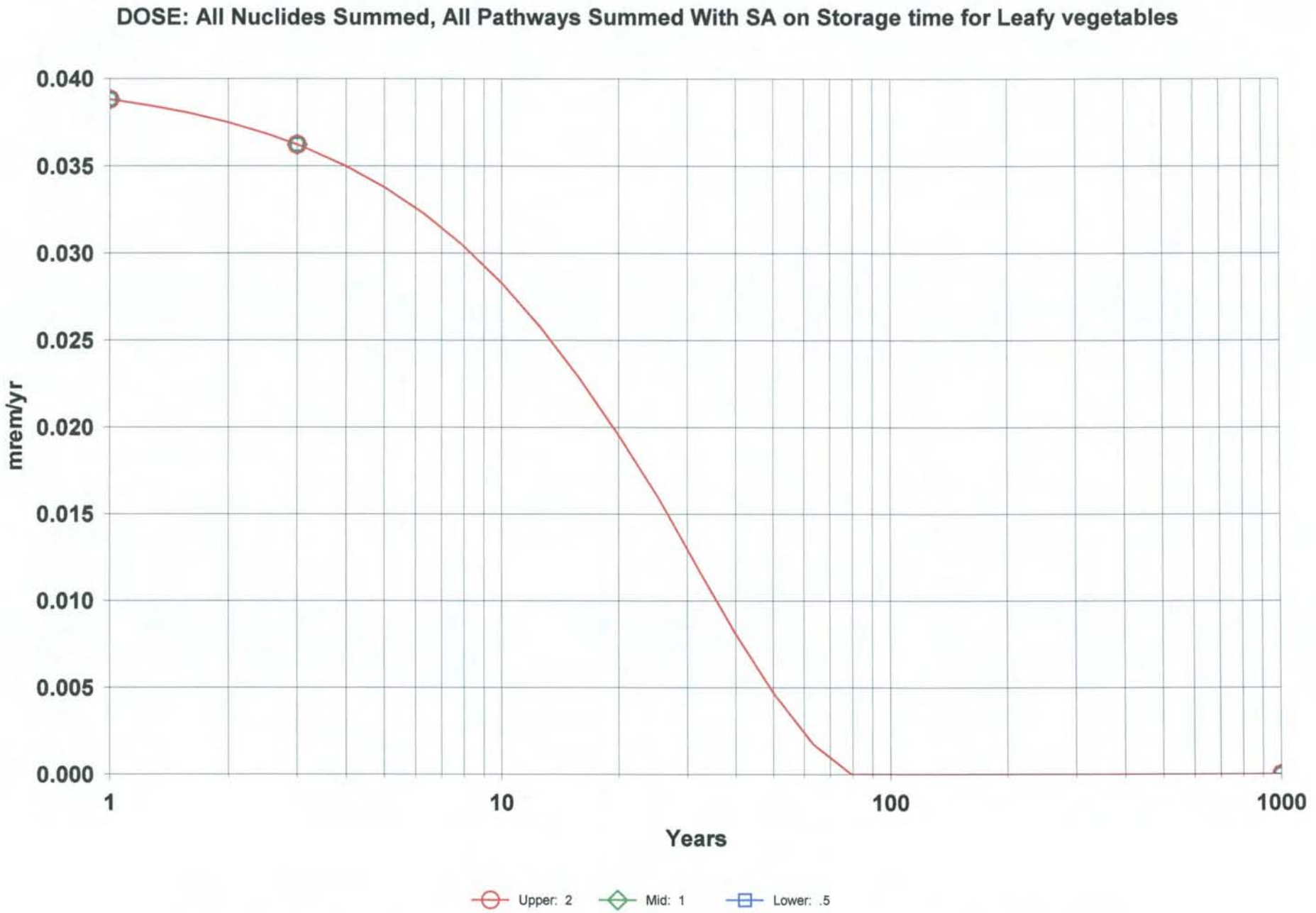

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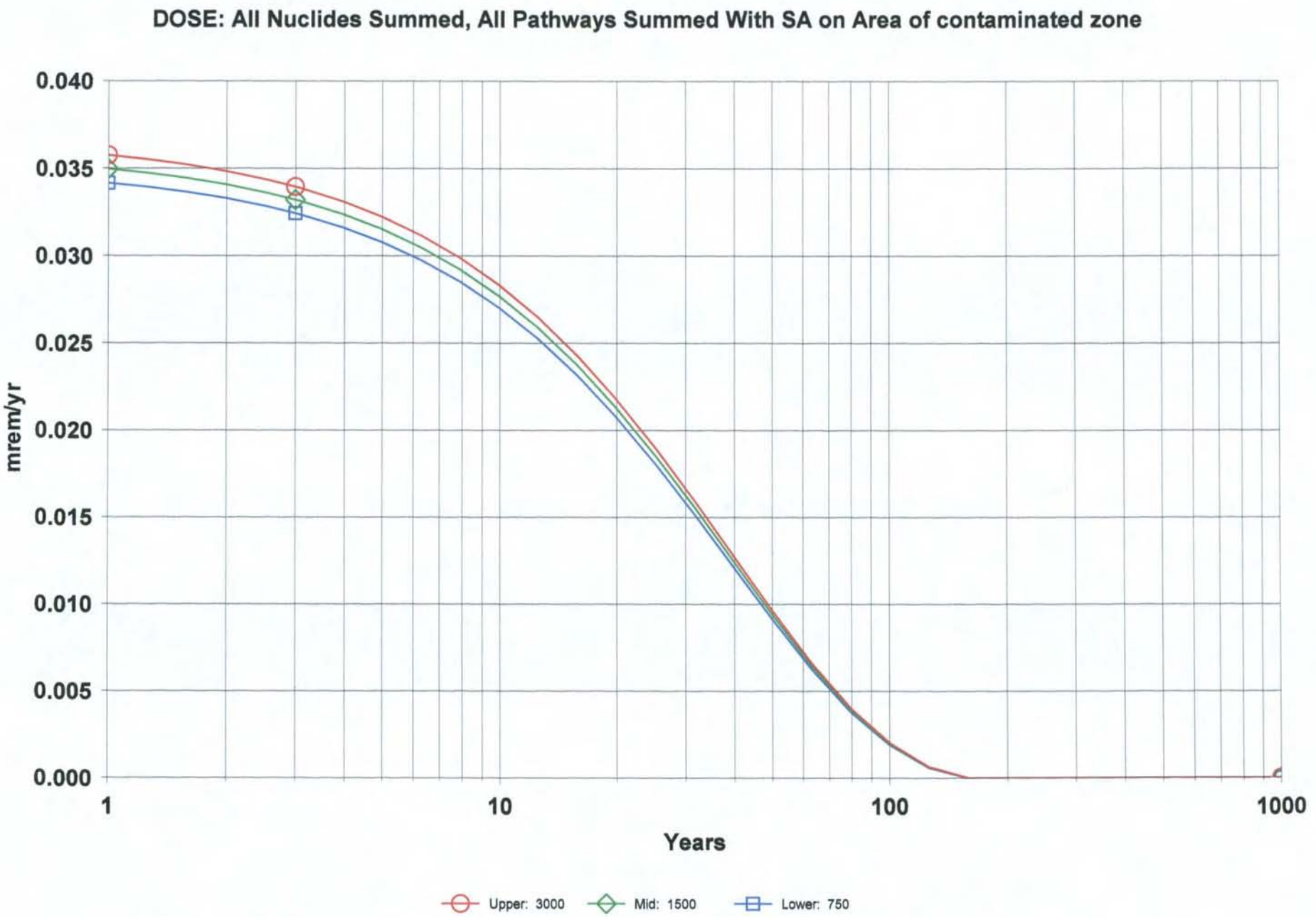
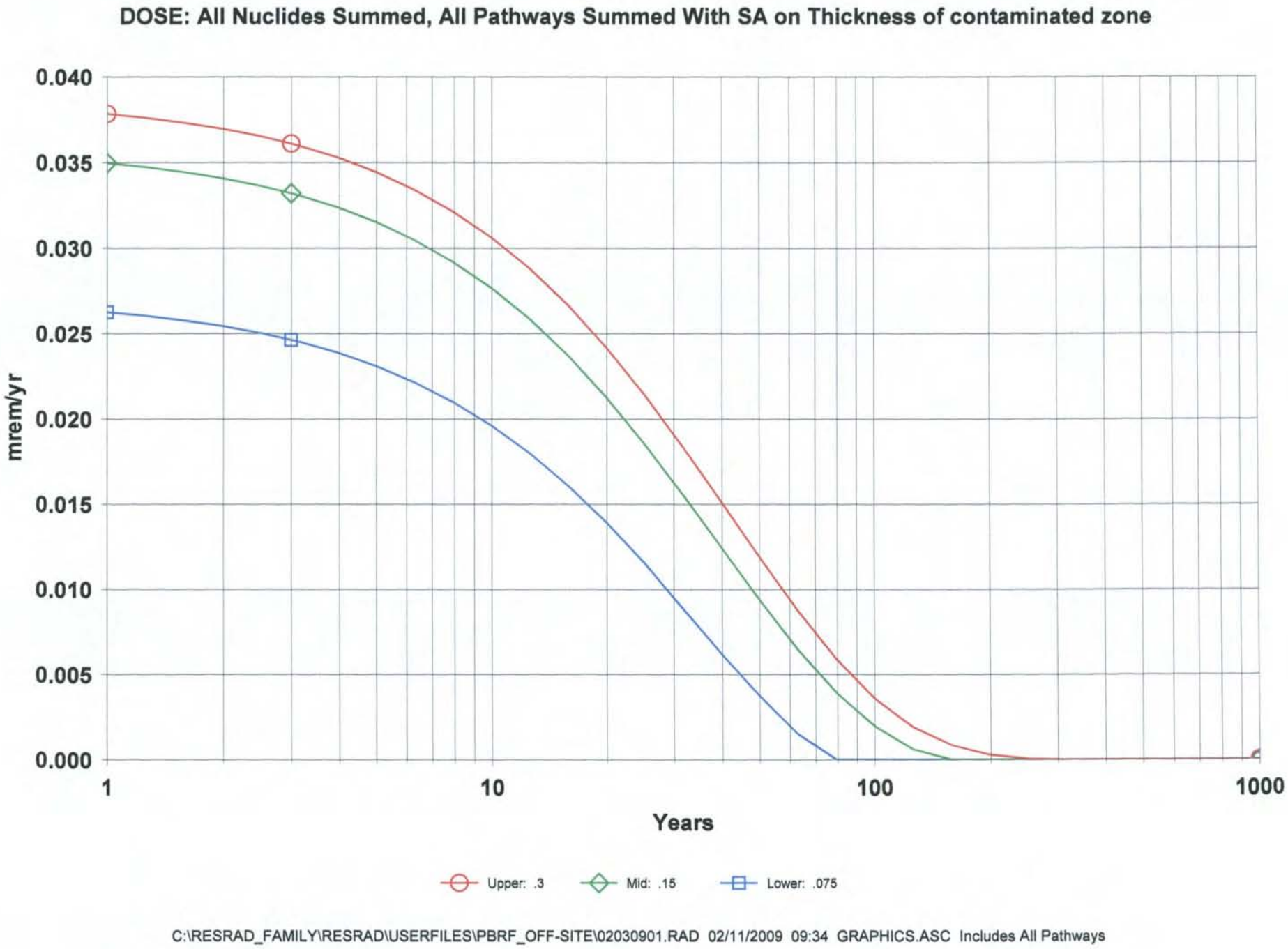
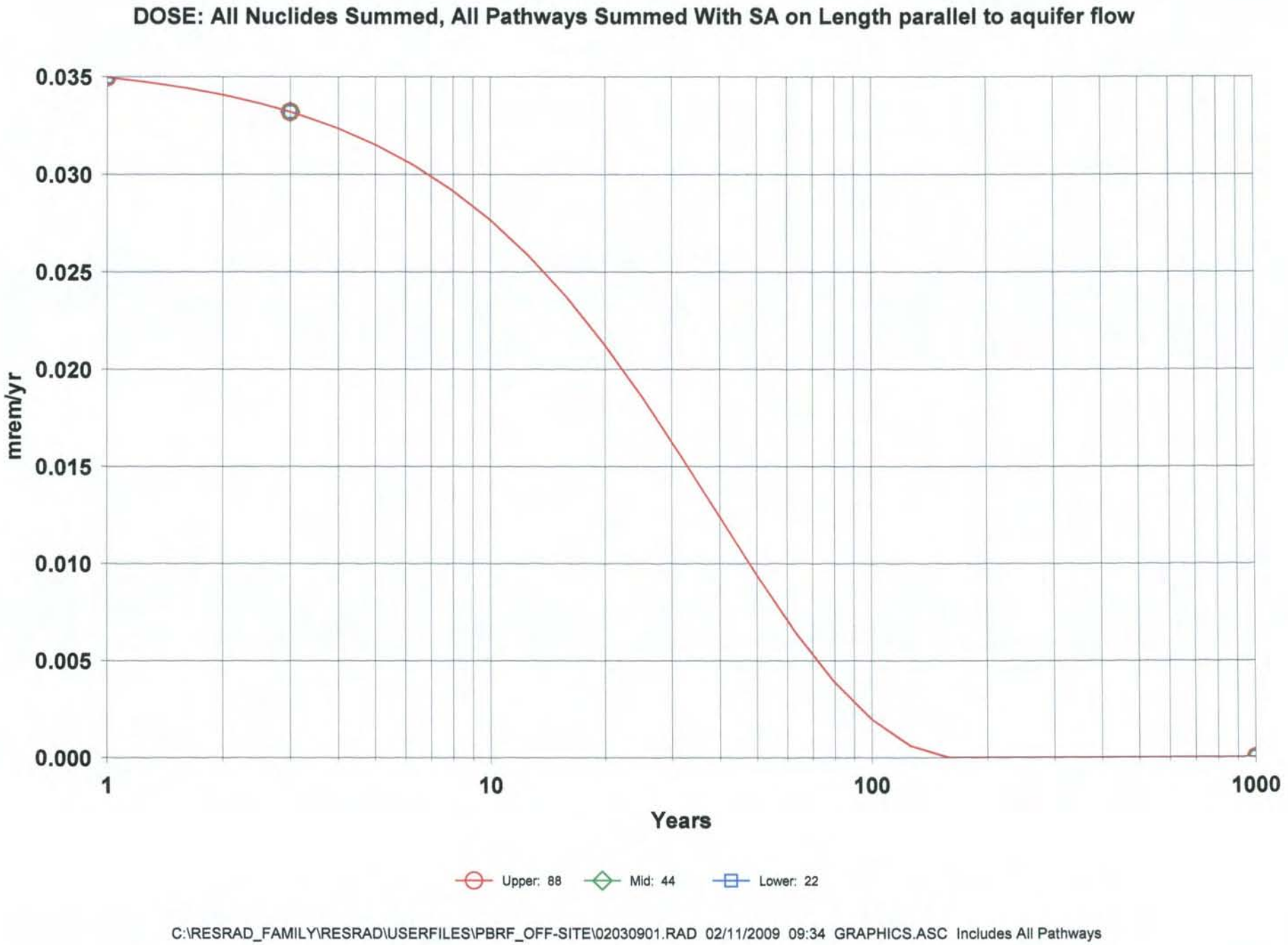
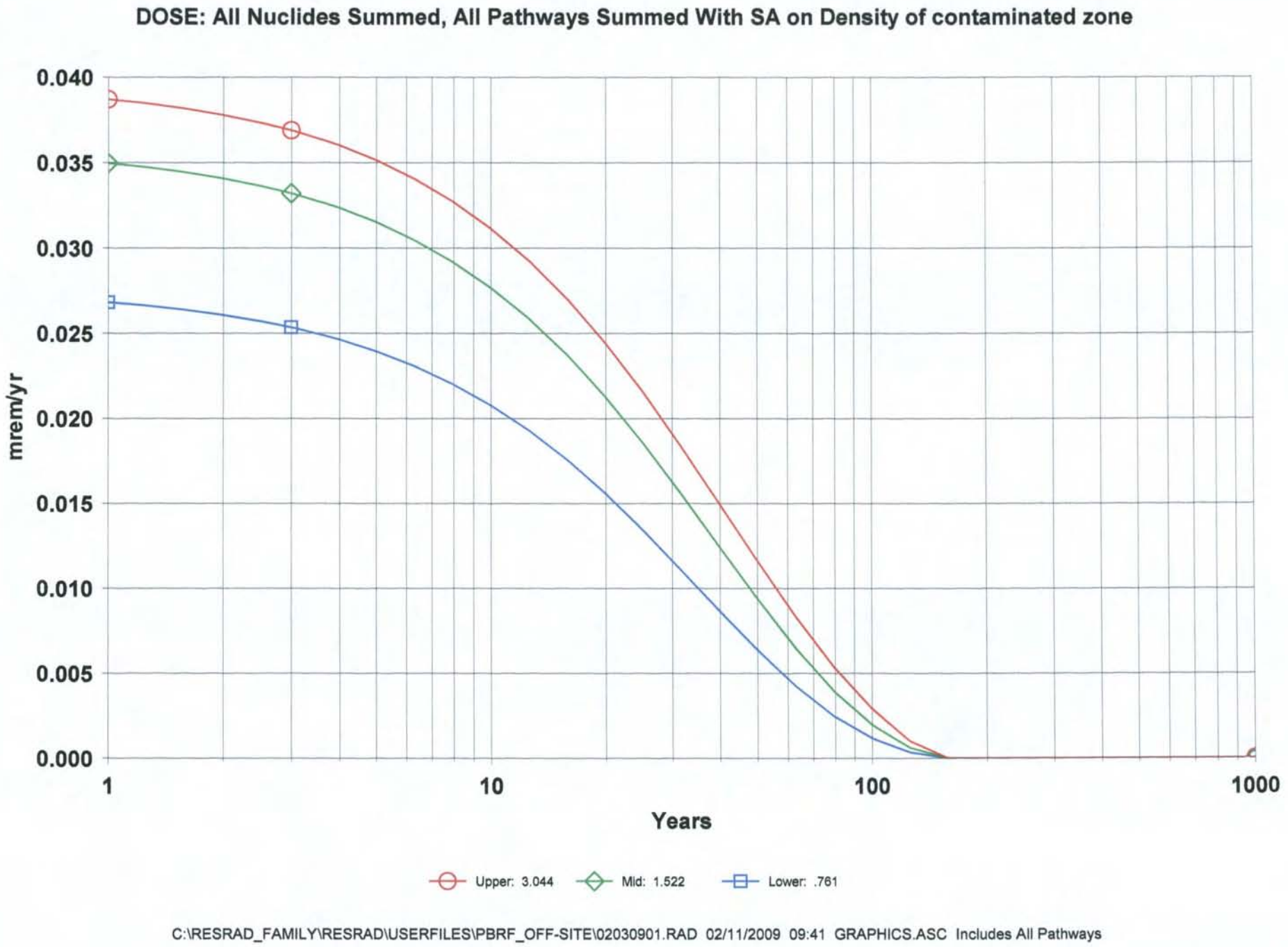
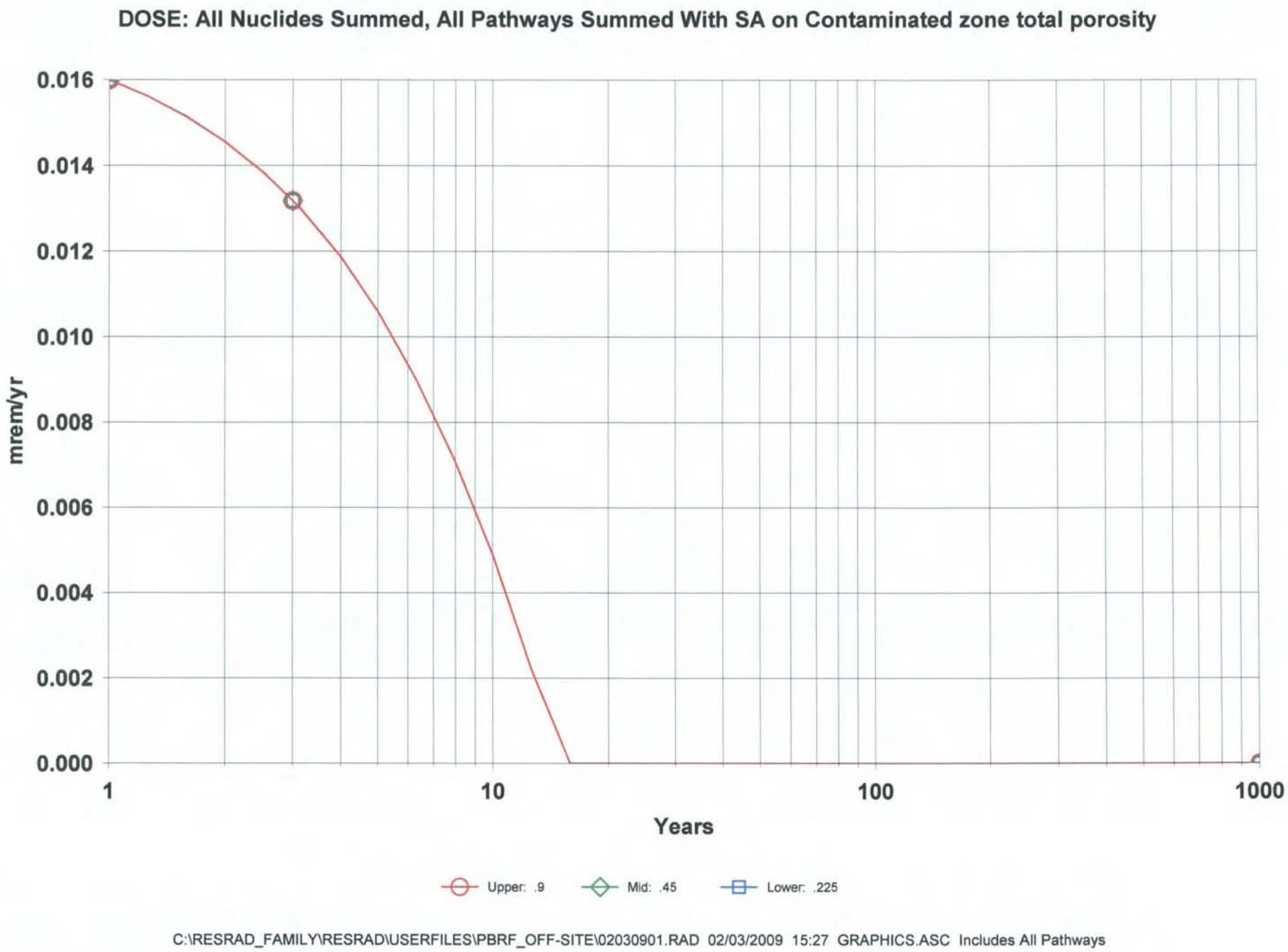


C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02030901.RAD 02/11/2009 09:34 GRAPHICS.ASC Includes All Pathways

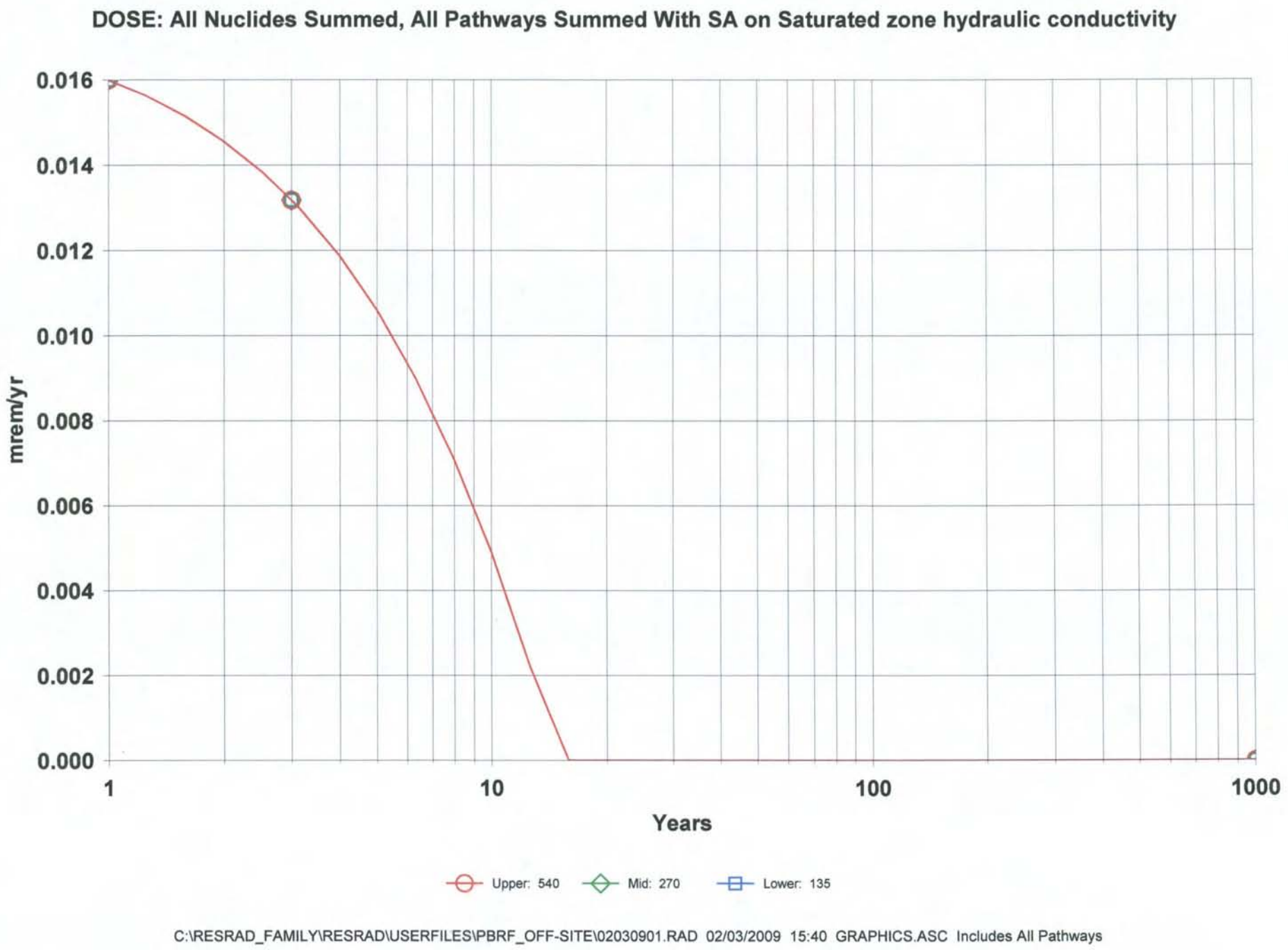

DOSE: All Nuclides Summed, All Pathways Summed With SA on Thickness of contaminated zone
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: .3
Mid: .15
Lower: .075
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02030901.RAD 02/11/2009 09:34 GRAPHICS.ASC Includes All Pathways


DOSE: All Nuclides Summed, All Pathways Summed With SA on Length parallel to aquifer flow
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: 88
Mid: 44
Lower: 22
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02030901.RAD 02/11/2009 09:34 GRAPHICS.ASC Includes All Pathways

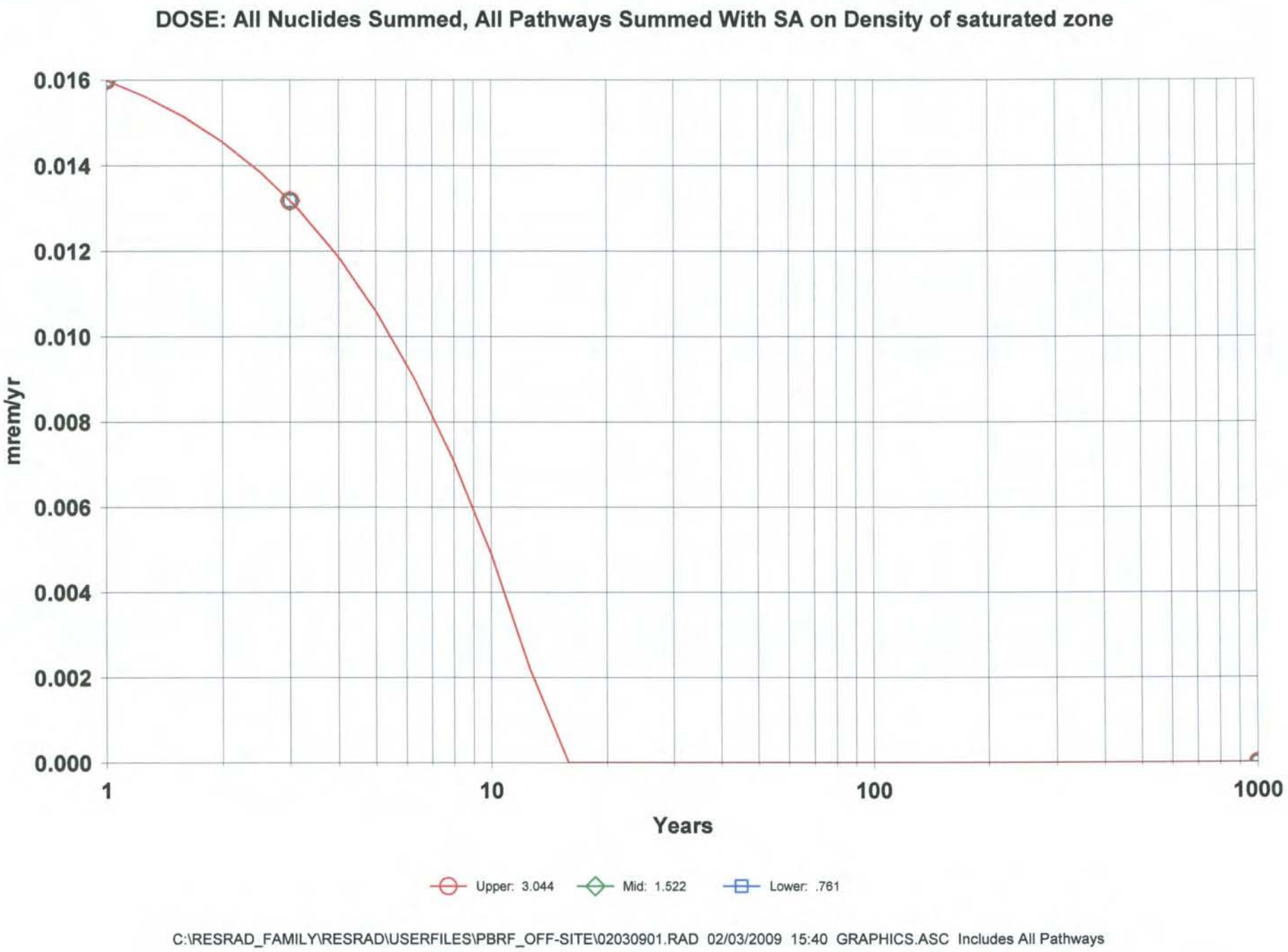

DOSE: All Nuclides Summed, All Pathways Summed With SA on Density of contaminated zone
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: 3.044
Mid: 1.522
Lower: .761
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02030901.RAD 02/11/2009 09:41 GRAPHICS.ASC Includes All Pathways

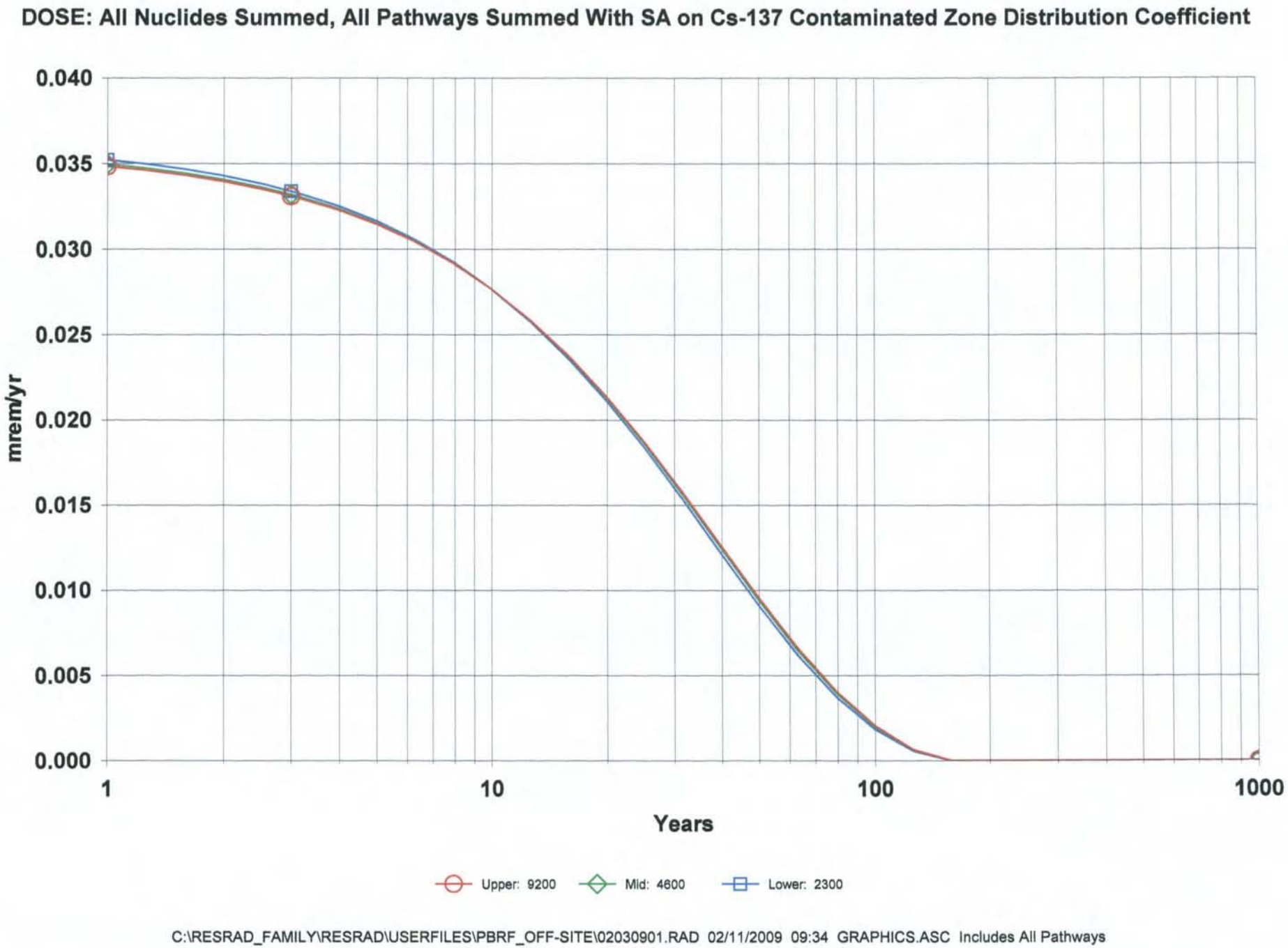

DOSE: All Nuclides Summed, All Pathways Summed With SA on Contaminated zone total porosity
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
mrem/yr
1
10
100
1000
Years
Upper: .9
Mid: .45
Lower: .225
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02030901.RAD 02/03/2009 15:27 GRAPHICS.ASC Includes All Pathways

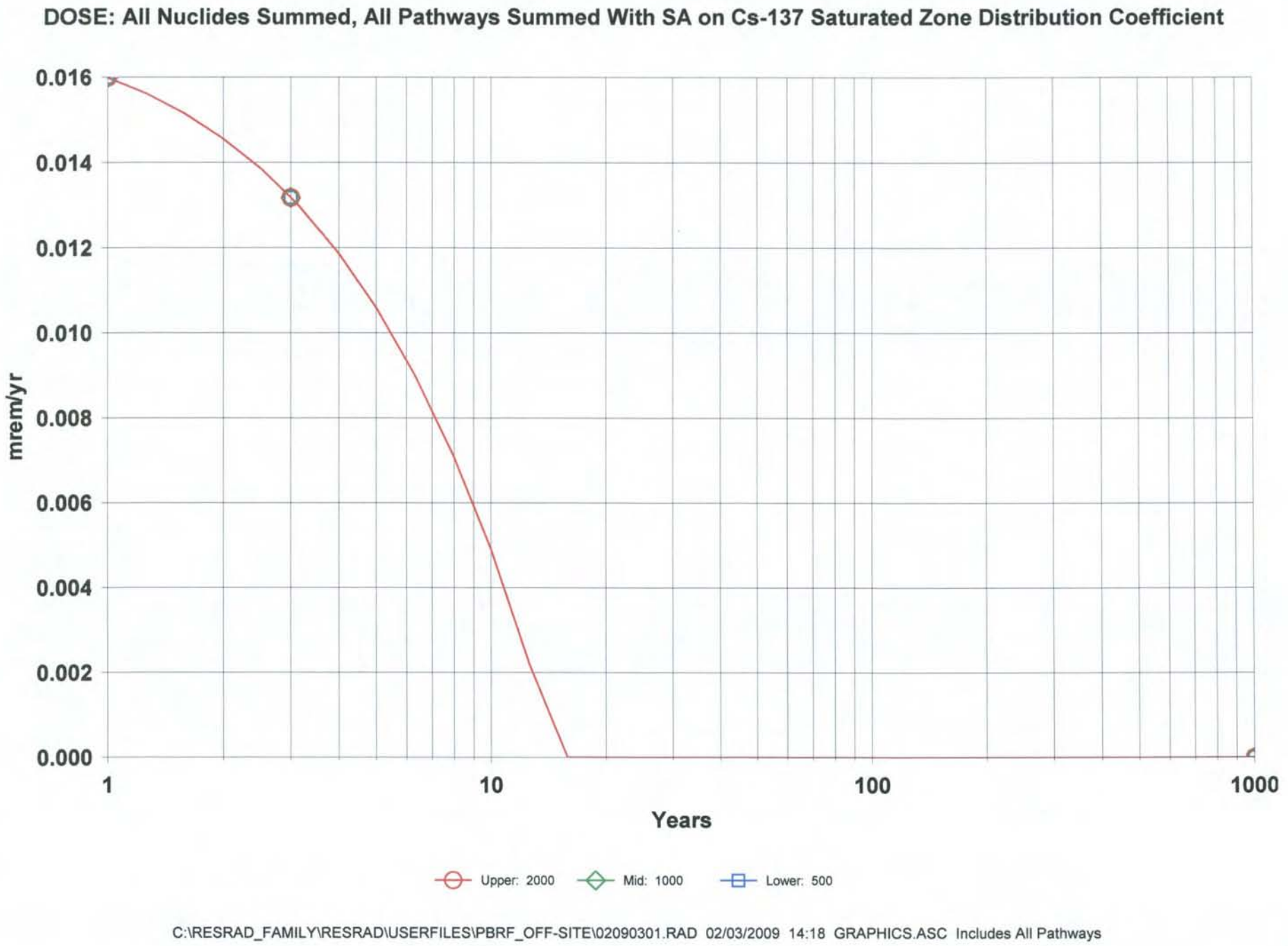
5


DOSE: All Nuclides Summed, All Pathways Summed With SA on Saturated zone hydraulic conductivity
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
mrem/yr
1
10
100
1000
Years
Upper: 540
Mid: 270
Lower: 135
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02030901.RAD 02/03/2009 15:40 GRAPHICS.ASC Includes All Pathways

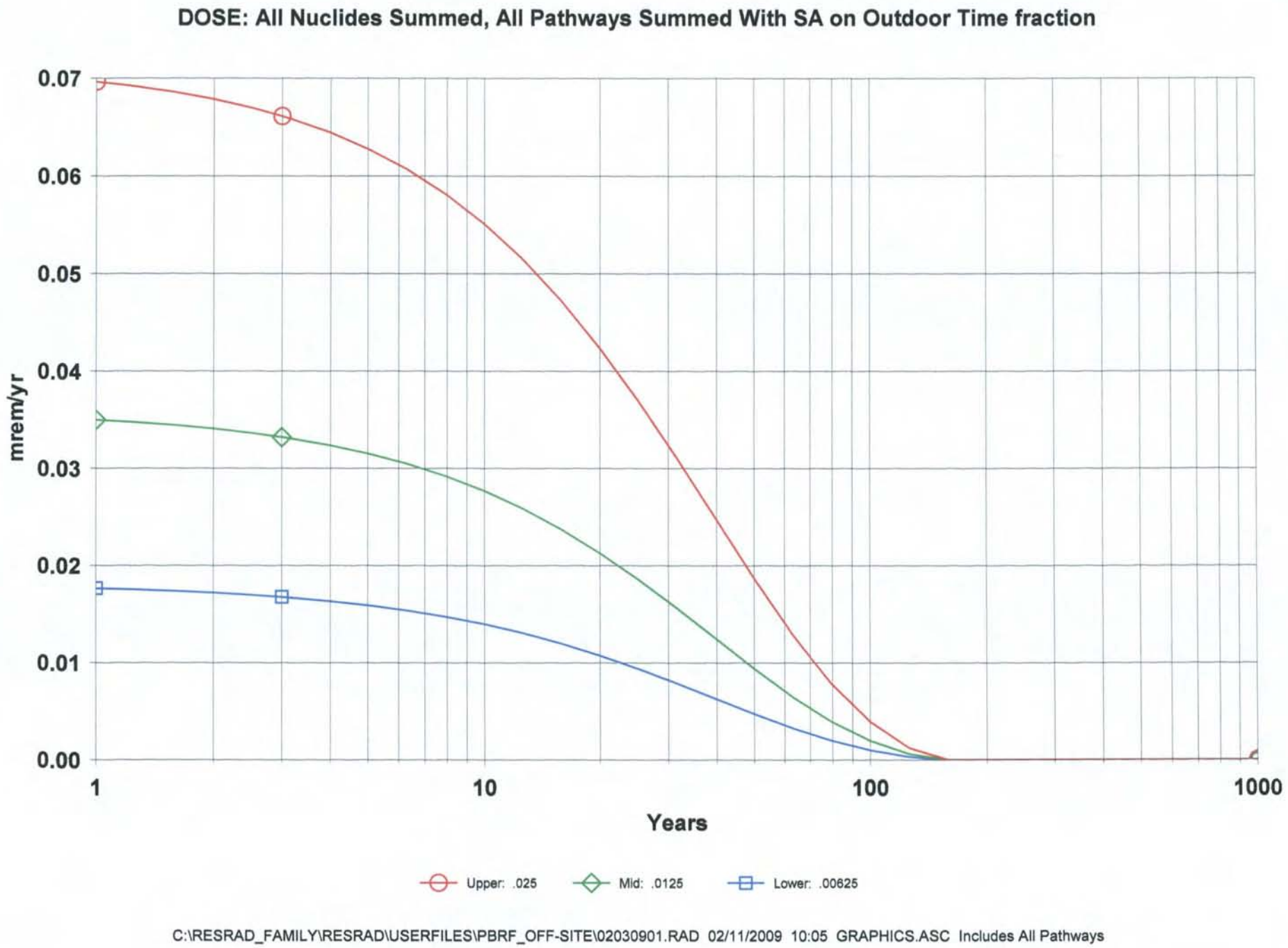
6

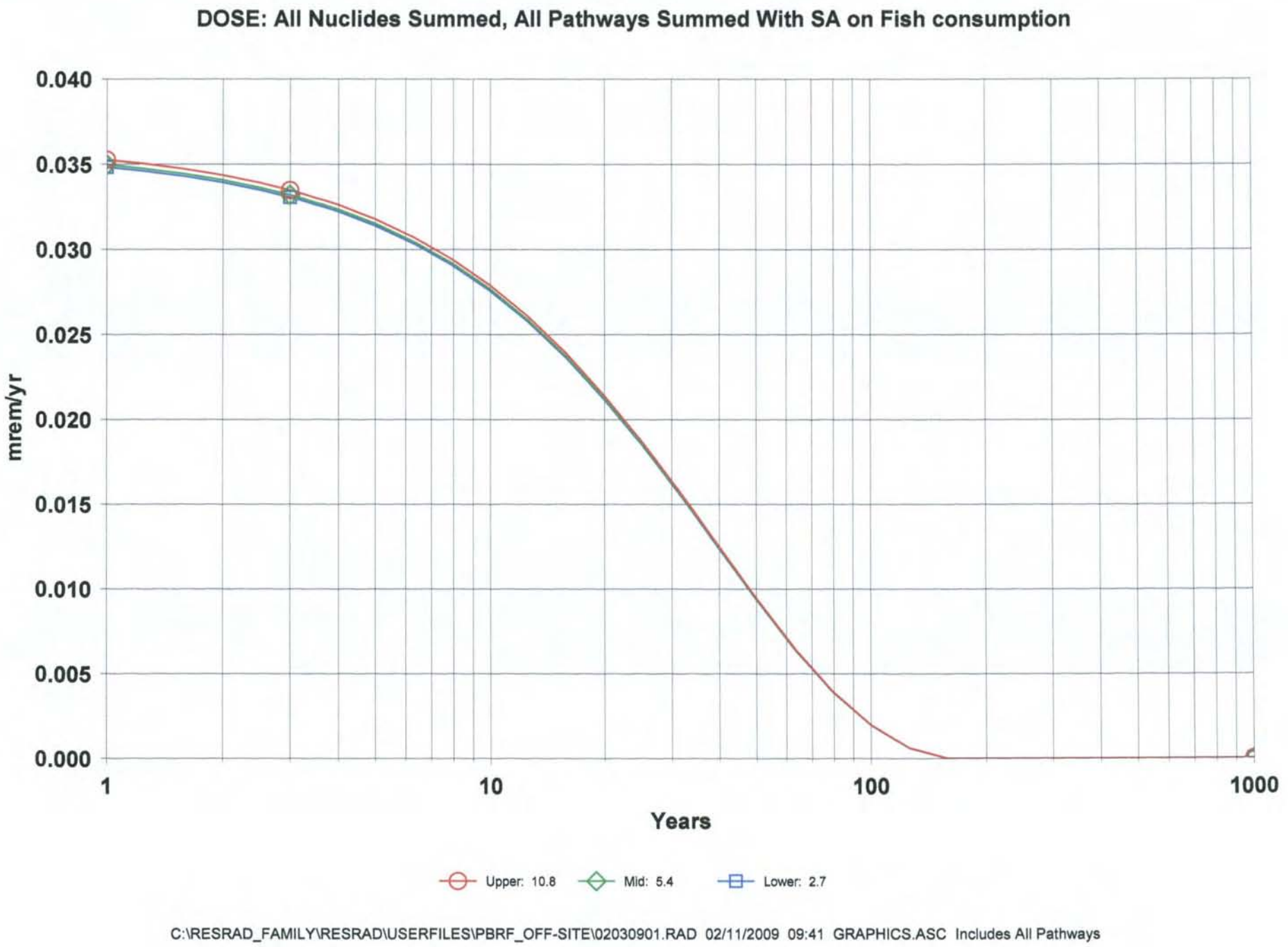

DOSE: All Nuclides Summed, All Pathways Summed With SA on Density of saturated zone
mrem/yr
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
1
10
100
1000
Years
Upper: 3.044
Mid: 1.522
Lower: .761
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02030901.RAD 02/03/2009 15:40 GRAPHICS.ASC Includes All Pathways

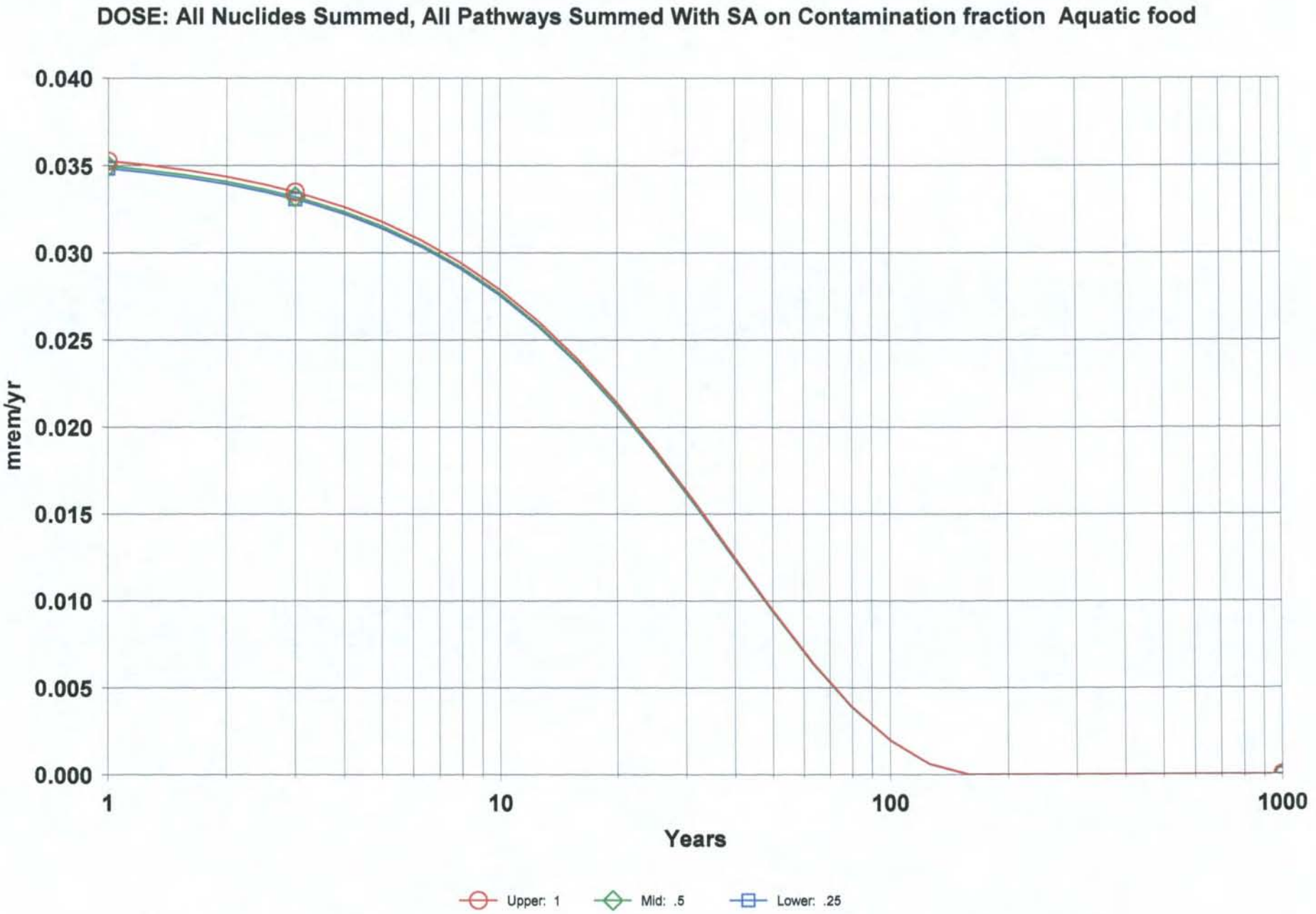

DOSE: All Nuclides Summed, All Pathways Summed With SA on Cs-137 Contaminated Zone Distribution Coefficient
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: 9200
Mid: 4600
Lower: 2300
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02030901.RAD 02/11/2009 09:34 GRAPHICS.ASC Includes All Pathways


DOSE: All Nuclides Summed, All Pathways Summed With SA on Cs-137 Saturated Zone Distribution Coefficient
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
mrem/yr
1
10
100
1000
Years
Upper: 2000
Mid: 1000
Lower: 500
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02090301.RAD 02/03/2009 14:18 GRAPHICS.ASC Includes All Pathways

9


DOSE: All Nuclides Summed, All Pathways Summed With SA on Outdoor Time fraction
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
mrem/yr
1
10
100
1000
Years
Upper: .025
Mid: .0125
Lower: .00625
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02030901.RAD 02/11/2009 10:05 GRAPHICS.ASC Includes All Pathways


DOSE: All Nuclides Summed, All Pathways Summed With SA on Fish consumption
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
mrem/yr
1
10
100
1000
Years
Upper: 10.8
Mid: 5.4
Lower: 2.7
C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02030901.RAD 02/11/2009 09:41 GRAPHICS.ASC Includes All Pathways



C:\RESRAD_FAMILY\RESRAD\USERFILES\PBRF_OFF-SITE\02030901.RAD 02/11/2009 09:41 GRAPHICS.ASC Includes All Pathways