Table I1
RESRAD Input Parameters - Assuming Subsistence Farmer Receptor

RESRAD Menu	Parameter	Definition and/or General Information	Default	Subsistence Farmer Scenario	Parameter Name	Parameter Justification (R# = See footnote for reference number)
Contaminated Zone	Area of contaminated zone (m^2)	Area in which contains all the soils samples with radionuclide concentrations that are clearly (2 standard deviations) above background. This area is assumed to be circular for modeling purposes.	1.0E+04	2.0E+04	AREA	Approximate area of site that had impacted material removed.
	Thickness of contaminated zone (meters)	Thickness of the area considered to be the contaminated zone.	2.0E+00	4.0E-01	THICK0	The thickness of contaminated zone is assumed to be 6 inches (0.15 meters)
	Length parallel to aquifer flow (m)	This length is the distance between two parallel lines that are perpendicular to the direction of aquifer flow, one at the upgradient edge of the contaminated zone, the other at the downgradient edge.	1.0E+02	1.0E+02	LCZPAQ	The square root of 20,000 square meters was used in absence of site specific data. Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when this value is changed.
Soil Concentrations	Basic radiation dose limit (mrem/yr)	NRC guideline of 25 mrem/yr	2.5E+01	1.5E+01	BRDL	NRC guideline of 25 mrem/yr
	Time since placement of material (yr)	This is the elapsed time, in years, between the placement of radioactive materials on-site and the performance of radiological survey. It is possible that on-site radioactive materials originated from different sources and have different placement times	0.0E+00	1.0E+00	TI	R3 explains that when radiological surveys are used to derive soil guideline information such as soil/water distribution coefficients, soil radionuclide concentrations and so forth, the elapsed time of waste placement is considered zero.
Calculation Times	Times for calculations (yr)	NA	1.0E+00	1.0E+00	T(2)	NA
	Times for calculations (yr)	NA	3.0E+00	6.0E+00	T(3)	NA
	Times for calculations (yr)	NA	1.0E+01	1.0E+01	T(4)	NA
	Times for calculations (yr)	NA	3.0E+01	2.4E+01	T(5)	NA
	Times for calculations (yr)	NA	1.0E+02	3.0E+01	T(6)	NA
	Times for calculations (yr)	NA	3.0E+02	7.0E+01	T(7)	NA
	Times for calculations (yr)		1.0E+03	1.0E+03	T(8)	NA
	Times for calculations (yr)	NA	0.0E+00	1.0E+04	T(9)	NA
Soil Concentrations	Initial principal radionuclide (pCi/g):	A principal radionuclide is one with a half-life longer than one-half year.				
	Ra-226		0.0E+00	2.44E+00	S1()	RESRAD takes into account progeny.
	Ra-228		0.0E+00	1.00E-03	S1()	RESRAD takes into account progeny.
	Th-228		0.0E+00	1.00E-03	S1()	RESRAD takes into account progeny.
	Th-230		0.0E+00	2.37E+00	S1()	RESRAD takes into account progeny.
	Th-232		0.0E+00	1.00E-03	S1()	RESRAD takes into account progeny.
	U-234		0.0E+00	1.18E+00	S1()	RESRAD takes into account progeny.
	U-235		0.0E+00	6.80E-02	S1()	RESRAD takes into account progeny.
	U-238		0.0E+00	1.52E+00	S1()	RESRAD takes into account progeny.
Cover/Hydrology	Cover depth (m)	The cover depth is the distance from the ground surface to the location of the uppermost soil sample with radionuclide concentrations that are clearly above background.	0.0E+00	0.0E+00	COVER0	No cover used.
	Density of cover material (g/cm^3)	The density is the ratio of the mass of a material to its volume.	1.5E+00	not used	DENSCV	NA
	Cover depth erosion rate (m/yr)	The cover depth erosion rate is the rate at which soil is removed by erosion. Appendix A of R1 has values 6.0E 04 for a 2% slope that can be used in a farming scenario and 6.0E-05 for a 2% slope that can be used for a non-farming scenario. This value ca	1.0E-03	not used	VCV	NA

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RESRAD Menu	Parameter	Definition and/or General Information	Default	Subsistence Farmer Scenario	Parameter Name	Parameter Justification (R# = See footnote for reference number)
	Density of contaminated zone (g/cm^3)	The density is the ratio of the mass of a material to its volume.	1.5E+00	1.75E+00	DENSCZ	Typical density of soil material.
	Contaminated zone erosion rate (m/yr)	The contaminated erosion rate is the rate at which soil is removed by erosion. This parameter is only in effect when the cover depth equals zero. Appendix A of R1 has a value of 6.0E-04 for a 2% slope that can be used in a farming scenario and 6.0E-05 f	1.0E-03	2.5E-04	VCZ	A site specific rate was estimated from existing soils.
	Contaminated zone total porosity	Total porosity of a porous medium is the ratio of the pore volume to the total volume of a representative sample. Porosity values are listed in Table E.8 of the R1 and Table 3.1 & 3.2 of R3.	4.0E-01	4.5E-01	TPCZ	A site specific porosity was estimated from geotechnical testing.
	Contaminated zone field capacity	Effective porosity of a porous medium is the ratio of the part of the pore volume where water can circulate to the total volume of a representative sample. Effective porosity should not be greater than total porosity. Porosity values are listed in Table	2.0E-01	2.5E-01	FCCZ	A site specific field capacity was estimated from geotechnical testing.
	Contaminated zone hydraulic conductivity (m/yr)	This value reflects the rate at which groundwater will move through soil. Table E.2 of R1 lists values.	1.0E+01	5.0E+01	HCCZ	A site specific hydraulic conductivity was estimated from existing soils.
	Contaminated zone b parameter	The b parameter is a hydrological parameter used to evaluate the saturation ratio. Values are listed in Table E.2 of R1.	5.3E+00	1.05E+01	BCZ	A site specific constant was estimated from existing soils types.
	Average annual wind speed (m/sec)	The average annual wind speed is the overall average of the wind speed, measured near the surface in a one year period.	2.0E+00	4.0E+00	WIND	Determined from local weather information.
	Humidity in air (g/cm^3)	This parameter is only relevant to the Tritium model	8.0E+00	not used	HUMID	NA - This parameter is only used when Tritium (H-3) is a principal radionuclide.
	Evapotranspiration coefficient	The evapotranspiration coefficient represents the total volume of water that changes phase, that is, from the liquid or solid state to the gaseous state, near the ground surface and is transferred to the atmosphere during a fixed period of time. R3 Figur	5.0E-01	8.0E-01	EVAPTR	Determined from local weather information.
	Precipitation (m/yr)	The precipitation rate is the average volume of water in the form of rain, snow, hail, or sleet that falls per unit of area and per unit of time at the site according to Section 9 of R3.	1.0E+00	3.8E-01	PRECIP	Determined from local weather information.
	Irrigation (m/yr)	The irrigation rate is the amount of water that is added to the soil at the site as a artificial water supply in order to permit agricultural use of the land. (Section 11, R3 & Page E-6, R1). From R1, the default value for a humid region is 0.2 m/yr where	2.0E-01	1.5E+00	RI	Determined from local weather conditions.
	Irrigation mode	No info available.	overhead	overhead	IDITCH	Typical irrigation mode for this area.
	Runoff coefficient	Runoff coefficient is the fraction of the average annual precipitation that does not infiltrate into the soil and is not transferred back into the atmosphere through evapotranspiration. Values are found in Table E.1 of R1 and Table 10.1 of R3.	2.0E-01	6.5E-01	RUNOFF	Estimated from site conditions.
	Watershed area for nearby stream or pond (m^2)	The watershed is a region contoured by an imaginary line connecting ridges or summits of high land and drained by or draining into a river, river system, or a body of water.	1.0E+06	1.0E+05	WAREA	Estimated from nearby drainage basin.
	Accuracy for water/soil computations	No information available	1.0E-03	1.0E-03	EPS	NA

Table I1
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RESRAD Menu	Parameter	Definition and/or General Information	Default	Subsistence Farmer Scenario	Parameter Name	Parameter Justification (R# = See footnote for reference number)
Saturated Zone	Density of saturated zone (g/cm^3)	The density is the ratio of the mass of a material to its volume. The saturated zone is the layer of the uncontaminated zone that lies below the contaminated zone and the unsaturated zone but within the water table. Typical values of Dry Density are fou	1.5E+00	1.75E+00	DENSAQ	A site specific density was estimated from geotechnical testing.
	Saturated zone total porosity	Total porosity of a porous medium is the ratio of the pore volume to the total volume of a representative sample. Porosity values are listed in Table E.8 of R1 and Table 3.1 & 3.2 of R3.	4.0E-01	3.8E-01	TPSZ	A site specific porosity was estimated from geotechnical testing.
	Saturated zone effective porosity	Effective porosity of a porous medium is the ratio of the part of the pore volume where water can circulate to the total volume of a representative sample. Effective porosity should not be greater than total porosity. Porosity values are listed in Table	2.0E-01	3.3E-01	EPSZ	A site specific porosity was estimated from geotechnical testing.
	Saturated zone field capacity	Field capacity is the volumetric moisture content of soil at which (free) gravity drainage ceases. This is the amount of moisture that will be retained in a column of soil against the force of gravity. The field capacity is used as the lower bound of th	2.0E-01	1.2E-01	FCSZ	A site specific field capacity was estimated from geotechnical testing.
	Saturated zone hydraulic conductivity (m/yr)	Hydraulic conductivity is the measure of the soil's ability to transmit water when submitted to a hydraulic gradient. Values are shown in Table E.2 of R1 and Tables 5.1 & 5.2 of R3.	1.0E+02	5.0E+02	HCSZ	A site specific hydraulic conductivity was estimated from geotechnical testing and soil types.
	Saturated zone hydraulic gradient	The hydraulic gradient is the change in hydraulic head per unit of distance of the groundwater flow in a given direction.	2.0E-02	8.0E-02	HGWT	A site specific hydraulic gradient was estimated from geotechnical testing and soil types.
	Saturated zone b parameter	The b parameter is a hydrological parameter used to evaluate the saturation ratio. Values are listed in Table E.2 of R1.	5.3E+00	4.5E+00	BSZ	A site specific constant was estimated from geotechnical testing and soil types.
	Water table drop rate (m/yr)	The water table drop rate is the rate at which the depth of the water table is lowered.	1.0E-03	1.0E-04	VWT	Estimated assuming the influence of the nearby Clear Creek alluvial system.
	Well pump intake depth (m below water table)	According to R3, the well-pump intake depth is the screened depth of a well within the aquifer (the saturated zone).	1.0E+01	2.0E+00	DWIBWT	Estimated value from characteristics of local aquifer.
	Model: Nondispersion (ND) or Mass-Balance (MB)	The choice of ND (non-dispersion) or MB (mass balance) selects which of two models used for water/soil concentration ratio calculations. Selecting 0 uses the ND model where selecting 1 uses the MB model. The MB model is not recommended for contaminated z	ND	ND	MODEL	Non-dispersion option was selected since area > 1,000 m2
	Well pumping rate (m^3/yr)	The well pumping rate is the total volume of water obtained annually from the well for use by humans and livestock. R5 Table 6.87 states that 118,000 L is the volume of water used for domestic purposes	2.5E+02	2.5E+02	UW	The default value was used. Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when this value is changed.
Unsaturated	Number of unsaturated zone strata	Number of unsaturated zones used in the model.	1.0E+00	2.0E+00	NS	The default value was used. Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when this value is changed.
	Unsat. zone 1, thickness (m)	The unsaturated zone #1 is the 1st layer of the uncontaminated zone that lies below the contaminated zone and above the saturated zone.	4.0E+00	1.0E+00	H(1)	The default value was used. Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when this value is changed.

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RESRAD Input Parameters - Assuming Subsistence Farmer Receptor

RESRAD Menu	Parameter	Definition and/or General Information	Default	Subsistence Farmer Scenario	Parameter Name	Parameter Justification (R# = See footnote for reference number)
	Unsat. zone 1, soil density (g/cm^3)	The density is the ratio of the mass of a material to its volume.	1.5E+00	2.7E+00	DENSUZ(1)	The default value was used. Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when this value is changed.
	Unsat. zone 1, total porosity	Total porosity of a porous medium is the ratio of the pore volume to the total volume of a representative sample. Porosity values are listed in Table E.8 of R1 and Table 3.1 & 3.2 of R3.	4.0E-01	4.5E-01	TPUZ(1)	The default value was used. Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when this value is changed.
	Unsat. zone 1, effective porosity	Effective porosity of a porous medium is the ratio of the part of the pore volume where water can circulate to the total volume of a representative sample. Effective porosity should not be greater than total porosity.	2.0E-01	1.5E-01	EPUZ(1)	The default value was used. Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when this value is changed.
	Unsat. zone 1, field capacity	Field capacity is the volumetric moisture content of soil at which (free) gravity drainage ceases. This is the amount of moisture that will be retained in a column of soil against the force of gravity.	2.0E-01	2.5E-01	FCUZ(1)	Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when this value is changed.
	Unsat. zone 1, soil-specific b parameter	The b parameter is a hydrological parameter used to evaluate the saturation ratio. Values are listed in Table E.2 of R1. NOTE: Input for this parameter will only be required if the water table drop rate is greater than zero.	5.3E+00	1.05E+01	BUZ(1)	Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when this value is changed.
	Unsat. zone 1, hydraulic conductivity (m/yr)	Hydraulic conductivity is the measure of the soil's ability to transmit water when submitted to a hydraulic gradient.	1.0E+01	5.0E+01	HCUZ(1)	Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when this value is changed.
	Unsat. zone 2, thickness (m)	The unsaturated zone #2 is the 2nd layer of the uncontaminated zone that lies below the contaminated zone and above the saturated zone.	0.0E+00	3.5E+00	H(1)	Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when this value is changed.
	Unsat. zone 2, soil density (g/cm^3)	The density is the ratio of the mass of a material to its volume.	1.5E+00	1.75E+00	DENSUZ(1)	Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when this value is changed.
	Unsat. zone 2, total porosity	Total porosity of a porous medium is the ratio of the pore volume to the total volume of a representative sample. Porosity values are listed in Table E.8 of R1 and Table 3.1 & 3.2 of R3.	4.0E-01	3.8E-01	TPUZ(1)	Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when this value is changed.
	Unsat. zone 2, effective porosity	Effective porosity of a porous medium is the ratio of the part of the pore volume where water can circulate to the total volume of a representative sample. Effective porosity should not be greater than total porosity. Porosity values are listed in Table	2.0E-01	3.3E-01	EPUZ(1)	Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when this value is changed.
	Unsat. zone 2, field capacity	Field capacity is the volumetric moisture content of soil at which (free) gravity drainage ceases. This is the amount of moisture that will be retained in a column of soil against the force of gravity. The field capacity is used as the lower bound of th	2.0E-01	1.2E-01	FCUZ(1)	Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when this value is changed.
	Unsat. zone 2, soil-specific b parameter	The b parameter is a hydrological parameter used to evaluate the saturation ratio. Values are listed in Table E.2 of R1. NOTE: Input for this parameter will only be required if the water table drop rate is greater than zero.	5.3E+00	4.50E+00	BUZ(1)	Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when this value is changed.
	Unsat. zone 2, hydraulic conductivity (m/yr)	Hydraulic conductivity is the measure of the soil's ability to transmit water when submitted to a hydraulic gradient.	1.0E+01	5.0E+01	HCUZ(1)	Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when this value is changed.

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RESRAD Menu	Parameter	Definition and/or General Information	Default	Subsistence Farmer Scenario	Parameter Name	Parameter Justification (R# = See footnote for reference number)
Soil Concentrations - Transport	Distribution coefficients for all isotopes					
	Contaminated zone (cm^3/g)	Distribution coefficients are used to develop the leach-rate constants between the surface soil layer, the unsaturated soil layer and the aquifer (R2).	Varies by Isotope	Default	DCNUCC(2)	Default value used.
	Unsaturated zone (cm^3/g)	Distribution coefficients are used to develop the leach-rate constants between the surface soil layer, the unsaturated soil layer and the aquifer (R2).	Varies by Isotope	Default	DCNUCC(2)	Default value used.
	Saturated zone (cm^3/g)	Distribution coefficients are used to develop the leach-rate constants between the surface soil layer, the unsaturated soil layer and the aquifer (R2).	Varies by Isotope	Default	DCNUCU(2,1)	Default value used.
	Leach rate (/yr)		0.0E+00	0.0E+00	ALEACH(2)	Calculated by model
	Solubility constant		0.0E+00	Not Used	SOLUBK(2)	Supplied by model
Occupancy	Inhalation rate (m^3/yr)	Inhalation rate determined for subsistence farmer who works land and has primary residence on site.	8.4E+04	7.5E+04	INHALR	Value determined using guidance provided in U.S. Army Corps of Engineers (USACE) White Paper titled Using RESRAD in a CERCLA Radiological Risk Assessment (October, 2002)
	Mass loading for inhalation (g/m^3)	The mass loading parameter is the concentration of soil particles in the air (Section 35, R3). Table 6.23 lists 1.0 x 10^{-4} as the outdoor air dust loading factor.Increased dust loading because of farming operations.	1.0E-04	3.0E-04	MLINH	Value determined using guidance provided in U.S. Army Corps of Engineers (USACE) White Paper titled Using RESRAD in a CERCLA Radiological Risk Assessment (October, 2002)
	Exposure duration (year)	The exposure duration is the span of time, in years, during which an individual is expected to spend time on the site. The default value in RESRAD is 30 years.	3.0E+01	3.0E+01	ED	USEPA standard default exposure factors for residential scenarios.
	Shielding factor, inhalation	The shielding factor describes the effect of the building structure on the level of gamma radiation and/or contaminated dust existing indoors. Shielding factor is dependent on exposure time.	4.0E-01	4.7E-01	SHF3	A value of 0.47 was determined by using the air dust loading factor for indoors and outdoors obtained from Table 6.23 of R2.
	Shielding factor, external gamma	The shielding factor describes the effect of the building structure on the level of gamma radiation and/or contaminated dust existing indoors. Shielding factor is dependent on exposure time.	7.0E-01	6.69E-01	SHF1	A value of 0.669 was determined from Table 2 of R4.
	Fraction of time spent indoors	The fraction of time spent indoors onsite is the average fraction of time in a year during which an individual stays inside a house or a building on the contaminated site (Section 28, R3).	6.55E-01	5.5E-01	FIND	Value determined using guidance provided in U.S. Army Corps of Engineers (USACE) White Paper titled Using RESRAD in a CERCLA Radiological Risk Assessment (October, 2002)
	Fraction of time spent outdoors (on site)	The fraction of time spent outdoors onsite is the average fraction of time in a year during which an individual stays outdoors on the site (Section 29, R3).	2.5E-01	2.1E-01	FOTD	Value determined using guidance provided in U.S. Army Corps of Engineers (USACE) White Paper titled Using RESRAD in a CERCLA Radiological Risk Assessment (October, 2002)
	Shape factor flag, external gamma	Setting the shape factor to -1 shows that the contaminated zone is not circular. The receptor was placed in the approximate center of a rectangular area.	1.0E+00	-1.0E+00	FS	Setting this parameter to -1 shows that the contaminated zone is not circular. Contaminated zone was modeled as rectangular with receptor in the approximate center.
Ingestion, Dietary	Fruits, vegetables and grain consumption (kg/yr)	Consumption rate of items whether produced offsite or onsite. The Contaminated Fraction Parameter takes into account the percentage of the consumed/ingested portion of the item that is obtained from the contaminated site. Consumption rate of fruits, no	1.6E+02	3.99E+02	DIET(1)	Value determined using guidance provided in U.S. Army Corps of Engineers (USACE) White Paper titled Using RESRAD in a CERCLA Radiological Risk Assessment (October, 2002)

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	Leafy vegetable consumption (kg/yr)	Consumption rate of leafy vegetables is found in Table 6.15 of R2. R3 Section 44 gives default values but was eliminated because R2 is more recent.	1.4E+01	1.80E+01	DIET(2)	Value determined using guidance provided in U.S. Army Corps of Engineers (USACE) White Paper titled Using RESRAD in a CERCLA Radiological Risk Assessment (October, 2002)
	Milk consumption (L/yr)	Consumption rate of milk is found in Table 6.15 of R2. R3 Section 47 gives default values but was eliminated because R2 is more recent.	9.2E+01	1.35E+02	DIET(3)	Value determined using guidance provided in U.S. Army Corps of Engineers (USACE) White Paper titled Using RESRAD in a CERCLA Radiological Risk Assessment (October, 2002)
	Meat and poultry consumption (kg/yr)	Consumption rates of meat and poultry (beef, 59 kg/yr, & poultry, 9 kg/yr) are found in Table 6.15 of R2. R3 Section 46 gives values that are similar to R2.	6.3E+01	1.1E+02	DIET(4)	Value determined using guidance provided in U.S. Army Corps of Engineers (USACE) White Paper titled Using RESRAD in a CERCLA Radiological Risk Assessment (October, 2002)
	Fish consumption (kg/yr)	Consumption rate of fish is found on page 6.28 of R2. R3 Section 41 gives default values but was eliminated because R2 is more recent.	5.4E+00	4.38E+01	DIET(5)	Value determined using guidance provided in U.S. Army Corps of Engineers (USACE) White Paper titled Using RESRAD in a CERCLA Radiological Risk Assessment (October, 2002)
	Other seafood consumption (kg/yr)	Consumption rate of other seafood (lobsters, oysters, scallops, shrimp and other non-fish) is assumed to be default value.	9.0E-01	9.0E-01	DIET(6)	Value determined using guidance provided in U.S. Army Corps of Engineers (USACE) White Paper titled Using RESRAD in a CERCLA Radiological Risk Assessment (October, 2002)
	Soil ingestion rate (g/yr)	The soil ingestion rate is the accidental ingestion rate of soil material or soil dust. This value is always applicable to the residential scenario. R2 Page 6.15, uses a value of 50 mg/d (18.3 g/yr) as the value for the residential scenario. Also found	3.7E+01	4.38E+01	SOIL	Value determined using guidance provided in U.S. Army Corps of Engineers (USACE) White Paper titled Using RESRAD in a CERCLA Radiological Risk Assessment (October, 2002)
	Drinking water intake (L/yr)	Average amount of water consumed by an adult. R1 states that drinking water intake is 510 L/yr. R2, Section 6.5.8 states that the intake is 2 L/d. R2 is more current.	5.1E+02	7.32E+02	DWI	Value determined using guidance provided in U.S. Army Corps of Engineers (USACE) White Paper titled Using RESRAD in a CERCLA Radiological Risk Assessment (October, 2002)
	Contamination fraction of drinking water	Fraction of substance used that originates from the contaminated site. Only used when applicable pathway is on. For example, for a scenario that does obtain drinking water from onsite, this value is zero. Off-site water is assumed to be uncontaminated	1.0E+00	1.0E+00	FDW	Assumption was made that the primary water source was an on site ground water well.
	Contamination fraction of household water	Fraction of substance used that originates from the contaminated site.	1.0E+00	1.0E+00	FHHW	Default, 100%, This is the most conservative value.
	Contamination fraction of livestock water	Fraction of substance used that originates from the contaminated site.	1.0E+00	1.0E+00	FLW	Default, 100%, This is the most conservative value.
	Contamination fraction of irrigation water	Fraction of substance used that originates from the contaminated site.	1.0E+00	1.0E+00	FIRW	Default, 100%, This is the most conservative value.
	Contamination fraction of aquatic food	Fraction of substance used that originates from the contaminated site. Only in effect when the aquatic pathway is turned on. It is assumed in R3, Section 41 that if there is a surface water body located nearby, it will provide 50% of the consumed aquatic food.	5.0E-01	5.0E-01	FR9	Default, 50%,.
	Contamination fraction of plant food	Fraction of substance used that originates from the contaminated site. Only in effect when plant ingestion pathway is turned on.	-1.0E+00	-1.0E+00	FPLANT	Default value used.
	Contamination fraction of meat	Fraction of substance used that originates from the contaminated site. Only in effect when meat ingestion pathway is turned on.	-1.0E+00	-1.0E+00	FMEAT	Default value used.
	Contamination fraction of milk	Fraction of substance used that originates from the contaminated site. Only in effect when milk ingestion pathway is turned on.	-1.0E+00	-1.0E+00	FMILK	Default value used.
Ingestion, Non-Dietary	Livestock fodder intake for meat (kg/day)	Rate at which beef animals intake fodder (forage, hay and grain). Default values used.	6.8E+01	6.8E+01	LFI5	R2 Table 6.8, Fodder intake (fresh forage + stored hay + stored grain) for beef animals. 27 + 14 + 3 = 44 kg/d.

Table I1
RESRAD Input Parameters - Assuming Subsistence Farmer Receptor

RESRAD Menu	Parameter	Definition and/or General Information	Default	Subsistence Farmer Scenario	Parameter Name	Parameter Justification (R# = See footnote for reference number)
	Livestock fodder intake for milk (kg/day)	Rate at which milk cows intake fodder (forage, hay, and grain). Default values used.	5.5E+01	5.5E+01	LFI6	R2 Table 6.8, Fodder intake (fresh forage + stored hay + stored grain) for milk cows. 36 + 29 + 2 = 67 kg/d.
	Livestock water intake for meat (L/day)	Rate at which beef animals intake water. Default values used.	5.0E+01	5.0E+01	LWI5	R2 Table 6.8 Water intake rate for beef animals. 50 kg/d.
	Livestock water intake for milk (L/day)	Rate at which milk cows intake water.	1.6E+02	1.6E+02	LWI6	R2 Table 6.8, Water intake rate for milk cows. 60 kg/d.
	Livestock soil intake (kg/day)	Rate at which beef animals and milk cows intake soil.	5.0E-01	5.0E-01	LSI	R2 Section 6.5.1, page 6.20 uses 0.05 for beef and milk cows. This value is also the RESRAD program default.
	Mass loading for foliar deposition (g/m^3)	Table 6.23 of R2 lists the outdoor air dust loading factor.	1.0E-04	1.0E-04	MLFD	A value of 1.0E-04 was obtained from Table 6.23 of R2, outdoor air dust loading factor. This value is also the RESRAD program default.
	Depth of soil mixing layer (m)	Table 6.23 of R2 lists the value of 0.15 for the thickness of surface soil layer.	1.5E-01	1.5E-01	DM	A value of 0.15 was obtained from Table 6.23 of R2, thickness of surface-soil layer. This value is also the RESRAD program default.
	Depth of roots (m)	This parameter is the average root depth of various plants grown in the contaminated zone. The root depth varies for different plants. R3, Section 37 states that most of the plant roots from which nutrients are obtained usually extend to less than 1m bel	9.0E-01	9.0E-01	DROOT	R3, Section 37 states that most of the plant roots from which nutrients are obtained usually extend to less than 1m below the surface. Therefore the RESRAD default value of 0.9 m was used.
	Drinking water fraction from ground water	Of the drinking water obtained from onsite sources (ground water or surface water), this parameter is the percentage of that water that originates from groundwater. Selecting 1 means 100% of drinking water is obtained from site ground water.	1.0E+00	1.0E+00	FGWDW	Drinking water (onsite) is assumed to originate as groundwater, therefore, this parameter is set to 1.0 in the residential scenario. Even in cases where the drinking water pathway is turned off, this value is still 1.0. This value is the maximum allowe
	Household water fraction from ground water	Of the household water obtained from onsite sources (ground water or surface water), this parameter is the percentage of that water that originates from groundwater. Selecting 1 means 100% of household water is obtained from site ground water.	1.0E+00	1.0E+00	FGWHH	Household water (onsite) is assumed to originate as groundwater, therefore, this parameter is set to 1.0 in the residential scenarios. This value is the maximum allowed for this parameter. Therefore, it is the most conservative assumption.
	Livestock water fraction from ground water	Of the livestock water obtained from on site sources (ground water or surface water), this parameter is the percentage of that water that originates from groundwater. Selecting 1 means 100% of livestock water is obtained from site ground water.	1.0E+00	1.0E+00	FGWLW	Livestock water (onsite) is assumed to originate as groundwater, therefore, this parameter is set to 1.0 in the residential scenarios. This value is the maximum allowed for this parameter. Therefore, it is the most conservative assumption .
	Irrigation fraction from ground water	Percentage of irrigation water obtained from on site ground water rather than on site surface water	1.0E+00	1.0E+00	FGWIR	Irrigation water (onsite) is assumed to originate as groundwater, therefore, this parameter is set to 1.0 in the residential scenarios. This value is the maximum allowed for this parameter. Therefore, it is the most conservative assumption.
Ingestion, Non-Dietary - Pla	Wet weight crop yield for Non-Leafy (kg/m^2)	Information presented in R2 Section 6.5.7, page 6.23. Parameters in Menu R019B are new to RESRAD in Version 5.82.	7.0E-01	7.0E-01	YV(1)	The default value was used . Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
	Wet weight crop yield for Leafy (kg/m^2)	Information presented in R2 Section 6.5.7, page 6.23.	1.5E+00	1.5E+00	YV(2)	The default value was used . Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
	Wet weight crop yield for Fodder (kg/m^2)	Information presented in R2 Section 6.5.7, page 6.23.	1.1E+00	1.1E+00	YV(3)	The default value was used . Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
	Growing Season for Non-Leafy (years)	Information presented in R2 Section 6.5.6, page 6.21 and Table 6.12.	1.7E-01	1.7E-01	TE(1)	The default value was used . Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
	Growing Season for Leafy (years)	Information presented in R2 Section 6.5.6, page 6.21 and Table 6.12.	2.5E-01	2.5E-01	TE(2)	The default value was used . Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.

Table I1
RESRAD Input Parameters - Assuming Subsistence Farmer Receptor

RESRAD Menu	Parameter	Definition and/or General Information	Default	Subsistence Farmer Scenario	Parameter Name	Parameter Justification (R# = See footnote for reference number)
	Growing Season for Fodder (years)	Information presented in R2 Section 6.5.6, page 6.21 and Table 6.12.	8.0E-02	8.0E-02	TE(3)	The default value was used . Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
	Translocation Factor for Non-Leafy	The translocation fraction is the fraction of activity deposited on plant surfaces that reaches the edible parts of the non-leafy plant.	1.0E-01	1.0E-01	TIV(1)	The default value was used . Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
	Translocation Factor for Leafy	The translocation fraction is the fraction of activity deposited on plant surfaces that reaches the edible parts of the leafy plant.	1.0E+00	1.0E+00	TIV(2)	The default value was used . Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
	Translocation Factor for Fodder	The translocation fraction is the fraction of activity deposited on plant surfaces that reaches the edible parts of the (grains) plant.	1.0E+00	1.0E+00	TIV(3)	The default value was used . Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
	Dry Foliar Interception Fraction for Non-Leafy	The interception fraction as defined on Page 6.27, of R2, is the fraction of deposited activity that is retained on plant surfaces. A value of 0.25 is used for all plant types. R2 does not discuss a difference between wet and dry fractions.	2.5E-01	2.5E-01	RDRY(1)	The default value was used . Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
	Dry Foliar Interception Fraction for Leafy	The interception fraction as defined on Page 6.27, of R2, is the fraction of deposited activity that is retained on plant surfaces. A value of 0.25 is used for all plant types. R2 does not discuss a difference between wet and dry fractions.	2.5E-01	2.5E-01	RDRY(2)	The default value was used . Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
	Dry Foliar Interception Fraction for Fodder	The interception fraction as defined on Page 6.27, of R2, is the fraction of deposited activity that is retained on plant surfaces. A value of 0.25 is used for all plant types. R2 does not discuss a difference between wet and dry fractions.	2.5E-01	2.5E-01	RDRY(3)	The default value was used . Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
	Wet Foliar Interception Fraction for Non-Leafy	The interception fraction as defined on Page 6.27, of R2, is the fraction of deposited activity that is retained on plant surfaces. A value of 0.25 is used for all plant types. R2 does not discuss a difference between wet and dry fractions.	2.5E-01	2.5E-01	RWET(1)	The default value was used . Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
	Wet Foliar Interception Fraction for Leafy	The interception fraction as defined on Page 6.27, of R2, is the fraction of deposited activity that is retained on plant surfaces. A value of 0.25 is used for all plant types. R2 does not discuss a difference between wet and dry fractions.	2.5E-01	2.5E-01	RWET(2)	The default value was used . Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
	Wet Foliar Interception Fraction for Fodder	The interception fraction as defined on Page 6.27, of R2, is the fraction of deposited activity that is retained on plant surfaces. A value of 0.25 is used for all plant types. R2 does not discuss a difference between wet and dry fractions.	2.5E-01	2.5E-01	RWET(3)	The default value was used . Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
	Weathering Removal Constant for Vegetation	No information on this parameters was found.	2.0E+01	2.0E+01	WLAM	The default value was used . Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
C-14	C-12 concentration in water (g/cm^3)	This set of parameters is only in effect if Carbon 14 is selected as a contaminant.	2.0E-05	not used	C12WTR	Not applicable
	C-12 concentration in contaminated soil (g/g)	"	3.0E-03	not used	C12CZ	Not applicable
	Fraction of vegetation carbon from soil	"	2.0E-02	not used	CSOIL	Not applicable
	Fraction of vegetation carbon from air	"	9.8E-01	not used	CAIR	Not applicable
	C-14 evasion layer thickness in soil (m)	"	3.0E-01	not used	DMC	Not applicable

Table I1
RESRAD Input Parameters - Assuming Subsistence Farmer Receptor

RESRAD Menu	Parameter	Definition and/or General Information	Default	Subsistence Farmer Scenario	Parameter Name	Parameter Justification (R# = See footnote for reference number)
	C-14 evasion flux rate from soil (1/sec)	"	7.0E-07	not used	EVSN	Not applicable
	C-12 evasion flux rate from soil (1/sec)	"	1.0E-10	not used	REVSN	Not applicable
	Fraction of grain in beef cattle feed	"	8.0E-01	not used	AVFG4	Not applicable
	Fraction of grain in milk cow feed	"	1.0E-01	not used	AVFG5	Not applicable
	DCF Corrections factor for gaseous forms of C14	"	8.9E+01	not used		
Storage Times	Storage times of contaminated foodstuffs (days):	These parameters are affected by the consumption rates listed above. For example, if a consumption rate is set to zero the corresponding storage time is irrelevant.				These parameters are affected by the consumption rates listed above. For example, if a consumption rate is set to zero the corresponding storage time is irrelevant.
	Fruits, non-leafy vegetables, and grain	The storage time for fruits, non-leafy vegetables and grains is the time between harvest and consumption.	1.4E+01	1.4E+01	STOR_T(1)	Default value used.
	Leafy vegetables	The storage time for leafy vegetables is the time between harvest and consumption.	1.0E+00	1.0E+00	STOR_T(2)	Default value used.
	Milk	The storage time for milk is the time between acquisition and consumption.	1.0E+00	1.0E+00	STOR_T(3)	Default value used.
	Meat and poultry	The storage time for meat and poultry is the time between slaughter and consumption.	2.0E+01	2.0E+01	STOR_T(4)	Default value used.
	Fish	The storage time for fish is the time between catch and consumption.	7.0E+00	7.0E+00	STOR_T(5)	Default value used.
	Crustacea and mollusks	The storage time for crustacea and mollusks is the time between catch and consumption.	7.0E+00	7.0E+00	STOR_T(6)	Default value used.
	Well water	The storage time for well water is the time between acquisition and consumption.	1.0E+00	1.0E+00	STOR_T(7)	Default value used.
	Surface water	The storage time for surface water is the time between acquisition and consumption.	1.0E+00	1.0E+00	STOR_T(8)	Default value used.
	Livestock fodder	The storage time for livestock is the time between acquisition and consumption.	4.5E+01	4.5E+01	STOR_T(9)	Default value used.
		This set of parameters is used when the radon pathway is turned on.				
Radon	Thickness of building foundation (m)	The thickness of the building foundation is the average thickness of the building shell structure in the subsurface of the soil.	1.5E-01	1.5E-01	FLOOR	A typical foundation thickness is a minimum of 6 inches. Therefore, the default value of 0.15 meters (6 inches) was used.
	Bulk density of building foundation (g/cm^3)	The density of the foundation material.	2.4E+00	2.4E+00	DENSFL	Foundations are typically made of concrete. The default value was used.
	Total porosity of the cover material	Total porosity of a porous medium is the ratio of the pore volume to the total volume of a representative sample. Porosity values are listed in Table E.7 of R1 and Table 3.1 & 3.2 of R3.	4.0E-01	Not used	TPCV	Not used - no cover assumed.
	Total porosity of the building foundation	Total porosity of a porous medium is the ratio of the pore volume to the total volume of a representative sample. Porosity values are listed in Table E.7 of R1 and Table 3.1 & 3.2 of R3.	1.0E-01	1.0E-01	TPFL	The default value was used since it represents concrete which is typically used for foundations. Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
	Volumetric water content of the cover material	The volumetric water content in a porous medium is the ratio of the total volume of water present in the pore space to the total volume of the medium. (Page 74, R1 & Section 6, R3)	5.0E-02	Not used	PH2OCV	Not used - no cover assumed.
	Volumetric water content of the foundation	The volumetric water content in a porous medium is the ratio of the total volume of water present in the pore space to the total volume of the medium. (Page 74, R1 & Section 6, R3)	3.0E-02	3.0E-02	PH2OFL	The default value was used because it represents concrete, which is typically used for foundations. Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.

Table I1
RESRAD Input Parameters - Assuming Subsistence Farmer Receptor

RESRAD Menu	Parameter	Definition and/or General Information	Default	Subsistence Farmer Scenario	Parameter Name	Parameter Justification (R# = See footnote for reference number)
	Diffusion coefficient for radon gas (m/sec):	The effective radon diffusion coefficient as the ratio of the radon flux across the pore area to the gradient of the radon concentration in the pore spaces (Page 75 R1).				
	in cover material	The value is set to -1 so that the program will generate the value on the basis of the porosity and water content of the medium.	2.0E-06	Not used	DIFCV	Not used - no cover assumed.
	in foundation material	The value is set to -1 so that the program will generate the value on the basis of the porosity and water content of the medium.	3.0E-07	-1.0E+00	DIFFL	The default value was used. Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
	in contaminated zone soil	The value is set to -1 so that the program will generate the value on the basis of the porosity and water content of the medium.	2.0E-06	-1.0E+00	DIFCZ	The default value was used. Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
	Radon vertical dimension of mixing (m)	The radon vertical dimension of mixing parameter is the assumed height to which the radon emission from the ground surface is uniformly mixed in the outdoor air (Page 75, R1& Section 20, R3).	2.0E+00	2.0E+00	HMIX	The default value was used. R3 states that the default value is conservative considering the typical height of humans. Performing a sensitivity analysis on this parameter showed that there is little effect on the dose when the value is changed.
	Average building air exchange rate (1/hr)	The average building air exchange rate is the number of total volumes of air contained in the building that is being exchanged with outside air per unit of time.	5.0E-01	3.5E-01	REXG	From ASHRAE standards for typically house air exchange rate.
	Height of the building (room) (m)	The height of the building (room) parameter is the average height of the living area of the building. (Page 75, R1 & Section 23, R3)	2.5E+00	2.5E+00	HRM	The default value was used. Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
	Building interior area factor	The building interior area factor is the fraction of the floor area built on the contaminated area (Page 75, R1 & Section 24, R3). Setting the value to.0 indicates that only a portion of the flooring was built on the contaminated zone.	0.0E+00	0.0E+00	FAI	Computed by model
	Building depth below ground surface (m)	The foundation depth below ground surface is the vertical distance in the soil from the very bottom of the basement floor slab to the ground surface.	-1.0E+00	1.8E+00	DMFL	Assumed basement beneath the house.
	Emanating power of Rn-222 gas	The radon emanation coefficient is the fraction of the total amount of radon produced by radium decay that escapes from the soil particles and gets into the pores of the medium.	2.5E-01	2.5E-01	EMANA(1)	The default value was used. Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.
	Emanating power of Rn-220 gas	The radon emanation coefficient is the fraction of the total amount of radon produced by radium decay that escapes from the soil particles and gets into the pores of the medium.	1.5E-01	2.5E-01	EMANA(2)	The default value was used. Performing a sensitivity analysis on this parameter showed that there is no effect on the dose when the value is changed.

R1 = User's Manual for RESRAD Version 6.0, July 2001
R2 = Residual Radioactive Contamination From Decommissioning, NUREG/CR-5512-Volume I, June 1994
R3 = Data Collection Handbook to Support Modeling Impacts of Radioactive Material In Soil, Argonne National Laboratory, April 1993
R4 = Preliminary Guidelines for Evaluating Dose Assessments in Support of Decommissioning, Handout, Nuclear Regulatory Commission Workshop, March 18 and 19, 1999.
R5 = Residual Radioactive Contamination From Decommissioning, NUREG/CR-5512-Volume 3, October 1999