April 25, 1995

See Rpt.

Oak Ridge National Laboratory
Attn: Mr. Jim Terry (MS 6200)
P.O. Box 2008
Oak Ridge, TN 37831-6200

SUBJECT: INFORMATION RELATED TO THE DEVELOPMENT OF AN ENVIRONMENTAL IMPACT STATEMENT FOR THE SHIELDALLOY METALLURGICAL CORPORATION, CAMBRIDGE, OHIO, FACILITY (FIN L2094, TASK 2)

Dear Mr. Terry:

The U.S. Nuclear Regulatory Commission staff has completed its preliminary analysis of the human health impacts of the onsite stabilization alternative for the subject environmental impact statement. A draft report is enclosed which includes the: (1) problem description; (2) onsite resident analyses; and (3) off site resident analyses. The purpose of these analyses is to establish a framework for completing the subsequent analyses after all site characterization data is received. Because these analyses were completed using limited information, they should not be interpreted as final results. Any suggestions or comments on the approaches and assumptions used in these analyses should be directed to Mr. Mark Thaggard of our staff at (301) 415-6718.

If you have any questions, please call me at (301) 415-6697.

Sincerely,

[Original signed by]

R. A. Nelson, Project Manager
Low-Level Waste and Decommissioning
Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

PPR per C. Poland
PF02 1/1

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Enclosures: As stated

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DATE	4/20/95	H	4/20/95	H	4/25/95		/ /95		/ /95	

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SITE X PROBLEM DESCRIPTION

Background

Site X is a 130 acre (52.6 hectares) industrial site, located one mile south of Cambridge, Ohio. The site was formally used to manufacture ferrovanadium, ferrocolumbium, and ferrotitanium (grainal) alloys and other vanadium products. A byproduct of the ferrocolumbium production is a slag contaminated with radionuclides. The source of the radioactivity is the columbium ore feed, which contained licensable quantities of uranium and thorium. Ferrocolumbium alloys are no longer produced at the site; ferrovanadium alloys and other vanadium products are still produced at the site. The source of the radioactivity within the grainal slag is believed to be primarily zirconium sands used in the production feed.

Both radioactive and non-radioactive slag is stockpiled in two large piles on the site. Slag was segregated based upon alloy production. The bulk of the ferrocolumbium slag was stockpiled in the smaller of the two piles, referred to as the East pile. Most of the radioactivity within the larger of the two piles (i.e., the West pile) is derived from slag and soil debris excavated from around the site and placed on the less radioactive ferrovanadium slag. Most of the grainal slag is believed to have been placed on the East pile. The West pile is currently partially covered (i.e., 90% of the surface area) with a three-foot clay cap. The East pile is presently uncovered.

The hypothetical licensee (i.e., for Site X) proposes to remediate the site by leaving the contaminated slag on site and covering the two piles each with a multi-layered cover.

Long-term human health effects will be assessed for two alternatives, for disposition of the radioactively contaminated slag; these are: (1) No action alternative - control of the site is lost with no remediation taken to control releases and (2) Releases are controlled by stabilization of the slag piles in place. For both alternatives it will be assumed that the slag piles may degrade in future times either by physical and/or chemical initiating events. However, releases of radionuclides from Site X will be considered only if they result from human and/or natural events that are likely and credible. Preliminary analyses will be somewhat bounding in nature, given the limited information available on the site. These analyses will help identify important data needs and design features.

ALTERNATIVE: ON-SITE STABILIZATION

For the post-remediation period, but <u>before</u> the loss of institutional control (for times less than 100 years), off-site exposures may occur at one or more receptor locations in the regional area outside the areas controlled by the operator of Site X, [nominally within a radius of 50 miles (80.5 Km) of the release site]. For the post-remediation period, and <u>after</u> loss of

Table 1. Physical dimensions of slag piles at Site X.

	West Pile (elliptical footprint)	East Pile (rectangular footprint)
Orientation of Major Axis (Longest Side)	120°	0°
a	130 m	130 m
b	75 m	80 m
Area	31 800 m^2	10 649 m^2
Mass of Contamination[1]	382 424 000 kg[2]	46 811 000 kg
Contamination Volume[3]	200 000 m^3	24 000 m^3

[1] Based upon numbers in the PTI Remedial Investigation/Feasibility Study.
[2] Value includes only the original slag and the excavated slag and the excavated soil from the 1989 decommissioning activities.
[3] Approximate values based upon the facility design.

Concentrations of uranium-238, thorium-23[illegible] and radium-226 within the slag and waste materials have been measured from c[illegible]re samples taken from the two piles. In addition, protactinium-231, thorium-22[illegible], and radium-223 concentrations have been measured in individual slag samples located off site. Based upon the average of these values and the assumption of secular equilibrium, the following tables show the radionuclide concentrations that will be assumed for the analyses.

Table 2. Radionuclide concentrations within the West pile.

Radionuclide	West Pile (Original Slag)		West Pile (Excavated Slag + Soil)		Weighted Average	
	pCi/g[1]	Ci[2]	pCi/g[3]	Ci[4]	pCi/g	Ci
Th-232; Ra-228; Ac-228; Th-228; Ra-224; Rn-220[5]; Po-216; Pb-212; Bi-212; Po-212; Tl-208	3.9	1.0	41.9	5.3	16.5	6.3
U-238; Th-234; Pa-234; U-234; Th-230; Rn-222[5]; Po-218; Pb-214; Bi-214; Po-214; Pb-210; Bi-210; Po-210	4.5	1.15	54	6.9	21	8
Ra-226[6]	2.4	0.6	42	5.3	15.5	5.9
Pa-231	4.9	1.25	4.9	0.6	4.9	1.9
Th-227	3.3	0.85	3.3	0.4	3.3	1.3
Ra-223	5.2	1.35	5.2	0.7	5.2	2.1

[1] Based upon measurements for Th-232 and U-238 in table 18 of PTI Remedial Investigation/Feasibility Study and on the sample measurements for the off-site slag material (ORISE letter - Preliminary Results for the Foote Mineral Off-site Locations, Cambridge, Ohio). Secular equilibrium is assumed.

[2] Based upon secular equilibrium arguments. Values listed are for each isotope and are based upon 282,000 short tons of original slag material (ENSR West Pile Decommissioning Plan). The concentrations are based upon sample measurements listed in table 18 of the PTI Remedial Investigation/Feasibility Study.

[3] Based upon weighted averages and sample measurements for Th-232 and U-238 from the excavated material (PTI Remedial Investigation/Feasibility Study) and on the same measurements for the off-site slag material (ORISE letter - Preliminary Results for the Foote Mineral Off-site Locations, Cambridge, Ohio). Secular equilibrium is assumed.

[4] Based upon secular equilibrium arguments. Values listed are for each isotope and are based upon 139,550 short tons of excavated material (ENSR West Pile Decommissioning Plan). The concentrations are based upon sample measurements listed in table 18 of the PTI Remedial Investigation/Feasibility Study and does not include any material that may be added from off-site.

[5] Radon will diffuse out of the slag pile more rapidly than the other radionuclides will leach out of the slag pile and will not be at secular equilibrium with the other isotopes of the decay chain.

[6] Based on ENSR 1990 report.

Table 3. Radionuclide concentrations within the East pile.

Radionuclide	East Pile (Original Slag)		East Pile (Grainal slag)		Weighted Average	
	pCi/g[1]	Ci[2]	pCi/g[3]	Ci[4]	pCi/g	Ci
Th-232; Ra-228; Ac-228; Th-228; Ra-224; Rn-220[5]; Po-216; Pb-212; Bi-212; Po-212; Tl-208	4.3	0.2	4.0	.025	4.25	0.2
U-238; Th-234; Pa-234; U-234; Th-230; Rn-222[5]; Po-218; Pb-214; Bi-214; Po-214; Pb-210; Bi-210; Po-210	24.1	1.0	18.9	0.12	23.4	1.1
Ra-226[6]	66	2.7	27.8	0.2	60.9	2.85
Pa-231	4.9	0.2	4.9	.031	4.9	.23
Th-227	3.3	0.13	3.3	0.02	3.3	0.15
Ra-223	5.2	0.21	5.2	0.03	5.2	0.24

[1] Based upon measurements for Th-232 and U-238 in table 18 of PTI Remedial Investigation/Feasibility Study. The numbers for Pa-231, Th-227, and Ra-223 are based upon the sample measurements for the off-site slag material (ORISE letter - Preliminary Results for the Foote Mineral Off-site Locations, Cambridge, Ohio). Secular equilibrium is assumed.

[2] Based upon secular equilibrium arguments. Values listed are for each isotope and are based upon 44,700 tons of original slag material (PTI Remedial Investigation/Feasibility Study, p. 19). The concentrations are based upon sample measurements listed in table 18 of the PTI Remedial Investigation/Feasibility Study.

[3] Based upon measurements for Th-232 and U-238 in table 18 of PTI Remedial Investigation/Feasibility Study. It is assumed that the grainal slag was not used for backfilling on-site and was not taken off-site. The numbers for Pa-231, Th-227, and Ra-223 are based upon the sample measurements for the off-site slag material (ORISE letter - Preliminary Results for the Foote Mineral Off-site Locations, Cambridge, Ohio). Secular equilibrium is assumed.

[4] Based upon secular equilibrium arguments. Values listed are for each isotope and are based upon 6900 tons of grainal pile material added to the East pile in the 1989 decommissioning activities (PTI Remedial Investigation/Feasibility Study). The concentrations are based upon sample measurements listed in table 18 of the PTI Remedial Investigation/Feasibility Study.

[5] Radon will diffuse out of the slag pile more rapidly than the other radionuclides will leach out of the slag pile and will not be at secular equilibrium with the other isotopes of the decay chain.

[6] Based upon the ENSR 1990 report.

The total number of curies estimated for each pile is based upon an estimated tonnage of waste material, as follows: 282,000 tons of slag in the original West pile, 139,550 tons of excavated slag and soil material added to the West pile, 44,700 tons of slag in the original East pile, and 6,900 tons of grainal slag added to the East pile. The weighted average concentrations and inventories are also based upon these tonnage.

Tables 2 and 3 show that, with the assumption of secular equilibrium, slightly more than 200 curies is assumed to be disposed within the two piles. Over 90% of the activity is assumed to be present in the West pile. The East pile has greater concentrations of radionuclides within the Ra-226 and U-238 series, but a much smaller mass than the West pile.

Estimated releases of radionuclides are based upon assuming either solubility-controlled or diffusive-controlled release. Thorium and uranium are assumed to be solubility-controlled. Their releases are estimated based upon an assumed solubility limit, the influx of water into the piles, and an assumed size fraction of slag within the piles. The thorium isotopes are assumed to have a solubility limit of 6.09E-09 g/cm^3 and the uranium isotopes a solubility limit of 5.30E-09 g/cm^3. The influx of water is assumed to be 1.2 inches/year (3 cm/yr) for the covered case and 19.7 inches/year (50 cm/yr) for the uncovered case (or degraded cover). The other radionuclides (i.e., besides the thorium and uranium isotopes) are assumed to be released through diffusion, at a diffusion rate of 1.4E-09 cm^2/s. This diffusion rate is based upon leaching data from similar slag at another site. As with the solubility-controlled releases, the diffusive-controlled releases is assumed to vary by assumed class sizes of slag within the piles. For both the solubility- and diffusive-controlled releases, the size fractions of slag within the piles assumed are shown in Table 4:

Conceptualization of the problem

Air, ground water, and surface water flow provide the principal environmental pathways of contaminant migration away from the two piles.

Radius (cm)	fraction
0.05	0.10
0.50	0.15
7.62	0.50
15.20	0.25

Table 4. Size fraction of slag assumed for source term analysis.

Air

Wind data in the region show that the predominant wind direction is to the northeast, at roughly 4.5 mph (2 m/s). The nearest receptor location, for the air pathway, while control of the site is maintained, is roughly 675 feet (205.74 m), northeast of the West pile. This is at the site boundary. For purposes of the analyses, the probability that wind blows to the receptor location will be based on regional joint frequency data. The nearest population centers that will be considered are Cambridge (pop. ≈ 12,500) and Byesville (pop. ≈ 3,500). The population center for Cambridge is roughly 2 miles (3.22 Km) northwest of the West pile, while the population center for Byesville is roughly 2 miles (3.22 Km) southeast of the West pile.

The mean annual precipitation in the Site X area is 39 inches/year (0.991 m/y). Estimated evapotranspiration at the site is 29 inches/year (0.74 m/y), which is roughly 75% of the annual precipitation.

Because of the nature of the slag (i.e., occurring primarily as large, heavy aggregates), the primary concern with air transport should be migration of gases from within the piles. From the inventory information, the only gas that is likely to be released from the piles is radon.

When control of the site is lost, it is reasonable to assume that someone will reside on site; therefore, health effects will be based only upon radon emanation rates and no transport analysis will be performed.

Ground water

The bedrock beneath the site is predominantly shales intermingled with thin sandstone units. Above the bedrock is valley-fill alluvial, lacustrine, and palustrine deposits consisting of clays, sandy-silty clays, and silty-clayey sands. At the site, the unconsolidated materials contain a water table aquifer. The bedrock is believed to contain a partially confined aquifer that is separated from the unconsolidated water-table aquifer.

Although residents in Cambridge and Byesville receive municipal water, there are domestic wells in the vicinity of the site. The nearest domestic well, down gradient from the site, is approximately 1000 feet (305 m) west of the western site boundary. Because productive domestic wells are located in proximity to the site, the ground water transport pathway should be considered in the analysis. Information on wells within the region show that most domestic wells withdraw water from the bedrock aquifer. These wells are typically 50-100 feet (15.24-30.48 m) deep, with screens covering the bottom 10-20 feet (3.05-6.1 m) section.

For purposes of the analyses, it will be assumed that all contaminant migration is limited to just the upper, unconsolidated water-table aquifer; this assumption should be appropriate if it is established that the bedrock aquifer is reasonably well confined. Drawdown calculations indicate the water-table aquifer can sustain a domestic well providing water to a subsistence farm of four people, with an assumed water need of 620 gpd (2.35 m^3/d).

Ground water in the water-table aquifer flows predominantly to the west, toward Chapman Run, at a rate of roughly 1.5E-02 ft/d (0.46 m/d). Figure 1 shows a conceptualization of the ground-water system that will be used in the analysis.

It is assumed that local rainfall recharges the ground-water system, at about 1E-3 ft/d (2.9E-4 m/d) and that ground-water discharges to nearby streams. The recharge estimate was calculated using the HELP ver. 2.05 computer code, using 20 years of simulated weather data based on the Columbus weather station. The soil hydraulic conductivity is based on soil permeability tests performed on soil cores around the site; the lab values were arbitrarily multiplied by a factor of 100 to adjust for field conditions. The saturated hydraulic conductivity and hydraulic gradient of the ground-water system is

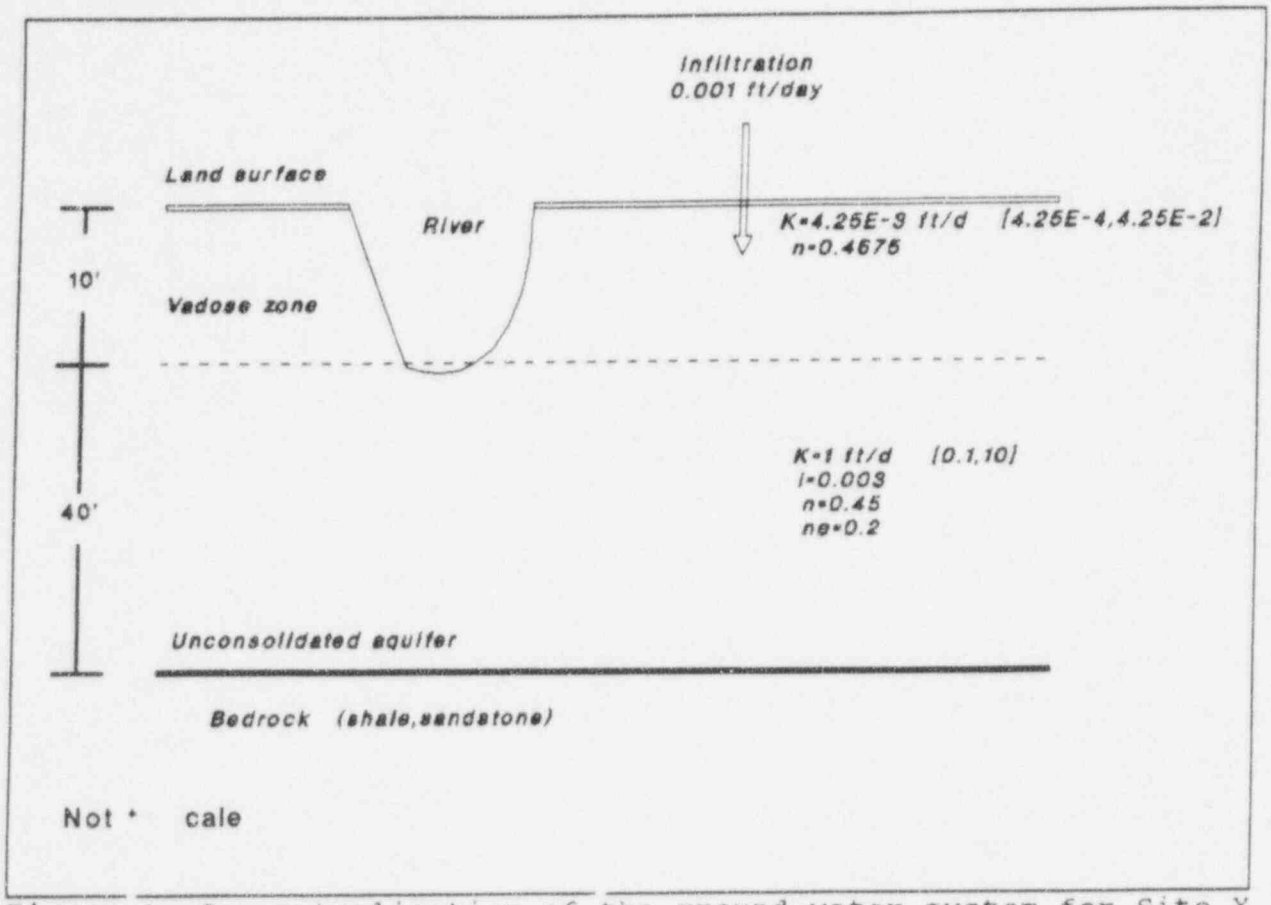

Figure 1. Conceptualization of the ground-water system for Site X (cross-sectional perspective).

based on data from wells, at the site. The porosity values are taken from literature for similar geologic media.

When site control is assumed to be maintained, two receptor locations will be evaluated, one for each of the two piles. The hypothetical well locations for these receptors are shown in figure 2. The effects from the use of each well will be viewed as independent and exclusive of the effects from the other well; that is, an off-site resident will be assumed to use only one of the wells for the analysis involving that particular well.

The nearest municipal wells are roughly 1.5 miles (2.4 Km) southwest of the site. These wells supply water to approximately 3000 people, in Byesville. Assessment of contaminants reaching these wells will be made only if it is determined that significant concentrations will reach the nearby hypothetical domestic wells. Since the hypothetical domestic wells are closer to the site, presumably concentrations and resulting impacts to members of the public will be greater, at the hypothetical wells, than for the municipal well use.

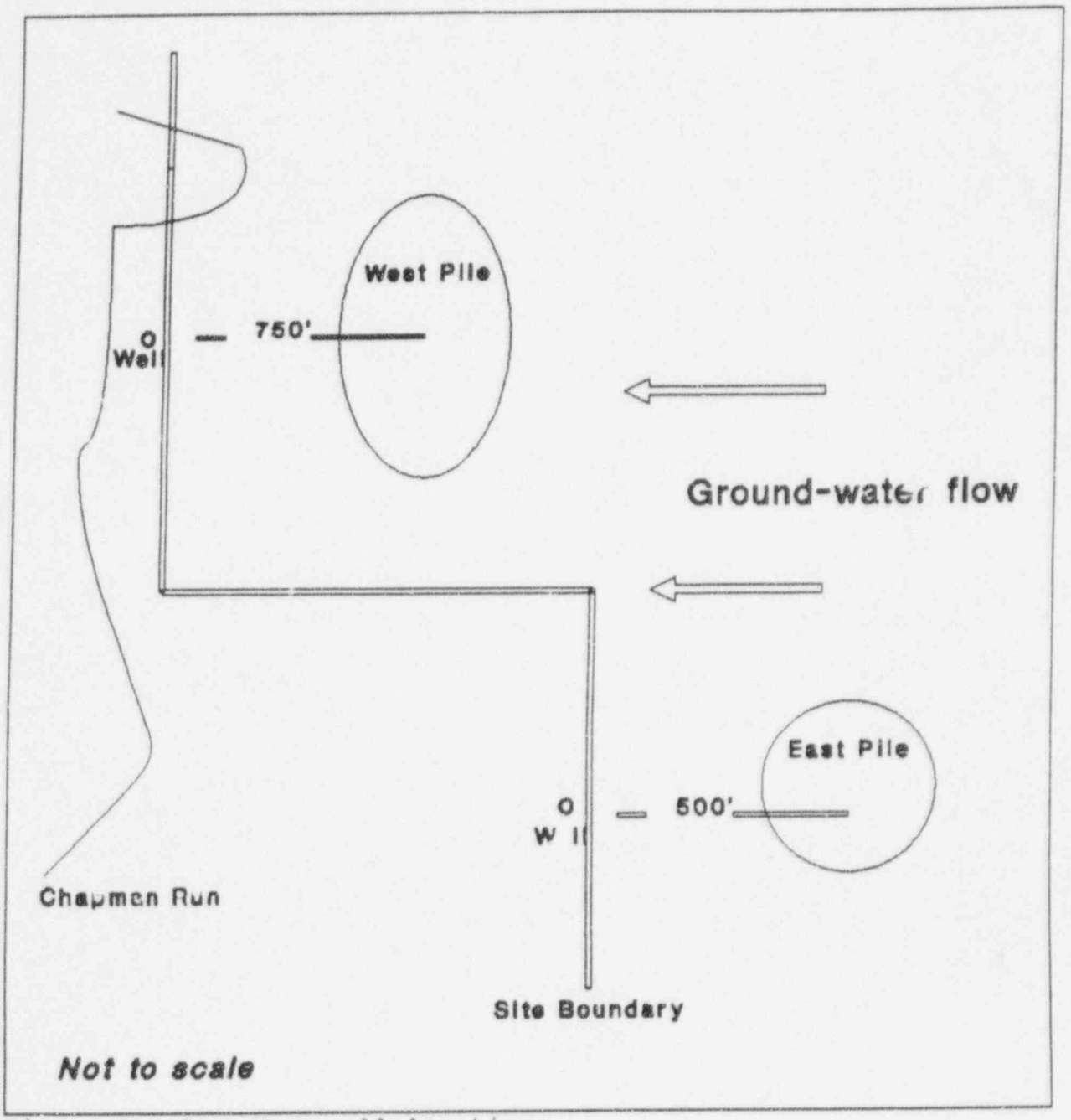

Figure 2. Receptor well locations.

When site control is assumed to be lost, the receptor well will be assumed to be located on site. Therefore, under this scenario, no ground-water transport analysis will be performed.

Surface water

Drainage onto and off the site is west and north to Chapman Run. Chapman Run joins Wills Creek roughly one mile north of the site. Flow information on Chapman Run is unavailable; however, the discharge is believed to be between 10 and 100 cubic feet per second (cfs) {0.3 to 3 m^3/s}. Wills Creek has a mean annual discharge of roughly 545 cfs (15 m^3/s).

The City of Cambridge water reservoir is located about 1.5 miles (2.4 Km) north of the site, and is taken from Wills Creek. This would be the likely point of entry into a municipal water system for contamination originating from the site. The Cambridge water system supplies water to about 17,500 people.

There are a number of drainage ditches and swales, tributaries, and wetlands on the site which controls surface water runoff. Two of these drainage systems are of primary concern in terms of contaminant transport.

A tributary to Chapman Run, along the western site boundary, receives water from a wetland that abuts the northwestern edge of the East pile. Water in this tributary flows north, along the western edge of the West pile and discharges into Chapman Run, near the site boundary. Conceivably particulates and/or dissolved contaminants from both piles could be transported along this drainage route. One potential surface-water receptor location would be at the point where this drainage channel discharges into Chapman Run, immediately west of the site boundary. There are no flow data available for this drainage channel. Flow rates will be arbitrarily assumed to be 1 to 10 cfs (0.03 to 0.3 m^3/s). The channel is assumed to be 0.5 to 5 ft (0.15 to 1.5 m) depth and 30 to 40 ft (9 to 12 m) across, based on topographic maps.

Another on-site drainage system which could transport contaminants is located immediately north of the West pile. A tributary to Chapman Run drains a wetland system, which abuts the northern edge of the West pile. Flow rates and channel dimensions will be the same as those above, for the other tributary. A receptor location for this drainage system will be at the point where Chapman Run leaves the site boundary.

Assessment of potential impacts to the City of Cambridge surface-water intake will not be made unless it is determined that significant impacts are likely to occur at the two receptor locations immediately off the site boundary. Because of the farther distance and greater streamflow, it is anticipated that concentrations at the city intake will be significantly less than those at the two nearby receptor locations.

References

ENSR, "Shieldalloy Metallurgical Corporation, Cambridge, Ohio - West Pile Decommissioning Plan", ENSR Consulting and Engineering, New York, NY, February 1990.

NRC, "Scenarios for Assessing Potential Doses Associated with Residual Radioactivity", Policy and Guidance Directive PG-8-08, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1994.

ORISE, Personal Communication to Mr. Raymant Glinski, Oak Ridge Institute for Science and Education, Oak Ridge, TN, July 15, 1994.

PRC, "Screening Site Inspection Report", PRC Environmental Management, Inc., Chicago, IL, December 1993.

PTI, "Draft Remedial Investigation and Feasibility Study Scoping Document Shieldalloy Cambridge Site", PTI Environmental Services, January 1995.

RMT, "Ground Water and Surface Water Monitoring Program for the East and West Slag Piles at Shieldalloy Metallurgical Corporation - Cambridge, Ohio", ENSR Consulting and Engineering, New York, NY, February 1990.

Schroeder, P.R., R.L. Peyton, B.M. McEnroe, and J.W. Sjostrom, "The Hydrologic Evaluation of Landfill Performance (HELP) Model - Vol. III. User's Guide for Version 2", U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS, 1988.

Shieldalloy Metallurgical Corporation, "Technical Basis for Decommissioning at the Cambridge, Ohio Facility", Shieldalloy Metallurgical Corp., Newfield, NJ, May 1993.

Versar, "Environmental Risk Assessment Survey of Newmont Mining Corporation - Final Report", Vol. 1., Versar, Inc., Springfield, VA, 1985.

DRAFT

Long-term Human Health Effects for On-site Resident - Site X

Approach

An assessment is made of long-term human health effects to someone residing on Site X. It is assumed that a self-subsistence residential farmer is located on top of the West pile. Since the West pile is the larger of the two piles and is presently covered, it is believed to be more credible to assume that someone will reside on the West pile as opposed to the East pile. Because current information on the site provide no indication of hazardous chemicals being present within the piles, only effects from radionuclides are considered. An analysis to look at impacts to an individual residing off site is provided as a separate analysis.

RESRAD version 5.41 is used to estimate doses to the on-site residential farmer. Since we are looking at effects to an on-site resident, we are assuming that site control has been lost; that is, there is no restriction to site access. The proposed dose standard for decommissioning involving restricted release is 100 mrem once site control is lost. Two cases are considered to assess whether this proposed standard would be exceeded; namely, the pile being uncovered and the pile being covered with a 1.2 meter thick cover. The case involving the covered pile is to look at a situation where either the existing cover (i.e., under the no-action alternative) or a new cover (i.e., under the in-situ stabilization alternative) has degraded to a point of being ineffective in inhibiting the influx of water or exflux of radon. Without active maintance, it is reasonable to assume that at some point in time a cover under either alternative may degrade to such a point. The covered scenario is used to look at the possible benefits of assuming either active maintance of the cover or design of a cover to be effective throughout the compliance period.

Radionuclides included in the analysis are U-238 and Th-232 and their progenies. Further, Pa-231 and several of its progenies are assumed to be present in the pile. Initial concentrations of the principal radionuclides are developed and described in the problem description document for Site X. RESRAD only requires initial concentrations for radionuclides with a half-life greater than 0.5 year; progenies associated with these radionuclides are assumed to be present and in secular equilibrium. The radiological concentrations used in the analyses are shown in Table 1.

Estimated release rates of radionuclides from the slag pile were determined as part of an auxiliary source term analysis. Distribution coefficients (K_d) used in RESRAD to estimate source release rates are adjusted so that the calculated leach fractions for each radionuclide agree with the estimated leach fraction from the auxiliary source term analysis. Estimated release rates for Ra-228 and Pb-210, from the auxiliary source term analysis, appeared to be questionably high; therefore, default K_d values for these two radionuclides are used in the analysis. The computer code used in the auxiliary source term analysis is currently being evaluated; if it is determined that the estimated release rates for Ra-228 and Pb-210 are reasonable, then the RESRAD analysis will be redone using the higher release rates. In the auxiliary source term analysis, no release estimates were made

for Ac-227 (a daughter of Pa-231), so again a default K_d is used.

Site related information is used, whenever possible, in defining parameters. Default parameters are used whenever site specific information is unavailable. The site-related parameters used in the analyses are listed in Appendix A.

K_d values for transport through the unsaturated and saturated zones are taken from the literature. Currently, there is minimal site information to estimate defendable K_d values. It is known that the soils and geologic medium comprising the unsaturated and saturated zones is mostly clays and silty clays. Further, water quality data indicate the ground water is slightly basic (primarily around the piles) to slightly acidic. Selection of K_d values for the analyses are based, where possible, on materials (i.e., silts and clays) and conditions (near neutral pH) to be similar to what is known about the site. Because very little information is available on materials at the site (e.g., mineralogy, chemistry, etc.), a safety factor is used to reduce the values obtained from the literature. An arbitrary safety factor of 10 or 100 is used depending upon the level of confidence in the literature value. Table 3 provides a listing of K_d values assumed for the unsaturated and saturated zones, in the RESRAD analyses.

Radionuclide	Initial Conc. (pCi/g)
Pa-231	4.9
Pb-210	21.0
Ra-226	15.5
Ra-228	16.5
Th-228	16.5
Th-230	21.0
Th-232	16.5
U-234	21.0
U-238	21.0

Table 1. Initial concentration of radionuclides used in RESRAD.

Findings

Results from the two analyses are included in Appendices B and C; that is, for the uncovered and covered case respectively. Obviously, there is considerable uncertainty in the estimated doses, due to the large number of parameters that have to be considered and the limited information available for the site. However, several general observations can be made from these analyses.

The peak dose for the uncovered case is roughly 1100 mrem, which occurs in slightly over 800 years. Roughly 47% of the peak dose is attributable to the water dependent pathways. Most of the water-dependent dose, which is mostly from drinking water, is due to three radionuclides: Ra-226, Pa-231, and Th-230. These radionuclides should be the primary radionuclides considered in evaluating impacts to off-site individual, when considering water transport pathways. Existing site information, although somewhat limited, tend to indicate that the ground-water and surface-water do not have significant concentrations of radionuclides. Therefore, our estimated release rates may be too high. It may be also possible that contaminants are being retarded in the unsaturated zone. Additional site information on the concentration of radionuclides (e.g., radium and protactinium) within the soils and surrounding ground-water system will help in determining whether refinements are needed in the release estimates. If the water-dependent exposure is eliminated (through

Radionuclide	K_d used in RESRAD	LEACH FRACTION (yr^{-1}) RESRAD	AUX. ANAL.
Pa-231	1.276E+2	2E-4	1.5E-4
Pb-210	1E+2	2.5E-4	7E-2
Ra-226	1.721E+1	1.5E-3	1E-3
Ra-228	7E+1	4E-4	3E-2
Th-228	1E+10	2.5E-12	0.0
Th-230	1E+10	2.5E-12	2E-13
Th-232	3.61E+7	7E-10	5E-10
U-234	1E+10	2.5E-12	8E-13
U-238	1.74E+8	1E-10	1E-10
Ac-227	2E+1	1.25E-3	---

Table 2. Distribution coefficients used in RESRAD for estimating radionuclide releases.

for example better source release information and/or information to support greater retardation within the unsaturated zone), it may be still difficult without some type of engineered-features to meet the 100 mrem/year standard, once site control is lost.

The key radionuclides contributing to dose for the water-independent pathways are Th-232, Ra-226, Th-230, and Pa-231. It may be possible to reduce or eliminate the dose attributable to Pa-231, if it is found to be either absence or at negligible concentrations within the piles. However, even with the elimination of Pa-231 and contributions from the water dependent pathways, the 100 mrem/year limit may still be exceeded due to Ra-226, Th-230, and Th-232 doses from the ground, radon, and plants. Confirmation of concentrations of Th-232, Ra-226, Th-230, and Pa-231, within the piles, is needed since they may greatly affect estimated doses.

For the covered case, the peak dose is not achieved during the 5000 year simulation period. At year 5000, the calculated dose is 0.7 rem/year. The 100 mrem/year standard is exceeded before 1000 years because of the exflux of radon from the pile.

These analyses show that for both alternatives (i.e., stabilization in place and no-action), the 100 mrem standard may be exceeded once site control is lost. Under the stabilization in place alternative, it may be possible to ensure compliance with the 100 mrem/year standard during the 1000 year compliance period, through the design of the cover. For example the figures in Appendix D show that the standard could be met during the 1000 year compliance period. These figures are from an analysis where it is assumed that the cover has an erosion rate of 2.8E-05 m/y and a saturated hydraulic conductivity less than 1.0E-07 cm/s. The health effects for an off-site resident (a separate analysis) will demonstrate the viability of the two alternatives, if effective access to the site is assumed.

Radionuclide	K_d (L/Kg)	Source
Actinium	20	Silt and clay in Thibault et. al. 1990, safety factor of 100.
Lead	350	Soil D (20% clay, pH = 7.5-8.0, organic content = 2.5%, CEC = 16) in Thibault et. al. 1990, safety factor of 10.
Protactinium	23	Silt and clay in Thibault et. al. 1990, safety factor of 100.
Radium	50	Alberta clay (pH = 7.8, organic content = 0.81%, $CaCO_3$ content = 5.2%), safety factor of 10.
Thorium	10	Assumed (not much thorium is expected to be released from the source; therefore, not much consideration is given to holding up its transport).
Uranium	45	Silty loam (36% clay, pH = 7.0, CEC = 28) in Thibault et. al, 1990, safety factor of 10.

Table 3. Distribution coefficients assumed for the unsaturated and saturated zones, in RESRAD analyses.

References

ENSR, "Shieldalloy Metallurgical Corporation, Cambridge, Ohio - West Pile Decommissioning Plan", ENSR Consulting and Engineering, New York, NY, February 1990.

Freeze, R.A., and J.A. Cherry, Groundwater, Prentice-Hall, Englewood Cliffs, NJ, 1979.

Schroeder, P.R., R.L. Peyton, B.M. McEnroe, and J.W. Sjostrom, "The Hydrologic Evaluation of Landfill Performance (HELP) Model - Vol. III. User's Guide for Version 2", U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS, 1988.

SMC, "Technical Basis for Decommissioning at the Cambridge, Ohio Facility", Shieldalloy Metallurgical Corp., Newfield, NJ, May 1993.

Thaggard, M., M.R. Byrne, J.R. Firth, and R.B. Neel, "Site X Problem Description", unpublished.

Thibault, D.H., M.I. Sheppard, and P.A. Smith, A Critical Compilation and Review of Default Soil Solid/Liquid Partition Coefficients, K_d, for Use in Environmental Assessments, Whiteshell Nuclear Research Establishment, Manitoba, Canada, pp. 112, 1990.

Yu, C., A.J. Zielen, J.J. Cheng, Y.C. Yuan, L.G. Jones, D.J. LePoire, Y.Y. Wang, C.O. Loureiro, E. Gnanapragasam, E. Faillace, A. Wallo, III, W.A. Williams, and H. Peterson, Manual for Implementing Residual Radioactive

Material Guidelines Using RESRAD, Version 5.0 - Final Draft, Argonne National Laboratory, Argonne, Illinois, pp. 377, 1993.

APPENDIX A - RESRAD INPUT PARAMETERS

UNCOVERED CASE

PARAMETER	VALUE	SOURCE
Area of contaminated zone (m^2)	31,800	SMC, 1993
Thickness of contaminated zone (m)	4.57	PTI Draft Work Plan
Length parallel to aquifer flow (m)	133	Problem description document
Density of contaminated mat'l. (g/cm^3)	2.61	Problem description document
Contaminated zone total porosity	0.51	M.Thaggard - estimate for coarse gravel
Contaminated zone effective porosity	0.21	RESRAD (Table E.7, coarse gravel)
Contaminated zone hydr. conductivity (m/yr)	5.9E+05	M.Thaggard - estimate for coarse gravel
Evapotranspiration coefficient	0.64	Calculated from equation E.4
Precipitation (m/yr)	0.991	Problem description document
Irrigation (m/yr)	0.23	M.Thaggard - water use estimate
Runoff coefficient	0.4	RESRAD (Table E.1)
Density of saturated zone (g/cm^3)	1.6	Freeze and Cherry, 1979 (p.405)
Saturated zone total porosity	0.42	RESRAD (Table E.7, silt)
Saturated zone hydr. conductivity (m/yr)	1.13E+02	Problem description document
Saturated zone hydr. gradient	0.003	Problem description document
Saturated zone b parameter	7.75	RESRAD (Table E.2, silty clay loam)
Well pump intake depth (m below water table)	3.05	Problem description document
Well pumping rate (m^3/yr)	8.574E+02	M. Thaggard - water use estimate
Unsaturated zone thickness (m)	3.05	Problem description document
Unsaturated zone soil density (g/cm^3)	1.6	Freeze and Cherry, 1979 (p.405)
Unsaturated zone total porosity	0.4675	HELP ver. 2.05 Manual (silty clay)
Unsaturated zone soil-specific b parameter	10.40	RESRAD (Table E.2, silty clay)
Unsaturated zone hydr. conductivity (m/yr)	0.475	Problem description document
Inhalation rate (m^3/yr)	1.05E+04	R. Neel
Mass loading for inhalation (g/m^3)	1.0E-04	R. Neel
Fraction of time spent outdoors (on site)	0.2	R. Neel
Fruit, veg. and grain consumption (kg/yr)	166	R. Neel (produce)
Leafy veg. consumption (kg/yr)	11	R. Neel
Milk consumption (L/yr)	100	R. Neel
Meat and poultry consumption (kg/yr)	68	R. Neel
Fish consumption (kg/yr)	10	R. Neel (aquatic)
Other seafood consumption (kg/yr)	0	M.Thaggard-assumed based on site
Soil ingestion (g/yr)	73	R. Neel
Drinking water intake (L/yr)	730	R. Neel
Livestock fodder intake for meat (kg/day)	44	R. Neel
Livestock fodder intake for milk (kg/day)	67	R. Neel
Livestock water intake for milk (L/day)	60	R. Neel
Depth of roots (m)	0.25	M.Thaggard - infiltration analysis
Storage time for leafy veg. (days)	14	R. Neel (crops)
Storage time for milk	3	R. Neel
Storage time for meat and poultry	6	R. Neel
Storage time for fish	1	R. Neel (aquatic)
Storage time for livestock fodder	90	R. Neel
Radon diffusion coeff. in contam. area (m/s)	6.3E-06	ENSR, 1983
Emanating power of Rn-222 gas	0.02	ENSR, 1983
Emanating power of Rn-220 gas	0.02	ENSR, 1983

COVERED CASE[1]

PARAMETER	VALUE	SOURCE
Cover depth (m)	1.22	SMC, 1993
Density of cover material (g/cm^3)	1.73	SMC, 1993
Cover depth erosion rate (m/yr)	2.79E-04	SMC, 1993
Evapotranspiration coefficient	0.95	Calculated from Equation E.4
Runoff coefficient	0.6	M.Thaggard estimate
Inhalation shielding factor	0.2	M.Thaggard - estimate (half of default)
External gamma shielding factor	0.35	M.Thaggard - estimate (half of default)

[1]All other parameters are the same as those used for the covered case.

APPENDIX B - RESRAD RESULTS UNCOVERED CASE

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines

Dose Conversion Factor (and Related) Parameter Summary
File: DOSFAC.BIN

Menu	Parameter	Current Value	Default	Parameter Name
A-1	Ground external gamma, volume DCF's, (mrem/yr)/(pCi/cm**3):			
A-1	Ac-227+D , soil density = 1.0 g/cm**3	2.760E+00	2.760E+00	DCF1(1,1)
A-1	Ac-227+D , soil density = 1.8 g/cm**3	1.520E+00	1.520E+00	DCF1(1,2)
A-1				
A-1	Pa-231 , soil density = 1.0 g/cm**3	.210E-01	2.210E-01	DCF1(2,1)
A-1	Pa-231 , soil densi = 1.8 g/cm**3	210E-01	1.210E-01	DCF1(2,2)
A-1				
A-1	Pb-210+D , soil density = 1.0 g/cm**3	4.870E-03	4.870E-03	DCF1(3,1)
A-1	Pb-210+D , soil density = 1.8 g/cm**3	2.310E-03	2.310E-03	DCF1(3,2)
A-1				
A-1	Ra-226+D , soil density = 1.0 g/cm**3	1.550E+01	1.550E+01	DCF1(4,1)
A-1	Ra-226+D , soil density = 1.8 g/cm**3	8.560E+00	8.560E+00	DCF1(4,2)
A-1				
A-1	Ra-228+D , soil density = 1.0 g/cm**3	8.180E+00	8.180E+00	DCF1(5,1)
A-1	Ra-228+D , soil density = 1.8 g/cm**3	4.510E+00	4.510E+00	DCF1(5,2)
A-1				
A-1	Th-228+D , soil density = 1.0 g/cm**3	1.330E+01	1.330E+01	DCF1(6,1)
A-1	Th-228+D , soil density = 1.8 g/cm**3	7.360E+00	7.360E+00	DCF1(6,2)
A-1				
A-1	Th-230 , soil density = 1.0 g/cm**3	2.110E-03	2.110E-03	DCF1(7,1)
A-1	Th-230 , soil density = 1.8 g/cm**3	1.030E-03	1.030E-03	DCF1(7,2)
A-1				
A-1	Th-232 , soil density = 1.0 g/cm**3	1.350E-03	1.350E-03	DCF1(8,1)
A-1	Th-232 , soil density = 1.8 g/cm**3	6.040E-04	6.040E-04	DCF1(8,2)
A-1				
A	I-234 , soil density = 1.0 g/cm**3	1.580E-03	1.580E-03	DCF1(9,1)
A-	U-234 , soil density = 1.8 g/cm**3	6.970E-04	6.970E-04	DCF1(9,2)
A-1				
A-1	U-238+D , soil density = 1.0 g/cm**3	1.270E-01	1.270E-01	DCF1(10,1)
A-1	U-238+D , soil density = 1.8 g/cm**3	6.970E-02	6.970E-02	DCF1(10,2)

A-3	Depth factors, ground external gamma, dimensionless:			
A-3	Ac-227+D , soil density = 1.0 g/cm**3, thickness = .15 m	7.900E-01	7.900E-01	FD(1,1,1)
A-3	Ac-227+D , soil density = 1.0 g/cm**3, thickness = 0.5 m	9.700E-01	9.700E-01	FD(1,2,1)
	Ac-227+D , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,1)
	Ac-227+D , soil density = 1.8 g/cm**3, thickness = .15 m	9.100E-01	9.100E-01	FD(1,1,2)
A-3	Ac-227+D , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(1,2,2)
A-3	Ac-227+D , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,2)
A-3				
A-3	Pa-231 , soil density = 1.0 g/cm**3, thickness = .15 m	7.900E-01	7.900E-01	FD(2,1,1)
A-3	Pa-231 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(2,2,1)
A-3	Pa-231 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,1)
A-3	Pa-231 , soil density = 1.8 g/cm**3, thickness = .15 m	9.200E-01	9.200E-01	FD(2,1,2)
A-3	Pa-231 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(2,2,2)
A-3	Pa-231 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,2)
A-3				

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: DOSFAC.BIN

Menu	Parameter	Current Value	Default	Parameter Name
A-3	Pb-210+D , soil density = 1.0 g/cm**3, thickness = .15 m	8.800E-01	8.800E-01	FD(3,1,1)
A-3	Pb-210+D , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(3,2,1)
A-3	Pb-210+D , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,1)
A-3	Pb-210+D , soil density = 1.8 g/cm**3, thickness = .15 m	9.700E-01	9.700E-01	FD(3,1,2)
A-3	Pb-210+D , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(3,2,2)
A-3	Pb-210+D , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,2)
A-3				
A-3	Ra-226+D , soil density = 1.0 g/cm**3, thickness = .15 m	6.300E-01	6.300E-01	FD(4,1,1)
A-	a-226+D , soil density = 1.0 g/cm**3, thickness = 0.5 m	9.200E-01	9.200E-01	FD(4,2,1)
A	a-226+D , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(4,3,1)
A-3	Ra-226+D , soil density = 1.8 g/cm**3, thickness = .15 m	8.500E-01	8.500E-01	FD(4,1,2)
A-3	Ra-226+D , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(4,2,2)
A-3	Ra-226+D , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(4,3,2)
A-3				
A-3	Ra-228+D , soil density = 1.0 g/cm**3, thickness = .15 m	6.800E-01	6.800E-01	FD(5,1,1)
A-3	Ra-228+D , soil density = 1.0 g/cm**3, thickness = 0.5 m	9.700E-01	9.700E-01	FD(5,2,1)
A-3	Ra-228+D , soil ensity = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(5,3,1)
A-3	Ra-228+D , soil ensity = 1.8 g/cm**3, thickness = .15 m	8.500E-01	8.500E-01	FD(5,1,2)
A-3	Ra-228+D , soil ensity = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(5,2,2)
A-3	Ra-228+D , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(5,3,2)
A-3				
A-3	Th-228+D , soil density = 1.0 g/cm**3, thickness = .15 m	6.100E-01	6.100E-01	FD(6,1,1)
A-3	Th-228+D , soil density = 1.0 g/cm**3, thickness = 0.5 m	9.400E-01	9.400E-01	FD(6,2,1)
A-3	Th-228+D , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(6,3,1)
A-3	Th-228+D , soil density = 1.8 g/cm**3, thickness = .15 m	7.500E-01	7.500E-01	FD(6,1,2)
A-3	Th-228+D , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(6,2,2)
A-3	Th-228+D , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(6,3,2)
A-3				
A-3	Th-230 , soil density = 1.0 g/cm**3, thickness = .15 m	9.300E-01	9.300E-01	FD(7,1,1)
A-3	Th-230 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(7,2,1)
A-3	Th-230 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(7,3,1)
A-3	Th-230 , soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(7,1,2)
A-3	Th-230 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(7,2,2)
A-3	Th-230 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(7,3,2)
A-3				
A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = .15 m	9.500E-01	9.500E-01	FD(8,1,1)
A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(8,2,1)
A-	h-232 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(8,3,1)
A-	h-232 , soil density = 1.0 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(8,1,2)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(8,2,2)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(8,3,2)
A-3				
A-3	U-234 , soil density = 1.0 g/cm**3, thickness = .15 m	9.000E-01	9.000E-01	FD(9,1,1)

A-3	U-234 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(9,2,1)
A-3	U-234 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(9,3,1)
A-3	U-234 , soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(9,1,2)
A-3	U-234 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(9,2,2)
A-3	U-234 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(9,3,2)
A-3				

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: DOSFAC.BIN

Menu	Parameter	Current Value	Default	Parameter Name
A-3	U-238+D , soil density = 1.0 g/cm**3, thickness = .15 m	7.800E-01	7.800E-01	FD(10,1,1)
A-3	U-238+D , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(10,2,1)
A-3	U-238+D , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(10,3,1)
A-3	U-238+D , soil density = 1.8 g/cm**3, thickness = .15 m	8.800E-01	8.800E-01	FD(10,1,2)
A-3	U-238+D , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(10,2,2)
A-3	U-238+D , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(10,3,2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.700E+00	6.700E+00	DCF2(1)
B-1	Pa-231	1.300E+00	1.300E+00	DCF2(2)
B-1	Pb-210+D	2.100E-02	2.100E-02	DCF2(3)
B-1	Ra-226+D	7.900E-03	7.900E-03	DCF2(4)
B-1	Ra-228+D	4.500E-03	4.500E-03	DCF2(5)
B-1	Th-228+D	3.100E-01	3.100E-01	DCF2(6)
B-1	Th-230	3.200E-01	3.200E-01	DCF2(7)
B-1	Th-232	1.600E+00	1.600E+00	DCF2(8)
B-1	U-234	1.300E-01	1.300E-01	DCF2(9)
B-1	U-238+D	1.200E-01	1.200E-01	DCF2(10)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.500E-02	1.500E-02	DCF3(1)
D-1	Pa-231	1.100E-02	1.100E-02	DCF3(2)
D-1	Pb-210+D	6.700E-03	6.700E-03	DCF3(3)
D-1	Ra-226+D	1.100E-03	1.100E-03	DCF3(4)
D-1	Ra-228+D	1.200E-03	1.200E-03	DCF3(5)
D-1	Th-228+D	7.500E-04	7.500E-04	DCF3(6)
D-1	Th-230	5.300E-04	5.300E-04	DCF3(7)
D-1	Th-232	2.800E-03	2.800E-03	DCF3(8)
D-1	U-234	2.600E-04	2.600E-04	DCF3(9)
D-1	U-238+D	2.500E-04	2.500E-04	DCF3(10)
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	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(5,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(5,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(5,3)

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: DOSFAC.BIN

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(6,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(7,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(8,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(8,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(8,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(9,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(9,2)
D-34	U-234 , milk/livestock intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(9,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(10,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(10,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(10,3)
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-	a-231 , fish	1.000E+01	1.000E+01	BIOFAC(2,1)
D-	a-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	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(5,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(5,2)
D-5				
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(6,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(6,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(7,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(7,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(8,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(8,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(9,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(9,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(10,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(10,2)

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)	3.180E+04	1.000E+04	---	AREA

R011	Thickness of contaminated zone (m)	4.570E+00	2.000E+00	---	THICKO
R011	Length parallel to aquifer flow (m)	1.330E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.000E+02	3.000E+01	---	BRDL
	Time since placement of material (yr)	3.000E+01	0.000E+00	---	TI
	Times for calculations (yr)	3.100E+01	1.000E+00	---	T(2)
R011	Times for calculations (yr)	4.100E+01	3.000E+00	---	T(3)
R011	Times for calculations (yr)	5.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	1.000E+02	3.000E+01	---	T(5)
R011	Times for calculations (yr)	5.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+03	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.500E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	2.000E+03	3.000E+03	---	T(9)
R011	Times for calculations (yr)	5.000E+03	1.000E+04	---	T(10)
R012	Initial principal radionuclide (pCi/g): Pa-231	4.900E+00	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Pb-210	2.100E+01	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Ra-226	1.550E+01	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): Ra-228	1.650E+01	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): Th-228	1.650E+01	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): Th-230	2.100E+01	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): Th-232	1.650E+01	0.000E+00	---	S1(8)
R012	Initial principal radionuclide (pCi/g): U-234	2.100E+01	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g): U-238	2.100E+01	0.000E+00	---	S1(10)
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): Ra-228	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(8)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(9)
	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(10)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVERO
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)	2.610E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	0.000E+00	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	5.100E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	2.100E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	5.900E+05	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	3.000E+00	5.300E+00	---	BCZ
R013	Humidity in air (g/cm**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	6.400E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	9.910E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.300E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	4.000E-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)	1.600E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.200E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
	Saturated zone hydraulic conductivity (m/yr)	1.130E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	3.000E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	7.750E+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)	3.050E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL

R014	Well pumping rate (m**3/yr)	8.574E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
	Unsat. zone 1, thickness (m)	3.050E+00	4.000E+00	---	H(1)
	Unsat. zone 1, soil density (g/cm**3)	1.600E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.675E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	1.040E+01	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	4.750E-01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Pa-231				
R016	Contaminated zone (cm**3/g)	1.276E+02	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	2.300E+01	5.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	2.300E+01	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.950E-04	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)	3.500E+02	1.000E+02	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	3.500E+02	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.488E-04	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)	1.721E+01	7.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	7.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	5.000E+01	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.443E-03	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
	Distribution coefficients for Ra-228				
	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	7.000E+01	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	5.000E+01	7.000E+01	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.553E-04	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)

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-228				
R016	Contaminated zone (cm**3/g)	1.000E+10	6.000E+04	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+01	6.000E+04	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	1.000E+01	6.000E+04	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.489E-12	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	1.000E+10	6.000E+04	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+01	6.000E+04	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	1.000E+01	6.000E+04	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.489E-12	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for Th-232				
	Contaminated zone (cm**3/g)	3.610E+07	6.000E+04	---	DCNUCC(8)
	Unsaturated zone 1 (cm**3/g)	1.000E+01	6.000E+04	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	1.000E+01	6.000E+04	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.894E-10	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for U-234				

R016	Contaminated zone (cm**3/g)	1.000E+10	5.000E+01	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	4.500E+01	5.000E+01	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	4.500E+01	5.000E+01	---	DCNUCS(9)
	Leach rate (/yr)	0.000E+00	0.000E+00	2.489E-12	ALEACH(9)
	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	1.740E+08	5.000E+01	---	DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	4.500E+01	5.000E+01	---	DCNUCU(10,1)
R016	Saturated zone (cm**3/g)	4.500E+01	5.000E+01	---	DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.430E-10	ALEACH(10)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(10)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.242E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.050E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.000E-01	2.500E-01	---	FOTD
R017	Shape factor, external gamma	1.000E+00	1.000E+00	---	FS1

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	Outer annular radius (m) = ∝(1/D)	not used	1.000E+00	---	FRACA(1)
R017	Outer annular radius (m) = ∝(10/D)	not used	1.000E+00	---	FRACA(2)
R017	Outer annular radius (m) = ∝(20/D)	not used	1.000E+00	---	FRACA(3)
R017	Outer annular radius (m) = ∝(50/D)	not used	.000E+00	---	FRACA(4)
R017	Outer annular radius (m) = ∝(100/D)	not used	.000E+00	---	FRACA(5)
R017	Outer annular radius (m) = ∝(200/D)	not used	1.000E+00	--	FRACA(6)
R017	Outer annular radius (m) = ∝(500/D)	not used	1.000E+00	--	FRACA(7)
R017	Outer annular radius (m) = ∝(1000/D)	not used	1.000E+00		FRACA(8)
R017	Outer annular radius (m) = ∝(5000/D)	not used	1.000E+00		FRACA(9)
R017	Outer annular radius (m) = ∝(1.E+04/D)	not used	1.000E+00	---	FRACA(10)
R017	Outer annular radius (m) = ∝(1.E+05/D)	not used	0.000E+00	---	FRACA(11)
R017	Outer annular radius (m) = ∝(1.E+06/D)	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.660E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.100E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	1.000E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.800E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	1.000E+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)	7.300E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	1.000E+00	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.100E+01	FMEAT
R018	Contamination fraction of milk	-1	-1	0.100E+01	FMILK

R019	Livestock fodder intake for meat (kg/day)	4.400E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	6.700E+01	5.500E+01	---	LFI6
	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
	Livestock water intake for milk (L/day)	6.000E+01	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	2.500E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	1.000E+00	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
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

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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
	Storage times of contaminated foodstuffs (days):				
	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.400E+01	.000E+00	---	STOR_T(2)
STOR	Milk	3.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	6.000E+00	2.000E+01	---	STOR_T(4)
STOR	Fish	1.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	9.000E+00	7.000E+0[illegible]	---	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[illegible]
STOR	Livestock fodder	9.000E+01	1.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	1.500E-01	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	2.400E+00	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	1.000E-01	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	3.000E-02	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	3.000E-07	3.000E-07	---	DIFFL
R021	in contaminated zone soil	6.300E-06	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMIX
R021	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	5.000E-01	5.000E-01	---	REXG
R021	Height of the building (room) (m)	2.500E+00	2.500E+00	---	HRM
R021	Building interior area factor	0.000E+00	0.000E+00	code computed (time dependent)	FAI
R021	Building depth below ground surface (m)	1.000E+00	1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	2.000E-02	2.500E-01	---	EMANA(1)
R	Emanating power of Rn-220 gas	2.000E-02	1.500E-01	---	EMANA(2)

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	active

Contaminated Zone Dimensions

Area:	31800.00 square meters
Thickness:	4.57 meters
Cover Depth:	0.00 meters

Initial Soil Concentrations, pCi/g

Pa-231	4.900E+00
Pb-210	2.100E+01
Ra-226	1.550E+01
Ra-228	1.650E+01
Th-228	1.650E+01
Th-230	2.100E+01
Th-232	1.650E+01
U-234	2.100E+01
U-238	2.100E+01

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 100 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

ears):	0.000E+00	3.100E+01	4.100E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	1.500E+03	2.000E+03	5.000E+03
SE(t):	8.125E+02	7.984E+02	7.933E+02	7.886E+02	7.631E+02	9.617E+02	1.023E+03	8.732E+02	7.953E+02	6.350E+02
M(t):	8.125E+00	7.984E+00	7.933E+00	7.886E+00	7.631E+00	9.617E+00	1.023E+01	8.732E+00	7.953E+00	6.350E+00

Maximum TDOSE(t): 1.095E+03 mrem/yr at t = 823.1 b 0.8 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 = 823.1 years
Water Independent Pathways (Inh lation 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
Pa-231	5.127E+00	0.0047	1.320E+01	0.0121	0.000E+00	0.0000	5.318E+01	0.0486	1.452E+01	0.0133	1.061E-01	0.0001	5.351E+00	0
Pb-210	2.062E-13	0.0000	1.148E-12	0.0000	0.000E+00	0.0000	7.843E-10	0.0000	4.522E-11	0.0000	3.103E-11	0.0000	4.531E-11	0
Ra-226	2.229E+01	0.0204	4.108E-02	0.0000	3.306E+01	0.0302	3.358E+01	0.0307	1.753E+00	0.0016	1.978E+00	0.0018	1.381E+00	0
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
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
Th-230	2.559E+01	0.0234	2.800E+00	0.0026	3.794E+01	0.0347	3.771E+01	0.0345	1.949E+00	0.0018	2.202E+00	0.0020	2.045E+00	0
Th-232	1.538E+02	0.1405	1.304E+01	0.0119	2.262E+00	0.0021	7.555E+01	0.0690	3.212E+00	0.0029	6.165E+00	0.0056	4.000E+00	0
U-234	1.276E-01	0.0001	1.146E+00	0.0010	1.755E-01	0.0002	1.381E+00	0.0013	8.585E-02	0.0001	2.288E-01	0.0002	2.891E-01	0
U-238	1.145E+00	0.0010	1.044E+00	0.0010	1.520E-04	0.0000	1.168E+00	0.0011	7.438E-02	0.0001	2.114E-01	0.0002	2.689E-01	0
Total	2.081E+02	0.1901	3.127E+01	0.0286	7.344E+01	0.0671	2.026E+02	0.1851	2.159E+01	0.0197	1.089E+01	0.0099	1.334E+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 = 823.1 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
Pa-231	2.019E+02	0.1844	1.989E+00	0.0018	0.000E+00	0.0000	1.202E+01	0.0110	5.261E+00	0.0048	7.774E-02	0.0001	3.127E+02	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	9.072E-10	0

Ra-226	2.133E+02	0.1948	2.641E+01	0.0241	1.925E+01	0.0176	1.277E+01	0.0117	2.557E+00	0.0023	3.975E+00	0.0036	3.723E+02	0
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
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
	2.609E+01	0.0238	3.137E+00	0.0029	2.439E+00	0.0022	1.562E+00	0.0014	3.143E-01	0.0003	4.961E-01	0.0005	1.443E+02	0
	3.661E-04	0.0000	2.676E-05	0.0000	8.295E-08	0.0000	2.464E-05	0.0000	1.063E-06	0.0000	7.800E-07	0.0000	2.580E+02	0
U-234	3.217E-02	0.0000	3.767E-03	0.0000	3.095E-03	0.0000	1.927E-03	0.0000	3.890E-04	0.0000	6.220E-04	0.0000	3.476E+00	0
U-238	1.548E-05	0.0000	1.090E-06	0.0000	8.994E-07	0.0000	9.246E-07	0.0000	1.391E-07	0.0000	2.833E-07	0.0000	3.911E+00	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	4.413E+02	0.4031	3.154E+01	0.0288	2.169E+01	0.0198	2.635E+01	0.0241	8.133E+00	0.0074	4.549E+00	0.0042	1.095E+03	1

0*Sum of all water independent and dependent pathways.

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Summary : Site X, West Pile, No cover File: SITEX-1.DAT

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
0
Water Independent Pathways (Inhalation excludes radon)

0 Radio- Nuclide	Ground mrem/yr	fract.	Inhalation mrem/yr	fract.	Radon mrem/yr	fract.	Plant mrem/yr	fract.	Meat mrem/yr	fract.	Milk mrem/yr	fract.	Soil mrem/yr	f
Pa-231	4.625E-01	0.0006	2.631E+00	0.0032	0.000E+00	0.0000	4.773E+01	0.0587	1.725E+01	0.0212	3.158E-02	0.0000	2.754E+00	0
Pb-210	3.272E-02	0.0000	1.822E-01	0.0002	0.000E+00	0.0000	1.245E+02	0.1532	7.175E+00	0.0088	4.924E+00	0.0061	7.190E+00	0
Ra-226	1.044E+02	0.1285	5.658E-02	0.0001	1.549E+02	0.1906	6.037E+01	0.0743	2.621E+00	0.0032	5.425E+00	0.0067	8.713E-01	0
Ra-228	5.846E+01	0.0719	3.067E-02	0.0000	0.000E+00	0.0000	6.978E+01	0.0859	2.969E+00	0.0037	6.139E+00	0.0076	1.012E+00	0
Th-228	9.576E+01	0.1179	2.117E+00	0.0026	2.269E+00	0.0028	1.087E+00	0.0013	4.529E-02	0.0001	3.473E-03	0.0000	6.324E-01	0
Th-230	1.502E-02	0.0000	2.776E+00	0.0034	0.000E+00	0.0000	9.915E-01	0.0012	4.127E-02	0.0001	3.166E-03	0.0000	5.687E-01	0
Th-232	6.337E-03	0.0000	1.090E+01	0.0134	0.000E+00	0.0000	4.116E+00	0.0051	1.713E-01	0.0002	1.314E-02	0.0000	2.361E+00	0
U-234	9.175E-03	0.0000	1.128E+00	0.0014	0.000E+00	0.0000	1.211E+00	0.0015	7.716E-02	0.0001	2.193E-01	0.0003	2.790E-01	0
U-238	1.145E+00	0.0014	1.041E+00	0.0013	0.000E+00	0.0000	1.165E+00	0.0014	7.419E-02	0.0001	2.109E-01	0.0003	2.683E-01	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	2.603E+02	0.3203	2.086E+01	0.0257	1.572E+02	0.1934	3.109E+02	0.3826	3.042E+01	0.0374	1.697E+01	0.0209	1.594E+01	0

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
0
Water Dependent Pathways

0 Radio- Nuclide	Water mrem/yr	fract.	Fish mrem/yr	fract.	Radon mrem/yr	fract.	Plant mrem/yr	fract.	Meat mrem/yr	fract.	Milk mrem/yr	fract.	All Pathw mrem/yr	f
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	7.086E+01	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	1.440E+02	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	3.286E+02	0
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	1.384E+02	0
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	1.019E+02	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	4.395E+00	0
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	1.757E+01	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	2.923E+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	3.903E+00	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.125E+02	1

0*Sum of all water independent and dependent pathways.

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Summary : Site X, West Pile, No cover File: SITEX-1.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.100E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground mrem/yr	fract.	Inhalation mrem/yr	fract.	Radon mrem/yr	fract.	Plant mrem/yr	fract.	Meat mrem/yr	fract.	Milk mrem/yr	fract.	Soil mrem/yr	f
Pa-231	4.057E+00	0.0051	1.090E+01	0.0137	0.000E+00	0.0000	5.745E+01	0.0720	1.718E+01	0.0215	9.184E-02	0.0001	5.048E+00	0
Pb-210	1.239E-02	0.0000	6.896E-02	0.0001	0.000E+00	0.0000	4.712E+01	0.0590	2.716E+00	0.0034	1.864E+00	0.0023	2.722E+00	0
Ra-226	9.852E+01	0.1234	1.279E-01	0.0002	1.461E+02	0.1830	1.117E+02	0.1399	5.633E+00	0.0071	7.290E+00	0.0091	3.985E+00	0
Ra-228	4.790E+00	0.0060	7.583E-02	0.0001	8.066E-02	0.0001	1.695E+00	0.0021	7.224E-02	0.0001	1.461E-01	0.0002	4.648E-02	0
Th-228	1.268E-03	0.0000	2.799E-05	0.0000	3.006E-05	0.0000	1.440E-05	0.0000	5.999E-07	0.0000	4.601E-08	0.0000	8.376E-06	0

Th-230	1.860E+00	0.0023	2.777E+00	0.0035	2.737E+00	0.0034	2.643E+00	0.0033	1.213E-01	0.0002	1.222E-01	0.0002	6.178E-01 0
Th-232	1.490E+02	0.1866	1.297E+01	0.0162	2.182E+00	0.0027	7.384E+01	0.0925	3.140E+00	0.0039	6.019E+00	0.0075	3.954E+00 0
U-234	9.438E-03	0.0000	1.128E+00	0.0014	3.857E-04	0.0000	1.212E+00	0.0015	7.717E-02	0.0001	2.193E-01	0.0003	2.791E-01 0
	1.145E+00	0.0014	1.041E+00	0.0013	1.133E-08	0.0000	1.165E+00	0.0015	7.420E-02	0.0001	2.109E-01	0.0003	2.683E-01 0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] e
Total	2.594E+02	0.3249	2.914E+01	0.0365	1.511E+02	0.1893	2.968E+02	0.3718	2.902E+01	0.0363	1.596E+01	0.0200	1.692E+01 0

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 = 3.100E+01 years

0
Water Dependent Pathways

0	Water		Fish		Radon		Plant		[illegible]		Milk		All Pathw
Radio-													
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr f
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	9.479E+01 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	5.450E+01 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	3.734E+02 0
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	6.906E+00 0
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	1.350E-03 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	1.088E+01 0
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	2.511E+02 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	2.925E+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	3.904E+00 0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] e
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.984E+02 1

0*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 = 4.100E+01 years

0
Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil
Radio-													
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr f
Pa-231	4.615E+00	0.0058	1.225E+01	0.0154	0.000E+00	0.0000	5.891E+01	0.0743	1.715E+01	0.0216	1.012E-01	0.0001	5.401E+00 0
Pb-210	9.057E-03	0.0000	5.041E-02	0.0001	0.000E+00	0.0000	3.444E+01	0.0434	1.986E+00	0.0025	1.363E+00	0.0017	1.990E+00 0
Ra-226	9.669E+01	0.1219	1.389E-01	0.0002	1.434E+02	0.1808	1.188E+02	0.1498	6.058E+00	0.0076	7.519E+00	0.0095	4.442E+00 0
Ra-228	1.433E+00	0.0018	2.269E-02	0.0000	2.414E-02	0.0000	5.[illegible]92E-01	0.0006	2.161E-02	0.0000	4.371E-02	0.0001	1.391E-02 0
Th-228	3.386E-05	0.0000	7.472E-07	0.0000	8.025E-07	0.0000	3.[illegible]45E-07	0.0000	1.602E-08	0.0000	1.228E-09	0.0000	2.236E-07 0
Th-230	2.433E+00	0.003[illegible]	2.777E+00	0.0035	3.587E+00	0.0045	3.[illegible]21E+00	0.0042	1.557E-01	0.0002	1.657E-01	0.0002	6.425E-01 0
Th-232	1.523E+02	0.1920	1.302E+01	0.0164	2.238E+00	0.0028	7.504E+01	0.0946	3.191E+00	0.0040	6.121E+00	0.0077	3.986E+00 0
U-234	9.631E-03	0.0000	1.129E+00	0.0014	6.704E-04	0.0000	1.212E+00	0.0015	7.718E-02	0.0001	2.193E-01	0.0003	2.792E-01 0
U-238	1.145E+00	0.0014	1.041E+00	0.0013	2.609E-08	0.0000	1.165E+00	0.0015	7.420E-02	0.0001	2.109E-01	0.0003	2.683E-01 0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] e
Total	2.587E+02	0.3261	3.043E+01	0.0384	1.493E+02	0.1882	2.934E+02	0.3699	2.872E+01	0.0362	1.574E+01	0.0198	1.702E+01 0

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 = 4.100E+01 years

0
Water Dependent Pathways

0	Water		Fish		Radon		Plant		Meat		Milk		All Pathw
Radio-													
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr f
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	9.843E+01 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	3.984E+01 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	3.771E+02 0
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	2.066E+00 0
Th[illegible]	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.604E-05 0
T[illegible]	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.308E+01 0
Th[illegible]	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.559E+02 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	2.926E+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	3.904E+00 0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] e
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.933E+02 1

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	Soil f
Pa-231	4.979E+00	0.0063	1.309E+01	0.0166	0.0[illegible]E+00	0.0000	5.983E+01	0.0759	1.712E+01	0.0217	1.072E-01	0.0001	5.630E+00	0
Pb-210	6.831E-03	0.0000	3.803E-02	0.0000	0.000E+00	0.0000	2.598E+01	0.0329	1.498E+00	0.0019	1.028E+00	0.0013	1.501E+00	0
Ra-226	9.508E+01	0.1206	1.456E-01	0.0002	1.410E+02	0.1788	1.230E+02	0.1560	6.311E+00	0.0080	7.636E+00	0.0097	4.723E+00	0
Ra-228	4.838E-01	0.0006	7.659E-03	0.0000	8.147E-03	0.0000	1.711E-01	0.0002	7.292E-03	0.0000	1.475E-02	0.0000	4.693E-03	0
Th-228	1.299E-06	0.0000	2.866E-08	0.0000	3.078E-08	0.0000	1.475E-08	0.0000	6.143E-10	0.0000	4.711E-11	0.0000	8.578E-09	0
Th-230	2.939E+00	0.0037	2.778E+00	0.0035	4.338E+00	0.0055	3.960E+00	0.0050	1.884E-01	0.0002	2.058E-01	0.0003	6.667E-01	0
Th-232	1.533E+02	0.1944	1.303E+01	0.0165	2.254E+00	0.0029	7.538E+01	0.0956	3.205E+00	0.0041	6.150E+00	0.0078	3.995E+00	0
U-234	9.848E-03	0.0000	1.129E+00	0.0014	9.915E-04	0.0000	1.212E+00	0.0015	7.720E-02	0.0001	2.193E-01	0.0003	2.792E-01	0
U-238	1.145E+00	0.0015	1.041E+00	0.0013	4.712E-08	0.0000	1.165E+00	0.0015	7.420E-02	0.0001	2.109E-01	0.0003	2.683E-01	0
Total	2.579E+02	0.3271	3.127[illegible]01	0.0396	1.476E+02	0.1872	2.90[illegible]E+02	0.3686	2.848E+01	0.0361	1.557E+01	0.0197	1.707E+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 = 5.000E+01 years
Water Dependent Pathways

Radio-Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathw mrem/yr	All Pathw f
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	1.008E+02	0
	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.005E+01	0
	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.779E+02	0
Ra-228	1.408E-10	0.0000	1.064E-11	0.0000	1.605E-13	0.0000	8.264E-12	0.0000	1.747E-13	0.0000	1.806E-14	0.0000	6.974E-01	0
Th-228	2.651E-16	0.0000	2.002E-17	0.0000	3.020E-19	0.0000	1.555E-17	0.0000	3.288E-19	0.0000	3.400E-20	0.0000	1.382E-06	0
Th-230	1.852E-08	0.0000	1.399E-09	0.0000	2.247E-12	0.0000	1.102E-09	0.0000	2.464E-11	0.0000	2.910E-12	0.0000	1.508E+01	0
Th-232	2.400E-05	0.0000	1.788E-06	0.0000	2.320E-09	0.0000	1.656E-06	0.0000	6.349E-08	0.0000	2.837E-08	0.0000	2.573E+02	0
U-234	1.629E-12	0.0000	1.859E-13	0.0000	9.780E-17	0.0000	9.695E-14	0.0000	5.980E-15	0.0000	3.577E-15	0.0000	2.927E+00	0
U-238	1.167E-13	0.0000	1.030E-14	0.0000	2.534E-15	0.0000	6.953E-15	0.0000	4.611E-16	0.0000	5.417E-16	0.0000	3.904E+00	0
Total	2.402E-05	0.0000	1.789E-06	0.0000	2.[illegible]72E-09	0.0000	1.657E-[illegible]	0.0000	6.352E-08	0.0000	2.837E-08	0.0000	7.886E+02	1

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

Radio-Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	Soil f
Pa-231	5.788E+00	0.0076	1.495E+01	0.0196	0.000E+00	0.0000	6.159E+01	0.0807	1.695E+01	0.0222	1.206E-01	0.0002	6.124E+00	0
Pb-210	1.426E-03	0.0000	7.938E-03	0.0000	0.000E+00	0.0000	5.424E+00	0.0071	3.127E-01	0.0004	2.146E-01	0.0003	3.133E-01	0
Ra-226	8.657E+01	0.1134	1.533E-01	0.0002	1.284E+02	0.1682	1.262E+02	0.1654	6.565E+00	0.0086	7.516E+00	0.0098	5.120E+00	0
Ra-228	1.158E-03	0.0000	1.834E-05	0.0000	1.951E-05	0.0000	4.096E-04	0.0000	1.746E-05	0.0000	3.532E-05	0.0000	1.124E-05	0
Th-228	1.762E-14	0.0000	3.887E-16	0.0000	4.175E-16	0.0000	2.000E-16	0.0000	8.332E-18	0.0000	6.391E-19	0.0000	1.164E-16	0
Th-230	5.601E+00	0.0073	2.781E+00	0.0036	8.285E+00	0.0109	7.670E+00	0.0101	3.805E-01	0.0005	4.301E-01	0.0006	8.141E-01	0
Th-232	1.538E+02	0.2015	1.304E+01	0.0171	2.262E+00	0.0030	7.555E+01	0.0990	3.212E+00	0.0042	6.165E+00	0.0081	4.000E+00	0
U-234	1.178E-02	0.0000	1.130E+00	0.0015	3.846E-03	0.0000	1.215E+00	0.0016	7.731E-02	0.0001	2.194E-01	0.0003	2.795E-01	0
U-238	1.145E+00	0.0015	1.041E+00	0.0014	3.683E-07	0.0000	1.165E+00	0.0015	7.421E-02	0.0001	2.109E-01	0.0003	2.684E-01	0
Total	2.529E+02	0.3314	3.311E+01	0.0434	1.389E+02	0.1821	2.788E+02	0.3653	2.757E+01	0.0361	1.488E+01	0.0195	1.692E+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 = 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
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	1.055E+02	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	6.274E+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	3.605E+02	0
Ra-228	2.588E-11	0.0000	1.955E-12	0.0000	2.949E-14	0.0000	1.519E-12	0.0000	3.210E-14	0.0000	3.319E-15	0.0000	1.670E-03	0
Th-228	3.117E-23	0.0000	2.354E-24	0.0000	3.551E-26	0.0000	1.829E-24	0.0000	3.865E-26	0.0000	3.997E-27	0.0000	1.875E-14	0
Th-230	1.616E-07	0.0000	1.221E-08	0.0000	1.672E-10	0.0000	9.616E-09	0.0000	2.276E-10	0.0000	5.151E-11	0.0000	2.596E+01	0
Th-232	2.423E-04	0.0000	1.777E-05	0.0000	4.951E-08	0.0000	1.638E-05	0.0000	6.928E-07	0.0000	4.769E-07	0.0000	2.580E+02	0
U-234	9.515E-11	0.0000	7.731E-12	0.0000	6.332E-14	0.0000	5.662E-12	0.0000	1.641E-13	0.0000	5.304E-14	0.0000	2.936E+00	0
U-238	8.891E-13	0.0000	7.553E-14	0.0000	1.917E-14	0.0000	5.297E-14	0.0000	3.325E-15	0.0000	3.950E-15	0.0000	3.904E+00	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	e
Total	2.425E-04	0.0000	1.778E-05	0.0000	4.968E-08	0.0000	1.639E-05	0.0000	6.930E-07	0.0000	4.770E-07	0.0000	7.631E+02	1

0*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 = 5.000E+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
Pa-231	5.497E+00	0.0057	1.415E+01	0.0147	0.000E+00	0.0000	5.702E+01	0.0593	1.557E+01	0.0162	1.138E-01	0.0001	5.738E+00	0
Pb-210	5.144E-09	0.0000	2.863E-08	0.0000	0.000E+00	0.0000	1.956E-05	0.0000	1.128E-06	0.0000	7.739E-07	0.0000	1.130E-06	0
Ra-226	4.087E+01	0.0425	7.533E-02	0.0001	6.062E+01	0.0630	6.157E+01	0.0640	3.215E+00	0.0033	3.627E+00	0.0038	2.533E+00	0
Ra-228	1.251E-24	0.0000	1.980E-26	0.0000	2.107E-26	0.0000	4.429E-25	0.0000	1.937E-26	0.0000	3.930E-26	0.0000	1.213E-26	0
[illegible]	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
[illegible]	1.985E+01	0.0206	2.797E+00	0.0029	2.941E+01	0.0306	2.906E+01	0.0302	1.497E+00	0.0016	1.692E+00	0.0018	1.691E+00	0
Th-232	1.538E+02	0.1599	1.304E+01	0.0136	2.262E+00	0.0024	7.555E+01	0.0786	3.212E+00	0.0033	6.165E+00	0.0064	4.000E+00	0
U-234	6.076E-02	0.0001	1.139E+00	0.0012	7.643E-02	0.0001	1.284E+00	0.0013	8.085E-02	0.0001	2.233E-01	0.0002	2.839E-01	0
U-238	1.145E+00	0.0012	1.042E+00	0.0011	3.869E-05	0.0000	1.166E+00	0.0012	7.430E-02	0.0001	2.112E-01	0.0002	2.687E-01	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	e
Total	2.212E+02	0.2300	3.225E+01	0.0335	9.238E+01	0.0961	2.257E+02	0.2346	2.365E+01	0.0246	1.203E+01	0.0125	1.451E+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 = 5.000E+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
Pa-231	2.157E+02	0.2243	2.126E+00	0.0022	0.000E+00	0.0000	1.284E+01	0.0134	5.621E+00	0.0058	8.308E-02	0.0001	3.345E+02	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	2.263E-05	0
Ra-226	7.714E+01	0.0802	8.803E+00	0.0092	7.622E+00	0.0079	4.620E+00	0.0048	9.359E-01	0.0010	1.515E+00	0.0016	2.732E+02	0
Ra-228	6.069E-25	0.0000	4.116E-26	0.0000	5.493E-28	0.0000	3.577E-26	0.0000	2.254E-27	0.0000	3.497E-27	0.0000	2.496E-24	0
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
Th-230	2.317E+00	0.0024	2.437E-01	0.0003	2.471E-01	0.0003	1.388E-01	0.0001	2.841E-02	0.0000	4.760E-02	0.0000	8.902E+01	0
Th-232	3.635E-04	0.0000	2.658E-05	0.0000	8.068E-08	0.0000	2.449E-05	0.0000	1.052E-06	0.0000	7.622E-07	0.0000	2.580E+02	0
U-234	7.532E-04	0.0000	7.416E-05	0.0000	8.477E-05	0.0000	4.514E-05	0.0000	9.308E-06	0.0000	1.599E-05	0.0000	3.149E+00	0
U-238	2.813E-06	0.0000	2.622E-08	0.0000	6.797E-09	0.0000	1.675E-07	0.0000	1.309E-08	0.0000	4.650E-08	0.0000	3.908E+00	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	e
Total	2.952E+02	0.3069	1.117E+01	0.0116	7.870E+00	0.0082	1.760E+01	0.0183	6.585E+00	0.0068	1.645E+00	0.0017	9.617E+02	1

*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	f
Pa-231	4.934E+00	0.0048	1.270E+01	0.0124	0.000E+00	0.0000	5.118E+01	0.0500	1.397E+01	0.0137	1.022E-01	0.0001	5.151E+00	0
[illegible]	8.086E-16	0.0000	4.501E-15	0.0000	0.000E+00	0.0000	3.075E-12	0.0000	1.773E-13	0.0000	1.217E-13	0.0000	1.777E-13	0
[illegible]	1.600E+01	0.0156	2.948E-02	0.0000	2.373E+01	0.0232	2.410E+01	0.0235	1.258E+00	0.0012	1.419E+00	0.0014	9.913E-01	0
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
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
Th-230	2.752E+01	0.0269	2.799E+00	0.0027	4.080E+01	0.0399	4.062E+01	0.0397	2.100E+00	0.0021	2.373E+00	0.0023	2.164E+00	0
Th-232	1.538E+02	0.1503	1.304E+01	0.0127	2.262E+00	0.0022	7.555E+01	0.0738	3.212E+00	0.0031	6.165E+00	0.0060	4.000E+00	0
U-234	1.699E-01	0.0002	1.150E+00	0.0011	2.382E-01	0.0002	1.443E+00	0.0014	8.904E-02	0.0001	2.323E-01	0.0002	2.924E-01	0
U-238	1.145E+00	0.0011	1.044E+00	0.0010	2.553E-04	0.0000	1.168E+00	0.0011	7.442E-02	0.0001	2.115E-01	0.0002	2.691E-01	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	2.035E+02	0.1989	3.077E+01	0.0301	6.702E+01	0.0655	1.941E+02	0.1896	2.071E+01	0.0202	1.050E+01	0.0103	1.287E+01	0

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

0

0 Water Dependent Pathways

Radio-Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathw mrem/yr	f
Pa-231	1.946E+02	0.1901	1.917E+00	0.0019	0.000E+00	0.0000	1.158E+01	0.0113	5.074E+00	0.0050	7.491E-02	0.0001	3.013E+02	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	3.557E-12	0
Ra-226	1.654E+02	0.1616	2.123E+01	0.0207	1.427E+01	0.0139	9.898E+00	0.0097	1.972E+00	0.0019	3.007E+00	0.0029	2.833E+02	0
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
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
Th-230	4.204E+01	0.0411	5.172E+00	0.0051	3.826E+00	0.0037	2.517E+00	0.0025	5.047E-01	0.0005	7.874E-01	0.0008	1.732E+02	0
Th-232	3.679E-04	0.0000	2.688E-05	0.0000	8.449E-08	0.0000	2.475E-05	0.0000	1.070E-06	0.0000	7.921E-07	0.0000	2.580E+02	0
U-234	7.937E-02	0.0001	9.519E-03	0.0000	7.437E-03	0.0000	4.752E-03	0.0000	9.563E-04	0.0000	1.511E-03	0.0000	3.718E+00	0
U-238	3.881E-05	0.0000	3.861E-06	0.0000	3.108E-06	0.0000	2.321E-06	0.0000	4.206E-07	0.0000	7.302E-07	0.0000	3.912E+00	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
T	4.021E+02	0.3929	2.833E+01	0.0277	1.811E+01	0.0177	2.400E+01	0.0235	7.552E+00	0.0074	3.871E+00	0.0038	1.023E+03	1

0 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 = 1.500E+03 years

0

0 Water Independent Pathways (Inhalation excludes Radon)

Radio-Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	f
Pa-231	4.429E+00	0.0051	1.140E+01	0.0131	0.000E+00	0.0000	4.594E+01	0.0526	1.254E+01	0.0144	9.169E-02	0.0001	4.623E+00	0
Pb-210	1.271E-22	0.0000	7.075E-22	0.0000	0.000E+00	0.0000	4.834E-19	0.0000	2.787E-20	0.0000	1.912E-20	0.0000	2.792E-20	0
Ra-226	6.261E+00	0.0072	1.154E-01	0.0000	9.287E+00	0.0106	9.432E+00	0.0108	4.924E-01	0.0006	5.556E-01	0.0006	3.880E-01	0
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
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
Th-230	3.044E+01	0.0349	2.792E+00	0.0032	4.512E+01	0.0517	4.501E+01	0.0516	2.330E+00	0.0027	2.632E+00	0.0030	2.343E+00	0
Th-232	1.538E+02	0.1761	1.304E+01	0.0149	2.262E+00	0.0026	7.555E+01	0.0865	3.212E+00	0.0037	6.165E+00	0.0071	4.000E+00	0
U-234	3.011E-01	0.0003	1.161E+00	0.0013	4.327E-01	0.0005	1.635E+00	0.0019	9.896E-02	0.0001	2.434E-01	0.0003	3.021E-01	0
U-238	1.145E+00	0.0013	1.046E+00	0.0012	7.277E-04	0.0000	1.170E+00	0.0013	7.456E-02	0.0001	2.118E-01	0.0002	2.695E-01	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	1.963E+02	0.2249	2.945E+01	0.0337	5.710E+01	0.0654	1.787E+02	0.2047	1.875E+01	0.0215	9.899E+00	0.0113	1.193E+01	0

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 = 1.500E+03 years

0

0 Water Dependent Pathways

Radio-Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathw mrem/yr	f
Pa-231	1.762E+02	0.2018	1.737E+00	0.0020	0.000E+00	0.0000	1.049E+01	0.0120	4.581E+00	0.0052	6.792E-02	0.0001	2.721E+02	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	5.591E-19	0
Ra-226	6.970E+01	0.0798	8.815E+00	0.0101	6.131E+00	0.0070	4.172E+00	0.0048	8.331E-01	0.0010	1.281E+00	0.0015	1.174E+02	0
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

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	0.000E+00	0
Th-230	6.635E+01	0.0760	8.212E+00	0.0094	5.993E+00	0.0069	3.972E+00	0.0045	7.957E-01	0.0009	1.237E+00	0.0014	2.172E+02	0		
Th-232	3.737E-04	0.0000	2.726E-05	0.0000	8.944E-08	0.0000	2.509E-05	0.0000	1.094E-06	0.0000	8.310E-07	0.0000	2.580E+02	0		
U-234	2.928E-01	0.0003	3.578E-02	0.0000	2.686E-02	0.0000	1.753E-02	0.0000	3.519E-03	0.0000	5.509E-03	0.0000	4.556E+00	0		
U-238	2.551E-04	0.0000	3.008E-05	0.0000	2.313E-05	0.0000	1.527E-05	0.0000	3.022E-06	0.0000	4.820E-06	0.0000	3.918E+00	0		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	3.126E+02	0.3580	1.880E+01	0.0215	1.215E+01	0.0139	1.865E+01	0.0214	6.213E+00	0.0071	2.591E+00	0.0030	8.732E+02	1		

0*Sum of all water independent and dependent pathways.

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Summary : Site X, West Pile, No cover File: SITEX-1.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 2.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0 Radio-Nuclide	Ground mrem/yr	fract.	Inhalation mrem/yr	fract.	Radon mrem/yr	fract.	Plant mrem/yr	fract.	Meat mrem/yr	fract.	Milk mrem/yr	fract.	Soil mrem/yr	f
Pa-231	3.975E+00	0.0050	1.023E+01	0.0129	0.000E+00	0.0000	4.123E+01	0.0518	1.126E+01	0.0142	8.230E-02	0.0001	4.149E+00	0
Pb-210	0.000E+00	0.0000	1.112E-28	0.0000	0.000E+00	0.0000	7.598E-26	0.0000	4.380E-27	0.0000	3.006E-27	0.0000	4.390E-27	0
Ra-226	2.451E+00	0.0031	4.516E-03	0.0000	3.635E+00	0.0046	3.692E+00	0.0046	1.927E-01	0.0002	2.174E-01	0.0003	1.519E-01	0
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
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
Th-230	3.149E+01	0.0396	2.782E+00	0.0035	4.668E+01	0.0587	4.660E+01	0.0586	2.413E+00	0.0030	2.725E+00	0.0034	2.406E+00	0
Th-232	1.538E+02	0.1933	1.304E+01	0.0164	2.262E+00	0.0028	7.555E+01	0.0950	3.212E+00	0.0040	6.165E+00	0.0078	4.000E+00	0
U-234	4.403E-01	0.0006	1.171E+00	0.0015	6.391E-01	0.0008	1.839E+00	0.0023	1.095E-01	0.0001	2.551E-01	0.0003	3.124E-01	0
U-238	1.146E+00	0.0014	1.047E+00	0.0013	1.485E-03	0.0000	1.173E+00	0.0015	7.470E-02	0.0001	2.122E-01	0.0003	2.699E-01	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	1.933E+02	0.2430	2.828E+01	0.0356	5.322E+01	0.0669	1.701E+02	0.2139	1.726E+01	0.0217	9.657E+00	0.0121	1.129E+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 = 2.000E+03 years

) Water Dependent Pathways

) Radio-Nuclide	Water mrem/yr	fract.	Fish mrem/yr	fract.	Radon mrem/yr	fract.	Plant mrem/yr	fract.	Meat mrem/yr	fract.	Milk mrem/yr	fract.	All Pathw mrem/yr	f
Pa-231	1.602E+02	0.2015	1.581E+00	0.0020	0.000E+00	0.0000	9.538E+00	0.0120	4.136E+00	0.0052	6.194E-02	0.0001	2.465E+02	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	8.787E-26	0
Ra-226	2.961E+01	0.0372	3.712E+00	0.0047	2.633E+00	0.0033	1.772E+00	0.0022	3.544E-01	0.0004	5.474E-01	0.0007	4.898E+01	0
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
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
Th-230	7.464E+01	0.0938	9.186E+00	0.0116	6.788E+00	0.0085	4.468E+00	0.0056	8.959E-01	0.0011	1.397E+00	0.0018	2.325E+02	0
Th-232	3.666E-04	0.0000	2.679E-05	0.0000	8.341E-08	0.0000	2.468E-05	0.0000	1.065E-06	0.0000	7.836E-07	0.0000	2.580E+02	0
U-234	5.555E-01	0.0007	6.774E-02	0.0001	5.107E-02	0.0001	3.326E-02	0.0000	6.677E-03	0.0000	1.046E-02	0.0000	5.492E+00	0
U-238	7.569E-04	0.0000	9.079E-05	0.0000	6.967E-05	0.0000	4.531E-05	0.0000	9.060E-06	0.0000	1.432E-05	0.0000	3.925E+00	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	2.650E+02	0.3332	1.455E+01	0.0183	9.472E+00	0.0119	1.581E+01	0.0199	5.393E+00	0.0068	2.017E+00	0.0025	7.953E+02	1

)*Sum of all water independent and dependent pathways.

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Summary : Site X, West Pile, No cover File: SITEX-1.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 5.000E+03 years

) Water Independent Pathways (Inhalation excludes radon)

) Radio-Nuclide	Ground mrem/yr	fract.	Inhalation mrem/yr	fract.	Radon mrem/yr	fract.	Plant mrem/yr	fract.	Meat mrem/yr	fract.	Milk mrem/yr	fract.	Soil mrem/yr	f
P	2.079E+00	0.0033	5.352E+00	0.0084	0.000E+00	0.0000	2.156E+01	0.0340	5.886E+00	0.0093	4.304E-02	0.0001	2.170E+00	0
F	0.000E+00	0.0000	0.000E+00	0.0000	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	8.810E-03	0.0000	1.624E-05	0.0000	1.307E-02	0.0000	1.327E-02	0.0000	6.929E-04	0.0000	7.817E-04	0.0000	5.459E-04	0
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
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
Th-230	3.140E+01	0.0494	2.709E+00	0.0043	4.654E+01	0.0733	4.649E+01	0.0732	2.407E+00	0.0038	2.719E+00	0.0043	2.388E+00	0
Th-232	1.538E+02	0.2422	1.304E+01	0.0205	2.262E+00	0.0036	7.555E+01	0.1190	3.212E+00	0.0051	6.165E+00	0.0097	4.000E+00	0

U-234	1.289E+00	0.0020	1.235E+00	0.0019	1.897E+00	0.0030	3.086E+00	0.0049	1.739E-01	0.0003	3.267E-01	0.0005	3.746E-01	0
U-238	1.153E+00	0.0018	1.058E+00	0.0017	1.226E-02	0.0000	1.194E+00	0.0019	7.591E-02	0.0001	2.146E-01	0.0003	2.729E-01	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1.897E+02	0.2987	2.340E+01	0.0368	5.073E+01	0.0799	1.479E+02	0.2329	1.176E+01	0.0185	9.469E+00	0.0149	9.206E+00	0

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 = 5.000E+03 years

0
Water Dependent Pathways

0	Water		Fish		Radon		Plant		Meat		Milk		All Pathw
Radio-													
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
Pa-231	8.619E+01	0.1357	8.498E-01	0.0013	0.000E+00	0.0000	5.131E+00	0.0081	2.239E+00	0.0035	3.324E-02	0.0001	1.315E+02	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	2.037E-01	0.0003	2.734E-02	0.0000	1.653E-02	0.0000	1.219E-02	0.0000	2.412E-03	0.0000	3.582E-03	0.0000	3.029E-01	0
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
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
Th-230	7.302E+01	0.1150	9.432E+00	0.0149	6.250E+00	0.0098	4.370E+00	0.0069	8.700E-01	0.0014	1.322E+00	0.0021	2.299E+02	0
Th-232	3.558E-04	0.0000	2.603E-05	0.0000	7.852E-08	0.0000	2.398E-05	0.0000	1.029E-06	0.0000	7.427E-07	0.0000	2.580E+02	0
U-234	2.179E+00	0.0034	2.797E-01	0.0004	1.881E-01	0.0003	1.304E-01	0.0002	2.599E-02	0.0000	3.962E-02	0.0001	1.122E+01	0
U-238	1.046E-02	0.0000	1.334E-03	0.0000	9.096E-04	0.0000	6.263E-04	0.0000	1.249E-04	0.0000	1.911E-04	0.0000	3.994E+00	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	1.61[illegible]E+02	0.2545	1.059E+01	0.0167	6.455E+00	0.0102	9.645E+00	0.0152	3.138E+00	0.0049	1.398E+00	0.0022	6.350E+02	1

0*Sum of all water independent and dependent pathways.

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

0Parent	Product	Branch	DSR(j,t) (mrem/yr)/(pCi/g)									
	(j)	Fraction	t= 0.000E+00	3.100E+01	4.100E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	1.500E+03	2.000E+03	5.000E+0
Pa	Pa-231	1.000E+00	1.446E+01	1.437E+01	1.434E+01	1.431E+01	1.416E+01	3.250E+01	2.928E+01	2.637E+01	2.375E+01	1.269E+0
Pa-231	Ac-227	1.000E+00	0.000E+00	4.975E+00	5.749E+00	6.253E+00	7.378E+00	3.576E+01	3.221E+01	2.916E+01	2.655E+01	1.416E+0
Pa-231	ΣDSR(j)		1.446E+01	1.934E+01	2.009E+01	2.056E+01	2.154E+01	6.826E+01	6.149E+01	5.553E+01	5.030E+01	2.684E+0
0Pb-210	Pb-210	1.000E+00	6.855E+00	2.595E+00	1.897E+00	1.431E+00	2.987E-01	1.078E-06	1.694E-13	2.663E-20	4.185E-27	0.000E+0
0Ra-226	Ra-226	1.000E+00	2.120E+01	2.001E+01	1.963E+01	1.930E+01	1.758E+01	1.217E+01	1.049E+01	4.382E+00	1.834E+00	1.018E-0
Ra-226	Pb-210	1.000E+00	0.000E+00	4.086E+00	4.696E+00	5.076E+00	5.681E+00	5.456E+00	7.786E+00	3.189E+00	1.326E+00	9.368E-0
Ra-226	ΣDSR(j)		2.120E+01	2.409E+01	2.433E+01	2.438E+01	2.326E+01	1.762E+01	1.828E+01	7.572E+00	3.160E+00	1.955E-0
0Ra-228	Ra-228	1.000E+00	8.387E+00	1.990E-01	5.953E-02	2.009E-02	4.810E-05	6.070E-26	0.000E+00	0.000E+00	0.000E+00	0.000E+0
Ra-228	Th-228	1.000E+00	0.000E+00	2.195E-01	6.570E-02	2.217E-02	5.309E-05	9.055E-26	0.000E+00	0.000E+00	0.000E+00	0.000E+0
Ra-228	ΣDSR(j)		8.387E+00	4.186E-01	1.252E-01	4.227E-02	1.012E-04	1.513E-25	0.000E+00	0.000E+00	0.000E+00	0.000E+0
0Th-228	Th-228	1.000E+00	6.176E+00	8.181E-05	2.184E-06	8.378E-08	1.136E-15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+0
0Th-230	Th-230	1.000E+00	2.093E-01	2.092E-01	2.092E-01	2.092E-01	2.091E-01	2.084E-01	2.074E-01	2.065E-01	2.056E-01	2.001E-0
Th-230	Ra-226	1.000E+00	0.000E+00	2.766E-01	3.624E-01	4.383E-01	8.371E-01	3.065E+00	5.555E+00	6.803E+00	7.259E+00	7.044E+0
Th-230	Pb-210	1.000E+00	0.000E+00	3.222E-02	5.132E-02	7.041E-02	1.900E-01	9.658E-01	2.486E+00	3.334E+00	3.606E+00	3.705E+0
Th-230	ΣDSR(j)		2.093E-01	5.181E-01	6.230E-01	7.179E-01	1.236E+00	4.239E+00	8.249E+00	1.034E+01	1.107E+01	1.095E+0
0Th-232	Th-232	1.000E+00	1.065E+00	1.112E+00	1.113E+00	1.113E+00	1.113E+00	1.113E+00	1.113E+00	1.113E+00	1.113E+00	1.113E+0
Th-232	Ra-228	1.000E+00	0.000E+00	8.167E+00	8.306E+00	8.345E+00	8.365E+00	8.365E+00	8.365E+00	8.365E+00	8.365E+00	8.365E+0
Th-232	Th-228	1.000E+00	0.000E+00	5.939E+00	6.093E+00	6.136E+00	6.158E+00	6.158E+00	6.158E+00	6.158E+00	6.158E+00	6.158E+0
Th-232	ΣDSR(j)		1.065E+00	1.522E+01	1.551E+01	1.559E+01	1.564E+01	1.564E+01	1.564E+01	1.564E+01	1.564E+01	1.564E+0
0U-234	U-234	1.000E+00	1.392E-01	1.392E-01	1.392E-01	1.392E-01	1.392E-01	1.390E-01	1.388E-01	1.386E-01	1.384E-01	1.373E-0
U-234	Th-230	1.000E+00	0.000E+00	5.840E-05	7.723E-05	9.418E-05	1.883E-04	9.393E-04	1.873E-03	2.801E-03	3.724E-03	9.147E-0
U-234	Ra-226	1.000E+00	0.000E+00	3.897E-05	6.774E-05	1.002E-04	3.886E-04	7.755E-03	2.686E-02	5.378E-02	8.371E-02	2.621E-0
U-234	Pb-210	1.000E+00	0.000E+00	3.241E-06	6.982E-06	1.190E-05	7.005E-05	2.230E-03	9.492E-03	2.174E-02	3.567E-02	1.260E-0
U-234	ΣDSR(j)		1.392E-01	1.393E-01	1.393E-01	1.394E-01	1.398E-01	1.499E-01	1.770E-01	2.169E-01	2.615E-01	5.345E-0
0U-238	U-238	1.000E+00	1.859E-01	1.859E-01	1.859E-01	1.859E-01	1.859E-01	1.859E-01	1.859E-01	1.859E-01	1.859E-01	1.859E-0
U-238	U-234	1.000E+00	0.000E+00	1.221E-05	1.615E-05	1.969E-05	3.938E-05	1.968E-04	3.933E-04	5.895E-04	7.855E-04	1.955E-0
U-238	Th-230	1.000E+00	0.000E+00	2.561E-09	4.480E-09	6.662E-09	2.664E-08	6.650E-07	2.655E-06	5.962E-06	1.058E-05	6.534E-0
U	Ra-226	1.000E+00	0.000E+00	1.145E-09	2.636E-09	4.761E-09	3.722E-08	3.912E-06	2.696E-05	8.219E-05	1.761E-04	1.580E-0
U	Pb-210	1.000E+00	0.000E+00	7.448E-11	2.150E-10	4.522E-10	5.611E-09	1.055E-06	8.463E-06	2.914E-05	6.682E-05	7.010E-0
U-238	ΣDSR(j)		1.859E-01	1.859E-01	1.859E-01	1.859E-01	1.859E-01	1.861E-01	1.863E-01	1.866E-01	1.869E-01	1.902E-0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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 = 100 mrem/yr

0Nuclide (i)	t= 0.000E+00	3.100E+01	4.100E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	1.500E+03	2.000E+03	5.000E+
Pa-231	6.915E+00	5.170E+00	4.978E+00	4.863E+00	4.643E+00	1.465E+00	1.626E+00	1.801E+00	1.988E+00	3.725E+
Pb-210	1.459E+01	3.853E+01	5.271E+01	6.988E+01	3.347E+02	9.280E+07	*7.631E+13	*7.631E+13	*7.631E+13	*7.631E+
Ra-226	4.717E+00	4.151E+00	4.110E+00	4.102E+00	4.300E+00	5.674E+00	5.471E+00	1.321E+01	3.165E+01	5.116E+
Ra-228	1.192E+01	2.389E+02	7.985E+02	2.366E+03	9.882E+05	*2.721E+14	*2.721E+14	*2.721E+14	*2.721E+14	*2.721E+
Th-228	1.619E+01	1.222E+06	4.578E+07	1.194E+09	*8.192E+14	*8.192E+14	*8.192E+14	*8.192E+14	*8.192E+14	*8.192E+
Th-230	4.778E+02	1.930E+02	1.605E+02	1.393E+02	8.089E+01	2.359E+01	1.212E+01	9.668E+00	9.033E+00	9.134E+
Th-232	9.390E+01	6.571E+00	6.447E+00	6.413E+00	6.395E+00	6.395E+00	6.395E+00	6.395E+00	6.395E+00	6.395E+
U-234	7.183E+02	7.179E+02	7.176E+02	7.174E+02	7.152E+02	6.669E+02	5.648E+02	4.609E+02	3.824E+02	1.871E+
U-238	5.380E+02	5.380E+02	5.379E+02	5.379E+02	5.379E+02	5.374E+02	5.367E+02	5.360E+02	5.350E+02	5.258E+

*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 = 823.1 þ 0.8 years

0Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Pa-231	4.900E+00	335.9 þ 0.3	7.055E+01	1.418E+00	6.382E+01	1.567E+00
Pb-210	2.100E+01	0.000E+00	6.855E+00	1.459E+01	4.320E-11	2.315E+12
Ra-226	1.550E+01	49.13 þ 0.05	2.438E+01	4.101E+00	2.402E+01	4.163E+00
Ra-228	1.650E+01	0.000E+00	8.387E+00	1.192E+01	0.000E+00	*2.721E+14
T[illegible]	1.650E+01	0.000E+00	6.176E+00	1.619E+01	0.000E+00	*8.192E+14
	2.100E+01	2780 þ 3	1.166E+01	8.576E+00	6.871E+00	1.455E+01
T[illegible]	1.650E+01	169.0 þ 0.2	1.564E+01	6.395E+00	1.564E+01	6.395E+00
U-234	2.100E+01	5.000E+03	5.345E-01	1.871E+02	1.655E-01	6.042E+02
U-238	2.100E+01	5.000E+03	1.902E-01	5.258E+02	1.862E-01	5.370E+02

*At specific activity limit

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

0Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	3.100E+01	4.100E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	1.500E+03	2.000E+03	5.000E+0
Pa-231	Pa-231	1.000E+00	7.086E+01	7.041E+01	7.026E+01	7.012E+01	6.937E+01	1.593E+02	1.434E+02	1.292E+02	1.164E+02	6.216E+0
0Ac-227	Pa-231	1.000E+00	0.000E+00	2.438E+01	2.817E+01	3.064E+01	3.615E+01	1.752E+02	1.578E+02	1.429E+02	1.301E+02	6.938E+0
0Pb-210	Pb-210	1.000E+00	1.440E+02	5.450E+01	3.984E+01	3.005E+01	6.274E+00	2.263E-05	3.557E-12	5.591E-19	8.787E-26	0.000E+0
Pb-210	Ra-226	1.000E+00	0.000E+00	6.334E+01	7.279E+01	7.868E+01	8.806E+01	8.457E+01	1.207E+02	4.944E+01	2.055E+01	1.452E-0
Pb-210	Th-230	1.000E+00	0.000E+00	6.766E-01	1.078E+00	1.479E+00	3.990E+00	2.028E+01	5.221E+01	7.001E+01	7.572E+01	7.780E+0
Pb-210	U-234	1.000E+00	0.000E+00	6.807E-05	1.466E-04	2.500E-04	1.471E-03	4.682E-02	1.993E-01	4.565E-01	7.490E-01	2.646E+0
Pb-210	U-238	1.000E+00	0.000E+00	1.564E-09	4.516E-09	9.496E-09	1.178E-07	2.216E-05	1.777E-04	6.120E-04	1.403E-03	1.472E-0
Pb-210	ßDOSE(j):		1.440E+02	1.185E+02	1.137E+02	1.102E+02	9.832E+01	1.049E+02	1.731E+02	1.199E+02	9.702E+01	8.060E+0
0Ra-226	Ra-226	1.000E+00	3.286E+02	3.101E+02	3.043E+02	2.992E+02	2.724E+02	1.886E+02	1.626E+02	6.792E+01	2.842E+01	1.578E-0
Ra-226	Th-230	1.000E+00	0.000E+00	5.808E+00	7.611E+00	9.204E+00	1.758E+01	6.436E+01	1.167E+02	1.429E+02	1.524E+02	1.479E+0
Ra-226	U-234	1.000E+00	0.000E+00	8.183E-04	1.422E-03	2.104E-03	8.160E-03	1.629E-01	5.640E-01	1.129E+00	1.758E+00	5.505E+0
Ra-226	U-238	1.000E+00	0.000E+00	2.404E-08	5.535E-08	9.997E-08	7.815E-07	8.216E-05	5.663E-04	1.726E-03	3.699E-03	3.318E-0
Ra-226	ßDOSE(j):		3.286E+02	3.159E+02	3.119E+02	3.084E+02	2.900E+02	2.531E+02	2.798E+02	2.119E+02	1.826E+02	1.536E+0
0[illegible]	Ra-228	1.000E+00	1.384E+02	3.284E+00	9.823E-01	3.315E-01	7.937E-04	1.002E-24	0.000E+00	0.000E+00	0.000E+00	0.000E+0
[illegible]	Th-232	1.000E+00	0.000E+00	1.348E+02	1.370E+02	1.377E+02	1.380E+02	1.380E+02	1.380E+02	1.380E+02	1.380E+02	1.380E+0
Ra-228	ßDOSE(j):		1.384E+02	1.380E+02	1.380E+02	1.380E+02	1.380E+02	1.380E+02	1.380E+02	1.380E+02	1.380E+02	1.380E+0
0Th-228	Ra-228	1.000E+00	0.000E+00	3.623E+00	1.084E+00	3.659E-01	8.760E-04	1.494E-24	0.000E+00	0.000E+00	0.000E+00	0.000E+0
Th-228	Th-228	1.000E+00	1.019E+02	1.350E-03	3.604E-05	1.382E-06	1.875E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+0
Th-228	Th-232	1.000E+00	0.000E+00	9.800E+01	1.005E+02	1.012E+02	1.016E+02	1.016E+02	1.016E+02	1.016E+02	1.016E+02	1.016E+0
Th-228	ßDOSE(j):		1.019E+02	1.016E+02	1.016E+02	1.016E+02	1.016E+02	1.016E+02	1.016E+02	1.016E+02	1.016E+02	1.016E+0

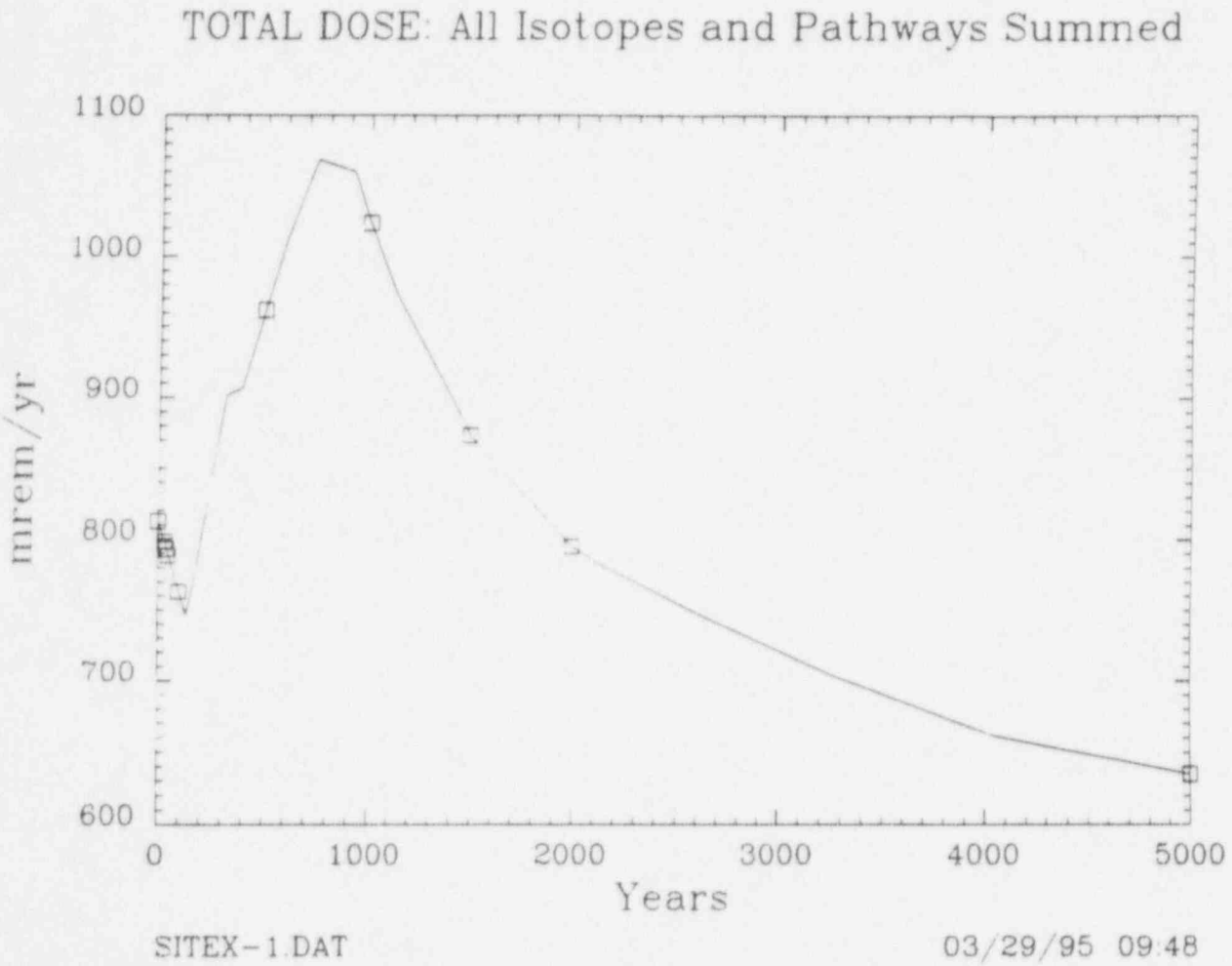
0Th-230	Th-230	1.000E+00	4.395E+00	4.394E+00	4.394E+00	4.393E+00	4.392E+00	4.376E+00	4.356E+00	4.337E+00	4.317E+00	4.202E+0
Th-230	U-234	1.000E+00	0.000E+00	1.226E-03	1.622E-03	1.978E-03	3.954E-03	1.973E-02	3.933E-02	5.883E-02	7.821E-02	1.921E-0
T[illegible]0	U-238	1.000E+00	0.000E+00	5.378E-08	9.407E-08	1.399E-07	5.595E-07	1.397E-05	5.575E-05	1.252E-04	2.221E-04	1.372E-0
	δDOSE(j):		4.395E+00	4.395E+00	4.395E+00	4.395E+00	4.395E+00	4.396E+00	4.396E+00	4.396E+00	4.396E+00	4.396E+0
0[illegible]	Th-232	1.000E+00	1.757E+01	1.835E+01	1.836E+01	1.837E+01	1.837E+01	1.837E+01	1.837E+01	1.837E+01	1.837E+01	1.837E+0
0U-23[illegible]	U-234	1.000E+00	2.923E+00	2.923E+00	2.923E+00	2.923E+00	2.923E+00	2.919E+00	2.915E+00	2.911E+00	2.907E+00	2.882E+0
U-234	U-238	1.000E+00	0.000E+00	2.564E-04	3.391E-04	4.135E-04	8.270E-04	4.133E-03	8.259E-03	1.238E-02	1.650E-02	4.106E-0
U-234	δDOSE(j):		2.923E+00	2.923E+00	2.923E+00	2.923E+00	2.923E+00	2.923E+00	2.923E+00	2.923E+00	2.923E+00	2.923E+0
0U-238	U-238	1.000E+00	3.903E+00	3.903E+00	3.903E+00	3.903E+00	3.903E+00	3.903E+00	3.903E+00	3.903E+00	3.903E+00	3.903E+0

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	3.100E+01	4.100E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	1.500E+03	2.000E+03	5.000E+0
Pa-231	Pa-231	1.000E+00	4.900E+00	4.867E+00	4.857E+00	4.847E+00	4.795E+00	4.398E+00	3.948E+00	3.543E+00	3.180E+00	1.663E+0
0Ac-227	Pa-231	1.000E+00	0.000E+00	3.016E+00	3.485E+00	3.791E+00	4.473E+00	4.261E+00	3.825E+00	3.433E+00	3.081E+00	1.611E+0
0Pb-210	Pb-210	1.000E+00	2.100E+01	7.951E+00	5.812E+00	4.38[illegible]+00	9.152E-01	3.301E-06	5.189E-13	8.[illegible]6E-20	1.282E-26	0.000E+0
Pb-210	Ra-226	1.000E+00	0.000E+00	9.240E+00	1.062E+01	1.148E+01	1.285E+01	6.402E+00	2.506E+00	9.8[illegible]7E-01	3.838E-01	1.380E-0
Pb-210	Th-230	1.000E+00	0.000E+00	9.871E-02	1.572E-01	2.157E-01	5.821E-01	2.801E+00	4.004E+00	4.462E+00	4.628E+00	4.622E+0
Pb-210	U-234	1.000E+00	0.[illegible]00E+00	9.929E-06	2.139E-05	3.646E-05	2.146E-04	6.784E-03	2.250E-02	4.168E-02	6.213E-02	1.870E-0
Pb-210	U-238	1.000E+00	0.000E+00	2.282E-10	6.587E-10	1.385E-09	1.719E-08	3.229E-06	2.332E-05	6.848E-05	1.418E-04	1.201E-0
Pb-210	δS(j):		2.100E+01	1.729E+01	1.659E+01	1.608E+01	1.[illegible]34E+01	9.210E+00	6.532E+00	5.485E+00	5.074E+00	4.812E+0
0Ra-226	Ra-226	1.000E+00	1.550E+01	1.462E+01	1.435E+01	1.411E+01	1.285E+01	6.067E+00	2.374E+00	9.293E-01	3.637E-01	1.308E-0
Ra-226	Th-230	1.000E+00	0.000E+00	2.739E-01	3.589E-01	4.341E-01	8.291E-01	2.944E+00	4.083E+00	4.515E+00	4.671E+00	4.658E+0
Ra-226	U-234	1.000E+00	0.000E+00	3.859E-05	6.709E-05	9.922E-05	3.849E-04	7.649E-03	2.384E-02	4.330E-02	6.396E-02	1.898E-0
Ra-226	U-238	1.000E+00	0.000E+00	1.134E-09	2.611E-09	4.715E-09	3.686E-08	3.872E-06	2.555E-05	7.282E-05	1.486E-04	1.227E-0
R[illegible]	δS(j):		1.550E+01	1.490E+01	1.471E+01	1.45[illegible]+01	1.368E+01	9.018E+00	6.481E+00	5.488E+00	5.099E+00	4.850E+0
R[illegible]	Ra-228	1.000E+00	1.650E+01	3.914E-01	1.171E-01	3.951[illegible]02	9.459E-05	1.022E-25	0.000E+00	0.000E+00	0.000E+00	0.000E+0
Ra-228	Th-232	1.000E+00	0.000E+00	1.606E+01	1.633E+01	1.641[illegible]+01	1.645E+01	1.645E+01	1.645E+01	1.645E+01	1.645E+01	1.645E+0
Ra-228	δS(j):		1.650E+01	1.645E+01	1.645E+01	1.645E+01	1.645E+01	1.645E+01	1.645E+01	1.645E+01	1.645E+01	1.645E+0
0Th-228	Ra-228	1.000E+00	0.000E+00	5.865E-01	1.755E-01	5.924[illegible]-02	1.413E-04	1.532E-25	0.000E+00	0.000E+00	0.000E+00	0.000E+0
Th-228	Th-228	1.000E+00	1.650E+01	2.186E-04	5.835E-06	2.238[illegible]-07	3.036E-15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+0
Th-228	Th-232	1.000E+00	0.000E+00	1.587E+01	1.628E+01	1.639E+01	1.645E+01	1.645E+01	1.645E+01	1.645E+01	1.645E+01	1.645E+0
Th-228	δS(j):		1.650E+01	1.645E+01	1.645E+01	1.64[illegible]+01	1.645E+01	1.645E+01	1.645E+01	1.645E+01	1.645E+01	1.645E+0
0Th-230	Th-230	1.000E+00	2.100E+01	2.099E+01	2.099E+01	2.09[illegible]+01	2.098E+01	2.091E+01	2.081E+01	2.072E+01	2.063E+01	2.05[illegible]0
Th-230	U-234	1.000E+00	0.000E+00	5.859E-03	7.749E-03	9.44[illegible]03	1.889E-02	9.424E-02	1.879E-0[illegible]	2.811E-01	3.736E-01	9.177E-0
Th-230	U-238	1.000E+00	0.000E+00	2.570[illegible]-07	4.494E-07	6.68[illegible]-07	2.673E-06	6.672E-05	2.664E-04	5.98[illegible]-04	1.061E-03	6.55[illegible]-0
Th-230	δS(j):		2.100E+01	2.100E+01	2.100E+01	2.100[illegible]+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+0
0Th-232	Th-232	1.000E+00	1.650E+01	1.650E+01	1.650E+01	1.650[illegible]+01	1.650E+01	1.650E+01	1.650E+01	1.650E+01	1.650E+01	1.650E+0
0U-234	U-234	1.000E+00	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.099E+01	2.097E+01	2.094E+01	2.091E+01	2.088E+01	2.071E+0
U-234	U-238	1.000E+00	0.000E+00	1.842E-03	2.436E-03	2.970E-03	5.940E-03	2.969E-02	5.933E-02	8.893E-02	1.185E-01	2.950E-0
U-234	δS(j):		2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+0
0U-238	U-238	1.000E+00	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+0

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


TOTAL DOSE: All Isotopes and Pathways Summed
1100
1000
900
800
700
600
mrem/yr
0
1000
2000
3000
4000
5000
Years
SITEX-1.DAT
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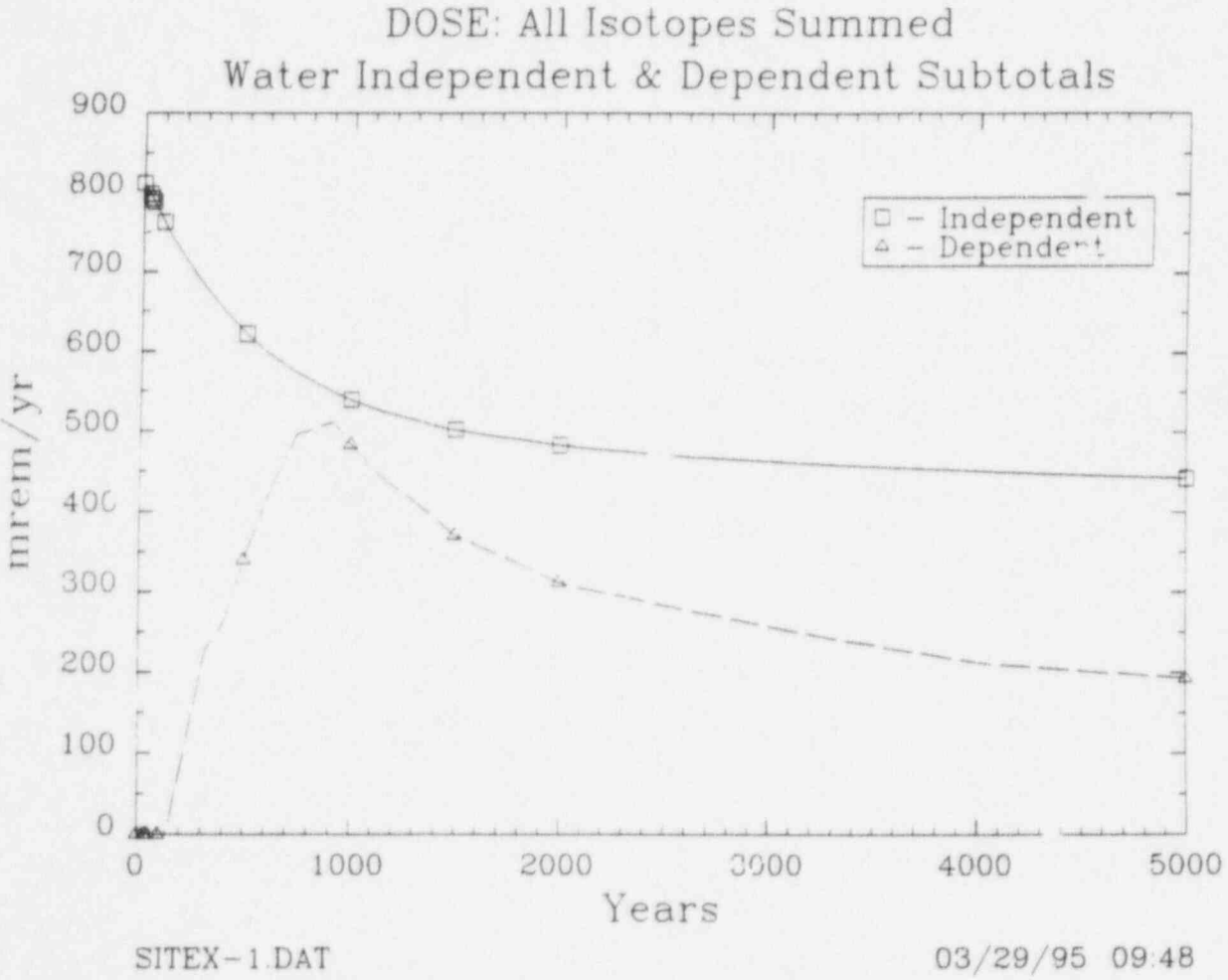
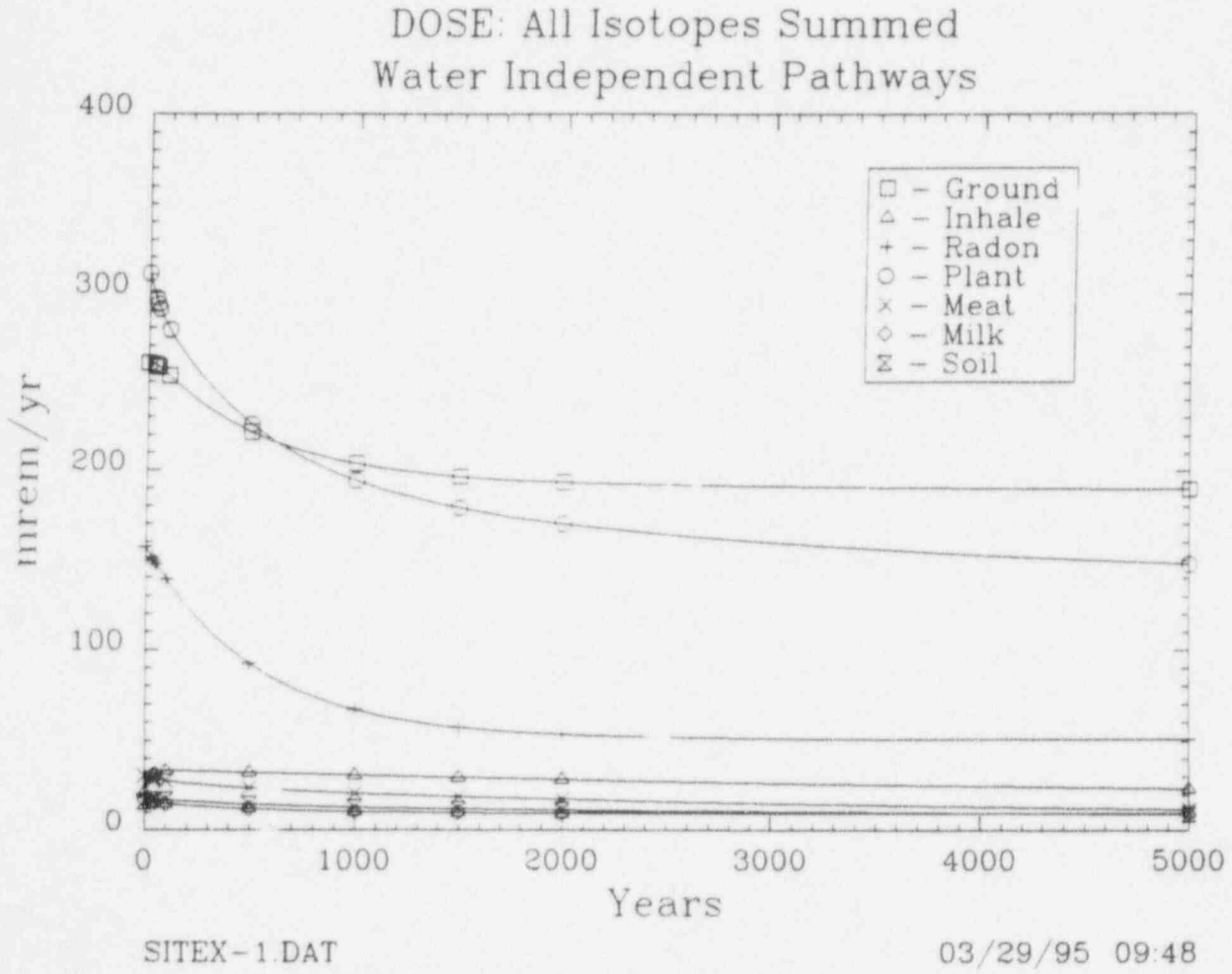
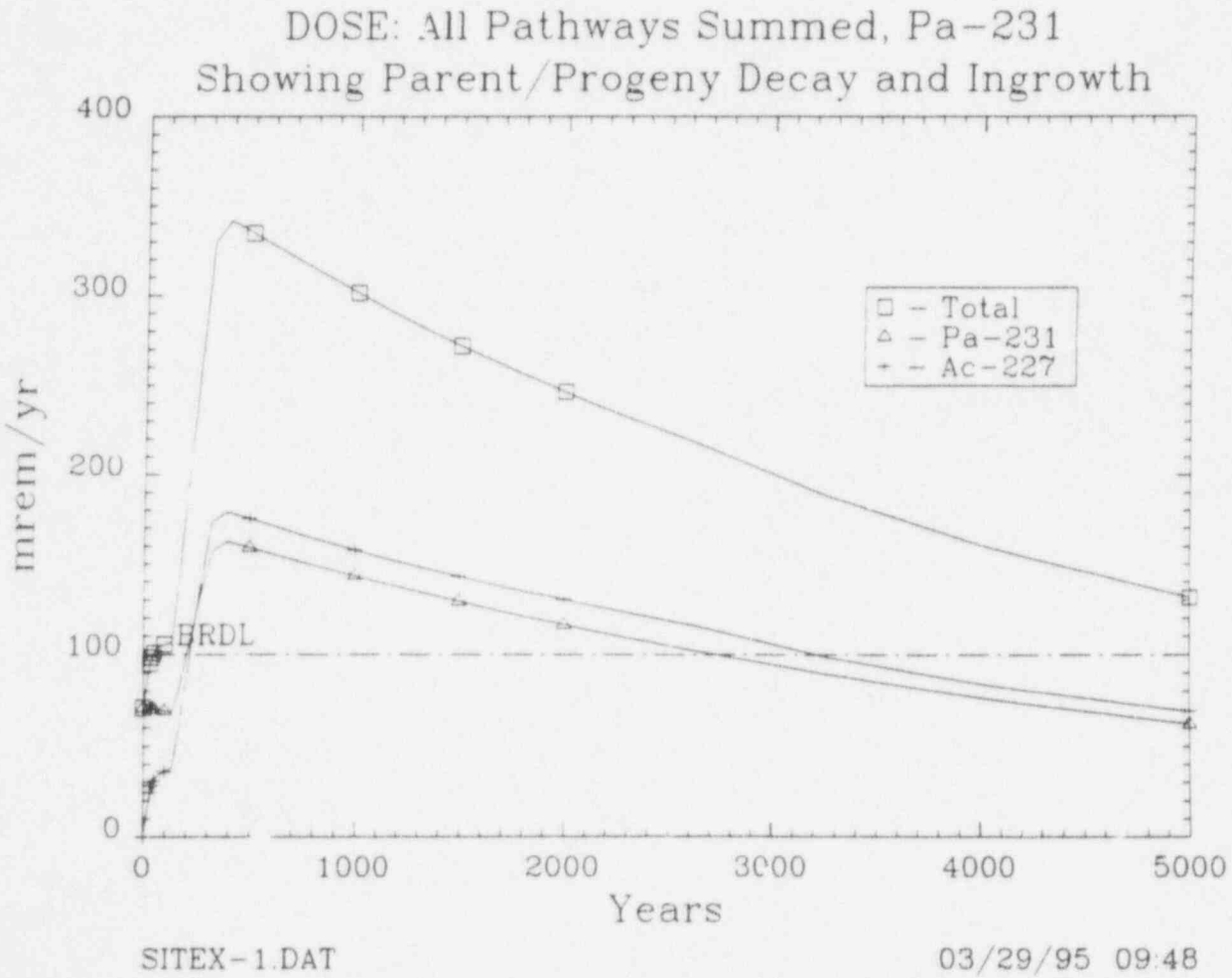
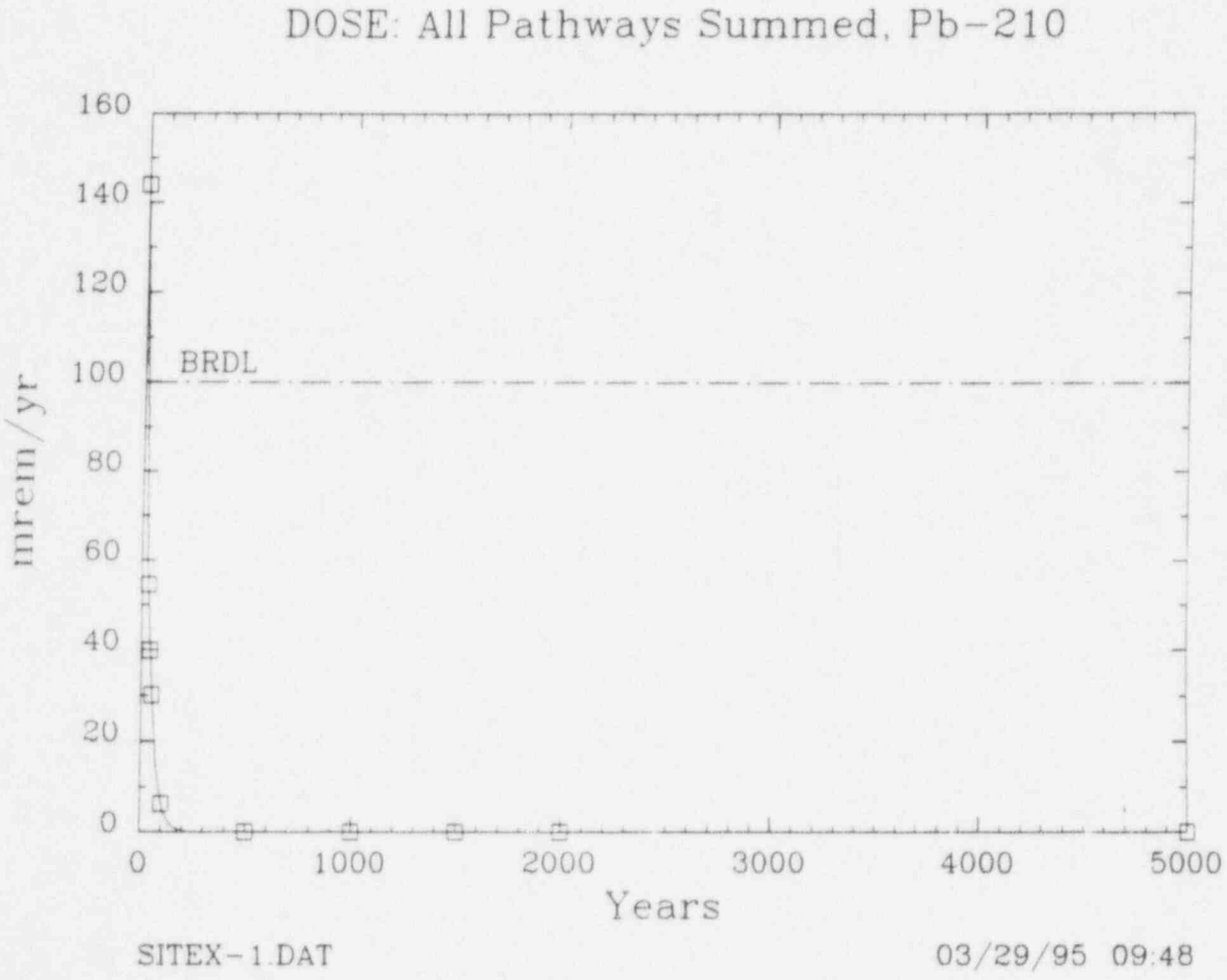
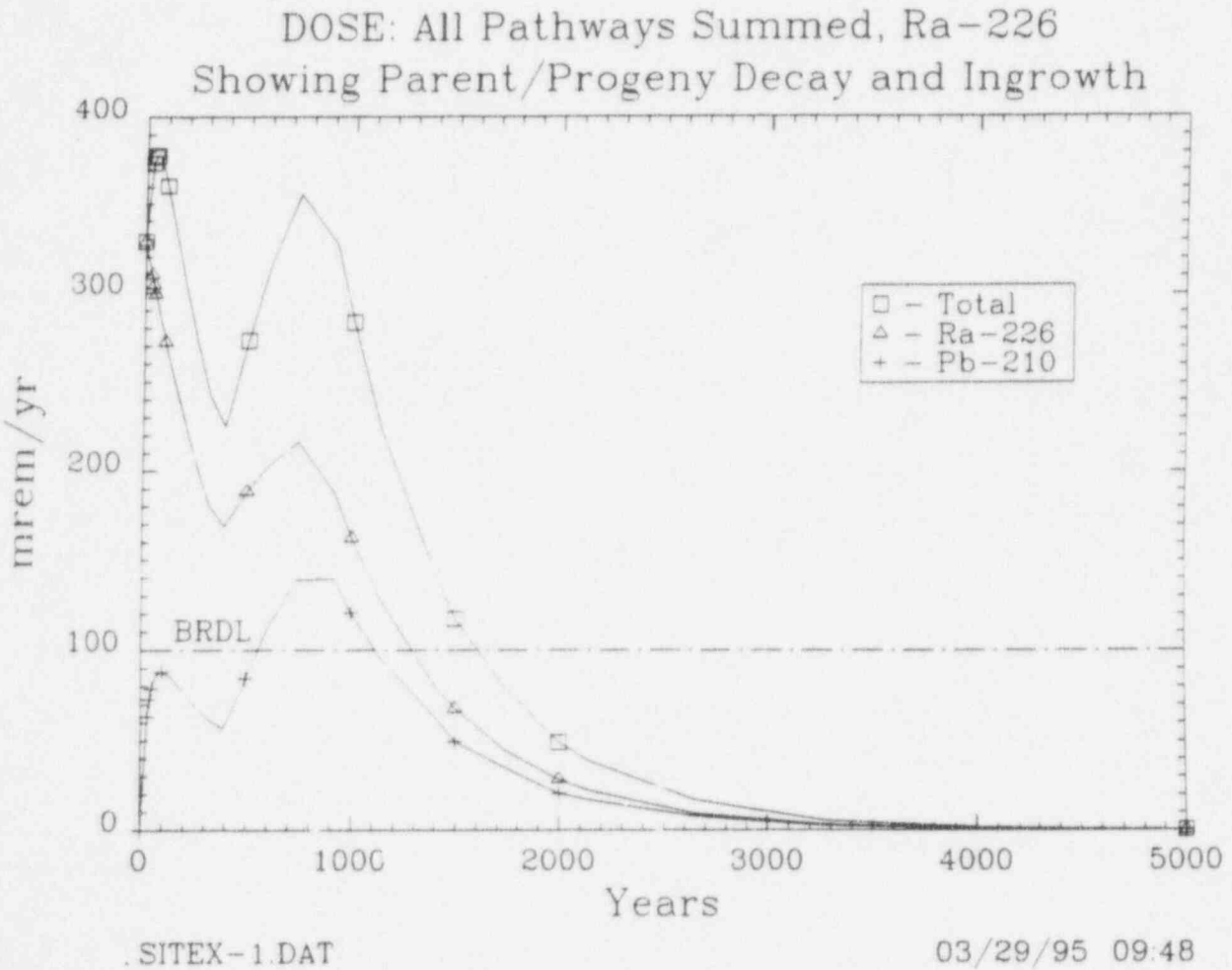
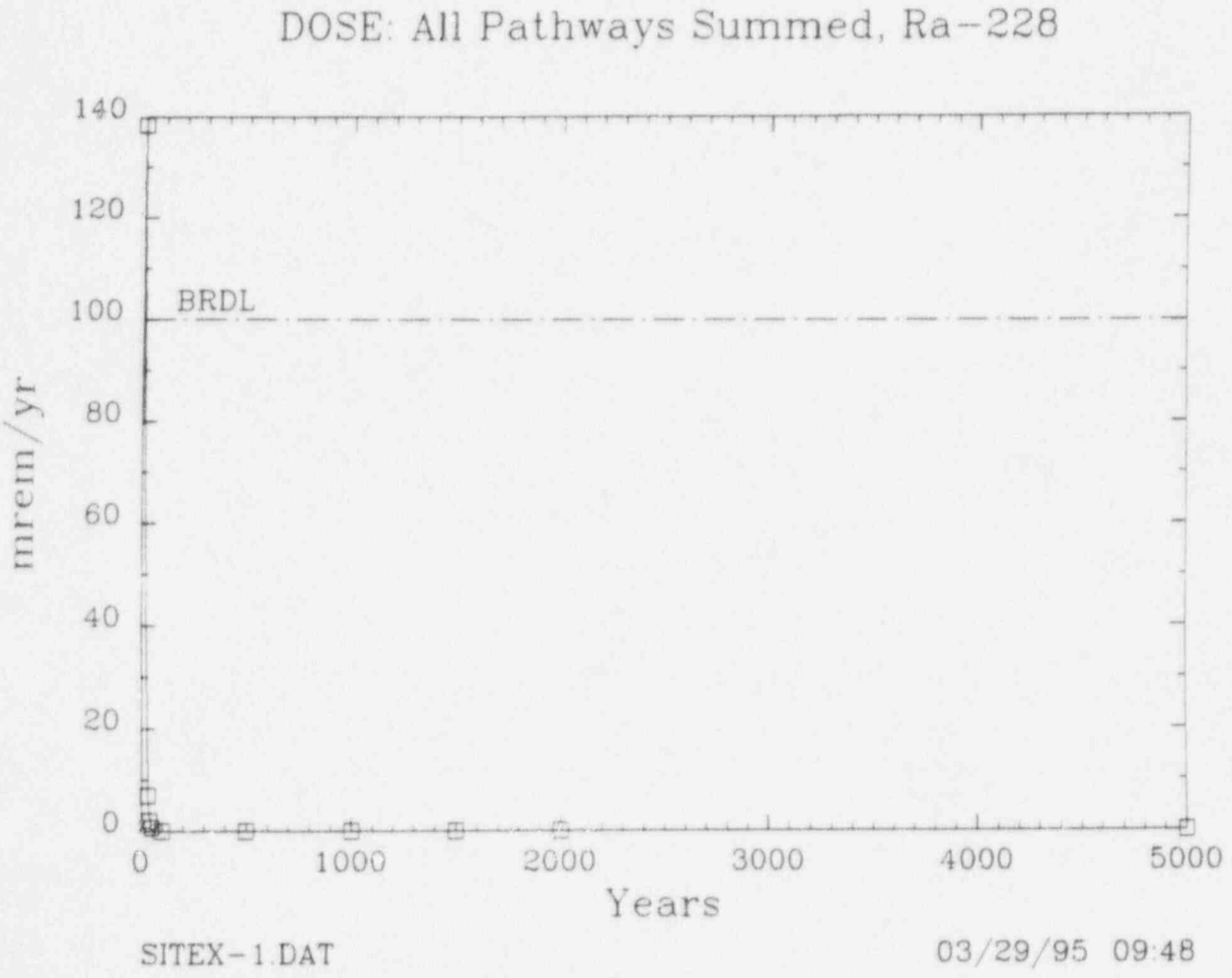

DOSE: All Isotopes Summed
Water Independent & Dependent Subtotals
900
800
700
600
500
400
300
200
100
0
mrem/yr
□ - Independent
△ - Dependent
0
1000
2000
3000
4000
5000
Years
SITEX-1.DAT
03/29/95 09:48

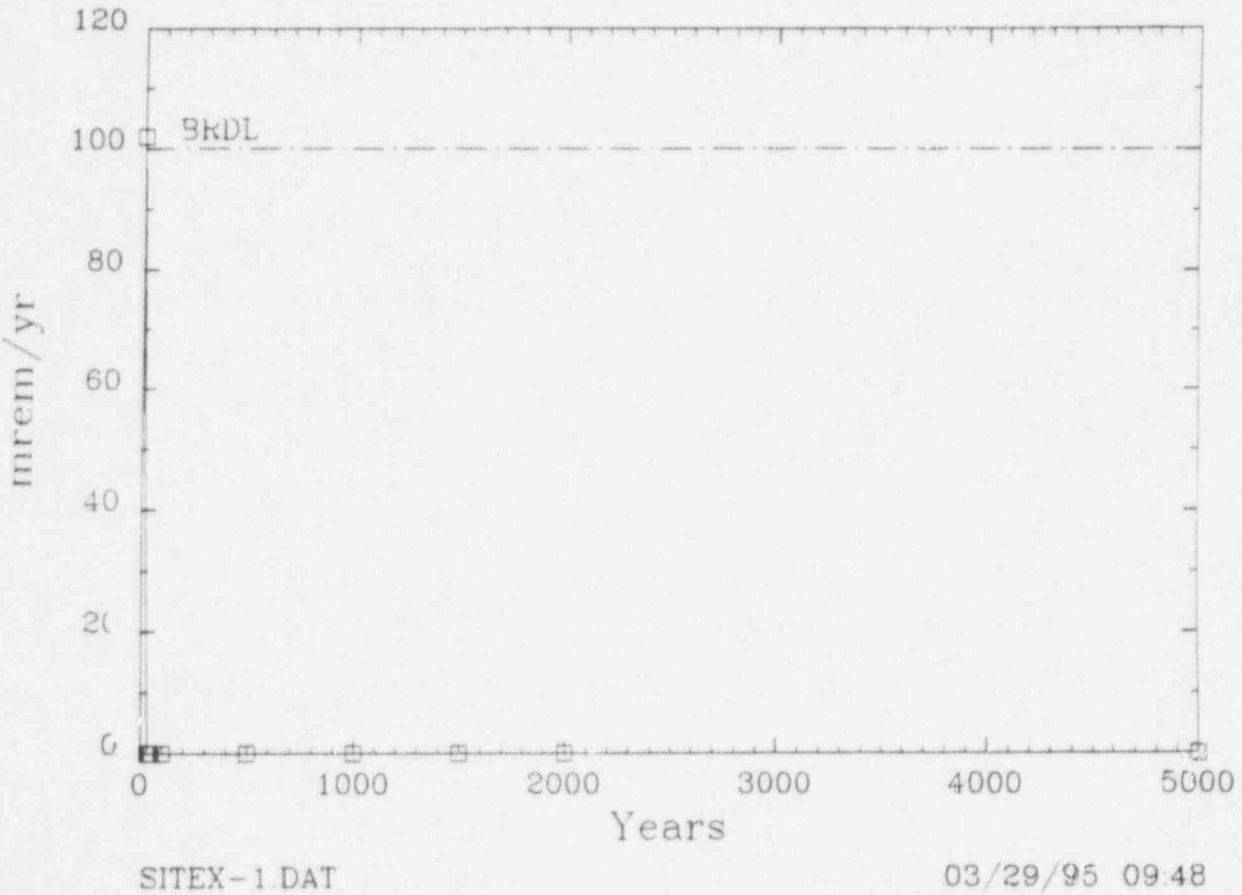

DOSE: All Isotopes Summed
Water Independent Pathways
400
300
200
100
0
mrem/yr
0
1000
2000
3000
4000
5000
Years
□ – Ground
△ – Inhale
+ – Radon
○ – Plant
× – Meat
◇ – Milk
⧖ – Soil
SITEX-1.DAT
03/29/95 09:48

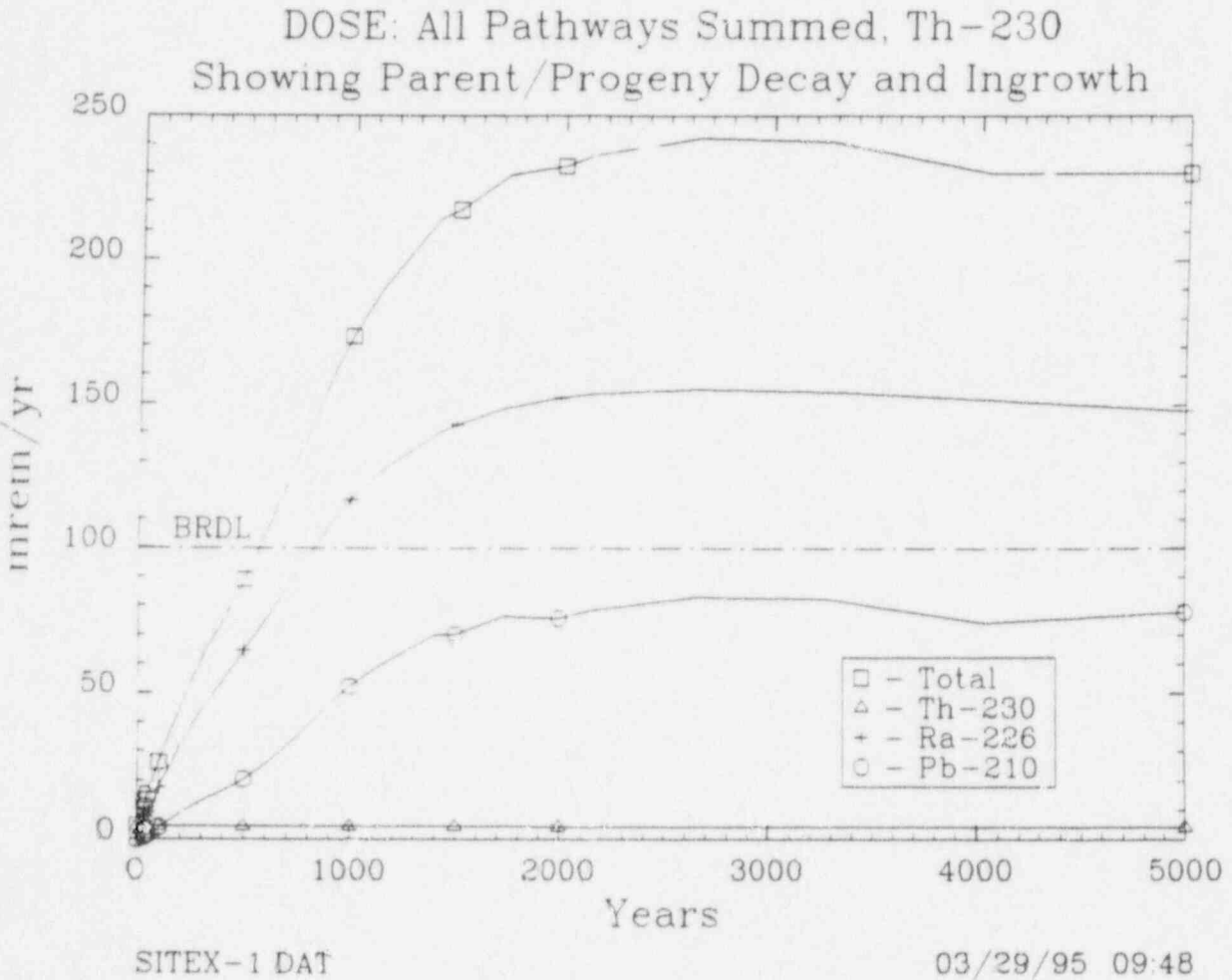

DOSE: All Pathways Summed, Pa-231
Showing Parent/Progeny Decay and Ingrowth
400
300
200
100
0
mrem/yr
□ - Total
△ - Pa-231
+ - Ac-227
BRDL
0
1000
2000
3000
4000
5000
Years
SITEX-1.DAT
03/29/95 09:48

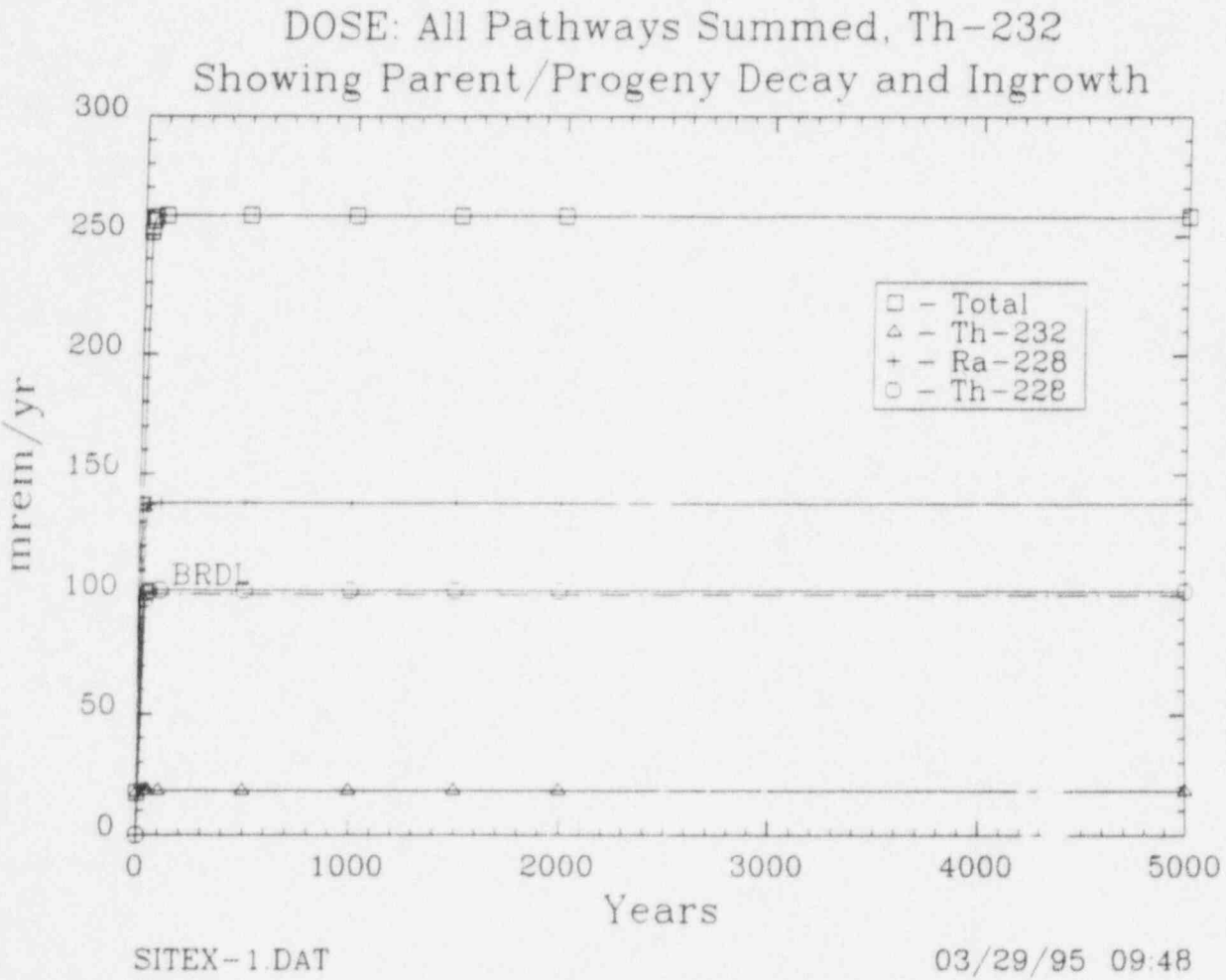

DOSE: All Pathways Summed, Pb-210
160
140
120
100
80
60
40
20
0
BRDL
mrem/yr
0
1000
2000
3000
4000
5000
Years
SITEX-1.DAT
03/29/95 09:48

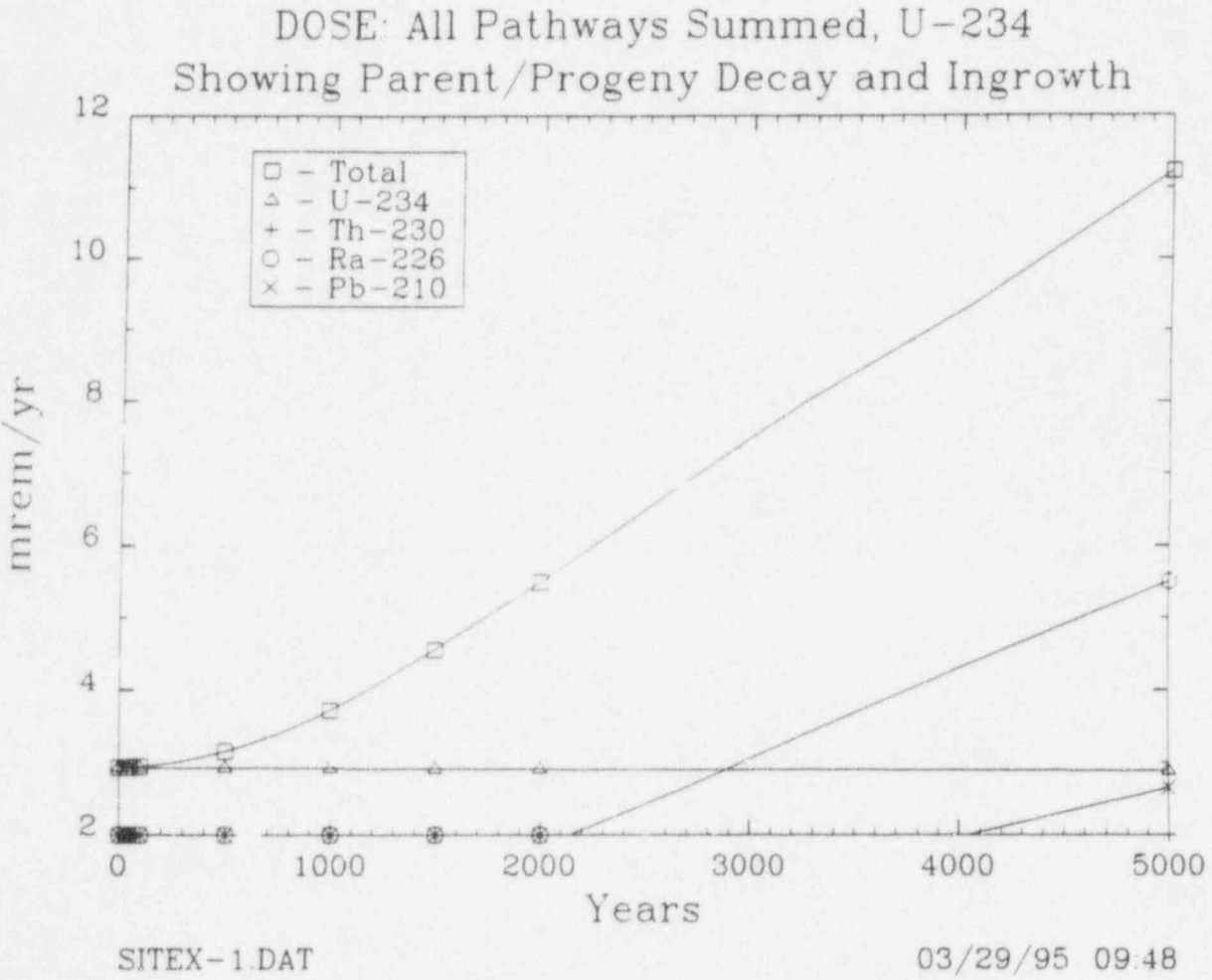

DOSE: All Pathways Summed, Ra-226
Showing Parent/Progeny Decay and Ingrowth
400
300
200
100
0
mrem/yr
□ - Total
△ - Ra-226
+ - Pb-210
BRDL
0
1000
2000
3000
4000
5000
Years
.SITEX-1.DAT
03/29/95 09:48

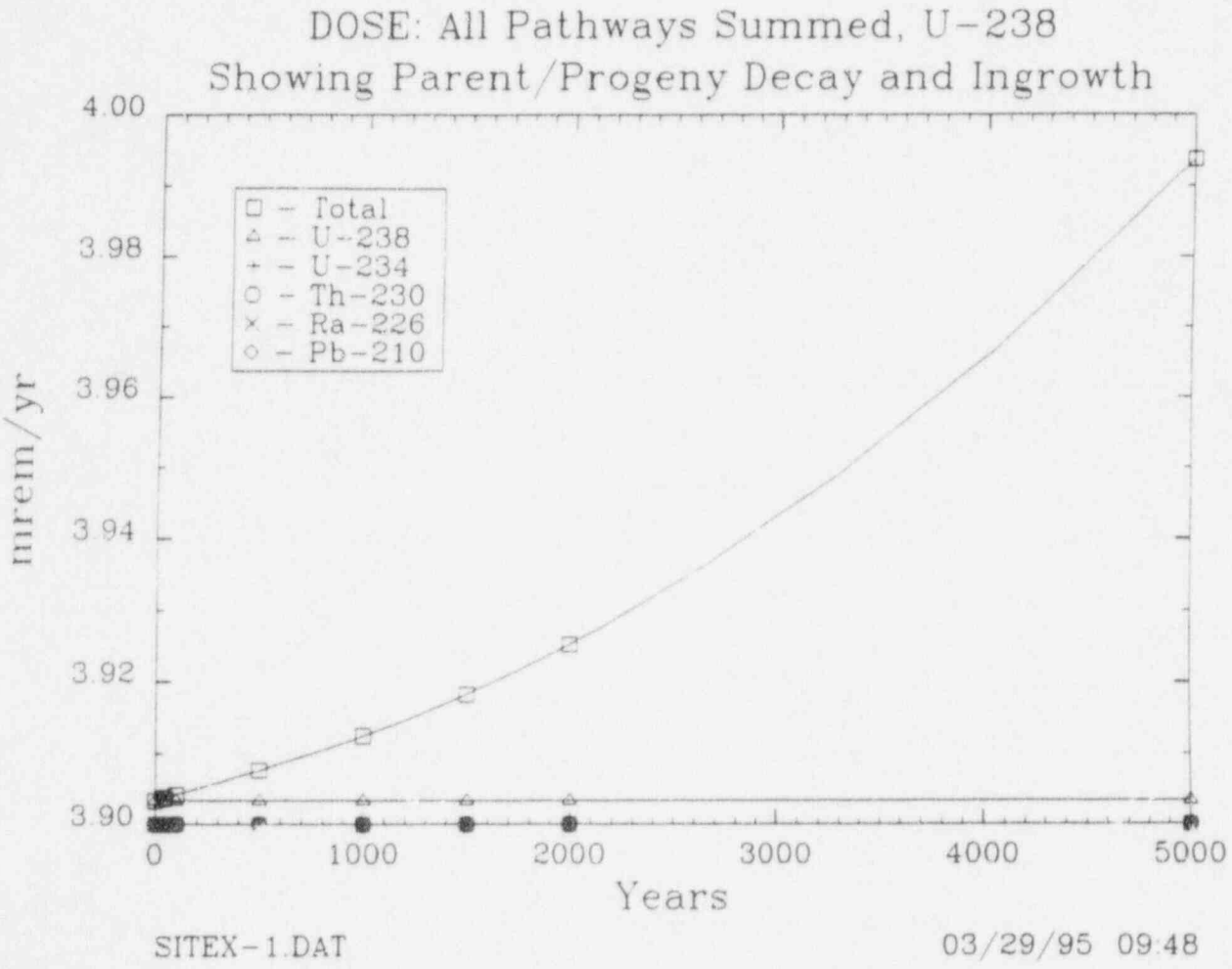

DOSE: All Pathways Summed, Ra-228
140
120
100
80
60
40
20
0
BRDL
mrem/yr
0
1000
2000
3000
4000
5000
Years
SITEX-1.DAT
03/29/95 09:48

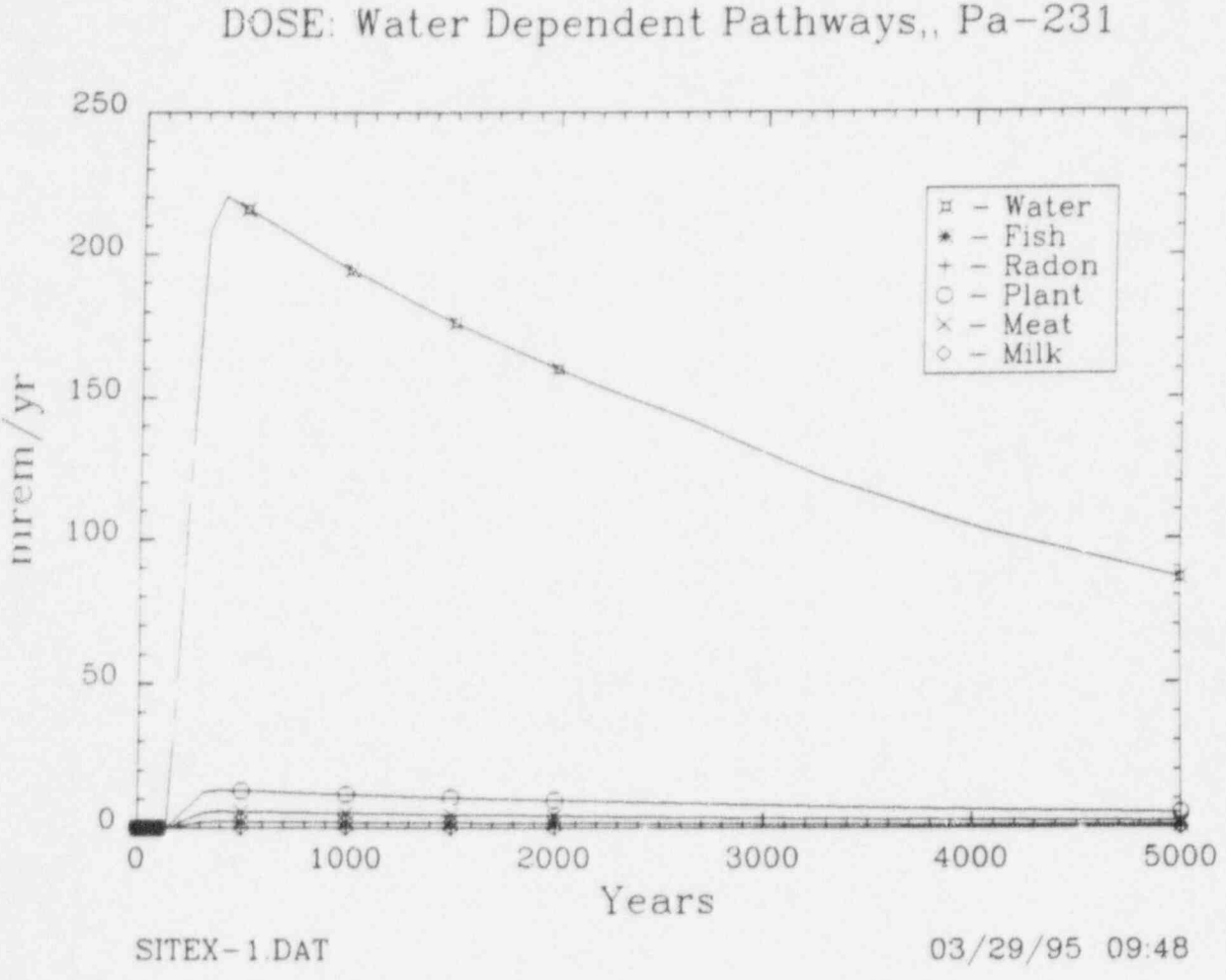

DOSE: All Pathways Summed, Th-228
120
100
80
60
40
20
0
BKDL
mrem/yr
0
1000
2000
3000
4000
5000
Years
SITEX-1.DAT
03/29/95 09:48

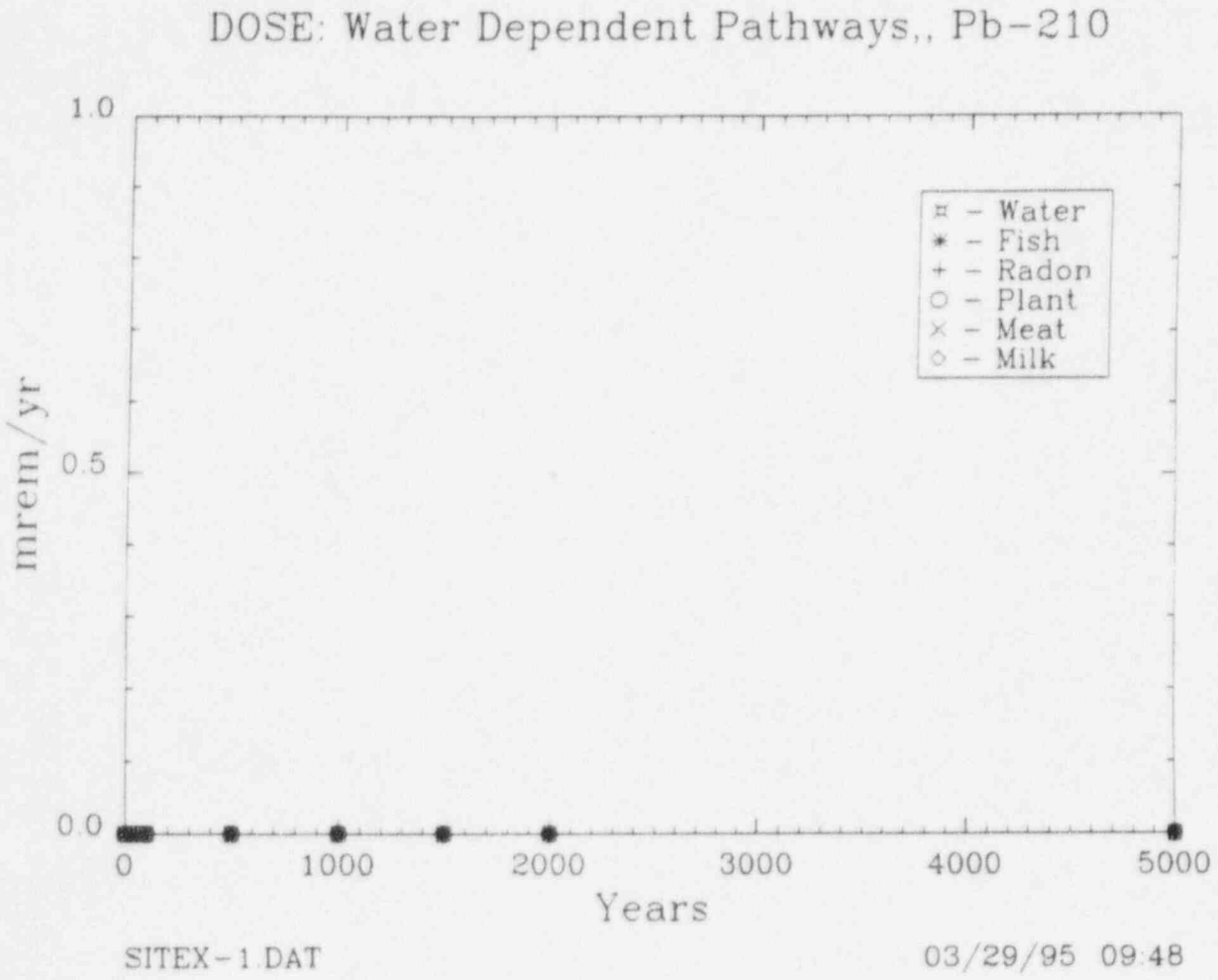

DOSE: All Pathways Summed, Th-230
Showing Parent/Progeny Decay and Ingrowth
250
200
150
100
50
0
mrem/yr
BRDL
□ - Total
△ - Th-230
+ - Ra-226
○ - Pb-210
0
1000
2000
3000
4000
5000
Years
SITEX-1 DAT
03/29/95 09:48

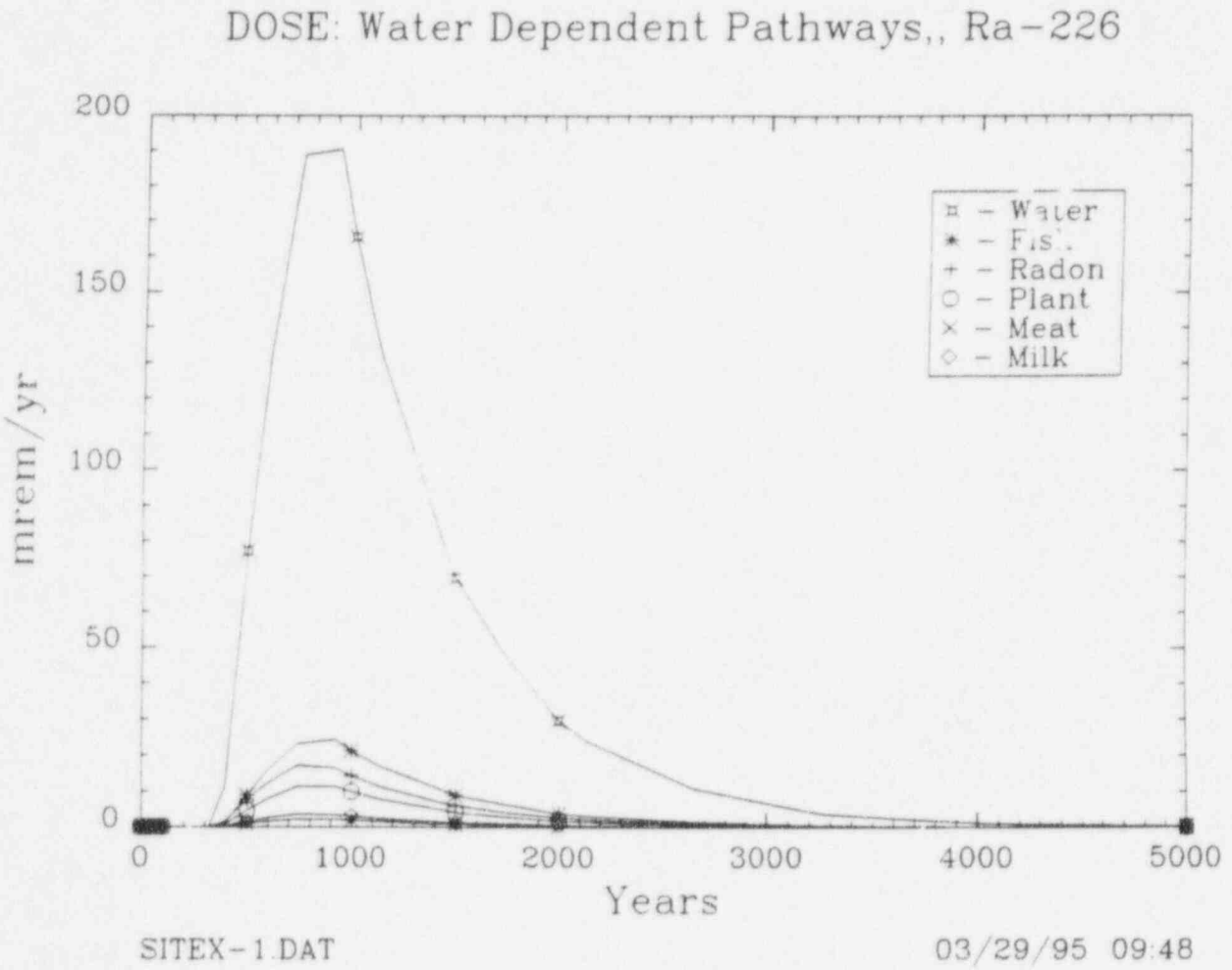

DOSE: All Pathways Summed, Th-232
Showing Parent/Progeny Decay and Ingrowth
300
250
200
150
100
50
0
mrem/yr
□ - Total
△ - Th-232
+ - Ra-228
○ - Th-228
BRDL
0
1000
2000
3000
4000
5000
Years
SITEX-1.DAT
03/29/95 09:48

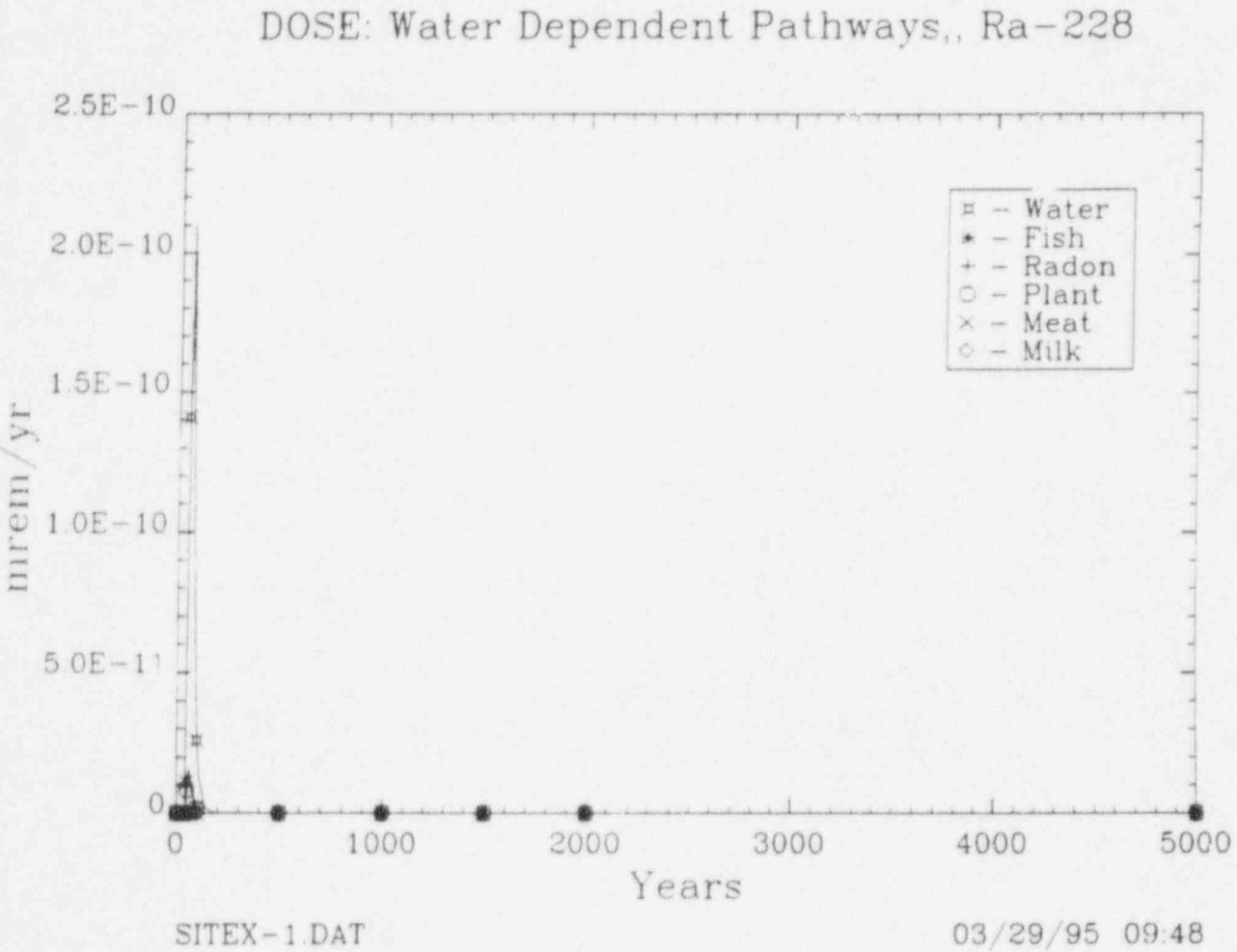

DOSE: All Pathways Summed, U-234
Showing Parent/Progeny Decay and Ingrowth
□ - Total
△ - U-234
+ - Th-230
○ - Ra-226
× - Pb-210
mrem/yr
12
10
8
6
4
2
0
1000
2000
3000
4000
5000
Years
SITEX-1.DAT
03/29/95 09:48

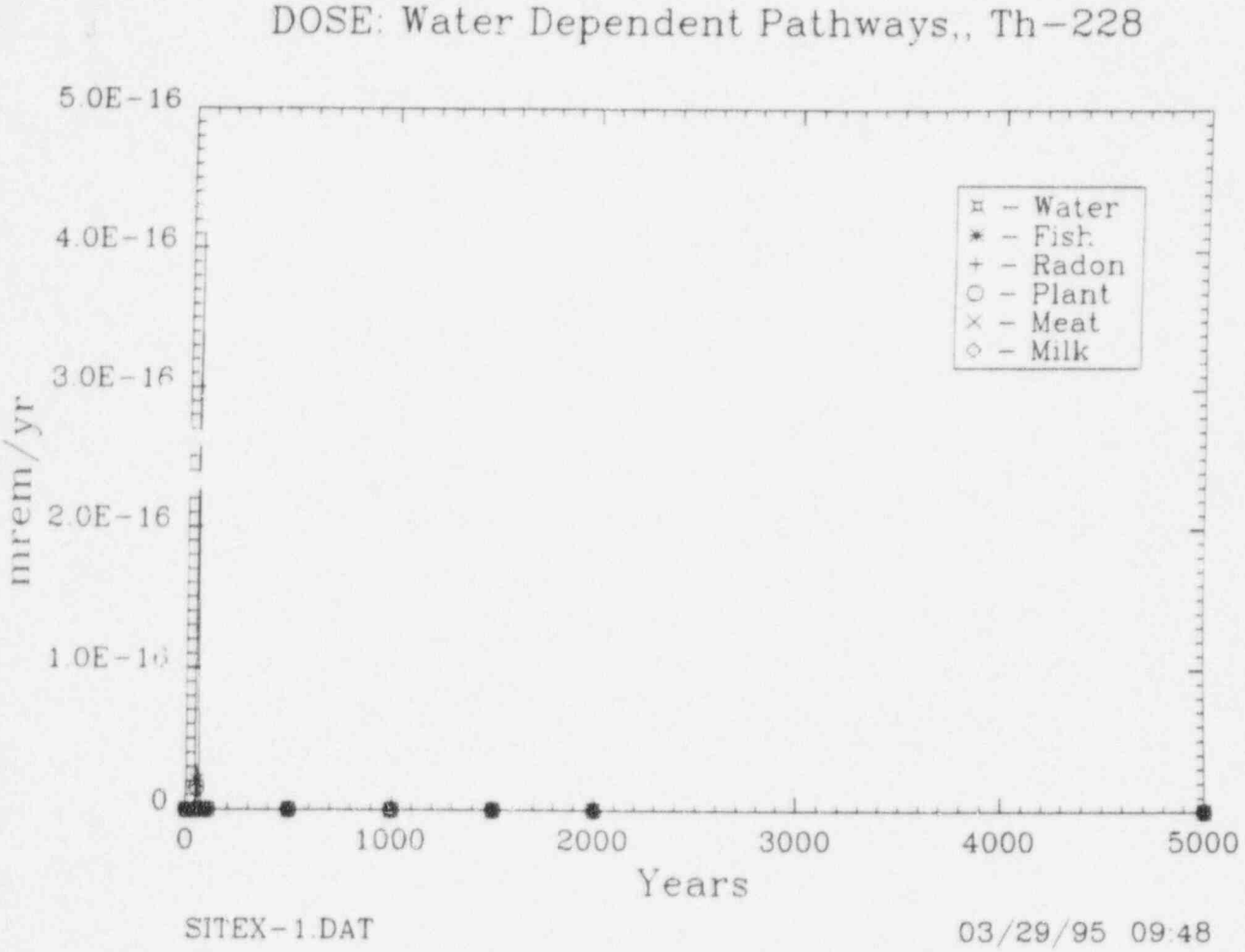

DOSE: All Pathways Summed, U-238
Showing Parent/Progeny Decay and Ingrowth
4.00
3.98
3.96
3.94
3.92
3.90
mrem/yr
□ - Total
△ - U-238
+ - U-234
○ - Th-230
× - Ra-226
◇ - Pb-210
0
1000
2000
3000
4000
5000
Years
SITEX-1.DAT
03/29/95 09:48

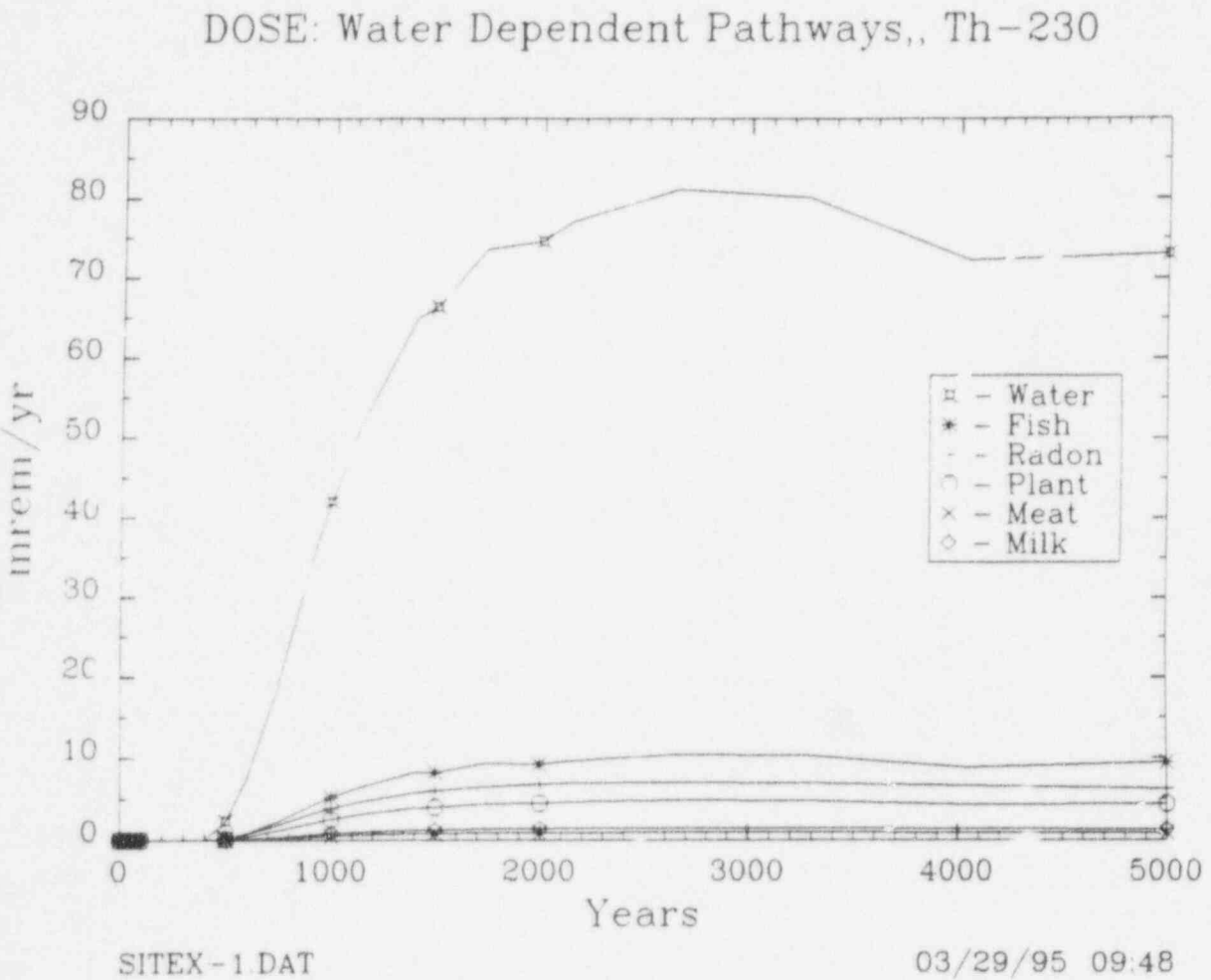

DOSE: Water Dependent Pathways,, Pa-231
250
200
150
100
50
0
mrem/yr
0
1000
2000
3000
4000
5000
Years
¤ - Water
* - Fish
+ - Radon
○ - Plant
× - Meat
◇ - Milk
SITEX-1.DAT
03/29/95 09:48

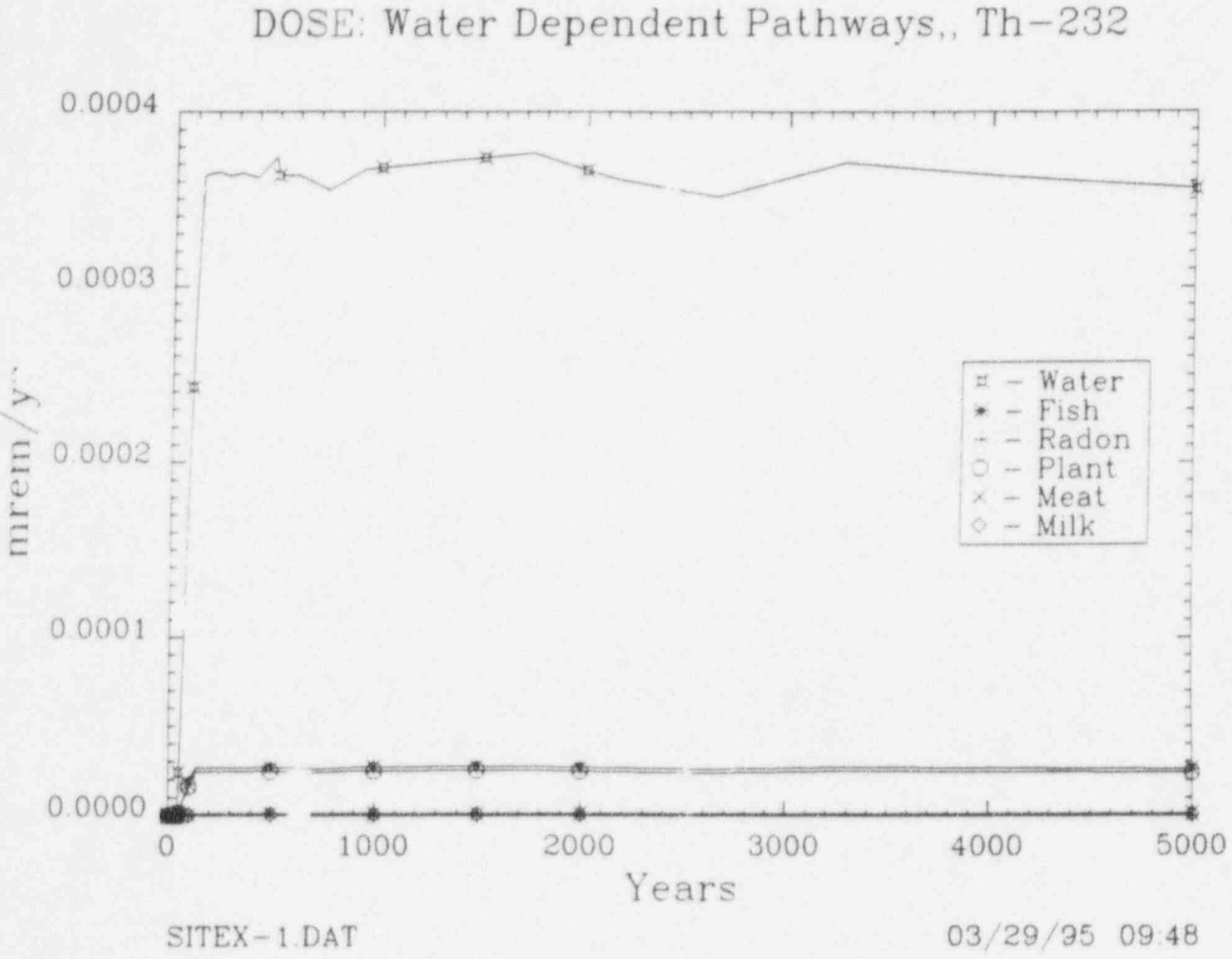

DOSE: Water Dependent Pathways,, Pb-210
1.0
0.5
0.0
mrem/yr
0
1000
2000
3000
4000
5000
Years
¤ - Water
* - Fish
+ - Radon
○ - Plant
× - Meat
◇ - Milk
SITEX-1 DAT
03/29/95 09:48

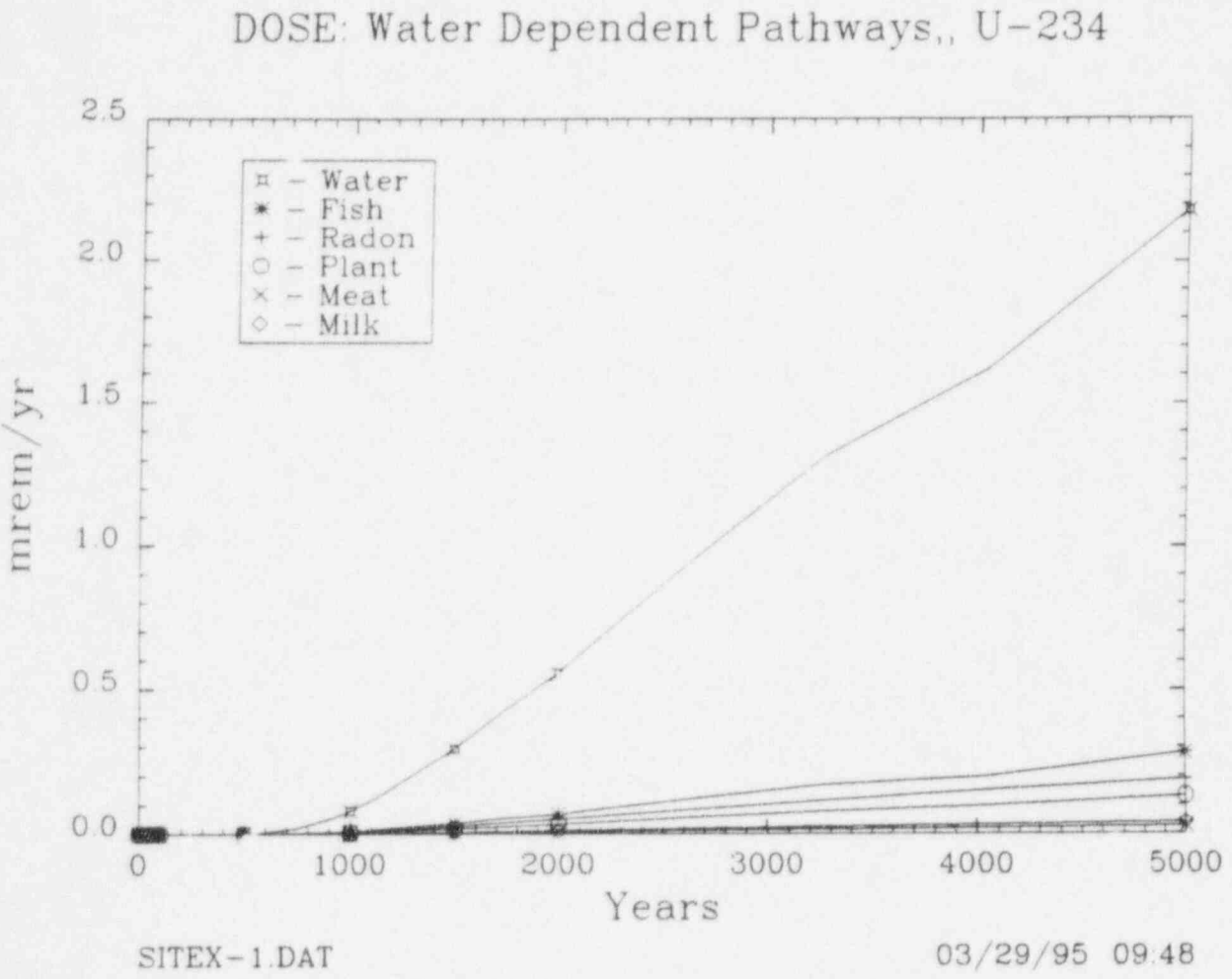

DOSE: Water Dependent Pathways,, Ra-226
200
150
100
50
0
mrem/yr
0
1000
2000
3000
4000
5000
Years
Water
Fish
Radon
Plant
Meat
Milk
SITEX-1.DAT
03/29/95 09:48

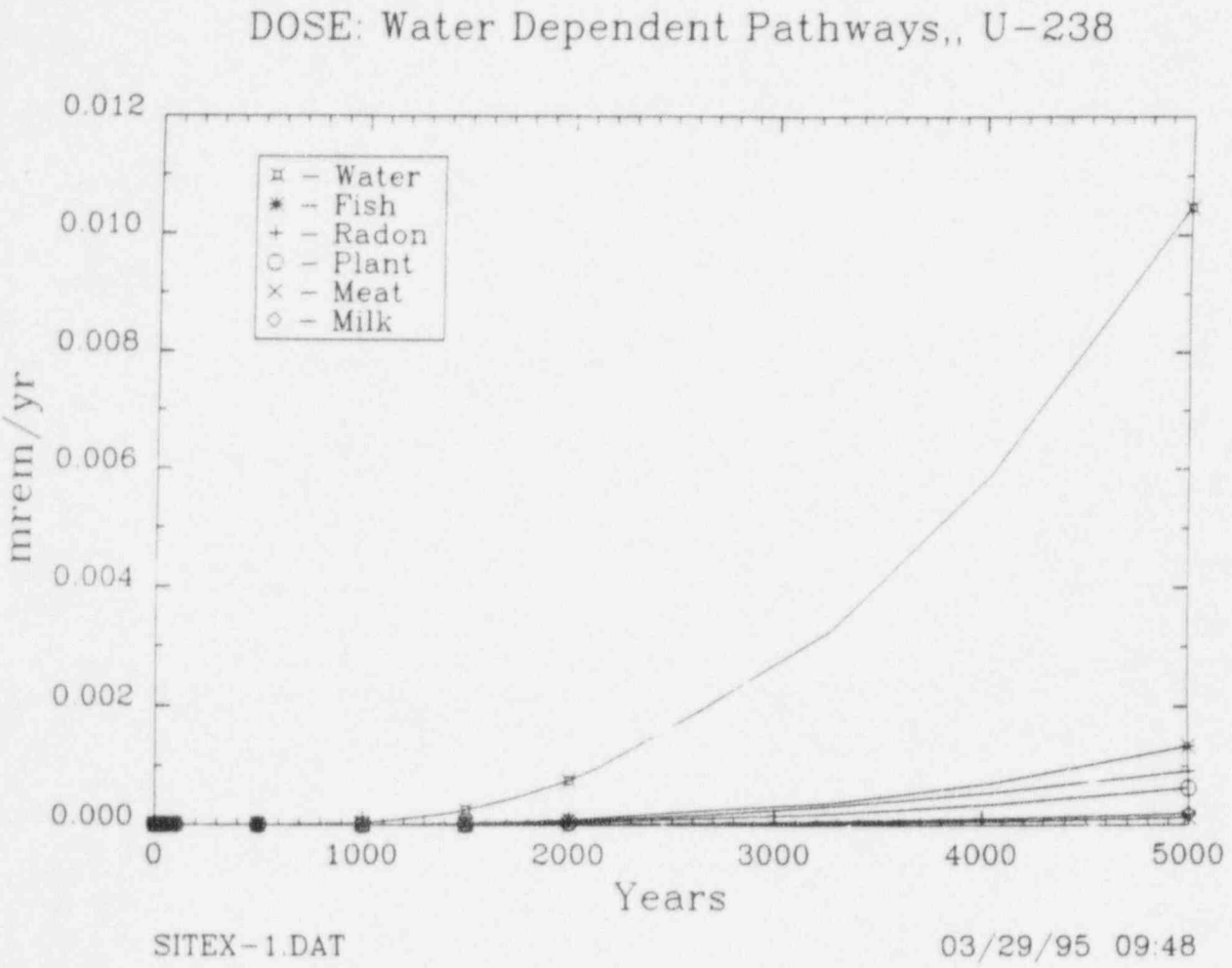

DOSE: Water Dependent Pathways,, Ra-228
2.5E-10
2.0E-10
1.5E-10
1.0E-10
5.0E-11
0
mrem/yr
0
1000
2000
3000
4000
5000
Years
Water
Fish
Radon
Plant
Meat
Milk
SITEX-1.DAT
03/29/95 09:48


DOSE: Water Dependent Pathways,, Th-228
5.0E-16
4.0E-16
3.0E-16
2.0E-16
1.0E-16
0
mrem/yr
0
1000
2000
3000
4000
5000
Years
Water
Fish
Radon
Plant
Meat
Milk
SITEX-1.DAT
03/29/95 09:48


DOSE: Water Dependent Pathways,, Th-230
mrem/yr
90
80
70
60
50
40
30
20
10
0
0
1000
2000
3000
4000
5000
Years
Water
Fish
Radon
Plant
Meat
Milk
SITEX-1.DAT
03/29/95 09:48


DOSE: Water Dependent Pathways,, Th-232
0.0004
0.0003
0.0002
0.0001
0.0000
mrem/y
0
1000
2000
3000
4000
5000
Years
Water
Fish
Radon
Plant
Meat
Milk
SITEX-1.DAT
03/29/95 09:48


DOSE: Water Dependent Pathways,, U-234
2.5
2.0
1.5
1.0
0.5
0.0
mrem/yr
Water
Fish
Radon
Plant
Meat
Milk
0
1000
2000
3000
4000
5000
Years
SITEX-1.DAT
03/29/95 09:48


DOSE: Water Dependent Pathways,, U-238
0.012
0.010
0.008
0.006
0.004
0.002
0.000
mrem/yr
¤ - Water
* - Fish
+ - Radon
○ - Plant
× - Meat
◇ - Milk
0
1000
2000
3000
4000
5000
Years
SITEX-1.DAT
03/29/95 09:48

APPENDIX C - RESRAD RESULTS COVERED CASE

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines

Dose Conversion Factor (and Related) Parameter Summary
File: DOSFAC.BIN

Menu	Parameter	Current value	Default	Parameter Name
A-1	Ground external gamma, volume DCF's, (mrem/yr)/(pCi/cm**3):			
A-1	Ac-227+D , soil density = 1.0 g/cm**3	2.760E+00	2.760E+00	DCF1(1,1)
A-1	Ac-227+D , soil density = 1.8 g/cm**3	1.520E+00	1.520E+00	DCF1(1,2)
A-1				
A-1	Pa-231 , soil density = 1.0 g/cm**3	2.210E-01	2.210E-01	DCF1(2,1)
A-1	Pa-231 , soil density = 1.8 g/cm**3	1.210E-01	1.210E-01	DCF1(2,2)
A-1				
A-1	Pb-210+D , soil density = 1.0 g/cm**3	4.870E-03	4.870E-03	DCF1(3,1)
A-1	Pb-210+D , soil density = 1.8 g/cm**3	2.310E-03	2.310E-03	DCF1(3,2)
A-1				
A-1	Ra-226+D , soil density = 1.0 g/cm**3	1.550E+01	1.550E+01	DCF1(4,1)
A-1	Ra-226+D , soil density = 1.8 g/cm**3	8.560E+00	8.560E+00	DCF1(4,2)
A-1				
A-1	Ra-228+D , soil density = 1.0 g/cm**3	8.180E+00	8.180E+00	DCF1(5,1)
A-1	Ra-228+D , soil density = 1.8 g/cm**3	4.510E+00	4.510E+00	DCF1(5,2)
A-1				
A-1	Th-228+D , soil density = 1.0 g/cm**3	1.330E+01	1.330E+01	DCF1(6,1)
A-1	Th-228+D , soil density = 1.8 g/cm**3	7.360E+00	7.360E+00	DCF1(6,2)
A-1				
A-1	Th-230 , soil density = 1.0 g/cm**3	2.110E-03	2.110E-03	DCF1(7,1)
A-1	Th-230 , soil density = 1.8 g/cm**3	1.030E-03	1.030E-03	DCF1(7,2)
A-1				
A-1	Th-232 , soil density = 1.0 g/cm**3	1.350E-03	1.350E-03	DCF1(8,1)
A-1	Th-232 , soil density = 1.8 g/cm**3	6.040E-04	6.040E-04	DCF1(8,2)
A-				
A	U-234 , soil density = 1.0 g/cm**3	1.580E-03	1.580E-03	DCF1(9,1)
A-	U-234 , soil density = 1.8 g/cm**3	6.970E-04	6.970E-04	DCF1(9,2)
A-1				
A-1	U-238+D , soil density = 1.0 g/cm**3	1.270E-01	1.270E-01	DCF1(10,1)
A-1	U-238+D , soil density = 1.8 g/cm**3	6.970E-02	6.970E-02	DCF1(10,2)

Menu	Parameter	Current Value	Default	Parameter Name
A-3	Depth factors, ground external gamma, dimensionless:			
A-3	Ac-227+D , soil density = 1.0 g/cm**3, thickness = .15 m	7.900E-01	7.900E-01	FD(1,1,1)
A-3	Ac-227+D , soil density = 1.0 g/cm**3, thickness = 0.5 m	9.700E-01	9.700E-01	FD(1,2,1)
	Ac-227+D , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,1)
	Ac-227+D , soil density = 1.8 g/cm**3, thickness = .15 m	9.100E-01	9.100E-01	FD(1,1,2)
A-3	Ac-227+D , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(1,2,2)
A-3	Ac-227+D , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,2)
A-3				
A-3	Pa-231 , soil density = 1.0 g/cm**3, thickness = .15 m	7.900E-01	7.900E-01	FD(2,1,1)
A-3	Pa-231 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(2,2,1)
A-3	Pa-231 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,1)
A-3	Pa-231 , soil density = 1.8 g/cm**3, thickness = .15 m	9.200E-01	9.200E-01	FD(2,1,2)
A-3	Pa-231 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(2,2,2)
A-3	Pa-231 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,2)
A-3				

Dose Conversion Factor (and Related) Parameter Summary (continued)
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Menu	Parameter	Current Value	Default	Parameter Name
A-3	Pb-210+D , soil density = 1.0 g/cm**3, thickness = .15 m	8.800E-01	8.800E-01	FD(3,1,1)
A-3	Pb-210+D , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(3,2,1)
A-3	Pb-210+D , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,1)
A-3	Pb-210+D , soil density = 1.8 g/cm**3, thickness = .15 m	9.700E-01	9.700E-01	FD(3,1,2)
A-3	Pb-210+D , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(3,2,2)
A-3	Pb-210+D , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,2)
A-3				
A-3	Ra-226+D , soil density = 1.0 g/cm**3, thickness = .15 m	6.300E-01	6.300E-01	FD(4,1,1)
	Ra-226+D , soil density = 1.0 g/cm**3, thickness = 0.5 m	9.200E-01	9.200E-01	FD(4,2,1)
	Ra-226+D , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(4,3,1)
A-3	Ra-226+D , soil density = 1.8 g/cm**3, thickness = .15 m	8.500E-01	8.500E-01	FD(4,1,2)
A-3	Ra-226+D , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(4,2,2)
A-3	Ra-226+D , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(4,3,2)
A-3				
A-3	Ra-228+D , soil density = 1.0 g/cm**3, thickness = .15 m	6.800E-01	6.800E-01	FD(5,1,1)
A-3	Ra-228+D , soil density = 1.0 g/cm**3, thickness = 0.5 m	9.700E-01	9.700E-01	FD(5,2,1)
A-3	Ra-228+D , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(5,3,1)
A-3	Ra-228+D , soil density = 1.8 g/cm**3, thickness = .15 m	8.500E-01	8.500E-01	FD(5,1,2)
A-3	Ra-228+D , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(5,2,2)
A-3	Ra-228+D , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(5,3,2)
A-3				
A-3	Th-228+D , soil density = 1.0 g/cm**3, thickness = .15 m	6.100E-01	6.100E-01	FD(6,1,1)
A-3	Th-228+D , soil density = 1.0 g/cm**3, thickness = 0.5 m	9.400E-01	9.400E-01	FD(6,2,1)
A-3	Th-228+D , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(6,3,1)
A-3	Th-228+D , soil density = 1.8 g/cm**3, thickness = .15 m	7.500E-01	7.500E-01	FD(6,1,2)
A-3	Th-228+D , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(6,2,2)
A-3	Th-228+D , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(6,3,2)
A-3				
A-3	Th-230 , soil density = 1.0 g/cm**3, thickness = .15 m	9.300E-01	9.300E-01	FD(7,1,1)
A-3	Th-230 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(7,2,1)
A-3	Th-230 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(7,3,1)
A-3	Th-230 , soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(7,1,2)
A-3	Th-230 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(7,2,2)
A-3	Th-230 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(7,3,2)
A-3				
A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = .15 m	9.500E-01	9.500E-01	FD(8,1,1)
A	Th-232 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(8,2,1)
	Th-232 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(8,3,1)
A-	Th-232 , soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(8,1,2)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(8,2,2)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(8,3,2)
A-3				
A-3	U-234 , soil density = 1.0 g/cm**3, thickness = .15 m	9.000E-01	9.000E-01	FD(9,1,1)

A-3	U-234 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(9,2,1)
A-3	U-234 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(9,3,1)
A-3	U-234 , soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(9,1,2)
/	U-234 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(9,2,2)
A	U-234 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(9,3,2)
A-3				

Dose Conversion Factor (and Related) Parameter Summary (continued)
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Menu	Parameter	Current Value	Default	Parameter Name
A-3	U-238+D , soil density = 1.0 g/cm**3, thickness = .15 m	7.800E-01	7.800E-01	FD(10,1,1)
A-3	U-238+D , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(10,2,1)
A-3	U-238+D , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(10,3,1)
A-3	U-238+D , soil density = 1.8 g/cm**3, thickness = .15 m	8.800E-01	8.800E-01	FD(10,1,2)
A-3	U-238+D , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(10,2,2)
A-3	U-238+D , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(10,3,2)
B-1	Dose conversion factors fo inhalation, mrem/pCi:			
B-1	Ac-227+D	6.700E+00	6.700E+00	DCF2(1)
B-1	Pa-231	1.300E+00	1.300E+00	DCF2(2)
B-1	Pb-210+D	2.100E-02	2.100E-02	DCF2(3)
B-1	Ra-226+D	7.900E-03	7.900E-03	DCF2(4)
B-1	Ra-228+D	4.500E-03	4.500E-03	DCF2(5)
B-1	Th-228+D	3.100E-01	3.100E-01	DCF2(6)
B-1	Th-230	3.200E-01	3.200E-01	DCF2(7)
B-1	Th-232	1.600E+00	1.600E+00	DCF2(8)
B-1	U-234	1.300E-01	1.300E-01	DCF2(9)
B	-238+D	1.200E-01	1.200E-01	DCF2(10)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.500E-02	1.500E-02	DCF3(1)
D-1	Pa-231	1.100E-02	1.100E-02	DCF3(2)
D-1	Pb-210+D	6.700E-03	6.700E-03	DCF3(3)
D-1	Ra-226+D	1.100E-03	1.100E-03	DCF3(4)
D-1	Ra-228+D	1.200E-03	1.200E-03	DCF3(5)
D-1	Th-228+D	7.500E-04	7.500E-04	DCF3(6)
D-1	Th-230	5.300E-04	5.300E-04	DCF3(7)
D-1	Th-232	2.800E-03	2.800E-03	DCF3(8)
D-1	U-234	2.600E-04	2.600E-04	DCF3(9)
D-1	U-238+D	2.500E-04	2.500E-04	DCF3(10)
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	a-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,3)
D-3				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(5,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(5,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(5,3)

Dose Conversion Factor (and Related) Parameter Summary (continued)
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Menu	Parameter	Current Value	Default	Parameter Name
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(6,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(7,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(8,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(8,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(8,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(9,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(9,2)
D-34	U-234 , milk/livestoc intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(9,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(10,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(10,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(10,3)
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	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(5,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(5,2)
D-5				
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(6,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(6,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(7,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(7,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(8,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(8,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(9,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(9,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(10,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(10,2)

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)	3.180E+04	1.000E+04	---	AREA

R011	Thickness of contaminated zone (m)		4.570E+00	2.000E+00	---	THICKO
R011	Length parallel to aquifer flow (m)		1.330E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)		1.000E+02	3.000E+01	---	BRDL
	Time since placement of material (yr)		3.000E+01	0.000E+00	---	TI
	Times for calculations (yr)		3.100E+01	1.000E+00	---	T(2)
R011	Times for calculations (yr)		4.100E+01	3.000E+00	---	T(3)
R011	Times for calculations (yr)		5.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)		1.000E+02	3.000E+01	---	T(5)
R011	Times for calculations (yr)		5.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)		1.000E+03	3.000E+02	---	T(7)
R011	Times for calculations (yr)		1.500E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)		2.000E+03	3.000E+03	---	T(9)
R011	Times for calculations (yr)		5.000E+03	1.000E+04	---	T(10)
R012	Initial principal radionuclide (pCi/g):	Pa-231	4.900E+00	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g):	Pb-210	2.100E+01	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g):	Ra-226	1.550E+01	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g):	Ra-228	1.650E+01	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g):	Th-228	1.650E+01	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g):	Th-230	2.100E+01	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g):	Th-232	1.650E+01	0.000E+00	---	S1(8)
R012	Initial principal radionuclide (pCi/g):	U-234	2.100E+01	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g):	U-238	2.100E+01	0.000E+00	---	S1(10)
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):	Ra-228	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L):	Th-228	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L):	Th-230	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L):	Th-232	not used	0.000E+00	---	W1(8)
R012	Concentration in groundwater (pCi/L):	U-234	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L):	U-238	not used	0.000E+00	---	W1(10)
R013	Cover depth (m)		1.220E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)		1.730E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)		2.790E-04	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)		2.610E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)		0.000E+00	1.000E-03	---	VCZ
R013	Contaminated zone total porosity		5.100E-01	1.000E-01	---	TPCZ
R013	Contaminated zone effective porosity		2.100E-01	1.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)		5.900E+05	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter		3.000E+00	5.300E+00	---	BCZ
R013	Humidity in air (g/cm**3)		not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient		9.500E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)		9.910E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)		2.300E-01	2.000E-01	---	RI
R013	Irrigation mode		overhead	overhead	---	IDITCH
R013	Runoff coefficient		6.000E-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)	1.600E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.200E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.130E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	3.000E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	7.750E+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)	3.050E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL

R014	Well pumping rate (m**3/yr)	8.574E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
	Unsat. zone 1, thickness (m)	3.050E+00	4.000E+00	---	H(1)
	Unsat. zone 1, soil density (g/cm**3)	1.600E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.675E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	1.040E+01	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	4.750E-01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Pa-231				
R016	Contaminated zone (cm**3/g)	1.276E+02	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	2.300E+01	5.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	2.300E+01	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.057E-05	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)	3.500E+02	1.000E+02	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	3.500E+02	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.625E-05	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)	1.721E+01	7.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	7.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	5.000E+01	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.523E-04	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	7.000E+01	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	5.000E+01	7.000E+01	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.750E-05	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)

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-228				
R016	Contaminated zone (cm**3/g)	1.000E+10	6.000E+04	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+01	6.000E+04	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	1.000E+01	6.000E+04	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.626E-13	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	1.000E+10	6.000E+04	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+01	6.000E+04	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	1.000E+01	6.000E+04	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.626E-13	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	3.610E+07	6.000E+04	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+01	6.000E+04	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	1.000E+01	6.000E+04	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.274E-11	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for U-234				

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Contaminated zone (cm**3/g)	1.000E+10	5.000E+01	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	4.500E+01	5.000E+01	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	4.500E+01	5.000E+01	---	DCNUCS(9)
	Leach rate (/yr)	0.000E+00	0.000E+00	2.626E-13	ALEACH(9)
	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	1.740E+08	5.000E+01	---	DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	4.500E+01	5.000E+01	---	DCNUCU(10,1)
R016	Saturated zone (cm**3/g)	4.500E+01	5.000E+01	---	DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.509E-11	ALEACH(10)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(10)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.311E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	1.050E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	2.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	3.500E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.000E-01	2.500E-01	---	FOTD
R017	Shape factor, external gamma	1.000E+00	1.000E+00	---	FS1

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	Outer annular radius (m) = «(1/D)	not used	1.000E+00	---	FRACA(1)
R017	Outer annular radius (m) = «(10/D)	not used	1.000E+00	---	FRACA(2)
R017	Outer annular radius (m) = «(20/D)	not used	1.000E+00	---	FRACA(3)
R017	Outer annular radius (m) = «(50/D)	not used	1.000E+00	---	FRACA(4)
R017	Outer annular radius (m) = «(100/D)	not used	1.000E+00	---	FRACA(5)
R017	Outer annular radius (m) = «(200/D)	not used	1.000E+00	---	FRACA(6)
R017	Outer annular radius (m) = «(500/D)	not used	1.000E+00	---	FRACA(7)
R017	Outer annular radius (m) = «(1000/D)	not used	1.000E+00	---	FRACA(8)
R017	Outer annular radius (m) = «(5000/D)	not used	1.000E+00	---	FRACA(9)
R017	Outer annular radius (m) = «(1.E+04/D)	not used	1.000E+00	---	FRACA(10)
R017	Outer annular radius (m) = «(1.E+05/D)	not used	0.000E+00	---	FRACA(11)
R017	Outer annular radius (m) = «(1.E+06/D)	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.660E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.100E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	1.000E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.800E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	1.000E+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)	7.300E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	1.000E+00	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.100E+01	FMEAT
R018	Contamination fraction of milk	-1	-1	0.100E+01	FMILK

R019	Livestock fodder intake for meat (kg/day)	4.400E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	6.700E+01	5.500E+01	---	LFI6
R	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R	Livestock water intake for milk (L/day)	6.000E+01	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	2.500E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	1.000E+00	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
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

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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
ST	torage times of contaminated foodstuffs (days):				
S	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.400E+01	1.000E+00	---	STOR_T(2)
STOR	Milk	3.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	6.000E+00	2.000E+01	---	STOR_T(4)
STOR	Fish	1.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	1.000E+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	9.000E+01	1.000E+00	---	STOR_T(9)
R021	Thickness of building foundation (m)	1.500E-01	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	2.400E+00	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	4.000E-01	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	1.000E-01	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	5.000E-02	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	3.000E-02	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	2.000E-06	2.000E-06	---	DIFCV
R021	in foundation material	3.000E-07	3.000E-07	---	DIFFL
R021	in contaminated zone soil	6.300E-06	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMIX
R021	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	5.000E-01	5.000E-01	---	REXG
R021	Height of the building (room) (m)	2.500E+00	2.500E+00	---	HRM
R021	Building interior area factor	0.000E+00	0.000E+00	code computed (time dependent)	FAI
R021	Building depth below ground surface (m)	1.000E+00	1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	2.000E-02	2.500E-01	---	EMANA(1)
R02	Emanating power of Rn-220 gas	2.000E-02	1.500E-01	---	EMANA(2)

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	active

Contaminated Zone Dimensions

Area:	31800.00 square meters
Thickness:	4.57 meters
Cover Depth:	1.22 meters

Initial Soil Concentrations, pCi/g

Pa-231	4.900E+00
Pb-210	2.100E+01
Ra-226	1.550E+01
Ra-228	1.650E+01
Th-228	1.650E+01
Th-230	2.100E+01
Th-232	1.650E+01
U-234	2.100E+01
U-238	2.100E+01

0

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 100 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

ears):	0.000E+00	3.100E+01	4.1[illegible]0E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	1.500E+03	2.000E+03	5.000E+03
SE(t):	9.117E+01	9.178E+01	[illegible]9.198E+01	9.216E+01	9.315E+01	1.011E+02	1.095E+02	1.158E+02	1.223E+02	7.912E+02
M(t):	9.117E-01	9.178E-01	9.198E-01	9.216E-01	9.315E-01	1.011E+00	1.095E+00	1.158E+00	1.223E+00	7.912E+00

0Maximum TDOSE(t): 7.912E+02 mrem/yr at t = 5.000E+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
0
Water Independent Pathways (Inhalation excludes radon)

0 Radio- Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	Soil f
Pa-231	1.114E-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
Pb-210	6.107E-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
Ra-226	3.782E-05	0.0000	0.000E+00	0.0000	9.117E+01	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Ra-228	1.712E-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
Th-228	1.222E-03	0.0000	0.000E+00	0.0000	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	1.028E-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
Th-232	8.327E-22	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
U-234	1.143E-19	0.0000	0.000E+00	0.0000	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	4.483E-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
Total	1.277E-03	0.0000	0.000E+00	0.0000	9.117E+01	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0

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
0
Water Dependent Pathways

0 Ra[illegible] Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathw mrem/yr	All Pathw f
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	1.114E-09	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	6.107E-14	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	9.117E+01	1
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	1.712E-05	0
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	1.222E-03	0
T	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.028E-20	0
T	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.327E-22	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	1.143E-19	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	4.483E-08	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	9.117E+01	1

0*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 = 3.100E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0 Radio- Nuclide	Ground mrem/yr	fract.	Inhalation mrem/yr	fract.	Radon mrem/yr	fract.	Plant mrem/yr	fract.	Meat mrem/yr	fract.	Milk mrem/yr	fract.	Soil mrem/yr	f
Pa-231	2.311E-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
Pb-210	2.812E-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
Ra-226	4.115E-05	0.0000	0.000E+00	0.0000	9.013E+01	0.9820	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Ra-228	4.778E-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
Th-228	1.749E-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
Th-230	7.554E-07	0.0000	0.000E+00	0.0000	1.655E+00	0.0180	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Th-232	1.291E-03	0.0000	0.000E+00	0.0000	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	1.057E-10	0.0000	0.000E+00	0.0000	2.316E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
U-238	5.046E-08	0.0000	0.000E+00	0.0000	6.780E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Total	1.381E-03	0.0000	0.000E+00	0.0000	9.178E+01	1.0000	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 = 3.100E+01 years

0 Water Dependent Pathways

0 Radio- Nuclide	Water mrem/yr	fract.	Fish mrem/yr	fract.	Radon mrem/yr	fract.	Plant mrem/yr	fract.	Meat mrem/yr	fract.	Milk mrem/yr	fract.	All Pathw mrem/yr	f
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	2.311E-08	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	2.812E-14	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	9.013E+01	0
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	4.778E-05	0
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	1.749E-08	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	1.655E+00	0
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	1.291E-03	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	2.316E-04	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	5.724E-08	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	9.178E+01	1

0*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 = 4.100E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0 Radio- Nu	Ground mrem/yr	fract.	Inhalation mrem/yr	fract.	Radon mrem/yr	fract.	Plant mrem/yr	fract.	Meat mrem/yr	fract.	Milk mrem/yr	fract.	Soil mrem/yr	f
Pa-231	2.779E-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
Pb-210	2.189E-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
Ra-226	4.228E-05	0.0000	0.000E+00	0.0000	8.979E+01	0.9762	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Ra-228	1.471E-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
Th-228	4.786E-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

Th-230	1.030E-06	0.0000	0.000E+00	0.0000	2.187E+00	0.0238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Th-232	1.358E-03	0.0000	0.000E+00	0.0000	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	1.908E-10	0.0000	0.000E+00	0.0000	4.051E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
U-238	5.242E-08	0.0000	0.000E+00	0.0000	1.570E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	1.416E-03	0.0000	0.000E+00	0.0000	9.198E+01	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0

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 = 4.100E+01 years

0 Water Dependent Pathways

0 Radio-Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathw mrem/yr	All Pathw f
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	2.779E-08	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	2.189E-14	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	8.979E+01	0
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	1.471E-05	0
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	4.786E-10	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	2.187E+00	0
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	1.358E-03	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	4.051E-04	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	6.811E-08	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	9.198E+01	1

0*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 = 5.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0 Radio-Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	Soil f
Pa-231	3.140E-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
Pb-210	1.748E-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
Ra-226	4.333E-05	0.0000	0.000E+00	0.0000	8.949E+01	0.9711	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Ra-228	5.091E-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
Th-228	1.877E-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
Th-230	1.290E-06	0.0000	0.000E+00	0.0000	2.665E+00	0.0289	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Th-232	1.399E-03	0.0000	0.000E+00	0.0000	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	2.918E-10	0.0000	0.000E+00	0.0000	6.026E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
U-238	5.425E-08	0.0000	0.000E+00	0.0000	2.848E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	1.448E-03	0.0000	0.000E+00	0.0000	9.216E+01	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0

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 = 5.000E+01 years

0 Water Dependent Pathways

0 Radio-Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathw mrem/yr	All Pathw f
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	3.140E-08	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	1.748E-14	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	8.949E+01	0
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	5.091E-06	0
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	1.877E-11	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	2.665E+00	0
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	1.399E-03	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	6.026E-04	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	8.273E-08	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	9.216E+01	1

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
0 Water Independent Pathways (Inhalation excludes radon)

0 Radio-Nuclide	Ground mrem/yr	fract.	Inhalation mrem/yr	fract.	Radon mrem/yr	fract.	Plant mrem/yr	fract.	Meat mrem/yr	fract.	Milk mrem/yr	fract.	Soil mrem/yr	f
Pa-231	4.631E-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
Pb-210	5.002E-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
Ra-226	4.964E-05	0.0000	0.000E+00	0.0000	8.784E+01	0.9430	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Ra-228	1.403E-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
Th-228	2.884E-19	0.0000	0.000E+00	0.0000	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	2.999E-06	0.0000	0.000E+00	0.0000	5.307E+00	0.0570	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Th-232	1.591E-03	0.0000	0.000E+00	0.0000	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	1.363E-09	0.0000	0.000E+00	0.0000	2.412E-03	0.0000	0.000E+00	0.000[illegible]	[illegible]0E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
U-238	6.564E-08	0.0000	0.000E+00	0.0000	2.286E-07	0.0000	0.000E+00	0.000[illegible]	[illegible]E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	1.644E-03	0.0000	0.000E+00	0.0000	9.315E+01	1.0000	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+02 years
0 Water Dependent Pathways

0 Radio-Nuclide	Water mrem/yr	fract.	Fish mrem/yr	fract.	Radon mrem/yr	fract.	Plant mrem/yr	fract.	Meat mrem/yr	fract.	Milk mrem/yr	fract.	All Pathw mrem/yr	f
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	4.631E-08	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	5.002E-15	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	8.784E+01	0
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	1.403E-08	0
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	2.884E-19	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	5.307E+00	0
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	1.591E-03	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	2.412E-03	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	2.943E-07	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	9.315E+01	1

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+02 years
0 Water Independent Pathways (Inhalation excludes radon)

0 Radio-Nuclide	Ground mrem/yr	fract.	Inhalation mrem/yr	fract.	Radon mrem/yr	fract.	Plant mrem/yr	fract.	Meat mrem/yr	fract.	Milk mrem/yr	fract.	Soil mrem/yr	f
Pa-231	2.627E-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
Pb-210	2.253E-19	0.0000	0.000E+00	0.0000	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	1.473E-04	0.0000	0.000E+00	0.0000	7.541E+01	0.7457	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Ra-228	4.611E-29	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
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
Th-230	5.009E-05	0.0000	0.000E+00	0.0000	2.565E+01	0.2536	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Th-232	4.333E-03	0.0000	0.000E+00	0.0000	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-[illegible]	1.183E-07	0.0000	0.000E+00	0.0000	6.056E-02	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
U-[illegible]	3.017E-07	0.0000	0.000E+00	0.0000	2.925E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	4.531E-03	0.0000	0.000E+00	0.0000	1.011E+02	1.0000	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 = 5.000E+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
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	2.627E-07	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	2.253E-19	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	7.541E+01	0
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	4.611E-29	0
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
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	2.565E+01	0
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	4.333E-03	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	6.056E-02	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	2.956E-05	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	1.011E+02	1

0*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	f
Pa-231	2.187E-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
Pb-210	8.309E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Ra-226	5.733E-04	0.0000	0.000E+00	0.0000	6.089E+01	0.5561	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
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
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
Th-230	4.552E-04	0.0000	0.000E+00	0.0000	4.834E+01	0.4415	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Th-232	1.522E-02	0.0001	0.000E+00	0.0000	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	2.249E-06	0.0000	0.000E+00	0.0000	2.389E-01	0.0022	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
U-238	2.032E-06	0.0000	0.000E+00	0.0000	2.361E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Total	1.625E-02	0.0001	0.000E+00	0.0000	1.095E+02	0.9999	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 Pathw	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
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	2.187E-06	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	8.309E-25	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	6.089E+01	0
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
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
Th-230	3.051E-08	0.0000	2.305E-09	0.0000	5.581E-11	0.0000	1.816E-09	0.0000	4.506E-11	0.0000	1.401E-11	0.0000	4.834E+01	0
Th-232	4.649E-05	0.0000	3.405E-06	0.0000	9.931E-09	0.0000	2.773E-06	0.0000	1.045E-07	0.0000	1.053E-07	0.0000	1.527E-02	0
U-234	7.575E-11	0.0000	1.249E-11	0.0000	3.780E-14	0.0000	4.511E-12	0.0000	5.154E-13	0.0000	3.778E-13	0.0000	2.389E-01	0
U-238	3.773E-11	0.0000	4.737E-12	0.0000	3.327E-12	0.0000	2.258E-12	0.0000	4.495E-13	0.0000	6.927E-13	0.0000	2.381E-04	0
Total	4.652E-05	0.0000	3.407E-06	0.0000	9.990E-09	0.0000	2.775E-06	0.0000	1.046E-07	0.0000	1.053E-07	0.0000	1.095E+02	1

*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 = 1.500E+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
Pa-231	1.822E-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
	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
R	2.232E-03	0.0000	0.000E+00	0.0000	4.801E+01	0.4147	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
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
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
Th-230	3.124E-03	0.0000	0.000E+00	0.0000	6.718E+01	0.5803	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Th-232	5.375E-02	0.0005	0.000E+00	0.0000	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	2.417E-05	0.0000	0.000E+00	0.0000	5.199E-01	0.0045	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
U-238	1.369E-05	0.0000	0.000E+00	0.0000	7.872E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	e
Total	5.916E-02	0.0005	0.000E+00	0.0000	1.157E+02	0.9995	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0

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 = 1.500E+03 years

0
Water Dependent Pathways

0

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
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	1.822E-05	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	4.801E+01	0
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
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
Th-230	1.522E-07	0.0000	1.135E-08	0.0000	1.206E-09	0.0000	9.063E-09	0.0000	2.949E-10	0.0000	2.253E-10	0.0000	6.719E+01	0
Th-232	2.266E-04	0.0000	1.657E-05	0.0000	5.021E-08	0.0000	1.352E-05	0.0000	5.172E-07	0.0000	5.313E-07	0.0000	5.401E-02	0
U-234	9.627E-10	0.0000	1.067E-10	0.0000	3.909E-12	0.0000	5.731E-11	0.0000	3.675E-12	0.0000	2.632E-12	0.0000	5.199E-01	0
U-238	2.249E-10	0.0000	2.761E-11	0.0000	1.869E-11	0.0000	1.345E-11	0.0000	2.544E-12	0.0000	3.895E-12	0.0000	8.009E-04	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	e
	2.267E-04	0.0000	1.65[illegible]-05	0.0000	5.143E-08	0.0000	1.353E-[illegible]5	0.0000	5.175E-07	0.0000	5.315E-07	0.0000	1.158E+02	1

0*[illegible] 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 = 2.000E+03 years

0
Water Independent Pathways (Inhalation excludes radon)

0

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
Pa-231	1.518E-04	0.0000	0.000E+00	0.0000	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	8.691E-03	0.0001	0.000E+00	0.0000	3.777E+01	0.3090	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
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
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
Th-230	1.918E-02	0.0002	0.000E+00	0.0000	8.337E+01	0.6819	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Th-232	1.915E-01	0.0016	0.000E+00	0.0000	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	2.060E-04	0.0000	0.000E+00	0.0000	8.956E-01	0.0073	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
U-238	9.232E-05	0.0000	0.000E+00	0.0000	1.845E-03	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	e
Total	2.198E-01	0.0018	0.000E+00	0.0000	1.220E+02	0.9982	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0

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 = 2.000E+03 years

0
Water Dependent Pathways

0

R	Water		Fish		Radon		Plant		Meat		Milk		All Pathw	
k	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
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	1.518E-04	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	3.778E+01	0
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

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	0.000E+00	0
Th-230	2.531E-07	0.0000	1.852E-08	0.0000	3.571E-09	0.0000	1.507E-08	0.0000	6.037E-10	0.0000	6.330E-10	0.0000	8.339E+01	0		
Th-232	3.627E-04	0.0000	2.653E-05	0.0000	8.003E-08	0.0000	2.164E-05	0.0000	8.264E-07	0.0000	8.471E-07	0.0000	1.919E-01	0		
	2.807E-09	0.0000	2.734E-10	0.0000	2.090E-11	0.0000	1.671E-10	0.0000	9.236E-12	0.0000	7.345E-12	0.0000	8.958E-01	0		
U	5.134E-10	0.0000	6.070E-11	0.0000	3.853E-11	0.0000	3.070E-11	0.0000	5.311E-12	0.0000	8.037E-12	0.0000	1.937E-03	0		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	e
Total	3.630E-04	0.0000	2.655E-05	0.0000	8.366E-08	0.0000	2.165E-05	0.0000	8.270E-07	0.0000	8.478E-07	0.0000	1.223E+02	1		

0*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 = 5.000E+03 years

0
Water Independent Pathways (Inhalation excludes radon)

0 Radio-Nuclide	Ground mrem/yr	fract.	Inhalation mrem/yr	fract.	Radon mrem/yr	fract.	Plant mrem/yr	fract.	Meat mrem/yr	fract.	Milk mrem/yr	fract.	Soil mrem/yr	f
Pa-231	3.482E+00	0.0044	9.835E+00	0.0124	0.000E+00	0.0000	5.195E+01	0.0657	1.407E+01	0.0178	1.052E-01	0.0001	5.276E+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	3.811E+00	0.0048	7.526E-03	0.0000	8.290E+00	0.0105	8.239E+00	0.0104	4.292E-01	0.0005	4.889E-01	0.0006	3.359E-01	0
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
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
Th-230	6.543E+01	0.0827	2.117E+00	0.0027	1.423E+02	0.1799	1.407E+02	0.1778	7.309E+00	0.0092	8.329E+00	0.0105	6.212E+00	0
Th-232	1.051E+02	0.1329	9.785E+00	0.0124	2.268E+00	0.0029	7.574E+01	0.0957	3.220E+00	0.0041	6.181E+00	0.0078	4.004E+00	0
U-234	2.130E+00	0.0027	9.289E-01	0.0012	4.619E+00	0.0058	5.752E+00	0.0073	3.126E-01	0.0004	4.857E-01	0.0006	4.027E-01	0
U-238	7.925E-01	0.0010	7.932E-01	0.0010	2.614E-02	0.0000	1.207E+00	0.0015	7.661E-02	0.0001	2.155E-01	0.0003	2.734E-01	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	e
Total	1.808E+02	0.2285	2.347E+01	0.0297	1.575E+02	0.1991	2.836E+02	0.3584	2.542E+01	0.0321	1.580E+01	0.0200	1.658E+01	0

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 = 5.000E+03 years

0
Water Dependent Pathways

0 Radio-Nuclide	Water mrem/yr	fract.	Fish mrem/yr	fract.	Radon mrem/yr	fract.	Plant mrem/yr	fract.	Meat mrem/yr	fract.	Milk mrem/yr	fract.	All Pathw mrem/yr	f
Pa-231	8.042E+01	0.1016	7.962E-01	0.0010	0.000E+00	0.0000	4.787E+00	0.0061	2.029E+00	0.0026	3.137E-02	0.0000	1.728E+02	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	2.160E+01	0
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
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
Th-230	2.994E-07	0.0000	2.004E-08	0.0000	1.228E-08	0.0000	1.787E-08	0.0000	1.292E-09	0.0000	2.073E-09	0.0000	3.724E+02	0
Th-232	3.536E-04	0.0000	2.592E-05	0.0000	7.219E-08	0.0000	2.391E-05	0.0000	1.012E-06	0.0000	6.958E-07	0.0000	2.063E+02	0
U-234	1.689E-08	0.0000	1.492E-09	0.0000	3.517E-10	0.0000	1.007E-09	0.0000	6.561E-11	0.0000	7.591E-11	0.0000	1.471E+01	0
U-238	5.125E-09	0.0000	5.372E-10	0.0000	2.636E-10	0.0000	3.060E-10	0.0000	3.848E-11	0.0000	5.523E-11	0.0000	3.385E+00	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	e
Total	8.042E+01	0.1016	7.962E-01	0.0010	8.508E-08	0.0000	4.787E+00	0.0061	2.029E+00	0.0026	3.137E-02	0.0000	7.912E+02	1

0*Sum of all water independent and dependent pathways.

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

0Parent (i)	Product (j)	Branch Fraction	t=	DSR(j,t) (mrem/yr)/(pCi/g) 0.000E+00	3.100E+01	4.100E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	1.500E+03	2.000E+03	5.000E+0
Pa-231	Pa-231	1.000E+00		2.273E-10	2.606E-10	2.724E-10	2.834E-10	3.533E-10	2.061E-09	1.868E-08	1.693E-07	1.535E-06	1.866E+0
Pa-231	Ac-227	1.000E+00		0.000E+00	4.455E-09	5.398E-09	6.125E-09	9.098E-09	5.155E-08	4.277E-07	3.549E-06	2.944E-05	1.660E+0
P	ΣDSR(j)			2.273E-10	4.716E-09	5.671E-09	6.409E-09	9.452E-09	5.361E-08	4.464E-07	3.718E-06	3.098E-05	3.526E+0
0P	Pb-210	1.000E+00		2.908E-15	1.339E-15	1.042E-15	8.323E-16	2.382E-16	1.073E-20	3.957E-26	1.460E-31	5.384E-37	0.000E+0
0Ra-226	Ra-226	1.000E+00		5.882E+00	5.815E+00	5.793E+00	5.774E+00	5.667E+00	4.865E+00	3.928E+00	3.098E+00	2.438E+00	1.020E+0
Ra-226	Pb-210	1.000E+00		0.000E+00	2.149E-15	2.649E-15	3.052E-15	4.892E-15	4.639E-14	7.269E-13	1.139E-11	1.784E-10	3.735E-0
Ra-226	ΣDSR(j)			5.882E+00	5.815E+00	5.793E+00	5.774E+00	5.667E+00	4.865E+00	3.928E+00	3.098E+00	2.438E+00	1.394E+0
0Ra-228	Ra-228	1.000E+00		1.037E-06	2.757E-08	8.554E-09	2.984E-09	8.583E-12	4.025E-32	0.000E+00	0.000E+00	0.000E+00	0.000E+0
Ra-228	Th-228	1.000E+00		0.000E+00	2.868E-06	8.828E-07	3.056E-07	8.419E-10	2.795E-30	0.000E+00	0.000E+00	0.000E+00	0.000E+0

Ra-228	ΣDSR(j)		1.037E-06	2.896E-06	8.913E-07	3.085E-07	8.504E-10	2.835E-30	0.000E+00	0.000E+00	0.000E+00	0.000E+0
0Th-228	Th-228	1.000E+00	7.406E-05	1.060E-09	2.901E-11	1.138E-12	1.748E-20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+0
0Th-230	Th-230	1.000E+00	4.897E-22	6.568E-22	7.220E-22	7.862E-22	1.262E-21	5.572E-20	1.628E-09	7.803E-09	1.245E-08	1.683E-0
	Ra-226	1.000E+00	0.000E+00	7.879E-02	1.041E-01	1.269E-01	2.527E-01	1.221E+00	2.302E+00	3.199E+00	3.971E+00	1.293E+0
)	Pb-210	1.000E+00	0.000E+00	1.678E-17	2.856E-17	4.159E-17	1.566E-16	1.079E-14	5.574E-12	6.086E-11	3.725E-10	4.639E+0
Th-230	ΣDSR(j)		4.897E-22	7.879E-02	1.041E-01	1.269E-01	2.527E-01	1.221E+00	2.302E+00	3.199E+00	3.971E+00	1.773E+0
0Th-232	Th-232	1.000E+00	5.047E-23	6.850E-23	7.559E-23	8.260E-23	1.352E-22	6.966E-21	2.405E-06	1.158E-05	1.856E-05	9.480E-0
Th-232	Ra-228	1.000E+00	0.000E+00	1.123E-06	1.181E-06	1.223E-06	1.450E-06	5.544E-06	2.984E-05	1.595E-04	8.487E-04	7.260E+0
Th-232	Th-228	1.000E+00	0.000E+00	7.711E-05	8.111E-05	8.355E-05	9.496E-05	2.571E-04	8.932E-04	3.102E-03	1.077E-02	4.296E+0
Th-232	ΣDSR(j)		5.047E-23	7.823E-05	8.229E-05	8.477E-05	9.641E-05	2.626E-04	9.254E-04	3.273E-03	1.163E-02	1.250E+0
0U-234	U-234	1.000E+00	5.441E-21	7.151E-21	7.809E-21	8.454E-21	1.313E-20	4.457E-19	3.650E-17	2.990E-15	2.449E-13	1.239E-0
U-234	Th-230	1.000E+00	0.000E+00	1.833E-25	2.665E-25	3.539E-25	1.137E-24	2.512E-22	1.660E-12	3.834E-11	1.214E-10	7.693E-0
U-234	Ra-226	1.000E+00	0.000E+00	1.103E-05	1.929E-05	2.870E-05	1.149E-04	2.884E-03	1.138E-02	2.476E-02	4.266E-02	4.196E-0
U-234	Pb-210	1.000E+00	0.000E+00	1.680E-21	3.862E-21	6.979E-21	5.680E-20	2.386E-17	2.789E-12	1.442E-11	3.020E-11	1.494E-0
U-234	ΣDSR(j)		5.441E-21	1.103E-05	1.929E-05	2.870E-05	1.149E-04	2.884E-03	1.138E-02	2.476E-02	4.266E-02	7.005E-0
0U-238	U-238	1.000E+00	2.135E-09	2.403E-09	2.496E-09	2.583E-09	3.126E-09	1.436E-08	9.666E-08	6.504E-07	4.376E-06	1.561E-0
U-238	U-234	1.000E+00	0.000E+00	6.272E-25	9.059E-25	1.196E-24	3.716E-24	6.309E-22	1.034E-19	1.272E-17	1.390E-15	1.765E-0
U-238	Th-230	1.000E+00	0.000E+00	8.039E-30	1.546E-29	2.504E-29	1.608E-28	1.778E-25	8.982E-15	7.395E-13	4.212E-12	5.495E-0
U-238	Ra-226	1.000E+00	0.000E+00	3.229E-10	7.474E-10	1.356E-09	1.089E-08	1.393E-06	1.124E-05	3.749E-05	8.786E-05	2.375E-0
U-238	Pb-210	1.000E+00	0.000E+00	3.852E-26	1.186E-25	2.641E-25	4.511E-24	1.086E-20	1.088E-12	6.120E-12	1.263E-11	8.394E-0
U-238	ΣDSR(j)		2.135E-09	2.725E-09	3.243E-09	3.940E-09	1.401E-08	1.407E-06	1.134E-05	3.814E-05	9.223E-05	1.612E-0

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 = 100 mrem/yr

0Nuclide (i)	t= 0.000E+00	3.100E+01	4.100E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	1.500E+03	2.000E+03	5.000E+
Pa-231	*4.716E+10	2.120E+10	1.763E+10	1.560E+10	1.058E+10	1.865E+09	2.240E+08	2.690E+07	3.228E+06	2.836E+
Pb-210	*7.631E+13	*7.631E+13	*7.631E+13	*7.631E+13	*7.631E+13	*7.631E+13	*7.631E+13	*7.631E+13	*7.631E+13	*7.631E+
Ra-226	1.700E+01	1.720E+01	1.726E+01	1.732E+01	1.765E+01	2.055E+01	2.546E+01	3.228E+01	4.102E+01	7.175E+
Ra-228	9.641E+07	3.453E+07	1.122E+08	3.241E+08	1.176E+11	*2.721E+14	*2.721E+14	*2.721E+14	*2.721E+14	*2.721E+
Th-228	1.350E+06	9.436E+10	3.448E+12	8.789E+13	*8.192E+14	*8.192E+14	*8.192E+14	*8.192E+14	*8.192E+14	*8.192E+
Th-230	*2.018E+10	1.269E+03	9.604E+02	7.881E+02	3.957E+02	8.187E+01	4.344E+01	3.126E+01	2.518E+01	5.639E+
Th-232	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	1.081E+05	3.055E+04	8.597E+03	7.997E+
U-234	*6.233E+09	9.069E+06	5.184E+06	3.485E+06	8.706E+05	3.468E+04	8.791E+03	4.039E+03	2.344E+03	1.28E+
U-238	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	6.204E+

*At specific activity limit

0

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 = 5.000E+03 years

0Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Pa-231	4.900E+00	5.000E+03	3.526E+01	2.836E+00	3.526E+01	2.836E+00
Pb-210	2.100E+01	0.000E+00	2.908E-15	*7.631E+13	0.000E+00	*7.631E+13
Ra-226	1.550E+01	0.000E+00	5.882E+00	1.700E+01	1.394E+00	7.175E+01
Ra-228	1.650E+01	4.571 ± 0.005	4.390E-05	2.278E+06	0.000E+00	*2.721E+14
Th-228	1.650E+01	0.000E+00	7.406E-05	1.350E+06	0.000E+00	*8.192E+14
Th-230	2.100E+01	5.000E+03	1.773E+01	5.639E+00	1.773E+01	5.639E+00
Th-232	1.650E+01	5.000E+03	1.250E+01	7.997E+00	1.250E+01	7.997E+00
U-234	2.100E+01	5.000E+03	7.005E-01	1.428E+02	7.005E-01	1.428E+02
U	2.100E+01	5.000E+03	1.612E-01	6.204E+02	1.612E-01	6.204E+02

*At specific activity limit

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

ONuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr									
			t= 0.000E+00	3.100E+01	4.100E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	1.500E+03	2.000E+03	5.000E+0
Pa-231	Pa-231	1.000E+00	1.114E-09	1.277E-09	1.335E-09	1.389E-09	1.731E-09	1.010E-08	9.153E-08	8.298E-07	7.522E-06	9.144E+0
OAc-227	Pa-231	1.000E+00	0.000E+00	2.183E-08	2.645E-08	3.001E-08	4.458E-08	2.526E-07	2.096E-06	1.739E-05	1.443E-04	8.134E+0
OPb-210	Pb-210	1.000E+00	6.107E-14	2.812E-14	2.189E-14	1.748E-14	5.002E-15	2.253E-19	8.309E-25	0.000E+00	0.000E+00	0.000E+0
Pb-210	Ra-226	1.000E+00	0.000E+00	3.330E-14	4.106E-14	4.730E-14	7.582E-14	7.191E-13	1.127E-11	1.765E-10	2.765E-09	5.789E+0
Pb-210	Th-230	1.000E+00	0.000E+00	3.523E-16	5.997E-16	8.734E-16	3.288E-15	2.265E-13	1.170E-10	1.278E-09	7.823E-09	9.742E+0
Pb-210	U-234	1.000E+00	0.000E+00	3.529E-20	8.110E-20	1.466E-19	1.193E-18	5.011E-16	5.857E-11	3.029E-10	6.342E-10	3.137E+0
Pb-210	U-238	1.000E+00	0.000E+00	8.089E-25	2.470E-24	5.545E-24	9.473E-23	2.281E-19	2.284E-11	1.285E-10	2.653E-10	1.763E-0
Pb-210	δDOSE(j):		6.107E-14	6.137E-14	6.355E-14	6.565E-14	8.411E-14	9.461E-13	2.097E-10	1.886E-09	1.149E-08	1.064E+0
ORa-226	Ra-226	1.000E+00	9.117E+01	9.013E+01	8.979E+01	8.949E+01	8.784E+01	7.541E+01	6.089E+01	4.801E+01	3.778E+01	1.581E+0
Ra-226	Th-230	1.000E+00	0.000E+00	1.655E+00	2.187E+00	2.665E+00	5.307E+00	2.565E+01	4.834E+01	6.719E+01	8.339E+01	2.714E+0
Ra-226	U-234	1.000E+00	0.000E+00	2.316E-04	4.051E-04	6.026E-04	2.412E-03	6.056E-02	2.389E-01	5.199E-01	8.958E-01	8.811E+0
Ra-226	U-238	1.000E+00	0.000E+00	6.780E-09	1.570E-08	2.848E-08	2.286E-07	2.925E-05	2.361E-04	7.873E-04	1.845E-03	4.987E-0
Ra-226	δDOSE(j):		9.117E+01	9.178E+01	9.198E+01	9.216E+01	9.315E+01	1.011E+02	1.095E+02	1.157E+02	1.221E+02	2.961E+0
ORa-228	Ra-228	1.000E+00	1.712E-05	4.549E-07	1.411E-07	4.923E-08	1.416E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+0
Ra-228	Th-232	1.000E+00	0.000E+00	1.853E-05	1.949E-05	2.018E-05	2.393E-05	9.147E-05	4.923E-04	2.631E-03	1.400E-02	1.198E+0
Ra-228	δDOSE(j):		1.712E-05	1.898E-05	1.963E-05	2.023E-05	2.393E-05	9.147E-05	4.923E-04	2.631E-03	1.400E-02	1.198E+0
OTh-228	Ra-228	1.000E+00	0.000E+00	4.753E-05	1.457E-05	5.042E-06	1.389E-08	4.611E-29	0.000E+00	0.000E+00	0.000E+00	0.000E+0
Th-228	Th-228	1.000E+00	1.222E-03	1.749E-08	4.786E-10	1.877E-11	2.884E-19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+0
Th-228	Th-232	1.000E+00	0.000E+00	1.272E-03	1.338E-03	1.378E-03	1.567E-03	4.242E-03	1.474E-02	5.118E-02	1.776E-01	7.089E+0
Th-228	δDOSE(j):		1.222E-03	1.320E-03	1.353E-03	1.384E-03	1.567E-03	4.242E-03	1.474E-02	5.118E-02	1.776E-01	7.089E+0
OTh-230	Th-230	1.000E+00	1.028E-20	1.380E-20	1.516E-20	1.651E-20	2.651E-20	1.170E-18	3.420E-08	1.639E-07	2.615E-07	3.535E+0
Th-230	U-234	1.000E+00	0.000E+00	3.849E-24	5.597E-24	7.433E-24	2.387E-23	5.275E-21	3.486E-11	8.051E-10	2.549E-09	1.616E-0
Th-230	U-238	1.000E+00	0.000E+00	1.688E-28	3.246E-28	5.258E-28	3.377E-27	3.734E-24	1.886E-13	1.553E-11	8.846E-11	1.154E-0
Th-230	δDOSE(j):		1.028E-20	1.380E-20	1.517E-20	1.652E-20	2.653E-20	1.175E-18	3.423E-08	1.647E-07	2.641E-07	3.697E+0
OTh-232	Th-232	1.000E+00	8.327E-22	1.150E-21	1.247E-21	1.363E-21	2.231E-21	1.149E-19	3.968E-05	1.910E-04	3.062E-04	1.564E+0
OU-234	U-234	1.000E+00	1.143E-19	1.502E-19	1.640E-19	1.775E-19	2.758E-19	9.359E-18	7.666E-16	6.279E-14	5.143E-12	2.602E+0
U	U-238	1.000E+00	0.000E+00	1.317E-23	1.902E-23	2.511E-23	7.804E-23	1.325E-20	2.172E-18	2.670E-16	2.918E-14	3.706E-0
U-2	δDOSE(j):		1.143E-19	1.502E-19	1.640E-19	1.776E-19	2.759E-19	9.373E-18	7.688E-16	6.306E-14	5.172E-12	2.639E+0
OU-238	U-238	1.000E+00	4.483E-08	5.046E-08	5.242E-08	5.425E-08	6.564E-08	3.017E-07	2.030E-06	1.366E-05	9.190E-05	3.279E+0
eeeeeee	eeeeee	eeeeeeee	eeeeeeeee	eeeeeeeee	eeeeeeeee	eeeeeeeee	eeeeeeeee	eeeeeeeee	eeeeeeeee	eeeeeeee	eeeeeeeee	eeeeeeee

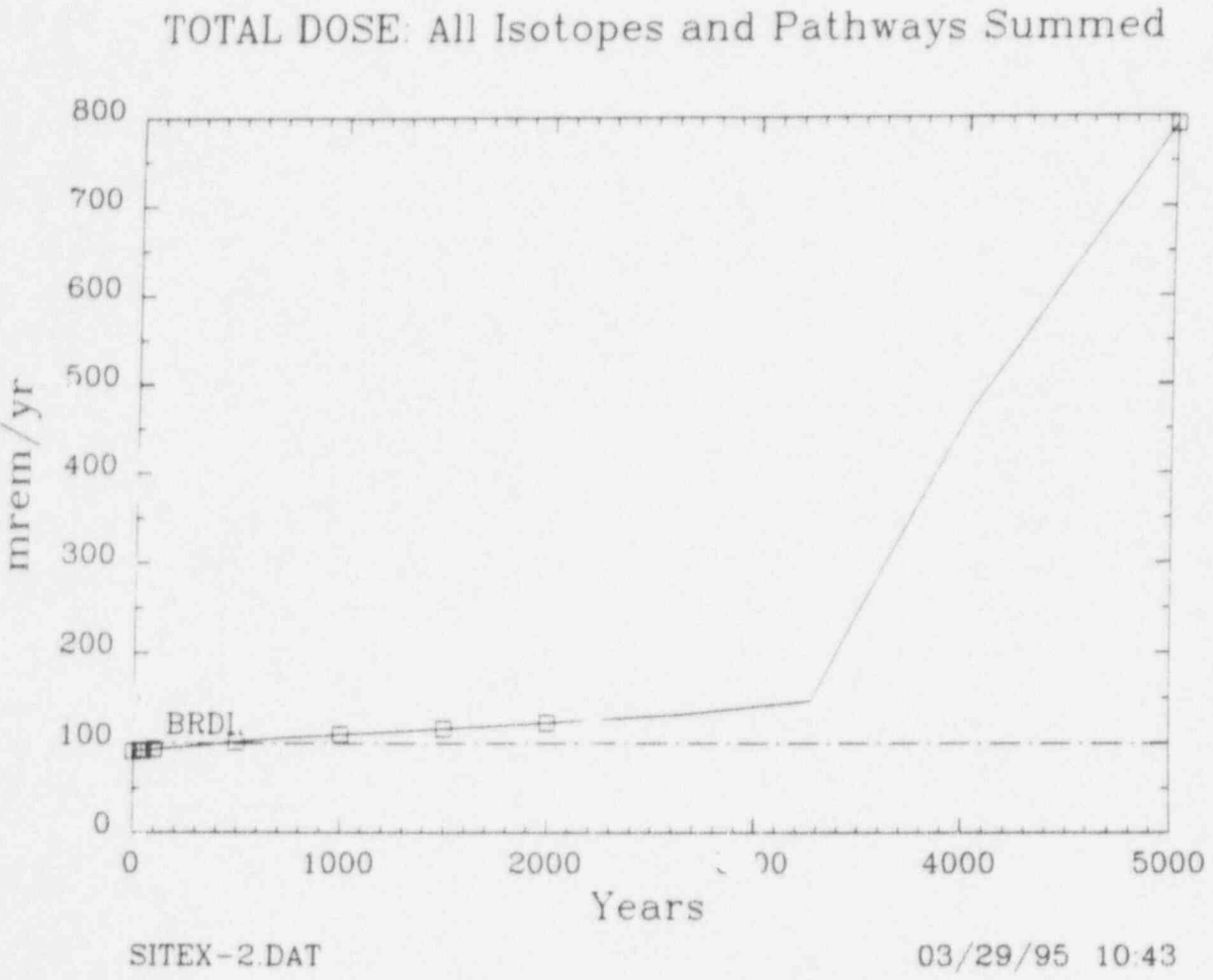
BRF(i) is the branch fraction of the parent nuclide.

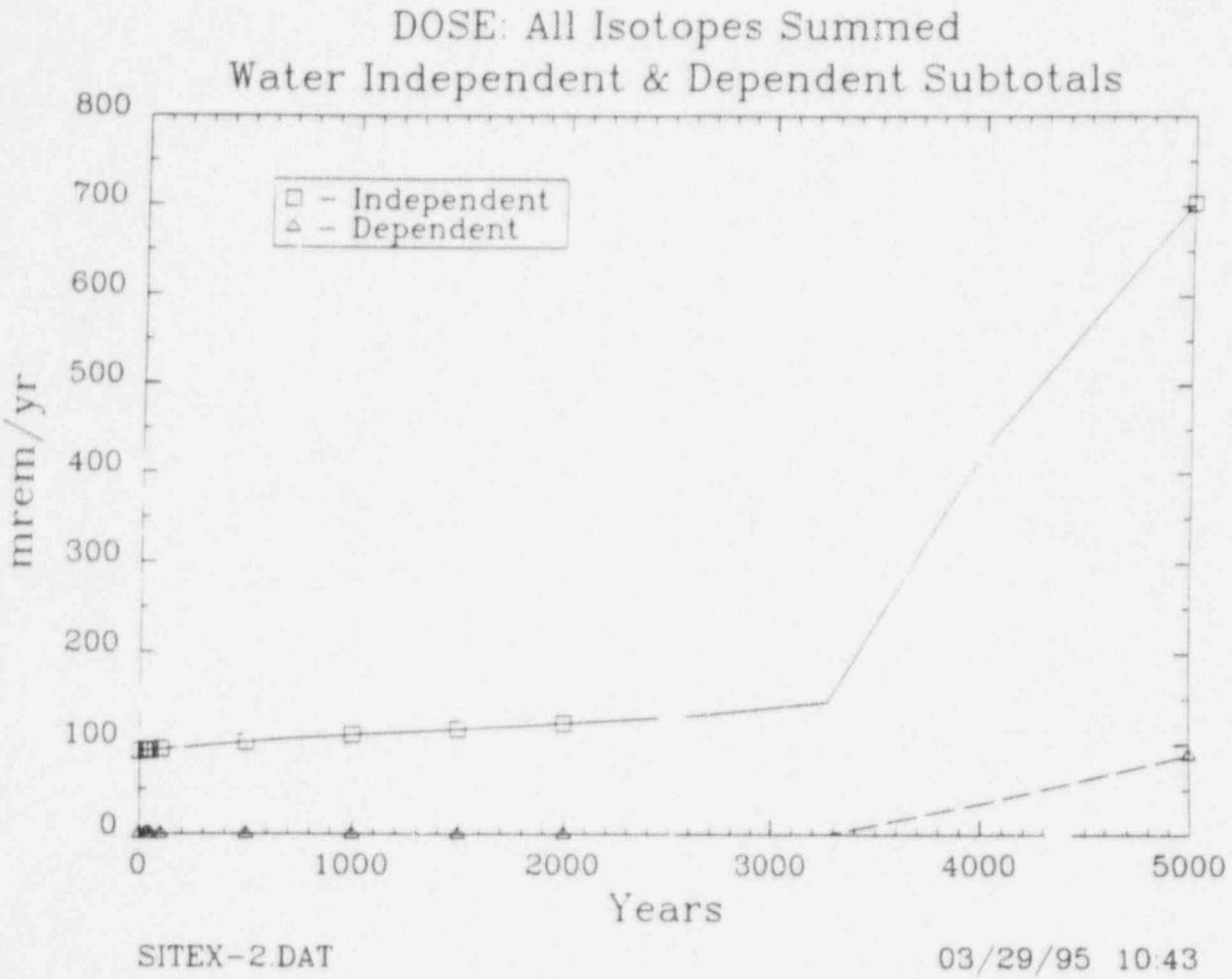
Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

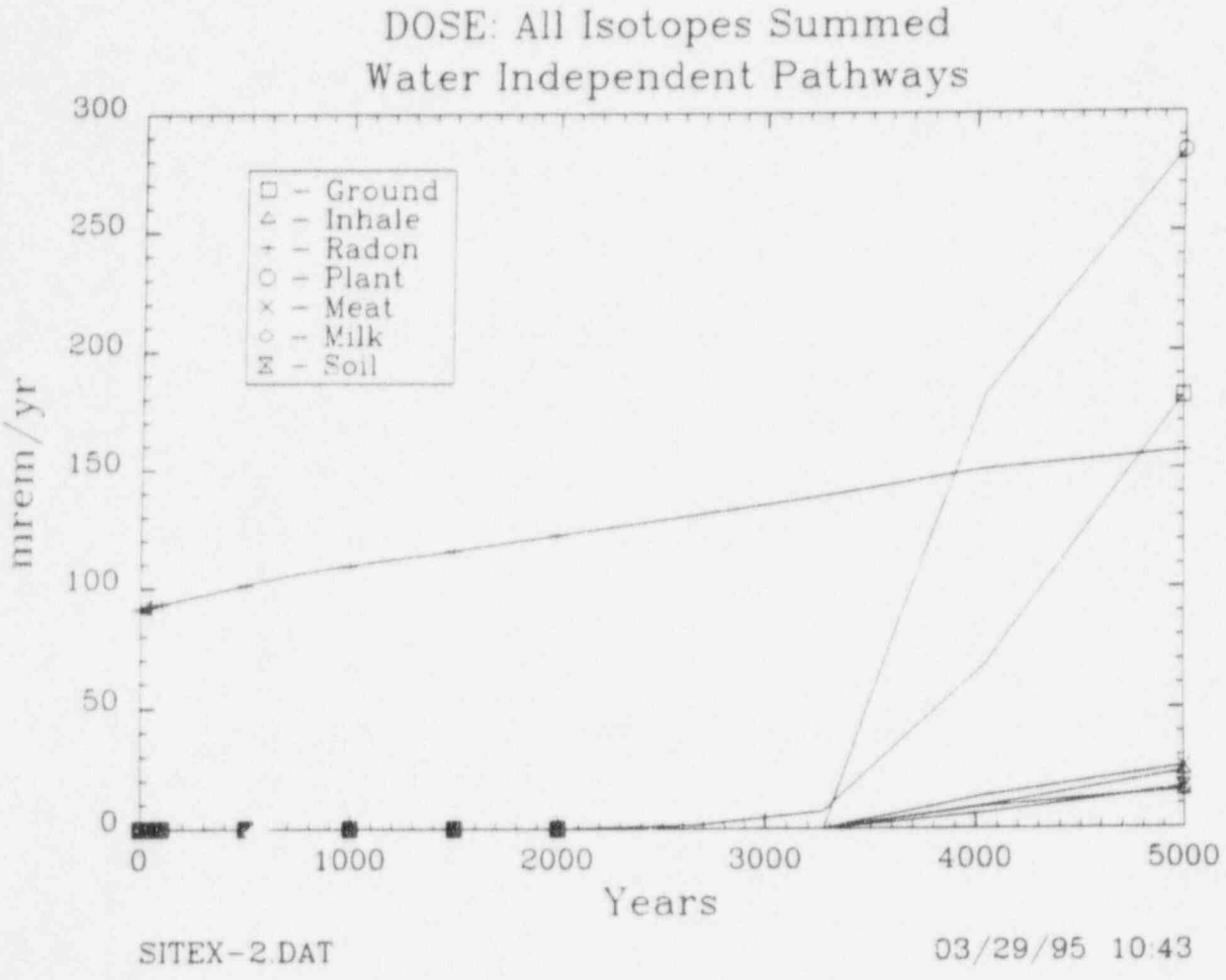
ONuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g									
			t= 0.000E+00	3.100E+01	4.100E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	1.500E+03	2.000E+03	5.000E+0
Pa-231	Pa-231	1.000E+00	4.900E+00	4.894E+00	4.892E+00	4.890E+00	4.880E+00	4.799E+00	4.700E+00	4.603E+00	4.508E+00	3.978E+0
OAc-227	Pa-231	1.000E+00	0.000E+00	3.069E+00	3.564E+00	3.891E+00	4.667E+00	4.785E+00	4.687E+00	4.590E+00	4.495E+00	3.967E+0
OPb-210	Pb-210	1.000E+00	2.100E+01	8.006E+00	5.865E+00	4.433E+00	9.358E-01	3.689E-06	6.482E-13	1.139E-19	2.001E-26	0.000E+0
Pb-210	Ra-226	1.000E+00	0.000E+00	9.483E+00	1.100E+01	1.200E+01	1.418E+01	1.178E+01	8.799E+00	6.558E+00	4.894E+00	8.448E-0
Pb-210	Th-230	1.000E+00	0.000E+00	1.003E-01	1.607E-01	2.215E-01	6.151E-01	3.710E+00	6.682E+00	8.883E+00	1.051E+01	1.422E+0
Pb-210	U-234	1.000E+00	0.000E+00	1.005E-05	2.173E-05	3.717E-05	2.231E-04	8.208E-03	3.190E-02	6.711E-02	1.108E-01	4.578E-0
Pb-210	U-238	1.000E+00	0.000E+00	2.303E-10	6.670E-10	1.406E-09	1.772E-08	3.736E-06	3.053E-05	9.941E-05	2.244E-04	2.573E-0
Pb-210	δS(j):		2.100E+01	1.759E+01	1.703E+01	1.665E+01	1.573E+01	1.550E+01	1.550E+01	1.551E+01	1.551E+01	1.552E+0
ORa-226	Ra-226	1.000E+00	1.550E+01	1.522E+01	1.513E+01	1.505E+01	1.462E+01	1.157E+01	8.631E+00	6.440E+00	4.806E+00	8.296E-0
Ra-226	Th-230	1.000E+00	0.000E+00	2.794E-01	3.685E-01	4.482E-01	8.832E-01	3.934E+00	6.852E+00	9.012E+00	1.061E+01	1.424E+0
Ra-226	U-234	1.000E+00	0.000E+00	3.911E-05	6.827E-05	1.014E-04	4.014E-04	9.288E-03	3.386E-02	6.973E-02	1.139E-01	4.623E-0
Ra-226	U-238	1.000E+00	0.000E+00	1.145E-09	2.645E-09	4.791E-09	3.805E-08	4.487E-06	3.346E-05	1.056E-04	2.347E-04	2.616E-0
Ra-226	δS(j):		1.550E+01	1.550E+01	1.550E+01	1.550E+01	1.550E+01	1.551E+01	1.552E+01	1.552E+01	1.553E+01	1.554E+0
ORa-228	Ra-228	1.000E+00	1.650E+01	3.952E-01	1.186E-01	4.014E-02	9.766E-05	1.197E-25	0.000E+00	0.000E+00	0.000E+00	0.000E+0
Ra-228	Th-232	1.000E+00	0.000E+00	1.610E+01	1.638E+01	1.645E+01	1.649E+01	1.649E+01	1.649E+01	1.649E+01	1.649E+01	1.649E+0
Ra-228	δS(j):		1.650E+01	1.649E+01	1.649E+01	1.649E+01	1.649E+01	1.649E+01	1.649E+01	1.649E+01	1.649E+01	1.649E+0
OTh-228	Th-228	1.000E+00	0.000E+00	5.915E-01	1.776E-01	6.011E-02	1.462E-04	1.793E-25	0.000E+00	0.000E+00	0.000E+00	0.000E+0
Th-228	Th-228	1.000E+00	1.650E+01	2.186E-04	5.835E-06	2.238E-07	3.036E-15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+0
Th-228	Th-232	1.000E+00	0.000E+00	1.590E+01	1.632E+01	1.643E+01	1.649E+01	1.649E+01	1.649E+01	1.649E+01	1.649E+01	1.649E+0
Th-228	δS(j):		1.650E+01	1.650E+01	1.649E+01	1.649E+01	1.649E+01	1.649E+01	1.649E+01	1.649E+01	1.649E+01	1.649E+0
OTh-230	Th-230	1.000E+00	2.100E+01	2.099E+01	2.099E+01	2.099E+01	2.098E+01	2.091E+01	2.081E+01	2.072E+01	2.063E+01	2.008E+0
Th-230	U-234	1.000E+00	0.000E+00	5.859E-03	7.749E-03	9.449E-03	1.889E-02	9.424E-02	1.879E-01	2.811E-01	3.736E-01	9.177E-0

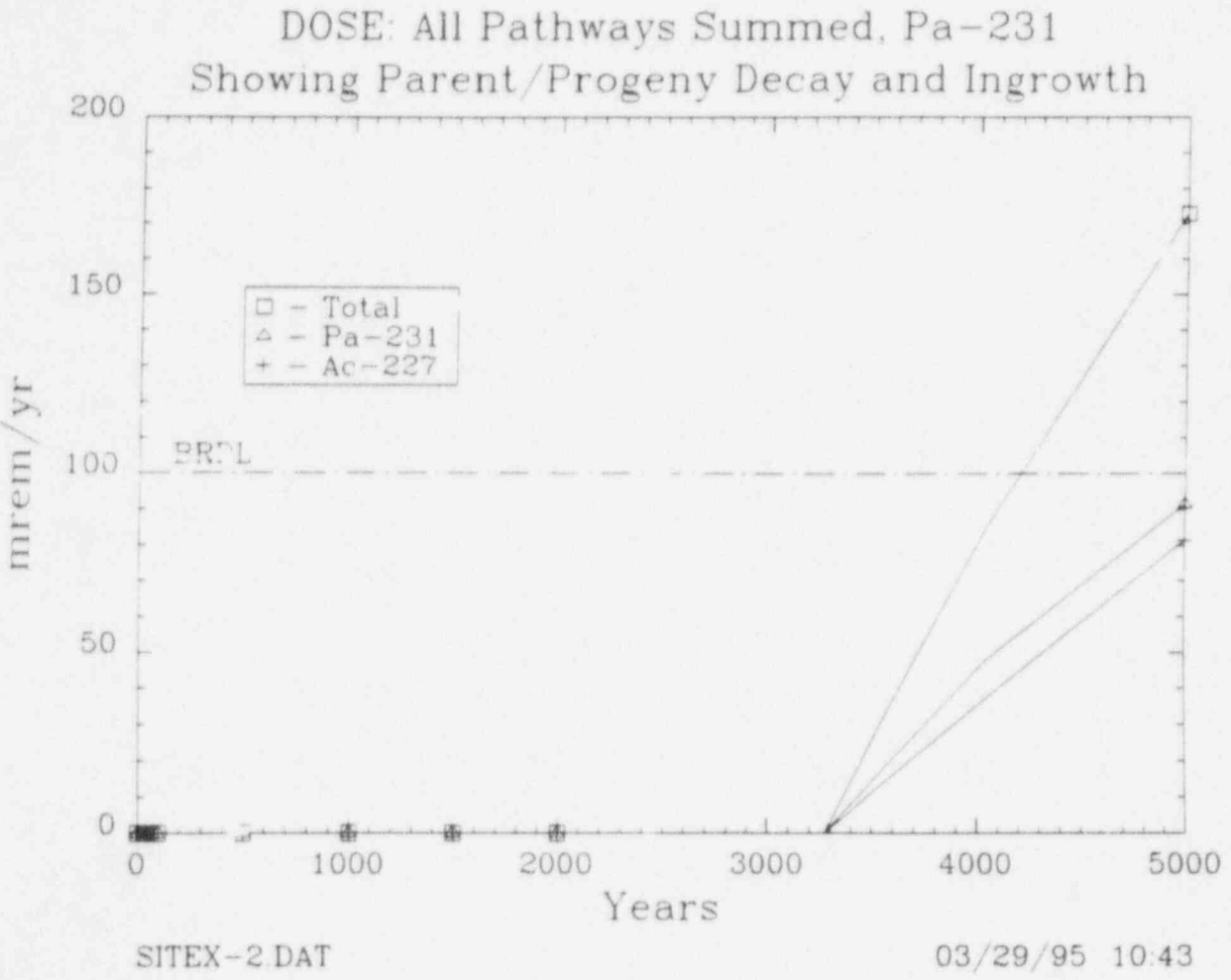
Th-230	U-238	1.000E+00	0.000E+00	2.570E-07	4.494E-07	6.684E-07	2.673E-06	6.672E-05	2.664E-04	5.981E-04	1.061E-03	6.555E-0
Th-230	δS(j):		2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+0
OT [illegible]	Th-232	1.000E+00	1.650E+01	1.650E+01	1.650E+01	1.650E+01	1.650E+01	1.650E+01	1.650E+01	1.650E+01	1.650E+01	1.650E+0
C [illegible]	U-234	1.000E+00	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.099E+01	2.097E+01	2.094E+01	2.091E+01	2.088E+01	2.071E+0
U [illegible]	U-238	1.000E+00	0.000E+00	1.842E-03	2.436E-03	2.970E-03	5.940E-03	2.969E-02	5.933E-02	8.893E-02	1.185E-01	2.950E-0
U-234	δS(j):		2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+0
0U-238	U-238	1.000E+00	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+01	2.100E+0
eeeeeee	eeeeeee	eeeeeeeee	eeeeeeeee	eeeeeeeee	eeeeeeeee	eeeeeeeee	eeeeeeeee	eeeeeeeee	eeeeeeeee	eeeeeeeee	eeeeeeeee	eeeeeeee

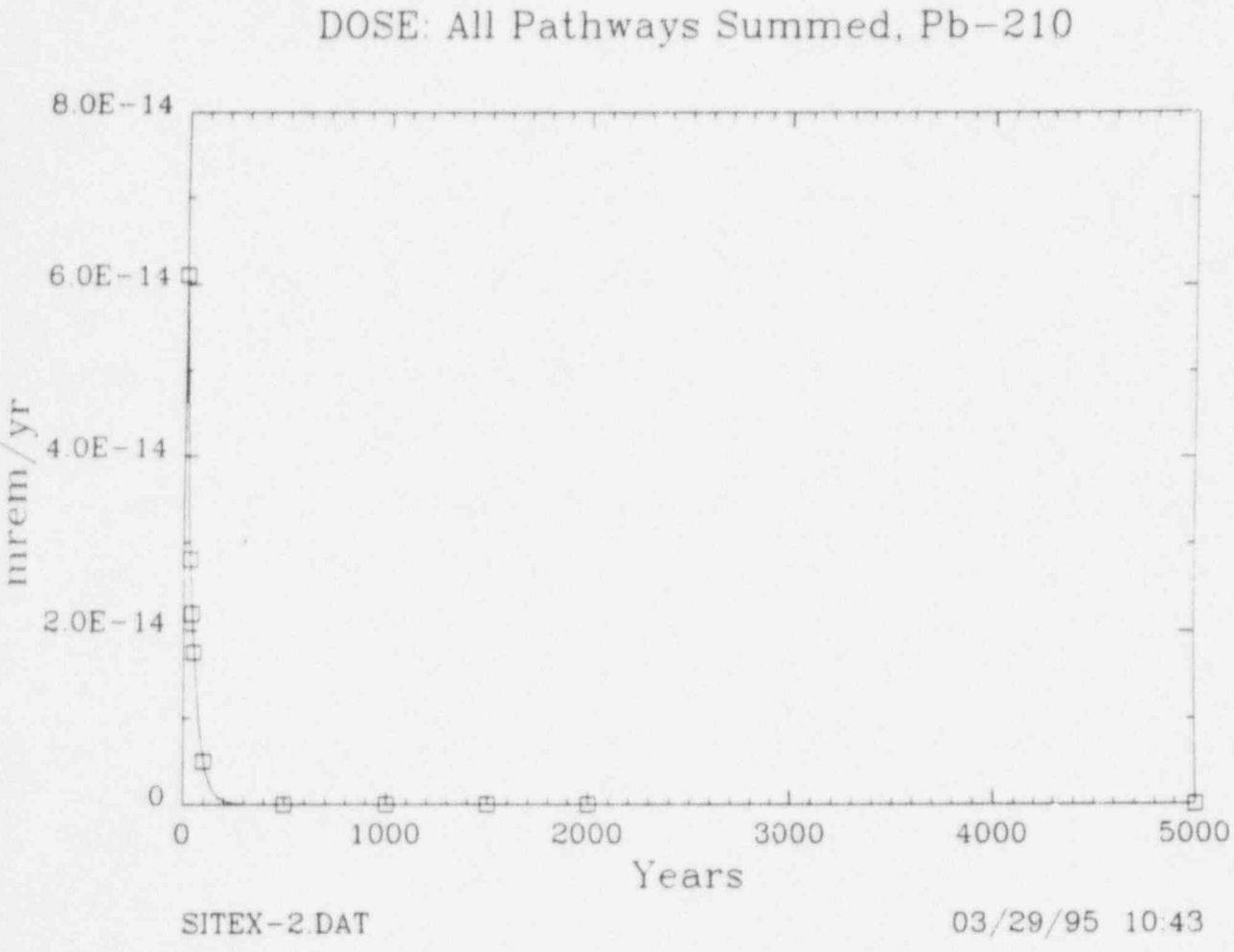
BRF(i) is the branch fraction of the parent nuclide.

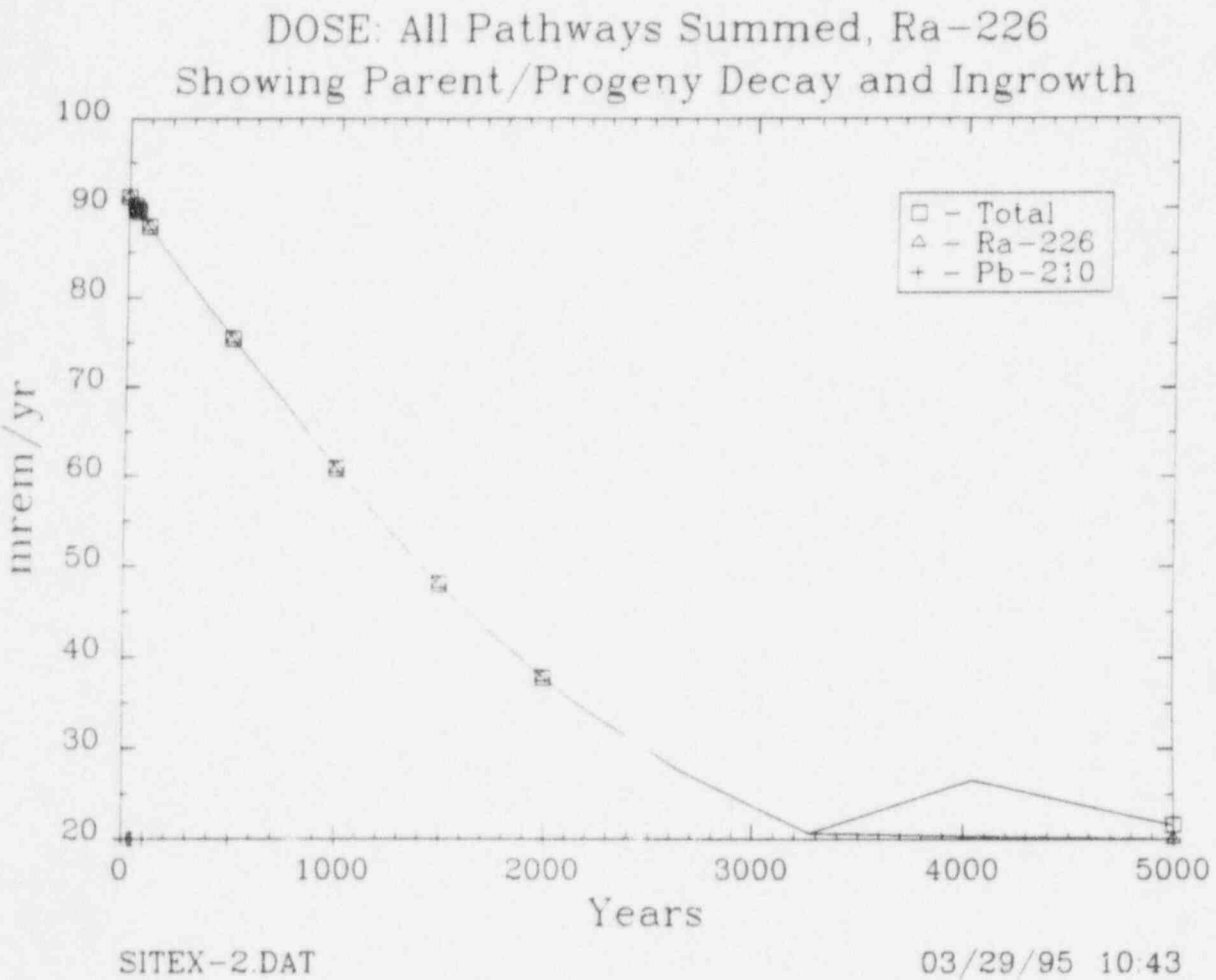

TOTAL DOSE: All Isotopes and Pathways Summed
800
700
600
500
400
300
200
100
0
mrem/yr
BRDL
0
1000
2000
4000
5000
Years
SITEX-2.DAT
03/29/95 10:43

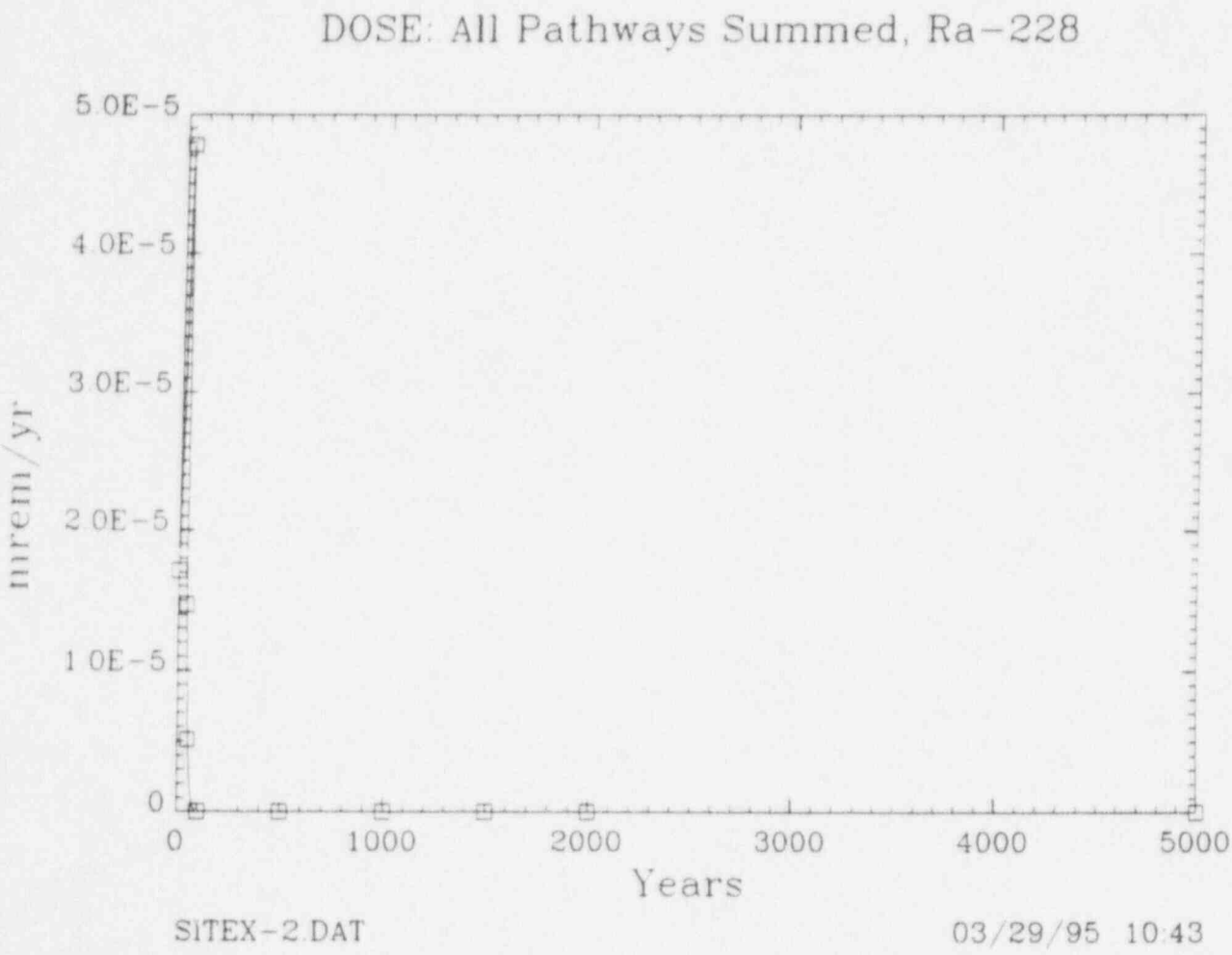

DOSE: All Isotopes Summed
Water Independent & Dependent Subtotals
□ - Independent
△ - Dependent
mrem/yr
800
700
600
500
400
300
200
100
0
0
1000
2000
3000
4000
5000
Years
SITEX-2.DAT
03/29/95 10:43

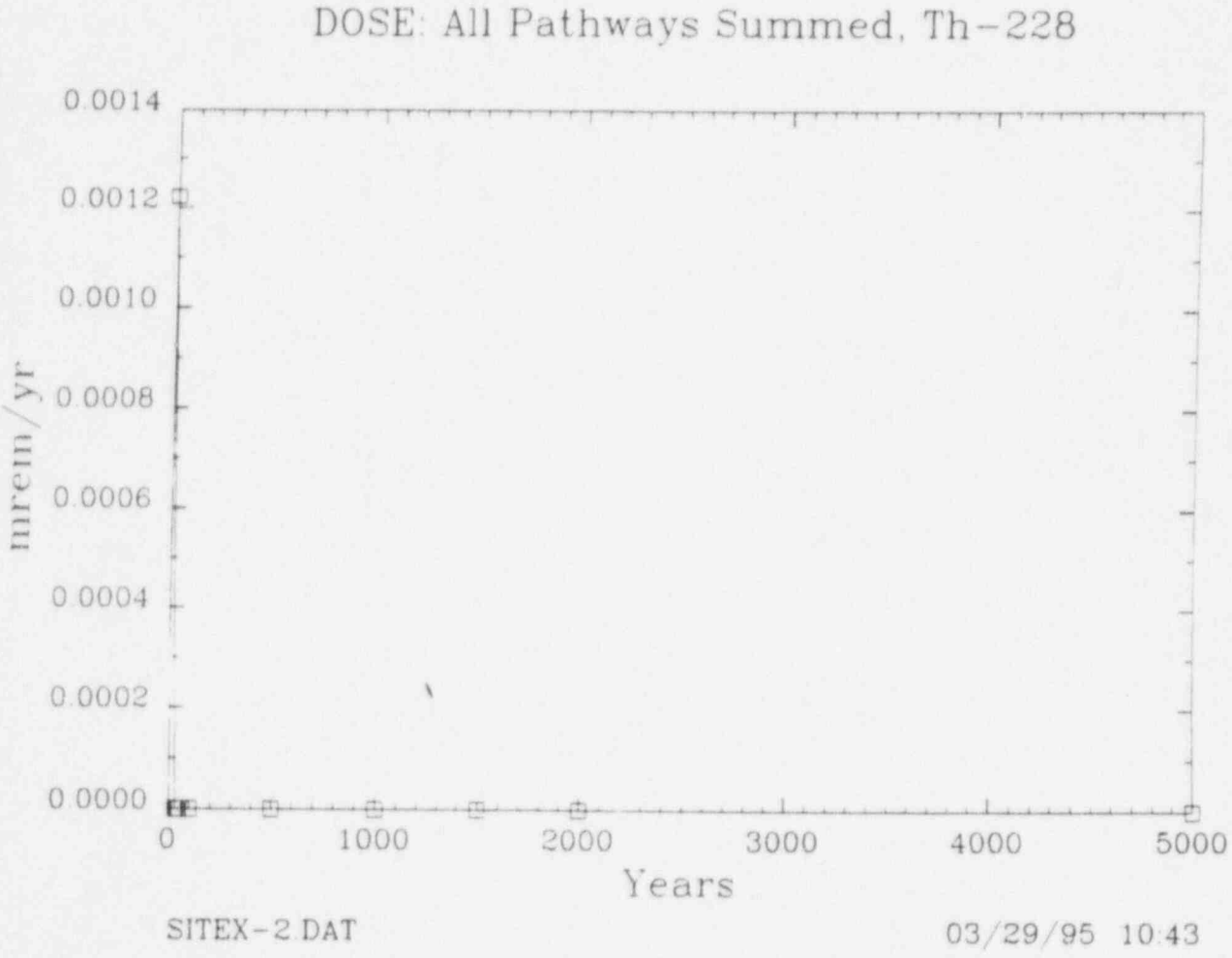

DOSE: All Isotopes Summed
Water Independent Pathways
300
250
200
150
100
50
0
mrem/yr
□ – Ground
△ – Inhale
+ – Radon
○ – Plant
× – Meat
◇ – Milk
⧖ – Soil
0
1000
2000
3000
4000
5000
Years
SITEX-2.DAT
03/29/95 10:43

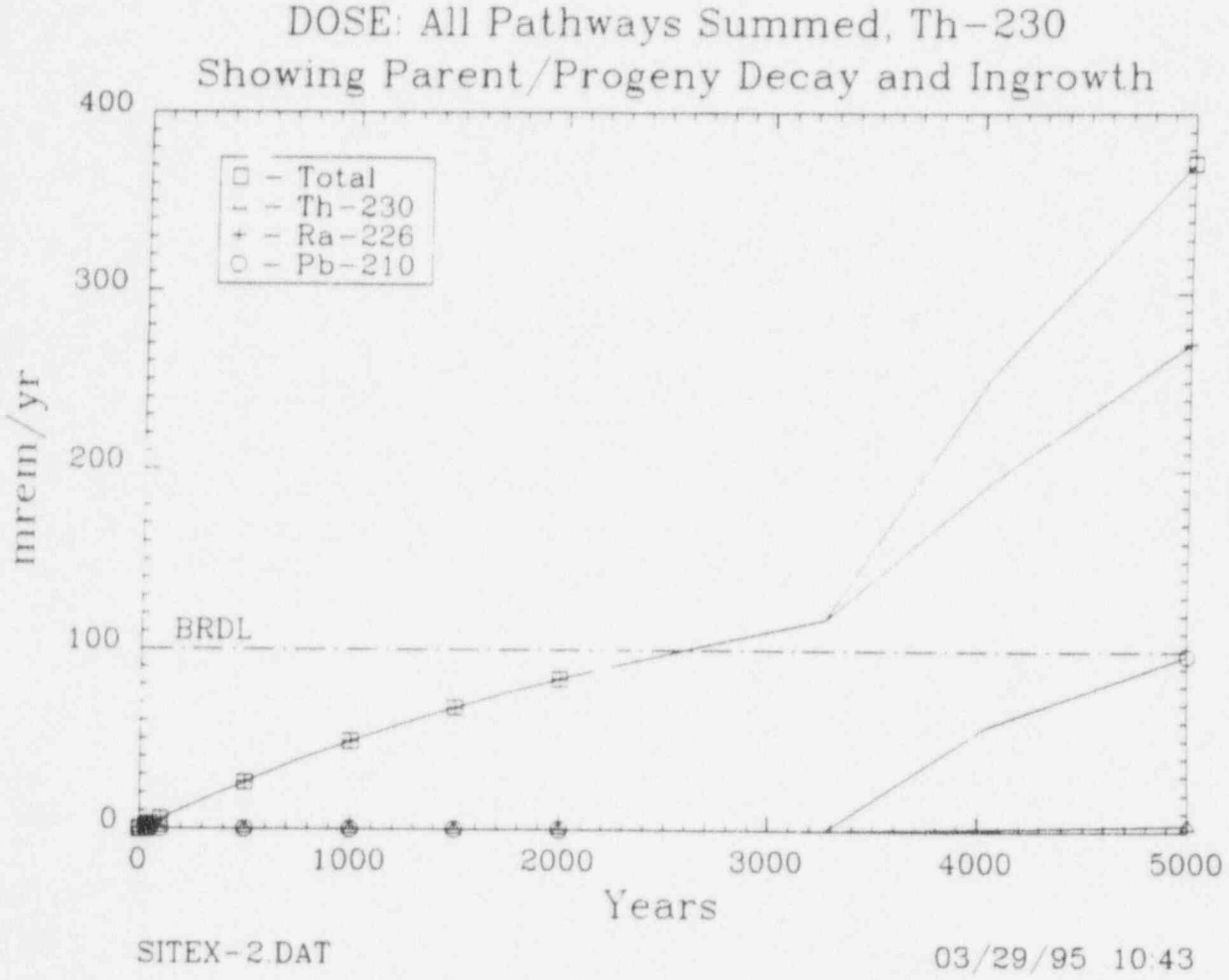

DOSE: All Pathways Summed, Pa-231
Showing Parent/Progeny Decay and Ingrowth
200
150
100
50
0
mrem/yr
□ - Total
△ - Pa-231
+ - Ac-227
PRDL
0
1000
2000
3000
4000
5000
Years
SITEX-2.DAT
03/29/95 10:43

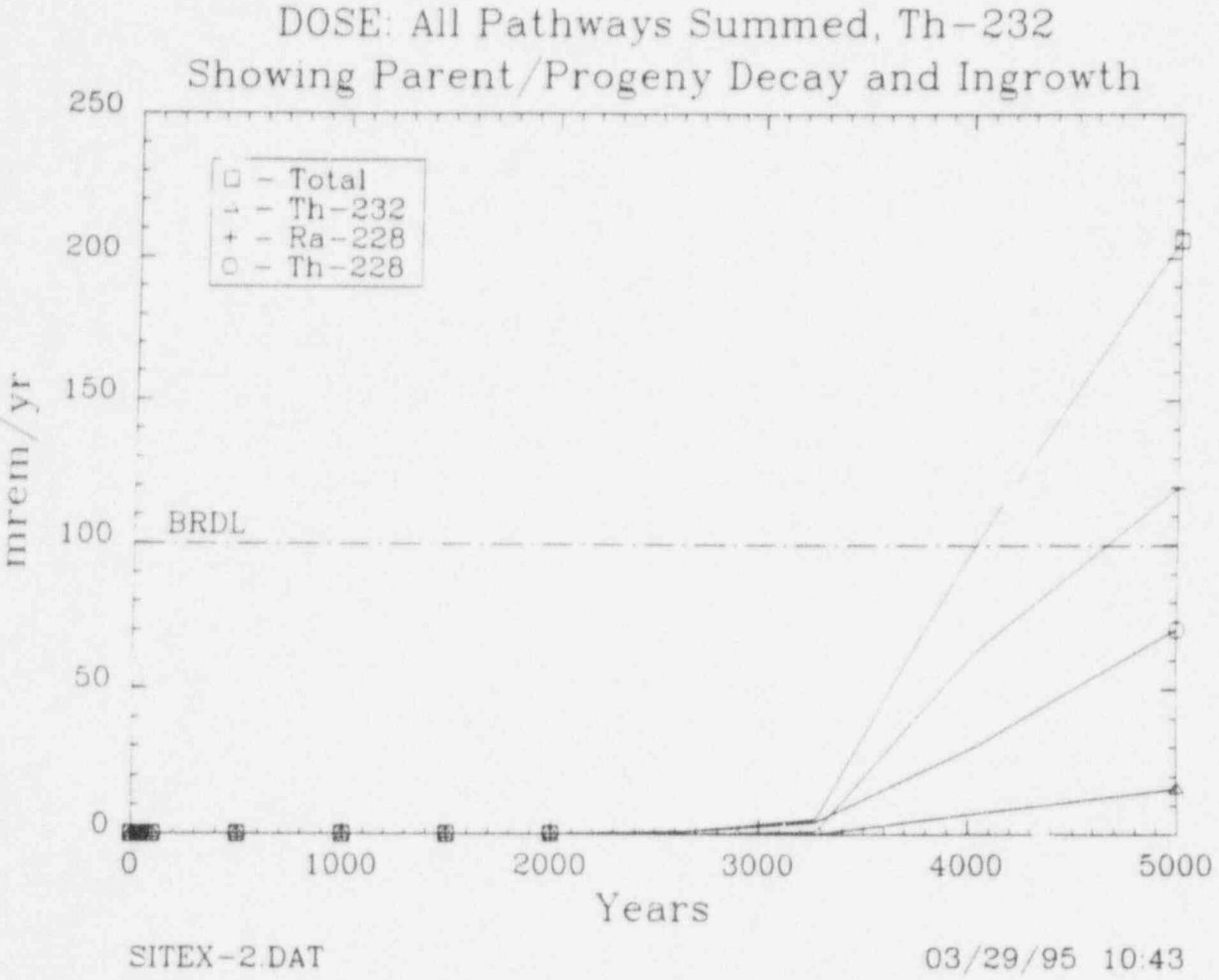

DOSE: All Pathways Summed, Pb-210
8.0E-14
6.0E-14
4.0E-14
2.0E-14
0
mrem/yr
0
1000
2000
3000
4000
5000
Years
SITEX-2.DAT
03/29/95 10:43

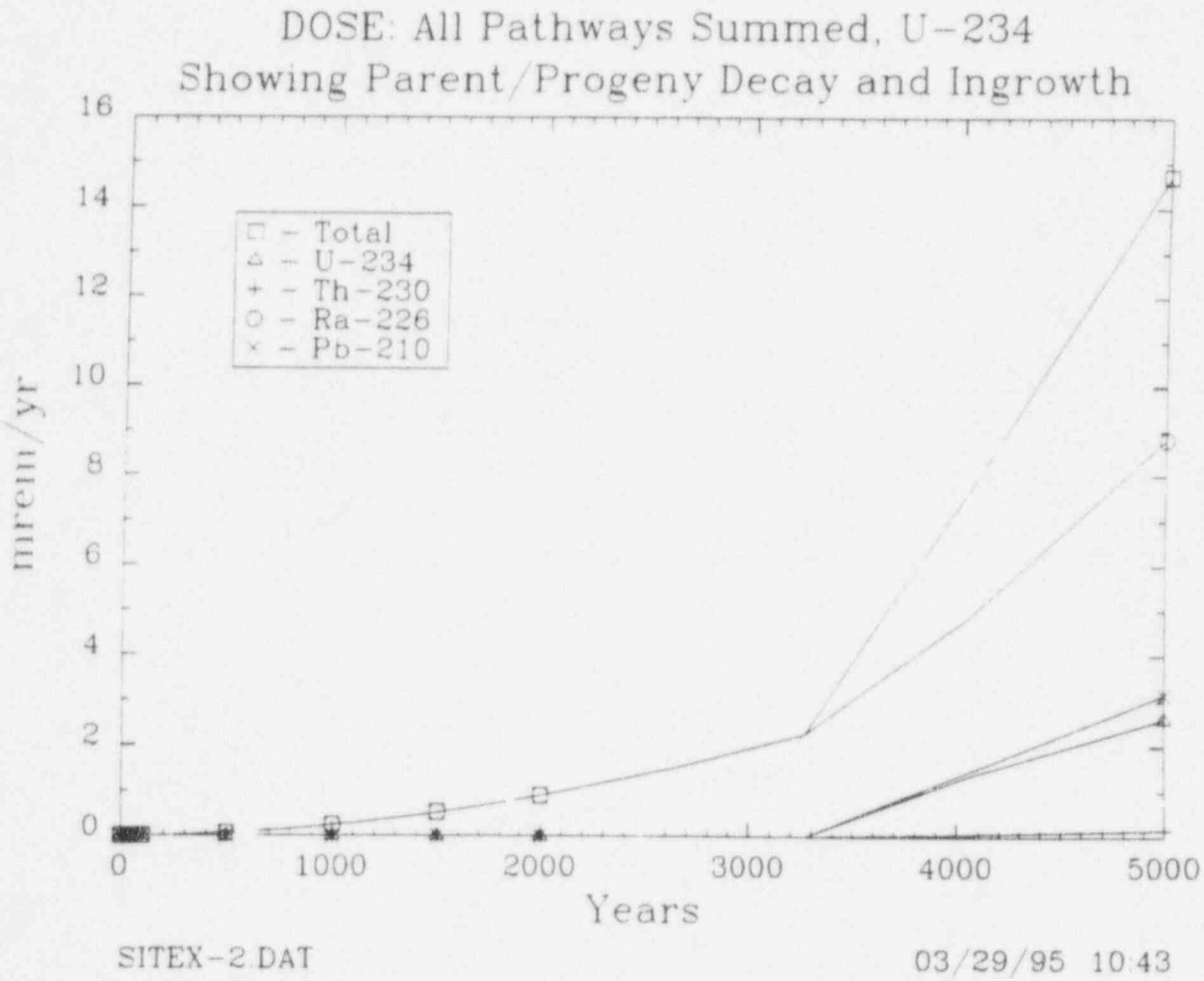

DOSE: All Pathways Summed, Ra-226
Showing Parent/Progeny Decay and Ingrowth
100
90
80
70
60
50
40
30
20
mrem/yr
0
1000
2000
3000
4000
5000
Years
□ - Total
△ - Ra-226
+ - Pb-210
SITEX-2.DAT
03/29/95 10:43

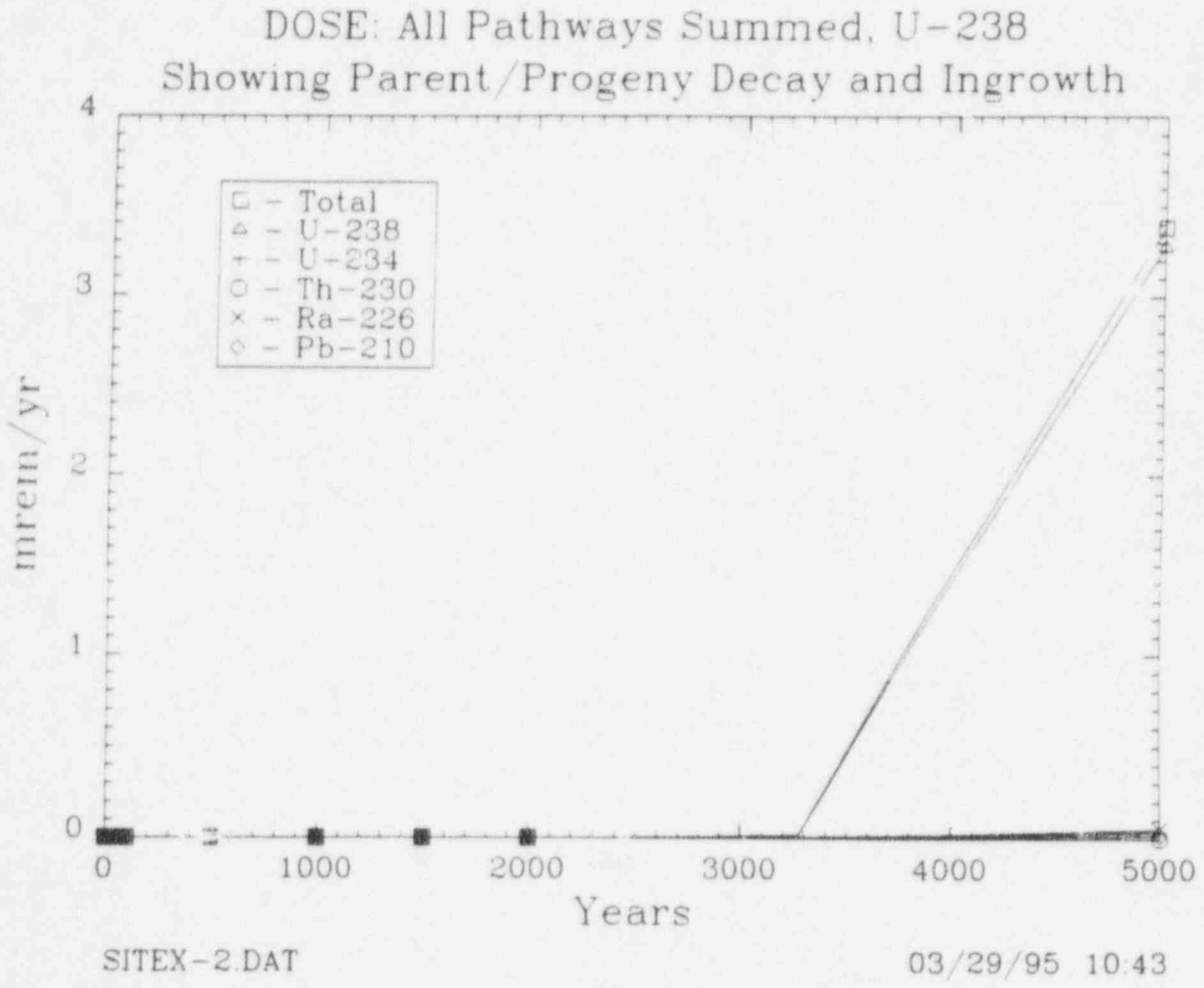

DOSE: All Pathways Summed, Ra-228
5.0E-5
4.0E-5
3.0E-5
2.0E-5
1.0E-5
0
mrem/yr
0
1000
2000
3000
4000
5000
Years
SITEX-2.DAT
03/29/95 10:43


DOSE: All Pathways Summed, Th-228
0.0014
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0000
mrem/yr
0
1000
2000
3000
4000
5000
Years
SITEX-2.DAT
03/29/95 10:43

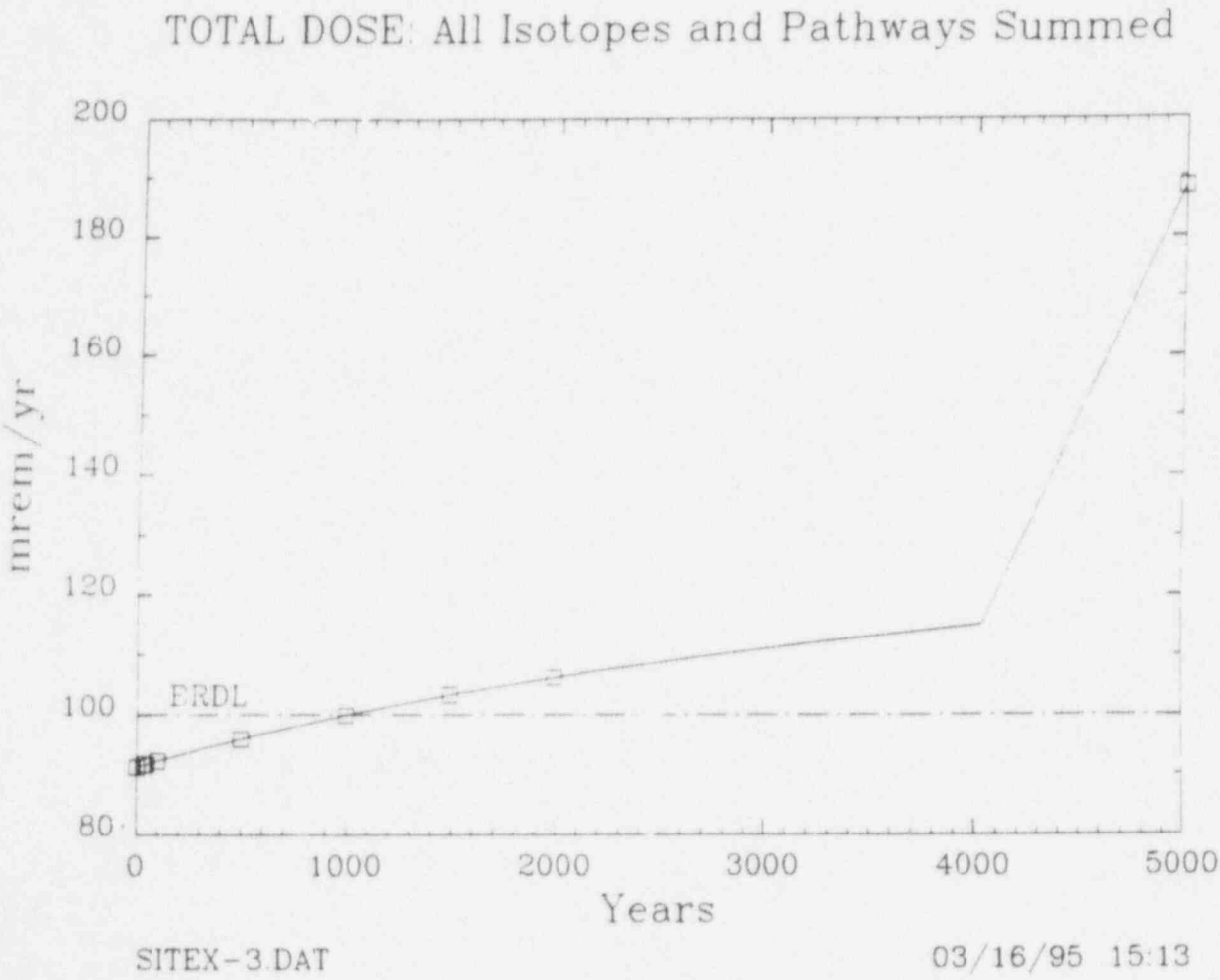

DOSE: All Pathways Summed, Th-230
Showing Parent/Progeny Decay and Ingrowth
□ - Total
– – Th-230
+ - Ra-226
○ - Pb-210
BRDL
mrem/yr
400
300
200
100
0
0
1000
2000
3000
4000
5000
Years
SITEX-2.DAT
03/29/95 10:43

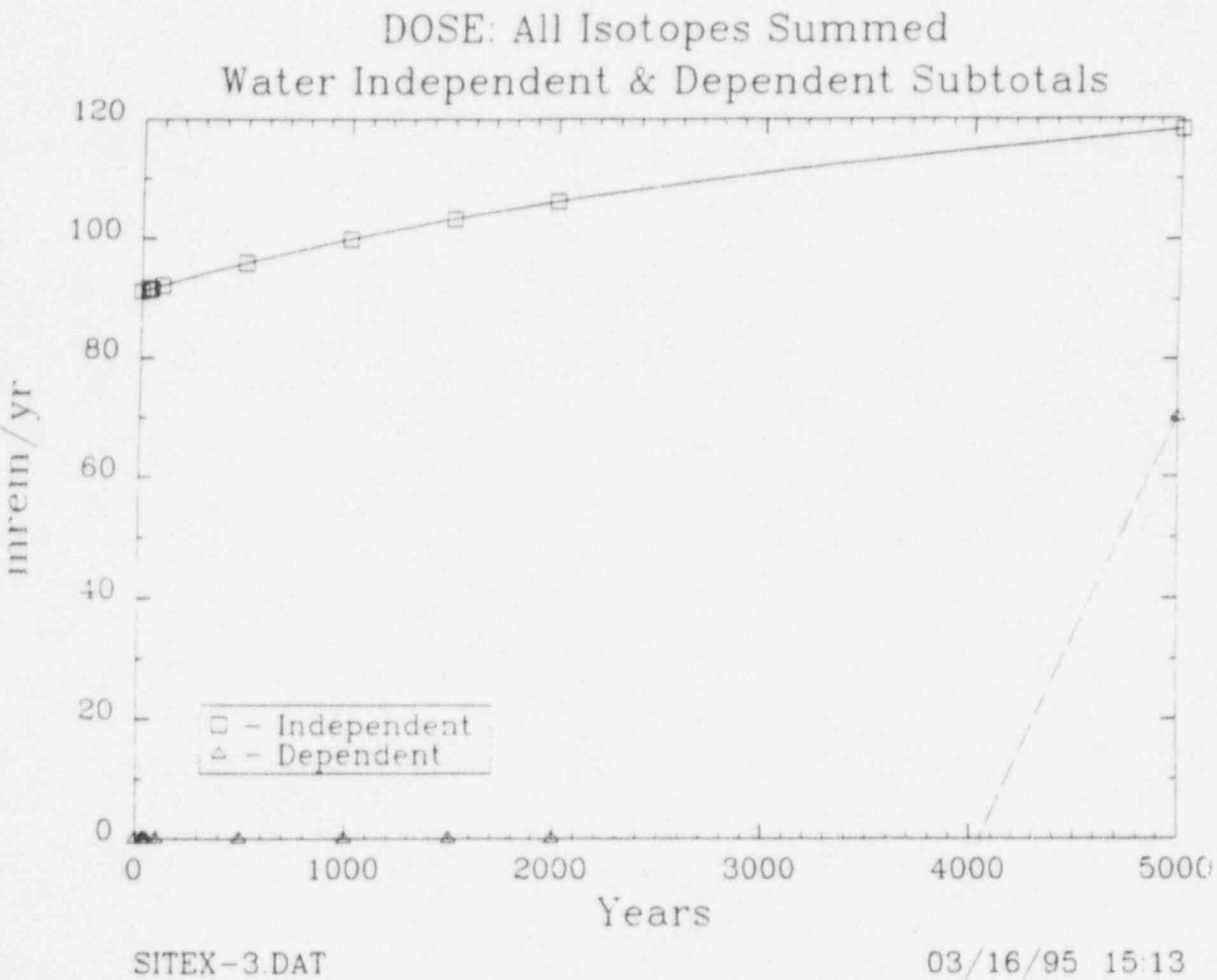

DOSE: All Pathways Summed, Th-232
Showing Parent/Progeny Decay and Ingrowth
□ - Total
→ - Th-232
+ - Ra-228
○ - Th-228
BRDL
mrem/yr
250
200
150
100
50
0
0
1000
2000
3000
4000
5000
Years
SITEX-2.DAT
03/29/95 10:43

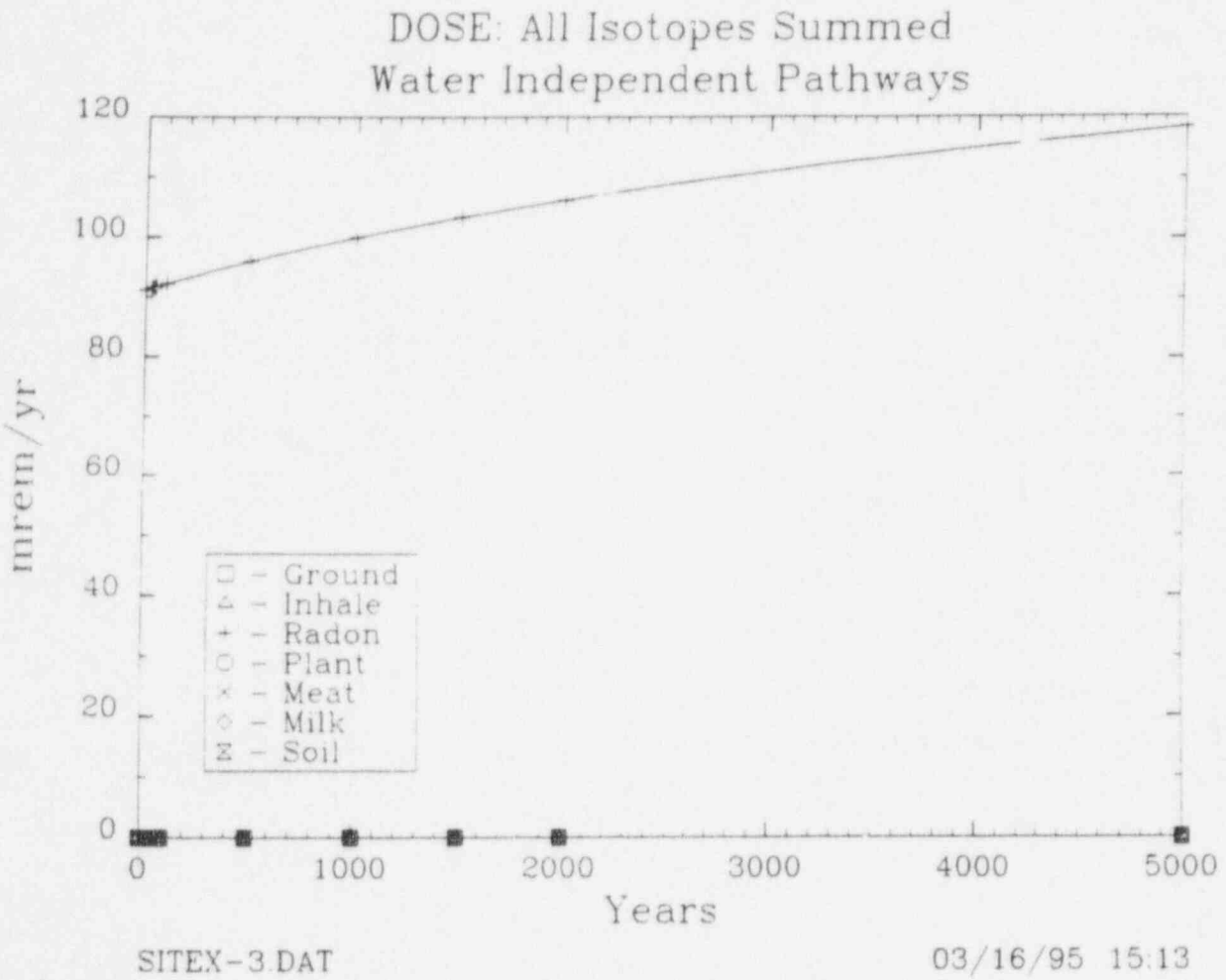

DOSE: All Pathways Summed, U-234
Showing Parent/Progeny Decay and Ingrowth
□ - Total
△ - U-234
+ - Th-230
○ - Ra-226
× - Pb-210
mrem/yr
0
2
4
6
8
10
12
14
16
0
1000
2000
3000
4000
5000
Years
SITEX-2.DAT
03/29/95 10:43

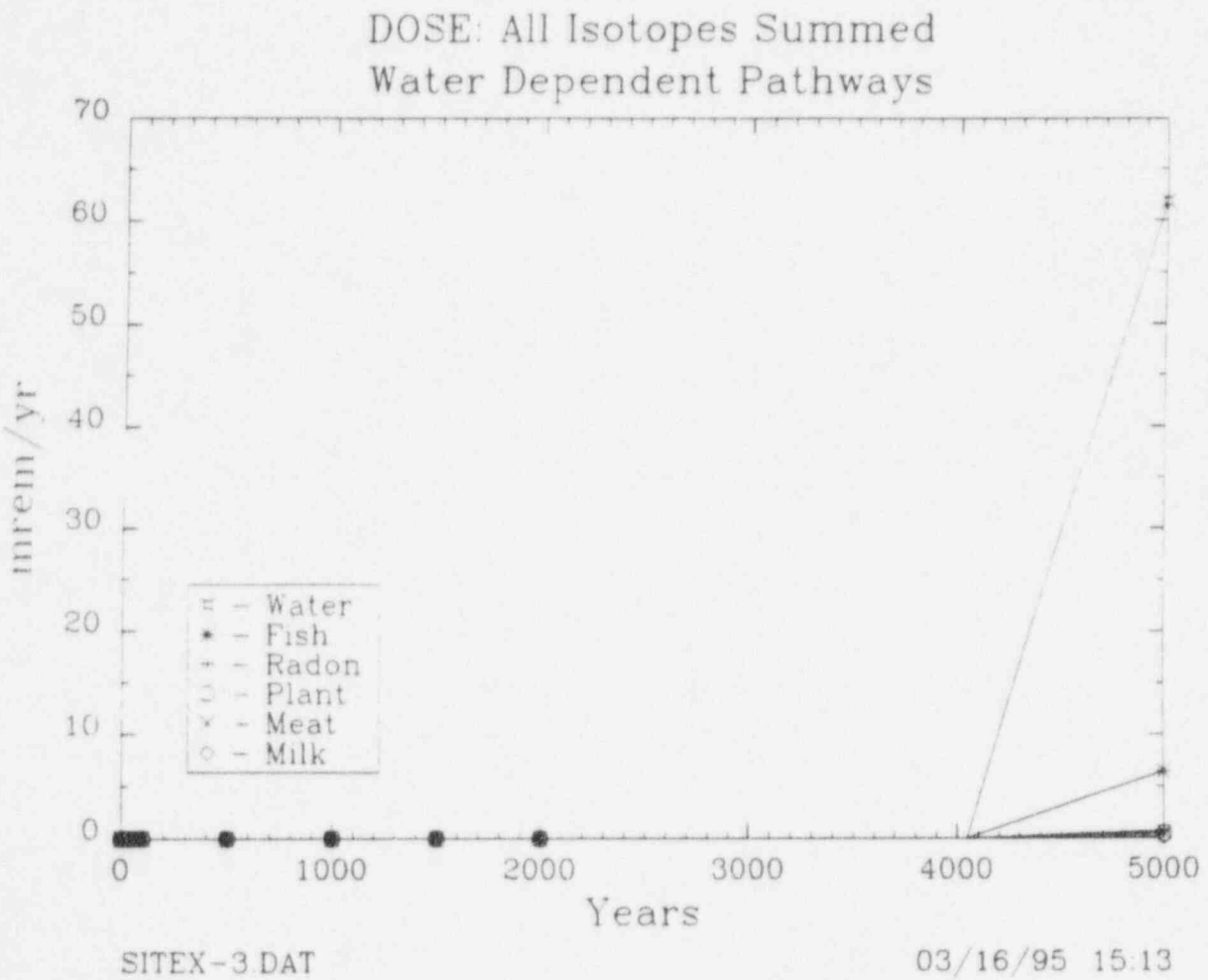

DOSE: All Pathways Summed, U-238
Showing Parent/Progeny Decay and Ingrowth
□ - Total
△ - U-238
+ - U-234
○ - Th-230
× - Ra-226
◇ - Pb-210
mrem/yr
0
1
2
3
4
0
1000
2000
3000
4000
5000
Years
SITEX-2.DAT
03/29/95 10:43

APPENDIX D - RESRAD RESULTS FOR MODIFIED COVERED CASE


TOTAL DOSE: All Isotopes and Pathways Summed
200
180
160
140
120
100
80
mrem/yr
ERDL
0
1000
2000
3000
4000
5000
Years
SITEX-3.DAT
03/16/95 15:13


DOSE: All Isotopes Summed
Water Independent & Dependent Subtotals
120
100
80
60
40
20
0
mrem/yr
□ - Independent
△ - Dependent
0
1000
2000
3000
4000
5000
Years
SITEX-3.DAT
03/16/95 15:13


DOSE: All Isotopes Summed
Water Independent Pathways
120
100
80
60
40
20
0
mrem/yr
□ - Ground
△ - Inhale
+ - Radon
○ - Plant
× - Meat
◇ - Milk
Σ - Soil
0
1000
2000
3000
4000
5000
Years
SITEX-3.DAT
03/16/95 15:13


DOSE: All Isotopes Summed
Water Dependent Pathways
70
60
50
40
30
20
10
0
mrem/yr
Water
Fish
Radon
Plant
Meat
Milk
0
1000
2000
3000
4000
5000
Years
SITEX-3.DAT
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Long-term Human Health Effects for Off-site Resident - Site X

Approach

An assessment of possible future impacts to individuals residing off site is made by looking at possible transport of radionuclides through three principal environmental transport pathways (i.e., ground water, surface water, and air). The primary focus of the off-site resident assessment is the transport of contaminants along these pathways. As with the assessment of impacts to the on-site resident, no consideration is given, at this time, to the transport of non-radiological contaminants. Some control over site access is assumed to be present, otherwise there would be no need for the analysis since the on-site resident assessment would provide the bounding doses. Two possible mechanisms are considered for transport of contaminants through the surface water pathway; namely, direct discharge of contaminants into nearby streams from overland runoff and discharge of contaminants into nearby streams from ground-water baseflow. Possible receptor locations are identified in the problem description document.

The proposed decommissioning standard for restricted release, assuming control over site access, is 15 mrem/year. In addition, the following ground-water protection standards must be considered:

Ra-226	20 pCi/L
Ra-228	20 pCi/L
Uranium[1]	30 pCi/L
4 mrem from all beta and photon emitters	

As with the on-site resident assessment, two situations are considered for assessing the no-action and in-situ stabilization alternatives; namely, the piles being covered and uncovered. The covered scenario is used to look at impacts from the West pile, in its present condition (i.e., no-action alternative), and both piles after remediation (assuming the cover performs as designed throughout the compliance period). The uncovered scenario is used to look at the East pile in its present condition (i.e., no-action alternative), and both piles after remediation if the cover is assumed to no longer function as designed. Where possible, in order to reduce the scope of the analysis, the more bounding analysis is performed first (this is ordinarily the scenario assuming no cover); results from the more bounding analysis is reviewed to determine if the additional analyses are needed. The uncovered scenario can be considered the bounding (limiting) condition for both alternatives. Radionuclides and transport pathways deem to be of little significance under this scenario will likely be of even less concern if it is assumed that the cover is maintained.

The GWSCREEN computer code is used to determine future concentrations in a hypothetical well, located down-gradient from the piles (i.e., to the west).

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[1] U-238+U-234+U-235 combined.

GWSCREEN is also used to analyze concentrations of radionuclides entering nearby Chapman Run from the ground water. Air transport of gaseous radionuclides and radionuclides entrained on particulates is analyzed as a separate analysis, outside of the GWSCREEN analyses. Further, since the piles are located in close proximity to a nearby creek (i.e., Chapman Run and its tributaries), another separate analysis is carried out to estimate concentrations within the creek from overland runoff.

Air

The computer code CAP88-PC (ver. 1.0) is used to estimate doses to a hypothetical individual, residing off site, inhaling radiologically contaminated dust or gas from the site. CAP88-PC uses a modified gaussian plume equation to estimate the average dispersion of radionuclides from either a point or area source. It computes radionuclide concentrations in air, rates of deposition on the ground surface, concentrations in food, and intake rates to people from ingestion of food produced in the assessment area.

Roughly 80-90% of the West pile is covered, in its present condition. The periphery of the pile is uncovered; therefore, it is conceivable for inhalants to be released from the pile in its current condition (i.e., under the no-action alternative). The East pile is currently uncovered, so obviously, inhalants can be released from it in its present condition. Under the in-situ stabilization alternative, both piles will be covered; therefore, significant releases of particulates are not expected to occur until the covers become significantly degraded. Significant releases of gases could occur anytime once the cover begins to degrade. Impacts under either alternative is expected to be comparable since they are likely to occur only under conditions when the cover is either degraded or partially absent; therefore, no distinction is made in the analyses between the two alternatives.

For purposes of the analyses, a hypothetical maximally exposed individual (i.e., maximally exposed for the air pathway) is assumed to be located 676 feet (206 m) northeast of the West pile, along the property line. The estimated population within a 50 mile (80.5 Km) radius is used to assess possible impacts to a population. A population of 1,216,055 persons is used in the analyses

The only gas expected to be released from the pile is radon. The current assumption for the inventory of the piles is based upon secular equilibrium. This assumption should result in inflated values for the concentration of Rn-220 and Rn-222 and their progeny, since the secular equilibrium values are based upon the measurements taken for uranium and thorium. For purposes of the analysis, it is assumed that the radon is released at a constant rate (i.e., the decay of radon equals the ingrowth of radon from its progenitors). Constant release rates for the piles are determined using an approach recommended in Regulatory Guide 3.64; these are shown in Table 1.

To evaluate impacts from particulate releases, the slag is assumed to erode at an arbitrary rate of 8.2E-4 ft/y (2.5E-4 m/y). This rate is an estimate made for clay (ENSR, 1990); therefore, it is considered to be a very conservative