Attachment E

Dennis Duffield's Comments to IEMA on Behalf of City of Joliet

Background

It was no surprise that the proposed amendment was published in the Illinois Register as the City of Joliet ("Joliet") has been working since 2004 with the Illinois Emergency Management Agency ("IEMA") to apply science to its concern of radium in water and wastewater treatment plant sludges. Joliet has developed the majority of the scientific information that is available concerning radium in sludges produced in Illinois. What was a surprise is that none of this information was referenced in the original proposal as published in the Illinois Register on August 28, 2009 or in the fact sheet that accompanied the hearing public notice dated September 18, 2009. This information has been developed at a great expense to Joliet. This information gathering was necessary on the part of Joliet because the regulators, IEMA and the Illinois Environmental Protection Agency ("IEPA"), had not developed a system for gathering information.

During meetings between Joliet representatives and representatives of IEMA and IEPA, little effort was expended by them to explain any dangers to public health. Further, the fact sheet provided with the notice of the public hearing does not directly discuss public health. The risk to a member of the general public from the proposal is not clear. Moreover, nor did IEMA clarify the risks on which it was basing its promulgation at the public hearing. In addition, the fact sheet discusses alternatives, but makes no effort to compare the impact on the public and the associated costs related to such. In addition, there is no discussion of mitigation techniques to limit exposure in a home or any discussion of alternate building techniques (removing organic topsoil from beneath the home) to limit exposure.

The fact sheet does not address the ability of the RESRAD model to estimate doses based on various input conditions. Anyone not familiar with RESRAD may believe that the fact sheet supports the position proposed by IEMA. The fact sheet includes the results of a RESRAD model that did not consider the actual conditions for converting agricultural land to residential neighborhoods. No attempt was made to modify input variables to represent the "real world."

Many standards discussed in the fact sheet actually support the methods proposed by Joliet and other wastewater treatment agencies.

Since IEMA has not chosen to address the risks to the public in either the fact sheet or in its statements at hearing, I will set forth in the remainder of this comment the potential exposures and the risks. I will include the risk to person who would build a home on soils that have had sludge applied which is the actual risk that gave rise to the proposed rule as well as addressing several potential risks that were raised by IEMA representatives at the hearing or were alluded to at hearing. These risks potentially arise because of the potential for exposure from three different groups of people. Water or

wastewater system employees are the first group. The second group is future residents of land converted from agricultural use to residential use. The last group are those individuals that may be impacted by topsoil removed from the site and transported for landscaping at another location.

Discussion

Workers

Joliet first identified workers as a potential risk group in October 2004. Joliet employed RSSI, Inc to inspect the Joliet Westside Wastewater Treatment Plant and measure radiation in the sludge storage and handling areas. This information was reported in a November 15, 2004 report. This report was submitted to the Illinois Pollution Control Board Rulemaking R2004-021 concerning the radium water quality standard. A copy of the report is attached to this comment as Exhibit 1.

The report conclusion pertinent to this proceeding is as follows:

> "Radiation levels and dose rates at the surface of tank no. 4 are lower than background are expected because the tank and its contents shielded the instrumentation from background radiation. Significant concentrations of radium would have raised radiation levels and dose rates."

This indicates that the sludge storage does not provide a risk to workers.

In order to describe the exposure of workers to radiation, the plant process must be described. Radium in sanitary sewage enters the plant through a gravity sewer. The gravity sewer discharges into a wetwell (pumping well). Pumps draw the sewage from the wetwell and discharge it through a pipe to an open channel located in the open air outside a building. The sewage flows by gravity into the primary settling basin. Particulates carrying radium settle to the bottom of the basin and are removed by primary sludge pumps to digesters for continued treatment. Primary settled sewage proceeds to the aeration section of the plant where the oxygen environment encourages bacteria growth. The bacteria metabolize the waste. After aeration, the aerated sewage proceeds to the final clarifiers for settling. The secondary sludge settles to the bottom of the clarifier and the treated wastewater is discharged to the receiving stream. The treated wastewater may or may not receive disinfection based on permit requirements. The majority of the secondary sludge is returned to the aeration basins. This sludge carries the bacteria that perform the treatment. By mixing the sludge with the primary settled sewage, a food source (the waste in the primary settled sewage) is made available to growing bacteria to continue the treatment process. A small portion of the secondary sludge is pumped to digesters.

Digesters receive both primary and secondary sludge. The sludge is stabilized by either aerobic bacteria (need oxygen to grow) or anaerobic bacteria (grow in the absence of oxygen). The sludge is concentrated by decanting water from this process. The resulting sludge can be dried and applied as sludge cake to agricultural land or pumped to tankers for land application as liquid.

The sludge containing radium may be in uncovered tanks, but these tanks are outdoors. This prevents the opportunity for radon to accumulate. During the drying process, liquid is separated from the solids. This is an automated process using a filter press. It is typically performed in a well ventilated room without employee intervention. One plant in Illinois has a completely automated process that removes sludge from tanks and deposits the dry sludge cake in trucks without plant operators at the plant site. In the case of Joliet, both primary and secondary sludge are contained in pipes without the opportunity for employee radon exposure. Sludge is digested and placed in closed storage tanks prior to truck loading. Truck loading is performed outdoors to avoid concentration of radon. After the truck leaves the plant, transfer of the sludge to the applicator is in a closed conduit. The applicator is a tank on wheels with a pump that injects liquid sludge through chisel plows below the ground surface. This also takes place outdoors. The tank structure protects workers for radiation similar to the method described for storage tank 4 at Joliet Westside Wastewater Treatment Plant .

Wastewater plants that produce sludge cake for application as dry sludge, store the dried sludge in well ventilated areas or in areas under roof, but without enclosures on the sides so that radon can be naturally dissipated by the air currents. Truck loading also occurs either outside or in well ventilated areas. Based on the above, the information presented in this comment supports the conclusion that worker safety is addressed by adequate ventilation at wastewater plants. This group is already protected and not impacted by the proposal.

Risk to Future Residents

There has been significant discussion concerning future residents of the land. Joliet presented a report entitled "Land Application of Radium Bearing Biosolids" in June 2007 and an update in June 2008 entitled "Addendum 1 Land Application of Radium Bearing Biosolids." Joliet believes that these reports were in IEMA files, but not referenced as being considered in the development of this proposal. The determination that the reports were in the IEMA files is the result of IEMA producing the June 2007 report to the City of Joliet's "freedom of information act" request by correspondence dated September 25, 2009. (A copy of the reports are provided in Additional References). These reports addressed the dose of radiation that future residents receive if topsoil is removed from the portion of the lot where the house will be constructed. This document points out that a dose of 10 milli-rems per year is not achieved with a 1.0 pico-curie per gram increase in background concentration.

IEMA seems to be concerned about allowing a dose of 10 milli-rems per year in a home built on a parcel that received sludge in the past although no radium bearing soil is beneath the home built in accordance with applicable building codes and sound construction practices. This is inconsistent with the comments provided by IEMA to the Illinois Pollution Control Board ("IPCB") in case R2004-021. In this case, Mr. Richard Allen advised the Illinois Pollution Control Board to allow discharge of radium to streams at a concentration of 60 pico-curies per liter. Mr. Allen further stated that if water at this radionuclide concentration was ingested continuously over the course of a year, it would produce a total effective dose of 50 milli-rems. A copy of this written submittal is provided with this Comment as Exhibit 2.

Although IEMA has previously recommended larger doses, a 10 milli-rem dose was accepted by IEMA, IEPA and Joliet during earlier discussions. The proposed limit for increase in soil concentration of combined radium 226 and radium 228 is 0.4 pico-curies per gram. This limit was placed in the Joliet's land application permit by IEPA. Joliet requested IEPA to modify the permit limitation to 1.0 pico-curies per gram. IEPA denied this request. Joliet appealed the denial to the IPCB.

The IPCB determined that the 1984 memorandum of agreement between the Illinois Department of Nuclear Safety and IEPA was implemented without proper rulemaking procedures being followed. The IPCB also determined that Joliet had not properly demonstrated that land application would not cause water pollution because the RESRAD modeling did not include the residents consuming drinking water from an on-site well and eating vegetables from an on-site garden.

Since the IPCB decision, Joliet directed RSSI, Inc. to perform RESRAD modeling including the use of on-site well water and consuming home-grown vegetables. The results of this modeling demonstrated that although there is a slight increase in dose to the residents, the dose after 10 applications is 5.25 milli-rems per year without onsite well and a garden and 5.94 milli-rems per year with onsite water supply and homegrown vegetables. This is a very slight increase and was anticipated. A similar increase in dose results from additional applications.

On-site wells and the use of home grown vegetables have an impact so small it would be difficult to measure. This modeling demonstrates that the Joliet proposed limit of 1.0 pico-curies per gram increase above background is still protective of future residents. This information was submitted at the public hearing by Mr. Sangho Nam of RSSI, Inc. Exhibit 3 provides the RESRAD results.

IEMA has now used the approach that the continued land application may not meet the requirements of ALARA. ALARA means "As Low As Reasonably Achievable." The key word is "reasonable." In my opinion, cost is a consideration into determining reasonableness.

Although a health physicist would not encourage the use of a benefit to cost ratio, the benefit to cost ratio is one method of determining reasonableness. If land application is considered for this type of analysis, the comparison would be the benefit of avoiding additional sludge disposal costs compared to the cost to the public for additional radiation dose.

If Joliet's situation is evaluated on a benefit-cost basis, the analysis must include benefits. In this situation, the avoided cost of landfill disposal is the benefit. Disposal costs were estimated in the report "Evaluation of Radium Removal Impacts on Sludge Handling at the Eastside and Westside Wastewater Treatment Facilities, Joliet, Il" prepared by Clark Dietz, Inc, in August 2004. The present value of the additional expenses to landfill sludge in lieu of land application was determined to be approximately $27,000.000 in 2004 dollars. If this cost is adjusted by the consumer price index to the current time, the cost increases to $30,000,000.

The cost is the cost of additional radiation to the public. In 1995, the Nuclear Regulatory Commission estimated the cost of each additional person-rem to be $2000. Adjusting this cost to 2009 using the consumer price index results in a cost per person rem of $2810. The Health Physics Society does not support the use of a cost per person-rem, however, this appears to be the only available information. A specific estimate of cost related to the land application of sludge is well beyond the capability of the City of Joliet to determine [redacted].

1310 acres is required to allow Joliet to apply sludge at the rate of 3.5 dry tons per acre for a 20 year period. 1310 acres, with a population density of 9.4 people per acre (3 houses per acre with 3.14 people per house), results in a population of 12,341 people. Applying the allowable dose of 10 milli-rems per year, (0.01 rems per year), this results in 123.4 person rems per year. Applying the cost per person-rem for a 20 year period results in a cost of $6,940,000.

The benefit to cost ratio is $30,000,000 divided by $6,940,000. The result is 4.3. This means that it costs the public 4.3 times as much to avoid this radiation exposure as to allow the exposure. It is not reasonable to expend public funds to avoid this additional radiation.

In addition to the large benefit to cost ratio related to land application, the Health Physics Society identifies 10 milli-rems per year as "low dose." 10 rem is the lower limit of dose that the Health Physics Society identifies as having effects that can be recognized by current epidemiological methods and data. A 10 rem dose is 1000 times greater than the dose considered from land application. The Health Physics Society supports a dose of 100 milli-rems per year from all controllable sources. From a specific source, the Society supports 25 milli-rems per year. The position statements of the Health Physics Society are provided with this comment as Exhibits 4, 5, and 6.

Since the dose under discussion is less than 10 milli-rems, the health risk cannot be defined. It is known that the primary health risk results from radon inhalation. Radon is

almost eliminated by removing the topsoil from beneath the home. The 10 milli-rem limitation provides a substantial buffer to the 25 milli-rem dose that is consistent with the Health Physics Society position.

Based on this information, it is clear that 10 milli-rems is a dose that is as low as can be reasonably achieved. Land application of sludge provides nutrients that would not be reused if stored in a landfill. This is clearly a benefit to society. This is a major consideration in comparison of risk to the general population and benefit to society.

Risk of taking topsoil to another location

Although the information has been presented many times, it is apparent that IEMA does not accept that topsoil is not a good building material. The latest concern expressed at the public hearing by IEMA is that topsoil will be removed from the site and deposited at a school, park or under a structure. While it is realistic to believe that topsoil will be relocated, it will be used for landscaping purposes only.

Schools and Parks

RSSI, Inc. has modeled the park and school yard situations. The results of the modeling indicate that the dose to recreational users is not of consequence. The inputs to the model are as follows:

> The radium concentration in the soil is 1 pico-curie per gram. The soil is placed 0.5 meters thick (just under 20 inches). There is not other material over the radium bearing soil. The recreational model of the RESRAD model was used. All the default inputs were used except foods grown on site was blocked from consideration. The use of default provides a conservative result when better input information is not known.

The predicted dose to users is less than 1 milli-rem per year in year one and grows to approximately 2 milli-rems per year in 1000 years. This dose is well below any dose than can be used to predict risk.

This information should be adequate to demonstrate that topsoil that is removed from the application site and placed on a park or school yard is not significant. Based on this information, no tracking of topsoil is necessary to protect the public health.

The RESRAD model results are provided with this comment as Exhibit 7.

Topsoil as Structural Fill

It is my understanding that IEMA is concerned about creating another situation similar to West Chicago where mill tailings containing radioactive materials were used as fill and foundations. Mill tailings have significantly different soil characteristics than organic topsoil. Mill tailings are primarily inorganic granular material. Granular material has value as a structural fill.

Shear strength is a measurement of the ability of soil to resist applied loads. The shear strength in soil is affected by the mineralogy, grain size, grain size distribution and particle shape. Mill tailings are angular in shape, have grain size ranging from less than .07mm (200 openings per square inch) to 2 mm. Approximately 40% of the material will pass through a 200 mesh screen. In addition, mill tailings are inorganic. This is the description of a material high in shear strength that could support substantial loads.

The situation concerning placing topsoil under a structure is not possible. Topsoil is highly organic. The material is weak in shear strength and will not support foundation loads. Foundations will settle if the material cannot support the foundation loads. The soil contains decaying organic material (roots and other plant materials) that will decay, create voids and contribute to foundation settling. The grain size of topsoil is primarily less that .07mm (200 openings per square inch). This grain size cannot easily be compacted to increase strength. The particles sizes in topsoil are relatively uniform which makes it difficult to eliminate voids. These characteristics contribute to the weak shear strength.

Although it is not possible to use topsoil as structural fill, Joliet requested RSSI, Inc to model a situation with a home built on fill. Two situations were modeled.

The first scenario considered a home with approximately an 1100 square ft foot print. 19 inches (0.5 meters) of radium bearing topsoil was placed around the structure. 19 inches is an unusual depth of topsoil. Normal depths are 4-6 inches. The dose residents received was dependent on the amount of time spent inside or outside the house. The model results and specific inputs are provided with this comment as Exhibit 8.

The largest dose occurs for a subject that spends 100 percent of the time outdoors. This dose is calculated at 9.63 milli-rems per year. The lowest dose is predicted for a subject that spends 50% of the time indoors, 25% of the time outdoors and 25% of the time off the site. This dose is 6.56 milli-rems per year.

Both of these doses are less than the 10 milli-rems previously discussed. It is apparent that the transportation of topsoil offsite for use in landscaping does not represent a hazard to the public.

The second situation considered homes built on 10 feet (3.05 meters) of topsoil fill. Although it is not a sound building practice to construct on topsoil and building codes prohibit this situation, the modeling was performed to provide a complete understanding for IEMA. Three styles of home construction were considered. The three styles of construction were a house on spread footing, a house with a basement and a house built slab on grade. In all cases, the topsoil was left beneath the home. The modeling information is provided with this comment as Exhibit 9.

Since the topsoil was left beneath the home, it became a contributor of radon which is the reason for the higher doses predicted. The predicted doses range from 33.53 to 35.52. These doses are higher than would occur if the topsoil were removed, but do not represent an immediate hazard to the resident.

Since a large portion of the dose results from radon accumulation, the measurement of radon using an home test kit and mailing it for analysis would advise the homeowner of the situation. Many communities are requiring the installation of passive radon mitigation (a vent pipe from beneath the floor slab through the roof) at the initial construction. If the testing results indicate high levels of radon, a fan can be added to the vent pipe to remove air faster and prevent radon accumulation.

Conclusion and Recommendation

Joliet has been working to resolve issues with radium for more than 20 years. The first issue was radium in drinking water, then radium in wastewater plant discharges and now radium in sludge. In each case, scientific evidence was clouded by people with special agendas.

Radium is everywhere in Illinois. It is a contributor to the background radiation. Radium in water treatment plant and wastewater treatment plant sludge is a created issue. It is being regulated for the sake of regulation. The force behind the proposed regulation is not protection of the public health. The public has been protected by current building practice. The protection against radiation may not have been the intent of building codes, but protection has been a result.

Water and wastewater treatment plants do not need a new regulation from another state agency. Land application of water and wastewater treatment plant sludges is appropriately a responsibility of the IEPA. There is no need for direct regulation by IEMA.

IEMA and IEPA should jointly form a stakeholder's group to work toward a system that will protect the public health and limit costs to the public. This will require the withdrawal of the current proposal. This is possible because there is no immediate public health problem. The stakeholder's group should consider the approach used by Wisconsin Department of Natural Resources.

If it is not possible to withdraw this proposal, it should be modified to implement the Wisconsin Department of Natural Resources approach.

The City of Joliet has provided enough documentation to allow this proposal to be modified or withdrawn. This documentation was developed to support Joliet's proposal (1.0 pico-curies per gram increase above background). The documentation also supports the Wisconsin Department of Natural Resources approach.

It is recommended that the IEMA withdraw this proposal and engage the IEPA in discussions concerning regulation of radium in water and wastewater treatment plant sludges by the IEPA.

EXHIBIT LIST

Exhibit 1	Report of Survey at Westside Wastewater Treatment Plant, Joliet, IL
Exhibit 2	IEMA Comment to IPCB R2004-021
Exhibit 3	RESRAD Results –Onsite Well and Vegetables Parts 1-9
Exhibit 4	Risk Assessment, Position Statement of the Health Physics Society
Exhibit 5	Ionizing Radiation-Safety Standards for the General Public Position Statement of the Health Physics Society
Exhibit 6	Radiation Risk in Perspective, Position Statement of the Health Physics Society
Exhibit 7	RESRAD Results –Recreation
Exhibit 8	RESRAD Results-Topsoil as Fill Nearby home Parts 1-7
Exhibit 9	RESRAD Results-Topsoil as Fill Under home Inputs Summary-see Exhibit 8 Part 1 Parts 1-3

Additional References in IEMA Files

Rogina and Associates, Ltd	Land Application of Radium Bearing Sludge
Rogina and Associates, Ltd	Addendum 1 Land Application of Radium Bearing Sludge

Exhibit 1

Report of Survey at Westside Wastewater Treatment Plant, Joliet, IL

REPORT OF SURVEY
AT
WESTSIDE WASTE WATER TREATMENT PLANT
IN
CITY OF JOLIET, ILLINOIS

PERFORMED FOR

DEPARTMENT OF PUBLIC WORKS AND UTILITIES
CITY OF JOLIET, ILLINOIS

BY

RSSI
6312 W. OAKTON STREET
MORTON GROVE, ILLINOIS

November 15, 2004

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INTRODUCTION

On October 15, 2004, RSSI performed a survey and a sludge sample was collected at the Joliet Westside Waste Water Treatment Plant (WWTP) to measure the dose rate at the surface of sludge tanks and for analysis for the radium concentration in the sludge.

METHODOLOGY

Direct Reading

Radiation levels were measured at the surface of sludge storage tank no. 4 to determine if areas of elevated radiation were present. The measurements were made using a Ludlum Model 3 survey meter with a 44-9 pancake probe. The probe was moved slowly approximately 1 centimeter from the surface of the surface and the tank between 3 to 6 feet above the base.

Exposure rate measurements were made at the surface of columns in a Water Remediation Technology, LLC (WRT) demonstration project. The demonstration project removes radium from a water flow of approximately one gallon per minute (gpm). The removed radium is retained in four columns through which the water flows in series. The exposure rate measurements were made using a Ludlum Model 3 survey meter with an Eberline HP-270 probe. The probe was moved slowly approximately 1 centimeter from the surface of the columns to located the areas of highest exposure rate for each column. At 1 gpm much less radium is removed than would be removed by a production unit.

The Ludlum Model 3 is a general-purpose portable survey instrument. It is used with a Ludlum Model 44-9 pancake type Geiger-Mueller (GM) detector or an Eberline HP-270 energy compensated GM detector. The Model 44-9 is sensitive to charged particle radiation, such as alpha and beta radiation, and has limited sensitivity to photons. The HP-270 is energy compensate, having a flat exposure rate response between 70 keV and 1.3 MeV. With its beta shield closed it is insensitive to particulate radiation.

Dose rates were measured using a Health Physics instrument (HPI) model 1010 survey meter. Dose rates were measured at the surface of the tank in the same areas as the radiation levels were measured. The HPI Model 1010 is a portable survey meter with a soft tissue equivalent gas multiplication chamber. It measures deep dose and

deep dose rates from photons and penetrating particles in continuous or pulsed radiation fields. The reading in mrad/hour is multiplied by the quality factor to obtain the dose equivalent in mrem/hour. The quality factor for beta and gamma radiation is one.

Bulk High Resolution Gamma Spectroscopy

A 535 grams sludge sample was collected by a city employee in 500 ml Marinelli beaker and counted for 48 hours in a Nucleus PCA II Analyzer. The Nucleus PCA II analyzer is a PC based 8k channel multichannel analyzer (MCA). It is used with an Ortec GEM-30185 high purity germanium (HPGe) detector, an Ortec 456 high voltage power supply, and a Canberra Model 2021 spectroscopy amplifier. Data are reduced using Quantum Technology gamma spectroscopy software. This system performs qualitative and quantitative analysis of spectra from the HPGe detector, identifying radionuclides and the quantities present in samples.

The sludge sample was analyzed for the presence of the naturally occurring uranium, thorium and actinium series and for potassium-40 using GDR software. Radium 228 is in the thorium series and emits no significant photons. Radium 226 is in the uranium series and has only one low abundance photon at 186 keV.

The concentrations of surrogates with more abundant high energy photons usually represent the concentration of Ra-228 and Ra-226. Actinium-228, in the thorium series, is frequently used as a surrogate for Radium-228. Lead-214, in the uranium series, is frequently used as a surrogate for Radium-226. These surrogates are in equilibrium with the radium isotopes after one month in-situ.

RESULTS

Instrument Surveys

Background radiation levels at the WWTP were between 50 and 60 counts per minute (cpm). Radiation levels at the surface of the tanks were approximately 40 cpm. The background dose rate was 8 µrad/hr. The dose rate at the surface of the tank was 5 µrad/hr.

Exposure rates at the surfaces of the columns in the WRT demonstration project are below.

Column Number	Exposure Rate (mR/hr)
1	2.0
2	1.3
3	0.6
4	< 0.1

Bulk High Resolution Gamma Spectroscopy

The 535 gram sludge sample dried to 17 grams. It was analyzed when collected and reanalyzed after being held 30 days to permit ingrowth of the radium daughters. High Resolution Gamma Spectroscopy results follow:

Isotope	Initial (pCi/g)	Final (pCi/g)
Ac-228	19.0	28.0
Pb-214	14.5	20.1
Total*		48.1

* Ra-226 and Ra-228 by surrogates

The changes in the activity of both surrogates are due to disequilibrium in the thorium and uranium series when the sample was collected. The lower initial concentration of Ac-228 suggests that the sample had a lower initial concentration of Ac-228 than of Ra-228. The ingrowth of Pb-214 occurs when a disturbance of equilibrium results from the release of radon-222.

CONCLUSIONS

- Radiation levels and dose rates at the surface of tank no. 4 lower than background are expected because the tank and its contents shielded the instrumentation from background radiation. Significant concentrations of radium would have raised the radiation levels and dose rates.
- The exposure rates at the surface of the WRT demonstration columns would be scaled up for radium removed from a two stage system at higher flow rates.
- The presence of significant radium in at least three stages of the WRT demonstration indicate that at least three stages, and probably four stages, may be required in a production operation to prevent breakthrough of radium.

Exhibit 2

IEMA Comment to IPCB 04-021

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STATE OF ILLINOIS
Pollution Control Board

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
REVISIONS TO RADIUM QUALITY	)	
STANDARDS: PROPOSED NEW ILL. ADM.	)	R 04-21
CODE 302.307 and AMENDMENTS TO	)	(Rulemaking – Water)
35 ILL. ADM. CODE 302.207 and 302.525	)	

TO: Dorothy Gunn, Clerk
Illinois Pollution Control Board
James R. Thompson Center
100 W. Randolph Street, Suite 11-500
Chicago, Illinois 60601

PC#24

The Illinois Emergency Management Agency (IEMA) respectfully submits the following comments to the Illinois Pollution Control Board ("Board") on the captioned proposed rulemaking.

IEMA agrees that the existing General Use Water Quality standard for radium-226 of 1 pCi/L is too low, given a number of practical considerations. The two most important of these considerations are the existing drinking water standard and the existing levels in natural background.

IEMA's position is that the General Use Water Quality standard should be set for the protection of human health. As such, our position is that the existing drinking water standard serves as an important benchmark for the current rulemaking. Given the current drinking water standard of 5 pCi/L, IEMA fails to see how a General Use Water Quality standard of 1 pCi/L can be supported by science that relates to human health considerations. It should also be noted that if Congress had not directed USEPA to drop its proposed radon standard, the current drinking water radium Maximum Contaminant Level would probably be 20 pCi/L for radium-226 and 20 pCi/L for radium-228.

IEMA performs testing on most of the community drinking water in the state. Our testing indicates that natural background radium concentrations in Northern Illinois groundwater range from less than detectable up to about 25 or 30 pCi/L. IEMA does not wish to argue about effluent releases from water treatment facilities or sewage treatment facilities in this submission. However, we would simply point out that common uses of groundwater that do not result in concentration of radium would be in violation of the current rule, if discharged to surface waters. Such common uses would include use of the water for domestic

purposes by individual users who do not treat for radium, cropland irrigation and once-through cooling systems used in industry.

IEMA's position is that IEPA's proposal to change the public and food processing water supply standard to 5 pCi/L is supportable. The support is provided by the large volume of documentation generated by USEPA in its December 7, 2000, rulemaking that re-affirmed the drinking water standard. On the other hand, IEPA's proposal to completely eliminate the rest of the General Use Water Quality Standard for radium is probably not supportable. To eliminate this standard in its entirety could allow significant sources of discharge to go unchecked. IEMA would support a numerical standard based on human health risk.

IEMA recognizes the arguments put forth by environmental groups concerned about radiation exposures to aquatic biota. These may be legitimate concerns, but IEMA's position is that protection of aquatic biota was not an original objective of the General Use Water Quality standard for radium. To generate a new standard with such an objective would constitute a major policy shift. To clarify, it is understood that IEPA and the Board have addressed protection of aquatic biota in previous rulemakings. Our point is that they have not explicitly done so for radioactive constituents. If the Board wishes to entertain such a policy shift, it should consider such action as a new initiative capable of standing on its own merits. At the moment, the argument has only been made as a rebuttal to IEPA's proposal. Such an initiative should be supported by Illinois specific environmental data, which we think all parties will agree, is either insufficient, or not in high enough quality to bring forward for the Board's consideration.

Therefore, in recognition of both IEPA's proposal and the objections that appear in the record, we recommend the following approach to moving forward on this rulemaking.

First, we would suggest setting an interim standard for protection of human health by adoption of a federal standard that IEMA suggests is relevant and appropriate for this purpose. We suggest that the interim standard be adopted from the U. S. Nuclear Regulatory Commission's (NRC) 10 CFR Part 20 Appendix B. IEMA has adopted this standard into Illinois radiation protection regulations at 32 IAC Part 340. The Appendix B Table 2 effluent concentration limit for radium in water is 60 pCi/L. This standard applies to radioactive materials licensees who discharge to surface waters. This standard relates directly to radiation dose to humans. The concentrations in Table 2 are equivalent to the radionuclide concentrations, which if ingested continuously over the course of a year, would produce a total effective dose equivalent of 50 millirem. For reference, the dose equivalent limit to members of the general public is 100 millirem.

Second, we would suggest that IEPA work with interested parties towards a determination of whether that interim standard is sufficiently protective of aquatic biota, or whether a more restrictive standard would be more appropriate. At this point, interested parties would propose this new policy initiative to the Board. Such a policy initiative should be supported by a number of important elements. This initiative should articulate a clear objective. As stated by the National Council on Radiation Protection and Measurements in NCRP Report 109, the fate of individual organisms is, generally, not the major concern but rather the response and maintenance of endemic populations. If the objective of the initiative is not in agreement with NCRP recommendations, it should be clearly stated. In any case, the initiative should be supported by a carefully developed Illinois specific data package and modeling effort.

IEMA believes that this two-phased approach will address IEPA's short term objectives to revise the General Use Water Quality standard to one, which is supported by science related to human health risk and will allow other interested parties to present a carefully developed case for a policy change to provide for protection of aquatic biota.

Respectfully submitted,

ILLINOIS EMERGENCY
MANAGEMENT AGENCY

By: Richard Allen
Richard Allen
Chief, Bureau of Environmental Safety

December 7, 2004

1035 Outer Park Drive
Springfield, Illinois 62704

Exhibit 3

RESRAD Results- Onsite Well and Vegetables

Part 1

RESRAD Modeling
with an on-site well and consumption of vegetables grown on-site.

This modeling was preformed in response to the Illinois Pollution Control Board opinion that Joliet had not demonstrated that water pollution would not occur in this situation. The remaining pages in this part of Exhibit 3 are summary tables. The remaining parts of this exhibit include the information generated by the computer program. The dosage is found on page 10 of each set of information.

Joliet Eastside Wastewater Treatment Plant

Time (Years)	Dose Ra-226	Concen. Ra-226	Dose Ra-228	Concen. Ra-228	Total Dose		Dose Ra-228	Concen. Ra-228	Application
0	0.22	0.014	0.09	0.016	0.31		0.094	0.016	1
1	0.22	0.014	0.08	0.014	0.30		0.083	0.014	1
2	0.44	0.028	0.17	0.029	0.61		0.074	0.013	2
3	0.44	0.028	0.15	0.025	0.59		0.065	0.011	2
4	0.66	0.042	0.23	0.038	0.89		0.058	0.010	3
5	0.66	0.042	0.20	0.034	0.86		0.051	0.009	3
6	0.88	0.056	0.27	0.046	1.16		0.046	0.008	4
7	0.88	0.056	0.24	0.041	1.12		0.040	0.007	4
8	1.11	0.07	0.31	0.052	1.41		0.036	0.006	5
9	1.11	0.07	0.27	0.046	1.38		0.032	0.005	5
10	1.33	0.084	0.33	0.057	1.66		0.028	0.005	6
11	1.33	0.084	0.30	0.051	1.62		0.025	0.004	6
12	1.55	0.098	0.36	0.061	1.90		0.022	0.004	7
13	1.55	0.098	0.32	0.054	1.86		0.020	0.003	7
14	1.77	0.112	0.37	0.064	2.14		0.017	0.003	8
15	1.77	0.112	0.33	0.057	2.10		0.015	0.003	8
16	1.99	0.126	0.39	0.066	2.38		0.014	0.002	9
17	1.99	0.126	0.34	0.059	2.33		0.012	0.002	9
18	2.21	0.14	0.40	0.068	2.61		0.011	0.002	10
19	2.21	0.14	0.35	0.060	2.56		0.010	0.002	10
20	2.43	0.154	0.41	0.069	2.84		0.008	0.001	11
21	2.43	0.154	0.36	0.062	2.79		0.007	0.001	11
22	2.65	0.168	0.41	0.071	3.07		0.007	0.001	12
23	2.65	0.168	0.37	0.063	3.02		0.006	0.001	12
24	2.87	0.182	0.42	0.071	3.29		0.005	0.001	13
25	2.87	0.182	0.37	0.063	3.24		0.005	0.001	13
26	3.09	0.196	0.42	0.072	3.52		0.004	0.001	14
27	3.09	0.196	0.38	0.064	3.47		0.004	0.001	14
28	3.32	0.21	0.43	0.073	3.74		0.003	0.001	15
29	3.32	0.21	0.38	0.064	3.69		0.003	0.000	15
30	3.54	0.224	0.43	0.073	3.96		0.003	0.000	16
31	3.54	0.224	0.38	0.065	3.92		0.002	0.000	16
32	3.76	0.238	0.43	0.073	4.19		0.002	0.000	17
33	3.76	0.238	0.38	0.065	4.14		0.002	0.000	17

Joliet Westside Wastewater Treatment Plant

Time (Years)	Dose Ra-226	Concen. Ra-226	Dose Ra-228	Concen. Ra-228	Total Dose		Dose Ra-228	Concen. Ra-228	Application
0	0.49	0.031	0.28	0.047	0.77		0.276	0.047	1
1	0.49	0.031	0.25	0.042	0.74		0.245	0.042	1
2	0.98	0.062	0.49	0.084	1.47		0.217	0.037	2
3	0.98	0.062	0.44	0.074	1.42		0.192	0.033	2
4	1.47	0.093	0.66	0.113	2.13		0.170	0.029	3
5	1.47	0.093	0.59	0.100	2.06		0.151	0.026	3
6	1.96	0.124	0.80	0.136	2.76		0.134	0.023	4
7	1.96	0.124	0.71	0.120	2.67		0.119	0.020	4
8	2.45	0.155	0.90	0.154	3.35		0.105	0.018	5
9	2.45	0.155	0.80	0.136	3.25		0.093	0.016	5
10	2.94	0.186	0.99	0.168	3.93		0.083	0.014	6
11	2.94	0.186	0.87	0.149	3.81		0.073	0.012	6
12	3.43	0.217	1.05	0.179	4.48		0.065	0.011	7
13	3.43	0.217	0.93	0.159	4.36		0.058	0.010	7
14	3.92	0.248	1.10	0.188	5.02		0.051	0.009	8
15	3.92	0.248	0.98	0.166	4.90		0.045	0.008	8
16	4.41	0.279	1.14	0.194	5.55		0.040	0.007	9
17	4.41	0.279	1.01	0.172	5.42		0.036	0.006	9
18	4.90	0.31	1.17	0.200	6.07		0.032	0.005	10
19	4.90	0.31	1.04	0.177	5.94		0.028	0.005	10
20	5.39	0.341	1.20	0.204	6.59		0.025	0.004	11
21	5.39	0.341	1.06	0.181	6.45		0.022	0.004	11
22	5.88	0.372	1.22	0.207	7.10		0.019	0.003	12
23	5.88	0.372	1.08	0.184	6.96		0.017	0.003	12
24	6.37	0.403	1.23	0.210	7.60		0.015	0.003	13
25	6.37	0.403	1.09	0.186	7.46		0.014	0.002	13
26	6.86	0.434	1.24	0.212	8.10		0.012	0.002	14
27	6.86	0.434	1.10	0.188	7.96		0.011	0.002	14
28	7.35	0.465	1.25	0.214	8.60		0.009	0.002	15
29	7.35	0.465	1.11	0.189	8.46		0.008	0.001	15
30	7.84	0.496	1.26	0.215	9.10		0.007	0.001	16
31	7.84	0.496	1.12	0.190	8.96		0.007	0.001	16
32	8.33	0.527	1.27	0.216	9.60		0.006	0.001	17
33	8.33	0.527	1.12	0.191	9.45		0.005	0.001	17

Joliet Eastside Wastewater Treatment Plant

After 6th Application

	Dose	Concen.	Dose	Concen.			Dose	Concen.		Total Concen.
Time (Years)	Ra-226	Ra-226	Ra-228	Ra-228	Total Dose		Ra-228	Ra-228	Application	
0	0.22	0.014	0.09	0.016	0.31		0.09	0.016	1	0.030
1	0.22	0.014	0.08	0.014	0.30		0.08	0.014	1	0.028
2	0.44	0.028	0.17	0.029	0.61		0.07	0.013	2	0.057
3	0.44	0.028	0.15	0.025	0.59		0.07	0.011	2	0.053
4	0.66	0.042	0.23	0.038	0.89		0.06	0.010	3	0.080
5	0.66	0.042	0.20	0.034	0.86		0.05	0.009	3	0.076
6	0.88	0.056	0.27	0.046	1.16		0.05	0.008	4	0.102
7	0.88	0.056	0.24	0.041	1.12		0.04	0.007	4	0.097
8	1.11	0.07	0.31	0.052	1.41		0.04	0.006	5	0.122
9	1.11	0.07	0.27	0.046	1.38		0.03	0.005	5	0.116
10	1.33	0.084	0.33	0.057	1.66		0.03	0.005	6	0.141
11	1.33	0.084	0.30	0.051	1.62		0.02	0.004	6	0.135
12	1.55	0.098	0.36	0.061	1.90		0.02	0.004	7	0.159

Joliet Eastside Wastewater Treatment Plant

After 8th Application

Time (Years)	Dose Ra-226	Concen. Ra-226	Dose Ra-228	Concen. Ra-228	Total Dose		Dose Ra-228	Concen. Ra-228	Application	Total Concen.
0	0.22	0.014	0.09	0.016	0.27		0.09	0.016	1	0.030
1	0.22	0.014	0.08	0.014	0.30		0.08	0.014	1	0.028
2	0.44	0.028	0.17	0.029	0.61		0.07	0.013	2	0.057
3	0.44	0.028	0.15	0.025	0.59		0.07	0.011	2	0.053
4	0.66	0.042	0.23	0.038	0.89		0.06	0.010	3	0.080
5	0.66	0.042	0.20	0.034	0.86		0.05	0.009	3	0.076
6	0.88	0.056	0.27	0.046	1.16		0.05	0.008	4	0.102
7	0.88	0.056	0.24	0.041	1.12		0.04	0.007	4	0.097
8	1.11	0.07	0.31	0.052	1.41		0.04	0.006	5	0.122
9	1.11	0.07	0.27	0.046	1.38		0.03	0.005	5	0.116
10	1.33	0.084	0.33	0.057	1.66		0.03	0.005	6	0.141
11	1.33	0.084	0.30	0.051	1.62		0.02	0.004	6	0.135
12	1.55	0.098	0.36	0.061	1.90		0.02	0.004	7	0.159
13	1.55	0.098	0.32	0.054	1.86		0.02	0.003	7	0.152
14	1.77	0.112	0.37	0.064	2.14		0.02	0.003	8	0.176
15	1.77	0.112	0.33	0.057	2.10		0.02	0.003	8	0.169
16	1.99	0.126	0.39	0.066	2.38		0.01	0.002	9	0.192

Joliet Eastside Wastewater Treatment Plant

After 10th Application

	Dose	Concen.	Dose	Concen.			Dose	Concen.		Total Concen.
Time (Years)	Ra-226	Ra-226	Ra-228	Ra-228	Total Dose		Ra-228	Ra-228	Application	
0	0.22	0.014	0.09	0.016	0.27		0.09	0.016	1	0.030
1	0.22	0.014	0.08	0.014	0.30		0.08	0.014	1	0.028
2	0.44	0.028	0.17	0.029	0.61		0.07	0.013	2	0.057
3	0.44	0.028	0.15	0.025	0.59		0.07	0.011	2	0.053
4	0.66	0.042	0.23	0.038	0.89		0.06	0.010	3	0.080
5	0.66	0.042	0.20	0.034	0.86		0.05	0.009	3	0.076
6	0.88	0.056	0.27	0.046	1.16		0.05	0.008	4	0.102
7	0.88	0.056	0.24	0.041	1.12		0.04	0.007	4	0.097
8	1.11	0.07	0.31	0.052	1.41		0.04	0.006	5	0.122
9	1.11	0.07	0.27	0.046	1.38		0.03	0.005	5	0.116
10	1.33	0.084	0.33	0.057	1.66		0.03	0.005	6	0.141
11	1.33	0.084	0.30	0.051	1.62		0.02	0.004	6	0.135
12	1.55	0.098	0.36	0.061	1.90		0.02	0.004	7	0.159
13	1.55	0.098	0.32	0.054	1.86		0.02	0.003	7	0.152
14	1.77	0.112	0.37	0.064	2.14		0.02	0.003	8	0.176
15	1.77	0.112	0.33	0.057	2.10		0.02	0.003	8	0.169
16	1.99	0.126	0.39	0.066	2.38		0.01	0.002	9	0.192
17	1.99	0.126	0.34	0.059	2.33		0.01	0.002	9	0.185
18	2.21	0.14	0.40	0.068	2.61		0.01	0.002	10	0.208
19	2.21	0.14	0.35	0.060	2.56		0.01	0.002	10	0.200
20	2.43	0.154	0.41	0.069	2.84		0.01	0.001	11	0.223

Joliet Westside Wastewater Treatment Plant

After 6th Application

	Dose	Concen.	Dose	Concen.		Dose	Concen.		Total Concen.
Time (Years)	Ra-226	Ra-226	Ra-228	Ra-228	Total Dose	Ra-228	Ra-228	Application	
0	0.49	0.031	0.28	0.047	0.77	0.28	0.047	1	0.078
1	0.49	0.031	0.24	0.042	0.73	0.24	0.042	1	0.073
2	0.98	0.062	0.49	0.084	1.47	0.22	0.037	2	0.146
3	0.98	0.062	0.44	0.074	1.42	0.19	0.033	2	0.136
4	1.47	0.093	0.66	0.113	2.13	0.17	0.029	3	0.206
5	1.47	0.093	0.59	0.100	2.06	0.15	0.026	3	0.193
6	1.96	0.124	0.80	0.136	2.76	0.13	0.023	4	0.260
7	1.96	0.124	0.71	0.120	2.67	0.12	0.020	4	0.244
8	2.45	0.155	0.90	0.154	3.35	0.11	0.018	5	0.309
9	2.45	0.155	0.80	0.136	3.25	0.09	0.016	5	0.291
10	2.94	0.186	0.99	0.168	3.93	0.08	0.014	6	0.354
11	2.94	0.186	0.87	0.149	3.81	0.07	0.012	6	0.335
12	3.43	0.217	1.05	0.179	4.48	0.06	0.011	7	0.396

Joliet Westside Wastewater Treatment Plant

After 8th Application

Time (Years)	Dose Ra-226	Concen. Ra-226	Dose Ra-228	Concen. Ra-228	Total Dose		Dose Ra-228	Concen. Ra-228	Application
0	0.49	0.031	0.28	0.047	0.64		0.28	0.047	1
1	0.49	0.031	0.24	0.042	0.73		0.24	0.042	1
2	0.98	0.062	0.49	0.084	1.47		0.22	0.037	2
3	0.98	0.062	0.44	0.074	1.42		0.19	0.033	2
4	1.47	0.093	0.66	0.113	2.13		0.17	0.029	3
5	1.47	0.093	0.59	0.100	2.06		0.15	0.026	3
6	1.96	0.124	0.80	0.136	2.76		0.13	0.023	4
7	1.96	0.124	0.71	0.120	2.67		0.12	0.020	4
8	2.45	0.155	0.90	0.154	3.35		0.11	0.018	5
9	2.45	0.155	0.80	0.136	3.25		0.09	0.016	5
10	2.94	0.186	0.99	0.168	3.93		0.08	0.014	6
11	2.94	0.186	0.87	0.149	3.81		0.07	0.012	6
12	3.43	0.217	1.05	0.179	4.48		0.06	0.011	7
13	3.43	0.217	0.93	0.159	4.36		0.06	0.010	7
14	3.92	0.248	1.10	0.188	5.02		0.05	0.009	8
15	3.92	0.248	0.98	0.166	4.90		0.05	0.008	8
16	4.41	0.279	1.14	0.194	5.55		0.04	0.007	9

Joliet Westside Wastewater Treatment Plant

Total Concen.
0.078
0.073
0.146
0.136
0.206
0.193
0.260
0.244
0.309
0.291
0.354
0.335
0.396
0.376
0.436
0.414
0.473

Joliet Westside Wastewater Treatment Plant

After 10th Application

Time (Years)	Dose Ra-226	Concen. Ra-226	Dose Ra-228	Concen. Ra-228	Total Dose	Dose Ra-228	Concen. Ra-228	Application	Total Concen.
0	0.49	0.031	0.28	0.047	0.64	0.28	0.047	1	0.078
1	0.49	0.031	0.24	0.042	0.73	0.24	0.042	1	0.073
2	0.98	0.062	0.49	0.084	1.47	0.22	0.037	2	0.146
3	0.98	0.062	0.44	0.074	1.42	0.19	0.033	2	0.136
4	1.47	0.093	0.66	0.113	2.13	0.17	0.029	3	0.206
5	1.47	0.093	0.59	0.100	2.06	0.15	0.026	3	0.193
6	1.96	0.124	0.80	0.136	2.76	0.13	0.023	4	0.260
7	1.96	0.124	0.71	0.120	2.67	0.12	0.020	4	0.244
8	2.45	0.155	0.90	0.154	3.35	0.11	0.018	5	0.309
9	2.45	0.155	0.80	0.136	3.25	0.09	0.016	5	0.291
10	2.94	0.186	0.99	0.168	3.93	0.08	0.014	6	0.354
11	2.94	0.186	0.87	0.149	3.81	0.07	0.012	6	0.335
12	3.43	0.217	1.05	0.179	4.48	0.06	0.011	7	0.396
13	3.43	0.217	0.93	0.159	4.36	0.06	0.010	7	0.376
14	3.92	0.248	1.10	0.188	5.02	0.05	0.009	8	0.436
15	3.92	0.248	0.98	0.166	4.90	0.05	0.008	8	0.414
16	4.41	0.279	1.14	0.194	5.55	0.04	0.007	9	0.473
17	4.41	0.279	1.01	0.172	5.42	0.04	0.006	9	0.451
18	4.9	0.31	1.17	0.200	6.07	0.03	0.005	10	0.510
19	4.9	0.31	1.04	0.177	5.94	0.03	0.005	10	0.487
20	5.39	0.341	1.20	0.204	6.59	0.02	0.004	11	0.545

Blended 67% Eastside 33% Westside

After 6th Application

Time (Years)	Dose Ra-226	Concen. Ra-226	Dose Ra-228	Concen. Ra-228	Total Dose		Dose Ra-228	Concen. Ra-228	Dose Ra-228	Concen. Ra-228	Application	Total Concen.
0	0.22	0.014	0.09	0.016	0.31		0.09	0.016	0.28	0.047	1	0.030
1	0.22	0.014	0.08	0.014	0.30		0.08	0.014	0.24	0.042	1	0.028
2	0.44	0.028	0.17	0.029	0.61		0.07	0.013	0.22	0.037	2	0.057
3	0.44	0.028	0.15	0.025	0.59		0.07	0.011	0.19	0.033	2	0.053
4	0.93	0.059	0.41	0.069	1.34		0.06	0.010	0.17	0.029	3	0.128
5	0.93	0.059	0.36	0.062	1.29		0.05	0.009	0.15	0.026	3	0.121
6	1.15	0.073	0.41	0.071	1.57		0.05	0.008	0.13	0.023	4	0.144
7	1.15	0.073	0.37	0.063	1.52		0.04	0.007	0.12	0.020	4	0.136
8	1.37	0.087	0.42	0.071	1.79		0.04	0.006	0.11	0.018	5	0.158
9	1.37	0.087	0.37	0.063	1.75		0.03	0.005	0.09	0.016	5	0.150
10	1.86	0.118	0.61	0.103	2.47		0.03	0.005	0.08	0.014	6	0.221
11	1.86	0.118	0.54	0.091	2.40		0.02	0.004	0.07	0.012	6	0.209

Blended 67% Eastside 33% Westside

After 9th Application

Time (Years)	Dose Ra-226	Concen. Ra-226	Dose Ra-228	Concen. Ra-228	Total Dose	Dose Ra-228	Concen. Ra-228	Dose Ra-228	Concen. Ra-228	Application	Total Concen.
0	0.22	0.014	0.09	0.016	0.27	0.09	0.016	0.28	0.047	1	0.030
1	0.22	0.014	0.08	0.014	0.30	0.08	0.014	0.24	0.042	1	0.028
2	0.44	0.028	0.17	0.029	0.61	0.07	0.013	0.22	0.037	2	0.057
3	0.44	0.028	0.15	0.025	0.59	0.07	0.011	0.19	0.033	2	0.053
4	0.93	0.059	0.41	0.069	1.34	0.06	0.010	0.17	0.029	3	0.128
5	0.93	0.059	0.36	0.062	1.29	0.05	0.009	0.15	0.026	3	0.121
6	1.15	0.073	0.41	0.071	1.57	0.05	0.008	0.13	0.023	4	0.144
7	1.15	0.073	0.37	0.063	1.52	0.04	0.007	0.12	0.020	4	0.136
8	1.37	0.087	0.42	0.071	1.79	0.04	0.006	0.11	0.018	5	0.158
9	1.37	0.087	0.37	0.063	1.75	0.03	0.005	0.09	0.016	5	0.150
10	1.86	0.118	0.61	0.103	2.47	0.03	0.005	0.08	0.014	6	0.221
11	1.86	0.118	0.54	0.091	2.40	0.02	0.004	0.07	0.012	6	0.209
12	2.09	0.132	0.57	0.097	2.65	0.02	0.004	0.06	0.011	7	0.229
13	2.09	0.132	0.50	0.089	2.59	0.02	0.003	0.06	0.010	7	0.221
14	2.31	0.146	0.54	0.092	2.85	0.02	0.003	0.05	0.009	8	0.238
15	2.31	0.146	0.48	0.082	2.79	0.02	0.003	0.05	0.008	8	0.228
16	2.80	0.177	0.70	0.120	3.50	0.01	0.002	0.04	0.007	9	0.297
17	2.80	0.177	0.62	0.106	3.42	0.01	0.002	0.04	0.006	9	0.283

Exhibit 3

RESRAD Results- Onsite Well and Vegetables

Part 2

Summary : Joliet City

File : H:\HOME\400001 HEALTH PHYSICS\JOLIET\RESRAD\JOLIET.RAD

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

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-228 (Source: FGR 12)	5.978E+00	5.978E+00	DCF1(1)
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1(2)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1(3)
A-1	Bi-212 (Source: FGR 12)	1.171E+00	1.171E+00	DCF1(4)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1(5)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(6)
A-1	Pb-212 (Source: FGR 12)	7.043E-01	7.043E-01	DCF1(7)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(8)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(9)
A-1	Po-212 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(10)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1(11)
A-1	Po-216 (Source: FGR 12)	1.042E-04	1.042E-04	DCF1(12)
A-1	Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1(13)
A-1	Ra-224 (Source: FGR 12)	5.119E-02	5.119E-02	DCF1(14)
A-1	Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1(15)
A-1	Ra-228 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(16)
A-1	Rn-220 (Source: FGR 12)	2.298E-03	2.298E-03	DCF1(17)
A-1	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1(18)
A-1	Th-228 (Source: FGR 12)	7.940E-03	7.940E-03	DCF1(19)
A-1	Tl-208 (Source: FGR 12)	2.298E+01	2.298E+01	DCF1(20)
A-1	Tl-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1(21)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.320E-02	1.360E-02	DCF2(1)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(2)
B-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(3)
B-1	Th-228+D	3.454E-01	3.420E-01	DCF2(4)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.276E-03	5.370E-03	DCF3(1)
D-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(2)
D-1	Ra-228+D	1.442E-03	1.440E-03	DCF3(3)
D-1	Th-228+D	8.086E-04	3.960E-04	DCF3(4)
D-34	Food transfer factors:			
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(1,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(1,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(1,3)
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(2,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,3)
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(3,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,3)

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

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(4,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(4,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(2,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(2,2)
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(3,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(3,2)
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(4,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(4,2)

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

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	5.900E+05	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.048E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	4.880E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	4.500E+01	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	2.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	5.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	1.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	2.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+01	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ra-226	1.400E-02	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Ra-228	1.600E-02	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.440E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	1.000E+00	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.310E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	9.075E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	4.500E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.763E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	4.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	2.590E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.200E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.550E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+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)	3.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Number of unsaturated zone strata	2	1	---	NS
R015	Unsat. zone 1, thickness (m)	2.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.440E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.500E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	9.075E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	4.310E+01	1.000E+01	---	HCUZ(1)
R015	Unsat. zone 2, thickness (m)	9.700E+00	0.000E+00	---	H(2)
R015	Unsat. zone 2, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(2)
R015	Unsat. zone 2, total porosity	4.000E-01	4.000E-01	---	TPUZ(2)
R015	Unsat. zone 2, effective porosity	3.200E-01	2.000E-01	---	EPUZ(2)
R015	Unsat. zone 2, field capacity	2.000E-01	2.000E-01	---	FCUZ(2)
R015	Unsat. zone 2, soil-specific b parameter	4.050E+00	5.300E+00	---	BUZ(2)
R015	Unsat. zone 2, hydraulic conductivity (m/yr)	5.550E+03	1.000E+01	---	HCUZ(2)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(2,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(2,2)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.176E-02	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,2)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.176E-02	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(1,1)
R016	Unsaturated zone 2 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(1,2)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.242E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(4,1)
R016	Unsaturated zone 2 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(4,2)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.378E-05	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	7.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	-1.000E+00	1.000E+00	-1 shows non-circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	5.467E+01	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	1.093E+02	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	1.640E+02	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	2.187E+02	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	2.733E+02	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	3.280E+02	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	3.827E+02	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	4.373E+02	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	4.920E+02	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	5.467E+02	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	6.013E+02	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	6.560E+02	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	1.000E+00	1.000E+00	---	FRACA(1)
R017	Ring 2	1.000E+00	2.732E-01	---	FRACA(2)
R017	Ring 3	1.000E+00	0.000E+00	---	FRACA(3)
R017	Ring 4	1.000E+00	0.000E+00	---	FRACA(4)
R017	Ring 5	8.900E-01	0.000E+00	---	FRACA(5)
R017	Ring 6	6.000E-01	0.000E+00	---	FRACA(6)
R017	Ring 7	4.900E-01	0.000E+00	---	FRACA(7)
R017	Ring 8	4.100E-01	0.000E+00	---	FRACA(8)
R017	Ring 9	3.500E-01	0.000E+00	---	FRACA(9)
R017	Ring 10	3.100E-01	0.000E+00	---	FRACA(10)
R017	Ring 11	2.800E-01	0.000E+00	---	FRACA(11)
R017	Ring 12	7.900E-02	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	1.000E+00	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	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	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	1.016E-01	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	2.403E+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	2.000E-06	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	3.000E-01	5.000E-01	---	REXG
R021	Height of the building (room) (m)	2.500E+00	2.500E+00	---	HRM
R021	Building interior area factor	8.000E-02	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	-1.000E+00	-1.000E+00	code computed (time dependent)	DMFL
R021	Emanating power of Rn-222 gas	2.500E-01	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	1.500E-01	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	513	---	---	KYMAX

Summary of Pathway Selections

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

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	590000.00 square meters	Ra-226	1.400E-02
Thickness:	0.30 meters	Ra-228	1.600E-02
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
TDOSE(t):	3.146E-01	3.248E-01	3.262E-01	3.056E-01	2.566E-01	1.952E-01	1.637E-01
M(t):	1.258E-02	1.299E-02	1.305E-02	1.222E-02	1.027E-02	7.808E-03	6.546E-03

Maximum TDOSE(t): 3.265E-01 mrem/yr at t = 1.695 ñ 0.003 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.695E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Nuclide														
Ra-226	8.800E-02	0.2695	5.889E-06	0.0000	1.056E-01	0.3234	2.310E-02	0.0707	0.000E+00	0.0000	0.000E+00	0.0000	6.725E-04	0.0021
Ra-228	8.449E-02	0.2588	1.120E-04	0.0003	3.342E-03	0.0102	2.054E-02	0.0629	0.000E+00	0.0000	0.000E+00	0.0000	6.371E-04	0.0020
Total	1.725E-01	0.5283	1.178E-04	0.0004	1.089E-01	0.3337	4.364E-02	0.1336	0.000E+00	0.0000	0.000E+00	0.0000	1.310E-03	0.0040

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.695E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Nuclide														
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	2.174E-01	0.6658
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	1.091E-01	0.3342
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.265E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	8.989E-02	0.2857	5.313E-06	0.0000	1.082E-01	0.3438	2.218E-02	0.0705	0.000E+00	0.0000	0.000E+00	0.0000	5.458E-04	0.0017
Ra-228	6.638E-02	0.2110	3.956E-05	0.0001	1.110E-03	0.0035	2.565E-02	0.0815	0.000E+00	0.0000	0.000E+00	0.0000	6.462E-04	0.0021
Total	1.563E-01	0.4967	4.487E-05	0.0001	1.093E-01	0.3473	4.783E-02	0.1520	0.000E+00	0.0000	0.000E+00	0.0000	1.192E-03	0.0038

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	2.208E-01	0.7018
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	9.383E-02	0.2982
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.146E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	8.877E-02	0.2733	5.660E-06	0.0000	1.066E-01	0.3283	2.274E-02	0.0700	0.000E+00	0.0000	0.000E+00	0.0000	6.220E-04	0.0019
Ra-228	8.010E-02	0.2466	9.072E-05	0.0003	2.686E-03	0.0083	2.252E-02	0.0693	0.000E+00	0.0000	0.000E+00	0.0000	6.504E-04	0.0020
Total	1.689E-01	0.5199	9.638E-05	0.0003	1.093E-01	0.3366	4.526E-02	0.1393	0.000E+00	0.0000	0.000E+00	0.0000	1.272E-03	0.0039

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	2.188E-01	0.6735
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	1.060E-01	0.3265
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.248E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	8.767E-02	0.2687	5.987E-06	0.0000	1.052E-01	0.3223	2.324E-02	0.0713	0.000E+00	0.0000	0.000E+00	0.0000	6.941E-04	0.0021
Ra-228	8.543E-02	0.2619	1.185E-04	0.0004	3.546E-03	0.0109	1.972E-02	0.0605	0.000E+00	0.0000	0.000E+00	0.0000	6.284E-04	0.0019
Total	1.731E-01	0.5306	1.245E-04	0.0004	1.087E-01	0.3332	4.297E-02	0.1317	0.000E+00	0.0000	0.000E+00	0.0000	1.323E-03	0.0041

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+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	2.168E-01	0.6645
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	1.095E-01	0.3355
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.262E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	8.444E-02	0.2763	6.856E-06	0.0000	1.008E-01	0.3299	2.449E-02	0.0802	0.000E+00	0.0000	0.000E+00	0.0000	8.874E-04	0.0029
Ra-228	7.716E-02	0.2525	1.303E-04	0.0004	3.930E-03	0.0129	1.321E-02	0.0432	0.000E+00	0.0000	0.000E+00	0.0000	4.985E-04	0.0016
Total	1.616E-01	0.5289	1.371E-04	0.0004	1.047E-01	0.3427	3.771E-02	0.1234	0.000E+00	0.0000	0.000E+00	0.0000	1.386E-03	0.0045

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+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	2.106E-01	0.6893
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	9.493E-02	0.3107
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.056E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	7.931E-02	0.3090	7.977E-06	0.0000	9.392E-02	0.3660	2.586E-02	0.1007	0.000E+00	0.0000	0.000E+00	0.0000	1.142E-03	0.0045
Ra-228	4.673E-02	0.1821	8.516E-05	0.0003	2.576E-03	0.0100	6.732E-03	0.0262	0.000E+00	0.0000	0.000E+00	0.0000	2.842E-04	0.0011
Total	1.260E-01	0.4911	9.314E-05	0.0004	9.650E-02	0.3760	3.259E-02	0.1270	0.000E+00	0.0000	0.000E+00	0.0000	1.426E-03	0.0056

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	2.002E-01	0.7802
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	5.641E-02	0.2198
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.566E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	6.993E-02	0.3583	9.270E-06	0.0000	8.149E-02	0.4174	2.658E-02	0.1362	0.000E+00	0.0000	0.000E+00	0.0000	1.456E-03	0.0075
Ra-228	1.316E-02	0.0674	2.467E-05	0.0001	7.470E-04	0.0038	1.735E-03	0.0089	0.000E+00	0.0000	0.000E+00	0.0000	7.869E-05	0.0004
Total	8.309E-02	0.4257	3.394E-05	0.0002	8.223E-02	0.4213	2.831E-02	0.1450	0.000E+00	0.0000	0.000E+00	0.0000	1.534E-03	0.0079

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+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.795E-01	0.9193
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	1.575E-02	0.0807
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	1.952E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	6.164E-02	0.3766	9.697E-06	0.0001	7.063E-02	0.4316	2.561E-02	0.1565	0.000E+00	0.0000	0.000E+00	0.0000	1.589E-03	0.0097
Ra-228	3.506E-03	0.0214	6.624E-06	0.0000	2.006E-04	0.0012	4.459E-04	0.0027	0.000E+00	0.0000	0.000E+00	0.0000	2.104E-05	0.0001
Total	6.514E-02	0.3981	1.632E-05	0.0001	7.083E-02	0.4328	2.606E-02	0.1592	0.000E+00	0.0000	0.000E+00	0.0000	1.610E-03	0.0098

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.595E-01	0.9745
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	4.181E-03	0.0255
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	1.637E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
Ra-226+D	Ra-226+D	1.000E+00	1.573E+01	1.552E+01	1.531E+01	1.470E+01	1.373E+01	1.197E+01	1.044E+01
Ra-226+D	Pb-210+D	1.000E+00	4.182E-02	1.117E-01	1.766E-01	3.495E-01	5.744E-01	8.444E-01	9.533E-01
Ra-226+D	ãDSR(j)		1.577E+01	1.563E+01	1.548E+01	1.504E+01	1.430E+01	1.282E+01	1.139E+01
Ra-228+D	Ra-228+D	1.000E+00	4.887E+00	4.276E+00	3.741E+00	2.506E+00	1.285E+00	3.377E-01	8.872E-02
Ra-228+D	Th-228+D	1.000E+00	9.777E-01	2.352E+00	3.100E+00	3.427E+00	2.241E+00	6.463E-01	1.726E-01
Ra-228+D	ãDSR(j)		5.864E+00	6.628E+00	6.841E+00	5.933E+00	3.526E+00	9.841E-01	2.613E-01

The DSR includes contributions from associated (half-life ó 180 days) daughters.

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

Nuclide (i)	t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
Ra-226	1.585E+00	1.600E+00	1.615E+00	1.662E+00	1.748E+00	1.950E+00	2.195E+00
Ra-228	4.263E+00	3.772E+00	3.655E+00	4.214E+00	7.091E+00	2.540E+01	9.568E+01

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 1.695 ñ 0.003 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ra-226	1.400E-02	0.000E+00	1.577E+01	1.585E+00	1.553E+01	1.610E+00
Ra-228	1.600E-02	2.039 ñ 0.004	6.841E+00	3.654E+00	6.820E+00	3.666E+00

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

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ
Ra-226	Ra-226	1.000E+00	2.202E-01	2.172E-01	2.143E-01	2.057E-01	1.922E-01	1.676E-01	1.461E-01
Pb-210	Ra-226	1.000E+00	5.855E-04	1.563E-03	2.472E-03	4.893E-03	8.042E-03	1.182E-02	1.335E-02
Ra-228	Ra-228	1.000E+00	7.818E-02	6.841E-02	5.986E-02	4.010E-02	2.056E-02	5.404E-03	1.420E-03
Th-228	Ra-228	1.000E+00	1.564E-02	3.763E-02	4.959E-02	5.483E-02	3.585E-02	1.034E-02	2.761E-03
ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ

THF(i) is the thread fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ
Ra-226	Ra-226	1.000E+00	1.400E-02	1.383E-02	1.366E-02	1.317E-02	1.239E-02	1.097E-02	9.711E-03
Pb-210	Ra-226	1.000E+00	0.000E+00	4.241E-04	8.267E-04	1.914E-03	3.374E-03	5.263E-03	6.196E-03
Ra-228	Ra-228	1.000E+00	1.600E-02	1.402E-02	1.228E-02	8.257E-03	4.261E-03	1.135E-03	3.022E-04
Th-228	Ra-228	1.000E+00	0.000E+00	4.537E-03	7.133E-03	8.888E-03	6.039E-03	1.770E-03	4.756E-04
ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ

THF(i) is the thread fraction of the parent nuclide.

RESCALC.EXE execution time = 172.56 seconds

Exhibit 3

RESRAD Results- Onsite Well and Vegetables

Part 3

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

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-228 (Source: FGR 12)	5.978E+00	5.978E+00	DCF1(1)
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1(2)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1(3)
A-1	Bi-212 (Source: FGR 12)	1.171E+00	1.171E+00	DCF1(4)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1(5)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(6)
A-1	Pb-212 (Source: FGR 12)	7.043E-01	7.043E-01	DCF1(7)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(8)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(9)
A-1	Po-212 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(10)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1(11)
A-1	Po-216 (Source: FGR 12)	1.042E-04	1.042E-04	DCF1(12)
A-1	Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1(13)
A-1	Ra-224 (Source: FGR 12)	5.119E-02	5.119E-02	DCF1(14)
A-1	Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1(15)
A-1	Ra-228 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(16)
A-1	Rn-220 (Source: FGR 12)	2.298E-03	2.298E-03	DCF1(17)
A-1	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1(18)
A-1	Th-228 (Source: FGR 12)	7.940E-03	7.940E-03	DCF1(19)
A-1	Tl-208 (Source: FGR 12)	2.298E+01	2.298E+01	DCF1(20)
A-1	Tl-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1(21)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.320E-02	1.360E-02	DCF2(1)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(2)
B-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(3)
B-1	Th-228+D	3.454E-01	3.420E-01	DCF2(4)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.276E-03	5.370E-03	DCF3(1)
D-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(2)
D-1	Ra-228+D	1.442E-03	1.440E-03	DCF3(3)
D-1	Th-228+D	8.086E-04	3.960E-04	DCF3(4)
D-34	Food transfer factors:			
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(1,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(1,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(1,3)
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(2,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,3)
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(3,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,3)

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

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(4,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(4,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(2,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(2,2)
D-5				
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(3,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(3,2)
D-5				
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(4,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(4,2)

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

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	5.900E+05	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.048E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	4.880E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	4.500E+01	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	2.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	5.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	1.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	2.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+01	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ra-226	4.200E-02	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Ra-228	3.400E-02	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.440E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	1.000E+00	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.310E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	9.075E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	4.500E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.763E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	4.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	2.590E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.200E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.550E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+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)	3.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Number of unsaturated zone strata	2	1	---	NS
R015	Unsat. zone 1, thickness (m)	2.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.440E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.500E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	9.075E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	4.310E+01	1.000E+01	---	HCUZ(1)
R015	Unsat. zone 2, thickness (m)	9.700E+00	0.000E+00	---	H(2)
R015	Unsat. zone 2, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(2)
R015	Unsat. zone 2, total porosity	4.000E-01	4.000E-01	---	TPUZ(2)
R015	Unsat. zone 2, effective porosity	3.200E-01	2.000E-01	---	EPUZ(2)
R015	Unsat. zone 2, field capacity	2.000E-01	2.000E-01	---	FCUZ(2)
R015	Unsat. zone 2, soil-specific b parameter	4.050E+00	5.300E+00	---	BUZ(2)
R015	Unsat. zone 2, hydraulic conductivity (m/yr)	5.550E+03	1.000E+01	---	HCUZ(2)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(2,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(2,2)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.176E-02	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,2)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.176E-02	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(1,1)
R016	Unsaturated zone 2 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(1,2)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.242E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(4,1)
R016	Unsaturated zone 2 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(4,2)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.378E-05	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	7.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	-1.000E+00	1.000E+00	-1 shows non-circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	5.467E+01	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	1.093E+02	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	1.640E+02	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	2.187E+02	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	2.733E+02	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	3.280E+02	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	3.827E+02	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	4.373E+02	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	4.920E+02	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	5.467E+02	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	6.013E+02	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	6.560E+02	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	1.000E+00	1.000E+00	---	FRACA(1)
R017	Ring 2	1.000E+00	2.732E-01	---	FRACA(2)
R017	Ring 3	1.000E+00	0.000E+00	---	FRACA(3)
R017	Ring 4	1.000E+00	0.000E+00	---	FRACA(4)
R017	Ring 5	8.900E-01	0.000E+00	---	FRACA(5)
R017	Ring 6	6.000E-01	0.000E+00	---	FRACA(6)
R017	Ring 7	4.900E-01	0.000E+00	---	FRACA(7)
R017	Ring 8	4.100E-01	0.000E+00	---	FRACA(8)
R017	Ring 9	3.500E-01	0.000E+00	---	FRACA(9)
R017	Ring 10	3.100E-01	0.000E+00	---	FRACA(10)
R017	Ring 11	2.800E-01	0.000E+00	---	FRACA(11)
R017	Ring 12	7.900E-02	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	1.000E+00	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	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	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	1.016E-01	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	2.403E+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	2.000E-06	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	3.000E-01	5.000E-01	---	REXG
R021	Height of the building (room) (m)	2.500E+00	2.500E+00	---	HRM
R021	Building interior area factor	8.000E-02	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	-1.000E+00	-1.000E+00	code computed (time dependent)	DMFL
R021	Emanating power of Rn-222 gas	2.500E-01	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	1.500E-01	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	513	---	---	KYMAX

Summary of Pathway Selections

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

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	590000.00 square meters	Ra-226	4.200E-02
Thickness:	0.30 meters	Ra-228	3.400E-02
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
TDOSE(t):	8.617E-01	8.817E-01	8.829E-01	8.336E-01	7.206E-01	5.719E-01	4.873E-01
M(t):	3.447E-02	3.527E-02	3.532E-02	3.334E-02	2.882E-02	2.287E-02	1.949E-02

Maximum TDOSE(t): 8.842E-01 mrem/yr at t = 1.575 ñ 0.003 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.575E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Nuclide														
Ra-226	2.644E-01	0.2991	1.755E-05	0.0000	3.174E-01	0.3589	6.911E-02	0.0782	0.000E+00	0.0000	0.000E+00	0.0000	1.992E-03	0.0023
Ra-228	1.784E-01	0.2018	2.316E-04	0.0003	6.906E-03	0.0078	4.434E-02	0.0502	0.000E+00	0.0000	0.000E+00	0.0000	1.360E-03	0.0015
Total	4.428E-01	0.5009	2.491E-04	0.0003	3.243E-01	0.3667	1.135E-01	0.1283	0.000E+00	0.0000	0.000E+00	0.0000	3.352E-03	0.0038

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.575E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Nuclide														
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	6.529E-01	0.7384
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	2.313E-01	0.2616
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	8.842E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	2.697E-01	0.3129	1.594E-05	0.0000	3.245E-01	0.3765	6.654E-02	0.0772	0.000E+00	0.0000	0.000E+00	0.0000	1.637E-03	0.0019
Ra-228	1.411E-01	0.1637	8.406E-05	0.0001	2.358E-03	0.0027	5.451E-02	0.0633	0.000E+00	0.0000	0.000E+00	0.0000	1.373E-03	0.0016
Total	4.107E-01	0.4766	1.000E-04	0.0001	3.268E-01	0.3793	1.211E-01	0.1405	0.000E+00	0.0000	0.000E+00	0.0000	3.011E-03	0.0035

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	6.623E-01	0.7686
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	1.994E-01	0.2314
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	8.617E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	2.663E-01	0.3020	1.698E-05	0.0000	3.199E-01	0.3629	6.823E-02	0.0774	0.000E+00	0.0000	0.000E+00	0.0000	1.866E-03	0.0021
Ra-228	1.702E-01	0.1931	1.928E-04	0.0002	5.707E-03	0.0065	4.785E-02	0.0543	0.000E+00	0.0000	0.000E+00	0.0000	1.382E-03	0.0016
Total	4.365E-01	0.4951	2.098E-04	0.0002	3.256E-01	0.3693	1.161E-01	0.1317	0.000E+00	0.0000	0.000E+00	0.0000	3.248E-03	0.0037

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	6.564E-01	0.7444
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	2.253E-01	0.2556
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	8.817E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	2.630E-01	0.2979	1.796E-05	0.0000	3.155E-01	0.3573	6.973E-02	0.0790	0.000E+00	0.0000	0.000E+00	0.0000	2.082E-03	0.0024
Ra-228	1.815E-01	0.2056	2.518E-04	0.0003	7.534E-03	0.0085	4.191E-02	0.0475	0.000E+00	0.0000	0.000E+00	0.0000	1.335E-03	0.0015
Total	4.446E-01	0.5035	2.698E-04	0.0003	3.230E-01	0.3658	1.116E-01	0.1265	0.000E+00	0.0000	0.000E+00	0.0000	3.418E-03	0.0039

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+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	6.503E-01	0.7366
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	2.326E-01	0.2634
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	8.829E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	2.533E-01	0.3039	2.057E-05	0.0000	3.024E-01	0.3628	7.348E-02	0.0882	0.000E+00	0.0000	0.000E+00	0.0000	2.662E-03	0.0032
Ra-228	1.640E-01	0.1967	2.768E-04	0.0003	8.350E-03	0.0100	2.807E-02	0.0337	0.000E+00	0.0000	0.000E+00	0.0000	1.059E-03	0.0013
Total	4.173E-01	0.5006	2.974E-04	0.0004	3.107E-01	0.3728	1.016E-01	0.1218	0.000E+00	0.0000	0.000E+00	0.0000	3.722E-03	0.0045

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+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	6.319E-01	0.7580
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	2.017E-01	0.2420
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	8.336E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	2.379E-01	0.3302	2.393E-05	0.0000	2.818E-01	0.3910	7.757E-02	0.1076	0.000E+00	0.0000	0.000E+00	0.0000	3.426E-03	0.0048
Ra-228	9.931E-02	0.1378	1.810E-04	0.0003	5.475E-03	0.0076	1.431E-02	0.0199	0.000E+00	0.0000	0.000E+00	0.0000	6.040E-04	0.0008
Total	3.372E-01	0.4680	2.049E-04	0.0003	2.872E-01	0.3986	9.187E-02	0.1275	0.000E+00	0.0000	0.000E+00	0.0000	4.030E-03	0.0056

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	6.007E-01	0.8336
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	1.199E-01	0.1664
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	7.206E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	2.098E-01	0.3669	2.781E-05	0.0000	2.445E-01	0.4275	7.973E-02	0.1394	0.000E+00	0.0000	0.000E+00	0.0000	4.367E-03	0.0076
Ra-228	2.796E-02	0.0489	5.243E-05	0.0001	1.587E-03	0.0028	3.687E-03	0.0064	0.000E+00	0.0000	0.000E+00	0.0000	1.672E-04	0.0003
Total	2.378E-01	0.4158	8.024E-05	0.0001	2.460E-01	0.4303	8.342E-02	0.1459	0.000E+00	0.0000	0.000E+00	0.0000	4.534E-03	0.0079

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+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.384E-01	0.9415
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.346E-02	0.0585
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.719E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.849E-01	0.3795	2.909E-05	0.0001	2.119E-01	0.4348	7.683E-02	0.1577	0.000E+00	0.0000	0.000E+00	0.0000	4.766E-03	0.0098
Ra-228	7.451E-03	0.0153	1.408E-05	0.0000	4.262E-04	0.0009	9.475E-04	0.0019	0.000E+00	0.0000	0.000E+00	0.0000	4.470E-05	0.0001
Total	1.924E-01	0.3948	4.317E-05	0.0001	2.123E-01	0.4357	7.778E-02	0.1596	0.000E+00	0.0000	0.000E+00	0.0000	4.811E-03	0.0099

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	4.784E-01	0.9818
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	8.884E-03	0.0182
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.873E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
Ra-226+D	Ra-226+D	1.000E+00	1.573E+01	1.552E+01	1.531E+01	1.470E+01	1.373E+01	1.197E+01	1.044E+01
Ra-226+D	Pb-210+D	1.000E+00	4.182E-02	1.117E-01	1.766E-01	3.495E-01	5.744E-01	8.444E-01	9.533E-01
Ra-226+D	äDSR(j)		1.577E+01	1.563E+01	1.548E+01	1.504E+01	1.430E+01	1.282E+01	1.139E+01
Ra-228+D	Ra-228+D	1.000E+00	4.887E+00	4.276E+00	3.741E+00	2.506E+00	1.285E+00	3.377E-01	8.872E-02
Ra-228+D	Th-228+D	1.000E+00	9.777E-01	2.352E+00	3.100E+00	3.427E+00	2.241E+00	6.463E-01	1.726E-01
Ra-228+D	äDSR(j)		5.864E+00	6.628E+00	6.841E+00	5.933E+00	3.526E+00	9.841E-01	2.613E-01

The DSR includes contributions from associated (half-life ó 180 days) daughters.

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

Nuclide (i)	t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
Ra-226	1.585E+00	1.600E+00	1.615E+00	1.662E+00	1.748E+00	1.950E+00	2.195E+00
Ra-228	4.263E+00	3.772E+00	3.655E+00	4.214E+00	7.091E+00	2.540E+01	9.568E+01

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 1.575 ñ 0.003 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ra-226	4.200E-02	0.000E+00	1.577E+01	1.585E+00	1.554E+01	1.608E+00
Ra-228	3.400E-02	2.039 ñ 0.004	6.841E+00	3.654E+00	6.802E+00	3.675E+00

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

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
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Ra-226	Ra-226	1.000E+00	6.606E-01	6.517E-01	6.429E-01	6.172E-01	5.766E-01	5.029E-01	4.384E-01
Pb-210	Ra-226	1.000E+00	1.756E-03	4.690E-03	7.416E-03	1.468E-02	2.413E-02	3.546E-02	4.004E-02
Ra-228	Ra-228	1.000E+00	1.661E-01	1.454E-01	1.272E-01	8.520E-02	4.369E-02	1.148E-02	3.017E-03
Th-228	Ra-228	1.000E+00	3.324E-02	7.997E-02	1.054E-01	1.165E-01	7.619E-02	2.198E-02	5.867E-03
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THF(i) is the thread fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
ÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ
Ra-226	Ra-226	1.000E+00	4.200E-02	4.149E-02	4.099E-02	3.952E-02	3.718E-02	3.291E-02	2.913E-02
Pb-210	Ra-226	1.000E+00	0.000E+00	1.272E-03	2.480E-03	5.743E-03	1.012E-02	1.579E-02	1.859E-02
Ra-228	Ra-228	1.000E+00	3.400E-02	2.979E-02	2.610E-02	1.755E-02	9.055E-03	2.411E-03	6.422E-04
Th-228	Ra-228	1.000E+00	0.000E+00	9.641E-03	1.516E-02	1.889E-02	1.283E-02	3.760E-03	1.011E-03
ÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍÍ

THF(i) is the thread fraction of the parent nuclide.

RESCALC.EXE execution time = 170.96 seconds

Exhibit 3

RESRAD Results- Onsite Well and Vegetables

Part 4

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

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-228 (Source: FGR 12)	5.978E+00	5.978E+00	DCF1(1)
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1(2)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1(3)
A-1	Bi-212 (Source: FGR 12)	1.171E+00	1.171E+00	DCF1(4)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1(5)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(6)
A-1	Pb-212 (Source: FGR 12)	7.043E-01	7.043E-01	DCF1(7)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(8)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(9)
A-1	Po-212 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(10)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1(11)
A-1	Po-216 (Source: FGR 12)	1.042E-04	1.042E-04	DCF1(12)
A-1	Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1(13)
A-1	Ra-224 (Source: FGR 12)	5.119E-02	5.119E-02	DCF1(14)
A-1	Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1(15)
A-1	Ra-228 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(16)
A-1	Rn-220 (Source: FGR 12)	2.298E-03	2.298E-03	DCF1(17)
A-1	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1(18)
A-1	Th-228 (Source: FGR 12)	7.940E-03	7.940E-03	DCF1(19)
A-1	Tl-208 (Source: FGR 12)	2.298E+01	2.298E+01	DCF1(20)
A-1	Tl-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1(21)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.320E-02	1.360E-02	DCF2(1)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(2)
B-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(3)
B-1	Th-228+D	3.454E-01	3.420E-01	DCF2(4)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.276E-03	5.370E-03	DCF3(1)
D-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(2)
D-1	Ra-228+D	1.442E-03	1.440E-03	DCF3(3)
D-1	Th-228+D	8.086E-04	3.960E-04	DCF3(4)
D-34	Food transfer factors:			
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(1,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(1,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(1,3)
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(2,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,3)
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(3,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,3)

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

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(4,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(4,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(2,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(2,2)
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(3,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(3,2)
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(4,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(4,2)

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

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	5.900E+05	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.048E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	4.880E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	4.500E+01	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	2.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	5.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	1.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	2.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+01	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ra-226	1.120E-01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Ra-228	5.700E-02	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.440E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	1.000E+00	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.310E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	9.075E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	4.500E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.763E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	4.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	2.590E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.200E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.550E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+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)	3.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Number of unsaturated zone strata	2	1	---	NS
R015	Unsat. zone 1, thickness (m)	2.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.440E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.500E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	9.075E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	4.310E+01	1.000E+01	---	HCUZ(1)
R015	Unsat. zone 2, thickness (m)	9.700E+00	0.000E+00	---	H(2)
R015	Unsat. zone 2, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(2)
R015	Unsat. zone 2, total porosity	4.000E-01	4.000E-01	---	TPUZ(2)
R015	Unsat. zone 2, effective porosity	3.200E-01	2.000E-01	---	EPUZ(2)
R015	Unsat. zone 2, field capacity	2.000E-01	2.000E-01	---	FCUZ(2)
R015	Unsat. zone 2, soil-specific b parameter	4.050E+00	5.300E+00	---	BUZ(2)
R015	Unsat. zone 2, hydraulic conductivity (m/yr)	5.550E+03	1.000E+01	---	HCUZ(2)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(2,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(2,2)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.176E-02	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,2)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.176E-02	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(1,1)
R016	Unsaturated zone 2 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(1,2)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.242E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(4,1)
R016	Unsaturated zone 2 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(4,2)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.378E-05	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	7.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	-1.000E+00	1.000E+00	-1 shows non-circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	5.467E+01	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	1.093E+02	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	1.640E+02	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	2.187E+02	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	2.733E+02	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	3.280E+02	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	3.827E+02	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	4.373E+02	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	4.920E+02	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	5.467E+02	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	6.013E+02	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	6.560E+02	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	1.000E+00	1.000E+00	---	FRACA(1)
R017	Ring 2	1.000E+00	2.732E-01	---	FRACA(2)
R017	Ring 3	1.000E+00	0.000E+00	---	FRACA(3)
R017	Ring 4	1.000E+00	0.000E+00	---	FRACA(4)
R017	Ring 5	8.900E-01	0.000E+00	---	FRACA(5)
R017	Ring 6	6.000E-01	0.000E+00	---	FRACA(6)
R017	Ring 7	4.900E-01	0.000E+00	---	FRACA(7)
R017	Ring 8	4.100E-01	0.000E+00	---	FRACA(8)
R017	Ring 9	3.500E-01	0.000E+00	---	FRACA(9)
R017	Ring 10	3.100E-01	0.000E+00	---	FRACA(10)
R017	Ring 11	2.800E-01	0.000E+00	---	FRACA(11)
R017	Ring 12	7.900E-02	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	1.000E+00	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	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	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	1.016E-01	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	2.403E+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	2.000E-06	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	3.000E-01	5.000E-01	---	REXG
R021	Height of the building (room) (m)	2.500E+00	2.500E+00	---	HRM
R021	Building interior area factor	8.000E-02	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	-1.000E+00	-1.000E+00	code computed (time dependent)	DMFL
R021	Emanating power of Rn-222 gas	2.500E-01	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	1.500E-01	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	513	---	---	KYMAX

Summary of Pathway Selections

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

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	590000.00 square meters	Ra-226	1.120E-01
Thickness:	0.30 meters	Ra-228	5.700E-02
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
TDOSE(t):	2.100E+00	2.128E+00	2.124E+00	2.023E+00	1.803E+00	1.492E+00	1.291E+00
M(t):	8.402E-02	8.512E-02	8.496E-02	8.093E-02	7.211E-02	5.967E-02	5.163E-02

Maximum TDOSE(t): 2.130E+00 mrem/yr at t = 1.308 ñ 0.003 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.308E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Nuclide														
Ra-226	7.074E-01	0.3322	4.610E-05	0.0000	8.495E-01	0.3989	1.832E-01	0.0860	0.000E+00	0.0000	0.000E+00	0.0000	5.157E-03	0.0024
Ra-228	2.938E-01	0.1380	3.610E-04	0.0002	1.074E-02	0.0050	7.702E-02	0.0362	0.000E+00	0.0000	0.000E+00	0.0000	2.301E-03	0.0011
Total	1.001E+00	0.4702	4.071E-04	0.0002	8.602E-01	0.4039	2.602E-01	0.1222	0.000E+00	0.0000	0.000E+00	0.0000	7.458E-03	0.0035

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.308E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Nuclide														
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.745E+00	0.8196
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.842E-01	0.1804
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.130E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	7.191E-01	0.3424	4.250E-05	0.0000	8.652E-01	0.4119	1.774E-01	0.0845	0.000E+00	0.0000	0.000E+00	0.0000	4.366E-03	0.0021
Ra-228	2.365E-01	0.1126	1.409E-04	0.0001	3.953E-03	0.0019	9.139E-02	0.0435	0.000E+00	0.0000	0.000E+00	0.0000	2.302E-03	0.0011
Total	9.556E-01	0.4549	1.834E-04	0.0001	8.692E-01	0.4138	2.688E-01	0.1280	0.000E+00	0.0000	0.000E+00	0.0000	6.668E-03	0.0032

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.766E+00	0.8409
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.343E-01	0.1591
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.100E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	7.102E-01	0.3337	4.528E-05	0.0000	8.531E-01	0.4009	1.819E-01	0.0855	0.000E+00	0.0000	0.000E+00	0.0000	4.976E-03	0.0023
Ra-228	2.854E-01	0.1341	3.232E-04	0.0002	9.568E-03	0.0045	8.022E-02	0.0377	0.000E+00	0.0000	0.000E+00	0.0000	2.317E-03	0.0011
Total	9.955E-01	0.4678	3.685E-04	0.0002	8.627E-01	0.4054	2.622E-01	0.1232	0.000E+00	0.0000	0.000E+00	0.0000	7.293E-03	0.0034

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.750E+00	0.8225
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.778E-01	0.1775
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.128E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	7.014E-01	0.3302	4.790E-05	0.0000	8.412E-01	0.3960	1.860E-01	0.0875	0.000E+00	0.0000	0.000E+00	0.0000	5.553E-03	0.0026
Ra-228	3.044E-01	0.1433	4.222E-04	0.0002	1.263E-02	0.0059	7.027E-02	0.0331	0.000E+00	0.0000	0.000E+00	0.0000	2.239E-03	0.0011
Total	1.006E+00	0.4735	4.701E-04	0.0002	8.539E-01	0.4020	2.562E-01	0.1206	0.000E+00	0.0000	0.000E+00	0.0000	7.792E-03	0.0037

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+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.734E+00	0.8164
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.899E-01	0.1836
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.124E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	6.755E-01	0.3339	5.485E-05	0.0000	8.064E-01	0.3986	1.960E-01	0.0969	0.000E+00	0.0000	0.000E+00	0.0000	7.099E-03	0.0035
Ra-228	2.749E-01	0.1359	4.640E-04	0.0002	1.400E-02	0.0069	4.707E-02	0.0233	0.000E+00	0.0000	0.000E+00	0.0000	1.776E-03	0.0009
Total	9.504E-01	0.4697	5.189E-04	0.0003	8.204E-01	0.4055	2.430E-01	0.1201	0.000E+00	0.0000	0.000E+00	0.0000	8.875E-03	0.0044

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+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.685E+00	0.8328
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.382E-01	0.1672
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.023E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	6.344E-01	0.3519	6.381E-05	0.0000	7.514E-01	0.4168	2.068E-01	0.1147	0.000E+00	0.0000	0.000E+00	0.0000	9.137E-03	0.0051
Ra-228	1.665E-01	0.0923	3.034E-04	0.0002	9.178E-03	0.0051	2.398E-02	0.0133	0.000E+00	0.0000	0.000E+00	0.0000	1.013E-03	0.0006
Total	8.009E-01	0.4443	3.672E-04	0.0002	7.606E-01	0.4219	2.308E-01	0.1280	0.000E+00	0.0000	0.000E+00	0.0000	1.015E-02	0.0056

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.602E+00	0.8885
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	2.010E-01	0.1115
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	1.803E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	5.595E-01	0.3750	7.416E-05	0.0000	6.519E-01	0.4370	2.126E-01	0.1425	0.000E+00	0.0000	0.000E+00	0.0000	1.165E-02	0.0078
Ra-228	4.688E-02	0.0314	8.790E-05	0.0001	2.661E-03	0.0018	6.181E-03	0.0041	0.000E+00	0.0000	0.000E+00	0.0000	2.803E-04	0.0002
Total	6.064E-01	0.4065	1.621E-04	0.0001	6.546E-01	0.4388	2.188E-01	0.1467	0.000E+00	0.0000	0.000E+00	0.0000	1.193E-02	0.0080

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+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.436E+00	0.9624
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	5.609E-02	0.0376
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	1.492E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	4.931E-01	0.3820	7.757E-05	0.0001	5.650E-01	0.4378	2.049E-01	0.1587	0.000E+00	0.0000	0.000E+00	0.0000	1.271E-02	0.0098
Ra-228	1.249E-02	0.0097	2.360E-05	0.0000	7.145E-04	0.0006	1.588E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	7.494E-05	0.0001
Total	5.056E-01	0.3917	1.012E-04	0.0001	5.657E-01	0.4383	2.065E-01	0.1600	0.000E+00	0.0000	0.000E+00	0.0000	1.279E-02	0.0099

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.276E+00	0.9885
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	1.489E-02	0.0115
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	1.291E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
Ra-226+D	Ra-226+D	1.000E+00	1.573E+01	1.552E+01	1.531E+01	1.470E+01	1.373E+01	1.197E+01	1.044E+01
Ra-226+D	Pb-210+D	1.000E+00	4.182E-02	1.117E-01	1.766E-01	3.495E-01	5.744E-01	8.444E-01	9.533E-01
Ra-226+D	ÄDSR(j)		1.577E+01	1.563E+01	1.548E+01	1.504E+01	1.430E+01	1.282E+01	1.139E+01
Ra-228+D	Ra-228+D	1.000E+00	4.887E+00	4.276E+00	3.741E+00	2.506E+00	1.285E+00	3.377E-01	8.872E-02
Ra-228+D	Th-228+D	1.000E+00	9.777E-01	2.352E+00	3.100E+00	3.427E+00	2.241E+00	6.463E-01	1.726E-01
Ra-228+D	ÄDSR(j)		5.864E+00	6.628E+00	6.841E+00	5.933E+00	3.526E+00	9.841E-01	2.613E-01

The DSR includes contributions from associated (half-life ó 180 days) daughters.

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

Nuclide (i)	t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
Ra-226	1.585E+00	1.600E+00	1.615E+00	1.662E+00	1.748E+00	1.950E+00	2.195E+00
Ra-228	4.263E+00	3.772E+00	3.655E+00	4.214E+00	7.091E+00	2.540E+01	9.568E+01

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 1.308 ñ 0.003 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ra-226	1.120E-01	0.000E+00	1.577E+01	1.585E+00	1.558E+01	1.604E+00
Ra-228	5.700E-02	2.039 ñ 0.004	6.841E+00	3.654E+00	6.741E+00	3.709E+00

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

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ
Ra-226	Ra-226	1.000E+00	1.762E+00	1.738E+00	1.714E+00	1.646E+00	1.538E+00	1.341E+00	1.169E+00
Pb-210	Ra-226	1.000E+00	4.684E-03	1.251E-02	1.978E-02	3.914E-02	6.434E-02	9.457E-02	1.068E-01
Ra-228	Ra-228	1.000E+00	2.785E-01	2.437E-01	2.132E-01	1.428E-01	7.324E-02	1.925E-02	5.057E-03
Th-228	Ra-228	1.000E+00	5.573E-02	1.341E-01	1.767E-01	1.953E-01	1.277E-01	3.684E-02	9.836E-03
ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ

THF(i) is the thread fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ
Ra-226	Ra-226	1.000E+00	1.120E-01	1.106E-01	1.093E-01	1.054E-01	9.914E-02	8.776E-02	7.769E-02
Pb-210	Ra-226	1.000E+00	0.000E+00	3.393E-03	6.614E-03	1.531E-02	2.699E-02	4.211E-02	4.957E-02
Ra-228	Ra-228	1.000E+00	5.700E-02	4.994E-02	4.375E-02	2.942E-02	1.518E-02	4.043E-03	1.077E-03
Th-228	Ra-228	1.000E+00	0.000E+00	1.616E-02	2.541E-02	3.166E-02	2.151E-02	6.304E-03	1.694E-03
ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ

THF(i) is the thread fraction of the parent nuclide.

RESCALC.EXE execution time = 169.94 seconds

Exhibit 3

RESRAD Results- Onsite Well and Vegetables

Part 5

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

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-228 (Source: FGR 12)	5.978E+00	5.978E+00	DCF1(1)
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1(2)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1(3)
A-1	Bi-212 (Source: FGR 12)	1.171E+00	1.171E+00	DCF1(4)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1(5)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(6)
A-1	Pb-212 (Source: FGR 12)	7.043E-01	7.043E-01	DCF1(7)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(8)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(9)
A-1	Po-212 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(10)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1(11)
A-1	Po-216 (Source: FGR 12)	1.042E-04	1.042E-04	DCF1(12)
A-1	Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1(13)
A-1	Ra-224 (Source: FGR 12)	5.119E-02	5.119E-02	DCF1(14)
A-1	Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1(15)
A-1	Ra-228 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(16)
A-1	Rn-220 (Source: FGR 12)	2.298E-03	2.298E-03	DCF1(17)
A-1	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1(18)
A-1	Th-228 (Source: FGR 12)	7.940E-03	7.940E-03	DCF1(19)
A-1	Tl-208 (Source: FGR 12)	2.298E+01	2.298E+01	DCF1(20)
A-1	Tl-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1(21)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.320E-02	1.360E-02	DCF2(1)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(2)
B-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(3)
B-1	Th-228+D	3.454E-01	3.420E-01	DCF2(4)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.276E-03	5.370E-03	DCF3(1)
D-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(2)
D-1	Ra-228+D	1.442E-03	1.440E-03	DCF3(3)
D-1	Th-228+D	8.086E-04	3.960E-04	DCF3(4)
D-34	Food transfer factors:			
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(1,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(1,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(1,3)
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(2,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,3)
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(3,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,3)

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

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(4,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(4,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(2,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(2,2)
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(3,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(3,2)
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(4,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(4,2)

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

Summary : Joliet City
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Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	5.900E+05	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.048E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	4.880E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	4.500E+01	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	2.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	5.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	1.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	2.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+01	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ra-226	1.540E-01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Ra-228	6.900E-02	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.440E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	1.000E+00	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.310E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	9.075E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	4.500E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.763E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	4.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	2.590E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.200E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.550E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+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)	3.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW

Summary : Joliet City

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Number of unsaturated zone strata	2	1	---	NS
R015	Unsat. zone 1, thickness (m)	2.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.440E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.500E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	9.075E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	4.310E+01	1.000E+01	---	HCUZ(1)
R015	Unsat. zone 2, thickness (m)	9.700E+00	0.000E+00	---	H(2)
R015	Unsat. zone 2, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(2)
R015	Unsat. zone 2, total porosity	4.000E-01	4.000E-01	---	TPUZ(2)
R015	Unsat. zone 2, effective porosity	3.200E-01	2.000E-01	---	EPUZ(2)
R015	Unsat. zone 2, field capacity	2.000E-01	2.000E-01	---	FCUZ(2)
R015	Unsat. zone 2, soil-specific b parameter	4.050E+00	5.300E+00	---	BUZ(2)
R015	Unsat. zone 2, hydraulic conductivity (m/yr)	5.550E+03	1.000E+01	---	HCUZ(2)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(2,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(2,2)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.176E-02	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,2)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.176E-02	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(1,1)
R016	Unsaturated zone 2 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(1,2)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.242E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(4,1)
R016	Unsaturated zone 2 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(4,2)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.378E-05	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	7.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	-1.000E+00	1.000E+00	-1 shows non-circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	5.467E+01	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	1.093E+02	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	1.640E+02	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	2.187E+02	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	2.733E+02	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	3.280E+02	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	3.827E+02	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	4.373E+02	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	4.920E+02	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	5.467E+02	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	6.013E+02	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	6.560E+02	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	1.000E+00	1.000E+00	---	FRACA(1)
R017	Ring 2	1.000E+00	2.732E-01	---	FRACA(2)
R017	Ring 3	1.000E+00	0.000E+00	---	FRACA(3)
R017	Ring 4	1.000E+00	0.000E+00	---	FRACA(4)
R017	Ring 5	8.900E-01	0.000E+00	---	FRACA(5)
R017	Ring 6	6.000E-01	0.000E+00	---	FRACA(6)
R017	Ring 7	4.900E-01	0.000E+00	---	FRACA(7)
R017	Ring 8	4.100E-01	0.000E+00	---	FRACA(8)
R017	Ring 9	3.500E-01	0.000E+00	---	FRACA(9)
R017	Ring 10	3.100E-01	0.000E+00	---	FRACA(10)
R017	Ring 11	2.800E-01	0.000E+00	---	FRACA(11)
R017	Ring 12	7.900E-02	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	1.000E+00	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	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	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	1.016E-01	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	2.403E+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	2.000E-06	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	3.000E-01	5.000E-01	---	REXG
R021	Height of the building (room) (m)	2.500E+00	2.500E+00	---	HRM
R021	Building interior area factor	8.000E-02	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	-1.000E+00	-1.000E+00	code computed (time dependent)	DMFL
R021	Emanating power of Rn-222 gas	2.500E-01	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	1.500E-01	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	513	---	---	KYMAX

Summary of Pathway Selections

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

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	590000.00 square meters	Ra-226	1.540E-01
Thickness:	0.30 meters	Ra-228	6.900E-02
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
TDOSE(t):	2.833E+00	2.864E+00	2.856E+00	2.726E+00	2.446E+00	2.042E+00	1.772E+00
M(t):	1.133E-01	1.146E-01	1.143E-01	1.090E-01	9.783E-02	8.168E-02	7.089E-02

Maximum TDOSE(t): 2.865E+00 mrem/yr at t = 1.240 ñ 0.002 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.240E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Nuclide														
Ra-226	9.736E-01	0.3398	6.314E-05	0.0000	1.169E+00	0.4081	2.515E-01	0.0878	0.000E+00	0.0000	0.000E+00	0.0000	7.037E-03	0.0025
Ra-228	3.537E-01	0.1234	4.277E-04	0.0001	1.271E-02	0.0044	9.407E-02	0.0328	0.000E+00	0.0000	0.000E+00	0.0000	2.790E-03	0.0010
Total	1.327E+00	0.4633	4.908E-04	0.0002	1.182E+00	0.4125	3.456E-01	0.1206	0.000E+00	0.0000	0.000E+00	0.0000	9.827E-03	0.0034

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.240E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Nuclide														
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	2.401E+00	0.8382
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	4.637E-01	0.1618
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.865E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	9.888E-01	0.3490	5.844E-05	0.0000	1.190E+00	0.4199	2.440E-01	0.0861	0.000E+00	0.0000	0.000E+00	0.0000	6.003E-03	0.0021
Ra-228	2.863E-01	0.1010	1.706E-04	0.0001	4.786E-03	0.0017	1.106E-01	0.0390	0.000E+00	0.0000	0.000E+00	0.0000	2.787E-03	0.0010
Total	1.275E+00	0.4500	2.290E-04	0.0001	1.194E+00	0.4216	3.546E-01	0.1252	0.000E+00	0.0000	0.000E+00	0.0000	8.790E-03	0.0031

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	2.429E+00	0.8572
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	4.046E-01	0.1428
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.833E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	9.765E-01	0.3410	6.226E-05	0.0000	1.173E+00	0.4096	2.502E-01	0.0874	0.000E+00	0.0000	0.000E+00	0.0000	6.842E-03	0.0024
Ra-228	3.454E-01	0.1206	3.912E-04	0.0001	1.158E-02	0.0040	9.711E-02	0.0339	0.000E+00	0.0000	0.000E+00	0.0000	2.805E-03	0.0010
Total	1.322E+00	0.4616	4.535E-04	0.0002	1.185E+00	0.4136	3.473E-01	0.1213	0.000E+00	0.0000	0.000E+00	0.0000	9.647E-03	0.0034

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	2.407E+00	0.8403
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	4.573E-01	0.1597
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.864E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	9.644E-01	0.3376	6.586E-05	0.0000	1.157E+00	0.4049	2.557E-01	0.0895	0.000E+00	0.0000	0.000E+00	0.0000	7.635E-03	0.0027
Ra-228	3.684E-01	0.1290	5.110E-04	0.0002	1.529E-02	0.0054	8.506E-02	0.0298	0.000E+00	0.0000	0.000E+00	0.0000	2.710E-03	0.0009
Total	1.333E+00	0.4666	5.769E-04	0.0002	1.172E+00	0.4103	3.407E-01	0.1193	0.000E+00	0.0000	0.000E+00	0.0000	1.035E-02	0.0036

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+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	2.384E+00	0.8348
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	4.720E-01	0.1652
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.856E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	9.288E-01	0.3407	7.542E-05	0.0000	1.109E+00	0.4067	2.694E-01	0.0988	0.000E+00	0.0000	0.000E+00	0.0000	9.762E-03	0.0036
Ra-228	3.327E-01	0.1221	5.617E-04	0.0002	1.695E-02	0.0062	5.697E-02	0.0209	0.000E+00	0.0000	0.000E+00	0.0000	2.150E-03	0.0008
Total	1.262E+00	0.4627	6.371E-04	0.0002	1.126E+00	0.4129	3.264E-01	0.1197	0.000E+00	0.0000	0.000E+00	0.0000	1.191E-02	0.0044

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+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	2.317E+00	0.8498
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	4.094E-01	0.1502
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.726E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	8.724E-01	0.3567	8.774E-05	0.0000	1.033E+00	0.4224	2.844E-01	0.1163	0.000E+00	0.0000	0.000E+00	0.0000	1.256E-02	0.0051
Ra-228	2.015E-01	0.0824	3.673E-04	0.0002	1.111E-02	0.0045	2.903E-02	0.0119	0.000E+00	0.0000	0.000E+00	0.0000	1.226E-03	0.0005
Total	1.074E+00	0.4391	4.550E-04	0.0002	1.044E+00	0.4270	3.134E-01	0.1282	0.000E+00	0.0000	0.000E+00	0.0000	1.379E-02	0.0056

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	2.203E+00	0.9005
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	2.433E-01	0.0995
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.446E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	7.693E-01	0.3767	1.020E-04	0.0000	8.964E-01	0.4390	2.924E-01	0.1432	0.000E+00	0.0000	0.000E+00	0.0000	1.601E-02	0.0078
Ra-228	5.675E-02	0.0278	1.064E-04	0.0001	3.222E-03	0.0016	7.482E-03	0.0037	0.000E+00	0.0000	0.000E+00	0.0000	3.393E-04	0.0002
Total	8.260E-01	0.4045	2.084E-04	0.0001	8.996E-01	0.4405	2.998E-01	0.1468	0.000E+00	0.0000	0.000E+00	0.0000	1.635E-02	0.0080

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+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.974E+00	0.9667
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	6.790E-02	0.0333
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.042E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	6.780E-01	0.3826	1.067E-04	0.0001	7.769E-01	0.4384	2.817E-01	0.1590	0.000E+00	0.0000	0.000E+00	0.0000	1.748E-02	0.0099
Ra-228	1.512E-02	0.0085	2.857E-05	0.0000	8.650E-04	0.0005	1.923E-03	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	9.072E-05	0.0001
Total	6.931E-01	0.3911	1.352E-04	0.0001	7.778E-01	0.4389	2.836E-01	0.1600	0.000E+00	0.0000	0.000E+00	0.0000	1.757E-02	0.0099

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.754E+00	0.9898
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	1.803E-02	0.0102
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	1.772E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
Ra-226+D	Ra-226+D	1.000E+00	1.573E+01	1.552E+01	1.531E+01	1.470E+01	1.373E+01	1.197E+01	1.044E+01
Ra-226+D	Pb-210+D	1.000E+00	4.182E-02	1.117E-01	1.766E-01	3.495E-01	5.744E-01	8.444E-01	9.533E-01
Ra-226+D	ÄDSR(j)		1.577E+01	1.563E+01	1.548E+01	1.504E+01	1.430E+01	1.282E+01	1.139E+01
Ra-228+D	Ra-228+D	1.000E+00	4.887E+00	4.276E+00	3.741E+00	2.506E+00	1.285E+00	3.377E-01	8.872E-02
Ra-228+D	Th-228+D	1.000E+00	9.777E-01	2.352E+00	3.100E+00	3.427E+00	2.241E+00	6.463E-01	1.726E-01
Ra-228+D	ÄDSR(j)		5.864E+00	6.628E+00	6.841E+00	5.933E+00	3.526E+00	9.841E-01	2.613E-01

The DSR includes contributions from associated (half-life 6 180 days) daughters.

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

Nuclide (i)	t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
Ra-226	1.585E+00	1.600E+00	1.615E+00	1.662E+00	1.748E+00	1.950E+00	2.195E+00
Ra-228	4.263E+00	3.772E+00	3.655E+00	4.214E+00	7.091E+00	2.540E+01	9.568E+01

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 1.240 ñ 0.002 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ra-226	1.540E-01	0.000E+00	1.577E+01	1.585E+00	1.559E+01	1.603E+00
Ra-228	6.900E-02	2.039 ñ 0.004	6.841E+00	3.654E+00	6.720E+00	3.720E+00

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

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ
Ra-226	Ra-226	1.000E+00	2.422E+00	2.389E+00	2.357E+00	2.263E+00	2.114E+00	1.844E+00	1.607E+00
Pb-210	Ra-226	1.000E+00	6.440E-03	1.720E-02	2.719E-02	5.382E-02	8.846E-02	1.300E-01	1.468E-01
Ra-228	Ra-228	1.000E+00	3.372E-01	2.950E-01	2.581E-01	1.729E-01	8.866E-02	2.330E-02	6.122E-03
Th-228	Ra-228	1.000E+00	6.746E-02	1.623E-01	2.139E-01	2.365E-01	1.546E-01	4.460E-02	1.191E-02
ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ

THF(i) is the thread fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ
Ra-226	Ra-226	1.000E+00	1.540E-01	1.521E-01	1.503E-01	1.449E-01	1.363E-01	1.207E-01	1.068E-01
Pb-210	Ra-226	1.000E+00	0.000E+00	4.665E-03	9.094E-03	2.106E-02	3.711E-02	5.790E-02	6.815E-02
Ra-228	Ra-228	1.000E+00	6.900E-02	6.045E-02	5.296E-02	3.561E-02	1.838E-02	4.894E-03	1.303E-03
Th-228	Ra-228	1.000E+00	0.000E+00	1.957E-02	3.076E-02	3.833E-02	2.604E-02	7.631E-03	2.051E-03
ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ

THF(i) is the thread fraction of the parent nuclide.

RESCALC.EXE execution time = 170.64 seconds

Exhibit 3

RESRAD Results- Onsite Well and Vegetables

Part 6

Summary : Joliet City
File : H:\HOME\400001 HEALTH PHYSICS\JOLIET\RESRAD\JOLIET.RAD

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Summary : Joliet City

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Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-228 (Source: FGR 12)	5.978E+00	5.978E+00	DCF1(1)
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1(2)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1(3)
A-1	Bi-212 (Source: FGR 12)	1.171E+00	1.171E+00	DCF1(4)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1(5)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(6)
A-1	Pb-212 (Source: FGR 12)	7.043E-01	7.043E-01	DCF1(7)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(8)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(9)
A-1	Po-212 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(10)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1(11)
A-1	Po-216 (Source: FGR 12)	1.042E-04	1.042E-04	DCF1(12)
A-1	Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1(13)
A-1	Ra-224 (Source: FGR 12)	5.119E-02	5.119E-02	DCF1(14)
A-1	Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1(15)
A-1	Ra-228 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(16)
A-1	Rn-220 (Source: FGR 12)	2.298E-03	2.298E-03	DCF1(17)
A-1	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1(18)
A-1	Th-228 (Source: FGR 12)	7.940E-03	7.940E-03	DCF1(19)
A-1	Tl-208 (Source: FGR 12)	2.298E+01	2.298E+01	DCF1(20)
A-1	Tl-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1(21)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.320E-02	1.360E-02	DCF2(1)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(2)
B-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(3)
B-1	Th-228+D	3.454E-01	3.420E-01	DCF2(4)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.276E-03	5.370E-03	DCF3(1)
D-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(2)
D-1	Ra-228+D	1.442E-03	1.440E-03	DCF3(3)
D-1	Th-228+D	8.086E-04	3.960E-04	DCF3(4)
D-34	Food transfer factors:			
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(1,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(1,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(1,3)
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(2,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,3)
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(3,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,3)

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

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(4,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(4,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(2,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(2,2)
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(3,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(3,2)
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(4,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(4,2)

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

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	5.900E+05	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.048E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	4.880E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	4.500E+01	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	2.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	5.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	1.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	2.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+01	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ra-226	3.100E-02	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Ra-228	4.700E-02	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.440E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	1.000E+00	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.310E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	9.075E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	4.500E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.763E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	4.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	2.590E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.200E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.550E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+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)	3.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Number of unsaturated zone strata	2	1	---	NS
R015	Unsat. zone 1, thickness (m)	2.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.440E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.500E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	9.075E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	4.310E+01	1.000E+01	---	HCUZ(1)
R015	Unsat. zone 2, thickness (m)	9.700E+00	0.000E+00	---	H(2)
R015	Unsat. zone 2, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(2)
R015	Unsat. zone 2, total porosity	4.000E-01	4.000E-01	---	TPUZ(2)
R015	Unsat. zone 2, effective porosity	3.200E-01	2.000E-01	---	EPUZ(2)
R015	Unsat. zone 2, field capacity	2.000E-01	2.000E-01	---	FCUZ(2)
R015	Unsat. zone 2, soil-specific b parameter	4.050E+00	5.300E+00	---	BUZ(2)
R015	Unsat. zone 2, hydraulic conductivity (m/yr)	5.550E+03	1.000E+01	---	HCUZ(2)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(2,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(2,2)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.176E-02	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,2)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.176E-02	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(1,1)
R016	Unsaturated zone 2 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(1,2)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.242E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(4,1)
R016	Unsaturated zone 2 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(4,2)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.378E-05	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	7.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	-1.000E+00	1.000E+00	-1 shows non-circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	5.467E+01	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	1.093E+02	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	1.640E+02	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	2.187E+02	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	2.733E+02	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	3.280E+02	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	3.827E+02	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	4.373E+02	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	4.920E+02	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	5.467E+02	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	6.013E+02	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	6.560E+02	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	1.000E+00	1.000E+00	---	FRACA(1)
R017	Ring 2	1.000E+00	2.732E-01	---	FRACA(2)
R017	Ring 3	1.000E+00	0.000E+00	---	FRACA(3)
R017	Ring 4	1.000E+00	0.000E+00	---	FRACA(4)
R017	Ring 5	8.900E-01	0.000E+00	---	FRACA(5)
R017	Ring 6	6.000E-01	0.000E+00	---	FRACA(6)
R017	Ring 7	4.900E-01	0.000E+00	---	FRACA(7)
R017	Ring 8	4.100E-01	0.000E+00	---	FRACA(8)
R017	Ring 9	3.500E-01	0.000E+00	---	FRACA(9)
R017	Ring 10	3.100E-01	0.000E+00	---	FRACA(10)
R017	Ring 11	2.800E-01	0.000E+00	---	FRACA(11)
R017	Ring 12	7.900E-02	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	1.000E+00	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	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	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	1.016E-01	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	2.403E+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	2.000E-06	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	3.000E-01	5.000E-01	---	REXG
R021	Height of the building (room) (m)	2.500E+00	2.500E+00	---	HRM
R021	Building interior area factor	8.000E-02	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	-1.000E+00	-1.000E+00	code computed (time dependent)	DMFL
R021	Emanating power of Rn-222 gas	2.500E-01	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	1.500E-01	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	513	---	---	KYMAX

Summary of Pathway Selections

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

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Contaminated Zone Dimensions	
Area:	590000.00 square meters
Thickness:	0.30 meters
Cover Depth:	0.00 meters

Initial Soil Concentrations, pCi/g	
Ra-226	3.100E-02
Ra-228	4.700E-02

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
TDOSE(t):	7.645E-01	7.960E-01	8.015E-01	7.452E-01	6.091E-01	4.436E-01	3.654E-01
M(t):	3.058E-02	3.184E-02	3.206E-02	2.981E-02	2.436E-02	1.775E-02	1.462E-02

Maximum TDOSE(t): 8.019E-01 mrem/yr at t = 1.767 ñ 0.004 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.767E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Nuclide														
Ra-226	1.947E-01	0.2428	1.309E-05	0.0000	2.336E-01	0.2913	5.122E-02	0.0639	0.000E+00	0.0000	0.000E+00	0.0000	1.501E-03	0.0019
Ra-228	2.490E-01	0.3105	3.338E-04	0.0004	9.973E-03	0.0124	5.976E-02	0.0745	0.000E+00	0.0000	0.000E+00	0.0000	1.866E-03	0.0023
Total	4.437E-01	0.5533	3.469E-04	0.0004	2.436E-01	0.3037	1.110E-01	0.1384	0.000E+00	0.0000	0.000E+00	0.0000	3.366E-03	0.0042

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.767E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Nuclide														
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	4.810E-01	0.5998
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.209E-01	0.4002
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	8.019E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.990E-01	0.2604	1.176E-05	0.0000	2.395E-01	0.3133	4.911E-02	0.0642	0.000E+00	0.0000	0.000E+00	0.0000	1.208E-03	0.0016
Ra-228	1.950E-01	0.2551	1.162E-04	0.0002	3.260E-03	0.0043	7.536E-02	0.0986	0.000E+00	0.0000	0.000E+00	0.0000	1.898E-03	0.0025
Total	3.940E-01	0.5154	1.280E-04	0.0002	2.427E-01	0.3175	1.245E-01	0.1628	0.000E+00	0.0000	0.000E+00	0.0000	3.107E-03	0.0041

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	4.889E-01	0.6395
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	2.756E-01	0.3605
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	7.645E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.966E-01	0.2470	1.253E-05	0.0000	2.361E-01	0.2967	5.036E-02	0.0633	0.000E+00	0.0000	0.000E+00	0.0000	1.377E-03	0.0017
Ra-228	2.353E-01	0.2956	2.665E-04	0.0003	7.889E-03	0.0099	6.614E-02	0.0831	0.000E+00	0.0000	0.000E+00	0.0000	1.910E-03	0.0024
Total	4.319E-01	0.5426	2.790E-04	0.0004	2.440E-01	0.3066	1.165E-01	0.1464	0.000E+00	0.0000	0.000E+00	0.0000	3.288E-03	0.0041

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	4.845E-01	0.6086
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.115E-01	0.3914
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	7.960E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.941E-01	0.2422	1.326E-05	0.0000	2.328E-01	0.2905	5.147E-02	0.0642	0.000E+00	0.0000	0.000E+00	0.0000	1.537E-03	0.0019
Ra-228	2.510E-01	0.3131	3.481E-04	0.0004	1.042E-02	0.0130	5.794E-02	0.0723	0.000E+00	0.0000	0.000E+00	0.0000	1.846E-03	0.0023
Total	4.451E-01	0.5553	3.614E-04	0.0005	2.433E-01	0.3035	1.094E-01	0.1365	0.000E+00	0.0000	0.000E+00	0.0000	3.383E-03	0.0042

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+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	4.800E-01	0.5989
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.215E-01	0.4011
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	8.015E-01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Joliet City
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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+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.870E-01	0.2509	1.518E-05	0.0000	2.232E-01	0.2995	5.424E-02	0.0728	0.000E+00	0.0000	0.000E+00	0.0000	1.965E-03	0.0026
Ra-228	2.266E-01	0.3041	3.826E-04	0.0005	1.154E-02	0.0155	3.881E-02	0.0521	0.000E+00	0.0000	0.000E+00	0.0000	1.464E-03	0.0020
Total	4.136E-01	0.5550	3.978E-04	0.0005	2.347E-01	0.3150	9.305E-02	0.1249	0.000E+00	0.0000	0.000E+00	0.0000	3.429E-03	0.0046

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+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	4.664E-01	0.6258
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	2.788E-01	0.3742
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	7.452E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.756E-01	0.2883	1.766E-05	0.0000	2.080E-01	0.3414	5.725E-02	0.0940	0.000E+00	0.0000	0.000E+00	0.0000	2.529E-03	0.0042
Ra-228	1.373E-01	0.2254	2.502E-04	0.0004	7.568E-03	0.0124	1.978E-02	0.0325	0.000E+00	0.0000	0.000E+00	0.0000	8.349E-04	0.0014
Total	3.129E-01	0.5137	2.678E-04	0.0004	2.155E-01	0.3539	7.703E-02	0.1265	0.000E+00	0.0000	0.000E+00	0.0000	3.364E-03	0.0055

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	4.434E-01	0.7279
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	1.657E-01	0.2721
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.091E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.549E-01	0.3491	2.053E-05	0.0000	1.804E-01	0.4067	5.885E-02	0.1327	0.000E+00	0.0000	0.000E+00	0.0000	3.223E-03	0.0073
Ra-228	3.866E-02	0.0871	7.248E-05	0.0002	2.194E-03	0.0049	5.097E-03	0.0115	0.000E+00	0.0000	0.000E+00	0.0000	2.312E-04	0.0005
Total	1.935E-01	0.4362	9.300E-05	0.0002	1.826E-01	0.4117	6.395E-02	0.1441	0.000E+00	0.0000	0.000E+00	0.0000	3.455E-03	0.0078

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+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	3.974E-01	0.8957
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	4.625E-02	0.1043
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.436E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.365E-01	0.3735	2.147E-05	0.0001	1.564E-01	0.4280	5.671E-02	0.1552	0.000E+00	0.0000	0.000E+00	0.0000	3.518E-03	0.0096
Ra-228	1.030E-02	0.0282	1.946E-05	0.0001	5.892E-04	0.0016	1.310E-03	0.0036	0.000E+00	0.0000	0.000E+00	0.0000	6.179E-05	0.0002
Total	1.468E-01	0.4017	4.093E-05	0.0001	1.570E-01	0.4296	5.802E-02	0.1588	0.000E+00	0.0000	0.000E+00	0.0000	3.580E-03	0.0098

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	3.531E-01	0.9664
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	1.228E-02	0.0336
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.654E-01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Joliet City
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Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
Ra-226+D	Ra-226+D	1.000E+00	1.573E+01	1.552E+01	1.531E+01	1.470E+01	1.373E+01	1.197E+01	1.044E+01
Ra-226+D	Pb-210+D	1.000E+00	4.182E-02	1.117E-01	1.766E-01	3.495E-01	5.744E-01	8.444E-01	9.533E-01
Ra-226+D	ãDSR(j)		1.577E+01	1.563E+01	1.548E+01	1.504E+01	1.430E+01	1.282E+01	1.139E+01
Ra-228+D	Ra-228+D	1.000E+00	4.887E+00	4.276E+00	3.741E+00	2.506E+00	1.285E+00	3.377E-01	8.872E-02
Ra-228+D	Th-228+D	1.000E+00	9.777E-01	2.352E+00	3.100E+00	3.427E+00	2.241E+00	6.463E-01	1.726E-01
Ra-228+D	ãDSR(j)		5.864E+00	6.628E+00	6.841E+00	5.933E+00	3.526E+00	9.841E-01	2.613E-01

The DSR includes contributions from associated (half-life ó 180 days) daughters.

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

Nuclide (i)	t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
Ra-226	1.585E+00	1.600E+00	1.615E+00	1.662E+00	1.748E+00	1.950E+00	2.195E+00
Ra-228	4.263E+00	3.772E+00	3.655E+00	4.214E+00	7.091E+00	2.540E+01	9.568E+01

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 1.767 ñ 0.004 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ra-226	3.100E-02	0.000E+00	1.577E+01	1.585E+00	1.552E+01	1.611E+00
Ra-228	4.700E-02	2.039 ñ 0.004	6.841E+00	3.654E+00	6.828E+00	3.661E+00

Summary : Joliet City
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Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ
Ra-226	Ra-226	1.000E+00	4.876E-01	4.810E-01	4.745E-01	4.555E-01	4.256E-01	3.712E-01	3.236E-01
Pb-210	Ra-226	1.000E+00	1.296E-03	3.462E-03	5.474E-03	1.083E-02	1.781E-02	2.618E-02	2.955E-02
Ra-228	Ra-228	1.000E+00	2.297E-01	2.010E-01	1.758E-01	1.178E-01	6.039E-02	1.587E-02	4.170E-03
Th-228	Ra-228	1.000E+00	4.595E-02	1.106E-01	1.457E-01	1.611E-01	1.053E-01	3.038E-02	8.110E-03
ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ

THF(i) is the thread fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ
Ra-226	Ra-226	1.000E+00	3.100E-02	3.062E-02	3.025E-02	2.917E-02	2.744E-02	2.429E-02	2.150E-02
Pb-210	Ra-226	1.000E+00	0.000E+00	9.391E-04	1.831E-03	4.239E-03	7.470E-03	1.165E-02	1.372E-02
Ra-228	Ra-228	1.000E+00	4.700E-02	4.118E-02	3.607E-02	2.425E-02	1.252E-02	3.334E-03	8.878E-04
Th-228	Ra-228	1.000E+00	0.000E+00	1.333E-02	2.095E-02	2.611E-02	1.774E-02	5.198E-03	1.397E-03
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THF(i) is the thread fraction of the parent nuclide.

RESCALC.EXE execution time = 171.93 seconds

Exhibit 3

RESRAD Results- Onsite Well and Vegetables

Part 7

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

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-228 (Source: FGR 12)	5.978E+00	5.978E+00	DCF1(1)
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1(2)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1(3)
A-1	Bi-212 (Source: FGR 12)	1.171E+00	1.171E+00	DCF1(4)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1(5)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(6)
A-1	Pb-212 (Source: FGR 12)	7.043E-01	7.043E-01	DCF1(7)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(8)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(9)
A-1	Po-212 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(10)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1(11)
A-1	Po-216 (Source: FGR 12)	1.042E-04	1.042E-04	DCF1(12)
A-1	Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1(13)
A-1	Ra-224 (Source: FGR 12)	5.119E-02	5.119E-02	DCF1(14)
A-1	Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1(15)
A-1	Ra-228 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(16)
A-1	Rn-220 (Source: FGR 12)	2.298E-03	2.298E-03	DCF1(17)
A-1	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1(18)
A-1	Th-228 (Source: FGR 12)	7.940E-03	7.940E-03	DCF1(19)
A-1	Tl-208 (Source: FGR 12)	2.298E+01	2.298E+01	DCF1(20)
A-1	Tl-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1(21)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.320E-02	1.360E-02	DCF2(1)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(2)
B-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(3)
B-1	Th-228+D	3.454E-01	3.420E-01	DCF2(4)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.276E-03	5.370E-03	DCF3(1)
D-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(2)
D-1	Ra-228+D	1.442E-03	1.440E-03	DCF3(3)
D-1	Th-228+D	8.086E-04	3.960E-04	DCF3(4)
D-34	Food transfer factors:			
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(1,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(1,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(1,3)
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(2,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,3)
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(3,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,3)

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

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(4,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(4,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(2,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(2,2)
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(3,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(3,2)
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(4,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(4,2)

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

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	5.900E+05	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.048E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	4.880E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	4.500E+01	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	2.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	5.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	1.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	2.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+01	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ra-226	9.300E-02	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Ra-228	1.000E-01	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.440E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	1.000E+00	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.310E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	9.075E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	4.500E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.763E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	4.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	2.590E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.200E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.550E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+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)	3.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Number of unsaturated zone strata	2	1	---	NS
R015	Unsat. zone 1, thickness (m)	2.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.440E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.500E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	9.075E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	4.310E+01	1.000E+01	---	HCUZ(1)
R015	Unsat. zone 2, thickness (m)	9.700E+00	0.000E+00	---	H(2)
R015	Unsat. zone 2, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(2)
R015	Unsat. zone 2, total porosity	4.000E-01	4.000E-01	---	TPUZ(2)
R015	Unsat. zone 2, effective porosity	3.200E-01	2.000E-01	---	EPUZ(2)
R015	Unsat. zone 2, field capacity	2.000E-01	2.000E-01	---	FCUZ(2)
R015	Unsat. zone 2, soil-specific b parameter	4.050E+00	5.300E+00	---	BUZ(2)
R015	Unsat. zone 2, hydraulic conductivity (m/yr)	5.550E+03	1.000E+01	---	HCUZ(2)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(2,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(2,2)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.176E-02	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,2)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.176E-02	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(1,1)
R016	Unsaturated zone 2 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(1,2)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.242E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(4,1)
R016	Unsaturated zone 2 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(4,2)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.378E-05	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	7.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	-1.000E+00	1.000E+00	-1 shows non-circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	5.467E+01	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	1.093E+02	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	1.640E+02	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	2.187E+02	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	2.733E+02	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	3.280E+02	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	3.827E+02	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	4.373E+02	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	4.920E+02	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	5.467E+02	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	6.013E+02	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	6.560E+02	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	1.000E+00	1.000E+00	---	FRACA(1)
R017	Ring 2	1.000E+00	2.732E-01	---	FRACA(2)
R017	Ring 3	1.000E+00	0.000E+00	---	FRACA(3)
R017	Ring 4	1.000E+00	0.000E+00	---	FRACA(4)
R017	Ring 5	8.900E-01	0.000E+00	---	FRACA(5)
R017	Ring 6	6.000E-01	0.000E+00	---	FRACA(6)
R017	Ring 7	4.900E-01	0.000E+00	---	FRACA(7)
R017	Ring 8	4.100E-01	0.000E+00	---	FRACA(8)
R017	Ring 9	3.500E-01	0.000E+00	---	FRACA(9)
R017	Ring 10	3.100E-01	0.000E+00	---	FRACA(10)
R017	Ring 11	2.800E-01	0.000E+00	---	FRACA(11)
R017	Ring 12	7.900E-02	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	1.000E+00	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	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	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	1.016E-01	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	2.403E+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	2.000E-06	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	3.000E-01	5.000E-01	---	REXG
R021	Height of the building (room) (m)	2.500E+00	2.500E+00	---	HRM
R021	Building interior area factor	8.000E-02	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	-1.000E+00	-1.000E+00	code computed (time dependent)	DMFL
R021	Emanating power of Rn-222 gas	2.500E-01	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	1.500E-01	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	513	---	---	KYMAX

Summary of Pathway Selections

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

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	590000.00 square meters	Ra-226	9.300E-02
Thickness:	0.30 meters	Ra-228	1.000E-01
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
TDOSE(t):	2.053E+00	2.116E+00	2.124E+00	1.992E+00	1.683E+00	1.291E+00	1.085E+00
M(t):	8.212E-02	8.465E-02	8.496E-02	7.970E-02	6.731E-02	5.162E-02	4.342E-02

Maximum TDOSE(t): 2.126E+00 mrem/yr at t = 1.692 ñ 0.003 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.692E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Nuclide														
Ra-226	5.846E-01	0.2750	3.912E-05	0.0000	7.015E-01	0.3300	1.534E-01	0.0722	0.000E+00	0.0000	0.000E+00	0.0000	4.466E-03	0.0021
Ra-228	5.280E-01	0.2483	6.993E-04	0.0003	2.088E-02	0.0098	1.284E-01	0.0604	0.000E+00	0.0000	0.000E+00	0.0000	3.983E-03	0.0019
Total	1.113E+00	0.5233	7.385E-04	0.0003	7.224E-01	0.3398	2.818E-01	0.1326	0.000E+00	0.0000	0.000E+00	0.0000	8.449E-03	0.0040

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.692E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Nuclide														
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.444E+00	0.6792
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	6.820E-01	0.3208
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.126E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	5.971E-01	0.2909	3.529E-05	0.0000	7.185E-01	0.3500	1.473E-01	0.0718	0.000E+00	0.0000	0.000E+00	0.0000	3.625E-03	0.0018
Ra-228	4.149E-01	0.2021	2.472E-04	0.0001	6.936E-03	0.0034	1.603E-01	0.0781	0.000E+00	0.0000	0.000E+00	0.0000	4.039E-03	0.0020
Total	1.012E+00	0.4929	2.825E-04	0.0001	7.254E-01	0.3533	3.077E-01	0.1499	0.000E+00	0.0000	0.000E+00	0.0000	7.664E-03	0.0037

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.467E+00	0.7144
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	5.864E-01	0.2856
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.053E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	5.897E-01	0.2787	3.760E-05	0.0000	7.084E-01	0.3348	1.511E-01	0.0714	0.000E+00	0.0000	0.000E+00	0.0000	4.132E-03	0.0020
Ra-228	5.006E-01	0.2366	5.670E-04	0.0003	1.679E-02	0.0079	1.407E-01	0.0665	0.000E+00	0.0000	0.000E+00	0.0000	4.065E-03	0.0019
Total	1.090E+00	0.5152	6.046E-04	0.0003	7.252E-01	0.3427	2.918E-01	0.1379	0.000E+00	0.0000	0.000E+00	0.0000	8.197E-03	0.0039

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.453E+00	0.6868
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	6.628E-01	0.3132
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.116E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	5.824E-01	0.2742	3.977E-05	0.0000	6.985E-01	0.3289	1.544E-01	0.0727	0.000E+00	0.0000	0.000E+00	0.0000	4.611E-03	0.0022
Ra-228	5.340E-01	0.2514	7.406E-04	0.0003	2.216E-02	0.0104	1.233E-01	0.0580	0.000E+00	0.0000	0.000E+00	0.0000	3.928E-03	0.0018
Total	1.116E+00	0.5256	7.804E-04	0.0004	7.207E-01	0.3393	2.777E-01	0.1307	0.000E+00	0.0000	0.000E+00	0.0000	8.538E-03	0.0040

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+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.440E+00	0.6779
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	6.841E-01	0.3221
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.124E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	5.609E-01	0.2815	4.554E-05	0.0000	6.696E-01	0.3361	1.627E-01	0.0817	0.000E+00	0.0000	0.000E+00	0.0000	5.895E-03	0.0030
Ra-228	4.822E-01	0.2420	8.141E-04	0.0004	2.456E-02	0.0123	8.257E-02	0.0414	0.000E+00	0.0000	0.000E+00	0.0000	3.116E-03	0.0016
Total	1.043E+00	0.5235	8.596E-04	0.0004	6.941E-01	0.3484	2.453E-01	0.1231	0.000E+00	0.0000	0.000E+00	0.0000	9.011E-03	0.0045

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+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.399E+00	0.7022
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	5.933E-01	0.2978
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	1.992E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	5.268E-01	0.3131	5.299E-05	0.0000	6.239E-01	0.3708	1.718E-01	0.1021	0.000E+00	0.0000	0.000E+00	0.0000	7.587E-03	0.0045
Ra-228	2.921E-01	0.1736	5.323E-04	0.0003	1.610E-02	0.0096	4.208E-02	0.0250	0.000E+00	0.0000	0.000E+00	0.0000	1.776E-03	0.0011
Total	8.189E-01	0.4867	5.853E-04	0.0003	6.400E-01	0.3804	2.138E-01	0.1271	0.000E+00	0.0000	0.000E+00	0.0000	9.363E-03	0.0056

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.330E+00	0.7905
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.526E-01	0.2095
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	1.683E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	4.646E-01	0.3600	6.158E-05	0.0000	5.413E-01	0.4194	1.766E-01	0.1368	0.000E+00	0.0000	0.000E+00	0.0000	9.670E-03	0.0075
Ra-228	8.225E-02	0.0637	1.542E-04	0.0001	4.669E-03	0.0036	1.084E-02	0.0084	0.000E+00	0.0000	0.000E+00	0.0000	4.918E-04	0.0004
Total	5.468E-01	0.4237	2.158E-04	0.0002	5.460E-01	0.4231	1.874E-01	0.1452	0.000E+00	0.0000	0.000E+00	0.0000	1.016E-02	0.0079

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+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.192E+00	0.9237
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	9.841E-02	0.0763
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	1.291E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	4.095E-01	0.3772	6.441E-05	0.0001	4.692E-01	0.4322	1.701E-01	0.1567	0.000E+00	0.0000	0.000E+00	0.0000	1.055E-02	0.0097
Ra-228	2.192E-02	0.0202	4.140E-05	0.0000	1.254E-03	0.0012	2.787E-03	0.0026	0.000E+00	0.0000	0.000E+00	0.0000	1.315E-04	0.0001
Total	4.314E-01	0.3974	1.058E-04	0.0001	4.704E-01	0.4334	1.729E-01	0.1593	0.000E+00	0.0000	0.000E+00	0.0000	1.069E-02	0.0098

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.059E+00	0.9759
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	2.613E-02	0.0241
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	1.085E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
Ra-226+D	Ra-226+D	1.000E+00	1.573E+01	1.552E+01	1.531E+01	1.470E+01	1.373E+01	1.197E+01	1.044E+01
Ra-226+D	Pb-210+D	1.000E+00	4.182E-02	1.117E-01	1.766E-01	3.495E-01	5.744E-01	8.444E-01	9.533E-01
Ra-226+D	ädsr(j)		1.577E+01	1.563E+01	1.548E+01	1.504E+01	1.430E+01	1.282E+01	1.139E+01
Ra-228+D	Ra-228+D	1.000E+00	4.887E+00	4.276E+00	3.741E+00	2.506E+00	1.285E+00	3.377E-01	8.872E-02
Ra-228+D	Th-228+D	1.000E+00	9.777E-01	2.352E+00	3.100E+00	3.427E+00	2.241E+00	6.463E-01	1.726E-01
Ra-228+D	ädsr(j)		5.864E+00	6.628E+00	6.841E+00	5.933E+00	3.526E+00	9.841E-01	2.613E-01

The DSR includes contributions from associated (half-life ó 180 days) daughters.

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

Nuclide (i)	t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
Ra-226	1.585E+00	1.600E+00	1.615E+00	1.662E+00	1.748E+00	1.950E+00	2.195E+00
Ra-228	4.263E+00	3.772E+00	3.655E+00	4.214E+00	7.091E+00	2.540E+01	9.568E+01

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 1.692 ñ 0.003 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ra-226	9.300E-02	0.000E+00	1.577E+01	1.585E+00	1.553E+01	1.610E+00
Ra-228	1.000E-01	2.039 ñ 0.004	6.841E+00	3.654E+00	6.820E+00	3.666E+00

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

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ
Ra-226	Ra-226	1.000E+00	1.463E+00	1.443E+00	1.424E+00	1.367E+00	1.277E+00	1.114E+00	9.707E-01
Pb-210	Ra-226	1.000E+00	3.889E-03	1.039E-02	1.642E-02	3.250E-02	5.342E-02	7.853E-02	8.866E-02
Ra-228	Ra-228	1.000E+00	4.887E-01	4.276E-01	3.741E-01	2.506E-01	1.285E-01	3.377E-02	8.872E-03
Th-228	Ra-228	1.000E+00	9.777E-02	2.352E-01	3.100E-01	3.427E-01	2.241E-01	6.463E-02	1.726E-02
ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ

THF(i) is the thread fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ
Ra-226	Ra-226	1.000E+00	9.300E-02	9.187E-02	9.076E-02	8.750E-02	8.233E-02	7.288E-02	6.451E-02
Pb-210	Ra-226	1.000E+00	0.000E+00	2.817E-03	5.492E-03	1.272E-02	2.241E-02	3.496E-02	4.116E-02
Ra-228	Ra-228	1.000E+00	1.000E-01	8.761E-02	7.675E-02	5.161E-02	2.663E-02	7.093E-03	1.889E-03
Th-228	Ra-228	1.000E+00	0.000E+00	2.836E-02	4.458E-02	5.555E-02	3.774E-02	1.106E-02	2.972E-03
ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ

THF(i) is the thread fraction of the parent nuclide.

RESCALC.EXE execution time = 174.55 seconds

Exhibit 3

RESRAD Results- Onsite Well and Vegetables

Part 8

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

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-228 (Source: FGR 12)	5.978E+00	5.978E+00	DCF1(1)
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1(2)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1(3)
A-1	Bi-212 (Source: FGR 12)	1.171E+00	1.171E+00	DCF1(4)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1(5)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(6)
A-1	Pb-212 (Source: FGR 12)	7.043E-01	7.043E-01	DCF1(7)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(8)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(9)
A-1	Po-212 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(10)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1(11)
A-1	Po-216 (Source: FGR 12)	1.042E-04	1.042E-04	DCF1(12)
A-1	Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1(13)
A-1	Ra-224 (Source: FGR 12)	5.119E-02	5.119E-02	DCF1(14)
A-1	Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1(15)
A-1	Ra-228 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(16)
A-1	Rn-220 (Source: FGR 12)	2.298E-03	2.298E-03	DCF1(17)
A-1	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1(18)
A-1	Th-228 (Source: FGR 12)	7.940E-03	7.940E-03	DCF1(19)
A-1	Tl-208 (Source: FGR 12)	2.298E+01	2.298E+01	DCF1(20)
A-1	Tl-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1(21)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.320E-02	1.360E-02	DCF2(1)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(2)
B-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(3)
B-1	Th-228+D	3.454E-01	3.420E-01	DCF2(4)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.276E-03	5.370E-03	DCF3(1)
D-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(2)
D-1	Ra-228+D	1.442E-03	1.440E-03	DCF3(3)
D-1	Th-228+D	8.086E-04	3.960E-04	DCF3(4)
D-34	Food transfer factors:			
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(1,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(1,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(1,3)
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(2,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,3)
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(3,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,3)

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

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(4,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(4,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(2,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(2,2)
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(3,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(3,2)
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(4,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(4,2)

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

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	5.900E+05	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.048E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	4.880E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	4.500E+01	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	2.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	5.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	1.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	2.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+01	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ra-226	1.860E-01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Ra-228	1.680E-01	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.440E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	1.000E+00	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.310E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	9.075E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	4.500E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.763E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	4.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	2.590E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.200E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.550E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+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)	3.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Number of unsaturated zone strata	2	1	---	NS
R015	Unsat. zone 1, thickness (m)	2.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.440E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.500E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	9.075E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	4.310E+01	1.000E+01	---	HCUZ(1)
R015	Unsat. zone 2, thickness (m)	9.700E+00	0.000E+00	---	H(2)
R015	Unsat. zone 2, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(2)
R015	Unsat. zone 2, total porosity	4.000E-01	4.000E-01	---	TPUZ(2)
R015	Unsat. zone 2, effective porosity	3.200E-01	2.000E-01	---	EPUZ(2)
R015	Unsat. zone 2, field capacity	2.000E-01	2.000E-01	---	FCUZ(2)
R015	Unsat. zone 2, soil-specific b parameter	4.050E+00	5.300E+00	---	BUZ(2)
R015	Unsat. zone 2, hydraulic conductivity (m/yr)	5.550E+03	1.000E+01	---	HCUZ(2)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(2,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(2,2)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.176E-02	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,2)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.176E-02	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(1,1)
R016	Unsaturated zone 2 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(1,2)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.242E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(4,1)
R016	Unsaturated zone 2 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(4,2)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.378E-05	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	7.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	-1.000E+00	1.000E+00	-1 shows non-circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	5.467E+01	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	1.093E+02	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	1.640E+02	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	2.187E+02	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	2.733E+02	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	3.280E+02	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	3.827E+02	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	4.373E+02	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	4.920E+02	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	5.467E+02	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	6.013E+02	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	6.560E+02	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	1.000E+00	1.000E+00	---	FRACA(1)
R017	Ring 2	1.000E+00	2.732E-01	---	FRACA(2)
R017	Ring 3	1.000E+00	0.000E+00	---	FRACA(3)
R017	Ring 4	1.000E+00	0.000E+00	---	FRACA(4)
R017	Ring 5	8.900E-01	0.000E+00	---	FRACA(5)
R017	Ring 6	6.000E-01	0.000E+00	---	FRACA(6)
R017	Ring 7	4.900E-01	0.000E+00	---	FRACA(7)
R017	Ring 8	4.100E-01	0.000E+00	---	FRACA(8)
R017	Ring 9	3.500E-01	0.000E+00	---	FRACA(9)
R017	Ring 10	3.100E-01	0.000E+00	---	FRACA(10)
R017	Ring 11	2.800E-01	0.000E+00	---	FRACA(11)
R017	Ring 12	7.900E-02	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	1.000E+00	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	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	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	1.016E-01	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	2.403E+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	2.000E-06	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	3.000E-01	5.000E-01	---	REXG
R021	Height of the building (room) (m)	2.500E+00	2.500E+00	---	HRM
R021	Building interior area factor	8.000E-02	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	-1.000E+00	-1.000E+00	code computed (time dependent)	DMFL
R021	Emanating power of Rn-222 gas	2.500E-01	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	1.500E-01	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	513	---	---	KYMAX

Summary of Pathway Selections

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

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	590000.00 square meters	Ra-226	1.860E-01
Thickness:	0.30 meters	Ra-228	1.680E-01
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
TDOSE(t):	3.918E+00	4.020E+00	4.029E+00	3.795E+00	3.253E+00	2.550E+00	2.163E+00
M(t):	1.567E-01	1.608E-01	1.612E-01	1.518E-01	1.301E-01	1.020E-01	8.650E-02

Maximum TDOSE(t): 4.034E+00 mrem/yr at t = 1.623 ñ 0.003 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.623E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Nuclide														
Ra-226	1.170E+00	0.2901	7.794E-05	0.0003	1.404E+00	0.3481	3.064E-01	0.0759	0.000E+00	0.0000	0.000E+00	0.0000	8.867E-03	0.0022
Ra-228	8.840E-01	0.2191	1.157E-03	0.0003	3.452E-02	0.0086	2.177E-01	0.0540	0.000E+00	0.0000	0.000E+00	0.0000	6.709E-03	0.0017
Total	2.054E+00	0.5092	1.235E-03	0.0003	1.439E+00	0.3567	5.241E-01	0.1299	0.000E+00	0.0000	0.000E+00	0.0000	1.558E-02	0.0039

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.623E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Nuclide														
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	2.890E+00	0.7164
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	1.144E+00	0.2836
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.034E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.194E+00	0.3048	7.059E-05	0.0000	1.437E+00	0.3667	2.947E-01	0.0752	0.000E+00	0.0000	0.000E+00	0.0000	7.251E-03	0.0019
Ra-228	6.970E-01	0.1779	4.153E-04	0.0001	1.165E-02	0.0030	2.694E-01	0.0687	0.000E+00	0.0000	0.000E+00	0.0000	6.785E-03	0.0017
Total	1.891E+00	0.4827	4.859E-04	0.0001	1.449E+00	0.3697	5.640E-01	0.1439	0.000E+00	0.0000	0.000E+00	0.0000	1.404E-02	0.0036

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	2.933E+00	0.7486
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	9.852E-01	0.2514
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.918E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.179E+00	0.2934	7.520E-05	0.0000	1.417E+00	0.3524	3.022E-01	0.0752	0.000E+00	0.0000	0.000E+00	0.0000	8.264E-03	0.0021
Ra-228	8.411E-01	0.2092	9.526E-04	0.0002	2.820E-02	0.0070	2.364E-01	0.0588	0.000E+00	0.0000	0.000E+00	0.0000	6.829E-03	0.0017
Total	2.020E+00	0.5026	1.028E-03	0.0003	1.445E+00	0.3594	5.386E-01	0.1340	0.000E+00	0.0000	0.000E+00	0.0000	1.509E-02	0.0038

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	2.907E+00	0.7230
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	1.113E+00	0.2770
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.020E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.165E+00	0.2891	7.954E-05	0.0000	1.397E+00	0.3467	3.088E-01	0.0766	0.000E+00	0.0000	0.000E+00	0.0000	9.222E-03	0.0023
Ra-228	8.971E-01	0.2226	1.244E-03	0.0003	3.723E-02	0.0092	2.071E-01	0.0514	0.000E+00	0.0000	0.000E+00	0.0000	6.598E-03	0.0016
Total	2.062E+00	0.5117	1.324E-03	0.0003	1.434E+00	0.3560	5.159E-01	0.1280	0.000E+00	0.0000	0.000E+00	0.0000	1.582E-02	0.0039

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+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	2.880E+00	0.7148
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	1.149E+00	0.2852
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.029E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.122E+00	0.2956	9.109E-05	0.0000	1.339E+00	0.3529	3.254E-01	0.0858	0.000E+00	0.0000	0.000E+00	0.0000	1.179E-02	0.0031
Ra-228	8.101E-01	0.2135	1.368E-03	0.0004	4.126E-02	0.0109	1.387E-01	0.0366	0.000E+00	0.0000	0.000E+00	0.0000	5.234E-03	0.0014
Total	1.932E+00	0.5091	1.459E-03	0.0004	1.380E+00	0.3637	4.642E-01	0.1223	0.000E+00	0.0000	0.000E+00	0.0000	1.702E-02	0.0045

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+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	2.798E+00	0.7374
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	9.967E-01	0.2626
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.795E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.054E+00	0.3239	1.060E-04	0.0000	1.248E+00	0.3836	3.435E-01	0.1056	0.000E+00	0.0000	0.000E+00	0.0000	1.517E-02	0.0047
Ra-228	4.907E-01	0.1509	8.942E-04	0.0003	2.705E-02	0.0083	7.069E-02	0.0217	0.000E+00	0.0000	0.000E+00	0.0000	2.984E-03	0.0009
Total	1.544E+00	0.4748	1.000E-03	0.0003	1.275E+00	0.3920	4.142E-01	0.1273	0.000E+00	0.0000	0.000E+00	0.0000	1.816E-02	0.0056

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	2.660E+00	0.8179
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	5.923E-01	0.1821
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.253E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	9.291E-01	0.3644	1.232E-04	0.0000	1.083E+00	0.4246	3.531E-01	0.1385	0.000E+00	0.0000	0.000E+00	0.0000	1.934E-02	0.0076
Ra-228	1.382E-01	0.0542	2.591E-04	0.0001	7.844E-03	0.0031	1.822E-02	0.0071	0.000E+00	0.0000	0.000E+00	0.0000	8.262E-04	0.0003
Total	1.067E+00	0.4186	3.822E-04	0.0001	1.090E+00	0.4277	3.713E-01	0.1456	0.000E+00	0.0000	0.000E+00	0.0000	2.017E-02	0.0079

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+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	2.384E+00	0.9352
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	1.653E-01	0.0648
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.550E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	8.189E-01	0.3787	1.288E-04	0.0001	9.383E-01	0.4339	3.402E-01	0.1573	0.000E+00	0.0000	0.000E+00	0.0000	2.111E-02	0.0098
Ra-228	3.682E-02	0.0170	6.955E-05	0.0000	2.106E-03	0.0010	4.682E-03	0.0022	0.000E+00	0.0000	0.000E+00	0.0000	2.209E-04	0.0001
Total	8.557E-01	0.3957	1.984E-04	0.0001	9.405E-01	0.4349	3.449E-01	0.1595	0.000E+00	0.0000	0.000E+00	0.0000	2.133E-02	0.0099

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	2.119E+00	0.9797
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	4.390E-02	0.0203
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.163E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : Joliet City

File : H:\HOME\400001 HEALTH PHYSICS\JOLIET\RESRAD\JOLIET.RAD

Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
Ra-226+D	Ra-226+D	1.000E+00	1.573E+01	1.552E+01	1.531E+01	1.470E+01	1.373E+01	1.197E+01	1.044E+01
Ra-226+D	Pb-210+D	1.000E+00	4.182E-02	1.117E-01	1.766E-01	3.495E-01	5.744E-01	8.444E-01	9.533E-01
Ra-226+D	ãDSR(j)		1.577E+01	1.563E+01	1.548E+01	1.504E+01	1.430E+01	1.282E+01	1.139E+01
Ra-228+D	Ra-228+D	1.000E+00	4.887E+00	4.276E+00	3.741E+00	2.506E+00	1.285E+00	3.377E-01	8.872E-02
Ra-228+D	Th-228+D	1.000E+00	9.777E-01	2.352E+00	3.100E+00	3.427E+00	2.241E+00	6.463E-01	1.726E-01
Ra-228+D	ãDSR(j)		5.864E+00	6.628E+00	6.841E+00	5.933E+00	3.526E+00	9.841E-01	2.613E-01

The DSR includes contributions from associated (half-life ó 180 days) daughters.

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

Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
Ra-226	1.585E+00	1.600E+00	1.615E+00	1.662E+00	1.748E+00	1.950E+00	2.195E+00
Ra-228	4.263E+00	3.772E+00	3.655E+00	4.214E+00	7.091E+00	2.540E+01	9.568E+01

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

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

at tmin = time of minimum single radionuclide soil guideline

and at tmax = time of maximum total dose = 1.623 ñ 0.003 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ra-226	1.860E-01	0.000E+00	1.577E+01	1.585E+00	1.554E+01	1.609E+00
Ra-228	1.680E-01	2.039 ñ 0.004	6.841E+00	3.654E+00	6.810E+00	3.671E+00

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

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ
Ra-226	Ra-226	1.000E+00	2.925E+00	2.886E+00	2.847E+00	2.733E+00	2.553E+00	2.227E+00	1.941E+00
Pb-210	Ra-226	1.000E+00	7.778E-03	2.077E-02	3.284E-02	6.501E-02	1.068E-01	1.571E-01	1.773E-01
Ra-228	Ra-228	1.000E+00	8.209E-01	7.183E-01	6.285E-01	4.210E-01	2.159E-01	5.674E-02	1.491E-02
Th-228	Ra-228	1.000E+00	1.643E-01	3.952E-01	5.207E-01	5.757E-01	3.764E-01	1.086E-01	2.899E-02
ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ

THF(i) is the thread fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ
Ra-226	Ra-226	1.000E+00	1.860E-01	1.837E-01	1.815E-01	1.750E-01	1.647E-01	1.458E-01	1.290E-01
Pb-210	Ra-226	1.000E+00	0.000E+00	5.635E-03	1.098E-02	2.543E-02	4.482E-02	6.993E-02	8.231E-02
Ra-228	Ra-228	1.000E+00	1.680E-01	1.472E-01	1.289E-01	8.670E-02	4.474E-02	1.192E-02	3.173E-03
Th-228	Ra-228	1.000E+00	0.000E+00	4.764E-02	7.489E-02	9.333E-02	6.341E-02	1.858E-02	4.993E-03
ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ

THF(i) is the thread fraction of the parent nuclide.

RESCALC.EXE execution time = 176.81 seconds

Exhibit 3

RESRAD Results- Onsite Well and Vegetables

Part 9

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

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-228 (Source: FGR 12)	5.978E+00	5.978E+00	DCF1(1)
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1(2)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1(3)
A-1	Bi-212 (Source: FGR 12)	1.171E+00	1.171E+00	DCF1(4)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1(5)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(6)
A-1	Pb-212 (Source: FGR 12)	7.043E-01	7.043E-01	DCF1(7)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(8)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(9)
A-1	Po-212 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(10)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1(11)
A-1	Po-216 (Source: FGR 12)	1.042E-04	1.042E-04	DCF1(12)
A-1	Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1(13)
A-1	Ra-224 (Source: FGR 12)	5.119E-02	5.119E-02	DCF1(14)
A-1	Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1(15)
A-1	Ra-228 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(16)
A-1	Rn-220 (Source: FGR 12)	2.298E-03	2.298E-03	DCF1(17)
A-1	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1(18)
A-1	Th-228 (Source: FGR 12)	7.940E-03	7.940E-03	DCF1(19)
A-1	Tl-208 (Source: FGR 12)	2.298E+01	2.298E+01	DCF1(20)
A-1	Tl-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1(21)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.320E-02	1.360E-02	DCF2(1)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(2)
B-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(3)
B-1	Th-228+D	3.454E-01	3.420E-01	DCF2(4)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.276E-03	5.370E-03	DCF3(1)
D-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(2)
D-1	Ra-228+D	1.442E-03	1.440E-03	DCF3(3)
D-1	Th-228+D	8.086E-04	3.960E-04	DCF3(4)
D-34	Food transfer factors:			
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(1,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(1,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(1,3)
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(2,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,3)
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(3,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,3)

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

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(4,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(4,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(2,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(2,2)
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(3,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(3,2)
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(4,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(4,2)

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

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	5.900E+05	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.048E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	4.880E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	4.500E+01	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	2.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	5.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	1.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	2.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+01	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ra-226	3.410E-01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Ra-228	2.040E-01	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.440E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	1.000E+00	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.310E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	9.075E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	4.500E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	8.763E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	4.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	2.590E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.200E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.550E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+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)	3.000E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Number of unsaturated zone strata	2	1	---	NS
R015	Unsat. zone 1, thickness (m)	2.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.440E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.500E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	9.075E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	4.310E+01	1.000E+01	---	HCUZ(1)
R015	Unsat. zone 2, thickness (m)	9.700E+00	0.000E+00	---	H(2)
R015	Unsat. zone 2, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(2)
R015	Unsat. zone 2, total porosity	4.000E-01	4.000E-01	---	TPUZ(2)
R015	Unsat. zone 2, effective porosity	3.200E-01	2.000E-01	---	EPUZ(2)
R015	Unsat. zone 2, field capacity	2.000E-01	2.000E-01	---	FCUZ(2)
R015	Unsat. zone 2, soil-specific b parameter	4.050E+00	5.300E+00	---	BUZ(2)
R015	Unsat. zone 2, hydraulic conductivity (m/yr)	5.550E+03	1.000E+01	---	HCUZ(2)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(2,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(2,2)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.176E-02	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,2)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.176E-02	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(1,1)
R016	Unsaturated zone 2 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(1,2)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.242E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(4,1)
R016	Unsaturated zone 2 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(4,2)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.378E-05	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	7.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	-1.000E+00	1.000E+00	-1 shows non-circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	5.467E+01	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	1.093E+02	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	1.640E+02	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	2.187E+02	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	2.733E+02	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	3.280E+02	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	3.827E+02	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	4.373E+02	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	4.920E+02	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	5.467E+02	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	6.013E+02	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	6.560E+02	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	1.000E+00	1.000E+00	---	FRACA(1)
R017	Ring 2	1.000E+00	2.732E-01	---	FRACA(2)
R017	Ring 3	1.000E+00	0.000E+00	---	FRACA(3)
R017	Ring 4	1.000E+00	0.000E+00	---	FRACA(4)
R017	Ring 5	8.900E-01	0.000E+00	---	FRACA(5)
R017	Ring 6	6.000E-01	0.000E+00	---	FRACA(6)
R017	Ring 7	4.900E-01	0.000E+00	---	FRACA(7)
R017	Ring 8	4.100E-01	0.000E+00	---	FRACA(8)
R017	Ring 9	3.500E-01	0.000E+00	---	FRACA(9)
R017	Ring 10	3.100E-01	0.000E+00	---	FRACA(10)
R017	Ring 11	2.800E-01	0.000E+00	---	FRACA(11)
R017	Ring 12	7.900E-02	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	1.000E+00	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	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	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	1.016E-01	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	2.403E+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	2.000E-06	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	3.000E-01	5.000E-01	---	REXG
R021	Height of the building (room) (m)	2.500E+00	2.500E+00	---	HRM
R021	Building interior area factor	8.000E-02	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	-1.000E+00	-1.000E+00	code computed (time dependent)	DMFL
R021	Emanating power of Rn-222 gas	2.500E-01	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	1.500E-01	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	513	---	---	KYMAX

Summary of Pathway Selections

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

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	590000.00 square meters	Ra-226	3.410E-01
Thickness:	0.30 meters	Ra-228	2.040E-01
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
TDOSE(t):	6.574E+00	6.681E+00	6.675E+00	6.341E+00	5.596E+00	4.572E+00	3.938E+00
M(t):	2.630E-01	2.672E-01	2.670E-01	2.536E-01	2.239E-01	1.829E-01	1.575E-01

Maximum TDOSE(t): 6.690E+00 mrem/yr at t = 1.419 ñ 0.003 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.419E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Nuclide														
Ra-226	2.151E+00	0.3215	1.413E-04	0.0000	2.582E+00	0.3860	5.592E-01	0.0836	0.000E+00	0.0000	0.000E+00	0.0000	1.590E-02	0.0024
Ra-228	1.060E+00	0.1585	1.335E-03	0.0002	3.974E-02	0.0059	2.716E-01	0.0406	0.000E+00	0.0000	0.000E+00	0.0000	8.206E-03	0.0012
Total	3.211E+00	0.4800	1.476E-03	0.0002	2.622E+00	0.3920	8.308E-01	0.1242	0.000E+00	0.0000	0.000E+00	0.0000	2.410E-02	0.0036

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.419E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Nuclide														
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.308E+00	0.7935
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	1.381E+00	0.2065
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.690E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	2.189E+00	0.3331	1.294E-04	0.0000	2.634E+00	0.4007	5.402E-01	0.0822	0.000E+00	0.0000	0.000E+00	0.0000	1.329E-02	0.0020
Ra-228	8.463E-01	0.1287	5.043E-04	0.0001	1.415E-02	0.0022	3.271E-01	0.0498	0.000E+00	0.0000	0.000E+00	0.0000	8.239E-03	0.0013
Total	3.036E+00	0.4618	6.337E-04	0.0001	2.648E+00	0.4029	8.673E-01	0.1319	0.000E+00	0.0000	0.000E+00	0.0000	2.153E-02	0.0033

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.377E+00	0.8180
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	1.196E+00	0.1820
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.574E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	2.162E+00	0.3236	1.379E-04	0.0000	2.598E+00	0.3888	5.540E-01	0.0829	0.000E+00	0.0000	0.000E+00	0.0000	1.515E-02	0.0023
Ra-228	1.021E+00	0.1529	1.157E-03	0.0002	3.424E-02	0.0051	2.871E-01	0.0430	0.000E+00	0.0000	0.000E+00	0.0000	8.292E-03	0.0012
Total	3.184E+00	0.4765	1.295E-03	0.0002	2.632E+00	0.3939	8.410E-01	0.1259	0.000E+00	0.0000	0.000E+00	0.0000	2.344E-02	0.0035

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.329E+00	0.7976
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	1.352E+00	0.2024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.681E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	2.135E+00	0.3199	1.458E-04	0.0000	2.561E+00	0.3837	5.662E-01	0.0848	0.000E+00	0.0000	0.000E+00	0.0000	1.691E-02	0.0025
Ra-228	1.089E+00	0.1632	1.511E-03	0.0002	4.521E-02	0.0068	2.515E-01	0.0377	0.000E+00	0.0000	0.000E+00	0.0000	8.012E-03	0.0012
Total	3.225E+00	0.4831	1.657E-03	0.0002	2.606E+00	0.3905	8.176E-01	0.1225	0.000E+00	0.0000	0.000E+00	0.0000	2.492E-02	0.0037

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+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.280E+00	0.7909
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	1.396E+00	0.2091
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.675E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	2.057E+00	0.3244	1.670E-04	0.0000	2.455E+00	0.3872	5.966E-01	0.0941	0.000E+00	0.0000	0.000E+00	0.0000	2.161E-02	0.0034
Ra-228	9.837E-01	0.1552	1.661E-03	0.0003	5.010E-02	0.0079	1.684E-01	0.0266	0.000E+00	0.0000	0.000E+00	0.0000	6.356E-03	0.0010
Total	3.040E+00	0.4795	1.828E-03	0.0003	2.505E+00	0.3951	7.651E-01	0.1207	0.000E+00	0.0000	0.000E+00	0.0000	2.797E-02	0.0044

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+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.130E+00	0.8091
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	1.210E+00	0.1909
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.341E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio-	ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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Ra-226	1.932E+00	0.3452	1.943E-04	0.0000	2.288E+00	0.4088	6.298E-01	0.1125	0.000E+00	0.0000	0.000E+00	0.0000	2.782E-02	0.0050
Ra-228	5.958E-01	0.1065	1.086E-03	0.0002	3.285E-02	0.0059	8.583E-02	0.0153	0.000E+00	0.0000	0.000E+00	0.0000	3.624E-03	0.0006
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Total	2.528E+00	0.4516	1.280E-03	0.0002	2.321E+00	0.4146	7.156E-01	0.1279	0.000E+00	0.0000	0.000E+00	0.0000	3.144E-02	0.0056

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

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-	ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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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	4.877E+00	0.8715
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.192E-01	0.1285
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Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.596E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.703E+00	0.3726	2.258E-04	0.0000	1.985E+00	0.4341	6.474E-01	0.1416	0.000E+00	0.0000	0.000E+00	0.0000	3.546E-02	0.0078
Ra-228	1.678E-01	0.0367	3.146E-04	0.0001	9.525E-03	0.0021	2.212E-02	0.0048	0.000E+00	0.0000	0.000E+00	0.0000	1.003E-03	0.0002
Total	1.871E+00	0.4093	5.404E-04	0.0001	1.994E+00	0.4362	6.695E-01	0.1464	0.000E+00	0.0000	0.000E+00	0.0000	3.646E-02	0.0080

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+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	4.371E+00	0.9561
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	2.007E-01	0.0439
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.572E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	1.501E+00	0.3813	2.362E-04	0.0001	1.720E+00	0.4369	6.238E-01	0.1584	0.000E+00	0.0000	0.000E+00	0.0000	3.870E-02	0.0098
Ra-228	4.471E-02	0.0114	8.446E-05	0.0000	2.557E-03	0.0006	5.685E-03	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	2.682E-04	0.0001
Total	1.546E+00	0.3926	3.206E-04	0.0001	1.723E+00	0.4375	6.295E-01	0.1599	0.000E+00	0.0000	0.000E+00	0.0000	3.897E-02	0.0099

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-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	3.884E+00	0.9865
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	5.330E-02	0.0135
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.938E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
Ra-226+D	Ra-226+D	1.000E+00	1.573E+01	1.552E+01	1.531E+01	1.470E+01	1.373E+01	1.197E+01	1.044E+01
Ra-226+D	Pb-210+D	1.000E+00	4.182E-02	1.117E-01	1.766E-01	3.495E-01	5.744E-01	8.444E-01	9.533E-01
Ra-226+D	ãDSR(j)		1.577E+01	1.563E+01	1.548E+01	1.504E+01	1.430E+01	1.282E+01	1.139E+01
Ra-228+D	Ra-228+D	1.000E+00	4.887E+00	4.276E+00	3.741E+00	2.506E+00	1.285E+00	3.377E-01	8.872E-02
Ra-228+D	Th-228+D	1.000E+00	9.777E-01	2.352E+00	3.100E+00	3.427E+00	2.241E+00	6.463E-01	1.726E-01
Ra-228+D	ãDSR(j)		5.864E+00	6.628E+00	6.841E+00	5.933E+00	3.526E+00	9.841E-01	2.613E-01

The DSR includes contributions from associated (half-life ó 180 days) daughters.

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

Nuclide (i)	t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
Ra-226	1.585E+00	1.600E+00	1.615E+00	1.662E+00	1.748E+00	1.950E+00	2.195E+00
Ra-228	4.263E+00	3.772E+00	3.655E+00	4.214E+00	7.091E+00	2.540E+01	9.568E+01

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 1.419 ñ 0.003 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ra-226	3.410E-01	0.000E+00	1.577E+01	1.585E+00	1.557E+01	1.606E+00
Ra-228	2.040E-01	2.039 ñ 0.004	6.841E+00	3.654E+00	6.770E+00	3.693E+00

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

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
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Ra-226	Ra-226	1.000E+00	5.363E+00	5.291E+00	5.220E+00	5.011E+00	4.681E+00	4.083E+00	3.559E+00
Pb-210	Ra-226	1.000E+00	1.426E-02	3.808E-02	6.021E-02	1.192E-01	1.959E-01	2.879E-01	3.251E-01
Ra-228	Ra-228	1.000E+00	9.969E-01	8.722E-01	7.632E-01	5.112E-01	2.621E-01	6.890E-02	1.810E-02
Th-228	Ra-228	1.000E+00	1.994E-01	4.798E-01	6.323E-01	6.991E-01	4.571E-01	1.319E-01	3.520E-02
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THF(i) is the thread fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	2.000E+00	5.000E+00	1.000E+01	2.000E+01	3.000E+01
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Ra-226	Ra-226	1.000E+00	3.410E-01	3.369E-01	3.328E-01	3.208E-01	3.019E-01	2.672E-01	2.365E-01
Pb-210	Ra-226	1.000E+00	0.000E+00	1.033E-02	2.014E-02	4.663E-02	8.217E-02	1.282E-01	1.509E-01
Ra-228	Ra-228	1.000E+00	2.040E-01	1.787E-01	1.566E-01	1.053E-01	5.433E-02	1.447E-02	3.853E-03
Th-228	Ra-228	1.000E+00	0.000E+00	5.785E-02	9.094E-02	1.133E-01	7.700E-02	2.256E-02	6.063E-03
ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ

THF(i) is the thread fraction of the parent nuclide.

RESCALC.EXE execution time = 172.59 seconds