ENVIRON

August 27, 2004

Dr. Peter Lee
U.S. NRC Region III
801 Warrenville Road
Lisle, IL 60532-4351

Subject: **Remedial Work Plan, Revision 2, Waste Excavation and Site Restoration Breckenridge Disposal Site, St. Louis, Michigan**

Dear Dr. Lee:

On behalf of the LePetomane III Custodial Trust, ENVIRON International Corporation (ENVIRON) is pleased to submit Revision 2 of the "Remedial Work Plan for Waste Excavation and Site Restoration for the Breckenridge Disposal Site."

At this juncture, we anticipate mobilization for the Waste Excavation and Site Restoration work to occur the week of September 20, 2004. A detailed work schedule is enclosed with this cover letter. Once work is underway, ENVIRON will keep you informed as to the progress of the work to facilitate the timing of any site visit(s) you wish to make.

The Custodial Trust is committed to work with the U.S. Nuclear Regulatory Commission ("NRC") to complete this project through approval of the Final Status Survey Report this year. Presuming the enclosed Revision 2 of the Work Plan is acceptable to the NRC, please provide us written notification to that fact so that we may proceed with the planned waste excavation and site restoration program for the Site.

If you have any questions regarding the enclosed work plan, please feel free to contact Dave Heidlauf at (312) 853-9430.

Sincerely;

ENVIRON International Corporation

Mark Travers
Principal

David Heidlauf
Senior Manager

CC. Ken Kasper
Jay A. Steinberg, not individually, but solely as President of LePetomane II, Inc., not individually, but solely in the representative capacity of Successor Liquidation Trustee, and as President of LePetomane III, Inc., not individually, but solely as Custodial Trustee.

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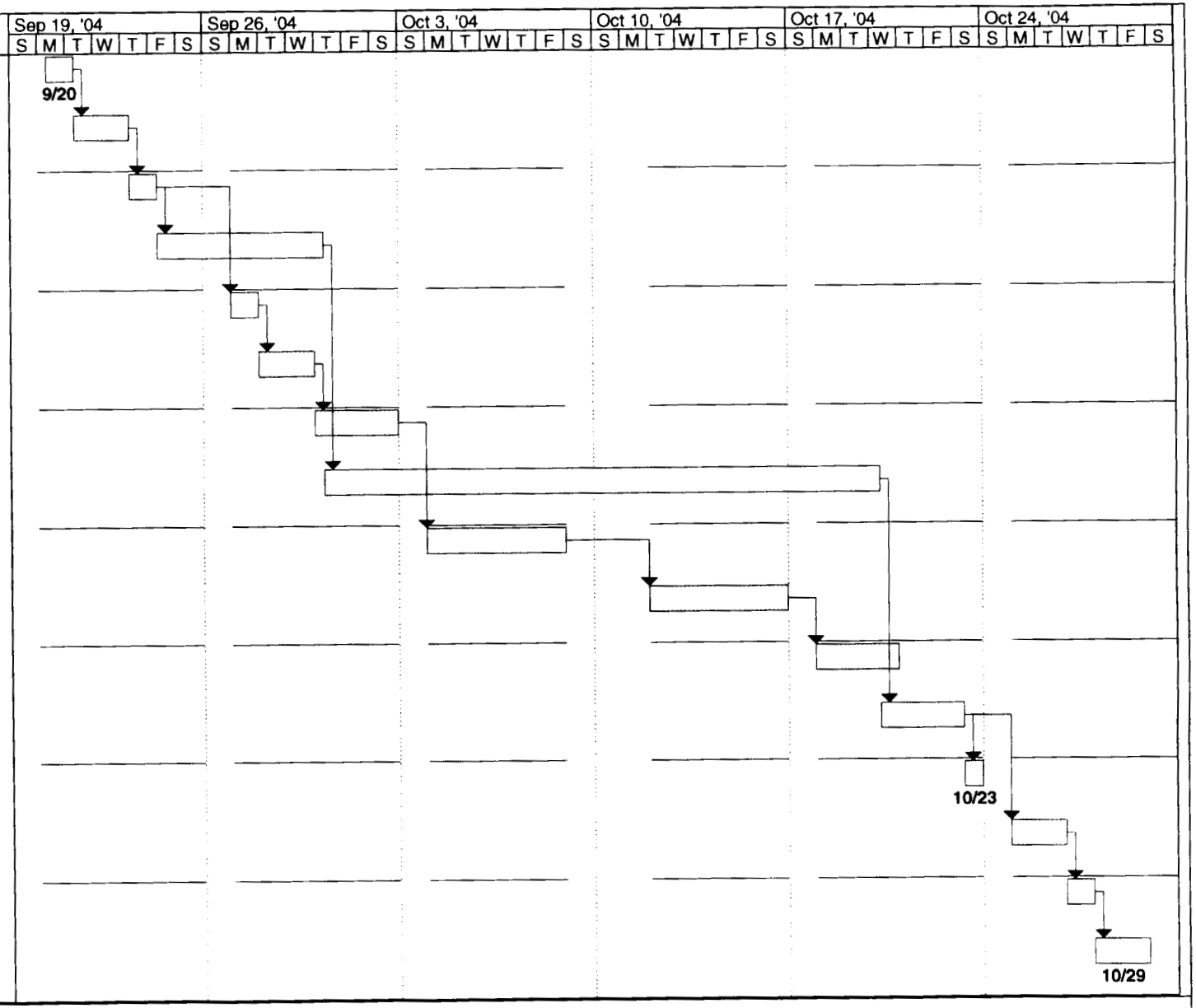
ID	Task Name
1	Site Mobilization
2	Equip/Area Set up
3	Training
4	Surface scan/remediation
5	Geoprobe Background
6	Geoprobe Class II
7	Geoprobe Riverside Area
8	Subsurface remediation
9	FSS Class II
10	FSS Class I Riverside
11	Geoprobe Hot side
12	Conduct FSS Hot Side
13	Lab Demob
14	Ship Waste
15	Survey Waste Storage Area
16	Site Demob



Project: Breckenridge Remediation
Date: Fri 8/20/04

Task		Rolled Up Task		External Tasks	
Progress		Rolled Up Milestone		Project Summary	
Milestone		Rolled Up Progress		External Milestone	
Summary		Split		Deadline	

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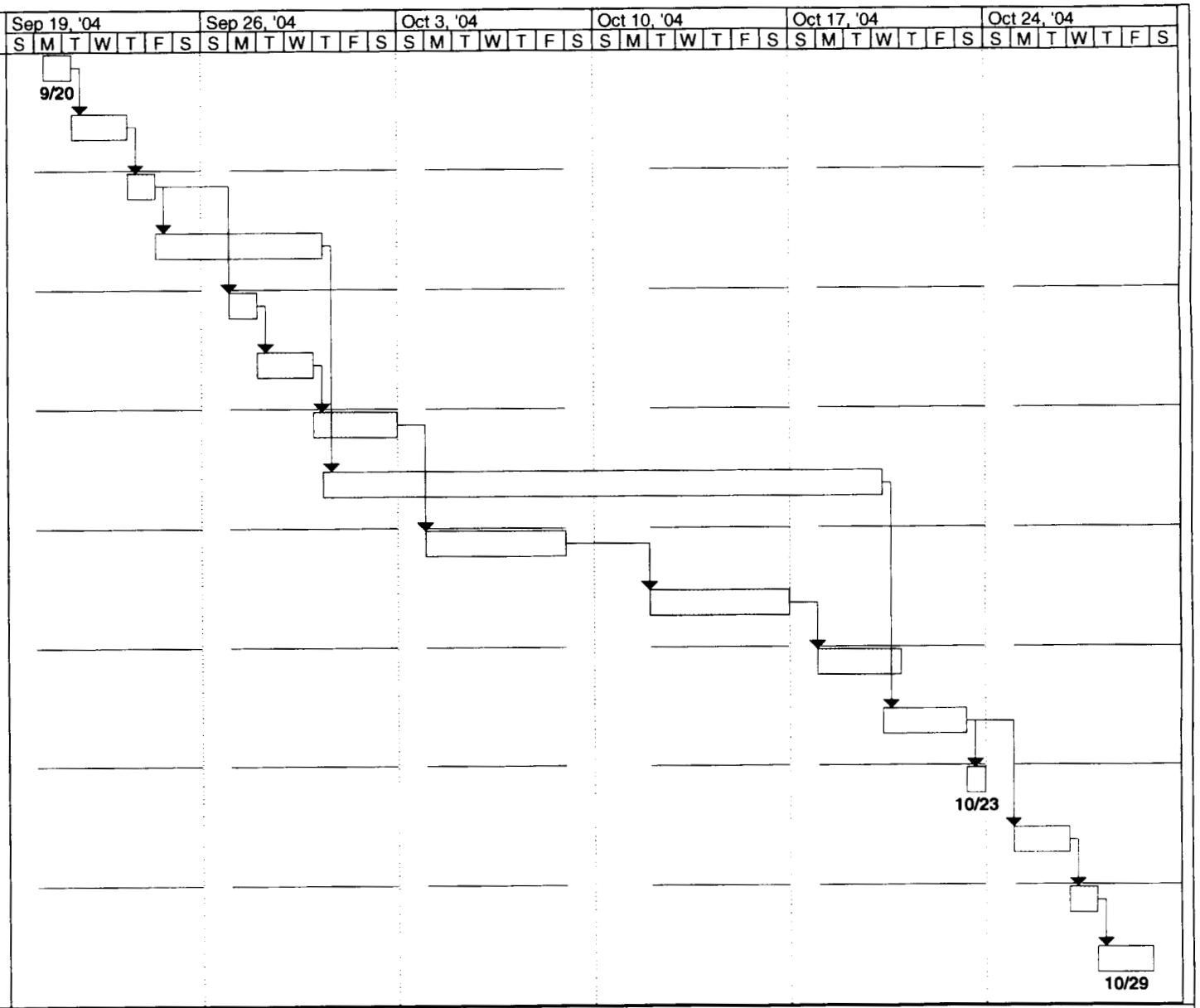

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REMEDIAL WORK PLAN

WASTE EXCAVATION AND SITE RESTORATION
BRECKENRIDGE DISPOSAL SITE

Madison Road
St. Louis, Bethany Township, Michigan

Prepared for:

ENVIRON International Corporation
123 North Wacker Drive, Suite 250
Chicago, IL 60606

Prepared by:

SCIENTECH, Inc.
143 West Street
New Milford, CT 06776

Project Application	*Prepared By*	*Date*
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APPROVALS:

Title	*Signature*	*Date*
Technical Review	Mark Nicholson	8/17/04
CRSO Review	Kenneth M. Kasper	8/17/04
Operations Manager	Lee G. Penney	8/17/04

Revision Log

Revision Number	Affected Pages	CRA Number	Approval
1	9-19, Attachments B - E	11532	K. Taylor
2	15, 18, B-5, B-7, Attachments C - F	11560	K. Taylor

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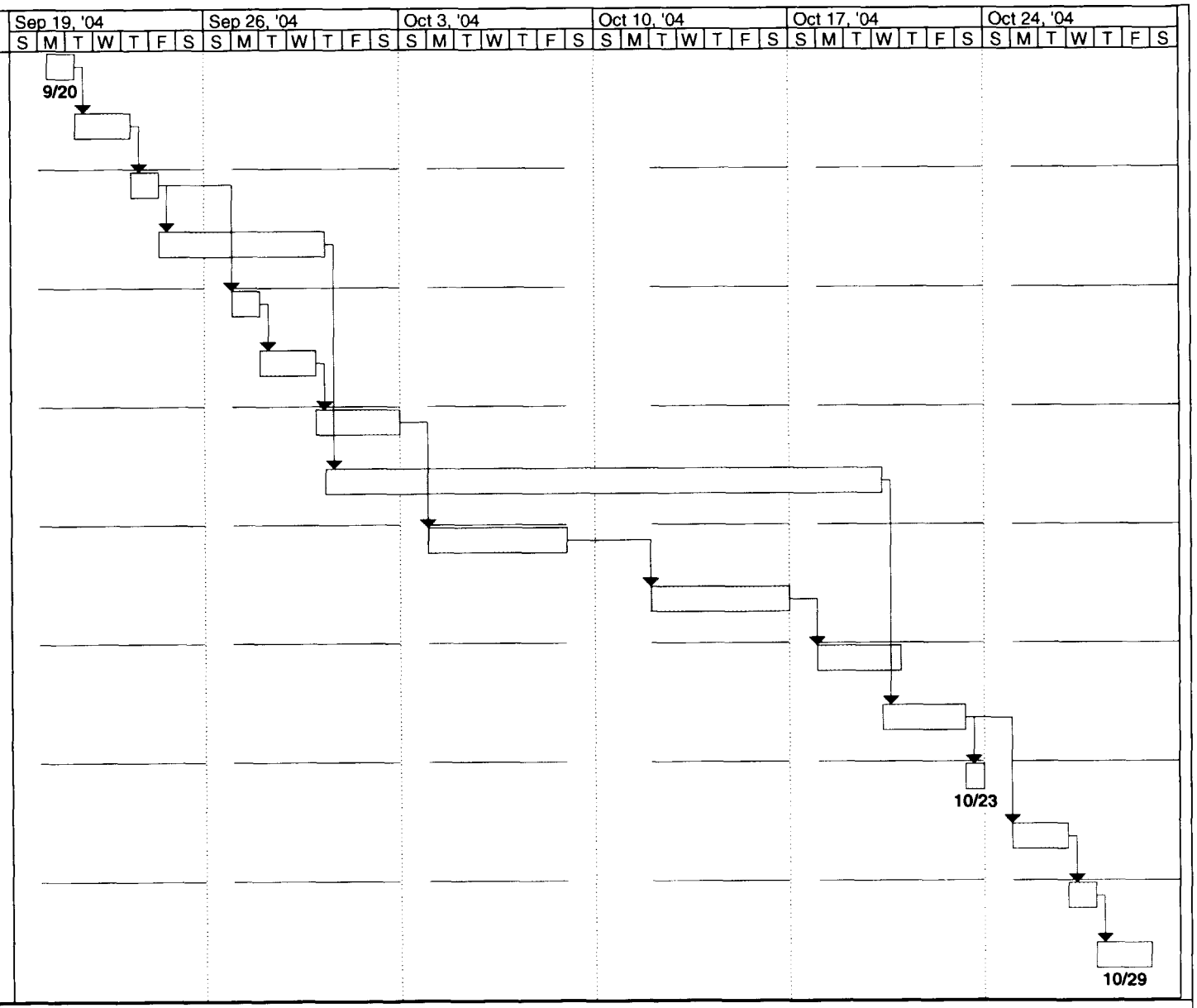

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1.0 INTRODUCTION

The Breckenridge Disposal Site (Site) is located on Madison Road about 4 miles east of downtown St. Louis, Bethany Township, Michigan. The Breckenridge property is a narrow triangular-shaped parcel of land that is mostly flat and grassy with scattered large trees. The Site, bounded by Madison Road on the north, by Bush Creek on the east, and by farmland on the west, is about 5,100 square meters (m^2). The nearest residence is located approximately 0.2 kilometers to the east across Bush Creek. A six-foot high chain-link fence controls access to the Site. Figures 1-1 and 1-2 provide the site location and site layout maps.

Between 1967 and 1970, the Site was used for the disposal of process wastes from a yttrium recovery operation managed by Michigan Chemical Corporation (MCC). These disposal activities were authorized under U.S. Atomic Energy Commission (AEC) License Number SMB-0833 and were performed in accordance with 10 CFR 20.304, "Disposal by Burial in the Soil." The buried waste material is a solid waste byproduct known as filtercake, which originated from a rare-earth metal (yttrium) extraction process. Disposal records reported that the filtercake was typically a dense, clay-like material containing elevated levels of naturally occurring uranium and thorium. After site operations ceased, AEC License Number SMB-0833 was terminated.

Since elevated levels of surface radioactivity remained on the Site, the U.S. Nuclear Regulatory Commission (NRC) requested that the radiological conditions at the Site be evaluated. Several radiological evaluations have been performed at the Site in recent years; the most recent of these evaluations took place in November 2001 (References 1 and 2). The latest characterization report (Reference 1) provided an estimate for the radioactive waste source term in area, volume, and the average thorium-232 and uranium-238 concentrations in the buried waste material. These average concentrations were determined to be 267 picocuries per gram (pCi/g) thorium-232+D and 170 pCi/g uranium-238+D (Reference 1). The "+D" indicates that the parent isotope is in equilibrium with its decay daughters.

Waste inventory estimates were previously derived using two different methods (Reference 1). The first waste inventory estimate was derived based on confirmed waste areas and potential waste areas identified during the 2001 site characterization activities. Confirmed waste areas were identified by the geophysical surveys and confirmed using core boring. Potential waste areas were identified as potential disposal areas by the geophysical surveys but were not confirmed by core boring. The locations of the confirmed waste areas (CWA) and potential waste areas (PWA) are provided in Figure A-1 of Attachment A. The size of the predicted waste areas were used to estimate a total waste volume of 113 cubic meters (m^3), based on the assumption of one 55-gallon waste drum per square meter of disposal area.

The second waste inventory estimate used a filtercake volume estimate based on the average densities of the 19 waste-material samples collected and the historical estimate of 151 wet tons on total waste deposited at the Site, as provided in the 1998 Historical Site Assessment (Reference 2). This second method estimated a waste inventory volume of approximately 103 m^3.

Surface scans of the Site also indicated that there are discrete locations of contamination in soils at and near the surface that should be considered in assessing the total activity of the Site. The volume of waste dispersed in the surface and near-surface soils is assumed to be very small in relation to the buried waste volume (i.e., less than 1%).

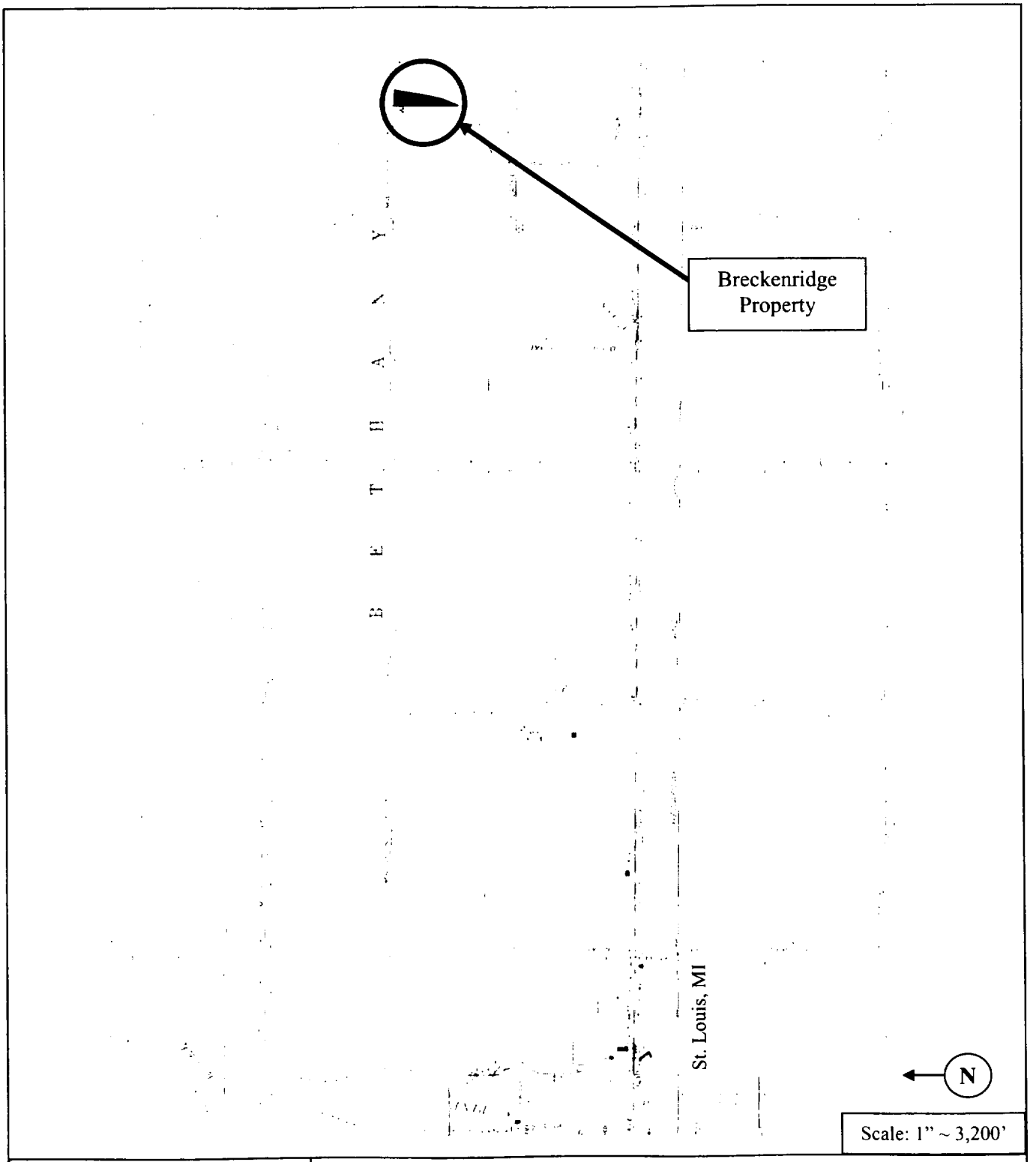
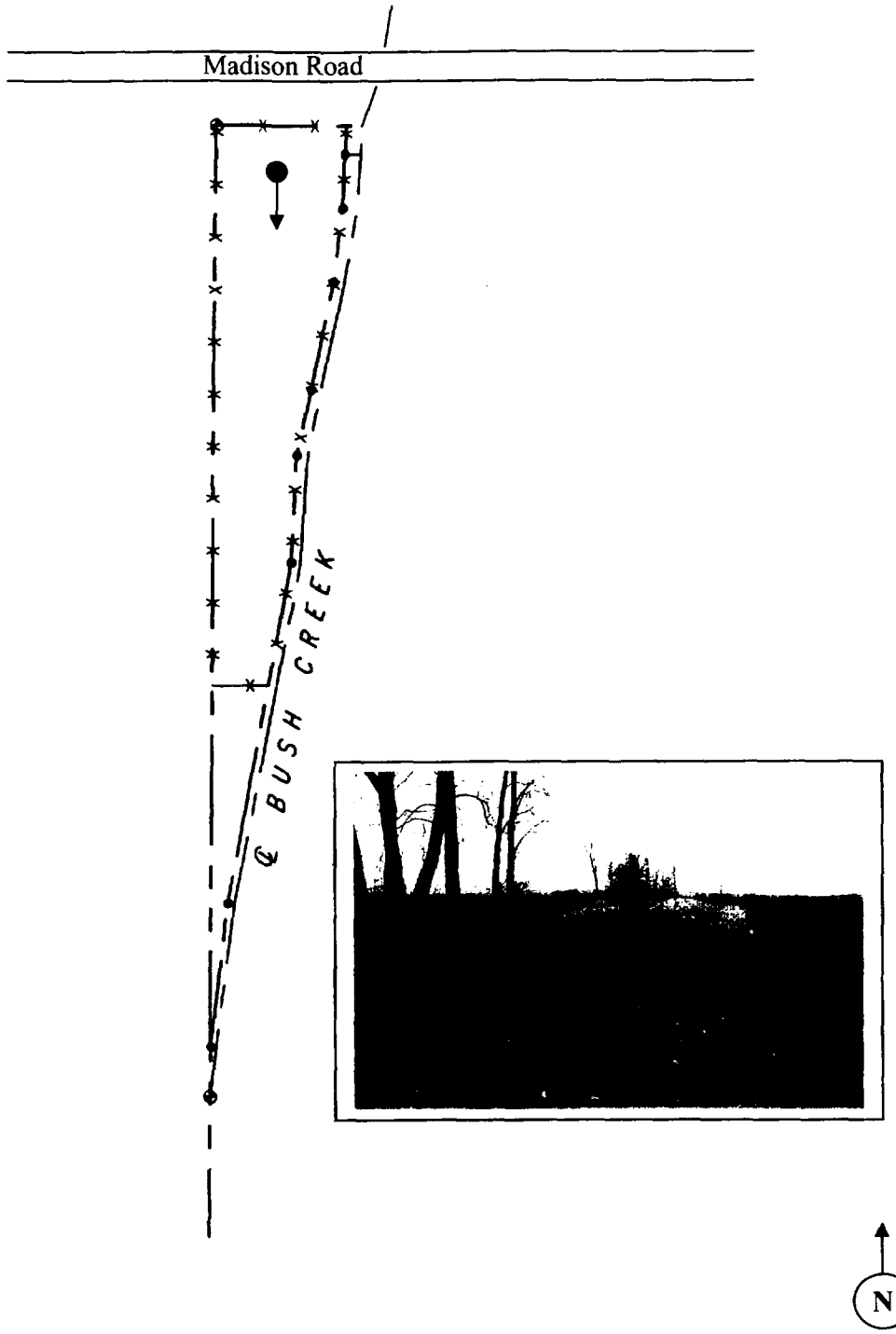


FIGURE 1-1
BRECKENRIDGE PROPERTY
SITE LOCATION MAP

Source: U.S. Geological Survey



Scale: 1" ~ 200'

FIGURE 1-2
BRECKENRIDGE PROPERTY
SITE LAYOUT MAP

Location and direction of site photograph

Source: Reference 1

2.0 OBJECTIVES

The primary objective of the site remediation project will be to remove radioactive waste filtercake or contaminated soils from the site and release the site for unrestricted use. These objectives will be accomplished through precise excavations at confirmed and potential locations of low-level radioactive waste (LLRW), a 100% scan of the site for identification of surface and near-surface contamination, removal of surface and near-surface contamination, and performance of a final status survey.

This Work Plan describes the on-site activities required to meet these objectives. This Work Plan also presents derived concentration guideline levels (DCGL) for the project. These DCGLs are based on known radiological contaminants and a dose assessment provided in Attachment B. The dose assessment was modeled after a dose assessment performed by SCIENTECH, Inc. (SCIENTECH) in April 2002 (Reference 3). The DCGLs and the method for applying them to the final status survey are presented in Section 4.0 of this Work Plan.

The site work is expected to begin in the summer of 2004. Figure 2-1 provides a projected weekly schedule of the major project tasks. These tasks include the following:

- Mobilization – A field team consisting of a site supervisor, project health physicist, environmental technicians, and an equipment operator will travel to the Site. All necessary equipment and supplies will be delivered. A field office trailer will be setup. The project health physicist will provide radiation awareness training to project team members.

- Site Preparations – Site preparation activities will include cutting the grass and removing small trees and shrubs. The LLRW areas will be marked. Waste material samples will be taken as necessary.

- Remediation – Remediation activities will include excavation of LLRW and contaminated soil, surface scans for and removal of surface and near-surface contamination, and remediation support surveys and sampling.

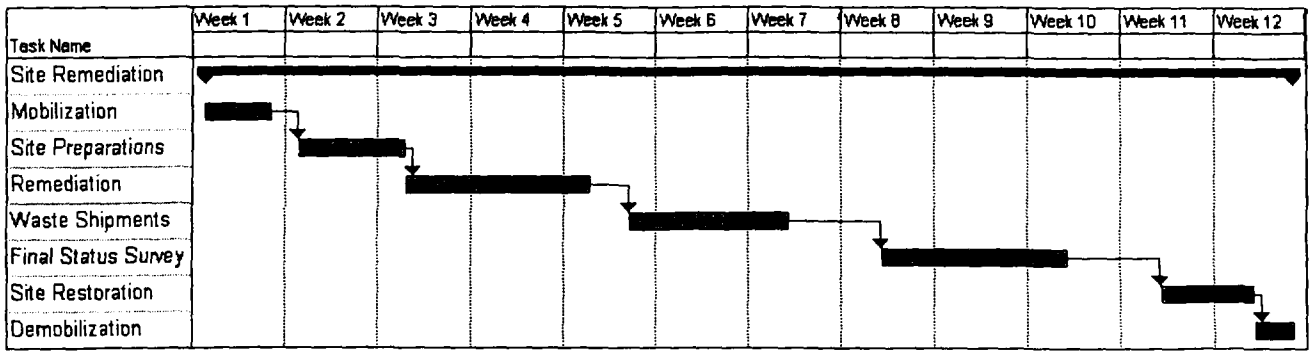
- Waste Shipments – Excavated LLRW and contaminated soils will be shipped to an appropriate disposal site. The project team may use a waste broker with experience in shipping radioactive waste to provide transportation and disposal support services.

- Final Status Survey – The environmental technicians will conduct the final status survey according to the Final Status Survey Plan (FSSP) as directed by the project health physicist.

- Site Restoration – Site restoration activities will include backfilling excavated areas with clean fill and seeding disturbed areas.

- Demobilization – The field team will package and ship all equipment and supplies. Arrangements will be made to remove the field trailer. The project team will travel back to their respective home offices.

FIGURE 2-1
PROJECTED SITE REMEDIATION SCHEDULE



3.0 PROJECT ORGANIZATION

The remediation project is being managed by ENVIRON International Corporation (ENVIRON) of Chicago, IL. ENVIRON is an environmental company addressing a broad range of human health and environmental risk issues related to the presence of chemicals in the environment. ENVIRON's subcontractor, SCIENTECH of New Milford, CT provides a full range of radiological service and has experience addressing the radiological issues present at the Site. ENVIRON and SCIENTECH will provide the following personnel to the project:

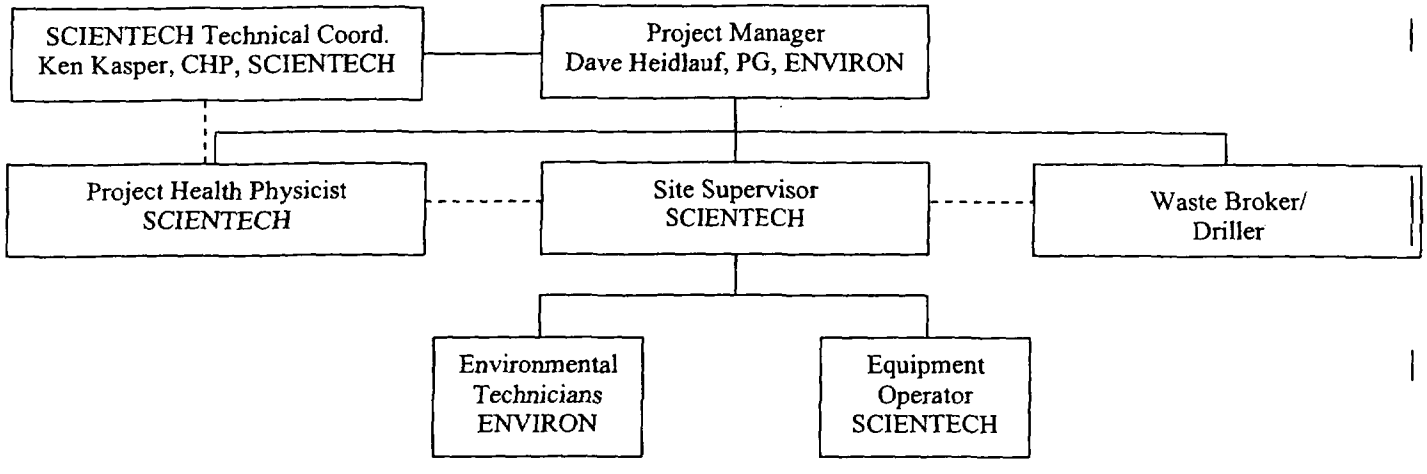
Project Manager – ENVIRON (overall project management)
Technical Coordinator – SCIENTECH
Project Health Physicist - SCIENTECH
Site Supervisor – SCIENTECH
Environmental Technicians (2) – ENVIRON
Equipment Operator – SCIENTECH

Figure 3-1 provides the project organization chart. The project manager has the overall responsibility of the project and will control the project budget, set the project schedule, and coordinate field activities with SCIENTECH. The project health physicist will be responsible for providing training to the ENVIRON environmental technicians and ensuring that the appropriate data is being collected to support waste characterization and site release. The site supervisor will be responsible for setting up radiological instrumentation and directing excavations, sampling, and surveys. The site supervisor will also act as the site health and safety officer and, along with the project manager and the project health physicist, has full stop work authority. The environmental technicians and equipment operator will work under the direction of the site supervisor. The environmental technicians and equipment operator should express any concerns first to the site supervisor but may contact the project health physicist or the project manager directly.

ENVIRON is expected to contract waste disposal services with a licensed waste broker or directly with a licensed disposal facility. The project manager will setup the contract and schedule the waste pickups. The site supervisor will provide on-site assistance to the project manager and waste broker. The site supervisor will maintain records of waste shipments on-site until the end of the project. Upon demobilization, records will be sent to the project manager.

The site supervisor will direct the final status survey as described in the FSSP. The site supervisor will routinely (daily, if possible) provide copies of instrument records and site survey data to the project health physicist for review. The final status survey will include collection of subsurface soil samples. ENVIRON will be responsible for establishing a subcontract with a drilling company.

FIGURE 3-1
PROJECT ORGANIZATION CHART



4.0 DERIVED CONCENTRATION GUIDELINES

The DCGLs for uranium-238 and thorium-232 were derived individually based on a 25 millirem per year (mrem/yr) dose limit to a future site receptor. Two models each for the uranium and thorium chains were used to assess both surface and subsurface activities. The surface and subsurface dose values for each chain were summed and then compared to the 25 mrem/yr limit. The dose modeling process is described in Attachment B. The RESRAD model outputs for uranium surface, uranium subsurface, thorium surface, and thorium subsurface are provided in Attachments C, D, E, and F respectively.

The thorium DCGL applies to the entire thorium-232 decay chain. Analytical results from samples collect by SCIENTECH in November 2001 (Reference 1) showed that thorium-232 was in secular equilibrium with its decay daughters; therefore, the dose model used to determine the thorium DCGL assumed equilibrium conditions.

The dose model also assumed secular equilibrium for the uranium-238 decay chain. While the November 2001 data did not fully support this assumption, it is believed the sample hold time was not long enough to reach an adequate level of equilibrium to form a definitive conclusion on the degree of equilibrium. Therefore, the assumption of equilibrium is considered conservative since the uranium-238 with its decay daughters has a greater dose impact than uranium-238 without its decay daughters.

Uranium-235 was also modeled along with uranium-238 at a uranium-235 to uranium-238 ratio of 0.72 weight percent (average natural ratio) and assuming secular equilibrium to establish a conservative uranium-238 DCGL.

Table 4-1 provides the DCGLs for the two isotopes of concern in units of picocuries per gram (pCi/g). To evaluate the impact of the combined concentrations, the unity rule is applied. That is, if the sum of the fractions between the average isotope concentrations and their respective DCGLs is less than 1, the combined concentration will not result in a dose greater than 25 mrem/yr. Table 4-2 provides an example of the application of the unity rule.

TABLE 4-1
SITE-SPECIFIC DCGLs

Isotopes	DCGL (pCi/g)	Maximum Dose (mrem/yr)	Year of Maximum Dose (t)
Uranium-238 +D	1.4	23.5	0
Thorium-232 +D	3.6	24.7	0

Note: +D: Includes decay daughters in secular equilibrium.

TABLE 4-2
EXAMPLE OF UNITY RULE APPLICATION

Isotopes	Concentration (pCi/g)	Conc./DCGL
Uranium-238 +D	0.8	0.57
Thorium-232 +D	0.2	0.06
The sum of the ratios < 1.0; therefore dose < 25 mrem/yr		Sum = 0.11

While the goal of the project is to remove all of the waste material from the site, locations with soil activity greater than the release criteria will not automatically be remediated in every instance. For example, should the sum of the fractions of the contaminants be slightly greater than 1.0 in a given sample, but the average for the area surrounding the slightly elevated area is less than 1.0, the elevated location will not require remediation. The decision to proceed with an excavation in an area where the sum of the fractions is greater than 1.0 will be made by the ENVIRON Project Manager in consultation with the SCIENTECH Technical Coordinator.

The DCGLs presented in Table 4-1 are soil concentrations greater than background concentrations. In order to determine the background activity for natural thorium and uranium, background surface soil samples (top 15 cm) will be collected at 19 sample locations. These samples will be analyzed using gamma spectroscopy at an off-site laboratory. Background data from previous investigations may be used in lieu of collecting new samples.

After sample analysis, the mean background and the standard deviation of the background will be determined. The mean background concentrations, in pCi/g, will be subtracted from site sample concentrations to determine the net concentrations. As described in MARSSIM, the maximum gross survey concentrations will also be compared against the gross background reference area concentration. If the difference between the minimum background reference area concentrations and the maximum survey unit concentrations is less than the DCGL for uranium and thorium, the survey unit can be free released without a statistical test.

5.0 SITE EXCAVATIONS

The two LLRW inventory volume estimates presented in Section 1.0 are consistent within about 10% and are considered reasonably sound approximations of the filtercake volume. The information obtained from the November 2001 site characterization (Reference 1) also helps to support the conceptual site model that approximately 151 wet tons (approximately 100 to 125 m^3) of LLRW material with varying concentrations of thorium and uranium were buried at the Site. As such, the initial areas of excavation are well defined. Additionally, it is apparent that burial practices were unrefined and resulted in random surface and near surface contamination.

In order to release the site for unrestricted use, the project team will excavate the buried LLRW and impacted soils, remove surface and near-surface contamination, load the material into waste containers, and prepare the containers for shipment to a waste disposal facility. The following sections provide specifics as to the anticipated excavation areas, the personnel and equipment needs, excavation and loading techniques, and decision making criteria.

5.1 AREAS, DEPTHS, AND VOLUMES

Table 5-1 provides the approximate size of each waste area and expected volume from each of the confirmed waste areas and potential waste areas defined in following the November 2001 site investigation (Reference 1). Figure A-1 of Attachment A shows the locations of these waste areas. The buried waste is typically in a layer beginning at 4 to 6 feet below the ground surface and is approximately 4 feet thick.

TABLE 5-1
ESTIMATED FILTERCAKE INVENTORY

Waste Area	Approximate Size (m^2)	Estimated Volume (m^3)[a]
CWA – 1	60	13
CWA – 2	25	6
CWA – 3	60	13
CWA – 4	50	11
CWA – 5	75	16
CWA – 6	75	16
CWA – 7	75	16
PWA – 1	75	16
PWA – 2	25	6
TOTALS	**410**	**113**

Note:
[a] It is assumed that waste was buried at a rate of one 55-gallon drum per square meter (rounded up to the nearest integer) (55 gallons = 0.21 m^3 per drum).

On-site excavations are expected to remove at a minimum the total volume of presented in Table 5-1. The filtercake waste is believed to have been originally buried in fiberboard drums that have degraded over time. As such, some of the soil surrounding the waste will also be excavated and packaged with the filtercake for LLRW disposal.

5.2 EQUIPMENT AND PERSONNEL

The project crew will use an excavator capable of excavating to depths of at least 12 feet, 2 feet below the maximum expected waste depth. The excavator will be rented from a local firm and should be delivered to the site by the end of the mobilization period. SCIENTECH will hire a local equipment operator with 40-hour hazardous waste operations (HAZWOPER) training to run the backhoe. The equipment operator will also receive radiation awareness training as directed by the project health physicist.

The environmental technicians will support the excavations by performing remedial action surveys and collecting soil samples from the bottoms of the excavations. Land surveys will be conducted using properly calibrated scaler/rate meters with 2-inch by 2-inch sodium iodide (2x2 NaI). The 2x2 NaI probes will be used to scan surface soils, field-screen soil samples, and survey large volumes of soils in containers. Geiger Mueller (GM) pancake probes or phoswich detectors will be used to "frisk" equipment, personnel, waste containers, etc. to ensure that contamination is not being tracked off site. Removable contamination samples (smears) will also be collected and analyzed to assess the level of removable contamination on equipment. Release limits for personnel and equipment are presented in Table 5-2. These values are traditional values originally presented in the NRC Regulatory Guide 1.86. Since the natural thorium limit is more restrictive than the natural uranium limit and field-screening techniques cannot distinguish between the two, the natural thorium limit will be used.

TABLE 5-2
ACCEPTABLE SURFACE CONTAMINATION LEVELS

Nuclide	Average[a]	Maximum	Removable
Natural Thorium	1,000 dpm/100cm^2	3,000 dpm/100cm^2	200 dpm/100cm^2

Note:
[a] Should not be averaged over an area greater than 1 m^2.

The environmental technicians will also use dose rate or exposure rate meters to ensure that general area dose rates are maintained at acceptable levels. Section 6.0 provides additional information on the survey and sampling methods.

5.3 EXCAVATION AND LOADING TECHNIQUES

Excavations will be performed in a precise manner as to minimize volumes of LLRW. Initially, the surface of each waste area (see Section 5.1) will be scanned for surface or near surface contamination using a 2x2 NaI detector. Surface or near-surface contamination can be identified by an increase in a ground-level count rate that decreases rapidly as the detector probe is raised from the ground surface to waist level. If the elevated count rate is due to a deep source, the count rate will not decrease significantly as the detector is raise to waste level. Should surface of near-surface activity be identified, the affected area of soil will be excavated and placed in LLRW shipping containers until the activity is removed.

After the surface is free of residual radioactivity, the cover soil will be dug in horizontal lifts 6" to 12" in depth. The excavated material will be surveyed with a NaI detector as it is removed from the ground and the trench and excavated material will be inspected after each lift to identify the presence of filtercake material. If no filtercake is seen and no elevated measurements are detected, the cover material will be treated as "potentially clean" (see Section 7.0).

If buried filtercake material is identified under the excavation, the potentially clean cover material will then be subjected to a composite sample of no less than 1 sample per 2 cubic yards. The composite sample will then be subjected to gamma spectroscopy using a high purity germanium (HPGe) detector. As soon as the presence of filtercake material is verified in an excavation, either by radiation measurements or visually, the excavated material will be loaded directly into waste disposal containers. This will include the soils adjacent to degrading waste drums. If the excavation yields no filtercake at any depth, the excavated soil will be replaced without additional sampling.

Once it appears visually that all of the waste has been removed from the excavation, the environmental technicians will verify that the soil in the bottom of the excavation is clean by scanning and sampling the bottom surface of the excavation. The survey, sampling and analysis techniques are described in Section 6.0. The bottom of each excavation will be photographed and the dimensions (length, width, and depth) of the excavation will be recorded.

6.0 SAMPLING AND ANALYSIS

Prior to the final status survey, environmental technicians will collect samples and conduct radiation surveys in support of remediation. Samples will be taken and surveys will be performed to verify the presence or absence of radioactive materials on the ground or in an excavation. Surveys and samples will also assess the level of contamination on equipment and personnel.

6.1 REMEDIATION SUPPORT SURVEYS AND FIELD SCREENING

As previously stated, environmental technicians will perform a walkover scan survey of each excavation area with 2x2 NaI detectors just prior to the start of the excavation. The purpose of this survey is to identify surface or near-surface contamination that should be removed prior to excavation. During excavations of potentially clean cover material, the soil in the excavator bucket and "potentially clean" soil stockpile will be periodically scanned with 2x2 NaI detectors. Once waste or contaminated soil is visually identified or identified based on instrument response, the material will be loaded directly into waste containers. Surveys on the outside of containers will be in compliance with DOT regulations and in accordance with disposal site requirements.

When it is suspected that all of the waste and contaminated soil has been removed from an excavation area, environmental technicians will conduct surveys of the bottom of the excavation. This can be done by physically entering the excavations in shoring boxes and conducting a 100% scan survey and visual survey and collection of soil samples at a rate of approximately one soil sample per 2 square meters. Up to 5 of these samples representing 10 square meters may be combined into a composite sample. Soil samples will be analyzed using HPGe-based gamma spectroscopy. If entering the excavations is determined to be detrimental to safety, at a minimum, the first 6" of the trench or pit bottom will be carefully removed, spread out in a designated survey area, and then be subjected to the same scanning and visual surveys and soil sampling as the in-situ survey.

6.2 GAMMA SPECTROSCOPY ANALYSIS

SCIENTECH currently intends to use an onsite gamma spectroscopy system that is equipped with a high purity germanium (HPGe) detector and GENIE 2000 gamma spectrum analysis software. This combination of hardware and software will be used to conduct near real-time analysis of soil samples or containers for the isotopes of concern. For quality assurance measures, approximately 5% of soil samples analyzed on site will be sent to an independent laboratory for analysis. The gamma spectroscopy results will determine the concentrations of uranium-238, uranium-235, and thorium-232 in units of pCi/g. The activity of these isotopes may be reported based on the activity of a decay daughter. Spectrum analysis will focus closely on the isotopes that result in the largest fraction of dose as determined by the dose assessment process. These include radium-226 (uranium-238 daughter), and radium-228 (thorium-232 daughter). An offsite laboratory may be used to provide analytical support (wet chemistry) in order to distinguish between radium-226 and uranium-235 concentrations because of the close energy lines. Gamma spectroscopy system calibration will be based on the use of a traceable, broad spectrum, radioactive source. The geometry of the calibration source and the soil samples will be identical and density will be similar.

6.3 EQUIPMENT RELEASE SURVEYS

Following appropriate decontamination, equipment that is to be released from the site must be surveyed. This equipment may include, but is not limited to, the excavator, hand tools, GeoProbe, survey instruments, buckets, and personnel protective clothing. These surveys will consist of scanning with a GM detector and collecting and counting smears. The release criteria for equipment release surveys are provided in Table 5-2 of Section 5.2. The following note is repeated for emphasis.

7.0 WASTE MANAGEMENT

Initially, excavated materials will be sorted into two separate volumes: contaminated and potentially clean. The material known to be contaminated (from visual inspections and gross gamma measurements) will be loaded directly into large-volume waste containers such as roll-off bins or soil sacks. Potentially clean material will also be segregated and staged in containers. After thorough scanning with a NaI detector and visual inspection for filtercake, the "potentially clean" material will be sampled and analyzed using gamma spectroscopy to determine if mean concentrations uranium and thorium meet the DCGLs. If the concentrations are less than the DCGLs (the sum-of-the-fractions test passes), the material will be declared clean and can then be used as on-site backfill. According to NUREG 1507[1], the 2"x2" NaI detector should yield minimum detectable concentration (MDC) values for scanning of about 1.8 pCi/g for thorium-232 and 2.8 pCi/g for radium-226, which is the primary dose driver for the uranium-238 decay chain. Although actual MDC values are dependent on source geometry and site specific conditions, if significant quantities of residual filtercake exist at or near the DCGL values, field scanning and fixed point measurements should be capable of detecting this material.

Waste shipments will comply with applicable U.S. Department of Transportation (DOT) regulations. According to 49 CFR 173, unlimited quantities of natural thorium and uranium are allowed activity in bulk waste containers. Therefore, if the following criteria are met the container is exempt from the requirements of 49 CFR 173, Subpart I, Class 7 (Radioactive) Materials:

- Radiation level at all points on the exterior surface of each bulk container is less than 0.5 millirem per hour (mrem/hr);
- The removable contamination limits do not exceed 22 dpm/100 cm^2 for natural uranium and natural thorium (total alpha and beta);
- The shipping container bears the marking "Radioactive";
- The package contains less than 15 grams of uranium-235.

If these criteria cannot be met, the regulations regarding shipping papers, marking, and labeling in 49 CFR 173, Subpart H, will apply. Placarding is not required for limited quantity shipments. The proper shipping name for the waste shipments is: "Radioactive Material, Excepted Package – Limited Quantity of Material." The proper identification number is "UN 2910."

[1] NRC Regulatory Guide, "Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions", June 1998.

8.0 SUPPORTING DOCUMENTS

This Work Plan will be supported by several other important plans that will be implemented during the course of the site remediation project. The plans include the Site-Specific Health and Safety Plan (SHASP), the Quality Assurance Project Plan (QAPP), and the Final Status Survey Plan (FSSP). These plans are briefly described in the following sections.

8.1 SITE-SPECIFIC HEALTH AND SAFETY PLAN

The SHASP will address all radiological and non-radiological hazards that may be encountered at the Site. Among other things, the SHASP will define levels of personnel protective equipment and provide emergency medical information. The SHASP must be read and acknowledged by everyone coming on-site during potentially hazardous operations.

8.2 QUALITY ASSURANCE PROJECT PLAN

The QAPP will be address quality issues associated with the collection of environmental samples and the performance of radiological surveys.

8.3 FINAL STATUS SURVEY PLAN

The FSSP will detail the survey, sampling, and analysis approach that will be implemented on site. The final status survey will be loosely based on the methods described in the "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)." While MARSSIM does not address methods for releasing subsurface soils, a sampling and analysis protocol will be established that provides adequate assurances that the site meets the release criteria.

The FSSP will define the specific survey units according to MARSSIM protocols. It is expected that the site, which is about 4,500 m^2 will be divided into two Class 1 survey units and one Class 2 survey unit. MARSSIM will be applied at the surface to ensure that all significant quantities of filtercake have been removed. Furthermore, the ENVIRON-SCIENTECH Team will conduct a relatively high-density downhole sampling protocol to ensure that no unidentified filtercake trenches remain.

The Class 2 survey unit will be the northern most area of the site, north of Line 4/175N in Figure A-1 of Appendix A. Previous surveys and investigations have not identified any radioactive materials, either surface or subsurface, in this area. The Class 2 area is approximately 1,300 m^2. The remaining portion of the site, about 3,800 m^2, will be divided into two Class 1 survey units of approximately equal size (see Figure A-1).

The surveys in each survey unit will include a 100% walkover scan survey using 2x2 NaI gamma scintillation detectors, including the Class 2 survey unit. Surface soil sample locations will be determined using the random start grid method defined in MARSSIM. Based on the background standard deviation for uranium-238 of 0.5 pCi/g (Reference 4) and a lower bound of the gray region at one-half the DCGL, MARSSIM protocols recommend that there should be a minimum of 19 sampling locations in each survey unit and in the background reference area. The samples will be collected from the first 15 cm of soil and analyzed using gamma spectroscopy. Deep soil samples will be collected as part of the remediation support status surveys to ensure that significant amounts of buried filtercake no longer remain at the site. If the standard deviation of radioactivity in the survey units is determined to be greater than that of the background reference area, the number of sampling locations will be modified in accordance with the MARSSIM protocol.

9.0 REFERENCES

1 SCIENTECH. 2002. "Breckenridge Disposal Site, Buried Filtercake Waste Characterization Report." Rev. 0. March 1.

2. SCIENTECH NES. 2001. "Site Characterization Plan Breckenridge Disposal Site." October 12.

3. SCIENTECH. 2002. "Dose Assessment Report, Breckenridge Disposal Site." Rev. 0. April 16.

4. SCIENTECH NES. 1999. "Radiological Evaluation of the Breckenridge Disposal Site." August.

ATTACHMENT A
SITE SURVEY AND SAMPLING MAP
(1 Page)

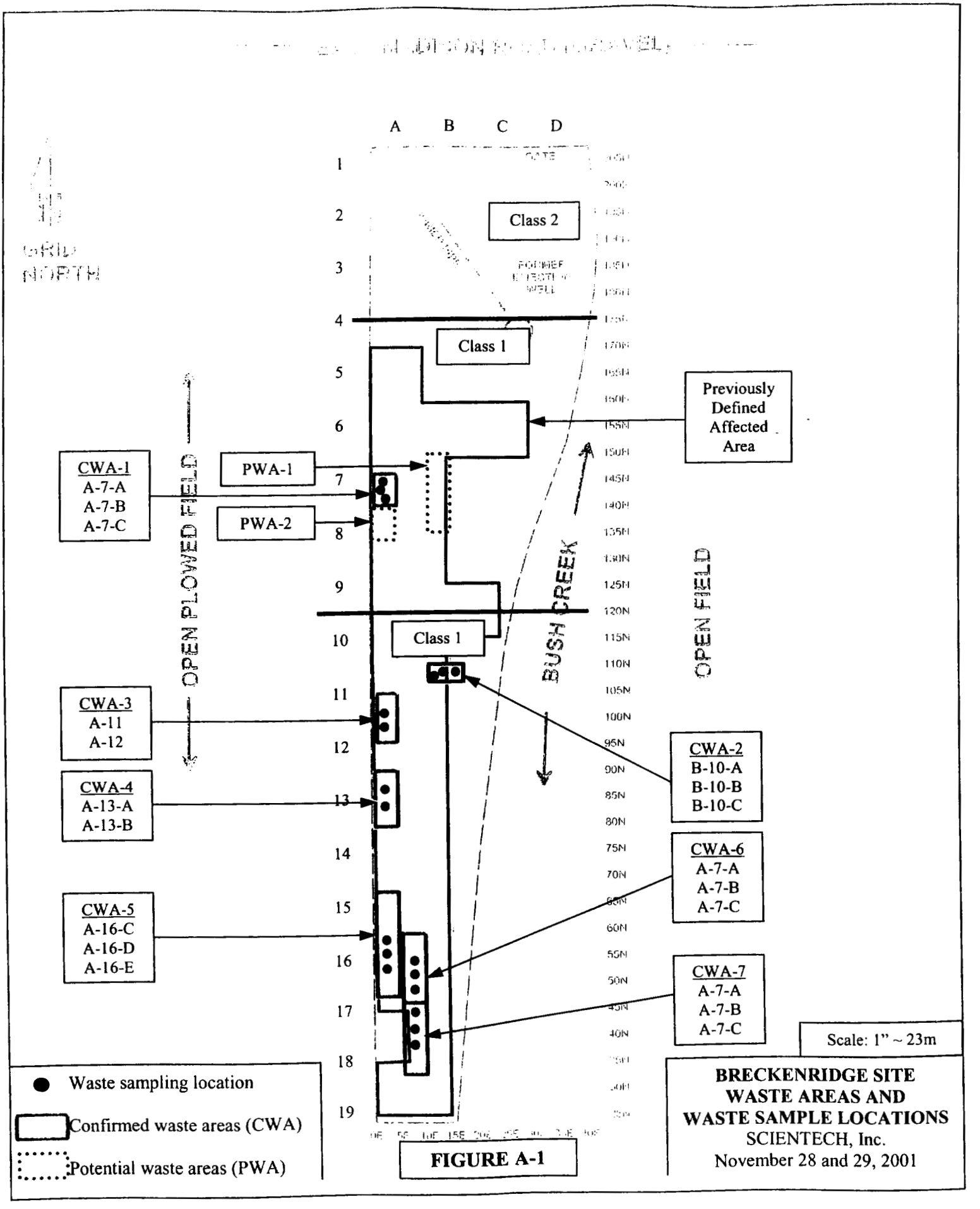

A
B
C
D
GRID NORTH
Class 2
Class 1
Previously Defined Affected Area
CWA-1
A-7-A
A-7-B
A-7-C
PWA-1
PWA-2
OPEN PLOWED FIELD
BUSH CREEK
OPEN FIELD
Class 1
CWA-3
A-11
A-12
CWA-4
A-13-A
A-13-B
CWA-5
A-16-C
A-16-D
A-16-E
CWA-2
B-10-A
B-10-B
B-10-C
CWA-6
A-7-A
A-7-B
A-7-C
CWA-7
A-7-A
A-7-B
A-7-C
Scale: 1" ~ 23m
Waste sampling location
Confirmed waste areas (CWA)
Potential waste areas (PWA)
BRECKENRIDGE SITE
WASTE AREAS AND
WASTE SAMPLE LOCATIONS
SCIENTECH, Inc.
November 28 and 29, 2001

FIGURE A-1

ATTACHMENT B
DOSE ASSESSMENT SUPPORTING DCGL DEVELOPMENT FOR THE BRECKENRIDGE DISPOSAL SITE
(8 Pages)

DOSE ASSESSMENT SUPPORTING DCGL DEVELOPMENT FOR THE BRECKENRIDGE DISPOSAL SITE

B1.0 INTRODUCTION

The Breckenridge Site is located on Madison Road about 4 miles east of downtown St. Louis, Bethany Township, Michigan. The Breckenridge property is a narrow triangular-shaped 2.2-acre parcel of land that is mostly flat and grassy with scattered large trees. The property is bounded by Madison Road on the north, by Bush Creek on the east, and by farmland on the west. The nearest residence is located approximately 0.2 kilometers to the east across Bush Creek. A six-foot high chain-link fence controls access to the Site. The site is located in a rural area surrounded by farms.

A previous dose assessment (Reference B1) was prepared by SCIENTECH, Inc. (SCIENTECH) to compare the estimated dose from the buried filtercake to a hypothetical future on-site residential receptor to the dose limit established by the U.S. Nuclear Regulatory Commission (NRC) for free release of radiologically contaminated areas. The NRC's dose limit, as established in Title 10, Chapter 20 of the U.S. Code of Federal Regulations (10 CFR 20), Subpart E (Reference 4), is 25 millirem per year (mrem/yr) total effective dose equivalent (TEDE). The regulation also stipulates that the dose should also be as low as reasonably achievable (ALARA). The results of the April 2002 dose assessment indicated that current site conditions did not meet the 25 mrem/yr standard.

B1.1 PURPOSE

This radiological dose assessment was prepared by SCIENTECH in support of the development of the derived concentration guideline levels (DCGL) for the waste removal and site restoration project at the Breckenridge Disposal Site. The radiological contaminants of concern at the disposal site include natural uranium (including ureanium-238, uranium-235, and their decay daughters) and natural thorium (thorium-232 and its decay daughters). DCGLs, in units of picocuries per gram (pCi/g), which result in approximately 25 mrem/yr to a hypothetical future site occupant, were developed separately for natural uranium and natural thorium.

B2.0 DOSE ASSESSMENT METHODS

The following paragraphs describe the modeling code used by SCIENTECH to calculate the dose to a hypothetical future site resident. For the purpose of the dose assessment, the hypothetical future site occupant is a resident farmer. Use of this receptor and supporting exposure parameters is considered the most conservative approach available. In development of the DCGLs, the source concentrations were varied until the dose limit of 25 mrem/yr was reached.

SCIENTECH assumes that implementation of the site remediation Work Plan meets the ALARA requirement because of the high cost of soil excavation and disposal. Section 1.5 of Appendix D, "ALARA Analysis," of NUREG 1727, "NMSS Decommissioning Standard Review Plan," supports this assumption in cases where a significant amount of material will be excavated from a site and disposed of as low-level radioactive waste (LLRW).

B2.1 EQUILIBRIUM EVALUATION

For the thorium decay chain, 90% equilibrium will be reached in 20 years. Since the material has been in the ground for about 35 years, no matter what the original state of the material, equilibrium conditions should be present. For the uranium decay chain, it takes about 75,000 years to reach an equilibrium state of about 90%. However, laboratory data shows that there are significant concentrations of uranium daughters in the waste material, but less than the uranium-238 concentrations (Reference B7). However, in the data analyzed, the samples were not held in a sealed container for an adequate time to allow the proper buildup of radon daughters prior to gamma spectroscopy analysis. The samples were analyzed within 5 days of receiving the sample when typically a longer period of at least 20 days is used for radon daughter buildup; the radon daughters are used to calculate the activity of uranium daughters above radon in the decay chain. Therefore, since the daughters were present in significant amounts, in one instance more than 50% of the uranium-238 activity, complete equilibrium of the uranium decay chain was assumed for the dose assessment.

B2.2 ANALYSIS WITH RESRAD

SCIENTECH used the RESRAD computer code (Version 6.21) developed by Argonne National Laboratory for the U.S. Department of Energy (DOE) to calculate a site-specific radiological dose to the future hypothetical on-site receptor. Site-specific input parameters were obtained from site and waste characterization data (Reference B1), available literature (Reference B2), and local well drilling records (Reference B3).

Since residual radioactivity may exist both at the surface and in waste cover material returned to the excavation, SCIENTECH generated two model outputs each for natural thorium (thorium-232 in equilibrium with its decay daughters) and one for natural uranium (uranium-238 and uranium-235 in equilibrium with their decay daughters). The activity of the uranium-235 was estimated based on a natural abundance of 0.72% weight percent. The four models included in the dose assessment are as follows:

- U-238 and U-235 plus Daughters near the surface (surface - 15 cm)
- U-238 and U-235 plus Daughters in the cover material used as backfill (subsurface)
- Th-232 plus Daughters near the surface (surface - 15 cm)
- Th-232 plus Daughters in the cover material used as backfill (subsurface)

The dose values from the surface and subsurface assessments are summed for uranium and thorium separately to ensure that material at the DCGL both on the surface and buried do not exceed the 25-millirem limit. The results of these 4 dose assessment models are provided as attachments C, D, E, and F respectively.

B2.3 EXPOSURE PATHWAY ANALYSIS

Table B-1 provides the exposure pathways that were selected to model the future resident farmer exposure scenario for the site-specific dose assessment. While the resident farmer scenario is typically considered a very conservative assumption on most radiological sites, the Breckenridge Site is surrounded by existing farm land, adjacent to a creek, and could easily be a residential property. The nearest resident, about 0.2 kilometers to the east, currently uses a groundwater well for drinking water. Irrigation in the area is provided by both surface water and groundwater sources. As such, all of the exposure parameters provided in Table B-1 were activated with only the radon pathway suppressed.

TABLE B-1
RESRAD EXPOSURE PATHWAYS

Pathway	Status	Pathway	Status
External Gamma Radiation	Active	Aquatic Foods	Active
Inhalation	Active	Drinking Water	Active
Plant Ingestion	Active	Soil Ingestion	Active
Meat Ingestion	Active	Radon	Suppressed
Milk Ingestion	Active		

B2.4 SPATIAL DISTRIBUTION OF POTENTIAL RESIDUAL CONTAMINANTS

Following site remediation, the conditions are expected to be quite different than the present conditions. With the goal of the site remediation project to remove all filtercake material from the site, one can expect that only small amounts of residual contamination near the surface or in the waste cover material, which may be returned to the excavations once the filtercake material is removed. As a result, residual radioactivity at the DCGLs was modeled as both a surface and subsurface source. The surface source is the top 15 cm of soil at the site that is believed to have been cross contaminated during burial operations. The subsurface source includes the waste cover material that may be backfilled into the filtercake excavation. The waste cover soil could have been cross contaminated with the filtercake material during its original burial or could become cross contaminated during the planned excavation.

As noted in Section 5.1 of the text, previous core sampling has shown the filtercake to be in a region 4 to 6 feet below grade in layers that are approximately 4 feet thick. For the purposes of dose modeling, a 4-foot cover depth is assumed for the filtercake. Based on other observed or calculated dimensions, the area of the filtercake burial locations is expected to be about 93 square meters.

Based on these dimensions, for modeling purposes, it is assumed that for each cubic meter of filtercake removed, 1 cubic meter of waste cover will be removed. The waste cover material will then be returned to the location of the filtercake. The model assumes that the waste cover material is at the DCGL. The waste cover material, after it is placed in the excavations as backfill, will then be covered by clean, imported soil to account for the lost filtercake volume and bring the excavation up to grade. Since both the cover and the filtercake are assumed to be about 4 feet thick, the model uses a 4-foot (1.22 meter) thick contaminated zone (original cover material) and a 4-foot clean cover (new, imported cover material).

B3.0 RESRAD PARAMETERS

Table B-2 provides the site-specific source term parameters used in the RESRAD code for the surface contamination model. The area of contamination was chosen to be 3,800 square meters (m^2) because this is the approximate area of the combined MARSSIM Class 1 survey units defined in the site Work Plan. The remaining portion of the site, about 1,500 m^2, is a Class 2 survey unit containing no buried waste material. While the same site-wide DCGLs will be applied to the Class 2 area, the contaminant concentrations in the area are not expected to be distinguishable from background and will not contribute to the dose of the future site occupant. The length parallel to the flow of the aquifer, while having negligible affect of the dose assessment, is assumed to be 600 meters. This is the approximate length of the combined Class 1 survey units approximately parallel to Bush Creek. Furthermore, the source material is not modeled with any clean cover material.

TABLE B-2
SITE-SPECIFIC SURFACE SOURCE TERM PARAMETERS

Source Term Parameter	RESRAD 6.21 Value
Area of contaminated zone	3,800 m^2
Thickness of contaminated zone	15 cm
Length Parallel to Aquifer Flow	600 m
Thickness of cover material	0 m

Table B-3 provides the site-specific source term parameters used in the RESRAD code for subsurface contamination model. The parameters used in this table are derived from the data provided above in Section B2.4. The length parallel to the flow of the aquifer, while having negligible affect of the dose assessment, is assumed to be 50 meters.

TABLE B-3
SITE-SPECIFIC SUBSURFACE SOURCE TERM PARAMETERS

Source Term Parameter	RESRAD 6.21 Value
Area of contaminated zone	93 m^2
Thickness of contaminated zone	1.22 m (4 ft)
Length Parallel to Aquifer Flow	50 m
Thickness of cover material	1.22 m (4 ft)

Table B-4 provides some of the site-specific and default input parameters used for the dose assessment simulation. The table also shows whether each parameter is the default RESRAD parameter, a site-specific parameter, or an NRC default parameter (Reference B5). The appropriate reference is provided for each site-specific parameter. Parameters not listed are provided in RESRAD output files in Attachments C and D.

TABLE B-4
RESRAD PARAMETERS

RESRAD Parameter	Surface Simulation	Default/Reference
Time Since Placement (years)	0	Default
Density of Cover Material (g/cm^3)	1.5	Default
Cover Erosion Rate (m/yr)	0.001	Default
Density of Contaminated Zone (g/cm^3)	1.4	B6
Contaminated Zone Erosion Rate (m/yr)	0.001	Default
Contaminated Zone Hydraulic Conductivity (m/yr)	89	B6
Average Annual Wind Speed (m/s)	4.65	B6
Evapotranspiration Coefficient	0.5	Default
Precipitation (m/yr)	0.754	B6
Irrigation (m/yr)	0.5	B5
Irrigation Mode	Overhead	Default
Watershed Area (m^2)	1,000,000	Default
Number of Unsaturated Zone Strata	1	Default
Unsaturated Zone Thickness (m)	0.3	B6
Unsaturated Zone Soil Density (g/cm^3)	1.4	B6
Unsaturated Zone Hydraulic Conductivity (m/yr)	89	B6
Saturated Zone Soil Density (g/cm^3)	1.4	B6
Saturated Zone Hydraulic Conductivity (m/yr)	289	B6
Well Pump Intake Depth (m)	35.3	B3
Well Pumping Rate (m^3/yr)	118	B3
Non-Dispersion (ND) or Mass Balance (MB)	ND	Estimate
Inhalation Rate (m^3/yr)	11,690	B5
Mass Loading for Inhalation (g/m^3)	3.14E-6	B5
Exposure Duration (years)	30	Default

TABLE B-4 (Continued)
RESRAD PARAMETERS

RESRAD Parameter	Surface Simulation	Default/Reference
Shielding Factor (Inhalation)	0.4	Default
Shielding Factor (External Gamma)	0.5512	B5
Fraction of Time Spent Indoors	0.6571	B5
Fraction of Time Spent Outdoors	0.1101	B5
Fruit, Vegetable, and Grain Consumption (kg/yr)	112	B5
Leafy Vegetable Consumption (kg/yr)	21.4	B5
Milk Consumption (kg/yr)	233	B5
Meat and Poultry Consumption (kg/yr)	65.1	B5
Fish Consumption (kg/yr)	20.6	B5
Other Seafood Consumption (kg/yr)	0	B5
Soil Ingestion Rate (g/yr)	18.26	B5
Drinking Water Intake (L/yr)	478.5	B5
Contamination Fraction of Drinking Water	1	Default
Contamination Fraction of Livestock Water	1	Default
Contamination Fraction of Irrigation Water	1	Default
Contamination Fraction of Aquatic Food	0	No source
Contamination Fraction of Plant Food	-1	Default
Contamination Fraction of Meat	-1	Default
Contamination Fraction of Milk	-1	Default
Mass Loading for Foliar Deposition	Not used	B5
Root Depth (m)	0.9	Default
All Other Agricultural Parameters	Used	Default
All Contaminated Foodstuff Storage Times	Used	B5

B4.0 MODEL RESULTS AND CONCLUSIONS

The contaminant concentrations that correspond to a maximum dose of not greater than 25 mrem/yr for a time period of 1,000 years are provided in Table B-5. To evaluate the impact of the combined concentrations, the unity rule is applied. That is, if the sum of the fractions between the average isotope concentrations and their respective DCGLs for uranium and the thorium is less than 1, the combined concentration will not result in a dose greater than 25 mrem/yr.

TABLE B-5
SITE-SPECIFIC DCGLs

Isotopes	DCGL (pCi/g)	Maximum Dose (mrem/yr)	Year of Maximum Dose (t)
Uranium-238 +D	4.0	24.6	0
Thorium-232 +D	3.6	24.7	0

Note: +D: Includes decay daughters in secular equilibrium.
U-238 + D includes U-235 which is assumed to exist in a natural state (0.72% by weight)
The maximum doses include both the surface and subsurface predicted doses

Uranium-235 was modeled with uranium-238 at a uranium-235 to uranium-238 ratio of 0.72 weight percent (average natural ratio) and assuming secular equilibrium to establish a conservative uranium-238 DCGL. Therefore, the uramium-235 concentration corresponding to the uranium-238 +D DCGL, at 0.72 weight percent, is 0.23 pCi/g.

The residual surface activity is the predominant source of dose in the developed models. The breakdown of the doses attributed to the specific exposure pathways from surface residual radioactivity are provided in Table B-6.

TABLE B-6
IMPORTANT EXPOSURE PATHWAYS

Pathway	Dose (mrem/yr)	Percent of Total Maximum Dose
	U-238 +D	
Ground (External)	17.6	70 %
Plant (Water Independent)	6.0	24%
	Th-232 +D	
Ground (External)	21.6	87.6 %
Plant (Water Independent)	2.4	9.7 %

B5.0 REFERENCES

B1. SCIENTECH. 2002. "Dose Assessment Report, Breckenridge Disposal Site." Rev. 0. April 16.

B2. 10 CFR 20, Subpart E "Standards for Protection Against Radiation, Radiological Criteria for License Termination."

B3. Oberlitner Well Drilling. Gratiot County, Michigan. 1999.

B4. U.S. Nuclear Regulatory Commission (NRC). 1998. "Decision Methods for Dose Assessment to Comply with Radiological License Termination." NUREG 1549. Draft. July.

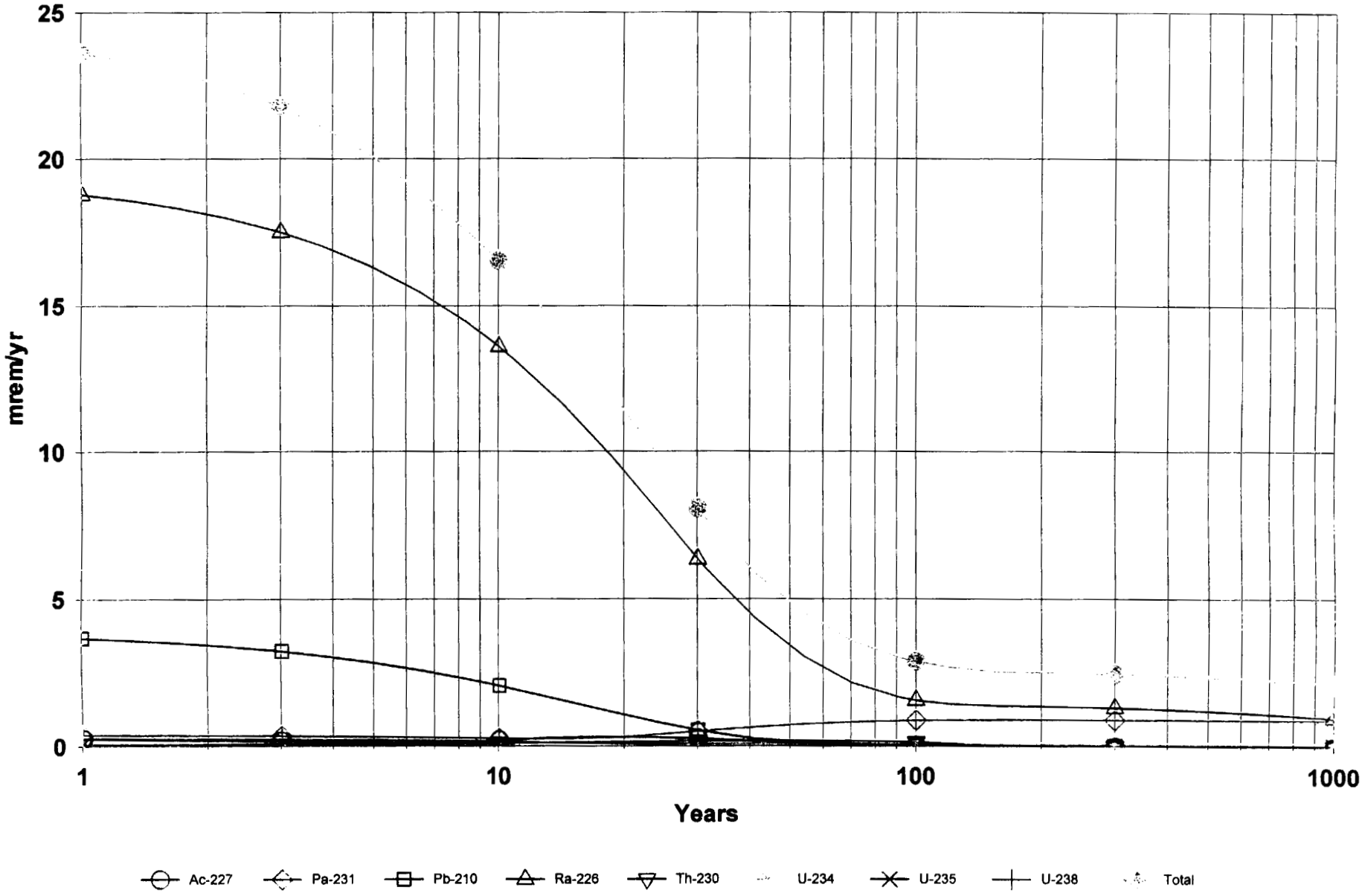
B5. NRC. 1999. "Preliminary Guidelines for Evaluating Dose Assessment in Support of Decommissioning." June 10.

B6. U.S. Department of Agriculture, Soil Conservation Service. 1979. "Soil Survey of Gratiot County, Michigan."

B7. SCIENTECH. 2002. "Breckenridge Disposal Site, Buried Filtercake Waste Characterization Report." Rev. 0. March 1.

ATTACHMENT C
RESRAD OUTPUT FILE -
U-238 AND U-235 PLUS DAUGHTERS NEAR THE SURFACE (SURFACE - 15 CM)
(23 Pages)

DOSE: All Nuclides Summed, All Pathways Summed



breck_U238_15cm.RAD 08/13/2004 08:12 Includes All Pathways

Summary : U-238+D DCGL - Breckenridge Disposal Site - SCIENTECH, Inc.
File : breck_U238_15cm.RAD

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Time = 3.000E+00 13
Time = 1.000E+01 14
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Summary : U-238+D DCGL - Breckenridge Disposal Site - SCIENTECH, Inc.
File : breck_U238_15cm.RAD

Dose Conversion Factor (and Related) Parameter Summary
File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.720E+00	6.720E+00	DCF2(1)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(2)
B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2(3)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2(4)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(5)
B-1	U-234	1.320E-01	1.320E-01	DCF2(6)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(7)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(8)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3(1)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(2)
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3(3)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3(4)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(5)
D-1	U-234	2.830E-04	2.830E-04	DCF3(6)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3(7)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3(8)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(3,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(3,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(3,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(4,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(5,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(6,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(6,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(6,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(7,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(7,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(7,3)
D-34				

Summary : U-238+D DCGL - Breckenridge Disposal Site - SCIENTECH, Inc.
File : breck_U238_15cm.RAD

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(8,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(8,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(8,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(2,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(2,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(4,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(4,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(5,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(5,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(6,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(6,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(7,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(8,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(8,2)

Summary : U-238+D DCGL - Breckenridge Disposal Site - SCIENTECH, Inc.
File : breck_U238_15cm.RAD

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)	3.800E+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)	6.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ac-227	2.300E-01	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Pa-231	2.300E-01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Pb-210	4.000E+00	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Ra-226	4.000E+00	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): Th-230	4.000E+00	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): U-234	4.000E+00	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): U-235	2.300E-01	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-238	4.000E+00	0.000E+00	---	S1(8)
R012	Concentration in groundwater (pCi/L): Ac-227	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Pa-231	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(4)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(8)
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)	1.400E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	8.900E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	4.650E+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)	7.540E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	5.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Density of saturated zone (g/cm**3)	1.400E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	2.890E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	3.530E+01	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
R015	Unsat. zone 1, thickness (m)	3.000E-01	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.400E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	8.900E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.301E-01	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(2,1
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.233E-02	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(3,1
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.622E-02	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(4,
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.742E-02	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.378E-05	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.233E-02	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.233E-02	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.233E-02	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(

Summary : U-238+D DCGL - Breckenridge Disposal Site - SCIENTECH, Inc.
File : breck_U238_15cm.RAD

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)	1.120E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.140E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	2.330E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.510E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	2.060E+01	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)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	4.785E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	0.000E+00	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.190E+00	FMEAT
R018	Contamination fraction of milk	-1	-1	0.190E+00	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	0.000E+00	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)

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	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	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
C14	DCF correction factor for gaseous forms of C14	not used	8.894E+01	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	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)

Summary : U-238+D DCGL - Breckenridge Disposal Site - SCIENTECH, Inc.
File : breck_U238_15cm.RAD

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Summary : U-238+D DCGL - Breckenridge Disposal Site - SCIENTECH, Inc.
File : breck_U238_15cm.RAD

Contaminated Zone Dimensions	
Area:	3800.00 square meters
Thickness:	0.15 meters
Cover Depth:	0.00 meters

Initial Soil Concentrations, pCi/g	
Ac-227	2.300E-01
Pa-231	2.300E-01
Pb-210	4.000E+00
Ra-226	4.000E+00
Th-230	4.000E+00
U-234	4.000E+00
U-235	2.300E-01
U-238	4.000E+00

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+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	2.461E+01	2.363E+01	2.178E+01	1.657E+01	8.084E+00	2.908E+00	2.482E+00	2.129E+00
M(t):	9.843E-01	9.451E-01	8.712E-01	6.627E-01	3.234E-01	1.163E-01	9.927E-02	8.517E-02

Maximum TDOSE(t): 2.461E+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	fr
Ac-227	1.788E-01	0.0073	1.237E-03	0.0001	0.000E+00	0.0000	8.739E-02	0.0036	4.123E-04	0.0000	1.452E-03	0.0001	4.388E-02	0.
Pa-231	2.079E-02	0.0008	2.684E-04	0.0000	0.000E+00	0.0000	2.653E-01	0.0108	9.034E-02	0.0037	3.343E-04	0.0000	3.387E-02	0.
Pb-210	1.055E-02	0.0004	7.816E-05	0.0000	0.000E+00	0.0000	3.134E+00	0.1274	1.713E-01	0.0070	2.215E-01	0.0090	3.946E-01	0
Ra-226	1.673E+01	0.6798	3.046E-05	0.0000	0.000E+00	0.0000	2.373E+00	0.0964	6.482E-02	0.0026	2.039E-01	0.0083	7.900E-02	0
Th-230	5.800E-03	0.0002	1.130E-03	0.0000	0.000E+00	0.0000	2.478E-02	0.0010	1.394E-03	0.0001	2.863E-04	0.0000	3.062E-02	0
U-234	6.954E-04	0.0000	4.458E-04	0.0000	0.000E+00	0.0000	3.060E-02	0.0012	2.450E-03	0.0001	1.527E-02	0.0006	1.540E-02	0
U-235	7.327E-02	0.0030	2.389E-05	0.0000	0.000E+00	0.0000	1.663E-03	0.0001	1.337E-04	0.0000	8.286E-04	0.0000	8.358E-04	0
U-238	2.354E-01	0.0096	3.985E-04	0.0000	0.000E+00	0.0000	2.909E-02	0.0012	2.329E-03	0.0001	1.452E-02	0.0006	1.464E-02	0
Total	1.725E+01	0.7012	3.612E-03	0.0001	0.000E+00	0.0000	5.946E+00	0.2416	3.332E-01	0.0135	4.581E-01	0.0186	6.129E-01	0

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 Path	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.132E-01	(
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.109E-01	(
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.932E+00	(
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.945E+01	(
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.401E-02	(
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.487E-02	(
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.675E-02	(
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.964E-01	(
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	2.461E+01	

*Sum of all water independent and dependent pathways.

Summary : U-238+D DCGL - Breckenridge Disposal Site - SCIENTECH, Inc.
File : breck_U238_15cm.RAD

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	f
Ac-227	1.519E-01	0.0064	1.045E-03	0.0000	0.000E+00	0.0000	7.388E-02	0.0031	3.488E-04	0.0000	1.227E-03	0.0001	3.708E-02	(
Pa-231	2.481E-02	0.0011	2.882E-04	0.0000	0.000E+00	0.0000	2.526E-01	0.0107	8.526E-02	0.0036	3.565E-04	0.0000	3.317E-02	(
Pb-210	9.959E-03	0.0004	7.331E-05	0.0000	0.000E+00	0.0000	2.940E+00	0.1245	1.608E-01	0.0068	2.078E-01	0.0088	3.702E-01	(
Ra-226	1.607E+01	0.6801	3.144E-05	0.0000	0.000E+00	0.0000	2.364E+00	0.1001	6.718E-02	0.0028	2.017E-01	0.0085	8.717E-02	(
Th-230	1.289E-02	0.0005	1.122E-03	0.0000	0.000E+00	0.0000	2.563E-02	0.0011	1.412E-03	0.0001	3.713E-04	0.0000	3.045E-02	(
U-234	6.600E-04	0.0000	4.202E-04	0.0000	0.000E+00	0.0000	2.885E-02	0.0012	2.311E-03	0.0001	1.440E-02	0.0006	1.452E-02	(
U-235	6.946E-02	0.0029	2.252E-05	0.0000	0.000E+00	0.0000	1.573E-03	0.0001	1.279E-04	0.0000	7.812E-04	0.0000	7.885E-04	(
U-238	2.230E-01	0.0094	3.757E-04	0.0000	0.000E+00	0.0000	2.743E-02	0.0012	2.196E-03	0.0001	1.369E-02	0.0006	1.380E-02	(
Total	1.656E+01	0.7010	3.378E-03	0.0001	0.000E+00	0.0000	5.714E+00	0.2419	3.196E-01	0.0135	4.403E-01	0.0186	5.871E-01	(

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 Path
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.655E-01
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.965E-01
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.689E+00
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.879E+01
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.187E-02
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.116E-02
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.276E-02
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.805E-01
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	2.363E+01

*Sum of all water independent and dependent pathways.

Summary : U-238+D DCGL - Breckenridge Disposal Site - SCIENTECH, Inc.
File : breck_U238_15cm.RAD

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
Ac-227	1.096E-01	0.0050	7.456E-04	0.0000	0.000E+00	0.0000	5.273E-02	0.0024	2.489E-04	0.0000	8.754E-04	0.0000	2.646E-02	0
Pa-231	3.008E-02	0.0014	3.091E-04	0.0000	0.000E+00	0.0000	2.282E-01	0.0105	7.577E-02	0.0035	3.791E-04	0.0000	3.136E-02	0
Pb-210	8.874E-03	0.0004	6.449E-05	0.0000	0.000E+00	0.0000	2.587E+00	0.1188	1.414E-01	0.0065	1.828E-01	0.0084	3.256E-01	0
Ra-226	1.483E+01	0.6808	3.284E-05	0.0000	0.000E+00	0.0000	2.326E+00	0.1068	7.041E-02	0.0032	1.960E-01	0.0090	1.004E-01	0
Th-230	2.617E-02	0.0012	1.107E-03	0.0001	0.000E+00	0.0000	2.730E-02	0.0013	1.452E-03	0.0001	5.374E-04	0.0000	3.012E-02	0
U-234	5.947E-04	0.0000	3.734E-04	0.0000	0.000E+00	0.0000	2.564E-02	0.0012	2.053E-03	0.0001	1.279E-02	0.0006	1.290E-02	0
U-235	6.243E-02	0.0029	2.002E-05	0.0000	0.000E+00	0.0000	1.407E-03	0.0001	1.169E-04	0.0000	6.941E-04	0.0000	7.019E-04	0
U-238	2.000E-01	0.0092	3.338E-04	0.0000	0.000E+00	0.0000	2.437E-02	0.0011	1.952E-03	0.0001	1.216E-02	0.0006	1.226E-02	0
Total	1.526E+01	0.7009	2.986E-03	0.0001	0.000E+00	0.0000	5.273E+00	0.2421	2.934E-01	0.0135	4.062E-01	0.0187	5.398E-01	0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Path	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.906E-01	(
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.661E-01	(
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.246E+00	(
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.752E+01	(
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.669E-02	(
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.435E-02	(
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.537E-02	(
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.511E-01	(
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	2.178E+01	1

*Sum of all water independent and dependent pathways.

Summary : U-238+D DCGL - Breckenridge Disposal Site - SCIENTECH, Inc.
File : breck_U238_15cm.RAD

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Ac-227	3.488E-02	0.0021	2.286E-04	0.0000	0.000E+00	0.0000	1.617E-02	0.0010	7.633E-05	0.0000	2.684E-04	0.0000	8.113E-03
Pa-231	3.230E-02	0.0019	2.806E-04	0.0000	0.000E+00	0.0000	1.561E-01	0.0094	5.004E-02	0.0030	3.402E-04	0.0000	2.342E-02
Pb-210	5.923E-03	0.0004	4.112E-05	0.0000	0.000E+00	0.0000	1.649E+00	0.0995	9.018E-02	0.0054	1.165E-01	0.0070	2.076E-01
Ra-226	1.117E+01	0.6743	3.358E-05	0.0000	0.000E+00	0.0000	2.084E+00	0.1258	7.246E-02	0.0044	1.704E-01	0.0103	1.217E-01
Th-230	6.451E-02	0.0039	1.054E-03	0.0001	0.000E+00	0.0000	3.254E-02	0.0020	1.597E-03	0.0001	1.055E-03	0.0001	2.901E-02
U-234	4.144E-04	0.0000	2.466E-04	0.0000	0.000E+00	0.0000	1.693E-02	0.0010	1.356E-03	0.0001	8.446E-03	0.0005	8.517E-03
U-235	4.293E-02	0.0026	1.326E-05	0.0000	0.000E+00	0.0000	9.518E-04	0.0001	8.457E-05	0.0000	4.583E-04	0.0000	4.667E-04
U-238	1.367E-01	0.0082	2.204E-04	0.0000	0.000E+00	0.0000	1.609E-02	0.0010	1.288E-03	0.0001	8.029E-03	0.0005	8.094E-03
Total	1.149E+01	0.6935	2.118E-03	0.0001	0.000E+00	0.0000	3.972E+00	0.2397	2.171E-01	0.0131	3.055E-01	0.0184	4.070E-01

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Path
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Ac-227	1.359E-01	0.0082	0.000E+00	0.0000	0.000E+00	0.0000	2.614E-02	0.0016	2.383E-05	0.0000	1.003E-04	0.0000	2.219E-01
Pa-231	1.028E-02	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	1.959E-03	0.0001	1.681E-06	0.0000	7.342E-06	0.0000	2.747E-01
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.070E+00
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.362E+01
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.298E-01
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.591E-02
U-235	3.283E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.211E-08	0.0000	5.030E-11	0.0000	2.275E-10	0.0000	4.490E-02
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.704E-01
Total	1.462E-01	0.0088	0.000E+00	0.0000	0.000E+00	0.0000	2.810E-02	0.0017	2.551E-05	0.0000	1.077E-04	0.0000	1.657E+01

*Sum of all water independent and dependent pathways.

Summary : U-238+D DCGL - Breckenridge Disposal Site - SCIENTECH, Inc.
File : breck_U238_15cm.RAD

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
Ac-227	1.314E-03	0.0002	7.687E-06	0.0000	0.000E+00	0.0000	5.436E-04	0.0001	2.567E-06	0.0000	9.025E-06	0.0000	2.728E-04	(
Pa-231	1.391E-02	0.0017	1.021E-04	0.0000	0.000E+00	0.0000	4.818E-02	0.0060	1.505E-02	0.0019	1.231E-04	0.0000	7.671E-03	(
Pb-210	1.858E-03	0.0002	1.120E-05	0.0000	0.000E+00	0.0000	4.492E-01	0.0556	2.456E-02	0.0030	3.174E-02	0.0039	5.654E-02	(
Ra-226	4.925E+00	0.6092	2.200E-05	0.0000	0.000E+00	0.0000	1.179E+00	0.1458	4.778E-02	0.0059	9.258E-02	0.0115	9.188E-02	(
Th-230	1.244E-01	0.0154	9.021E-04	0.0001	0.000E+00	0.0000	4.076E-02	0.0050	1.857E-03	0.0002	1.936E-03	0.0002	2.572E-02	(
U-234	1.559E-04	0.0000	7.426E-05	0.0000	0.000E+00	0.0000	5.096E-03	0.0006	4.079E-04	0.0001	2.541E-03	0.0003	2.565E-03	(
U-235	1.461E-02	0.0018	4.028E-06	0.0000	0.000E+00	0.0000	3.065E-04	0.0000	3.181E-05	0.0000	1.379E-04	0.0000	1.435E-04	(
U-238	4.562E-02	0.0056	6.629E-05	0.0000	0.000E+00	0.0000	4.840E-03	0.0006	3.876E-04	0.0000	2.415E-03	0.0003	2.435E-03	(
Total	5.127E+00	0.6342	1.190E-03	0.0001	0.000E+00	0.0000	1.728E+00	0.2137	9.009E-02	0.0111	1.315E-01	0.0163	1.872E-01	

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Path
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Ac-227	2.334E-01	0.0289	0.000E+00	0.0000	0.000E+00	0.0000	4.519E-02	0.0056	4.319E-05	0.0000	1.767E-04	0.0000	2.809E-01
Pa-231	3.642E-01	0.0450	0.000E+00	0.0000	0.000E+00	0.0000	7.045E-02	0.0087	3.473E-03	0.0004	2.323E-04	0.0000	5.234E-01
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.639E-01
Ra-226	1.425E-02	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	2.724E-03	0.0003	1.084E-04	0.0000	4.387E-04	0.0001	6.353E+00
Th-230	3.301E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.207E-07	0.0000	2.217E-08	0.0000	9.894E-08	0.0000	1.956E-01
U-234	3.466E-02	0.0043	0.000E+00	0.0000	0.000E+00	0.0000	6.700E-03	0.0008	1.078E-04	0.0000	7.828E-04	0.0001	5.309E-02
U-235	2.025E-03	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.916E-04	0.0000	8.069E-06	0.0000	4.255E-05	0.0000	1.770E-02
U-238	3.295E-02	0.0041	0.000E+00	0.0000	0.000E+00	0.0000	6.370E-03	0.0008	1.025E-04	0.0000	7.442E-04	0.0001	9.593E-02
Total	6.814E-01	0.0843	0.000E+00	0.0000	0.000E+00	0.0000	1.318E-01	0.0163	3.843E-03	0.0005	2.417E-03	0.0003	8.084E+00

*Sum of all water independent and dependent pathways.

Summary : U-238+D DCGL - Breckenridge Disposal Site - SCIENTECH, Inc.
File : breck_U238_15cm.RAD

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
Ac-227	1.067E-08	0.0000	3.815E-11	0.0000	0.000E+00	0.0000	2.699E-09	0.0000	1.275E-11	0.0000	4.480E-11	0.0000	1.354E-09	0
Pa-231	2.477E-04	0.0001	1.107E-06	0.0000	0.000E+00	0.0000	5.132E-04	0.0002	1.599E-04	0.0001	1.335E-06	0.0000	8.225E-05	0
Pb-210	2.749E-05	0.0000	8.405E-08	0.0000	0.000E+00	0.0000	3.373E-03	0.0012	1.845E-04	0.0001	2.383E-04	0.0001	4.244E-04	0
Ra-226	2.152E-01	0.0740	1.034E-06	0.0000	0.000E+00	0.0000	5.016E-02	0.0172	2.256E-03	0.0008	3.817E-03	0.0013	4.658E-03	0
Th-230	1.092E-01	0.0376	3.724E-04	0.0001	0.000E+00	0.0000	2.296E-02	0.0079	1.029E-03	0.0004	1.274E-03	0.0004	1.114E-02	0
U-234	2.110E-05	0.0000	8.516E-07	0.0000	0.000E+00	0.0000	5.790E-05	0.0000	4.505E-06	0.0000	2.721E-05	0.0000	2.911E-05	0
U-235	2.662E-04	0.0001	4.445E-08	0.0000	0.000E+00	0.0000	4.020E-06	0.0000	5.754E-07	0.0000	1.468E-06	0.0000	1.647E-06	0
U-238	7.816E-04	0.0003	7.047E-07	0.0000	0.000E+00	0.0000	5.147E-05	0.0000	4.124E-06	0.0000	2.568E-05	0.0000	2.588E-05	0
Total	3.258E-01	0.1120	3.763E-04	0.0001	0.000E+00	0.0000	7.712E-02	0.0265	3.639E-03	0.0013	5.384E-03	0.0019	1.636E-02	0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathw	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
Ac-227	2.641E-02	0.0091	0.000E+00	0.0000	0.000E+00	0.0000	5.114E-03	0.0018	4.893E-06	0.0000	2.001E-05	0.0000	3.155E-02	(
Pa-231	7.419E-01	0.2551	0.000E+00	0.0000	0.000E+00	0.0000	1.437E-01	0.0494	8.010E-03	0.0028	4.647E-04	0.0002	8.951E-01	(
Pb-210	3.281E-02	0.0113	0.000E+00	0.0000	0.000E+00	0.0000	6.363E-03	0.0022	2.429E-04	0.0001	3.727E-04	0.0001	4.403E-02	(
Ra-226	1.066E+00	0.3666	0.000E+00	0.0000	0.000E+00	0.0000	2.071E-01	0.0712	8.348E-03	0.0029	1.828E-02	0.0063	1.576E+00	(
Th-230	1.568E-02	0.0054	0.000E+00	0.0000	0.000E+00	0.0000	3.045E-03	0.0010	1.233E-04	0.0000	2.801E-04	0.0001	1.651E-01	(
U-234	7.920E-02	0.0272	0.000E+00	0.0000	0.000E+00	0.0000	1.534E-02	0.0053	2.495E-04	0.0001	1.800E-03	0.0006	9.672E-02	(
U-235	5.519E-03	0.0019	0.000E+00	0.0000	0.000E+00	0.0000	1.068E-03	0.0004	3.051E-05	0.0000	9.837E-05	0.0000	6.991E-03	(
U-238	7.531E-02	0.0259	0.000E+00	0.0000	0.000E+00	0.0000	1.458E-02	0.0050	2.372E-04	0.0001	1.712E-03	0.0006	9.273E-02	(
Total	2.043E+00	0.7025	0.000E+00	0.0000	0.000E+00	0.0000	3.963E-01	0.1363	1.725E-02	0.0059	2.303E-02	0.0079	2.908E+00	

*Sum of all water independent and dependent pathways.

Summary : U-238+D DCGL - Breckenridge Disposal Site - SCIENTECH, Inc.
File : breck_U238_15cm.RAD

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
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	0.000E+00	0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Path
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Ac-227	4.548E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.808E-06	0.0000	8.427E-09	0.0000	3.446E-08	0.0000	5.433E-05
Pa-231	7.630E-01	0.3074	0.000E+00	0.0000	0.000E+00	0.0000	1.478E-01	0.0595	8.049E-03	0.0032	4.802E-04	0.0002	9.193E-01
Pb-210	7.773E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.508E-05	0.0000	5.762E-07	0.0000	8.834E-07	0.0000	9.426E-05
Ra-226	1.086E+00	0.4375	0.000E+00	0.0000	0.000E+00	0.0000	2.109E-01	0.0850	8.479E-03	0.0034	1.825E-02	0.0074	1.323E+00
Th-230	3.119E-02	0.0126	0.000E+00	0.0000	0.000E+00	0.0000	6.060E-03	0.0024	2.436E-04	0.0001	5.245E-04	0.0002	3.802E-02
U-234	7.999E-02	0.0322	0.000E+00	0.0000	0.000E+00	0.0000	1.549E-02	0.0062	2.527E-04	0.0001	1.817E-03	0.0007	9.755E-02
U-235	8.805E-03	0.0035	0.000E+00	0.0000	0.000E+00	0.0000	1.705E-03	0.0007	6.491E-05	0.0000	1.013E-04	0.0000	1.068E-02
U-238	7.600E-02	0.0306	0.000E+00	0.0000	0.000E+00	0.0000	1.472E-02	0.0059	2.394E-04	0.0001	1.727E-03	0.0007	9.269E-02
Total	2.045E+00	0.8239	0.000E+00	0.0000	0.000E+00	0.0000	3.967E-01	0.1598	1.733E-02	0.0070	2.290E-02	0.0092	2.482E+00

*Sum of all water independent and dependent pathways.

Summary : U-238+D DCGL - Breckenridge Disposal Site - SCIENTECH, Inc.
File : breck_U238_15cm.RAD

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
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	0.000E+00	0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Path
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Ac-227	2.806E-18	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.451E-19	0.0000	5.319E-22	0.0000	2.150E-21	0.0000	3.354E-18
Pa-231	7.518E-01	0.3531	0.000E+00	0.0000	0.000E+00	0.0000	1.456E-01	0.0684	7.931E-03	0.0037	4.732E-04	0.0002	9.058E-01
Pb-210	2.762E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.357E-15	0.0000	2.047E-16	0.0000	3.139E-16	0.0000	3.349E-14
Ra-226	8.018E-01	0.3766	0.000E+00	0.0000	0.000E+00	0.0000	1.558E-01	0.0732	6.261E-03	0.0029	1.348E-02	0.0063	9.773E-01
Th-230	2.417E-02	0.0114	0.000E+00	0.0000	0.000E+00	0.0000	4.696E-03	0.0022	1.888E-04	0.0001	4.064E-04	0.0002	2.946E-02
U-234	8.168E-02	0.0384	0.000E+00	0.0000	0.000E+00	0.0000	1.582E-02	0.0074	2.667E-04	0.0001	1.845E-03	0.0009	9.961E-02
U-235	2.002E-02	0.0094	0.000E+00	0.0000	0.000E+00	0.0000	3.878E-03	0.0018	1.832E-04	0.0001	1.083E-04	0.0001	2.419E-02
U-238	7.616E-02	0.0358	0.000E+00	0.0000	0.000E+00	0.0000	1.475E-02	0.0069	2.399E-04	0.0001	1.731E-03	0.0008	9.288E-02
Total	1.756E+00	0.8245	0.000E+00	0.0000	0.000E+00	0.0000	3.405E-01	0.1599	1.507E-02	0.0071	1.804E-02	0.0085	2.129E+00

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	Ac-227	1.000E+00	1.362E+00	1.154E+00	8.288E-01	9.649E-01	1.221E+00	1.372E-01	2.362E-04	1.458E-17
Pa-231	Pa-231	1.000E+00	1.763E+00	1.663E+00	1.478E+00	9.771E-01	6.975E-01	9.213E-01	9.221E-01	9.085E-01
Pa-231	Ac-227	1.000E+00	2.373E-02	6.158E-02	1.140E-01	2.172E-01	1.578E+00	2.970E+00	3.075E+00	3.030E+00
Pa-231	∑DSR(j)		1.786E+00	1.724E+00	1.592E+00	1.194E+00	2.275E+00	3.892E+00	3.997E+00	3.938E+00
Pb-210	Pb-210	1.000E+00	9.831E-01	9.223E-01	8.114E-01	5.174E-01	1.410E-01	1.101E-02	2.357E-05	8.374E-15
Ra-226	Ra-226	1.000E+00	4.845E+00	4.651E+00	4.286E+00	3.216E+00	1.404E+00	1.308E-01	6.904E-02	5.098E-02
Ra-226	Pb-210	1.000E+00	1.750E-02	4.607E-02	9.357E-02	1.890E-01	1.839E-01	2.632E-01	2.618E-01	1.933E-01
Ra-226	∑DSR(j)		4.862E+00	4.697E+00	4.380E+00	3.405E+00	1.588E+00	3.939E-01	3.308E-01	2.443E-01
Th-230	Th-230	1.000E+00	1.495E-02	1.486E-02	1.466E-02	1.398E-02	1.203E-02	5.171E-03	0.000E+00	0.000E+00
Th-230	Ra-226	1.000E+00	1.047E-03	3.096E-03	6.935E-03	1.795E-02	3.479E-02	3.056E-02	1.986E-03	1.538E-03
Th-230	Pb-210	1.000E+00	2.730E-06	1.665E-05	7.735E-05	5.159E-04	2.077E-03	5.555E-03	7.519E-03	5.828E-03
Th-230	∑DSR(j)		1.600E-02	1.797E-02	2.167E-02	3.244E-02	4.889E-02	4.129E-02	9.505E-03	7.366E-03
U-234	U-234	1.000E+00	1.622E-02	1.529E-02	1.359E-02	8.975E-03	1.327E-02	2.417E-02	2.434E-02	2.429E-02
U-234	Th-230	1.000E+00	6.882E-08	1.956E-07	4.245E-07	1.018E-06	1.654E-06	9.089E-07	8.835E-08	3.154E-07
U-234	Ra-226	1.000E+00	3.094E-09	2.121E-08	1.056E-07	7.548E-07	3.422E-06	5.982E-06	1.257E-05	1.355E-04
U-234	Pb-210	1.000E+00	6.419E-12	8.253E-11	8.245E-10	1.550E-08	1.648E-07	2.754E-06	3.832E-05	4.784E-04
U-234	∑DSR(j)		1.622E-02	1.529E-02	1.359E-02	8.977E-03	1.327E-02	2.418E-02	2.439E-02	2.490E-02
U-235	U-235	1.000E+00	3.337E-01	3.163E-01	2.841E-01	1.950E-01	7.598E-02	2.397E-02	2.298E-02	2.298E-02
U-235	Pa-231	1.000E+00	1.749E-05	5.150E-05	1.083E-04	2.164E-04	4.501E-04	1.961E-03	5.881E-03	1.944E-02
U-235	Ac-227	1.000E+00	1.754E-07	1.065E-06	4.575E-06	2.343E-05	5.377E-04	4.467E-03	1.756E-02	6.277E-02
U-235	∑DSR(j)		3.337E-01	3.163E-01	2.842E-01	1.952E-01	7.696E-02	3.039E-02	4.642E-02	1.052E-01
U-238	U-238	1.000E+00	7.409E-02	7.011E-02	6.278E-02	4.260E-02	2.398E-02	2.318E-02	2.315E-02	2.315E-02
U-238	U-234	1.000E+00	2.276E-08	6.481E-08	1.346E-07	2.670E-07	1.147E-06	6.888E-06	2.074E-05	6.898E-05
U-238	Th-230	1.000E+00	6.616E-14	4.308E-13	2.067E-12	1.381E-11	5.356E-11	5.152E-11	4.526E-11	4.954E-10
U-238	Ra-226	1.000E+00	2.171E-15	3.179E-14	3.461E-13	7.059E-12	5.383E-10	1.351E-09	4.230E-09	1.379E-07
U-238	Pb-210	1.000E+00	3.779E-18	9.924E-17	2.102E-15	1.125E-13	1.710E-09	4.000E-09	1.227E-08	4.707E-07
U-238	∑DSR(j)		7.409E-02	7.011E-02	6.278E-02	4.260E-02	2.398E-02	2.318E-02	2.317E-02	2.322E-02

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j)
The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	1.836E+01	2.166E+01	3.017E+01	2.591E+01	2.047E+01	1.823E+02	1.058E+05	*7.230E+13
Pa-231	1.399E+01	1.450E+01	1.571E+01	2.093E+01	1.099E+01	6.424E+00	6.255E+00	6.348E+00
Pb-210	2.543E+01	2.711E+01	3.081E+01	4.832E+01	1.773E+02	2.271E+03	1.061E+06	*7.631E+13
Ra-226	5.141E+00	5.322E+00	5.708E+00	7.341E+00	1.574E+01	6.346E+01	7.557E+01	1.023E+02
Th-230	1.562E+03	1.391E+03	1.154E+03	7.706E+02	5.113E+02	6.055E+02	2.630E+03	3.394E+03
U-234	1.542E+03	1.635E+03	1.840E+03	2.785E+03	1.884E+03	1.034E+03	1.025E+03	1.004E+03
U-235	7.491E+01	7.903E+01	8.796E+01	1.281E+02	3.248E+02	8.225E+02	5.386E+02	2.377E+02
U-238	3.374E+02	3.566E+02	3.982E+02	5.868E+02	1.042E+03	1.078E+03	1.079E+03	1.077E+03

*At specific activity limit

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

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ac-227	2.300E-01	18.51 ± 0.04	1.484E+00	1.685E+01	1.362E+00	1.836E+01
Pa-231	2.300E-01	216.7 ± 0.4	4.001E+00	6.248E+00	1.786E+00	1.399E+01
Pb-210	4.000E+00	0.000E+00	9.831E-01	2.543E+01	9.831E-01	2.543E+01
Ra-226	4.000E+00	0.000E+00	4.862E+00	5.141E+00	4.862E+00	5.141E+00
Th-230	4.000E+00	51.1 ± 0.1	5.280E-02	4.735E+02	1.600E-02	1.562E+03
U-234	4.000E+00	1.000E+03	2.490E-02	1.004E+03	1.622E-02	1.542E+03
U-235	2.300E-01	0.000E+00	3.337E-01	7.491E+01	3.337E-01	7.491E+01
U-238	4.000E+00	0.000E+00	7.409E-02	3.374E+02	7.409E-02	3.374E+02

Summary : U-238+D DCGL - Breckenridge Disposal Site - SCIENTECH, Inc.
File : breck_U238_15cm.RAD

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

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	Ac-227	1.000E+00	3.132E-01	2.655E-01	1.906E-01	2.219E-01	2.809E-01	3.155E-02	5.433E-05	3.354E-18
Ac-227	Pa-231	1.000E+00	5.459E-03	1.416E-02	2.623E-02	4.995E-02	3.629E-01	6.832E-01	7.072E-01	6.969E-01
Ac-227	U-235	1.000E+00	4.033E-08	2.451E-07	1.052E-06	5.390E-06	1.237E-04	1.028E-03	4.038E-03	1.444E-02
Ac-227	∑DOSE(j)		3.187E-01	2.796E-01	2.168E-01	2.719E-01	6.440E-01	7.158E-01	7.113E-01	7.113E-01
Pa-231	Pa-231	1.000E+00	4.054E-01	3.824E-01	3.399E-01	2.247E-01	1.604E-01	2.119E-01	2.121E-01	2.090E-01
Pa-231	U-235	1.000E+00	4.022E-06	1.185E-05	2.491E-05	4.976E-05	1.035E-04	4.511E-04	1.353E-03	4.471E-03
Pa-231	∑DOSE(j)		4.054E-01	3.824E-01	3.399E-01	2.248E-01	1.605E-01	2.124E-01	2.134E-01	2.134E-01
Pb-210	Pb-210	1.000E+00	3.932E+00	3.689E+00	3.246E+00	2.070E+00	5.639E-01	4.403E-02	9.426E-05	3.349E-14
Pb-210	Ra-226	1.000E+00	7.001E-02	1.843E-01	3.743E-01	7.559E-01	7.354E-01	1.053E+00	1.047E+00	7.734E-01
Pb-210	Th-230	1.000E+00	1.092E-05	6.658E-05	3.094E-04	2.063E-03	8.308E-03	2.222E-02	3.008E-02	2.331E-02
Pb-210	U-234	1.000E+00	2.568E-11	3.301E-10	3.298E-09	6.198E-08	6.591E-07	1.101E-05	1.533E-04	1.913E-03
Pb-210	U-238	1.000E+00	1.512E-17	3.970E-16	8.409E-15	4.500E-13	6.840E-09	1.600E-08	4.907E-08	1.883E-06
Pb-210	∑DOSE(j)		4.002E+00	3.874E+00	3.620E+00	2.828E+00	1.308E+00	1.119E+00	1.078E+00	7.986E-01
Ra-226	Ra-226	1.000E+00	1.938E+01	1.861E+01	1.714E+01	1.287E+01	5.618E+00	5.231E-01	2.761E-01	2.039E-01
Ra-226	Th-230	1.000E+00	4.188E-03	1.238E-02	2.774E-02	7.178E-02	1.391E-01	1.222E-01	7.942E-03	6.151E-03
Ra-226	U-234	1.000E+00	1.238E-08	8.484E-08	4.222E-07	3.019E-06	1.369E-05	2.393E-05	5.026E-05	5.422E-04
Ra-226	U-238	1.000E+00	8.683E-15	1.272E-13	1.384E-12	2.823E-11	2.153E-09	5.405E-09	1.692E-08	5.515E-07
Ra-226	∑DOSE(j)		1.938E+01	1.862E+01	1.717E+01	1.294E+01	5.757E+00	6.454E-01	2.841E-01	2.106E-01
Th-230	Th-230	1.000E+00	5.981E-02	5.942E-02	5.864E-02	5.592E-02	4.813E-02	2.068E-02	0.000E+00	0.000E+00
Th-230	U-234	1.000E+00	2.753E-07	7.825E-07	1.698E-06	4.074E-06	6.615E-06	3.636E-06	3.534E-07	1.261E-06
Th-230	U-238	1.000E+00	2.646E-13	1.723E-12	8.268E-12	5.525E-11	2.143E-10	2.061E-10	1.810E-10	1.982E-09
Th-230	∑DOSE(j)		5.981E-02	5.942E-02	5.864E-02	5.592E-02	4.814E-02	2.069E-02	3.536E-07	1.263E-06
U-234	U-234	1.000E+00	6.487E-02	6.116E-02	5.435E-02	3.590E-02	5.307E-02	9.668E-02	9.734E-02	9.715E-02
U-234	U-238	1.000E+00	9.105E-08	2.592E-07	5.385E-07	1.068E-06	4.589E-06	2.755E-05	8.296E-05	2.759E-04
U-234	∑DOSE(j)		6.487E-02	6.116E-02	5.435E-02	3.590E-02	5.307E-02	9.671E-02	9.742E-02	9.742E-02
U-235	U-235	1.000E+00	7.675E-02	7.274E-02	6.534E-02	4.485E-02	1.747E-02	5.512E-03	5.285E-03	5.285E-03
U-238	U-238	1.000E+00	2.964E-01	2.805E-01	2.511E-01	1.704E-01	9.592E-02	9.271E-02	9.260E-02	9.260E-02

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

Summary : U-238+D DCGL - Breckenridge Disposal Site - SCIENTECH, Inc.
File : breck_U238_15cm.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

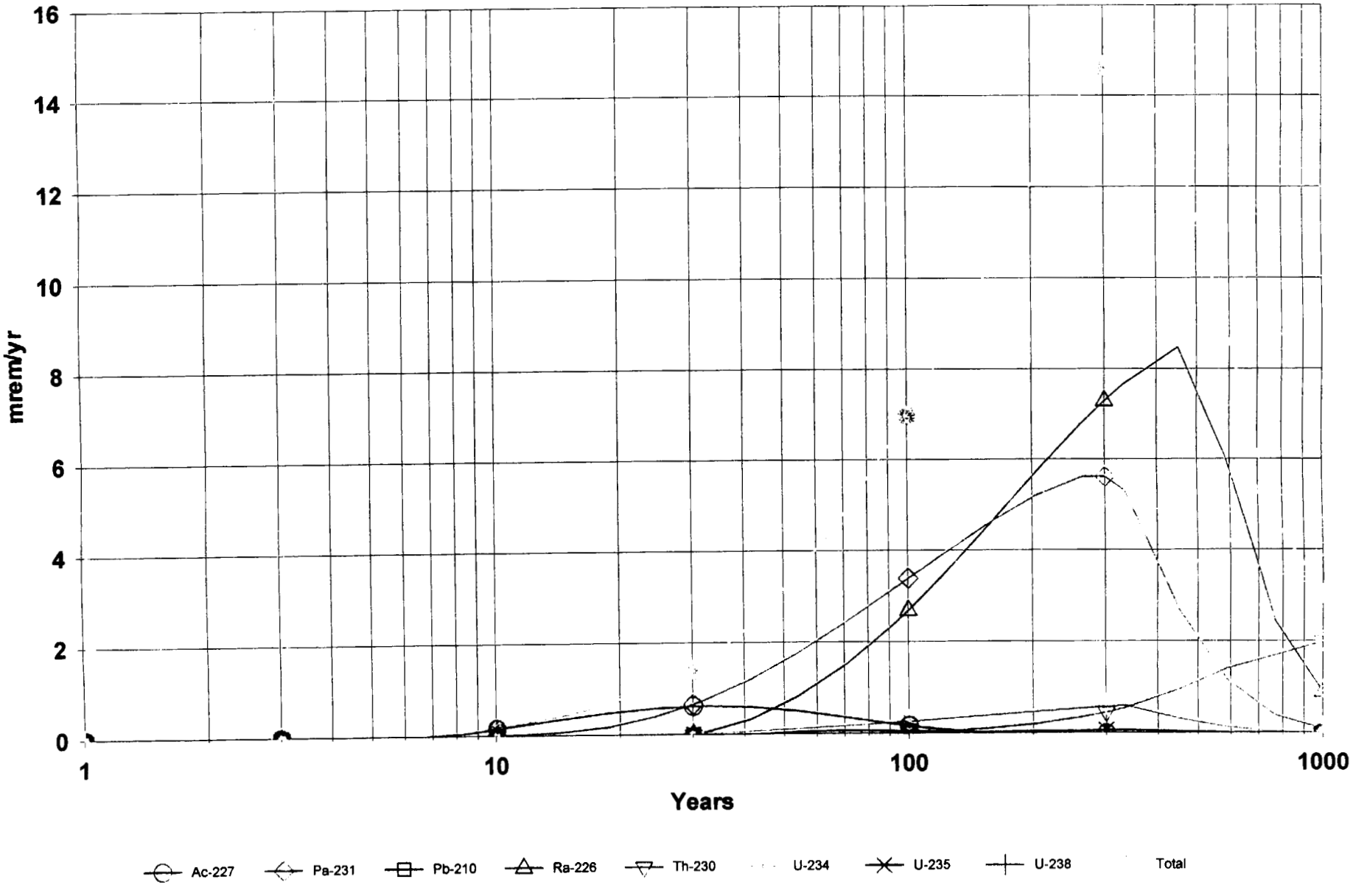
Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	Ac-227	1.000E+00	2.300E-01	1.956E-01	1.415E-01	4.557E-02	1.789E-03	2.143E-08	1.859E-22	0.000E+00
Ac-227	Pa-231	1.000E+00	0.000E+00	6.582E-03	1.600E-02	2.636E-02	1.338E-02	3.561E-04	1.011E-08	1.231E-24
Ac-227	U-235	1.000E+00	0.000E+00	7.090E-08	5.356E-07	3.288E-06	6.240E-06	6.853E-07	6.239E-11	2.608E-26
Ac-227	∑S(j):		2.300E-01	2.022E-01	1.575E-01	7.193E-02	1.517E-02	3.568E-04	1.017E-08	1.257E-24
Pa-231	Pa-231	1.000E+00	2.300E-01	2.183E-01	1.966E-01	1.363E-01	4.783E-02	1.225E-03	3.478E-08	4.236E-24
Pa-231	U-235	1.000E+00	0.000E+00	4.618E-06	1.248E-05	2.883E-05	3.037E-05	2.595E-06	2.215E-10	9.058E-26
Pa-231	∑S(j):		2.300E-01	2.183E-01	1.966E-01	1.363E-01	4.786E-02	1.228E-03	3.500E-08	4.327E-24
Pb-210	Pb-210	1.000E+00	4.000E+00	3.777E+00	3.368E+00	2.255E+00	7.170E-01	1.299E-02	1.370E-07	5.222E-25
Pb-210	Ra-226	1.000E+00	0.000E+00	1.186E-01	3.234E-01	7.738E-01	9.078E-01	1.244E-01	7.461E-05	2.327E-16
Pb-210	Th-230	1.000E+00	0.000E+00	2.609E-05	2.205E-04	1.975E-03	9.986E-03	2.325E-02	2.450E-02	2.361E-02
Pb-210	U-234	1.000E+00	0.000E+00	7.789E-11	1.954E-09	5.617E-08	7.571E-07	3.633E-06	4.218E-06	4.066E-06
Pb-210	U-238	1.000E+00	0.000E+00	5.503E-17	4.116E-15	3.855E-13	1.449E-11	1.656E-10	2.287E-10	2.205E-10
Pb-210	∑S(j):		4.000E+00	3.896E+00	3.692E+00	3.031E+00	1.635E+00	1.606E-01	2.458E-02	2.362E-02
Ra-226	Ra-226	1.000E+00	4.000E+00	3.851E+00	3.571E+00	2.739E+00	1.285E+00	9.082E-02	4.682E-05	1.456E-16
Ra-226	Th-230	1.000E+00	0.000E+00	1.700E-03	4.914E-03	1.442E-02	3.104E-02	4.456E-02	4.512E-02	4.349E-02
Ra-226	U-234	1.000E+00	0.000E+00	7.569E-09	6.417E-08	5.809E-07	3.013E-06	7.315E-06	7.770E-06	7.488E-06
Ra-226	U-238	1.000E+00	0.000E+00	7.113E-15	1.789E-13	5.185E-12	7.137E-11	3.578E-10	4.213E-10	4.061E-10
Ra-226	∑S(j):		4.000E+00	3.853E+00	3.576E+00	2.754E+00	1.316E+00	1.354E-01	4.518E-02	4.349E-02
Th-230	Th-230	1.000E+00	4.000E+00	4.000E+00	3.999E+00	3.998E+00	3.994E+00	3.979E+00	3.937E+00	3.794E+00
Th-230	U-234	1.000E+00	0.000E+00	3.508E-05	9.996E-05	2.803E-04	5.444E-04	6.815E-04	6.780E-04	6.534E-04
Th-230	U-238	1.000E+00	0.000E+00	4.929E-11	4.140E-10	3.628E-09	1.733E-08	3.592E-08	3.677E-08	3.543E-08
Th-230	∑S(j):		4.000E+00	4.000E+00	3.999E+00	3.998E+00	3.994E+00	3.980E+00	3.938E+00	3.795E+00
U-234	U-234	1.000E+00	4.000E+00	3.796E+00	3.419E+00	2.370E+00	8.323E-01	2.135E-02	6.082E-07	7.503E-23
U-234	U-238	1.000E+00	0.000E+00	1.076E-05	2.908E-05	6.720E-05	7.079E-05	6.053E-06	5.175E-10	2.130E-25
U-234	∑S(j):		4.000E+00	3.796E+00	3.419E+00	2.370E+00	8.323E-01	2.136E-02	6.087E-07	7.525E-23
U-235	U-235	1.000E+00	2.300E-01	2.183E-01	1.966E-01	1.363E-01	4.786E-02	1.228E-03	3.500E-08	4.327E-24
U-238	U-238	1.000E+00	4.000E+00	3.796E+00	3.419E+00	2.370E+00	8.323E-01	2.136E-02	6.087E-07	7.525E-23

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

RESCALC.EXE execution time = 28.55 seconds

ATTACHMENT D
RESRAD OUTPUT FILE -
U-238 AND U-235 PLUS DAUGHTERS IN THE COVER MATERIAL USED AS BACKFILL
(SUBSURFACE)
(24 Pages)

DOSE: All Nuclides Summed, All Pathways Summed



breck_U238_subsurface_only.RAD 08/13/2004 08:48 Includes All Pathways

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Dose Conversion Factor (and Related) Parameter Summary
File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.720E+00	6.720E+00	DCF2(1)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(2)
B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2(3)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2(4)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(5)
B-1	U-234	1.320E-01	1.320E-01	DCF2(6)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(7)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(8)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3(1)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(2)
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3(3)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3(4)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(5)
D-1	U-234	2.830E-04	2.830E-04	DCF3(6)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3(7)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3(8)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(3,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(3,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(3,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(4,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(5,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(6,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(6,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(6,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(7,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(7,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(7,3)
D-34				

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(8,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(8,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(8,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(2,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(2,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(4,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(4,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(5,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(5,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(6,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(6,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(7,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(8,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(8,2)

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	9.300E+01	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.220E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	5.000E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ac-227	2.300E-01	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Pa-231	2.300E-01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Pb-210	4.000E+00	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Ra-226	4.000E+00	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): Th-230	4.000E+00	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): U-234	4.000E+00	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): U-235	2.300E-01	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-238	4.000E+00	0.000E+00	---	S1(8)
R012	Concentration in groundwater (pCi/L): Ac-227	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Pa-231	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(4)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(8)
R013	Cover depth (m)	1.220E+00	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)	1.400E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	8.900E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	4.650E+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)	7.540E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	5.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Density of saturated zone (g/cm**3)	1.400E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	2.890E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	3.530E+01	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
R015	Unsat. zone 1, thickness (m)	3.000E-01	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.400E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	8.900E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.599E-02	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.434E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.223E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.601E-03	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.382E-06	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.434E-03	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.434E-03	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.434E-03	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.120E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.140E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	2.330E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.510E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	2.060E+01	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)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	4.785E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	0.000E+00	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.465E-01	FPLANT
R018	Contamination fraction of meat	-1	-1	0.465E-02	FMEAT
R018	Contamination fraction of milk	-1	-1	0.465E-02	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	0.000E+00	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)

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	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	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
C14	DCF correction factor for gaseous forms of C14	not used	8.894E+01	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	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)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions	
Area:	93.00 square meters
Thickness:	1.22 meters
Cover Depth:	1.22 meters

Initial Soil Concentrations, pCi/g	
Ac-227	2.300E-01
Pa-231	2.300E-01
Pb-210	4.000E+00
Ra-226	4.000E+00
Th-230	4.000E+00
U-234	4.000E+00
U-235	2.300E-01
U-238	4.000E+00

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+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	4.999E-06	5.038E-06	5.118E-06	1.723E-01	1.414E+00	6.960E+00	1.465E+01	3.028E+00
M(t):	1.999E-07	2.015E-07	2.047E-07	6.893E-03	5.657E-02	2.784E-01	5.861E-01	1.211E-01

Maximum TDOSE(t): 1.488E+01 mrem/yr at t = 332.8 ± 0.7 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 = 3.328E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	4.197E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.306E-11	0.0000	6.123E-15	0.0000	1.778E-14	0.0000	0.000E+00	0.0000
Pa-231	3.595E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.299E-04	0.0000	4.283E-06	0.0000	2.594E-08	0.0000	0.000E+00	0.0000
Pb-210	7.305E-18	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.880E-07	0.0000	7.565E-10	0.0000	8.244E-10	0.0000	0.000E+00	0.0000
Ra-226	5.884E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.941E-03	0.0006	2.608E-05	0.0000	5.006E-05	0.0000	0.000E+00	0.0000
Th-230	2.198E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.184E-03	0.0002	8.870E-06	0.0000	1.768E-05	0.0000	0.000E+00	0.0000
U-234	2.130E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.340E-05	0.0000	4.229E-08	0.0000	1.907E-07	0.0000	0.000E+00	0.0000
U-235	1.195E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.947E-06	0.0000	3.214E-08	0.0000	9.613E-09	0.0000	0.000E+00	0.0000
U-238	1.421E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.890E-05	0.0000	3.228E-08	0.0000	1.655E-07	0.0000	0.000E+00	0.0000
Total	8.098E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.252E-02	0.0008	3.934E-05	0.0000	6.813E-05	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.328E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	5.262E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.480E-08	0.0000	2.392E-11	0.0000	9.769E-11	0.0000	5.357E-06	0.0000
Pa-231	5.231E+00	0.3516	0.000E+00	0.0000	0.000E+00	0.0000	9.423E-02	0.0063	1.552E-03	0.0001	7.813E-05	0.0000	5.327E+00	0.3580
Pb-210	1.692E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.052E-06	0.0000	3.068E-08	0.0000	4.705E-08	0.0000	1.726E-04	0.0000
Ra-226	7.513E+00	0.5050	0.000E+00	0.0000	0.000E+00	0.0000	1.357E-01	0.0091	1.437E-03	0.0001	3.105E-03	0.0002	7.662E+00	0.5150
Th-230	5.491E-01	0.0369	0.000E+00	0.0000	0.000E+00	0.0000	9.920E-03	0.0007	1.051E-04	0.0000	2.295E-04	0.0000	5.626E-01	0.0378
U-234	6.322E-01	0.0425	0.000E+00	0.0000	0.000E+00	0.0000	1.139E-02	0.0008	4.887E-05	0.0000	3.514E-04	0.0000	6.440E-01	0.0433
U-235	6.912E-02	0.0046	0.000E+00	0.0000	0.000E+00	0.0000	1.246E-03	0.0001	1.362E-05	0.0000	1.957E-05	0.0000	7.040E-02	0.0047
U-238	6.009E-01	0.0404	0.000E+00	0.0000	0.000E+00	0.0000	1.082E-02	0.0007	4.631E-05	0.0000	3.342E-04	0.0000	6.121E-01	0.0411
Total	1.460E+01	0.9810	0.000E+00	0.0000	0.000E+00	0.0000	2.634E-01	0.0177	3.203E-03	0.0002	4.118E-03	0.0003	1.488E+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 = 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.
Ac-227	9.979E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	1.331E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	1.067E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	4.985E-06	0.9973	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.083E-09	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	3.249E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	8.290E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.230E-08	0.0025	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	4.999E-06	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.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.979E-11	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.331E-11	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.067E-16	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.985E-06	0.9973
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.083E-09	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.249E-15	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.290E-13	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.230E-08	0.0025
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	4.999E-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 = 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.
Ac-227	9.682E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	1.661E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	1.058E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	5.022E-06	0.9969	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	3.278E-09	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	2.291E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	8.412E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.239E-08	0.0025	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.038E-06	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 = 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.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.682E-11	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.661E-11	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.058E-16	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.022E-06	0.9969
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.278E-09	0.0007
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.291E-14	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.412E-13	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.239E-08	0.0025
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	5.038E-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 = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	9.113E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	2.303E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	1.041E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	5.097E-06	0.9960	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	7.799E-09	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.232E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	8.664E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.257E-08	0.0025	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.118E-06	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 = 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.113E-11	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.303E-11	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.041E-16	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.097E-06	0.9960
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.799E-09	0.0015
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.232E-13	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.664E-13	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.257E-08	0.0025
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	5.118E-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 = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	7.373E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	4.393E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	9.842E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	5.369E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	2.508E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.170E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	9.625E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.324E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.407E-06	0.0000	0.000E+00	0.0000	0.000E+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 = 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	1.579E-01	0.9163	0.000E+00	0.0000	0.000E+00	0.0000	2.820E-03	0.0164	6.715E-07	0.0000	2.840E-06	0.0000	1.607E-01	0.9326
Pa-231	1.140E-02	0.0662	0.000E+00	0.0000	0.000E+00	0.0000	2.019E-04	0.0012	4.535E-08	0.0000	1.987E-07	0.0000	1.160E-02	0.0673
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.842E-17	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.369E-06	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.508E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.170E-12	0.0000
U-235	3.632E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.385E-09	0.0000	1.358E-12	0.0000	6.149E-12	0.0000	3.696E-07	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.324E-08	0.0000
Total	1.693E-01	0.9824	0.000E+00	0.0000	0.000E+00	0.0000	3.022E-03	0.0175	7.168E-07	0.0000	3.038E-06	0.0000	1.723E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	4.024E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	9.466E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	8.377E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	6.227E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	8.892E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.173E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.313E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.533E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	6.332E-06	0.0000	0.000E+00	0.0000	0.000E+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 = 3.000E+01 years

Water Dependent Pathways

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

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	4.833E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	2.690E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	4.766E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	1.047E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	5.926E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	2.350E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	3.913E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	2.565E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.108E-05	0.0000	0.000E+00	0.0000	0.000E+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 = 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	1.729E-01	0.0248	0.000E+00	0.0000	0.000E+00	0.0000	3.113E-03	0.0004	7.833E-07	0.0000	3.204E-06	0.0000	1.760E-01	0.0253
Pa-231	3.339E+00	0.4797	0.000E+00	0.0000	0.000E+00	0.0000	6.012E-02	0.0086	7.072E-04	0.0001	5.327E-05	0.0000	3.400E+00	0.4885
Pb-210	6.230E-02	0.0090	0.000E+00	0.0000	0.000E+00	0.0000	1.123E-03	0.0002	1.127E-05	0.0000	1.730E-05	0.0000	6.345E-02	0.0091
Ra-226	2.648E+00	0.3805	0.000E+00	0.0000	0.000E+00	0.0000	4.784E-02	0.0069	5.087E-04	0.0001	1.138E-03	0.0002	2.697E+00	0.3876
Th-230	3.538E-02	0.0051	0.000E+00	0.0000	0.000E+00	0.0000	6.391E-04	0.0001	6.827E-06	0.0000	1.580E-05	0.0000	3.604E-02	0.0052
U-234	2.849E-01	0.0409	0.000E+00	0.0000	0.000E+00	0.0000	5.130E-03	0.0007	2.193E-05	0.0000	1.583E-04	0.0000	2.902E-01	0.0417
U-235	2.075E-02	0.0030	0.000E+00	0.0000	0.000E+00	0.0000	3.736E-04	0.0001	2.686E-06	0.0000	8.672E-06	0.0000	2.114E-02	0.0030
U-238	2.709E-01	0.0389	0.000E+00	0.0000	0.000E+00	0.0000	4.879E-03	0.0007	2.085E-05	0.0000	1.506E-04	0.0000	2.760E-01	0.0397
Total	6.834E+00	0.9819	0.000E+00	0.0000	0.000E+00	0.0000	1.232E-01	0.0177	1.280E-03	0.0002	1.545E-03	0.0002	6.960E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	1.134E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	2.499E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	9.516E-18	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	4.612E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.401E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.277E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	7.469E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.116E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	6.026E-05	0.0000	0.000E+00	0.0000	0.000E+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 = 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	2.495E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.496E-07	0.0000	1.134E-10	0.0000	4.632E-10	0.0000	2.540E-05	0.0000
Pa-231	5.520E+00	0.3767	0.000E+00	0.0000	0.000E+00	0.0000	9.942E-02	0.0068	1.495E-03	0.0001	8.418E-05	0.0000	5.621E+00	0.3836
Pb-210	4.332E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.815E-06	0.0000	7.856E-08	0.0000	1.205E-07	0.0000	4.413E-04	0.0000
Ra-226	7.161E+00	0.4887	0.000E+00	0.0000	0.000E+00	0.0000	1.294E-01	0.0088	1.369E-03	0.0001	2.963E-03	0.0002	7.295E+00	0.4978
Th-230	4.546E-01	0.0310	0.000E+00	0.0000	0.000E+00	0.0000	8.213E-03	0.0006	8.706E-05	0.0000	1.904E-04	0.0000	4.631E-01	0.0316
U-234	6.072E-01	0.0414	0.000E+00	0.0000	0.000E+00	0.0000	1.094E-02	0.0007	4.691E-05	0.0000	3.376E-04	0.0000	6.185E-01	0.0422
U-235	6.565E-02	0.0045	0.000E+00	0.0000	0.000E+00	0.0000	1.183E-03	0.0001	1.206E-05	0.0000	1.880E-05	0.0000	6.687E-02	0.0046
U-238	5.773E-01	0.0394	0.000E+00	0.0000	0.000E+00	0.0000	1.040E-02	0.0007	4.449E-05	0.0000	3.211E-04	0.0000	5.881E-01	0.0401
Total	1.439E+01	0.9818	0.000E+00	0.0000	0.000E+00	0.0000	2.595E-01	0.0177	3.055E-03	0.0002	3.915E-03	0.0003	1.465E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	7.089E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.616E-23	0.0000	4.401E-27	0.0000	1.273E-26	0.0000	0.000E+00	0.0000
Pa-231	5.826E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.277E-04	0.0001	2.988E-06	0.0000	1.803E-08	0.0000	0.000E+00	0.0000
Pb-210	3.383E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.692E-15	0.0000	4.494E-18	0.0000	4.878E-18	0.0000	0.000E+00	0.0000
Ra-226	8.283E-03	0.0027	0.000E+00	0.0000	0.000E+00	0.0000	1.592E-02	0.0053	4.695E-05	0.0000	8.976E-05	0.0000	0.000E+00	0.0000
Th-230	1.078E-01	0.0356	0.000E+00	0.0000	0.000E+00	0.0000	1.992E-01	0.0658	5.659E-04	0.0002	1.116E-03	0.0004	0.000E+00	0.0000
U-234	1.483E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.952E-04	0.0001	8.020E-07	0.0000	1.657E-06	0.0000	0.000E+00	0.0000
U-235	1.423E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.999E-06	0.0000	6.521E-08	0.0000	7.031E-09	0.0000	0.000E+00	0.0000
U-238	1.922E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.038E-05	0.0000	2.321E-08	0.0000	1.175E-07	0.0000	0.000E+00	0.0000
Total	1.162E-01	0.0384	0.000E+00	0.0000	0.000E+00	0.0000	2.157E-01	0.0712	6.167E-04	0.0002	1.207E-03	0.0004	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	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.
Ac-227	9.602E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.730E-21	0.0000	4.365E-25	0.0000	1.783E-24	0.0000	9.783E-20	0.0000
Pa-231	9.560E-02	0.0316	0.000E+00	0.0000	0.000E+00	0.0000	1.722E-03	0.0006	3.001E-05	0.0000	1.409E-06	0.0000	9.759E-02	0.0322
Pb-210	1.233E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.224E-15	0.0000	2.238E-17	0.0000	3.430E-17	0.0000	1.273E-13	0.0000
Ra-226	8.536E-01	0.2819	0.000E+00	0.0000	0.000E+00	0.0000	1.542E-02	0.0051	1.629E-04	0.0001	3.473E-04	0.0001	8.939E-01	0.2952
Th-230	1.663E+00	0.5492	0.000E+00	0.0000	0.000E+00	0.0000	3.005E-02	0.0099	3.183E-04	0.0001	6.909E-04	0.0002	2.003E+00	0.6613
U-234	1.851E-02	0.0061	0.000E+00	0.0000	0.000E+00	0.0000	3.338E-04	0.0001	2.135E-06	0.0000	9.451E-06	0.0000	1.930E-02	0.0064
U-235	2.674E-03	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	4.818E-05	0.0000	6.936E-07	0.0000	4.030E-07	0.0000	2.731E-03	0.0009
U-238	1.180E-02	0.0039	0.000E+00	0.0000	0.000E+00	0.0000	2.126E-04	0.0001	9.112E-07	0.0000	6.568E-06	0.0000	1.206E-02	0.0040
Total	2.645E+00	0.8735	0.000E+00	0.0000	0.000E+00	0.0000	4.779E-02	0.0158	5.150E-04	0.0002	1.056E-03	0.0003	3.028E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	Ac-227	1.000E+00	4.339E-10	4.209E-10	3.962E-10	6.988E-01	2.762E+00	7.652E-01	1.104E-04	4.253E-19
Pa-231	Pa-231	1.000E+00	5.092E-11	5.148E-11	5.262E-11	5.681E-11	4.186E-01	2.714E+00	5.754E+00	1.164E-01
Pa-231	Ac-227	1.000E+00	6.967E-12	2.073E-11	4.749E-11	5.045E-02	2.514E+00	1.207E+01	1.868E+01	3.079E-01
Pa-231	∑DSR(j)		5.789E-11	7.221E-11	1.001E-10	5.045E-02	2.932E+00	1.478E+01	2.444E+01	4.243E-01
Pb-210	Pb-210	1.000E+00	2.667E-17	2.645E-17	2.603E-17	2.460E-17	2.094E-17	1.586E-02	1.103E-04	3.182E-14
Ra-226	Ra-226	1.000E+00	1.246E-06	1.256E-06	1.274E-06	1.342E-06	3.052E-03	1.575E-01	3.803E-01	4.669E-02
Ra-226	Pb-210	1.000E+00	4.180E-19	1.261E-18	2.983E-18	9.401E-18	6.557E-04	5.168E-01	1.443E+00	1.768E-01
Ra-226	∑DSR(j)		1.246E-06	1.256E-06	1.274E-06	1.342E-06	3.707E-03	6.743E-01	1.824E+00	2.235E-01
Th-230	Th-230	1.000E+00	6.873E-19	7.068E-19	7.476E-19	9.097E-19	1.594E-18	1.134E-17	3.089E-15	2.535E-03
Th-230	Ra-226	1.000E+00	2.707E-10	8.194E-10	1.950E-09	6.270E-09	7.647E-07	2.346E-03	2.510E-02	1.377E-01
Th-230	Pb-210	1.000E+00	6.069E-23	4.297E-22	2.330E-21	2.291E-20	1.130E-07	6.664E-03	9.067E-02	3.605E-01
Th-230	∑DSR(j)		2.707E-10	8.194E-10	1.950E-09	6.270E-09	8.776E-07	9.010E-03	1.158E-01	5.007E-01
U-234	U-234	1.000E+00	5.299E-20	5.420E-20	5.672E-20	6.647E-20	1.118E-02	7.255E-02	1.544E-01	3.148E-03
U-234	Th-230	1.000E+00	3.101E-24	9.511E-24	2.330E-23	8.316E-23	1.387E-09	4.687E-08	3.834E-07	4.379E-06
U-234	Ra-226	1.000E+00	8.123E-16	5.728E-15	3.079E-14	2.925E-13	7.824E-09	2.267E-06	5.793E-05	4.060E-04
U-234	Pb-210	1.000E+00	1.368E-28	2.079E-27	2.496E-26	7.349E-25	4.629E-09	4.669E-06	1.800E-04	1.267E-03
U-234	∑DSR(j)		8.123E-16	5.728E-15	3.079E-14	2.925E-13	1.118E-02	7.255E-02	1.546E-01	4.826E-03
U-235	U-235	1.000E+00	3.604E-12	3.656E-12	3.761E-12	4.156E-12	1.055E-02	6.847E-02	1.458E-01	2.984E-03
U-235	Pa-231	1.000E+00	5.397E-16	1.635E-15	3.898E-15	1.262E-14	2.703E-04	5.777E-03	3.670E-02	2.491E-03
U-235	Ac-227	1.000E+00	4.935E-17	3.447E-16	1.813E-15	1.607E-06	7.487E-04	1.766E-02	1.082E-01	6.398E-03
U-235	∑DSR(j)		3.604E-12	3.657E-12	3.767E-12	1.607E-06	1.156E-02	9.190E-02	2.907E-01	1.187E-02
U-238	U-238	1.000E+00	3.075E-09	3.097E-09	3.143E-09	3.309E-09	1.062E-02	6.898E-02	1.469E-01	3.006E-03
U-238	U-234	1.000E+00	7.539E-26	2.308E-25	5.631E-25	1.979E-24	9.668E-07	2.067E-05	1.316E-04	8.943E-06
U-238	Th-230	1.000E+00	2.934E-30	2.096E-29	1.160E-28	1.225E-27	3.020E-13	1.055E-11	2.219E-10	2.439E-09
U-238	Ra-226	1.000E+00	5.756E-22	8.694E-21	1.030E-19	2.887E-18	4.594E-10	3.276E-09	2.229E-08	2.183E-07
U-238	Pb-210	1.000E+00	7.771E-35	2.442E-33	6.340E-32	5.537E-30	1.758E-09	1.212E-08	6.820E-08	6.764E-07
U-238	∑DSR(j)		3.075E-09	3.097E-09	3.143E-09	3.309E-09	1.063E-02	6.900E-02	1.470E-01	3.016E-03

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

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	5.762E+10	5.939E+10	6.310E+10	3.578E+01	9.052E+00	3.267E+01	2.264E+05	*7.230E+13
Pa-231	*4.722E+10	*4.722E+10	*4.722E+10	4.956E+02	8.525E+00	1.691E+00	1.023E+00	5.892E+01
Pb-210	*7.631E+13	*7.631E+13	*7.631E+13	*7.631E+13	*7.631E+13	1.576E+03	2.266E+05	*7.631E+13
Ra-226	2.006E+07	1.991E+07	1.962E+07	1.863E+07	6.743E+03	3.707E+01	1.371E+01	1.119E+02
Th-230	*2.018E+10	*2.018E+10	1.282E+10	3.987E+09	2.849E+07	2.775E+03	2.160E+02	4.993E+01
U-234	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	2.237E+03	3.446E+02	1.617E+02	5.180E+03
U-235	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	2.162E+03	2.720E+02	8.599E+01	2.106E+03
U-238	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	2.353E+03	3.623E+02	1.701E+02	8.290E+03

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 332.8 ± 0.7 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ac-227	2.300E-01	32.97 ± 0.07	2.782E+00	8.987E+00	2.329E-05	1.073E+06
Pa-231	2.300E-01	282.2 ± 0.6	2.458E+01	1.017E+00	2.316E+01	1.079E+00
Pb-210	4.000E+00	74.0 ± 0.1	2.000E-02	1.250E+03	4.315E-05	5.794E+05
Ra-226	4.000E+00	495.7 ± 1.0	2.156E+00	1.159E+01	1.916E+00	1.305E+01
Th-230	4.000E+00	1.000E+03	5.007E-01	4.993E+01	1.406E-01	1.778E+02
U-234	4.000E+00	344.7 ± 0.7	1.630E-01	1.534E+02	1.610E-01	1.553E+02
U-235	2.300E-01	340.7 ± 0.7	3.081E-01	8.115E+01	3.061E-01	8.167E+01
U-238	4.000E+00	344.7 ± 0.7	1.549E-01	1.614E+02	1.530E-01	1.634E+02

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

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	Ac-227	1.000E+00	9.979E-11	9.682E-11	9.113E-11	1.607E-01	6.352E-01	1.760E-01	2.540E-05	9.783E-20
Ac-227	Pa-231	1.000E+00	1.602E-12	4.767E-12	1.092E-11	1.160E-02	5.782E-01	2.775E+00	4.297E+00	7.081E-02
Ac-227	U-235	1.000E+00	1.135E-17	7.928E-17	4.171E-16	3.696E-07	1.722E-04	4.062E-03	2.489E-02	1.471E-03
Ac-227	∑DOSE(j)		1.014E-10	1.016E-10	1.021E-10	1.723E-01	1.214E+00	2.956E+00	4.322E+00	7.228E-02
Pa-231	Pa-231	1.000E+00	1.171E-11	1.184E-11	1.210E-11	1.307E-11	9.628E-02	6.242E-01	1.323E+00	2.678E-02
Pa-231	U-235	1.000E+00	1.241E-16	3.760E-16	8.965E-16	2.904E-15	6.217E-05	1.329E-03	8.442E-03	5.730E-04
Pa-231	∑DOSE(j)		1.171E-11	1.184E-11	1.210E-11	1.307E-11	9.634E-02	6.255E-01	1.332E+00	2.735E-02
Pb-210	Pb-210	1.000E+00	1.067E-16	1.058E-16	1.041E-16	9.842E-17	8.377E-17	6.345E-02	4.413E-04	1.273E-13
Pb-210	Ra-226	1.000E+00	1.672E-18	5.045E-18	1.193E-17	3.761E-17	2.623E-03	2.067E+00	5.773E+00	7.071E-01
Pb-210	Th-230	1.000E+00	2.428E-22	1.719E-21	9.321E-21	9.163E-20	4.518E-07	2.665E-02	3.627E-01	1.442E+00
Pb-210	U-234	1.000E+00	5.474E-28	8.316E-27	9.983E-26	2.939E-24	1.852E-08	1.868E-05	7.200E-04	5.070E-03
Pb-210	U-238	1.000E+00	0.000E+00	0.000E+00	0.000E+00	2.215E-29	7.032E-09	4.846E-08	2.728E-07	2.706E-06
Pb-210	∑DOSE(j)		1.083E-16	1.109E-16	1.161E-16	1.361E-16	2.623E-03	2.158E+00	6.137E+00	2.154E+00
Ra-226	Ra-226	1.000E+00	4.985E-06	5.022E-06	5.097E-06	5.369E-06	1.221E-02	6.300E-01	1.521E+00	1.868E-01
Ra-226	Th-230	1.000E+00	1.083E-09	3.278E-09	7.799E-09	2.508E-08	3.059E-06	9.384E-03	1.004E-01	5.507E-01
Ra-226	U-234	1.000E+00	3.249E-15	2.291E-14	1.232E-13	1.170E-12	3.130E-08	9.068E-06	2.317E-04	1.624E-03
Ra-226	U-238	1.000E+00	2.303E-21	3.477E-20	4.120E-19	1.155E-17	1.838E-09	1.310E-08	8.916E-08	8.733E-07
Ra-226	∑DOSE(j)		4.986E-06	5.026E-06	5.105E-06	5.394E-06	1.221E-02	6.394E-01	1.622E+00	7.391E-01
Th-230	Th-230	1.000E+00	2.749E-18	2.827E-18	2.990E-18	3.639E-18	6.375E-18	4.537E-17	1.236E-14	1.014E-02
Th-230	U-234	1.000E+00	1.240E-23	3.804E-23	9.322E-23	3.326E-22	5.549E-09	1.875E-07	1.534E-06	1.752E-05
Th-230	U-238	1.000E+00	1.174E-29	8.385E-29	4.641E-28	4.900E-27	1.208E-12	4.219E-11	8.877E-10	9.757E-09
Th-230	∑DOSE(j)		2.749E-18	2.827E-18	2.990E-18	3.639E-18	5.551E-09	1.875E-07	1.535E-06	1.016E-02
U-234	U-234	1.000E+00	2.120E-19	2.168E-19	2.269E-19	2.659E-19	4.471E-02	2.902E-01	6.176E-01	1.259E-02
U-234	U-238	1.000E+00	3.016E-25	9.231E-25	2.252E-24	7.916E-24	3.867E-06	8.270E-05	5.263E-04	3.577E-05
U-234	∑DOSE(j)		2.120E-19	2.168E-19	2.269E-19	2.659E-19	4.471E-02	2.903E-01	6.181E-01	1.263E-02
U-235	U-235	1.000E+00	8.289E-13	8.408E-13	8.651E-13	9.560E-13	2.426E-03	1.575E-02	3.353E-02	6.864E-04
U-238	U-238	1.000E+00	1.230E-08	1.239E-08	1.257E-08	1.324E-08	4.250E-02	2.759E-01	5.875E-01	1.202E-02

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

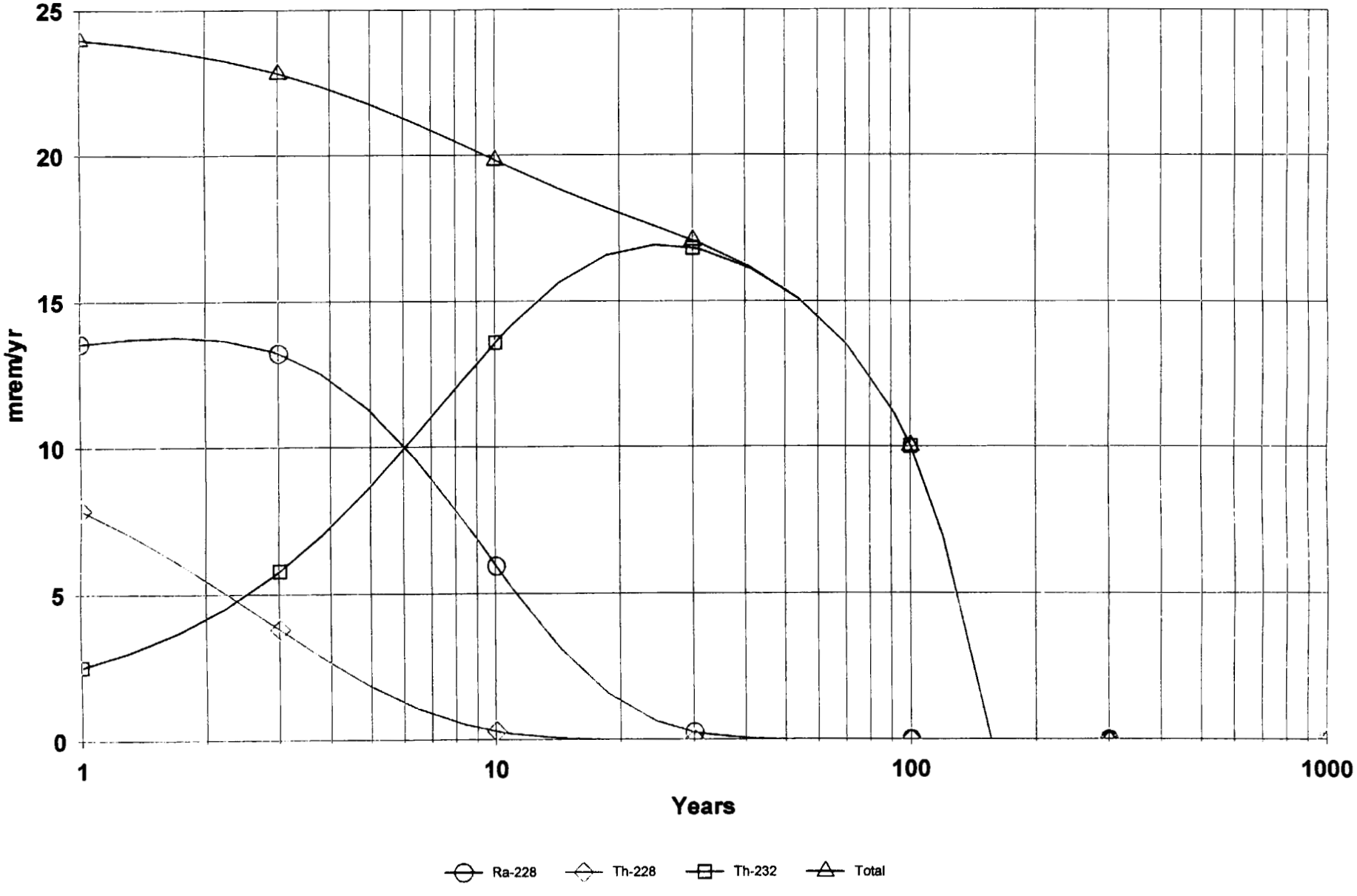
Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	Ac-227	1.000E+00	2.300E-01	2.193E-01	1.993E-01	1.426E-01	5.478E-02	1.926E-03	1.351E-07	3.903E-22
Ac-227	Pa-231	1.000E+00	0.000E+00	7.127E-03	2.026E-02	5.622E-02	1.037E-01	9.133E-02	2.552E-02	2.784E-04
Ac-227	U-235	1.000E+00	0.000E+00	7.591E-08	6.564E-07	6.357E-06	3.955E-05	1.498E-04	1.494E-04	5.807E-06
Ac-227	∑S(j):		2.300E-01	2.264E-01	2.195E-01	1.988E-01	1.585E-01	9.341E-02	2.567E-02	2.842E-04
Pa-231	Pa-231	1.000E+00	2.300E-01	2.285E-01	2.256E-01	2.156E-01	1.895E-01	1.206E-01	3.317E-02	3.618E-04
Pa-231	U-235	1.000E+00	0.000E+00	4.835E-06	1.432E-05	4.563E-05	1.203E-04	2.555E-04	2.112E-04	7.736E-06
Pa-231	∑S(j):		2.300E-01	2.285E-01	2.256E-01	2.157E-01	1.896E-01	1.209E-01	3.338E-02	3.695E-04
Pb-210	Pb-210	1.000E+00	4.000E+00	3.865E+00	3.609E+00	2.838E+00	1.429E+00	1.295E-01	1.356E-04	5.048E-15
Pb-210	Ra-226	1.000E+00	0.000E+00	1.219E-01	3.517E-01	1.025E+00	2.134E+00	2.430E+00	9.380E-01	2.767E-02
Pb-210	Th-230	1.000E+00	0.000E+00	2.658E-05	2.331E-04	2.369E-03	1.676E-02	9.262E-02	2.306E-01	3.061E-01
Pb-210	U-234	1.000E+00	0.000E+00	7.989E-11	2.109E-09	7.220E-08	1.572E-06	2.998E-05	1.972E-04	4.201E-04
Pb-210	U-238	1.000E+00	0.000E+00	5.668E-17	4.497E-15	5.166E-13	3.427E-11	2.240E-09	4.192E-08	1.760E-07
Pb-210	∑S(j):		4.000E+00	3.987E+00	3.961E+00	3.866E+00	3.580E+00	2.652E+00	1.169E+00	3.342E-01
Ra-226	Ra-226	1.000E+00	4.000E+00	3.980E+00	3.940E+00	3.804E+00	3.439E+00	2.418E+00	8.835E-01	2.605E-02
Ra-226	Th-230	1.000E+00	0.000E+00	1.729E-03	5.159E-03	1.690E-02	4.824E-02	1.360E-01	2.675E-01	3.380E-01
Ra-226	U-234	1.000E+00	0.000E+00	7.770E-09	6.940E-08	7.507E-07	6.263E-06	5.371E-05	2.436E-04	4.653E-04
Ra-226	U-238	1.000E+00	0.000E+00	7.338E-15	1.963E-13	7.048E-12	1.741E-10	4.743E-09	5.557E-08	1.962E-07
Ra-226	∑S(j):		4.000E+00	3.982E+00	3.945E+00	3.821E+00	3.488E+00	2.554E+00	1.151E+00	3.646E-01
Th-230	Th-230	1.000E+00	4.000E+00	4.000E+00	4.000E+00	3.999E+00	3.998E+00	3.994E+00	3.983E+00	3.943E+00
Th-230	U-234	1.000E+00	0.000E+00	3.589E-05	1.070E-04	3.487E-04	9.821E-04	2.653E-03	4.770E-03	5.518E-03
Th-230	U-238	1.000E+00	0.000E+00	5.082E-11	4.535E-10	4.890E-09	4.042E-08	3.361E-07	1.414E-06	2.411E-06
Th-230	∑S(j):		4.000E+00	4.000E+00	4.000E+00	4.000E+00	3.999E+00	3.997E+00	3.988E+00	3.948E+00
U-234	U-234	1.000E+00	4.000E+00	3.974E+00	3.924E+00	3.751E+00	3.298E+00	2.101E+00	5.800E-01	6.408E-03
U-234	U-238	1.000E+00	0.000E+00	1.127E-05	3.337E-05	1.063E-04	2.805E-04	5.958E-04	4.935E-04	1.819E-05
U-234	∑S(j):		4.000E+00	3.974E+00	3.924E+00	3.751E+00	3.298E+00	2.102E+00	5.805E-01	6.426E-03
U-235	U-235	1.000E+00	2.300E-01	2.285E-01	2.256E-01	2.157E-01	1.896E-01	1.209E-01	3.338E-02	3.695E-04
U-238	U-238	1.000E+00	4.000E+00	3.974E+00	3.924E+00	3.751E+00	3.298E+00	2.102E+00	5.805E-01	6.426E-03

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

RESCALC.EXE execution time = 39.90 seconds

ATTACHMENT E
RESRAD OUTPUT FILE -
THORIUM-232 PLUS DAUGHTERS NEAR THE SURFACE (SURFACE - 15 CM)
(19 pages)

DOSE: All Nuclides Summed, All Pathways Summed



breck_TH232_15cm.RAD 08/13/2004 09:23 Includes All Pathways

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Dose Conversion Factor (and Related) Parameter Summary
File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(1)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(2)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(3)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(1)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(2)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(3)
D-34	Food transfer factors:			
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(2,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(2,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5				
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(2,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(2,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(3,2)

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	3.800E+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)	6.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ra-228	3.600E+00	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Th-228	3.600E+00	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Th-232	3.600E+00	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(3)
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)	1.400E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	8.900E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	4.650E+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)	7.540E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	5.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.400E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	2.890E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	3.530E+01	1.000E+01	---	DWIBWT

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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
R015	Unsat. zone 1, thickness (m)	3.000E-01	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.400E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	8.900E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.742E-02	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.378E-05	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.378E-05	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)	1.120E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.140E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	2.330E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.510E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	2.060E+01	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)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	4.785E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	0.000E+00	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.190E+00	FMEAT
R018	Contamination fraction of milk	-1	-1	0.190E+00	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R019	Mass loading for foliar deposition (g/m**3)	0.000E+00	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	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
C14	DCF correction factor for gaseous forms of C14	not used	8.894E+01	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	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

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	3800.00 square meters	Ra-228	3.600E+00
Thickness:	0.15 meters	Th-228	3.600E+00
Cover Depth:	0.00 meters	Th-232	3.600E+00

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+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	2.455E+01	2.399E+01	2.283E+01	1.985E+01	1.709E+01	1.003E+01	1.990E-06	1.186E-09
M(t):	9.822E-01	9.598E-01	9.132E-01	7.941E-01	6.837E-01	4.012E-01	7.961E-08	4.745E-11

Maximum TDOSE(t): 2.455E+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.
Ra-228	9.777E+00	0.3982	1.789E-04	0.0000	0.000E+00	0.0000	2.144E+00	0.0873	5.743E-02	0.0023	1.839E-01	0.0075	7.316E-02	0.0030
Th-228	1.129E+01	0.4598	9.030E-04	0.0000	0.000E+00	0.0000	2.705E-02	0.0011	1.539E-03	0.0001	2.742E-04	0.0000	3.408E-02	0.0014
Th-232	5.645E-01	0.0230	5.124E-03	0.0002	0.000E+00	0.0000	2.339E-01	0.0095	9.060E-03	0.0004	1.138E-02	0.0005	1.416E-01	0.0058
Total	2.163E+01	0.8809	6.206E-03	0.0003	0.000E+00	0.0000	2.405E+00	0.0980	6.803E-02	0.0028	1.956E-01	0.0080	2.488E-01	0.0101

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.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.224E+01	0.4983
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.135E+01	0.4624
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.655E-01	0.0393
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	2.455E+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.
Ra-228	1.148E+01	0.4784	4.027E-04	0.0000	0.000E+00	0.0000	1.829E+00	0.0762	4.927E-02	0.0021	1.561E-01	0.0065	7.152E-02	0.0030
Th-228	7.837E+00	0.3266	6.243E-04	0.0000	0.000E+00	0.0000	1.870E-02	0.0008	1.064E-03	0.0000	1.895E-04	0.0000	2.356E-02	0.0010
Th-232	1.858E+00	0.0774	5.126E-03	0.0002	0.000E+00	0.0000	4.693E-01	0.0196	1.529E-02	0.0006	3.150E-02	0.0013	1.494E-01	0.0062
Total	2.117E+01	0.8824	6.153E-03	0.0003	0.000E+00	0.0000	2.317E+00	0.0965	6.562E-02	0.0027	1.878E-01	0.0078	2.445E-01	0.0102

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.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.359E+01	0.5662
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.881E+00	0.3284
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.529E+00	0.1054
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	2.399E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	1.171E+01	0.5129	5.568E-04	0.0000	0.000E+00	0.0000	1.323E+00	0.0580	3.589E-02	0.0016	1.124E-01	0.0049	6.152E-02	0.0027
Th-228	3.776E+00	0.1654	2.984E-04	0.0000	0.000E+00	0.0000	8.937E-03	0.0004	5.086E-04	0.0000	9.059E-05	0.0000	1.126E-02	0.0005
Th-232	4.697E+00	0.2057	5.177E-03	0.0002	0.000E+00	0.0000	8.370E-01	0.0367	2.519E-02	0.0011	6.293E-02	0.0028	1.634E-01	0.0072
Total	2.018E+01	0.8840	6.032E-03	0.0003	0.000E+00	0.0000	2.169E+00	0.0950	6.160E-02	0.0027	1.754E-01	0.0077	2.362E-01	0.0103

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.324E+01	0.5800
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.797E+00	0.1663
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.791E+00	0.2536
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	2.283E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	5.455E+00	0.2748	3.023E-04	0.0000	0.000E+00	0.0000	4.208E-01	0.0212	1.153E-02	0.0006	3.546E-02	0.0018	2.417E-02	0.0012
Th-228	2.929E-01	0.0148	2.249E-05	0.0000	0.000E+00	0.0000	6.735E-04	0.0000	3.833E-05	0.0000	6.827E-06	0.0000	8.486E-04	0.0000
Th-232	1.182E+01	0.5952	5.301E-03	0.0003	0.000E+00	0.0000	1.443E+00	0.0727	4.161E-02	0.0021	1.146E-01	0.0058	1.893E-01	0.0095
Total	1.756E+01	0.8848	5.626E-03	0.0003	0.000E+00	0.0000	1.865E+00	0.0939	5.317E-02	0.0027	1.500E-01	0.0076	2.144E-01	0.0108

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.947E+00	0.2996
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.945E-01	0.0148
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.361E+01	0.6856
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	1.985E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	2.371E-01	0.0139	1.242E-05	0.0000	0.000E+00	0.0000	1.535E-02	0.0009	4.217E-04	0.0000	1.290E-03	0.0001	9.330E-04	0.0001
Th-228	1.948E-04	0.0000	1.372E-08	0.0000	0.000E+00	0.0000	4.109E-07	0.0000	2.338E-08	0.0000	4.165E-09	0.0000	5.177E-07	0.0000
Th-232	1.499E+01	0.8771	4.740E-03	0.0003	0.000E+00	0.0000	1.499E+00	0.0877	4.285E-02	0.0025	1.202E-01	0.0070	1.777E-01	0.0104
Total	1.523E+01	0.8910	4.752E-03	0.0003	0.000E+00	0.0000	1.514E+00	0.0886	4.327E-02	0.0025	1.215E-01	0.0071	1.786E-01	0.0105

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	2.906E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.584E-05	0.0000	2.317E-06	0.0000	1.021E-05	0.0000	2.555E-01	0.0149
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.958E-04	0.0000
Th-232	2.057E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.880E-06	0.0000	1.415E-07	0.0000	6.762E-07	0.0000	1.684E+01	0.9850
Total	3.112E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.972E-05	0.0000	2.458E-06	0.0000	1.089E-05	0.0000	1.709E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	2.282E-06	0.0000	8.128E-11	0.0000	0.000E+00	0.0000	1.003E-07	0.0000	2.759E-09	0.0000	8.432E-09	0.0000	6.100E-09	0.0000
Th-228	1.134E-15	0.0000	5.479E-20	0.0000	0.000E+00	0.0000	1.642E-18	0.0000	9.346E-20	0.0000	1.664E-20	0.0000	2.068E-18	0.0000
Th-232	9.262E+00	0.9234	1.961E-03	0.0002	0.000E+00	0.0000	6.240E-01	0.0622	1.785E-02	0.0018	5.010E-02	0.0050	7.367E-02	0.0073
Total	9.262E+00	0.9234	1.961E-03	0.0002	0.000E+00	0.0000	6.240E-01	0.0622	1.785E-02	0.0018	5.010E-02	0.0050	7.367E-02	0.0073

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	1.296E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.541E-07	0.0000	1.216E-08	0.0000	4.908E-08	0.0000	4.011E-06	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.138E-15	0.0000
Th-232	6.064E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	1.186E-04	0.0000	5.591E-06	0.0000	2.278E-05	0.0000	1.003E+01	1.0000
Total	6.077E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	1.189E-04	0.0000	5.603E-06	0.0000	2.283E-05	0.0000	1.003E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	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.
Ra-228	4.581E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.983E-18	0.0000	4.298E-19	0.0000	1.735E-18	0.0000	5.696E-17	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.602E-06	0.8050	0.000E+00	0.0000	0.000E+00	0.0000	3.133E-07	0.1574	1.474E-08	0.0074	6.012E-08	0.0302	1.990E-06	1.0000
Total	1.602E-06	0.8050	0.000E+00	0.0000	0.000E+00	0.0000	3.133E-07	0.1574	1.474E-08	0.0074	6.012E-08	0.0302	1.990E-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 = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	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.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	9.549E-10	0.8050	0.000E+00	0.0000	0.000E+00	0.0000	1.868E-10	0.1574	8.789E-12	0.0074	3.584E-11	0.0302	1.186E-09	1.0000
Total	9.549E-10	0.8050	0.000E+00	0.0000	0.000E+00	0.0000	1.868E-10	0.1574	8.789E-12	0.0074	3.584E-11	0.0302	1.186E-09	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-228	Ra-228	1.000E+00	2.822E+00	2.402E+00	1.739E+00	5.617E-01	2.210E-02	6.480E-07	1.579E-17	0.000E+00
Ra-228	Th-228	1.000E+00	5.773E-01	1.372E+00	1.939E+00	1.090E+00	4.886E-02	4.663E-07	3.597E-20	0.000E+00
Ra-228	∑DSR(j)		3.399E+00	3.774E+00	3.678E+00	1.652E+00	7.096E-02	1.114E-06	1.582E-17	0.000E+00
Th-228	Th-228	1.000E+00	3.153E+00	2.189E+00	1.055E+00	8.181E-02	5.438E-05	3.161E-16	0.000E+00	0.000E+00
Th-232	Th-232	1.000E+00	7.205E-02	7.157E-02	7.060E-02	6.722E-02	5.756E-02	2.387E-02	0.000E+00	0.000E+00
Th-232	Ra-228	1.000E+00	1.719E-01	4.845E-01	9.743E-01	1.817E+00	2.054E+00	1.199E+00	5.517E-07	3.289E-10
Th-232	Th-228	1.000E+00	2.429E-02	1.464E-01	5.636E-01	1.896E+00	2.565E+00	1.564E+00	1.081E-09	6.445E-13
Th-232	∑DSR(j)		2.682E-01	7.024E-01	1.609E+00	3.780E+00	4.677E+00	2.786E+00	5.528E-07	3.295E-10

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-228	7.355E+00	6.625E+00	6.796E+00	1.513E+01	3.523E+02	2.244E+07	*2.726E+14	*2.726E+14
Th-228	7.928E+00	1.142E+01	2.370E+01	3.056E+02	4.597E+05	*8.192E+14	*8.192E+14	*8.192E+14
Th-232	9.321E+01	3.559E+01	1.554E+01	6.613E+00	5.346E+00	8.973E+00	*1.096E+05	*1.096E+05

*At specific activity limit

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

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ra-228	3.600E+00	1.685 ± 0.003	3.834E+00	6.521E+00	3.399E+00	7.355E+00
Th-228	3.600E+00	0.000E+00	3.153E+00	7.928E+00	3.153E+00	7.928E+00
Th-232	3.600E+00	25.08 ± 0.05	4.708E+00	5.310E+00	2.682E-01	9.321E+01

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

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-228	Ra-228	1.000E+00	1.016E+01	8.645E+00	6.261E+00	2.022E+00	7.958E-02	2.333E-06	5.683E-17	0.000E+00
Ra-228	Th-232	1.000E+00	6.187E-01	1.744E+00	3.508E+00	6.541E+00	7.393E+00	4.315E+00	1.986E-06	1.184E-09
Ra-228	∑DOSE(j)		1.078E+01	1.039E+01	9.769E+00	8.563E+00	7.473E+00	4.315E+00	1.986E-06	1.184E-09
Th-228	Ra-228	1.000E+00	2.078E+00	4.940E+00	6.981E+00	3.925E+00	1.759E-01	1.679E-06	1.295E-19	0.000E+00
Th-228	Th-228	1.000E+00	1.135E+01	7.881E+00	3.797E+00	2.945E-01	1.958E-04	1.138E-15	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	8.743E-02	5.270E-01	2.029E+00	6.827E+00	9.236E+00	5.629E+00	3.892E-09	2.320E-12
Th-228	∑DOSE(j)		1.352E+01	1.335E+01	1.281E+01	1.105E+01	9.412E+00	5.629E+00	3.892E-09	2.320E-12
Th-232	Th-232	1.000E+00	2.594E-01	2.576E-01	2.542E-01	2.420E-01	2.072E-01	8.595E-02	0.000E+00	0.000E+00

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

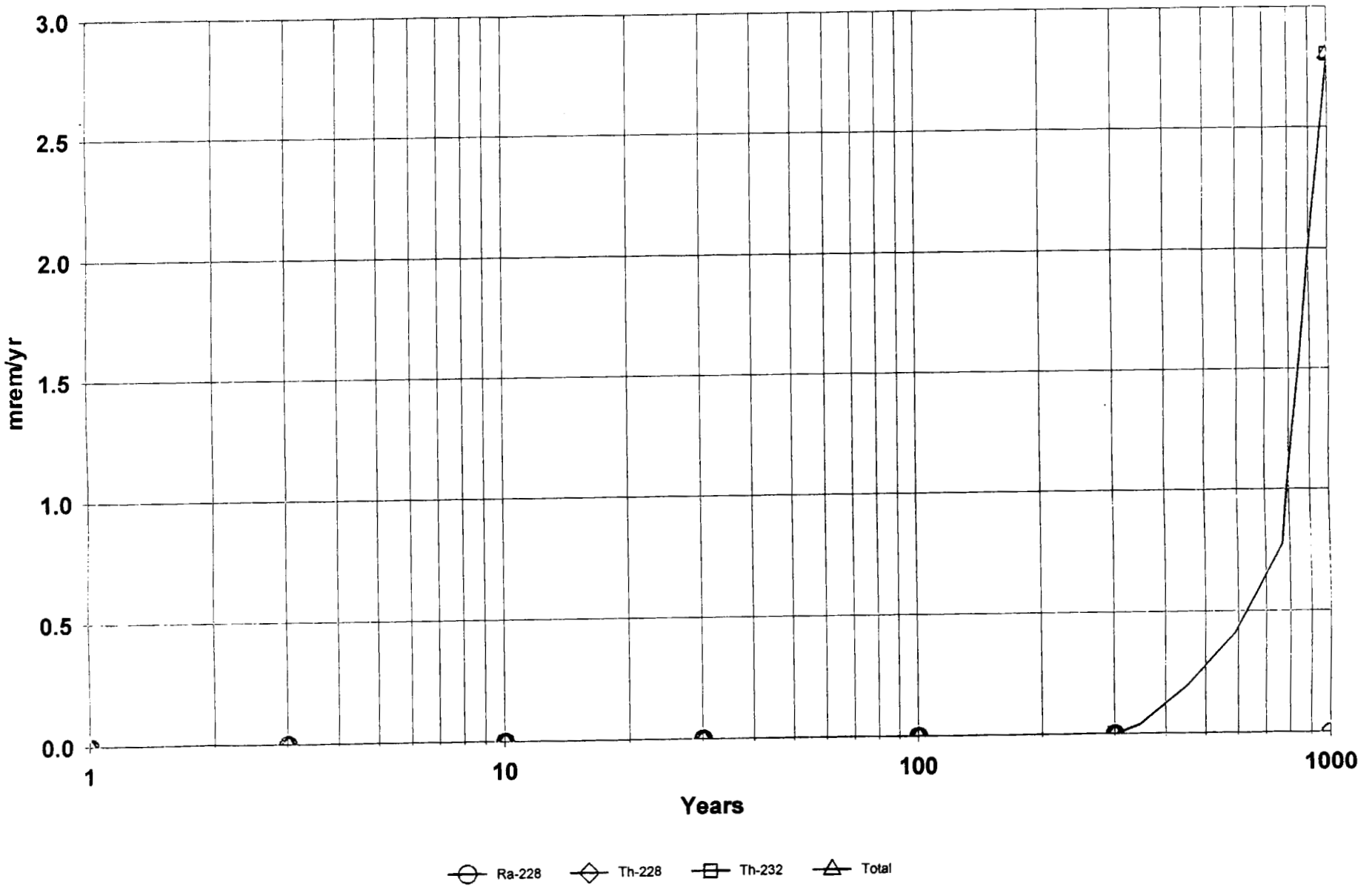
Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-228	Ra-228	1.000E+00	3.600E+00	3.074E+00	2.241E+00	7.418E-01	3.149E-02	4.965E-07	9.444E-21	0.000E+00
Ra-228	Th-232	1.000E+00	0.000E+00	4.014E-01	1.037E+00	2.181E+00	2.720E+00	2.736E+00	2.712E+00	2.630E+00
Ra-228	∑S(j):		3.600E+00	3.475E+00	3.278E+00	2.922E+00	2.752E+00	2.736E+00	2.712E+00	2.630E+00
Th-228	Ra-228	1.000E+00	0.000E+00	1.007E+00	1.821E+00	1.145E+00	5.570E-02	8.801E-07	1.674E-20	0.000E+00
Th-228	Th-228	1.000E+00	3.600E+00	2.506E+00	1.214E+00	9.607E-02	6.842E-05	6.595E-16	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	0.000E+00	6.628E-02	4.309E-01	1.800E+00	2.702E+00	2.736E+00	2.712E+00	2.630E+00
Th-228	∑S(j):		3.600E+00	3.579E+00	3.466E+00	3.040E+00	2.758E+00	2.736E+00	2.712E+00	2.630E+00
Th-232	Th-232	1.000E+00	3.600E+00	3.600E+00	3.600E+00	3.598E+00	3.595E+00	3.584E+00	3.553E+00	3.446E+00

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

RESCALC.EXE execution time = 4.09 seconds

ATTACHMENT F
RESRAD OUTPUT FILE -
THORIUM-232 PLUS DAUGHTERS IN THE COVER MATERIAL USED AS BACKFILL
(SUBSURFACE)
(19 Pages)

DOSE: All Nuclides Summed, All Pathways Summed



breck_TH232_subsurface_only.RAD 08/13/2004 09:39 Includes All Pathways

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Dose Conversion Factor (and Related) Parameter Summary
File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(1)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(2)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(3)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(1)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(2)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(3)
D-34	Food transfer factors:			
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(2,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(2,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5				
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(2,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(2,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(3,2)

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	9.300E+01	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.220E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	5.000E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ra-228	3.600E+00	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Th-228	3.600E+00	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Th-232	3.600E+00	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	1.220E+00	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)	1.400E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	8.900E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	4.650E+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)	7.540E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	5.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.400E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	2.890E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	3.530E+01	1.000E+01	---	DWIBWT

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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
R015	Unsat. zone 1, thickness (m)	3.000E-01	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.400E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	8.900E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.601E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.382E-06	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.382E-06	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)	1.120E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.140E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	2.330E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.510E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	2.060E+01	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)	1.826E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	4.785E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	0.000E+00	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.465E-01	FPLANT
R018	Contamination fraction of meat	-1	-1	0.465E-02	FMEAT
R018	Contamination fraction of milk	-1	-1	0.465E-02	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R019	Mass loading for foliar deposition (g/m**3)	0.000E+00	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	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
C14	DCF correction factor for gaseous forms of C14	not used	8.894E+01	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	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

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	93.00 square meters	Ra-228	3.600E+00
Thickness:	1.22 meters	Th-228	3.600E+00
Cover Depth:	1.22 meters	Th-232	3.600E+00

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+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	1.867E-05	1.886E-05	1.920E-05	2.046E-05	3.493E-04	1.306E-03	6.994E-04	2.807E+00
M(t):	7.469E-07	7.544E-07	7.682E-07	8.183E-07	1.397E-05	5.226E-05	2.797E-05	1.123E-01

Maximum TDOSE(t): 2.807E+00 mrem/yr at t = 1.000E+03 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.
Ra-228	3.645E-06	0.1952	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	1.486E-05	0.7957	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.705E-07	0.0091	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.867E-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.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.645E-06	0.1952
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.486E-05	0.7957
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.705E-07	0.0091
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	1.867E-05	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.
Ra-228	7.531E-06	0.3993	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	1.046E-05	0.5546	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	8.702E-07	0.0461	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.886E-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 = 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.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.531E-06	0.3993
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.046E-05	0.5546
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.702E-07	0.0461
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	1.886E-05	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	1.080E-05	0.5626	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	5.183E-06	0.2699	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	3.217E-06	0.1675	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.920E-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 = 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.080E-05	0.5626
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.183E-06	0.2699
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.217E-06	0.1675
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	1.920E-05	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	7.761E-06	0.3794	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	4.439E-07	0.0217	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.225E-05	0.5989	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.046E-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 = 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.761E-06	0.3794
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.439E-07	0.0217
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.225E-05	0.5989
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	2.046E-05	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	8.656E-07	0.0025	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	3.962E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.446E-05	0.0700	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.532E-05	0.0725	0.000E+00	0.0000	0.000E+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 = 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	2.970E-04	0.8503	0.000E+00	0.0000	0.000E+00	0.0000	5.306E-06	0.0152	5.779E-08	0.0002	2.551E-07	0.0007	3.035E-04	0.8689
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.962E-10	0.0000
Th-232	2.095E-05	0.0600	0.000E+00	0.0000	0.000E+00	0.0000	3.673E-07	0.0011	3.517E-09	0.0000	1.683E-08	0.0000	4.579E-05	0.1311
Total	3.180E-04	0.9103	0.000E+00	0.0000	0.000E+00	0.0000	5.673E-06	0.0162	6.131E-08	0.0002	2.719E-07	0.0008	3.493E-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 = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	3.001E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	8.416E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	5.601E-05	0.0429	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.601E-05	0.0429	0.000E+00	0.0000	0.000E+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 = 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	3.452E-06	0.0026	0.000E+00	0.0000	0.000E+00	0.0000	6.293E-08	0.0000	7.909E-10	0.0000	3.196E-09	0.0000	3.519E-06	0.0027
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.416E-21	0.0000
Th-232	1.223E-03	0.9363	0.000E+00	0.0000	0.000E+00	0.0000	2.225E-05	0.0170	2.755E-07	0.0002	1.123E-06	0.0009	1.303E-03	0.9973
Total	1.227E-03	0.9390	0.000E+00	0.0000	0.000E+00	0.0000	2.231E-05	0.0171	2.763E-07	0.0002	1.127E-06	0.0009	1.306E-03	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	3.915E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	5.465E-04	0.7815	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.465E-04	0.7815	0.000E+00	0.0000	0.000E+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 = 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	3.076E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.610E-18	0.0000	7.061E-20	0.0000	2.851E-19	0.0000	3.136E-16	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.499E-04	0.2144	0.000E+00	0.0000	0.000E+00	0.0000	2.727E-06	0.0039	3.378E-08	0.0000	1.377E-07	0.0002	6.994E-04	1.0000
Total	1.499E-04	0.2144	0.000E+00	0.0000	0.000E+00	0.0000	2.727E-06	0.0039	3.378E-08	0.0000	1.377E-07	0.0002	6.994E-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 = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.802E+00	0.6419	0.000E+00	0.0000	0.000E+00	0.0000	9.931E-01	0.3538	3.087E-03	0.0011	8.827E-03	0.0031	0.000E+00	0.0000
Total	1.802E+00	0.6419	0.000E+00	0.0000	0.000E+00	0.0000	9.931E-01	0.3538	3.087E-03	0.0011	8.827E-03	0.0031	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	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.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	8.781E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.597E-09	0.0000	1.978E-11	0.0000	8.065E-11	0.0000	2.807E+00	1.0000
Total	8.781E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.597E-09	0.0000	1.978E-11	0.0000	8.065E-11	0.0000	2.807E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-228	Ra-228	1.000E+00	2.512E-07	2.246E-07	1.795E-07	8.201E-08	8.401E-05	9.759E-07	8.697E-17	0.000E+00
Ra-228	Th-228	1.000E+00	7.613E-07	1.867E-06	2.822E-06	2.074E-06	2.950E-07	1.607E-09	1.501E-19	0.000E+00
Ra-228	∑DSR(j)		1.013E-06	2.092E-06	3.001E-06	2.156E-06	8.431E-05	9.775E-07	8.712E-17	0.000E+00
Th-228	Th-228	1.000E+00	4.127E-06	2.905E-06	1.440E-06	1.233E-07	1.101E-10	2.338E-21	0.000E+00	0.000E+00
Th-232	Th-232	1.000E+00	5.998E-21	6.188E-21	6.587E-21	8.194E-21	1.529E-20	1.358E-19	6.955E-17	1.274E-02
Th-232	Ra-228	1.000E+00	1.549E-08	4.454E-08	9.492E-08	2.148E-07	6.296E-06	3.469E-04	5.589E-05	3.995E-01
Th-232	Th-228	1.000E+00	3.187E-08	1.972E-07	7.986E-07	3.189E-06	6.424E-06	1.504E-05	1.384E-04	3.674E-01
Th-232	∑DSR(j)		4.736E-08	2.417E-07	8.936E-07	3.403E-06	1.272E-05	3.619E-04	1.943E-04	7.796E-01

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-228	2.469E+07	1.195E+07	8.330E+06	1.160E+07	2.965E+05	2.557E+07	*2.726E+14	*2.726E+14
Th-228	6.057E+06	8.605E+06	1.737E+07	2.028E+08	2.272E+11	*8.192E+14	*8.192E+14	*8.192E+14
Th-232	*1.096E+05	*1.096E+05	*1.096E+05	*1.096E+05	*1.096E+05	6.908E+04	*1.096E+05	3.207E+01

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 1.000E+03 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ra-228	3.600E+00	37.00 ± 0.07	2.529E-04	9.884E+04	0.000E+00	*2.726E+14
Th-228	3.600E+00	0.000E+00	4.127E-06	6.057E+06	0.000E+00	*8.192E+14
Th-232	3.600E+00	1.000E+03	7.796E-01	3.207E+01	7.796E-01	3.207E+01

*At specific activity limit

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

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-228	Ra-228	1.000E+00	9.043E-07	8.086E-07	6.464E-07	2.952E-07	3.024E-04	3.513E-06	3.131E-16	0.000E+00
Ra-228	Th-232	1.000E+00	5.577E-08	1.603E-07	3.417E-07	7.733E-07	2.266E-05	1.249E-03	2.012E-04	1.438E+00
Ra-228	∑DOSE(j)		9.601E-07	9.689E-07	9.881E-07	1.068E-06	3.251E-04	1.252E-03	2.012E-04	1.438E+00
Th-228	Ra-228	1.000E+00	2.741E-06	6.722E-06	1.016E-05	7.466E-06	1.062E-06	5.784E-09	5.402E-19	0.000E+00
Th-228	Th-228	1.000E+00	1.486E-05	1.046E-05	5.183E-06	4.439E-07	3.962E-10	8.416E-21	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	1.147E-07	7.098E-07	2.875E-06	1.148E-05	2.313E-05	5.415E-05	4.982E-04	1.323E+00
Th-228	∑DOSE(j)		1.771E-05	1.789E-05	1.822E-05	1.939E-05	2.419E-05	5.415E-05	4.982E-04	1.323E+00
Th-232	Th-232	1.000E+00	2.159E-20	2.228E-20	2.371E-20	2.950E-20	5.505E-20	4.887E-19	2.504E-16	4.586E-02

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-228	Ra-228	1.000E+00	3.600E+00	3.177E+00	2.473E+00	1.030E+00	8.429E-02	1.322E-05	1.782E-16	0.000E+00
Ra-228	Th-232	1.000E+00	0.000E+00	4.079E-01	1.085E+00	2.476E+00	3.386E+00	3.466E+00	3.462E+00	3.449E+00
Ra-228	∑S(j):		3.600E+00	3.584E+00	3.559E+00	3.505E+00	3.470E+00	3.466E+00	3.462E+00	3.449E+00
Th-228	Ra-228	1.000E+00	0.000E+00	1.025E+00	1.923E+00	1.426E+00	1.287E-01	2.019E-05	2.723E-16	0.000E+00
Th-228	Th-228	1.000E+00	3.600E+00	2.506E+00	1.214E+00	9.611E-02	6.850E-05	6.620E-16	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	0.000E+00	6.701E-02	4.455E-01	2.001E+00	3.343E+00	3.466E+00	3.462E+00	3.449E+00
Th-228	∑S(j):		3.600E+00	3.597E+00	3.583E+00	3.524E+00	3.472E+00	3.466E+00	3.462E+00	3.449E+00
Th-232	Th-232	1.000E+00	3.600E+00	3.600E+00	3.600E+00	3.600E+00	3.599E+00	3.598E+00	3.594E+00	3.581E+00

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

RESCALC.EXE execution time = 4.08 seconds